



CERTIFICATE OF CONFORMITY

This is to certify that

Firth Ribraft® Floor System



Complies with the New Zealand Building Code:

1. B1.3.1, B1.3.2 & B1.3.3 - Structure
2. B2.3.1(a) - Durability
3. E2.3.3 - External Moisture
4. F2.3.1 – Hazardous Building Materials
5. H1.3.1 - Energy Efficiency (Refer to limitation c)

Product Purpose or Use

The Firth RibRaft® Floor System is a method of concrete floor construction, suitable for all slab-on-ground concrete floors for domestic or residential buildings, which fall within the scope of NZS 3604:2011 – Timber-framed buildings.

Subject to the following Conditions & Limitations:

- a. Must be installed in accordance with the [Firth RibRaft® Technical Manual FIR0586 Dated October 2018](#).
- b. Specified products must be supplied by Firth Industries or a Firth Industries approved supplier.
- c. The energy efficiency rating of the Firth RibRaft® Floor System relates only to the floor.
- d. Nothing in this document should be construed as a warranty or guarantee by CMI, and the only applicable warranties will be those provided by the Certificate Holder.
- e. The certificate holder must maintain compliance with the conditions set out in Section 15 of the Building (Product Certification) Regulations 2008.

Product Description

The Firth RibRaft® Floor System comprises of polystyrene pods, steel reinforcing rods, plastic spacers and Firth RibRaft® concrete.

Refer A1 below for further detail.

Certificate Holder

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30/11/2018

Date of Issue

CM40015-I02-R00

Certificate Number

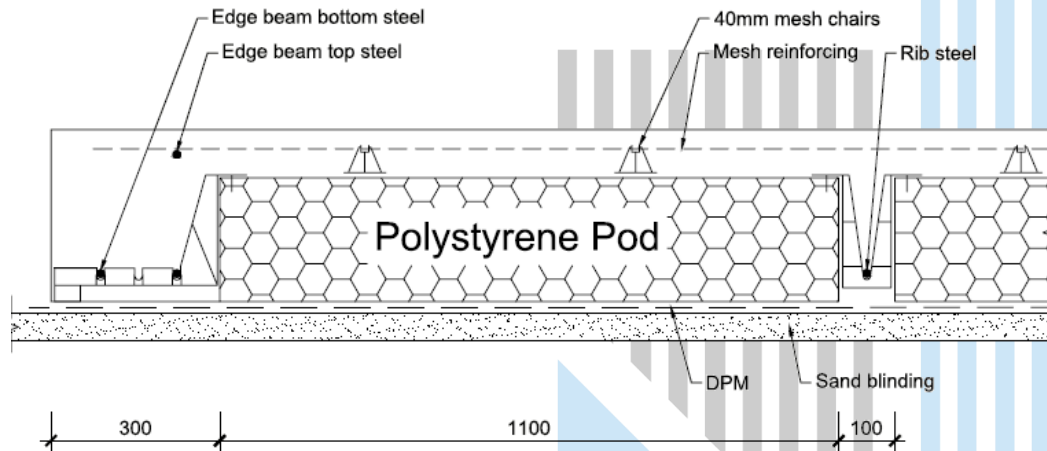
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MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT
HIKINA WHAKATUTUKI

A1 Product or System Specification

Typically, the Firth RibRaft® Floor System consists of an 85mm thick slab supported by a grid of ribs normally 100mm wide at 1200mm x 1200mm centres. The overall depth is 305mm. Edge beams and ribs under load bearing walls are 300mm wide to provide for the extra load carried by these members. Where heating coils of less than 25mm diameter are embedded in the topping, the slab concrete thickness shall be 110mm meaning the overall thickness is 330mm. Where the top floor surface is honed to provide a decorative finish, a slab thickness of 100mm (before honing) should be specified.



Components

Pods	Firth RibRaft® polystyrene pods 1100mm square and 220mm thick 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. Pods may be cut to suit specific architecture layout and also to accommodate services. 300mm thick pods are available if needed for deeper edge beams and internal ribs.
Steel	Reinforcing steel in the slab shall consist of Welded Reinforcing Mesh complying with AS/NZS 4671:2001 with a minimum weight of 2.27kg/m ² , a lower characteristic stress of 500MPa, square configuration of orthogonal bars between 150 to 200mm centres, and ductility class L or E, hereafter referred to as “mesh”. The presence of Class E reinforcing bars in the ribs and beams provides adequate ductility of the system which allows the use of class L mesh. Typically, the topping mesh reinforcement will be 665 mesh (class L) or SE62 ductile mesh, each being equally applicable. The reinforcing bars in the ribs and edge beams shall conform to AS/NZS 4671:2001 “Steel Reinforcing Materials”. Specifically, designed spacers are used to position the polystyrene pods and the rib and edge beam reinforcing steel bars in a secure manner until the concrete is placed. The reinforcing mesh is held in place by mesh chairs. Conventional timber or steel formwork is used to form the edge of the slab.
Concrete	One of the following Firth concrete products shall be used in the system: <ol style="list-style-type: none"> 1. Firth Raftmix: 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. Firth Raftmix25: a 25MPa 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. 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 defined as exposure zone D in 4.2.3.3 of NZS 3604:2011).

Source: Firth RibRaft® Technical Manual FIR0586 Dated October 2018.

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A2 Installation Requirements

The Firth RibRaft® Floor System must be constructed in accordance with [Manufacturers Technical Manual \(FIR0586\) Dated October 2018](#).

A3 Other Relevant Technical Data

The Firth RibRaft® Floor System, if designed, installed, used and maintained in accordance with the statements and conditions of this Certificate of Conformity, will meet the following provisions of the New Zealand Building Code (NZBC):

Clause(s)	Compliance
B1.3.1, B1.3.2 & B1.3.3	Engineering Opinions, based on testing and load calculations, confirm the systems compliance with B1.3.1, B1.3.2 & B1.3.3.
B2.3.1(a)	Durability of 50 years has been confirmed.
E2.3.3	Reliance is placed on the 0.25 polythene membrane placed beneath the pods to provide sufficient resistance to vapour transmission from the ground into the substructure and building as detailed in NZS 3604:2011; therefore, compliance has been demonstrated.
F2.3.1	The system has been confirmed as non-hazardous.
H1.3.1	R-values confirm compliance of the system to H1.3.1.

Structural Limitations

Specific engineering input shall not be required only where the structure supported by the system complies with the following criteria:

- The structure supported by the system is constructed in a location where the Seismic Hazard Factor Z (defined in NZS 1170.5:2004 “Structural design actions, Part 5: Earthquake Actions”) is less than or equal to 0.45.
- The system is laid level or has a maximum step of 600mm as detailed in [Manufacturers Technical Manual \(FIR0586\) Dated October 2018](#).
- The structure supported by the system has no basement, part basement or foundation walls.
- The total height from the lowest ground level to the highest point of the roof shall not exceed 10m.
- The structure supported by the system has a roof pitch limited to 60o maximum from the horizontal.
- The maximum height of a single or top storey is 4.8m and any other storey is 3m.
- Only ground floor walls of the structure supported by the system are permitted to be “heavy external walls” (as defined in Clause 3.3 of the [Firth RibRaft® Technical Manual FIR0586 Dated October 2018](#)).
- The roof span shall be less than or equal to 12m when the roof and ceiling loads are supported entirely by the external walls. Where internal support of roof trusses is used the footings below point loads identified by the truss designer shall comply with this Manual.
- Where internal load bearing walls are used to support the roof or floors, the loaded dimensions stated in Tables 8.2 and 14.10 of NZS 3604:2011 shall apply, and the load bearing wall shall be supported on a 300mm wide load bearing rib as detailed in the Firth RibRaft® Technical Manual FIR0586 Dated October 2018.
- Floors may be of unlimited size provided that the maximum dimension between free joints shall not exceed 30m. Where free joints are required they should be detailed in accordance with NZS 3604:2011.

Source: Firth RibRaft® Technical Manual FIR0586 Dated October 2018.

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Basis of CodeMark Certification

CMI has followed the following procedures for certifying the Firth RibRaft® Floor System;

- Testing and assessment of the Firth RibRaft® Floor System;
- Assessing a quality plan for the Firth RibRaft® Floor System that conforms to ISO 10005:2018 and the CodeMark Scheme Rules Version 2009.1;
- By reviewing testing of samples supplied to ascertain whether or not the product meets the performance requirements specified on this certificate; and
- Conducting site audits of the factory to verify compliance of the Firth RibRaft® Floor System.

B2 Sources of Information

- OPUS; Report 10-524A91.00; B2 Durability; May 2010.
- OPUS; Report; Seismic Shear Key; June 2006.
- Holmes Consulting Group; Structural Peer Review; September 2010.
- Holmes Consulting Group; Structural Review; May 2012.
- eCubed Building Workshop Ltd; Thermal Performance Report.
- Arbitration New Zealand; Report on compliance with the NZBC; December 2011.
- NZS 4214:2006 - Methods of determining the total thermal resistance of parts of buildings.
- AS/NZS 4671:2001 "Steel Reinforcing Materials.
- NZS 3604:2011 "Timber Framed Buildings".
- NZS 3109:1997 "Concrete Construction".
- NZS 1170.5:2004 Earthquake actions – New Zealand.

The Certificate Holder has chosen not to make the above listed reports publicly available, as they are considered commercial in confidence.

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