



BRANZ Appraised

Appraisal No.687 [2010]

BRANZ Appraisals

Technical Assessments of products
for building and construction

**BRANZ
APPRAISAL
No. 687 (2010)**

Amended 18 February 2011.

**FORTRESS SCREW
BOLTS**

Manufacturing Suppliers Limited

560 Rosebank Road
Avondale
Auckland 1026

Tel: 0800 42 52 62

Fax: 0800 80 60 50

Web: www.fortressfasteners.co.nz



BRANZ

**BRANZ Limited
Private Bag 50 908
Porirua City
New Zealand**

Tel: +64 4 237 1170

Fax: +64 4 237 1171

www.branz.co.nz



Product

1.1 Fortress Screw Bolts are used to resist earthquake and wind loads on the bottom plates of timber frame buildings designed and constructed in accordance with NZS 3604. The range consists of screw-type fasteners for proprietary bracing systems hold downs to concrete slab-on-ground construction. They are also for fixing non-bracing internal and external walls to concrete slab-on-ground.



Scope

2.1 The Fortress Screw Bolts have been appraised for use as wall bracing system hold downs and bottom plate fixings to concrete slab-on-ground in buildings designed and constructed in accordance with NZS 3604. They are for use in internal, dry, protected environments.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, the Fortress Screw Bolts, 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 Fortress Screw Bolts meet these requirements for loads from imposed gravity loads arising from use, earthquake, snow, wind and impact [i.e. B1.3.3 (b), (f), (g), (h), and (j)]. See Paragraphs 8.1 - 8.2.

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years. The Fortress Screw Bolts meet this requirement. See Paragraph 9.1.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The Fortress Screw Bolts meet this requirement and will not present a health hazard to people.

3.2 This is an appraisal of an **Alternative Solution** in terms of New Zealand Building Code compliance when used with proprietary bracing systems.

3.3 This is an appraisal of an **Acceptable Solution** in terms of New Zealand Building Code compliance. The Fortress Screw Bolts meet the requirements of Section 7.5.12 of NZS 3604 which is a NZBC Compliance Document.

Technical Specification

Description

4.1 The following fasteners are covered by this Appraisal:

Fortress 12 x 150 Screw Bolt

These screw bolts are manufactured from steel and are coated with a nominal 5 micron zinc layer. The screw anchor has a hexagonal head and a nominal shank diameter of 12 mm. The under-head anchor or shank length is 150 mm. They are identified with "F 12 x 150" stamped on the head.

Fortress 10 x 120 Screw Bolt

These screw bolts are manufactured from steel and are coated with a nominal 5 micron zinc layer. The screw anchor has a hexagonal head and a nominal shank diameter of 10 mm. The under-head anchor or shank length is 120 mm. They are identified with "F 10 x 120" stamped on the head.

Handling and Storage

5.1 Fortress Screw Bolts should be stored in a clean, dry area until they are used. Their exposure to the elements after installation should be kept to a minimum. Closing the building in within the required time to protect the framing timber from the environment will be suitable.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the Fortress Screw Bolts. The Technical Literature must be read in conjunction with this Appraisal. 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 Fortress Screw Bolts are concrete fasteners used to resist earthquake and wind loads on timber frame buildings designed and constructed in accordance with NZS 3604. They are for fixing the bottom plates of walls to concrete slab-on-ground construction. They include fasteners for in situ concrete foundation edge detail, concrete masonry foundation edge detail and internal slab detail.

Proprietary Bracing Systems

7.2 The Fortress Screw Bolts are for use as hold downs for proprietary bracing systems rated up to 150 BU/m (bracing units per metre) for the Fortress 12 x 150 screw bolt, and bracing systems rated up to 120 BU/m (bracing units per metre) for the Fortress 10 x 120 screw bolt, as described in Table 1.

Formed Concrete Foundations

7.3 When Fortress Screw Bolts are used as fixings for external walls with formed concrete foundations the minimum concrete strength must be 17.5 MPa in Zone 2 and Zone 3, 20 MPa in Zone 1 and 25 MPa in the Sea Spray Zone (refer 4.8.2 of NZS 3604). These concrete strength requirements are as prescribed by NZS 3604 and are not a special requirement for Fortress Screw Bolts.

Concrete Masonry Header Block Foundations

7.4 In the Sea Spray Zone, as defined by NZS 3604, insufficient cover is able to be achieved and so Fortress Screw Bolts must not be used in external walls in concrete masonry header block foundations.

7.5 When Fortress 12 x 150 screw bolts are used as fixings for external walls with concrete masonry header block foundations in Zone 1, Zone 2 and Zone 3 as defined by NZS 3604, then the minimum grout/concrete strength is 17.5 MPa. Fortress 10 x 120 screw bolts have not been assessed for use with concrete masonry header block foundations.

Internal Walls

7.6 When Fortress Screw Bolts are used as fixings for internal walls the minimum concrete strength is 17.5 MPa.

7.7 Holes that are drilled for the fasteners must be 10 mm deeper than their embedment depth. Care should be taken as this may require slab thickening in some situations, and this must be taken into account when the slab is laid.

Structure

Bracing systems hold downs

8.1 The Fortress Screw Bolts may be used for proprietary bracing systems hold down bolts to concrete slab-on-ground construction. The maximum characteristic uplift strengths for the fasteners are given in Table 1. The Technical Literature of the proprietary bracing system must be referenced to determine the required hold down characteristic strength for the bracing elements.

NZS 3604 Fixing of Timber

8.2 Table 2 gives the maximum fastener spacing allowed for the Fortress Screw Bolts to meet the requirements of NZS 3604 Paragraphs 7.5.12.3 and 7.5.12.4.

Durability

Serviceable Life

9.1 The Fortress Screw Bolts are expected to have a serviceable life of at least 50 years, provided they are designed, used, installed and maintained in accordance with this Appraisal and the Technical Literature.

Maintenance

10.1 The Fortress Screw Bolts will not normally require maintenance. However, if damage occurs to the cladding or lining covering the Fortress Screw Bolts, then repairs or replacement of the cladding or lining must be carried out to ensure the integrity of the Bracing System.

External and Internal Moisture

11.1 The Fortress Screw Bolts are protected from moisture by the exterior cladding and internal lining systems of the building, which must meet the provisions of NZBC Clause E2 and Clause E3.

Installation Information

Installation Skill Level Requirement

12.1 Installation of the Fortress Screw Bolts can be carried out by any competent building contractor.

Table 1: Bracing hold-down characteristic tensile strengths

Fastener	Wall Type	Characteristic Strength	Maximum BU/m	Minimum Embedment Depth
Fortress 10 x 120	Internal wall	11 kN	120	70 mm
	External wall - formed concrete foundation	11 kN	120	
	External wall - masonry header block foundation	Not Tested	Not tested	
Fortress 12 x 150	Internal wall	15 kN	150	100 mm
	External wall - formed concrete foundation	15 kN	150	
	External wall - masonry header block foundation	15 kN	150	

Table 2: Bottom plate fastener spacings

Fastener	Wall Type	Maximum Fastener Spacing	Minimum Edge Distance*	Minimum Embedment Depth
Fortress 10 x 120	Internal wall	900 mm	60 mm	70 mm
	External wall - formed concrete foundation	725 mm		
	External wall - masonry header block foundation	Not Tested		
Fortress 12 x 150	Internal wall	900 mm	60 mm	100 mm
	External wall - formed concrete foundation	900 mm		
	External wall - masonry header block foundation	750 mm		

*This edge distance is to the centre of the fastener (which is 55 mm cover).

Fastener Installation

13.1 The Fortress Screw Bolts must be installed in accordance with the Technical Literature.

13.2 Fortress Screw Bolts are installed by drilling a hole into the concrete of a diameter and to the depth specified in the Technical Literature and tightening up the fastener with a torque wrench to the required load given in the Installation Instructions.

13.3 Prior to wall lining application, when all timber framing moisture content is 20% or less, as required by the wall lining manufacturer, fasteners must be checked for tightness.

Inspections

14.1 The Technical Literature of Fortress Screw Bolts and the bracing system proprietor must be referred to during the inspection of installations.

14.2 Critical areas of inspection for wall bracing systems are:

- The bracing schedule; and,
- Bracing rating and fastener strength; and,
- Hold down fastener type by checking the markings on the screw anchor head; and,
- Edge detail and distance; and,
- Fasteners are not to be used in header block foundations in the Sea Spray Zone as defined in NZS 3604.

Health and Safety

15.1 Suitable precautions should be taken when drilling concrete to prevent the inhalation of concrete dust. Care should also be taken when using power tools.

Basis of Appraisal

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

Tests

16.1 Testing of the Fortress Screw Bolts was carried out by BRANZ in accordance with BRANZ Evaluation Method EM1 (1999), as required by NZS 3604.

Other Investigations

17.1 Structural and durability assessments have been provided by BRANZ technical experts.

17.2 Observations have been made by BRANZ to assess the practicability of installation, and to examine completed installations.

17.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

Quality

18.1 The manufacture of Fortress Screw Bolts 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. BRANZ carries out random sampling and testing of the Fortress Screw Bolts to ensure ongoing quality.

18.2 The quality of Fortress Screw Bolts supplied is the responsibility of Manufacturing Suppliers Limited.

18.3 Designers are responsible for the design of buildings incorporating the Fortress Screw Bolts and the proprietary bracing systems.

18.4 The building contractors are responsible for the quality of construction of the building structure in accordance with the Technical Literature.

18.5 Building owners are responsible for the maintenance of wall claddings and linings as applicable so that the Fortress Screw Bolts remain protected during their service life.

Sources of Information

- BRANZ Evaluation Method EM1 Method for Evaluating the Strength and Stiffness of Structural Joints, 1999.
- NZS 3604:1999 Timber framed buildings.
- New Zealand Building Code Handbook Department of Building and Housing, Third Edition May 2007.
- The Building Regulations 1992, up to, and including August 2008 Amendment.



BRANZ

In the opinion of BRANZ, Fortress Screw Bolts are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Manufacturing Suppliers 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. [Manufacturing Suppliers 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 [Manufacturing Suppliers 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 [Manufacturing Suppliers Limited](#) or any third party.

For BRANZ

P Burghout
Chief Executive

Amendment No. 1, dated 18 February 2011.

This Appraisal has been amended to update fastener spacings.

Date of issue: 29 April 2010