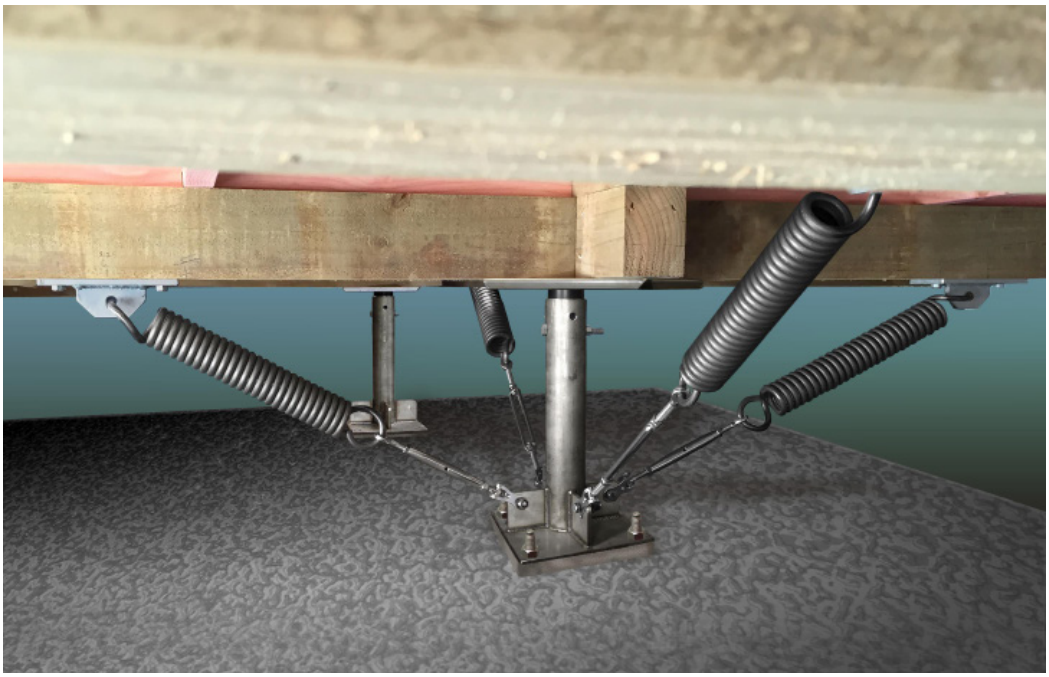
BRANZ Appraised
Appraisal No. 952 [2017]

ADJUSTABLE BASE ISOLATION PIER SYSTEM



Appraisal No. 952 (2017)

Amended 29 September 2022

BRANZ Appraisals

Technical Assessments of products for building and construction.

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Product

1.1 The Adjustable Base Isolation Pier System is intended to isolate lightweight buildings from lateral earth movement during earthquake events. It utilizes stainless steel springs and support and fixing components to connect the building to a concrete under-slab, individual footings or timber piles.

Scope

2.1 The Adjustable Base Isolation Pier System has been appraised for use as a base isolation system within the following scope:

- with single or 2-storey, single unit (detached) buildings; and,
- constructed on a 150 mm or 300 mm thick concrete under-slab in accordance with MBIE Technical Guidance Document Section 15.4.4; or,
- with individual concrete pad or timber pile foundations suitable for good ground as defined in NZS 3604; and,
- with timber-framed floor, walls and roof designed and constructed in accordance with NZS 3604 or the subject of specific engineering design; and,
- with a light roof and light or medium wall cladding (as defined by NZS 3604); and,
- with a maximum floor live load of 1.5 kPa and deck live load of 2 kPa; and,
- situated in NZS 3604 earthquake zones 1, 2, 3, and 4; and,
- situated in NZS 3604 Wind Zones up to, and including, Extra High.

2.2 All buildings incorporating the Adjustable Base Isolation Pier System must be the subject of specific engineering design for the base isolation system by a suitably qualified Chartered Professional Engineer. The engineer is responsible for the incorporation of the Adjustable Base Isolation Pier System into their design in accordance with the instructions of ABI Piers Ltd.

Building Regulations

New Zealand Building Code (NZBC)

3.1 **In the opinion of BRANZ, the Adjustable Base Isolation Pier 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 Adjustable Base Isolation Pier System meets the requirements for loads arising from imposed gravity loads, earthquake, and wind [i.e. B1.3.3 (b), (f), and (h)]. See Paragraphs 7.1-7.6.

Clause B2 DURABILITY: Performance B2.3.1 (a) not less than 50 years. The Adjustable Base Isolation Pier System meets this requirement. See Paragraphs 8.1 and 8.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The Adjustable Base Isolation Pier System meets this requirement.

Technical Specification

4.1 Components and accessories for the Adjustable Base Isolation Pier System, which are supplied by ABI Piers Ltd are as follows:

- **Posts** – including base plates may be manufactured from Grade 304 stainless steel with a yield strength (fy) of 300 MPa, or hot-dip galvanised (HDG) 600 steel for NZS 3604 Exposure Zone B and parts of Exposure Zone C and where springs are connected to a ring foundation.
- **Post anchor bolts** – minimum M12 Grade 304 or 316 stainless steel anchor bolts. Minimum M12 HDG 600 steel where HDG piers are used.
- **Collar and caps for timber piles** - manufactured from Grade 304 or 316 stainless steel.
- **Springs** – manufactured from 12 mm diameter Grade 304 or 316 stainless steel wire.
- **Turnbuckles** – manufactured from Grade 304 or 316 stainless steel.
- **Wire strops** - manufactured from Grade 304 or 316 stainless steel.
- **Steel pans** – manufactured from Grade 304 or 316 stainless steel.
- **Plastic plugs** – manufactured from Sustamid 6G MO (coloured black).
- **Under-bearer brackets or eye bolts**– manufactured from Grade 304 stainless steel with a yield strength (fy) of 300 MPa.
- **Fixings** – Grade 304 or 316 stainless steel bolts or screws, except that hot-dip galvanised hold downs must be used with hot-dip galvanised posts. The galvanising coating on the hold downs must be at least 600 g/m^2.
- **Nail fixings** - 90 x 4 mm stainless steel nails.

Handling and Storage

5.1 Components and accessories for the Adjustable Base Isolation Pier System should be stored in a clean, dry area until they are used.

Technical Literature

6.1 This Appraisal must be read in conjunction with:

- Adjustable Base Isolation Pier System Sample Design, Job No. 011-CHR-17SD dated 03 July 2017.
- Adjustable Base Isolation Pier System Sample Design, Job No. 106-CHR-18SD dated 26.10.2019, Revision 26.8.2022.

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 Adjustable Base Isolation Pier System is designed to reduce the magnitude of seismic forces affecting the superstructure (building). The system is intended for timber-framed single and 2-storey buildings. The building (excluding foundations), must be designed and constructed in accordance with NZS 3604 or be the subject of specific engineering design.

7.2 The Adjustable Base Isolation Pier System is connected to and supported by a 150 or 300 mm thick concrete under-slab in accordance with MBIE Technical Guidance Document Section 15.4.4, or individual concrete pad or timber pile foundations suitable for good ground, as defined in NZS 3604. The minimum access (crawl) space between the under-slab and the building floor joists must be 450 mm.

7.3 All aspects of the foundation and building design when incorporating the Adjustable Base Isolation Pier System must be the subject of specific engineering design.

7.4 The Adjustable Base Isolation Pier System utilises springs as a mechanism to absorb the seismic energy, and friction between the superstructure and the foundation pier as a dampening mechanism.

7.5 Small earthquake loads and wind loads are transferred between the building and foundation by friction. In larger earthquakes, the Adjustable Base Isolation Pier System absorbs the lateral seismic loads. Due to friction, the system cannot totally isolate the building from seismic forces.

7.6 After a major earthquake, the building foundation and Adjustable Base Isolation Pier System should be inspected, so that if the foundation has slumped, the piers can be individually adjusted for level and height. If friction between the plastic plugs and top pans has prevented the pans returning centrally over the piers, an assessment can be made as to whether it is necessary to slightly reposition the house.

7.7 Consideration shall be given to surface water such that it is directed away from the concrete under-slab.

Durability

Serviceable Life

8.1 The metal components of the Adjustable Base Isolation Pier System are manufactured of stainless steel. In addition, where spring assemblies are not attached to piers, the piers and their associated fasteners may also be manufactured from hot-dip galvanised steel. The galvanised steel piers and their fasteners are only for use in NZS 3604 Exposure Zone B, or greater than 20 km from breaking surf on the west and south coasts of the South Island, or greater than 5 km from salt water in Exposure Zone C. The system is expected to have a serviceable life of more than 50 years.

Maintenance

8.2 Following earthquakes, the building foundation, piers and tension of spring assemblies should be checked.

Installation Information

Installation Skill Requirement

9.1 All design and building work must be carried out in accordance with the Adjustable Base Isolation Pier System Technical Literature and this Appraisal by competent and experienced tradespersons conversant with the Adjustable Base Isolation Pier 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.

Basis of Appraisal

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

Tests

10.1 Tests were carried out by BRANZ to establish the structural performance of the Adjustable Base Isolation Pier System.

Calculations

11.1 Calculations to justify the structural adequacy of the Adjustable Base Isolation Pier System and the design method have been examined by BRANZ and found to be satisfactory.

Other Investigations

12.1 BRANZ has observed the assembly of the Adjustable Base Isolation Pier System to assess practicability of the installation methods.

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

Quality

13.1 Details of materials and components used and methods adopted for quality control have been obtained by BRANZ and found to be satisfactory.

13.2 The quality of materials and components supplied by ABI Piers Ltd is the responsibility of ABI Piers Ltd.

13.3 Quality on-site is the responsibility of building contractor and installer.

13.4 The structural designer is responsible for the building design incorporating the Adjustable Base Isolation Pier System. The designer must be a suitably qualified Chartered Professional Engineer.

13.5 The building contractor is responsible for the quality of installation.

13.6 Building owners are responsible for maintenance.

Sources of Information

- AS/NZS 1170:2002 Structural design actions.
- 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.

Amendments

Amendment No. 1, dated 16 February 2017.

This Appraisal has been amended to update the Appraisal Holder and the Appraisal Image.

Amendment No. 2, dated 07 March 2018.

This Appraisal has been amended to include independent concrete pad and timber pile foundations.

Amendment No. 3, dated 29 September 2022.

This Appraisal has been amended to include hot-dip galvanised piers.

BRANZ

In the opinion of BRANZ, the Adjustable Base Isolation Pier 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 ABI Piers 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. ABI Piers 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 ABI Piers 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 ABI Piers Ltd or any third party.

For BRANZ

Chelydra Percy
Chief Executive
15 February 2017