



## BRANZ Appraised

Appraisal No. 810 [2012]

## ALLIED CONCRETE READY FLOOR

Appraisal No. 810 [2012]

Amended 21 December 2016

### BRANZ Appraisals

Technical Assessments of  
products for building and  
construction.



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## BRANZ

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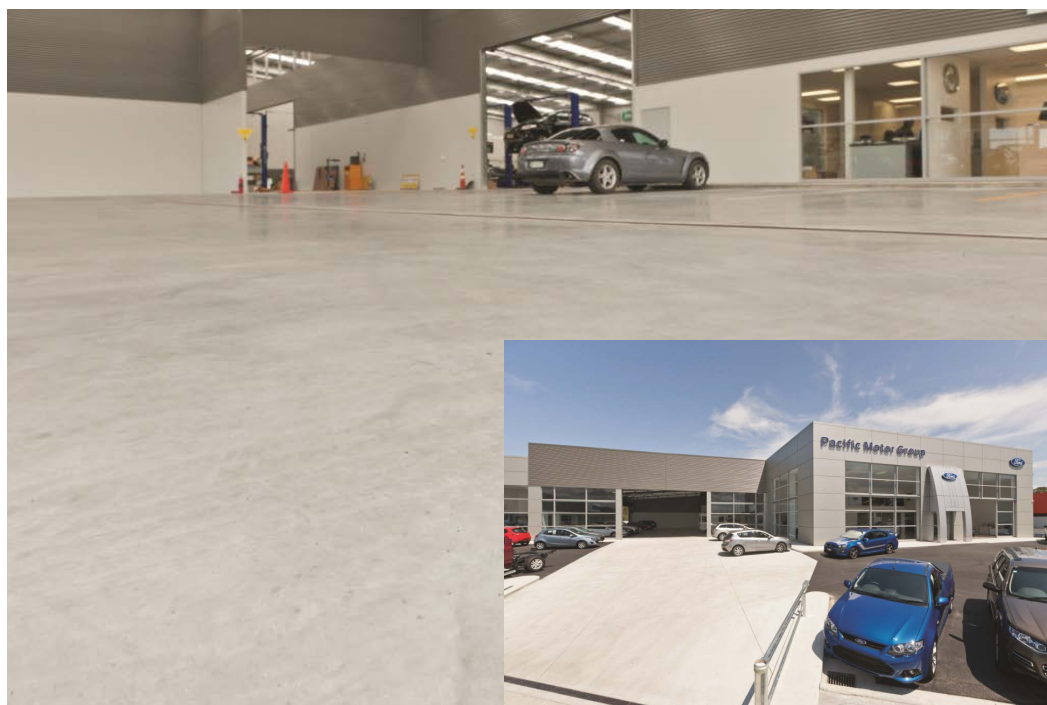
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## Product

- 1.1 Allied Concrete READY Floor is steel fibre reinforced concrete for the construction of concrete slabs-on-ground with combined foundations and concrete slabs-on-ground for residential, commercial and industrial use.

## Scope

- 2.1 Allied Concrete READY Floor has been appraised for the following uses:
- for floor slabs with combined foundations for timber framed buildings within the scope of NZS 3604, built on "good ground" as defined by Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure; and,
  - for separately poured floor slabs with conventionally reinforced foundations for timber framed buildings within the scope of NZS 3604, built on good ground as defined by Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure; and,
  - as commercial and/or industrial concrete slabs-on-ground from 100 mm to 150 mm thick, on soil with a modulus of subgrade reaction of  $k > 30$  kPa/mm.
- 2.2 Allied Concrete READY Floor is not suitable for soils that are expansive or prone to liquefaction or differential settlement.

## Building Regulations

### New Zealand Building Code (NZBC)

- 3.1 In the opinion of BRANZ, Allied Concrete READY Floor if designed, installed, used and maintained in accordance with the statements and conditions of this Appraisal will meet the following provisions of the NZBC:

**Clause B1 STRUCTURE:** Performance B1.3.1, B1.3.2 and B1.3.4. Allied Concrete READY Floor meets the requirements for loads arising from self-weight, imposed gravity loads, earthquake, wind, differential movements and time dependent effects including creep and shrinkage. [i.e. B1.3.3 (a), (b), (f), (h), (m) and (q)]. See Paragraphs 8.1 – 8.9.

**Clause B2 DURABILITY:** Performance B2.3.1 (a) not less than 50 years. Allied Concrete READY Floor will meet this requirement. See Paragraphs 9.1 – 9.2.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. Allied Concrete READY Floor will meet this requirement.

- 3.2 This is an Appraisal of an **Alternative Solution** in terms of New Zealand Building Code compliance.

## Technical Specification

### General

- 4.1 Allied Concrete READY Floor is a concrete flooring system that contains integral reinforcement in the form of Dramix READY steel fibres. They are manufactured in accordance with EN14889-1 and the dosage used exceeds the minimum declared value in accordance with the CE Certification.

### Steel Fibres

- 4.2 The steel fibres used as reinforcing for Allied Concrete READY Floor are Dramix® READY fibres manufactured by Bekaert. They are nominally 60 mm long with a diameter of 0.75 mm. Each end of each fibre has a hook.
- 4.3 The steel used for manufacturing the fibres is low carbon with a tensile strength of 1225 MPa. The fibres have a bright steel finish.

### Concrete

- 4.4 The concrete grade for use with Allied Concrete READY Floor is 20 MPa, 25 MPa or 30 MPa, manufactured in accordance with NZS 3104.

### Reinforcing Steel

- 4.5 Where reinforcing steel is required by the Technical Literature, D300E12 bars in accordance with AS/NZS 4671 are to be used.

## Packaging, Handling and Storage

- 5.1 The Dramix® READY steel fibres used in the concrete mix are provided in 10 kg bags. These must be kept dry prior to the use of the fibres in the concrete.

## Technical Literature

- 6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Allied Concrete READY Floor. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, installation, use and maintenance contained within the Technical Literature and within the scope of this Appraisal must be followed.

## Design Information

### General

- 7.1 Allied Concrete READY Floor uses Dramix® READY steel fibres to replace steel mesh and reinforcing in concrete slab-on-ground floors. For timber framed buildings within the scope of NZS 3604 Allied Concrete READY Floor provides an Alternative Solution to the prescriptive solution in NZS 3604. It also allows for the replacement of steel mesh and reinforcing for commercial or industrial slabs-on-ground subject to specific engineering design.
- 7.2 The soil that the slab is to be poured on must be "good ground" as described in Paragraph 2.1 above. For specific engineering design the modulus of subgrade reaction,  $k$ , must be greater than 30 kPa/mm.
- 7.3 The design philosophy for Allied Concrete READY Floor slabs is for the direct transfer of wind, gravity and earthquake loads from the structure to the ground. Allied Concrete READY Floor slabs are not designed to resist other actions or to accommodate differential settlements of the ground beyond 25 mm over a horizontal distance of 6 m. Hence expansive and liquefaction prone soils, that could impart large lateral loads, and greater differential settlements are outside the scope of this Appraisal.

- 7.4 Degradation of exposed fibres at exterior concrete surfaces will occur, and these degraded exposed fibres will be removed by weathering. This degradation is non-structural and will not affect the overall durability provision of the NZBC for these concrete structures, however corrosion products at the surface may be created as a result of the steel fibres corroding. Allied Concrete READY Floor is not suitable where decorative, exposed aggregate or architecturally sensitive concrete is specified. Where these types of finishes are desired, advice must be sought from Allied Concrete Limited.

## Structure

### NZS 3604 Buildings

- 8.1 Allied Concrete READY Floor can be used for constructing concrete slab-on-ground floors for timber framed buildings within the scope of NZS 3604.
- 8.2 Where the Allied Concrete READY Floor is to have the foundation integral with the floor slab, this must be placed as one continuous pour. The dimensions of the floor and foundations must be as described in NZS 3604 Figure 7.13 [B] or 7.15 [B], for the concrete slab-on-ground with combined foundations. There is no requirement for the steel mesh or R10 stirrups and only one D12 bar is required at each of the top and bottom of the footing. These bars must be installed in accordance with the Technical Literature.
- 8.3 The minimum depth of Allied Concrete READY Floor foundations below cleared ground level shall be 200 mm as specified by NZS 3604 Paragraph 3.4.2. The inner face of the foundation shall slope up to the underside of the integral floor slab at an angle of approximately 45°, as shown in NZS 3604, Figure 7.13 [b].
- 8.4 Where the foundations are poured separately they must be in accordance with NZS 3604, Figure 7.13 [B], 7.14 [B] or 7.15 [B], including reinforcement steel. The slab may then be poured at a later date, and mesh is not required.
- 8.5 In the situations described in Paragraphs 8.2 and 8.4 above, the dimensions of slab thickenings under internal loadbearing walls must be as described in NZS 3604, Section 7.5.11, except that there is no need for additional reinforcing.
- 8.6 Shrinkage control joints must be made by saw cuts at maximum 6 metre centres. Saw cutting of Allied Concrete READY Floor should be carried out as soon as the concrete surface can endure the saw cutting process, but not later than 24 hours after placement. It is recommended that shrinkage control joints extend from re-entrant corners. Where this is not practical supplementary steel in accordance with NZS 3604, Clause 7.5.8.6.4 [b] must be used.

### Other Concrete Slabs

- 8.7 For buildings subject to specific design Table 1 gives the maximum loads for different slab thicknesses for Allied Concrete READY Floor.

**Table 1: Maximum Loads**

Floor Thickness [mm]	Maximum Loads		
	Tonne/axle	Tonne/point	Tonne/m <sup>2</sup>
100	1.2	0.3	0.3
120	3.0	1.0	1.5
130	3.5	1.5	2.0
140	4.0	2.0	2.5
150	6.0	3.0	3.0

- 8.8 Allied Concrete READY Floor industrial / commercial ground floor slabs should be detailed following industry best practice, such as but not limited to:
- isolating slabs from beams or internal columns;
  - local reinforcing at re-entrant corners; and
  - incorporating free movement joints with dowels, where necessary, to transfer slab loads across joints.
- 8.9 Allied Concrete READY Floor slab thickness up to 200 mm may be used provided the allowable loads do not exceed what is shown in Table 1, or a specific design is required.

### **Durability**

#### **Serviceable Life**

- 9.1 Allied Concrete READY Floor is expected to have a serviceable life equal to that of standard concrete floors and slabs. Degradation of exposed fibres at exterior concrete surfaces will occur, and these degraded exposed fibres will be removed by weathering. This degradation is non-structural and will not affect the overall durability provision of the NZBC for these concrete structures. See Paragraph 7.3.
- 9.2 There is no minimum cover requirement to the steel fibres in Allied Concrete READY Floor. Cover to any supplementary steel incorporated in the concrete must be maintained.

### **Maintenance**

- 10.1 Conventional maintenance procedures may be used for floors and slabs constructed using the Allied Concrete READY Floor System.

### **Installation Information**

- 11.1 The steel fibre reinforced concrete used for Allied Concrete READY Floor is batched at plants that are certified under the New Zealand Ready Mixed Concrete Association Plant Audit Scheme.
- 11.2 The concrete for Allied Concrete READY Floor must be placed, finished and cured in accordance with the requirements of NZS 3109.

### **Health and Safety**

- 12.1 Wet concrete is a highly alkali substance and all necessary protective clothing should be worn when handling, placing and working with it.

### **Basis of Appraisal**

The following is a summary of the technical investigations carried out.

#### **Tests**

- 13.1 Testing was carried out by BRANZ to ensure the suitable behaviour of Allied Concrete READY Floor and foundations with the requirements of the NZBC. Structural loading tests were also carried out to assess the performance of Allied Concrete READY Floor slabs-on-ground.

#### **Other BRANZ Investigations**

- 14.1 Inspections of Allied Concrete READY Floor being placed and completed installations have been made by BRANZ.
- 14.2 The Technical Literature has been examined by BRANZ and found to be satisfactory.

### Quality

- 15.1 The manufacture of the Dramix® READY steel fibres has not been examined by BRANZ, but details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.
- 15.2 Allied Concrete Limited is responsible for the quality of the concrete supplied for the Allied Concrete READY Floor.
- 15.3 Quality on site is the responsibility of the concrete placer.
- 15.4 Designers are responsible for incorporating the Allied Concrete READY Floor into the design of buildings.
- 15.5 Building owners are responsible for the maintenance of the Allied Concrete READY Floor in accordance with the instructions of Allied Concrete Limited.

### Sources of Information

- AS/NZS 4671: 2001 Steel reinforcing materials.
- EN 14889-1 : 2006 Fibre for concrete. Steel fibres. Definitions, specification and conformity
- NZS 3104:2003 Specification for concrete production.
- NZS 3109:1997 Concrete construction.
- NZS 3604:2011 Timber-framed buildings.
- Acceptable Solutions and Verification Methods for New Zealand Building Code Clause E2 Ministry of Business, Innovation and Employment, Third Edition, July 2005 [Amendment 6, 14 February 2014].
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.

### Amendments

#### Amendment No. 1, dated 31 October 2014.

This Appraisal has been amended to clarify details about separately poured foundations and to clarify the definition of good ground.

#### Amendment No. 2, dated 21 December 2016.

This Appraisal has been amended to update the reinforcing specification.



In the opinion of BRANZ, **Allied Concrete Ready Floor** is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Allied Concrete Limited**, and is valid until further notice, subject to the Conditions of Appraisal.

### Conditions of Appraisal

1. This Appraisal:
  - a) relates only to the product as described herein;
  - b) must be read, considered and used in full together with the Technical Literature;
  - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
  - d) is copyright of BRANZ.
2. **Allied Concrete Limited:**
  - a) continues to have the product reviewed by BRANZ;
  - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
  - c) abides by the BRANZ Appraisals Services Terms and Conditions.
  - d) Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
  - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
  - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
  - c) any guarantee or warranty offered by **Allied Concrete Limited**.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to **Allied Concrete Limited** or any third party.

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**For BRANZ**



**Pieter Burghout**

Chief Executive

Date of Issue:

20 December 2012