+RIBRAFT® X-POD®

INSTALLERS GUIDE

July 2025

RIBRAFT® X-POD®

1 SCOPE

This installation guide has been developed for the exclusive use of Firth customers who are experienced in the construction of residential concrete foundation systems. The Building Act requires that only suitably qualified persons, who are Licensed Building Practitioners, (LBP) or working under the supervision of a LBP, can construct foundations systems. Experience in the placing finishing and early age care of concrete in accordance with NZS3109 is mandatory.

The RibRaft® X-Pod® foundation is a specifically designed systems and as such all details shall be provided in the project drawings. These drawing will have been reviewed as part of the building consent process. Any errors or omissions should be brought to the designers attention for instruction.

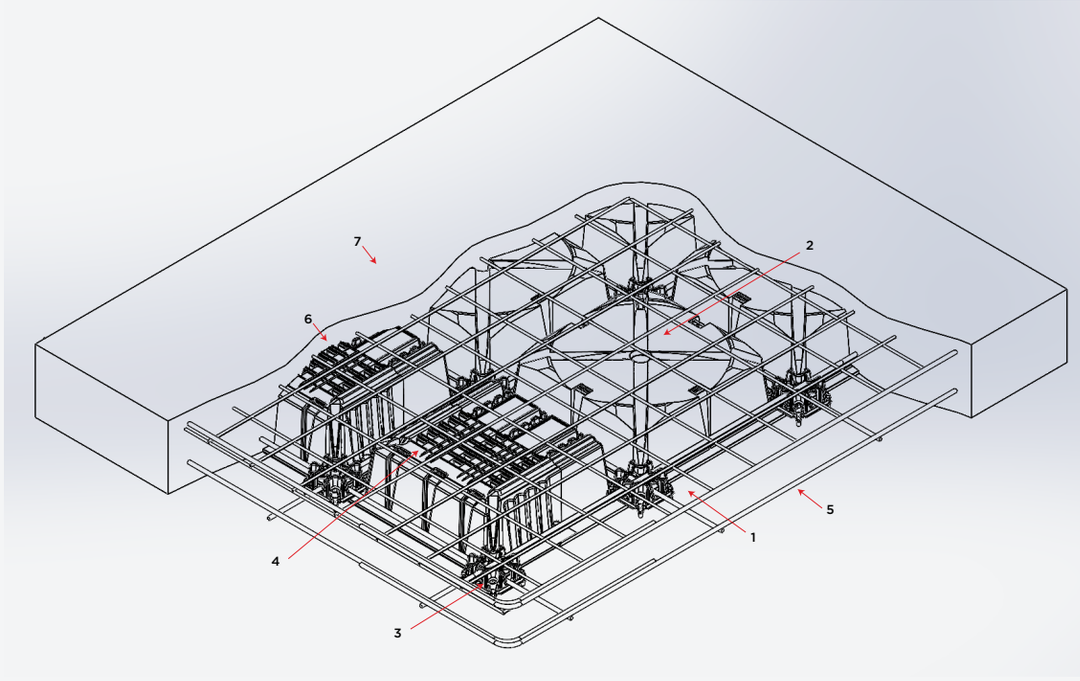
Contact your local Firth Representative for supply of Firth RibRaft® X-Pod®s. Pods shall be released to site upon confirmation of the placement of an order for the appropriate Firth concrete mix code (see section 2.1).

2 DESCRIPTION OF THE SYSTEM

The Firth RibRaft® X-Pod® flooring system comprises of:

- Firth concrete mix IP2019X or IP2519X, refer section 2.1
- A matrix of RibRaft® X-Pod® formers to create typically a total floor thickness of 300mm with ribs at 750 or 1500mm centres and a 85mm minimum topping above the RibRaft® X-Pod®s. Note refer to the project drawings as designers have differing preferences for topping thickness, refer section 2.2
- Firth RibRaft® Keystones which lock the X-Pod®s into place
- Mesh in the topping, refer section 2.3
- Reinforcement typically in the form of DH10s or larger diameter in the ribs, perimeter, and load bearing beams, section 2.4
- DPM providing a vapour barrier between ground and flooring system, section 2.5
- Dependent upon soil conditions the flooring system may sit on a compacted gravel raft, section 2.6
- The system is compatible with Firth HotEdge® should slab edge insulation be specified, section 2.7

FIGURE 1 - THE RIBRAFT® X-POD® SYSTEM



1	DPM
2	RibRaft X-Pod (215/750 or 215/1500)
3	RibRaft Keystone 8/16
4	RibRaft Mini Pod 215/300 and MP Extender 215/400.600
5	RibRaft Rebate X-Pod (145/750) R-XP145SR
6	Steel reinforcing (bars)
7	Steel reinforcing (mesh)
8	Firth Concrete (mix code IP2019X or IP2519X)

2.1 CONCRETE

RibRaft X-Pod Foundation systems require a specific Firth designed concrete mix. Choose one of the following:

1 **X-Pod Mix IP2019X** – a 20MPa 100mm slump mix available as a pump mix suitable for 100mm pump lines available in either a 13mm or more usually a 19mm nominal aggregate size, or as a structural (non-pump) mix

2 **X-Pod Mix IP2519X** – a 25MPa 120mm slump mix available as a pump mix suitable for 100mm pump lines available in either a 13mm or more usually a 19mm nominal aggregate size, or as a structural (non-pump) mix. This mix shall be specified for buildings constructed in the 'sea spray zone' (i.e. within 500m of the sea including harbours, within 100m of tidal estuaries or inlets, on offshore islands and elsewhere as defined as exposure zone D in 4.2.3.3 of NZS3604).

The X-Pod system is available across most of NZ, where there is a Firth Concrete plant available to supply the X-Pod special mix concrete. However in some parts of the county, X-Pod isn't available including Kaitaia, Wairarapa, Kaikoura, Motueka and Golden Bay, where there is no Firth Plant or a Firth Plant is too far away to make the supply of X-Pod concrete feasible.

In these cases, please talk to your local Firth rep for more information and to discuss a suitable alternative foundation design.

2.2 PODS

The Firth RibRaft X-Pod flooring system comprises of 4 pod options which are linked using the X-Pod Keystone clip to create an efficient and strong flooring system. The pod options are:

- **RibRaft X-Pod 215/750.** These units, when laid out and linked with the X-Pod Keystone create a grid with 100mm ribs at 750 centres. The height of the pods are 215mm which when combined with 85mm of concrete topping give a total floor thickness of 300mm. ***See Figure 2.***

- **RibRaft X-Pod 215/1500.** These units, when laid linked with the X-Pod Keystone create a grid with 100mm ribs at 1500 centres. The units are designed to form a cross shaped concrete column in the centre of the 1500mm rib grid. The height of the pods are 215mm which when combined with 85mm of concrete topping give a total floor thickness of 300mm. ***See Figure 3.***

- **Ribraft Mini Pod (215/300 and Mini Pod Extender 215/400.600).** These units can be used when the required spacing between beams and ribs is less than 750mm. The Mini Pod forms a 300mm void. When combined with the MP EXT 215/400.600 unit, voids of between 400 to 600mm can be filled. Figure 4 illustrates the units.

- **RibRaft X-Pod Rebate Pod 145/750.** Use when a shower rebate, recessed area or topping slab thickening is required.

FIGURE 2 - TYPICAL RIBS LAYOUT OBTAINED WITH RIBRAFT® X-POD®S 215/750

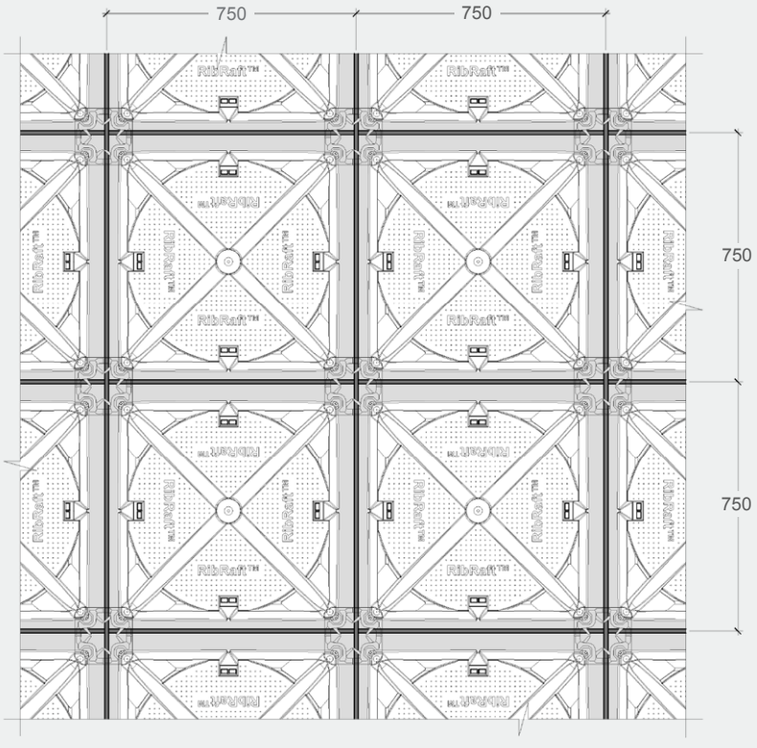


Illustration: © Cresco.co.nz

FIGURE 3 - TYPICAL RIBS LAYOUT OBTAINED WITH RIBRAFT® X-POD®S 215/1500

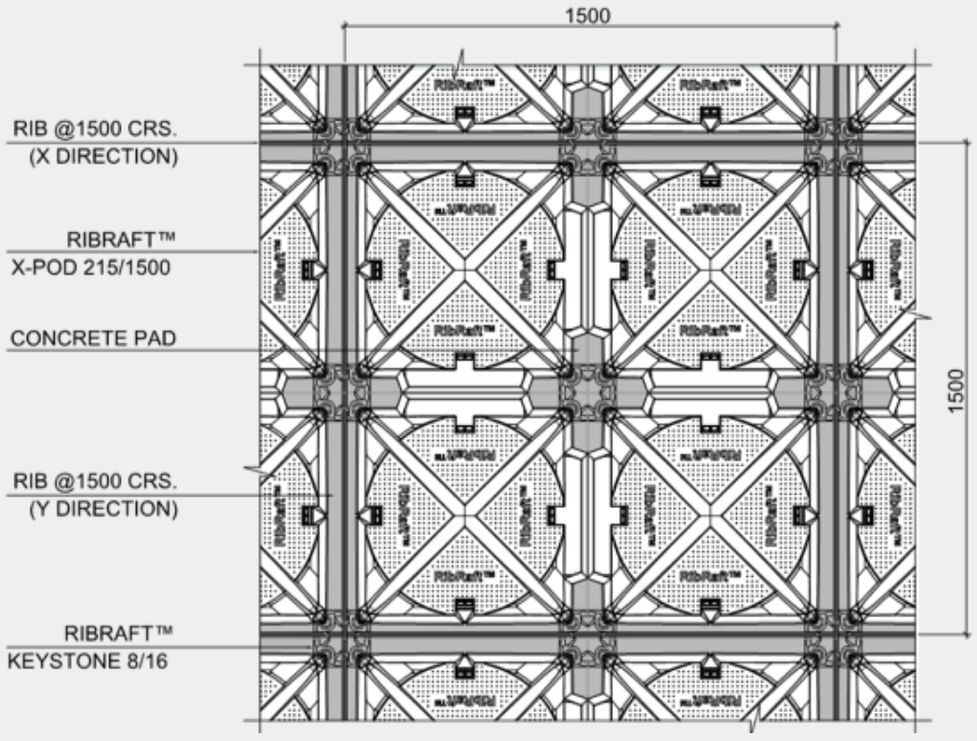
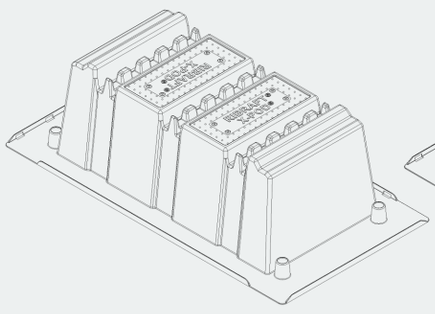
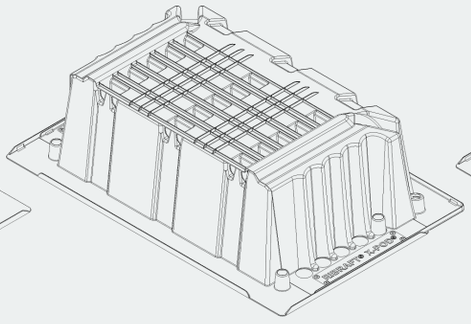


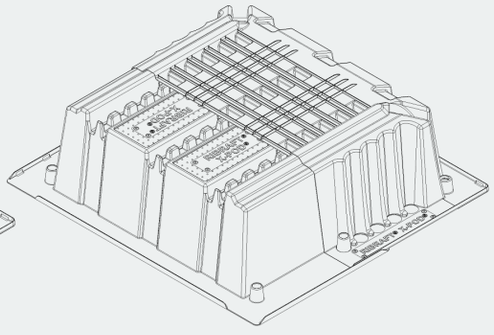
Illustration: © Ribraftdesign.co.nz

FIGURE 4 - RIBRAFT® X-POD® TWO PART ADJUSTMENT PODS



RibRaft® Xpod Mini Pod 215/300



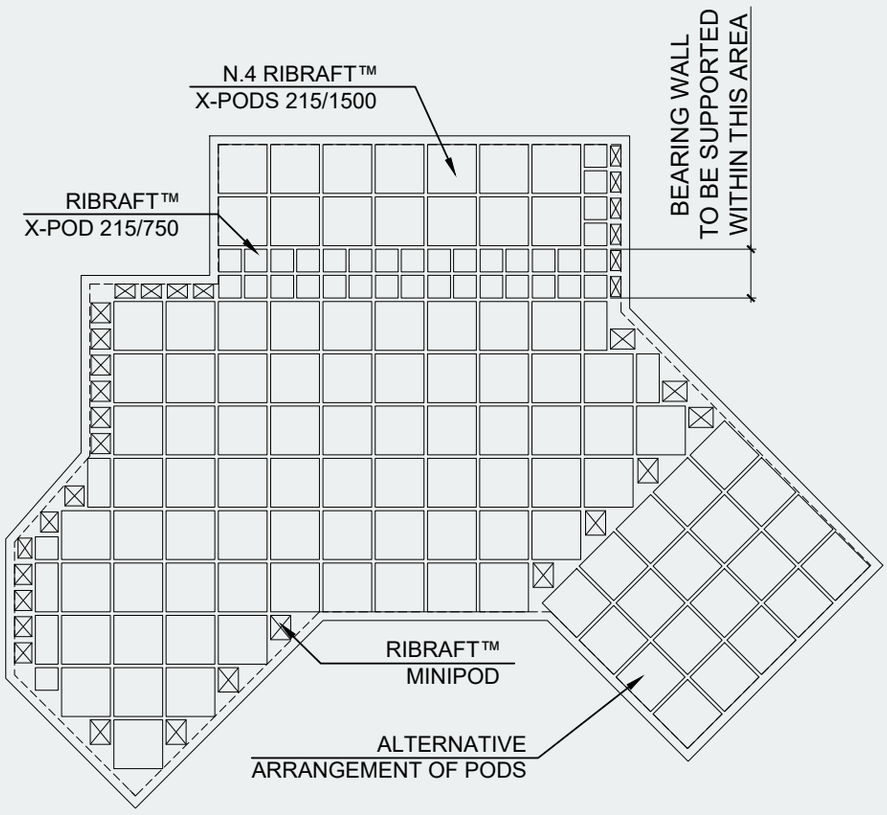


RibRaft® Xpod Mini Pod 215/300 and MP Extender 215/400.600

Firth RibRaft® X-Pod®s are placed directly on levelled ground and are arranged in such a way as to form a reinforced concrete floor slab with a grid of reinforced concrete ribs and edge beams when concrete is placed onto them. The RibRaft® ADJ Series X-Pod®s may be used to suit specific architecture layout and also to accommodate services.

Figure 5 shows how the various X-Pod® components might be utilised on a complex floor arrangement where liquefaction or expansive soils are not a consideration.

FIGURE 5 - EXAMPLE OF HOW THE VARIOUS X-POD® COMPONENTS CAN BE UTILISED ON A COMPLEX SHAPED FLOOR



2.3 MESH

Mesh shall be Grade 500 and comply with AS/NZS 4671:2001. Typically the mesh will be 665 mesh (Class L) or SE62 ductile mesh (Class E). The Design Engineer shall specify the required mesh.

Class L mesh can be used when the sole purpose is limitation of crack widths and the ground conditions are defined as good in terms of NZS3604. The Class E reinforcing bars in the ribs and beams provides adequate ductility of the system which allow the use of Class L mesh. Class E shall be used when the mesh preforms a structural function such as a slab on ground prone to liquefaction or expansive soils.

Mesh shall be lapped in accordance with NZS3101.

Two options are available for supporting the mesh which shall be defined on the drawings:

1 The mesh can be supported on mesh chairs to achieve cover to the top surface of 35mm. This methodology minimises the cover and therefore enhances the crack width limiting ability of the mesh.

2 The mesh can alternatively be laid on upstands provided in the corners of the pods. The 15mm upstands on the pods mean that cover from the concrete surface to the mesh (SE62) is 58mm and slightly less at mesh overlaps.

2.4 STEEL

The reinforcing bars in the ribs and edge beams shall conform to AS/NZS 4671:2001 Grade 500, Class E “Steel Reinforcing Materials”. The volume of reinforcement shall be documented on the approved building consented drawings.

The Firth RibRaft® X-Pod® Keystones hold the reinforcement in positon without the need for tying. The X-Pod® Keystone can accommodate up to two DH16 bars at a lap positon.

2.5 DPM

The damp proof membrane (DPM) material shall be polyethylene sheet in accordance with NZS 3604:2011. The DPM shall be laid over the entire building platform directly on top of a sand blinding layer, extending to the outside of the edge beam. The joints shall be lapped not less than 50mm and sealed with pressure sensitive tape not less than 50mm wide. All penetrations of the DPM by plumbing and services or punctures during construction shall also be sealed with pressure sensitive tape. The DPM may extend beyond the edge of the slab i.e. underneath the formwork, or may be folded and stapled up the inside of the formwork. The minimum requirement is that the DPM extends to the outside of the edge beam. It is very important that the DPM is not bunched up at the formwork.

Where enhanced thermal performance is required, ThermoX DPM can be used as the DPM.

2.6 OPTIONAL GRAVEL RAFT

Often a gravel raft is not required below the DPM where ground bearing conditions permit, although a sand blinding layer may be required to provide puncture resistance to the DPM. Where ground conditions are soft, a compacted gravel raft can be provided to reduce the bearing pressures in the natural ground to acceptable levels. Details of any gravel raft shall be provided on the project drawings.

2.7 FIRTH HOTEDGE®

Where additional thermal efficiency is required, Firth HotEdge® can be incorporated into the design. Refer Firth web page for more information.

3 INSTALLATION OF THE SYSTEM

The following provides an overview of the installation of the Firth RibRaft® X-Pod® system. Where conflict exists between the information provided in this document and the approved building consent drawing set, the drawings shall take precedence.

However, it is mandatory that the concrete used is supplied by Firth Industries to allow management of quality control.

3.1 SITE/EARTH WORKS

The building footprint shall be excavated to a suitable depth to ensure all organic material is removed (top soil, roots etc). Excavation shall extend beyond the footprint a distance shown on the drawings which is typically twice the depth of compacted hardfill beneath the concrete slab. Precautions shall be taken to prevent silt laden runoff from leaving the site should rain occur.

3.2 PLUMBING

Various Territorial Authorities have their own preferences for plumbing details so always check with the local council.

Two options exist for running plumbing:

- The pipes are installed in the ground below the slab and then rise up through the slab at the desired location within the building, referred to as “below slab installation”. This is the preferred option in most situations.
- The pipes run within the plane of the X-Pod® flooring system, referred to as “in floor installation”.

3.2.1 BELOW SLAB PLUMBING INSTALLATION METHODOLOGY

This option is applicable for most situations but should not be used on liquefaction sites for which lateral spread is expected. In most situations this is the norm and most cost effective solution.

For this option, pipes shall be conveyed underground to their plan location then brought up through the X-Pod® and the concrete floor slab. The trenching, placing and bedding of the pipes/ducts and the backfilling shall conform to the requirements of the consent documentation. Services shall not be placed within any concrete except to cross that section of concrete i.e. services shall not run along ribs or edge beams. In accordance with AS/NZS3500.4:2015 pipes penetrating through concrete shall be:

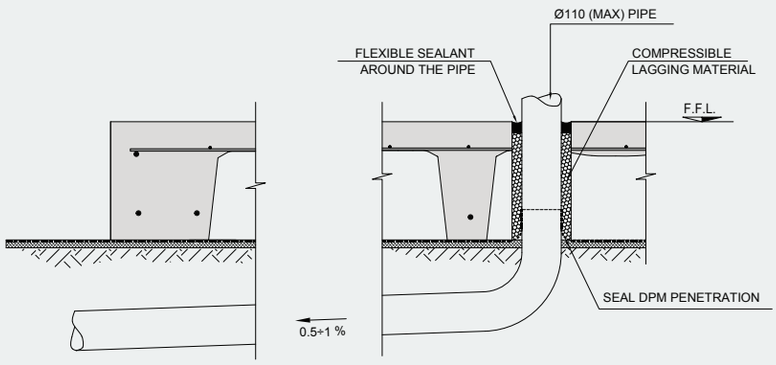
- Installed at right angles to the slab surface
- Lagged with an impermeable material for the full depth of the concrete penetration
- Lagging must be at least 6mm thick

Any services horizontally crossing ribs or the edge beams shall be placed only within the middle third of the member. At no stage shall any of the reinforcement bars be relocated or cut to allow for the services (it is acceptable, however to cut the mesh). In some instances this will dictate the location of the pods.

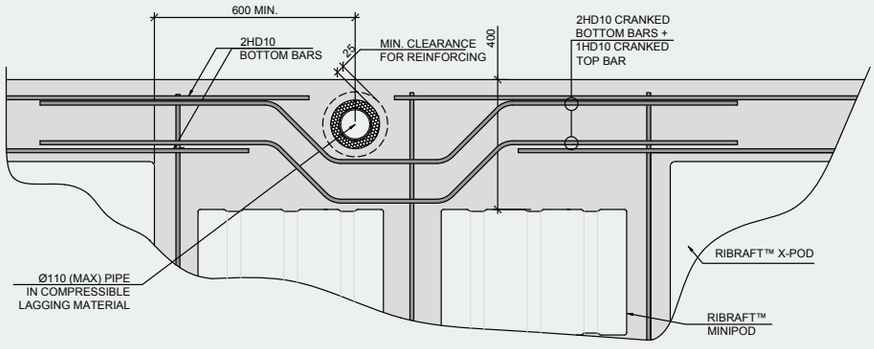
The Xpod® Mini Pods spacers can be used to trim around plumbing penetrations if required.

TYPICAL DETAILS ARE SHOWN BELOW

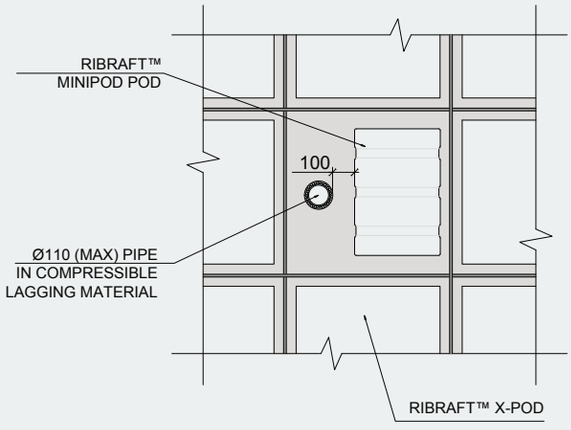
Below slab installation showing lagging of pipes



Details where large diameter pipe required through perimeter beam



Use of Xpod® Mini Pods to create zone for pipes to penetrate slab.



3.3 IN FLOOR PLUMBING INSTALLATION METHODOLOGY

This is the preferred methodology for sites where lateral spread associated with liquefaction is expected as it provides enhanced protection for the pipes compared to the below slab methodology. However, it can be used for all ground conditions.

Pipes services can be run within the plane of the RibRaft® X-Pod®s either exiting out of the side of the perimeter ring beam or going underground near the edge beam. Pipes shall be laid at a fall to comply with NZBC G13/AS1. For pipe up to 65mm diameter the minimum gradient is typically 1 in 40, while for 100mm pipes its 1 in 60, however greater falls may be required dependent upon the required number of discharge units. Table 1 provides distances from the edge of the slab to pipe surface penetration to achieve minimum pipe gradients. Where gradients cannot be achieved, then services will be required to be run under the slab.

Pipes shall either be:

1 Located to pass perpendicular to the ribs and beams and shall not be laid along the length of ribs or beams. X-Pod®s can be cut and sealed as required to achieve the required fall and position.

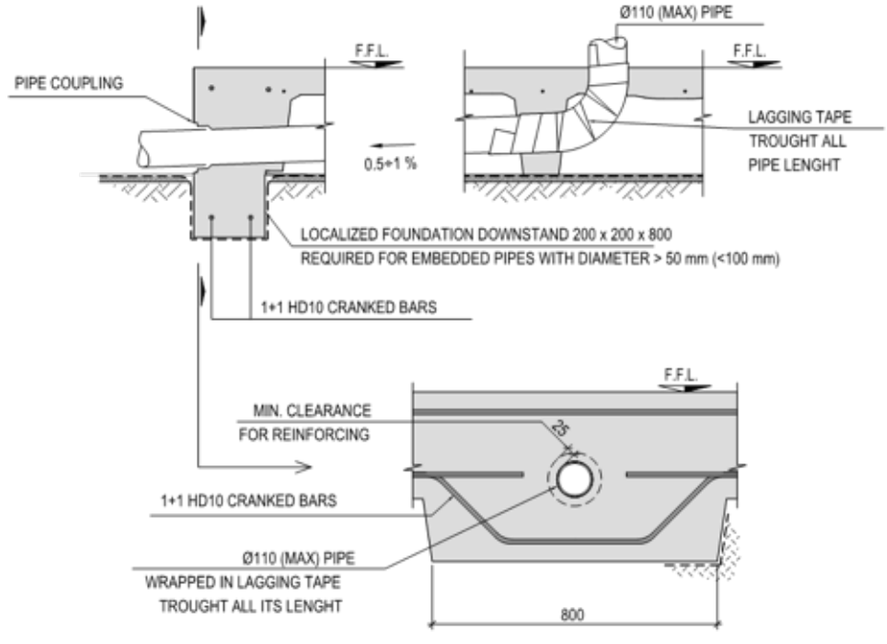
2 The Xpod® Mini Pods spacers can be used to create beams to run services through. Pipes shall be laid to ensure 15mm concrete cover between pipe and reinforcement in the perimeter beam. The width of the rib containing the pipes shall be greater than the specified rib width (typically 100mm) plus the pipe diameter. This ensures the rib width is maintained even though plumbing pipes run through it. All pipes in contact with concrete shall be lagged with an impermeable material of at least 6mm thickness.

TABLE 1 MAXIMUM DISTANCE FROM EXTERIOR TO ENTRANCE POINT OF PLUMBING PIPES

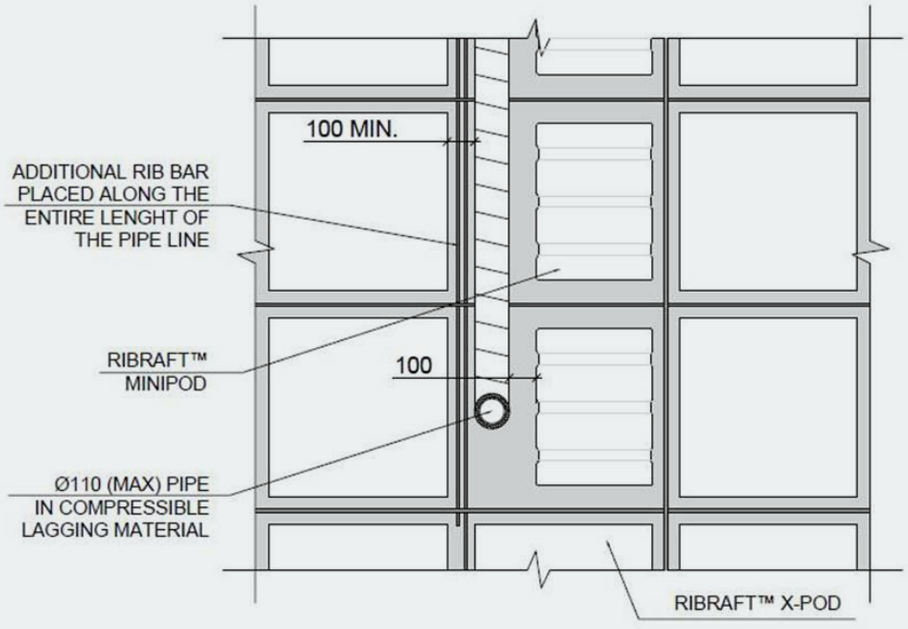
Pipe Diameter (ID)mm	Gradient	Maximum distance to edge with 215mm thick pod
40	1 in 40	3400
50	1 in 40	3000
65	1 in 40	2400
100	1 in 60	1200

TYPICAL DETAILS ARE SHOWN BELOW

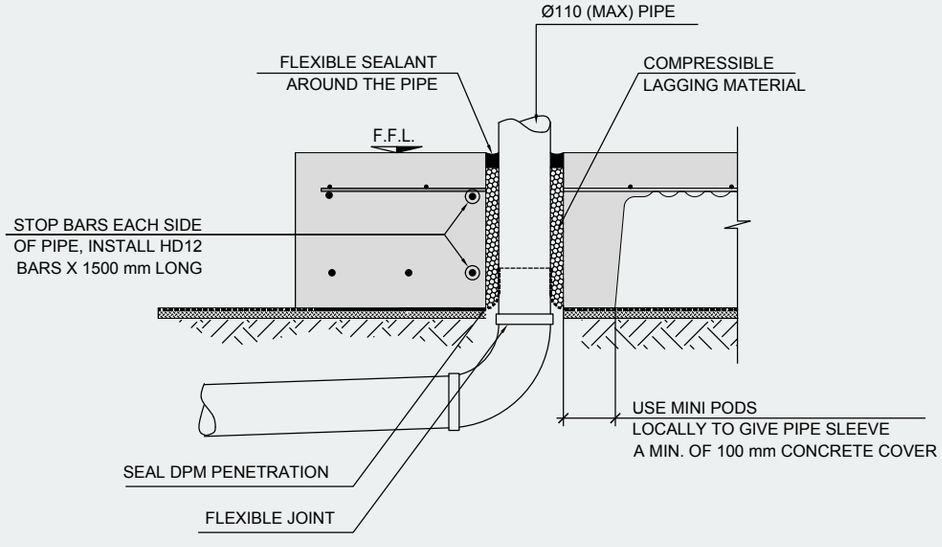
In slab installation pipes cut through rib walls



Use of Xpod® Mini Pods to create zone for pipes to run without compromising the ribs



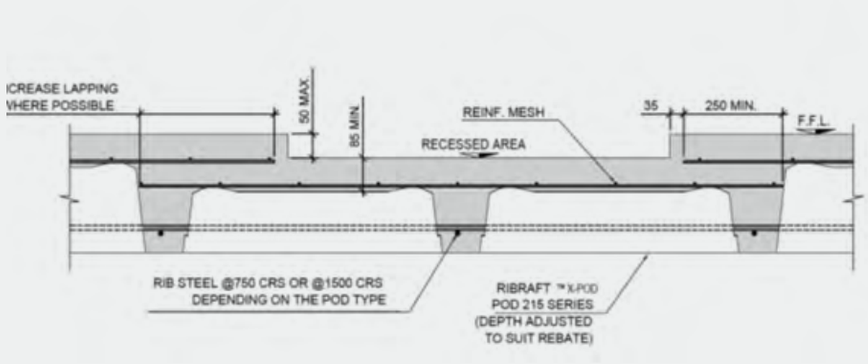
Typical drop down detail for sewer line to prevent it being visible at exterior of slab



3.4 RECESSES FOR SHOWERS

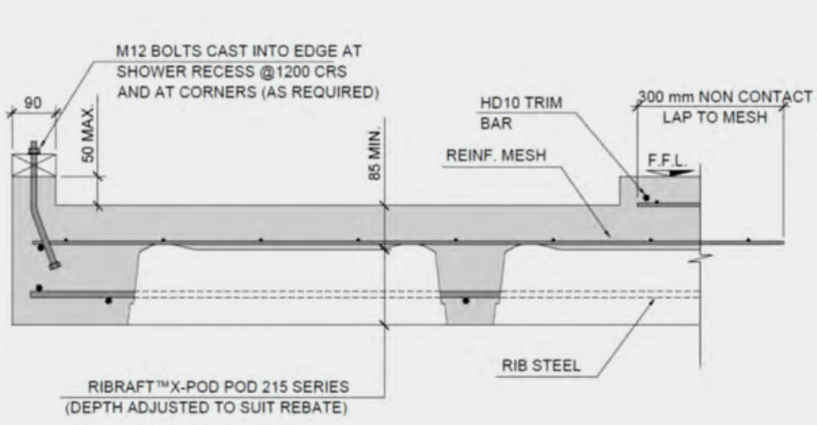
The following figures provide typical details for recesses and large penetrations.

Shower recess distant from slab edge



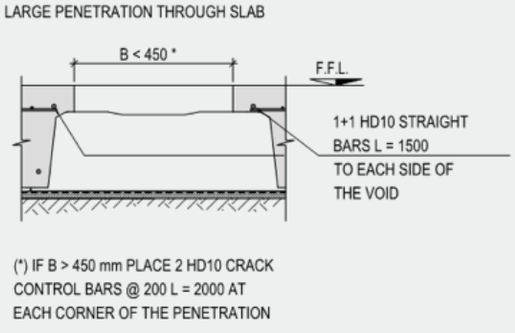
NOTE: 145/750 Rebate X-Pod available to eliminate cutting when a shower rebate, recessed area or topping slab thickening is required.

Shower recess close to slab edge

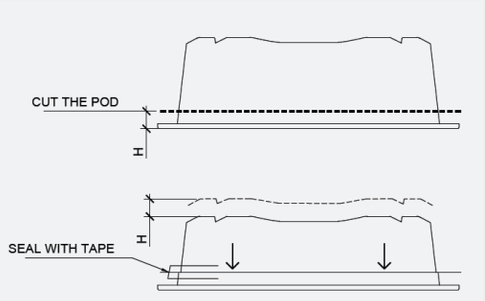


NOTE: 145/750 Rebate X-Pod available to eliminate cutting when a shower rebate, recessed area or topping slab thickening is required.

Large penetration through slab



How to adjust depth of Pod (cut) to suite rebate



3.5 SUB-BASE/SUBGRADE

Excavated material shall be replaced with hardfill material compacted in maximum layers of 150mm or as specified by the design engineer. Refer specific project drawings/ specification for minimum hardfill layer under slab. A blinding layer of 0-5 mm sand or crusher dust shall cover base material to a maximum thickness of 25mm (for final hand screeding). The finished level of compacted hardfill shall be determined specifically by the designer for each site. The subgrade/sub-base should be inspected by the design engineer when this is a condition of the building consent, or where concerns exist that the ground conditions are not those implied by the design.

3.6 FORMWORK SETUP

Perimeter shutters shall be set to profiles or string lines with top edge at Finished Floor level. Setting level of shutters must allow for variation across prepared base and final hand screed of sand blinding layer (to +/- 5mm). Shutters shall be adequately braced to ensure minimal movement occurs under full load of wet vibrated concrete and construction loadings. Forms shall prevent the leakage of grout at joints which can result in a bony surface finish.

The finished floor level shall ensure that the height above ground level satisfies the greater requirements of:

- E1/AS1, refer section 2 in particular
- E2/AS1, refer section 9.1 in particular
- any local flood management clearance criteria

The specified levels shall be shown on the project drawings.

3.7 DPM PLACEMENT

The DPM shall be laid over the entire building platform directly on top of a sand blinding layer, extending to the outside of the edge beam. The joints shall be lapped not less than 50mm and sealed with pressure sensitive tape not less than 50mm wide. All penetrations of the DPM by plumbing and services or punctures during construction shall also be sealed with pressure sensitive tape. The DPM may extend beyond the edge of the slab i.e. underneath the formwork, or may be folded and stapled up the inside of the formwork. The minimum requirement is that the DPM extends to the outside of the edge beam. It is very important that the DPM is not bunched up at the formwork.

ThermoX DPM is highly reflective and sunglasses should be used when installing on sunny days. The reflective side is placed upwards.

3.8 POD INSTALLATION

The drawing should be reviewed to determine whether the symmetrical RibRaft®.

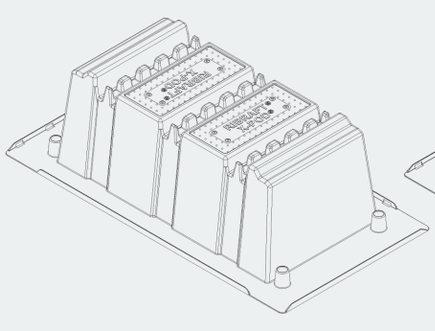
X-Pod® 750/215 is specified or the non-symmetrical

1500/215 pod. Review of the 1500/215 pod will show that only two of the sides only will create a 100mm rib.

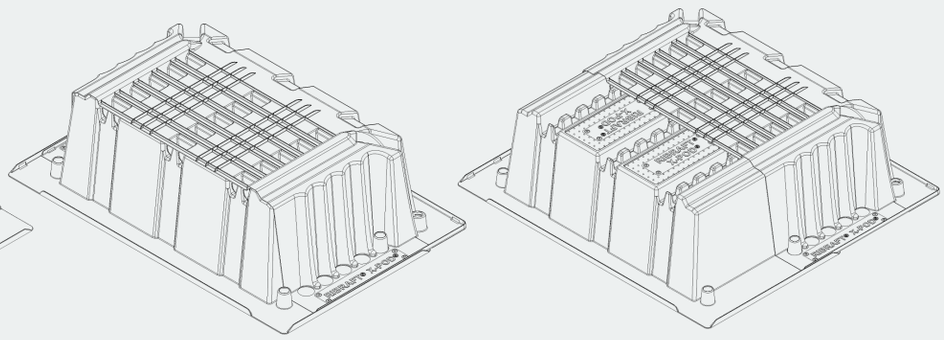
Place a row of RibRaft® X-Pod®s the specified distance away from the formwork (refer consent drawings). Click in X-Pod keystones along perimeter beam to secure in place. Align second row of X-Pod®s and clip together in groups of four pods with X-Pod® Keystone in the holes provided. The X-Pod® Keystones click into place. Continue placing X-Pod®s and clicking together with X-Pod® Keystones. Note the pods are securely held together and modest realignment can occur by pushing. However, take care to avoid damage to the DPM.

Where adjustment pods are specified, or where required to frame around a plumbing penetration, follow the following procedure, ***refer Figure 6.***

FIGURE 6 RIBRAFT® X-POD® TWO PART ADJUSTMENT PODS



RibRaft® Xpod Mini Pod 215/300



RibRaft® Xpod Mini Pod 215/300 and MP Extender 215/400.600

Where a 300mm gap needs filling use the Mini Pod 215/300. Simply clip the Mini Pod to the full pod with the Xpod® Keystones creating a 100mm rib between the full pod and mini pod.

For extension requirements of 400 to 600mm overlay the Mini Pod Extender to achieve the required extension.

The holes on the sides of the extension pods are designed to accommodate the X-Pod® Keystone if required.

3.9 REINFORCEMENT PLACEMENT

The X-Pod® Keystones have been designed to securely hold reinforcement in positon without the need for tying. Place reinforcement in the location and to the details shown on the drawing. Clip reinforcement into place in X-Pod® Keystones.

Mesh can either be placed on reinforcement chairs or supported on the upstands in the corner of each X-Pod®. Refer to the drawings to determined which mesh support mechanism is specified for a particular project to determine the preference of the design engineer.

3.10 CONCRETE PLACEMENT

Firth concrete mix IP2019X or IP2519X are the most commonly specified mix designs for X-Pod® floors. The volume of the concrete floor above the pods can be estimated by calculating the overall volume including the pods (typically 750x750x300) and deducting the volume of the X-Pod®s provided in Table 2.

TABLE 2 VOLUME OF RIBRAFT® X-POD®S

Type of X-Pod®	Volume (litres)
215/750	83
215/1500	91

The Firth concrete mix is designed to have a suitable strength at a higher slump. The mix has been formulated to achieve appropriate filling of the X-Pod® foundation system. Pumping concrete is the recommended method of delivering the fresh concrete to the work face. Other methods of delivery may be suitable however approval from Firth or project engineer is required. For placing and finishing guidelines refer below and to CCANZ's posters number 3 and 5.

1 It is generally preferable to start pour at the garage (allows a harder, flatter finish) and work away. Controlling the flow from the pump nozzle is important to ensure even coverage.

2 Follow behind pour face with immersion (spud) type vibrator to all concrete (beams, ribs and top slab).

3 Care must be taken around plumbing to ensure damage, or movement does not occur.

4 Following vibration, normal concrete finishing techniques shall be carried out (refer poster number 5). Screed off concrete using normal screeding tools or vibrating screeds. Bull float to push down aggregates left at the surface during the screeding operation. Finish the edges with steel trowel and the interior of the slab surface with troweling machines. It is important that final troweling does not commence until all the bleed water has evaporated as premature commencement of troweling can lead to surface delamination or dusting.

5 Hot and/or windy conditions present during pouring/finishing require steps be taken for the protection of the concrete to prevent plastic cracking. Protection measures include:

a Aliphatic alcohol sprays

b Water vapour misting over surface (ie from water blaster directed upward, and wind carrying mist over slab surface). However this water must be fully evaporated from the surface before commencing trowelling.

c Positioning wind breaks

6 Curing the slab is crucial to ensure strength gain of concrete and protection from early age cracking. Suitable methods of curing include:

a Water spraying/ponding

b Curing membrane sprays

c Polythene covering

7 If environmental conditions forecast greater than 12 degrees variation of day time to overnight temperatures, then measures to protect slab from thermal shock shall be employed, these include:

a Planning the pour time to minimise the temperature variations the concrete will experience

b Covering surface with fabric, plastic covers or polythene

c Using early entry saws

Forms shall not be struck on the day of the pour, and consideration should be given to leaving forms in place for 2-3 days following pour in very cold or shaded locations.

3.11 SHRINKAGE CONTROL JOINTS

Shrinkage control joints reduce the risk of unwanted cracks, and their placement needs to be carefully considered where uncontrolled cracking could be unacceptable. Two types are described here, saw cut joints (which are tied joints) and free joints.

3.11.1 SAW CUT JOINTS

Saw cuts are located at positons in which the concrete is likely to crack due to stresses induced by restrained shrinkage.

The aim of providing them is for the concrete to crack at the bottom of the saw cut thus minimizing the potential for a visible crack wandering over the surface. The level of reinforcement provided in a RibRaft® X-Pod® flooring system mean that cracks have no structural implications being only an aesthetics issue. Factors to consider are the type of floor finish, the location of ribs and ground beams.

When warm sunny days are followed by cool nights, the change in temperature can cause cracking. Hence preference should be given to using early entry saws which are used immediately after finishing. Shrinkage control joints cut using diamond blades shall be cut as early as possible which is typically within 24 hours of hardening in summer, and 48 hours in winter. They shall be cut to a depth of 25mm. Shrinkage control joints do not guaranteed to eliminate all visible or unwanted cracks.

Joints shall be positioned to coincide with major changes in floor plan. Where concrete is to be exposed, for example in a garage, or brittle covering placed over, the maximum intermediate bay sizes shall be limited to 5m. Bay dimensions formed by shrinkage control joints shall be limited to a maximum ratio of length:width of 1.5:1. Where a shrinkage control joint runs along the line of a load bearing rib, then the joint shall be located directly above one edge of that rib.

In order to limit the width of cracks at re-entrant, or internal corners, extra steel is often specified and is placed on top of the mesh. These are typically 2-HD12 bars (grade 500E), 1200mm long tied to the top of the mesh at 200mm centres, with 50mm cover to the internal corner – refer Building Consent drawing for details.

3.11.2 FREE JOINTS

For large plan areas the designer may specify free joints. These are typically joints which allow unrestrained movement, but are doweled to prevent vertical movement. If specified then follow details shown on the building consent drawings.

3.12 FINISH EXPECTATIONS

The Building Amendment Act 2013 introduced new consumer protection measures which became effective on

1 January 2015. MBIE has developed guidance to the industry on what constitutes a defect and the definition of acceptable/ unacceptable defects. The MBIE guidance document suggest that for a concrete floor it is recognised that some cracking in concrete is common and not necessarily a sign of poor workmanship. The document suggests that cracks up to 3mm wide are acceptable.

It is also recognises that the levelness of the floor is important. NZS3114 requires an even plane within 35mm for every 3m direction for a carpeted floors and 33mm for tiled and vinyl floors. Individual mounds should be less than 3mm high and depressions less than 3mm deep. In additional no abrupt deviations greater than specified in NZS3114 should exist.

Visible reinforcing or bony concrete should not exist along the slab edge.

Concrete is a natural material and shade variation can be expected. Often slight colour variations will fade with time.

4 INSTALLATION DOCUMENTATION

When requested, the installation contractor shall provide a PS3 for the installation of the Firth RibRaft® X-Pod® floor. Confirming that construction was in accordance with the project drawings and that the concrete used for the project was supplied by Firth Industries.

POSTER No. 3

PLACING AND COMPACTING

PLACING

- Make sure you can see what you are doing
  - Lights may be needed for thin and/or deep formwork
- Concrete mixers, skips and pumps can easily place the concrete exactly where it is needed
- Make sure that you order the right type of concrete with the correct slump for your placing method because you should not add water to a mix on site
  - A different type of concrete is used for pumping than is used for placing with a skip for example
  - Only small amounts of water may be added to a mix on site to make up for loss of water during travel, and may only authorised by the Ready Mix supplier
- Placing must be done at the correct speed
  - Too fast and the compacting gang will not be able to keep up
  - Too slow and the mix will stiffen making compaction very difficult
- Concrete should be placed in layers to make sure that it is compacted properly
  - With poker vibrators the layers shouldn't be deeper than the length of the head
  - With vibrating beams layers shouldn't be deeper than 150 mm
- When dropping concrete from a height use tubes and/or baffle boards to prevent damage to the formwork

1 CONCRETE MIXERS CAN PLACE THE CONCRETE EXACTLY WHERE IT IS NEEDED

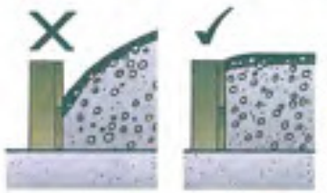
2 TUBES ATTACHED TO SKIPS CAN AIM THE CONCRETE IN THE RIGHT DIRECTION.

3 CONCRETE PUMPS CAN MOVE THE CONCRETE LONG DISTANCES TO WHERE IT IS NEEDED.

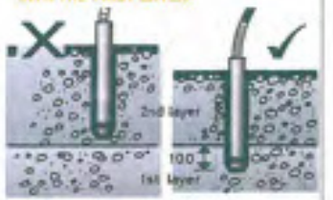
4

SLUMP	ON SITE	
Check the slump is right for the job	Site workers must NOT add water to the concrete	Ready Mix suppliers may add up to 10 litres/m³ to adjust the slump

5 DON'T PLACE CONCRETE IN PILES BUT IN FLAT, EVEN LAYERS

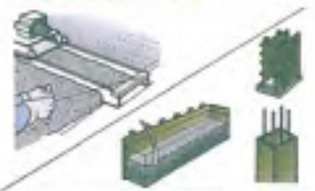


6 DON'T MAKE THE SECOND LAYER TOO THICK. THE POKER MUST GO 100mm INTO THE FIRST LAYER.



7 BAFFLE BOARDS PROTECT THE FORMWORK FROM BEING DAMAGED BY DROPPED CONCRETE

8 FOR THIN SLABS USE A BEAM VIBRATOR. FOR COLUMNS, WALLS AND THICK SLABS USE POKER VIBRATORS.



9 ALWAYS HAVE A SURCHARGE OF CONCRETE IN FRONT OF ANY BEAM VIBRATOR.

10 DOUBLE BEAM VIBRATORS REQUIRE NO FINISHING ON SOME JOBS.

11 FOR SMALL JOB SLABS UP TO 100mm THICK A HAND TAMPER MAY BE USED.

12 POKER VIBRATORS SHOULD BE USED ALONG THE EDGES OF SLABS WHEN COMPACTING WITH A BEAM

COMPACTING

- Air is always trapped in concrete when it is being mixed.
- The aim of compaction is to remove as much of this air as possible.
- Why does getting rid of the air matter?
  - Air holes reduce the strength of concrete.
    If you don't compact concrete, it may only be half as strong as it should be.
  - Air holes in the concrete stop a good bond forming between the concrete and the reinforcing steel making the structure weaker.
  - Large air holes can cause ugly marks on the surface.
- Use the right compaction equipment for each job.
  - Poker vibrators for beams, columns, walls and deep slabs.
  - Beam vibrators for thin layered slabs.
  - Clamp-on vibrators can be used on special formwork, especially in the precast industry.
- Always have spare compacting equipment in case of a breakdown.
- Fore more information on the use of poker vibrators see Poster No 4 "Using a Poker Vibrator".

THE NEW ZEALAND READY MIXED CONCRETE ASSOCIATION INC.

SAFETY ON SITE: Suitable protective clothing should be worn when handling wet concrete

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POSTER No. 5

METHODS OF FINISHING CONCRETE

PLANNING

Labour Resources

Make sure you have enough labour for the job size. Typical finishes have the following labour output production.

Floating
- Wood float - 3 to 4 m²/hour
- Hand steel float 3 to 4m²/hour
- Power float - 6 to 8m²/hour

Power Trowelling
- 1 pass - 6 to 8m²/hour
- 2 passes - 10 to 12 m²/hour

Equipment

Make sure you have enough equipment for the job. Make sure you know where to get replacement gear for power equipment.

Typical gear list:
- Square Mouthed shovels.
- Concrete Rakes
- Straightedge
- Edging trowels
- Power Finishing
  - Float
  - Trowel
- Hand finishing
  - Bull float
  - Wood float
  - Steel Trowels
- Special broom to suit a textured finish.
- Special finishes: you will need to check you have all the special gear, such as imprinting stamps, etc.

WEATHER

- Do not concrete slabs that are exposed to the weather if rain is forecast. It is virtually impossible to repair a rain-damaged surface.
- Have some sheets of polythene available to cover the slab if you do get caught by a shower of rain.

1

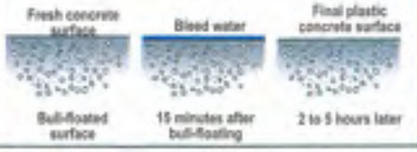
SCREEDED FINISH (U1): This is the simplest finish to produce - the surface is formed with a hand tamping beam during the placement and compaction of the concrete.

2

FLOATED FINISH (U2): Concrete surface being levelled with a "bull float". On the forward stroke the float is pushed with handle lowered, on the returns stroke the float is pulled with the handle raised.

3

BLEED WATER: Water known as bleed water will come onto the surface of concrete within 15 minutes of compacting the concrete. No finishing work can start until this water has evaporated.

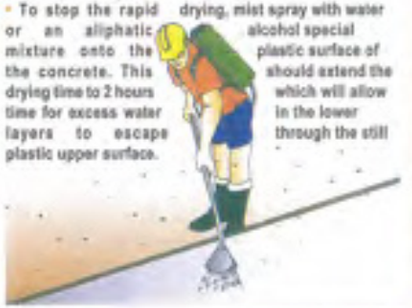


WAITING TIME

4

Winter
- In cold weather the waiting period could be up to 5 hours.
- The wetter the concrete, you use the longer the wait.

Summer
- In hot weather, the waiting time could be two hours.
- If it is drying faster than two hours, then plastic surface cracking is likely to occur.
- To stop the rapid drying, mist spray with water or an aliphatic alcohol special mixture onto the plastic surface of the concrete. This should extend the drying time to 2 hours which will allow time for excess water in the lower layers to escape through the still plastic upper surface.



FOOTPRINT Concrete is ready for power floating when standing on the concrete creates an imprint not deeper than 2-3mm.

5

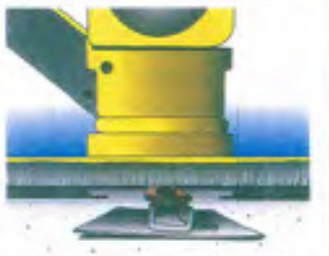
6

POWER FLOATING a slab surface.

7

HAND TROWELLING: The finish near edge is improved with steel hand trowel.

8



POWER TROWELLING can start when the surface has dried and is not sticky to the palm of the hand. The close-up view is of the trowel blade tilted during final stages.

THE PROCESS

- The basic steps are shown in the numbered sequence 1 to 8.
- There must be a waiting period for bleed water to evaporate from the slab surface.
- Be warned that in the summer, evaporation can be too rapid leading to plastic cracking.
- In the summer, surface stiffening may still leave the lower parts of the slab in a plastic state. This can lead to problems of a rolling surface while trying to finish.
- As soon as the concrete has hardened enough to avoid surface marking, usually after 2 passes of steel trowelling, start the curing process, using for example a membrane spray. See Curing Poster No 6

TYPES OF FINISHES

Make sure you understand the specification requirements in NZS 3114 before you start. The finish designations in NZS 3114 are:

U1	Screeded Finish - see Step 1
U2	Floated Finish - typically bull floating after the U1 finish.
U3	Trowelled Finish - developed from a U2 finish after bleed water on the surface has evaporated.
U4	Vibrating steel beam - surface left untouched from beam.
U5/6	Broom finishes - different textures.
U11	Early Age Grinding - usually applied to a U2 finish 36-48 hours after completing.

Note: there are other special finishes in NZS 3114; those using the letter E are Exposed Aggregate finishes.

SLAB PROTECTION

- Have the curing process decided before you start the job - *See Curing Poster No 6*
- In summer, make sure you can apply a mist spray of water or a special aliphatic alcohol to slow down the surface evaporation of water. This is very important with special concretes often used on commercial/industrial floors.
- In winter or in summer where there can be a big change in temperature between day and night, make sure you cover the slab.

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