

BRANZ Appraised

Appraisal No. 1221 [2022]

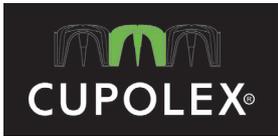
CUPOLEX®

Appraisal No. 1221 [2022]



BRANZ Appraisals

Technical Assessments of products
for building and construction.



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Product

- 1.1 CUPOLEX® is a concrete floor system which includes plastic, dome-shaped concrete void formers to create concrete slab-on-ground floors. Concrete is placed over the modular pod void formers to create a waffle raft slab. The system consists of CUPOLEX® Pods, Beton Stops, Flat Stops, Reinforcing Chairs and Load Spreaders which are all identified by the CUPOLEX® brand on the individual components. The concrete used with the CUPOLEX® system is specified by the Technical Literature or by the Chartered Professional Engineer.

Scope

- 2.1 CUPOLEX® is a concrete floor system intended for use within slab-on-ground floors for either timber-framed buildings within the scope limitations of NZS 3604, or steel-framed buildings within the scope of limitations of NASH Standard Part 2, or other similar light weight construction where floor slabs are subject to Specific Engineering Design.
- 2.2 CUPOLEX® can be designed using design details from the Technical Literature when built on:
 - 'good ground' and 'TC1' type ground within the 'Canterbury earthquake region', as defined by the NZBC Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure; or,
 - ground with an ultimate bearing capacity of minimum 200 kPa pressure (as defined in the Technical Literature) and with all other classification details of 'good ground' or 'TC1' type ground within the 'Canterbury earthquake region'
- 2.3 When built on 'TC2' type ground within the 'Canterbury earthquake region', or moderately to highly expansive soils, CUPOLEX® is subject to Specific Engineering Design, as well as to verification and assessment by a Chartered Professional Engineer.
- 2.4 Compliance with NZBC Clause H1 Energy Efficiency is dependent on project-specific details (including supplementary insulation where required), refer to Paragraph 12.1.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, CUPOLEX®, 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. CUPOLEX® 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. CUPOLEX® meets these requirements. See Paragraphs 8.1–8.3.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.3. CUPOLEX® meets these requirements. See Paragraphs 11.1–11.3.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. CUPOLEX® meets this requirement.

Clause H1 ENERGY EFFICIENCY: Performance H1.3.1 and H1.3.2E. CUPOLEX® contributes to meeting these requirements. See Paragraphs 12.1–12.2.

Technical Specification

4.1 The components of CUPOLEX® supplied by Cupolex Solutions Ltd are:

- **CUPOLEX® Pods** - H200 and H260 – 100% recycled polypropylene injection moulded concrete void formers.
- **Beton Stops** - adjustable concrete stop ends, used to make adjustments on edge beams and around plumbing or where there is not enough space to incorporate a full CUPOLEX® Pod.
- **Flat Stops** – 100% recycled polypropylene injection moulded forms that fit where Beton Stops are not required, to enclose the pod on the outer edges.
- **Reinforcing Chairs** – C100 – plastic reinforcement chairs used for the accurate placement of perimeter and internal reinforcing bars.
- **Load Spreader** – a polypropylene reinforcement column used in the reinforcement of CUPOLEX® Pods.

Handling and Storage

5.1 CUPOLEX® must be stored securely on-site and protected from damage. Protection from direct ultraviolet (UV) exposure should be provided whilst in storage and limited during install. Installation of CUPOLEX® must only be undertaken once the reinforcing steel and mesh is also ready to place to minimise delays with the concrete pour.

Technical Literature

6.1 This Appraisal must be read in conjunction with:

- CUPOLEX® Technical Manual, Version 1.5.22.

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 CUPOLEX® can be designed using design details from the Technical Literature when:
- built on 'good ground' and 'TC1' type ground within the 'Canterbury earthquake region'; or,
 - built on ground with an ultimate bearing capacity of minimum 200 kPa pressure [as defined in the Technical Literature referenced by this Appraisal] and with all other classification details of 'good ground' or 'TC1' type ground within the 'Canterbury earthquake region'
- 7.2 CUPOLEX® is subject to Specific Engineering Design, as well as to verification and assessment by a Chartered Professional Engineer, when built on 'TC2' type ground within the 'Canterbury earthquake region' or moderately to highly expansive soils, with due allowance made for the underlying ground conditions and soil bearing capacity. The Chartered Professional Engineer is also responsible for considerations listed in Paragraphs 7.3-7.7.
- 7.3 In all cases it is recommended that a geotechnical investigation of the subject site be carried out to inform the structural design.
- 7.4 Pipe and service penetrations through the slab must be specifically detailed with consideration to the structural design of the slab.
- 7.5 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.
- 7.6 Shrinkage control joints in the CUPOLEX® floor system must be specifically detailed. 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.
- 7.7 Bottom plate fixings must 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.

Durability

Serviceable Life

- 8.1 CUPOLEX® 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 CUPOLEX® must be determined by the NZS 3604 Exposure Zone, or otherwise nominated by the Design Engineer.
- 8.3 Cover to steel must meet the 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 CUPOLEX®.
- 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 CUPOLEX® must meet specific exterior surface finish requirements in accordance with NZBC Acceptable Solutions C/AS1 Paragraph 5.4 or C/AS2 Paragraph 5.8.1, protective coatings applied to the exposed perimeter surface of CUPOLEX® shall be selected to meet these requirements based on information from the coating supplier. Applied plaster coatings for use over CUPOLEX® have not been assessed by BRANZ and are outside the scope of this Appraisal.

External Moisture

- 11.1 A suitable damp-proof membrane (DPM) must be used under CUPOLEX®, in accordance with NZS 3604, Clauses 7.5.4–7.5.7.
- 11.2 Ground clearances must be maintained throughout the life of the building, in accordance with NZS 3604, Figure 7.11 and NZBC Acceptable Solution E2/AS1, Paragraph 9.1.3.1.
- 11.3 The exposed perimeter surface of the concrete slab can be considered to be directly comparable to that of a NZS 3604-style slab-on-ground. If desired, [and observed at the site visit], EPS foam can be used for perimeter insulation as part of the floor design. If used, EPS 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. The use of EPS and applied plaster coatings over the EPS has not been assessed by BRANZ and is outside the scope of the Appraisal.

Energy Efficiency

- 12.1 Compliance with H1 Energy Efficiency is dependent on project-specific details (including supplementary insulation where required) complying with:
 - NZBC Acceptable Solution H1/AS1 Fifth Edition and Verification Method H1/VM1 5th Edition for all housing, and buildings up to 300 m²; or,
 - NZBC Acceptable Solution H1/AS2, First Edition and Verification Method H1/VM2, First Edition for buildings greater than 300 m²; or,
 - NZBC Acceptable Solution H1/AS1, Fourth Edition, Amendment 4 for all buildings within the scope of this certification for building consent applications submitted before 3 November 2022.

Installation Information

- 13.1 Installation of CUPOLEX® must be in accordance with the Technical Literature. The main items for consideration are summarised below:
- 13.2 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 Chartered Professional Engineer. Cut platforms should not be left exposed to dry out for any significant time, particularly where the underlying soils are identified as expansive.
- 13.3 Piped services that are to be placed under CUPOLEX® 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.
- 13.4 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 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.
- 13.5 Boxing 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.
- 13.6 CUPOLEX® pods shall be placed on the DPM as per the set-out drawings, which ensures the correct dimensions for all perimeter foundations and internal ribs. All CUPOLEX® components should be placed as designated in the plan provided.
- 13.7 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.
- 13.8 The concrete for CUPOLEX® must be placed, finished and cured in accordance with the requirements of NZS 3109.
- 13.9 If EPS foam is used for perimeter insulation, the exposed perimeter surface of the EPS foam forms must be protected from physical damage, UV light and water ingress. The application of EPS and applied coatings for use over perimeter insulation has not been assessed by BRANZ and is outside the scope of the 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 CUPOLEX® 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 CUPOLEX® 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 Cupolex Solutions Ltd is responsible for the quality of the components supplied for CUPOLEX®.
- 16.2 Quality on-site is the responsibility of the building contractor.
- 16.3 Cupolex Solutions Ltd is responsible for incorporating CUPOLEX® into the design of buildings when built on 'good ground' and 'TC1' type ground within the 'Canterbury earthquake region'; or, built on ground with an ultimate bearing capacity of minimum 200 kPa pressure (as defined in the Technical Literature) and with all other classification details of 'good ground' or 'TC1' type ground within the 'Canterbury earthquake region'
- 16.4 Chartered Professional Engineers are responsible for incorporating CUPOLEX® into the design of buildings when built on 'TC2' type ground within the 'Canterbury earthquake region' or moderately to highly expansive soils .
- 16.5 Building owners are responsible for the maintenance of CUPOLEX® in accordance with the instructions of Cupolex Solutions Ltd.

Sources of Information

- NASH Standard Part 2:2019 Light Steel Framed Buildings.
- NZS 3109:1997 Concrete construction.
- NZS 3604:2011 Timber-framed buildings.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.



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01 June 2022

CUPOLEX®



In the opinion of BRANZ, **CUPOLEX®** 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 **Cupolex Solutions Ltd**, 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. **Cupolex Solutions Ltd**
 - 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 **Cupolex Solutions Ltd**
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 **Cupolex Solutions Ltd** or any third party.

For BRANZ

Chelydra Percy

Chief Executive

Date of Issue:

01 June 2022