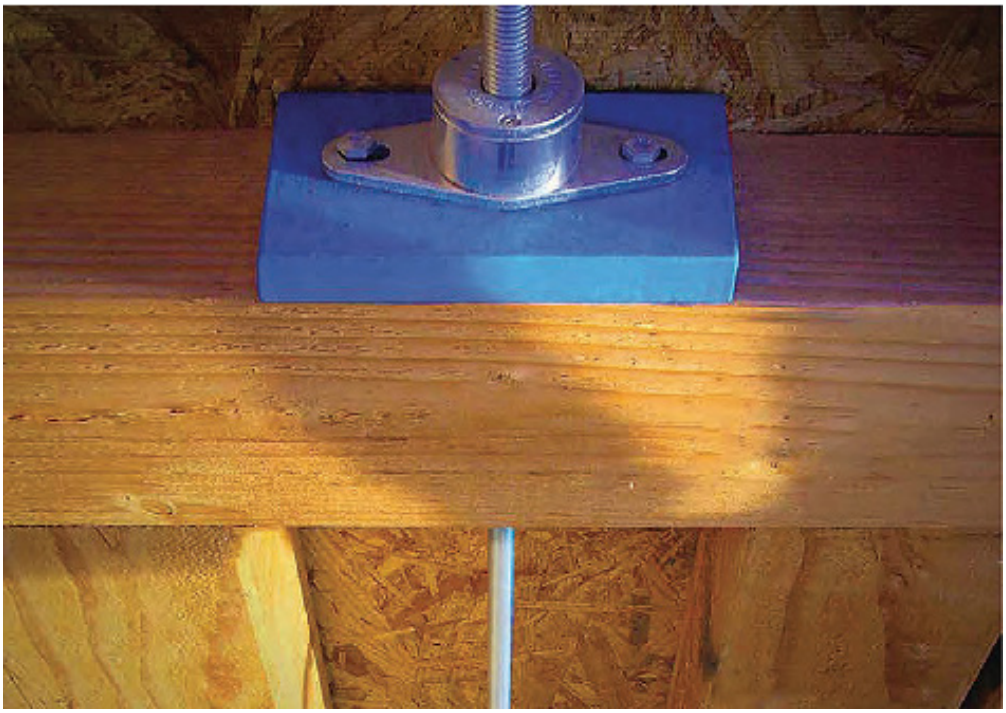
BRANZ Appraised
Appraisal No. 1228 [2023]

MITEK® Z4 TIE-DOWN SYSTEM



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BRANZ Appraisals

Technical Assessments of products for building and construction.

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Product

1.1 The MiTek® Z4 Tie-Down System is a hold down anchor system to transfer overturning and uplift tension forces resulting from earthquake and wind loading, to the foundation. It consists of MiTek® Z4 All Threaded Rods, MiTek® Z4 CNX-Series Cinch Nuts, Couplers, MiTek® Z4 Bearing Plate Washers, and Anchor Ties.

Scope

2.1 The MiTek® Z4 Tie-Down System has been appraised for use as a component of the bracing system in multi-storey timber-framed buildings complying with the NZBC.

2.2 Installations are subject to Specific Engineering Design (SED) and supervision by a Chartered Professional Engineer.

Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, the MiTek® Z4 Tie-Down 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 MiTek® Z4 Tie-Down System meets these requirements for loads arising from earthquake and wind [i.e. B1.3.3 (f) and (h)]. See Paragraphs 7.1-8.9.

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years. The MiTek® Z4 Tie-Down System meets this requirement. See Paragraphs 9.1-9.3.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The MiTek® Z4 Tie-Down System meets this requirement.

Technical Specification

4.1 Components of the MiTek® Z4 Tie-Down System supplied by MiTek New Zealand Limited are:

- **MiTek® Z4 All Threaded Rod (ATR)** - a fully threaded rod available in either ASTM Grade A36 or ASTM Grade A193-B7 steel and in lengths of 1.829 m (6'), 3.048 m (10') and 3.658 m (12'). Other lengths are available on special order.
- **MiTek® Z4 CNX-Series Cinch Nut** - available in 3.175 mm (1/8") increments for installation with threaded rods between 9.525 mm (3/8") and 38.1 mm (1-1/2") diameter.
- **Coupler** - available in standard and high strength grade steel in various sizes to suit the relevant MiTek® Z4 ATR. Reducer couplers are available to connect rods of different diameters.
- **MiTek® Z4 Bearing Plate Washer (BPW)** - fabricated from ASTM Grade A36 steel and powder-coated in a range of colours. They are available in various sizes as specified in the Technical Literature.
- **Anchor Tie** - fabricated from ASTM Grade A36 steel plates including a pre-welded nut. They are available in 229, 299 and 406 mm heights. Other heights are available upon request.
- **Screw** - MiTek® WS-3 or MiTek® Type 17-14 g electro-galvanised screw.

Handling and Storage

5.1 Handling and storage of all MiTek® Z4 Tie-Down System components, when on-site, is under the control of the installer. All components must be stored securely on-site in clean, dry conditions.

Technical Literature

6.1 This Appraisal must be read in conjunction with:

- MiTek New Zealand Limited, MiTek Guide for Z4 Lateral Solution, June 2023.

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 MiTek® Z4 Tie-Down System is subject to Specific Engineering Design by a Chartered Professional Engineer.

7.2 In all cases it is recommended that a geotechnical investigation of the subject site be carried out to inform the structural design.

7.3 Design considerations not covered by the Technical Literature are outside the scope of this Appraisal.

7.4 MiTek Z4 Tie-Down System components referenced in Technical Literature but not specified in this Appraisal have not been assessed and are outside the scope of this Appraisal.

Structure

8.1 The MiTek® Z4 Tie-Down System is capable of providing a tensile hold down force as shown in Table 1.

MiTek® Z4 All Threaded Rod (ATR)

8.2 The fully threaded rods transfer loads from the cinch nut to the terminating structure of concrete foundation, steel beam or timber beam.

MiTek® Z4 CNX-Series Cinch Nut

8.3 The CNX-Series Cinch Nut is a shrinkage compensating take-up device that has the ability to perpetually 'travel' down the length of the threaded rod in one direction only, using an internal self-ratcheting action. When connected to the floor framing, the CNX-Series Cinch Nut travels down the rod and keeps connections of tie-down runs tight to the floor framing members when shrinkage and compression of timber fibres occur.

8.4 Table 1 shall be used to compute the deformation of the MiTek® Z4 CNX-Series Cinch Nut under earthquake tension, as described in the Technical Literature. The deformation of the timber under the MiTek® Z4 Bearing Plate Washer and tensile elongation of the MiTek® Z4 All Threaded Rod shall also be considered in determining the total deformation of the MiTek® Z4 Tie-Down System at each level.

Table 1: Cinch Nut Movement Due to Tension

Parameter	CNX-Series Cinch Nut Model Number									
	CNX-3	CNX-4	CNX-5	CNX-6	CNX-7	CNX-8	CNX-9	CNX-10	CNX-11	CNX-12
P_A Max capacity (kN)	32.51	59.53	94.81	140.31	193.70	254.12	320.20	406.56	484.49	589.52
Δ_A (mm) Deflection at max capacity	0.40	0.55	0.47	0.57	0.59	0.61	0.59	0.73	0.68	0.92
Δ_R (mm) Device average travel and seating increment	0.74	1.22	1.31	1.47	1.29	1.39	1.33	1.92	2.04	1.82

Coupler

8.5 Couplers are used to connect MiTek® Z4 ATR end-to-end to create a continuous load path. Reducer couplers connect two rods of different diameters.

MiTek® Z4 Bearing Plate Washer (BPW)

8.6 The BPW transfers loads between the MiTek® Z4 CNX-Series Cinch Nut and the timber framing. They are the interface between the MiTek® Z4 Tie-Down System and the level of the building being anchored to the foundation.

Anchor Tie

8.7 The Anchor Tie is a structural component designed for connecting the MiTek® Z4 Tie-Down System to steel members. Common applications include connecting to steel beams where MiTek® Z4 ATR terminate. Steel beam installations must be designed by Chartered Professional Engineers.

8.8 The Anchor Tie, when designed and installed in accordance with the Technical Literature, shall have sufficient tension capacity exceeding the specified bar strength.

8.9 The Anchor Tie shall be welded onto the steel member using a 'complete penetration butt weld' in accordance with NZS 3404.1 Section 9.7.2.7.

Durability

Serviceable Life

9.1 The MiTek® Z4 Tie-Down System is expected to have a serviceable life of not less than 50 years.

9.2 The CNX-Series Cinch Nut shall be kept free from debris and all components shall remain dry during the construction period.

9.3 The MiTek® Z4 Tie-Down System should be enclosed as soon as practically possible.

Maintenance

10.1 No maintenance is required for the MiTek® Z4 Tie-Down System. Regular checks, at least annually, must be made of the cladding, flashings and penetrations to ensure they are maintained weathertight and continue to perform their function, to ensure that water will not penetrate the cladding.

External Moisture

11.1 The exterior cladding of the building shall remain weathertight, and be maintained in accordance with the cladding manufacturer's instructions.

Installation Information

Installation Skill Level Requirement

12.1 All design and building work must be carried out in accordance with the MiTek® Z4 Tie-Down System Technical Literature, a Chartered Professional Engineer and this Appraisal by competent and experienced tradespeople conversant with the MiTek® Z4 Tie-Down System. Where the work involves Restricted Building Work (RBW) this must be completed by, or under the supervision of, a Licensed Building Practitioner (LBP) with the relevant License Class.

General

13.1 Installation of the MiTek® Z4 Tie-Down System must only be undertaken before and during the timber frame construction.

13.2 The specified MiTek® Z4 BPW must be placed onto the bottom plate of a timber-framed wall.

13.3 The MiTek® Z4 CNX-Series Cinch Nut must be oriented with the "wings" downward and placed over the MiTek® Z4 ATR extending from below and pushed down until it seats firmly on the MiTek® Z4 BPW.

13.4 The screws through the wings of the MiTek® Z4 CNX-Series Cinch Nut must penetrate a minimum of 40 mm into bottom plate. For MiTek® Z4 BPW model numbers BPW-5 and BPW-6, the screws fit in-between the wings; whilst model numbers BPW-7 and larger are provided with two screw holes for fastening. The wings of the MiTek® Z4 CNX-Series Cinch Nut must align with the MiTek Z4 BPW screw holes to allow installation of 14 g screws.

13.5 To resist tension loads due to overturning moments in multi-story buildings, the MiTek® Z4 CNX-Series Cinch Nut is installed over a MiTek® Z4 BPW on top of the bottom plate at each level. At the upper-most level, a MiTek® Z4 CNX-Series Cinch Nut is also installed over a MiTek® Z4 BPW above the top plate.

Health and Safety

14.1 There are no specific health and safety requirements for the MiTek® Z4 Tie-Down System, however safe use and handling procedures for the components that make up the system must be followed in accordance with the requirements of the Technical Literature.

Basis of Appraisal

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

BRANZ Investigations

15.1 A structural review of the MiTek® Z4 Tie-Down 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 the MiTek® Z4 Tie-Down System have been made by BRANZ to assess the practicability of installation, and to examine completed installations.

Quality

16.1 MiTek New Zealand Limited is responsible for the quality of the components supplied for the MiTek® Z4 Tie-Down System.

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

16.3 A Chartered Professional Engineer is responsible for incorporating the MiTek® Z4 Tie-Down System into the design of buildings.

16.4 Building owners are responsible for the maintenance of the building in order to keep the MiTek® Z4 Tie-Down System dry during its serviceable life.

Sources of Information

- NZS 3604:2011 Timber-framed buildings.
- NZS 3404.1:1997 Steel Structures Standard.
- 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 MiTek® Z4 Tie-Down 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 MiTek New Zealand 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. MiTek New Zealand 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 MiTek New Zealand 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 MiTek New Zealand Limited or any third party.

For BRANZ

Claire Falck
Acting Chief Executive
Date of Issue:
10 August 2023