



BRANZ Appraised

Appraisal No.429 [2006]

BRANZ Appraisals

Technical Assessments of products
for building and construction

BRANZ APPRAISAL CERTIFICATE No. 429 (2006)

This Certificate replaces Appraisal
Certificate No. 429 (2002) issued
31 July 2002.

THE MONIERBRICK ABC 2 STOREY BRICK VENEER SYSTEM

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Product

1.1 The MonierBrick ABC 2 Storey Brick Veneer System is a clay brick veneer system specifically for use on 2 storey buildings.



Scope

2.1 The MonierBrick ABC 2 Storey Brick Veneer System has been appraised for use as a veneer cladding system for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1 Paragraph 1.1 in terms of floor area, and with a maximum of two stories; and,
- with a risk score of 0-20, calculated in accordance with NZBC Acceptable Solution E2/AS1 Table 2; and,
- with timber framing constructed on slab-on-ground in accordance with NZS 3604 and/or concrete masonry constructed in accordance with NZS 4229; and,
- with a maximum height of 7 m above the supporting foundation, except that at gable ends this height is measured to the mid-point of the gable, and a maximum height of 4 m above a roof line; and,
- with a cavity width of between 40 mm and 60 mm; and,
- situated in NZS 3604 Building Wind Zones up to and including 'Very High'; and,
- situated in NZS 3604 Earthquake Zones up to and including A.

2.2 The MonierBrick ABC 2 Storey Brick Veneer System is appraised for use with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. *(The Appraisal of the MonierBrick ABC 2 Storey Brick Veneer System relies on the joinery meeting the requirements of NZS 4211 for the relevant Building Wind Zone).*

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, the MonierBrick ABC 2 Storey Brick Veneer System if designed, used, installed and maintained in accordance with the statements and conditions of this Certificate, will meet the following provisions of the NZBC:

Clause B1 Structure: Performance B1.3.1, B1.3.2 and B1.3.4. The MonierBrick ABC 2 Storey Brick Veneer System meets the requirements for loads arising from self-weight, earthquake, wind, impact and creep and shrinkage [i.e. B1.3.3 (a), (f), (h), (j) and (q)]. See Paragraphs 8.1 - 8.24.

Clause B2 Durability: Performance B2.3.1 (a), not less than 50 years. The structural support elements and hidden flashings meet this requirement. Performance B2.3.1(b), 15 years. The brick veneer wall cladding meets this requirement. See Paragraphs 9.1 - 9.3.

Clause E2 External Moisture: Performance E2.3.2. The MonierBrick ABC 2 Storey Brick Veneer System meets this requirement. See Paragraphs 11.1 - 11.5.

Clause F2 Hazardous Building Materials: Performance F2.3.1. The MonierBrick ABC 2 Storey Brick Veneer System meets this requirement and will not present a health hazard to people.

3.2 This Certificate appraises as an **Alternative Solution** in terms of New Zealand Building Code compliance.

Technical Specification

MonierBrick Bricks

4.1 The MonierBrick ABC 2 Storey Brick Veneer System uses MonierBrick 70 mm bricks, which are extruded, kiln-fired clay bricks, nominally 230 mm long and either 76, 119 or 162 mm high. The bricks are smooth, patterned or textured, and are manufactured to AS/NZS 4455.

Accessories

4.2 Accessories used with the MonierBrick ABC 2 Storey Brick Veneer System that are supplied by the bricklayer or builder are:

- Mortar – complying with NZS 4210.
- Metal brick ties and screw fixings – complying with AS/NZS 2699.1.
- Steel lintels and steel shelf angles – complying with AS/NZS 2699.3.
- Slip layers – bituminous damp proof course and Damp-A-Thene, or McDowels Bearing Strip.
- Snake Wire – a galvanised wriggly wire used as reinforcing in mortar joints over steel-less openings as described in this Certificate.
- Flexible sealant – sealant complying with NZBC Acceptable Solution E2/AS1, Paragraph 9.2.4.1, or sealant covered by a valid BRANZ Appraisal Certificate for use as a weather sealing sealant for exterior use.
- Coach screws – hot dipped galvanised as per the requirements of Table 4.2 of NZS 3604; 75 x 10 mm for fixing shelf angles to studs, and 100 and 120 x 10 mm for fixing timber supports over roofs.
- Building wrap – paper or wrap complying with NZBC Acceptable Solution E2/AS1, Table 23, or breather-type membranes covered by a valid BRANZ Appraisal Certificate for use as wall wraps.
- Tape – tapes complying with NZBC Acceptable Solution E2/AS1, Paragraph 4.3.11, or flexible flashing tapes covered by a valid BRANZ Appraisal Certificate for use around window and door openings.
- Joinery head flashings – folded from aluminium or galvanised steel to suit window or door trim opening. Refer to NZS 3604, Section 4 and NZBC Acceptable Solution E2/AS1, Table 20 for material selection and durability requirements.
- Window and door trim cavity air seal – air seals complying with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.6, or self-expanding, moisture cure polyurethane foam air seals covered by a valid BRANZ Appraisal Certificate suitable for use around window, door and other wall penetration openings.
- Roof support flashings – Butyl rubber or bituminous flashings complying with either Paragraph 4.3.9 or Paragraph 4.3.10

of NZBC Acceptable Solution E2/AS1.

Packaging, Handling and Storage

5.1 MonierBrick bricks are packaged in shrink-wrap and delivered on pallets. They must be handled with care to avoid physical damage, particularly to corners and edges, and must be stored so that they are protected from the weather.

5.2 Components such as brick ties, lintels and shelf angles must be handled so as to avoid damage. They must also be stored in dry locations protected from the weather.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ Website for details of the current Technical Literature for the MonierBrick ABC 2 Storey Brick Veneer System. The Technical Literature must be read in conjunction with this Certificate. All aspects of design, use, installation and maintenance contained within the Technical Literature and within the scope of this Certificate must be followed.

Design Information

General

7.1 The MonierBrick ABC 2 Storey Brick Veneer System allows brick veneer cladding to be erected to a height greater than that specified by NZS 3604 by incorporating a slip joint system that effectively structurally separates the veneer at an intermediate height. This separation then allows the top and bottom panels to move independently should a major earthquake event occur, minimising the likelihood of structural damage to the veneer.

7.2 This system also allows the use of the veneer supported above roof lines on steel shelf angles or alternatively on support ledges constructed from sealed and flashed H3.1 treated timber plates nail and coach screw fixed to the wall framing (see Paragraph 8.17).

7.3 The system and Technical Literature apply for use only with MonierBrick 70 mm bricks.

7.4 The length of any veneer wall return or panel must not be less than 230 mm measured on the external face of the veneer.

7.5 The system is designed for use with a veneer cavity of 40-60 mm.

Structure

General

8.1 The MonierBrick ABC 2 Storey Brick Veneer System can be used with buildings designed to have floor loadings of up to 3.0 kPa capacity.

Foundations

8.2 Foundation systems supporting the veneer must consist of concrete slab-on-ground systems complying with either NZS 3604 or NZS 4229, or to specific engineering design.

Framing

8.4 The system can be used as a masonry veneer cladding for timber framed buildings complying with NZS 3604, or for buildings to specific design in accordance with NZS 4203 and NZS 3603.

8.5 All framing timber, including studs, floor joists and lintels must be kiln dried to a maximum of 18% moisture content.

8.6 Wall framing to which the veneer is attached must be constructed from nominal 100 x 50 mm minimum, VSG8 or MSG8, or better. Studs must be at maximum 400 mm centres.

8.7 The maximum span of any ground floor external opening where the veneer is supported over the opening must be in accordance with the lintel tables in the Technical Literature. Maximum span for internal timber lintels in walls supporting veneer over roofs is 2.4 m. Where lintels exceed this span specific engineering design is required.

Timber Treatment

8.8 All framing timber including studs, floor joists, and lintels must be treated to a minimum of H1.2. Timber support ledges must be treated to a minimum of H3.1.

Veneer Height

8.9 The maximum permitted height of veneer for the MonierBrick ABC 2 Storey Brick Veneer System is 7.0 m above its foundation support, except at gable ends the maximum height is measured to the mid-point of the gable. Where veneer is above roofs, the maximum permitted height is 4.0 m above the veneer roof-line support, or 7.0 m above an adjacent building foundation, whichever is greater.

Slip Joints

8.10 The system incorporates a slip layer at certain points, which consists of a layer or layers of plastic set in a horizontal mortar joint. The slip layer is designed to completely break the bonding between bricks to allow movement to occur in a major earthquake event. If such an event occurs, the expected damage will not be significantly different to regular masonry veneer.

8.11 The maximum height above the top of the foundation to a horizontal mortar joint containing a slip layer must be 4.0 m. More than one slip layer may be installed within a wall.

8.12 Wherever possible, slip layers must be at the same horizontal level around a building exterior to provide a total separation of the veneer around the building.

8.13 A row of brick ties must be installed in the mortar course immediately above and below the slip joint, plus an additional row within 345 mm of the first row must also be installed.

8.14 Slip joints must be formed from a 50 mm wide layer of bituminous damp proof course with a 50 mm wide strip of Damp-A-Thene laid smooth side down on top, or a 50 mm wide strip of McDowels Bearing Strip.

Wall Bracing Requirements

8.15 Bracing requirements of walls may be calculated by using the prescribed tables in NZS 3604. However, the Technical Literature contains alternative tables for use that reduce the level of bracing units required by taking account of the actual weight of the cladding.

Mass

8.16 For structural design purposes, MonierBrick 70 mm wide bricks have a mass of approximately 130 kg/m².

Supporting Bricks Above Roof Lines

8.17 The Technical Literature offers 3 options for supporting bricks above a roof line where no direct foundation support is available. These options are:

- Timber framing option – a ledge of approximately 90 mm width is formed from two timber stringers nailed and coach screwed side-by-side to the framing. The veneer is supported on the timber after a waterproof membrane has been placed up the wall and over the timber to protect it, and to provide a flashing out over the roof.
- Timber framing and steel option – as above, except only one stringer is fixed to the framing. To the face of the stringer is fixed a galvanised steel angle to form the support shelf.

Again, a waterproof membrane is placed over the stringer and steel angle, then out over the roof.

- Steel shelf angle option – a galvanised steel angle is fixed to the framing as support for the veneer. A waterproof membrane is placed over the angle and out over the roof.

8.18 The brick-over-roof support details as outlined above may be fixed in a horizontal position, such as at the head of the roof, or on an angle with the slope of the roof.

8.19 Options are also given for supporting veneer in the middle of a roof area such as may be found at the sides of dormer windows or at small gable ends. This option applies only where the face area of the brick veneer being supported is 1.5 m² or less, and the height of veneer is no more than 1.2 m. At dormer openings, three trimmer rafters are required for structural support in place of the normal two. For brick veneer outside the above limits specific engineering design is required.

Steel Lintel Angles

8.20 Lintel angle sizes and details based on NZS 3604 Table 11.4 for spans varying from 0.8 m to 4.8 m are given in the Technical Literature.

Steel-less Openings

8.21 The Technical Literature also gives an option for the use of steel-less openings, as an alternative solution to steel lintel angles. Openings up to a maximum span of 3.7 m are permitted, providing there is timber support framing over the opening to which brick ties can be fixed. Where no timber framing is provided over the opening (e.g. such as may be found over garage doors), the normal steel lintel angles must then be provided for the brickwork support.

8.22 Steel-less openings are based on the engineering design principles of brick ties fixed to framing to support the bricks in courses immediately above the opening. Higher courses are supported by arch action to the adjacent walls once the mortar has cured. However, when using this system, the alternative span tables for timber lintels as set out in the Technical Literature must be used, along with details given in MonierBrick Design Note A7.

8.23 The brickwork is supported by the veneer ties fixed to the framing, as well as 'Snake Wire' (a galvanised wiggly wire) set in the first mortar course above the opening where the opening width is over 1.2 m, and the height of the brick veneer over the opening exceeds 400 mm. Installation must be strictly as set out in the MonierBrick Design Note A7. Brickwork constructed using this method must be temporarily supported until the mortar has cured.

Concrete Masonry Buildings

8.24 The MonierBrick ABC 2 Storey Brick Veneer System may also be used with concrete masonry buildings constructed in accordance with NZS 4229. A cavity, with a minimum width of 40 mm and maximum 60 mm, must be formed between the veneer and masonry structural wall, with the veneer attached to the concrete masonry by veneer ties mechanically fixed to the face of the masonry, all in accordance with the Technical Literature.

Durability

Serviceable Life

9.1 MonierBrick kiln-fired clay bricks will have a serviceable life of at least the life of the building, and in excess of 50 years.

9.2 Brick veneer ties and exposed lintels and shelf angles must meet the durability requirements of NZS 3604 Paragraph 4.5 and Table 4.4. Shelf angles that are covered with a membrane flashing system that completely seals them within the framing cavity must be hot dip galvanised as a minimum.

9.3 Flashings complying with NZS 3604 Paragraph 4.10 and Table 4.5 will meet the durability provisions of the NZBC.

Maintenance

10.1 An inspection of all MonierBrick brick veneer must be carried out at least annually. Weep holes must be kept clear of dust, dirt, spider webs and the like to ensure that moisture can continue to drain from the cavity.

10.2 Where bricks or mortar are cracked, the cause must be determined (this may require a structural engineer's assessment) and repairs must be carried out to restore the cladding.

External Moisture

11.1 The MonierBrick ABC 2 Storey Brick Veneer System, when installed in accordance with this Certificate and the Technical Literature on buildings with a risk score of 0-20, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2, prevents the penetration of moisture that could cause undue dampness or damage to building elements.

11.2 The cavity must be sealed off from the roof and sub-floor space to meet code compliance with Clause E2.3.6.

11.3 The MonierBrick ABC 2 Storey Brick Veneer System allows excess moisture present at the completion of construction to be dissipated without permanent damage to building elements in compliance with Clause E2.3.6.

Installation Information

Installation Skill Level Requirement

12.1 Installation of MonierBrick clay bricks, brick ties, lintels, shelf angles and Snake Wire must only be carried out by competent bricklayers, in accordance with instructions given within the MonierBrick ABC 2 Storey Brick Veneer System Technical Literature and this Certificate.

System Installation

Building Wrap and Tape Installation

13.1 The selected building wrap and tape system must be installed by the building contractor in accordance with the wrap and tape manufacturers' instructions prior to the installation of the MonierBrick clay bricks. Particular attention must be paid to the installation of the building wrap and sill/jamb junction and head/jamb junction tapes at window and door openings to ensure a continuous seal is achieved and all exposed timber in the opening is protected.

Aluminium Joinery Installation

13.2 Adequate weather protection must be provided around door and window frames. Aluminium joinery must be installed so that a cover to the brick veneer of approximately 10 – 20 mm is provided when measured from the back of the brick to the front of the joinery flange.

13.3 Aluminium joinery must have a 7.5 mm nominal gap left between the joinery reveal and the wall framing so a PEF rod and air seal can be installed after the joinery has been secured in place.

13.4 Head flashings must be provided at all openings of the brick veneer cladding as set out in the Technical Literature. Jamb flashings must be flashed with the likes of a dpc flashing material attached to the opening stud over the building wrap or paper and folded around into the back of the joinery flange. The jamb flashing material must overlap in front of the sill flashing upstands.

13.5 Sill flashings must be provided in the veneer cavity under all window openings as described in the Technical Literature.

MonierBrick Clay Brick Installation

13.6 If at all possible, bricks should be of one single batch. If this is not possible, bricks from two batches should be thoroughly mixed to avoid obvious colour variations. It is recommended that bricks be selected from at least 3 different pallets simultaneously.

13.7 Pallets should always be kept covered so that bricks are laid dry. If rain is likely during construction, the top course and cavity should be covered to reduce the likelihood of efflorescence occurring on the surface of the bricks.

13.8 Brickwork should be cleaned thoroughly as construction progresses, as mortar stains can be difficult to remove later. Acid must not be used to clean bricks as this may cause salts from within the bricks to stain the surface.

13.9 It is recommended bricks should be half bonded.

13.10 Mortar joints may be between 7 and 13 mm thick, with the recommended thickness being 10 mm. Joints can be raked 6 mm and should be tooled to provide a hard smooth surface to reduce water absorption.

13.11 Mortar must be carefully mixed by volume at a '4 sand to 1 cement' ratio to ensure consistent colour and bond strength. Trade mortar is recommended for its consistency in both strength and colour, as well as its low level of chloride salts.

Over-Roof Support Installation

13.12 The over-roof support, such as timber stringers or steel angles, should not be fixed to the framing until the veneer below has reached its full height so that the veneer is correctly aligned.

13.13 Timber support ledges must be formed from nominal 100 x 50 mm H3.1 treated timber, nail fixed to studs at maximum 400 mm centres using two 100 x 4 mm galvanised flat head nails to each stud. The timber stringer must then additionally be fixed to each stud using a 100 x 10 mm galvanised coach screw. A second timber stringer, if used, must be nail fixed to the first using two 100 x 4 mm galvanised flat head nails for each 400 mm stud position.

13.14 Where a timber stringer and steel angle option over-roof support is used, the timber stringer is nail fixed to the studs as above, then the galvanised angle is fixed through the timber plate to the studs with 120 x 10 mm galvanised coach screws.

13.15 Where steel angle alone is to be fixed above a roof, it is recommended that temporary timber blocks be cut to the slope of the rafter below and the correct height, then tack nailed to provide temporary support until the steel angle is permanently fixed. The angle is then fixed to the studs with 75 x 10 mm galvanised coach screws.

13.16 Where the over-roof support option slopes, bricks must be cut to the angle at which the support slopes, and be laid on a 10 mm thick mortar bed.

13.17 Where steel angles are proposed, they should be ordered from the fabricator and clearly marked with a marking pen so that their location according to the building drawings is uniquely identified. Holes should be drilled 11 mm diameter at 25 mm down from the top of the vertical flange, sharp edges filed and the bare metal surfaces of galvanised steel angles painted as soon as possible with 2 coats of zinc rich primer. For quality, drilling and painting is best carried out in a fabricator's workshop.

13.18 When fixing steel angles to the framing or through the timber stringer, 6 mm pilot holes must first be drilled in the studs to take the coach screws.

13.19 Over-roof supports must be flashed with membrane type roofing material in accordance with the Technical Literature prior to the installation of the brick veneer. The membrane flashing

must be correctly lapped and sealed, and must extend at least 150 mm onto any roofing material below, with all installation details complying fully with the instructions of the membrane manufacturer or marketer as applicable. Building wraps must be installed over flashing upstands.

Slip Joint Installation

13.20 The slip joint material must be laid directly on to the brickwork at heights specified in the Technical Literature.

13.21 The slip joint material must then be covered with mortar, and the brick laying continued above the joint.

13.22 Brick ties adjacent to slip joints must be installed as specified in the Technical Literature.

General

13.23 During and after brick veneer installation it is recommended that, if possible, internal linings be attached to timber framing by screwing rather than nailing in order to avoid vibration to the cladding that could produce hairline cracks in the mortar.

Inspections

13.24 The Technical Literature must be referred to during the inspection of the MonierBrick ABC 2 Storey Brick Veneer System installations by Building Consent Authorities and Territorial Authorities.

Health and Safety

14.1 Cutting of MonierBrick clay bricks with power tools should be carried out in well ventilated areas, and a dust mask and eye protection should be worn.

Basis of Appraisal

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

Tests

15.1 The following testing has been completed by BRANZ:

- BRANZ expert opinion on NZBC E2 code compliance for the MonierBrick ABC 2 Storey Brick Veneer System was based on testing and evaluation of all details within the scope and stated within this Certificate. The MonierBrick ABC 2 Storey Brick Veneer System was tested to NZBC E2/VM1. The testing assessed the performance of the foundation detail, window head, jamb and sill details, meter box head, jamb and sill details, vertical control joints, horizontal slip joints, internal and external corners and a pipe penetration. In addition to the weathertightness test, the details contained within the Technical Literature have been reviewed, and an opinion has been given by BRANZ technical experts that the system will meet the performance levels of NZBC Acceptable Solution E2/AS1 for drained cavity buildings.

Other Investigations

16.1 The manufacturer's Technical Literature has been examined by BRANZ and found to be satisfactory.

16.2 Site inspections were carried out by BRANZ to assess methods used for construction of the MonierBrick ABC 2 Storey Brick Veneer System and to inspect completed systems.

16.3 Assessment has been made of the structural aspects and durability of the system and opinions given by BRANZ technical experts.

Quality

17.1 The manufacture of MonierBrick 70 mm clay bricks has been examined by BRANZ, and details of the quality and composition of the materials used were obtained and found to be satisfactory.

17.2 The manufacture of MonierBrick clay bricks has been assessed and registered as meeting the requirements of AS/NZS ISO 9001:2000 by SAI Global Limited, Certificate No. QEC20967.

17.3 CSR Building Materials (NZ) Ltd are responsible for the quality of bricks supplied.

17.4 Various component suppliers are responsible for the supply of components used with the system.

17.5 Designers are responsible for the design of the building and incorporating the wall cladding system in accordance with the instructions of CSR Building Systems (NZ) Ltd.

17.6 Quality on site for construction of the MonierBrick ABC 2 Storey Brick Veneer System is the responsibility of the building contractor and the bricklayer in accordance with the instructions of CSR Building Systems (NZ) Ltd.

17.7 Building owners are responsible for the maintenance of the MonierBrick ABC 2 Storey Brick Veneer System in accordance with the instructions of CSR Building Systems (NZ) Ltd.

Sources of Information

- AS/NZS 2699.1:2000 Built-in components for masonry construction – Wall ties.
- AS/NZS 2699.3:2002 Built-in components for masonry construction – Lintels and shelf angles (durability requirements).
- AS/NZS 4455:1997 Masonry units and segmental pavers.
- NZS 3603:1993 Timber structures standard.
- NZS 3604:1999 Timber framed buildings.
- NZS 4203:1992 General structural design and design loadings for buildings.
- NZS 4229:1999 Concrete masonry buildings not requiring specific engineering design.
- NZS 4210:2001 Masonry construction: Materials and workmanship.
- NZS 4211:1985 Specification for performance of windows.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005.
- New Zealand Building Code Handbook and Approved Documents, Building Industry Authority, 1992.
- The Building Regulations 1992, up to, and including October 2004 amendment.



BRANZ

In the opinion of BRANZ, The MonierBrick ABC 2 Storey Brick Veneer System is fit for purpose and will comply with the Building Code to the extent specified in this Certificate provided it is used, designed, installed and maintained as set out in this Certificate.

The Appraisal Certificate is issued only to the Certificate Holder, CSR Building Materials (NZ) Ltd, and is valid until further notice, subject to the Conditions of Certification.

Conditions of Certification

1. This Certificate:
 - 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. The Certificate Holder:
 - 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.
3. The product and the manufacture are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ.
4. BRANZ makes no representation 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 the Certificate Holder.
5. Any reference in this Certificate to any other publication shall be read as a reference to the version of the publication specified in this Certificate.

For BRANZ

P Robertson
Chief Executive

Date of issue: 16 June 2006