BRANZ Appraised

Appraisal No. 1054 (2024)

MAXRAFT CONCRETE SLAB FLOOR SYSTEM

Appraisal No. 1054 (2024)

This Appraisal replaces BRANZ Appraisal No. 1054 (2019)

BRANZ Appraisals

Technical Assessments of products for building and construction.

MBSS Limited T/A MAXRaft

Unit 3
156 Glenda Drive
Queenstown

Tel: 0800 629 7238

Email: quotes@maxraft.co.nz

Web: www.maxraft.co.nz

BRANZ

1222 Moonshine Rd,
RD1, Porirua 5381
Private Bag 50 908
Porirua 5240,
New Zealand
Tel: 04 237 1170
branz.co.nz

Product

1.1 The MAXRaft Concrete Slab Floor System is an insulated, concrete, slab-on-ground flooring system for use in residential and light commercial buildings. The MAXRaft Concrete Slab Floor System features a continuous polystyrene insulating layer beneath the slab and to the exterior perimeter surfaces. The MAXRaft Concrete Slab Floor System can be designed as an insulated slab-on-grade where ground conditions meet the requirements of 'good ground' as per NZS 3604. Alternatively, it can be designed as a waffle raft floor designed to suit ground conditions on the subject site.

Scope

2.1 The MAXRaft Concrete Slab Floor System has been appraised for use to construct steel reinforced, concrete slab-on-ground floors subject to specific engineering design for buildings within the following scope:

- ground floor slabs for timber-framed buildings, within the scope of NZS 3604, or other similar light weight constructions where they are subject to specific engineering design; and,
- built on 'good ground' as defined by Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure; or,
- built on 'TC2' type ground within the 'Canterbury earthquake region', or moderately to highly expansive soils, subject to verification and assessment by a Chartered Professional Engineer.

Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, the MAXRaft Concrete Slab Floor System, if designed, used, installed 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. The MAXRaft Concrete Slab Floor System 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 7.1–7.7.

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years and B2.3.2. The MAXRaft Concrete Slab Floor System meets these requirements. See Paragraphs 8.1–8.3.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.3. The MAXRaft Concrete Slab Floor System meets these requirements. See Paragraphs 11.1–11.3.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The MAXRaft Concrete Slab Floor System meets this requirement.

Clause H1 ENERGY EFFICIENCY: Performance H1.3.1 and H1.3.2E. The MAXRaft Concrete Slab Floor System contributes to meeting these requirements. See Paragraphs 12.1–12.2.

Technical Specification

4.1 The MAXRaft Concrete Slab Floor System consists of a range of proprietary expanded polystyrene (EPS) or high-density XPS foam forms that are used to provide insulated slab edges, and either a waffle raft floor configuration, or a fully insulated slab with a continuous polystyrene layer beneath the concrete. Overall slab thicknesses range from 250 to 400 mm, providing a varying degree of thermal insulation, dependent on the grade of polystyrene, insulation thickness and slab configuration.

4.2 All MAXRaft slabs are subject to specific engineering design, with a preference for waffle raft floors in instances where ground conditions do not meet the requirements of 'good ground' and insulated slab-on-grade in other cases.

4.3 MAXRaft provide a full design and install service in conjunction with their accredited installer network, with all materials supplied and constructed on site. Alternatively, MAXRaft offer a 'supply only' service, allowing for the use of their system in floor slabs structurally designed or constructed by others.

4.4 EPS perimeter components of the system are proprietary products and are available solely from MAXRaft. Substitution of MAXRaft EPS perimeter components with alternatives have not been assessed and is outside the scope of this Appraisal. Other components of the system such as concrete, reinforcing steel, bar chairs, pod spacers and damp-proof membranes (DPMs) are generically specified within the MAXRaft system and shall be selected and sourced to meet the particular specifications given in the specific engineering design for the slab.

4.5 All MAXRaft flooring types can be designed to readily accommodate detailing typical of slab-on-ground construction, such as recessed shower bases, under-slab plumbing, drainage and slab thickenings to allow for structural loads

Handling and Storage

5.1 The EPS forms must be stored so that they are secure on-site, are protected from damage and remain free from dirt. Protection from direct ultraviolet (UV) exposure should be provided. Installation of the EPS components must only be undertaken once the reinforcing steel and mesh is also ready to place, as it is useful to secure the EPS components in position and prevent them from being blown around.

5.2 Reinforcing steel should be stored supported, up off the ground and kept clean.

Technical Literature

6.1 This Appraisal must be read in conjunction with:

- MAXRaft® Installation Manual V6 2017
- Maxraft® Technical Details V3 24.11.14

6.2 All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

General

7.1 The MAXRaft Concrete Slab Floor System, when specifically designed and when constructed in accordance with the Technical Literature, will meet the requirements of NZBC Clause B1 Structure. MAXRaft Concrete Slab Floor System floors are intended for single and two-storey timber-framed buildings, or other similar lightweight constructions where they are subject to specific engineering design.

7.2 The MAXRaft Concrete Slab Floor System must be appropriately designed by the engineer, with due allowance made for the underlying ground conditions and soil bearing capacity. It is recommended in all cases that a geotechnical investigation of the subject site be carried out to inform the structural design.

7.3 Pipe and service penetrations through the slab must be specifically detailed by the design engineer, with consideration to the structural design of the slab.

7.4 Pipes penetrating concrete or under buildings must be installed in accordance with NZBC Verification Method G12/VM1, NZBC Acceptable Solution G12/AS1, NZBC Acceptable Solution G13/AS2 and NZBC Acceptable Solution G13/AS3, as applicable.

7.5 Shrinkage control joints in the MAXRaft Concrete Slab Floor System shall be specifically detailed by the engineer. Saw cutting where required should be carried out as soon as the concrete surface can endure the saw cutting process, but not later than 24 hours after placement.

7.6 Bottom plate fixings shall be selected with regard to the required installation depth and minimum edge distances specified by the fastening proprietor. Wall framing can be increased in depth to accommodate specific fixing installation requirements. Refer to the Technical Literature for additional information.

7.7 Exposed perimeter surfaces of the EPS foam forms must be protected from physical damage, UV light and water ingress. This is typically achieved by the application of a plastered coating that protects the insulation and is suitable to be in close proximity to the ground. Applied plaster coatings for use over the MAXRaft Concrete Slab Floor System have not been assessed by BRANZ and are outside the scope of the Appraisal.

Durability

Serviceable Life

8.1 The MAXRaft Concrete Slab Floor System is expected to have a serviceable life equal to that of standard concrete floors and slabs.

8.2 The minimum compressive strength of the concrete used in the construction of the MAXRaft Concrete Slab Floor System shall be determined by the NZS 3604 exposure zone, or otherwise nominated by the design engineer.

8.3 Cover to steel must meet minimum values set out in NZS 3604, Paragraph 4.5.1.

Maintenance

9.1 Conventional maintenance procedures typical of concrete slabs may be used for slabs constructed using MAXRaft Concrete Slab Floor System.

9.2 All exposed perimeter surfaces shall be inspected and cleaned at least annually, and any damage repaired immediately. Protective coatings must be maintained throughout the life of the building in accordance with the coating proprietor's instructions to ensure the ongoing protection of the slab.

Control of External Fire Spread

10.1 Where the MAXRaft Concrete Slab Floor System must meet specific exterior surface finish requirements in accordance with NZBC Acceptable Solutions C/AS1, Paragraph 5.3.1.1 or NZBC Acceptable Solution C/AS2, Paragraph 5.8.1, protective coatings applied to the exposed perimeter surface of the MAXRaft Concrete Slab Floor System shall be selected to meet these requirements based on information from the coating supplier. Applied plaster coatings for use over the MAXRaft Concrete Slab Floor System have not been assessed by BRANZ and are outside the scope of this Appraisal.

External Moisture

11.1 A suitable DPM in accordance with NZS 3604, Clauses 7.5.4–7.5.7 must be used under MAXRaft Concrete Slab Floor Systems.

11.2 Ground clearances in accordance with NZS 3604, Figure 7.11 and NZBC E2/AS1, Paragraph 9.1.3.1 must be maintained throughout the life of the building.

11.3 The exposed perimeter surface of the EPS foam forms must be protected from physical damage, UV light and water ingress. This is typically achieved by the application of a plastered coating that protects the insulation and is suitable to be in close proximity to the ground. Applied plaster coatings for use over the MAXRaft Concrete Slab Floor System have not been assessed by BRANZ and are outside the scope of this Appraisal.

Energy Efficiency

12.1 Minimum construction R-values required by NZBC Clause H1 Energy Efficiency for slab-on-ground floors is dependent on the climate zone and if there is in-slab heating built into the foundations. Compliance with NZBC Clause H1 Energy Efficiency for slab-on-ground floors is dependent on project-specific details, including floor type, floor area to perimeter ratio, floor insulation type and external wall type. Construction R-values for concrete slab-on-ground floors, including floors of basements that contain certain conditioned spaces, shall be determined using either:

- the performance tables in Section F1.2 of NZBC Acceptable Solutions H1/AS1 or H1/AS2; or,
- the calculation methods in NZBC Verification Methods H1/VM1 or H1/VM2, Appendix F.

12.2 The MAXRaft Concrete Slab Floor System can be used to meet the NZBC Clause H1 requirements, refer to the relevant manufacturers websites for further information. The system and components have not been assessed for insulation contribution and this aspect is outside the scope of this Appraisal.

Installation Information

13.1 Installation of the MAXRaft Concrete Slab Floor System must be in accordance with the Technical Literature. The main items for consideration are summarised here:

- Site preparation – a flat, level platform must be prepared. Where fill material is used to prepare the site, it should be tested to ensure that it meets the ground bearing capacity specified by the engineer. Cut platforms should not be left exposed to dry out for any significant time, particularly where the underlying soils are identified as expansive.
- Piped services that are to be placed under the MAXRaft Concrete Slab Floor System must be installed by the drainage contractor with appropriate pipe bedding material and in accordance with the relevant NZBC Acceptable Solutions and Verification Methods. Refer to Paragraph 7.4.
- DPM – the DPM must be placed over a blinding layer of compacted sand/fines to a depth of 25 mm. The blinding layer must be laid over continuously over the building platform and extend a minimum of 500 mm beyond the perimeter of the slab. The blinding must be compacted and levelled to +/-3 mm of the desired level.
- Boxing – this must be set to correct height and levels and be accurately checked to ensure correct layout. All rebates for brickwork, garage door thresholds or joinery should be accommodated in the construction of the boxing.
- EPS foam forms – the forms shall be placed on the DPM as per the set-out drawings, which ensures the correct dimensions for all perimeter foundations and internal ribs. The MAXRaft system components are delivered with a panel plan, with all EPS components labelled correspondingly. All components should be placed as designated in the panel plan provided. Cutting of any required service holes should be carried out to a diameter of 20 mm larger than the size of the penetration using either a holesaw, sabre saw or a handsaw. This should be done away from the building footprint to ensure no free polystyrene beads 'float up' during concrete placement. Once all forms are positioned and penetrations are made, joints and gaps shall be filled with expanding foam to ensure containment of wet concrete.
- Reinforcing – all reinforcing steel shall be laid out as per the set-out drawings, adequately supported on bar chairs and spacers to ensure correct concrete cover.

13.2 The concrete for the MAXRaft Concrete Slab Floor System must be placed, finished and cured in accordance with the requirements of NZS 3109.

13.3 The exposed perimeter surface of the EPS foam forms must be protected from physical damage, UV light and water ingress. This is typically achieved by the application of a plastered coating that protects the insulation and is suitable to be in close proximity to the ground. Applied plaster coatings for use over the MAXRaft Concrete Slab Floor System have not been assessed by BRANZ and are outside the scope of this Appraisal.

Health and Safety

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

Basis of Appraisal

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

BRANZ Investigations

15.1 A structural review of the MAXRaft Concrete Slab Floor System was undertaken by BRANZ structural engineers and found to be satisfactory.

15.2 A durability assessment has been provided by BRANZ technical experts.

15.3 The Technical Literature has been reviewed by BRANZ and found to be satisfactory.

15.4 Inspections of MAXRaft Concrete Slab Floor System installations being placed, and completed installations have been made by BRANZ to assess the practicability of installation, and to examine completed installations.

Quality

16.1 MAXRaft is responsible for the quality of the components supplied for the MAXRaft Concrete Slab Floor System.

16.2 Quality on-site is the responsibility of the building contractor.

16.3 Designers are responsible for incorporating the MAXRaft Concrete Slab Floor System into the design of buildings.

16.4 Building owners are responsible for the maintenance of the MAXRaft Concrete Slab Floor System in accordance with the instructions of MAXRaft.

Sources of Information

- AS/NZS 4671:2001 Steel reinforcing materials.
- NZS 3104:2003 Specification for concrete production.
- NZS 3109:1997 Concrete construction.
- NZS 3604:2011 Timber-framed buildings.
- NZS 4218:2009 Thermal insulation – Housing and small buildings.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.

BRANZ

In the opinion of BRANZ, the MAXRaft Concrete Slab Floor System 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 MBSS Limited T/A MAXRaft, 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. MBSS Limited T/A MAXRaft:
   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 quality of work;
   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 MBSS Limited T/A MAXRaft.
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 MBSS Limited T/A MAXRaft or any third party.

For BRANZ

Claire Falck
Chief Executive

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13 August 2024