



**BRANZ Appraised**  
Appraisal No.446 [2005]

**BRANZ Appraisals**

Technical Assessments of products  
for building and construction

**BRANZ  
APPRAISAL  
CERTIFICATE  
No. 446 (2005)**

This Certificate replaces BRANZ  
Appraisal Certificate No. 446 (2004)  
issued 23 February 2004.

Amended 6 March 2007.

**LINEA®  
WEATHERBOARD**

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## Product

1.1 Linea® Weatherboard is a bevel-backed fibre cement weatherboard, which is designed to be used as part of an external wall cladding system for residential and light commercial type buildings where domestic construction techniques are used.

1.2 The weatherboards are applied direct to the external wall framing over a building wrap and incorporate secondary seals behind all internal and external corners, head and sill flashings for window and door penetrations as well as air seals to wall penetrations. The cladding is finished with a latex paint system.



## Scope

2.1 Linea® Weatherboard has been appraised as an external wall cladding for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
- constructed with timber framing complying with the NZBC; and,
- with a risk score of 0-12, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
- situated in NZS 3604 Building Wind Zones up to, and including 'Very High'.

2.2 Linea® Weatherboard must only be installed horizontally on vertical surfaces.

2.3 Linea® Weatherboard is appraised for use with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. (*The Appraisal of Linea® Weatherboard relies on the joinery meeting the requirements of NZS 4211 for the relevant Building Wind Zone.*)

(*Note: Linea® Weatherboard can be used to provide structural bracing and fire resistance rated construction, but these aspects have not been assessed by this Certificate and are outside its scope.*)

## Building Regulations

### New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, Linea® Weatherboard 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. Linea® Weatherboard meets the requirements for loads arising from self-weight, earthquake, wind, human impact and creep [i.e. B1.3.3 (a), (f), (h), (j) and (q)]. See Paragraphs 9.1 - 9.3.

**Clause B2 DURABILITY:** Performance B2.3.1 (b), 15 years. Linea® Weatherboard meets this requirement. See Paragraphs 10.1 and 10.2.

**Clause C3 SPREAD OF FIRE:** Performance C3.3.5. Linea® Weatherboard meets this requirement. See Paragraph 12.1.

**Clause E2 EXTERNAL MOISTURE:** Performance E2.3.2. Linea® Weatherboard meets this requirement. See Paragraphs 14.1 - 14.3.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. Linea® Weatherboard meets this requirement and will not present a health hazard to people.

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

## Technical Specification

4.1 Linea® Weatherboards are produced with a smooth face and are pre-primed with an acrylic primer on the front face and both edges. The weatherboards are 16 mm thick and are available 135 mm, 150 mm and 180 mm wide. All boards are supplied 4200 mm long.

4.2 Linea® Weatherboards are manufactured from a reduced density cellulose fibre cement formulation. The boards are formed, cut to length and then cured by high-pressure autoclaving. After autoclaving, a bevel is cut on the back face of the weatherboards, the front corner at the bottom of the board is chamfered and the ends are tongue and grooved for jointing. Linea® Weatherboards are manufactured to meet the requirements of AS/NZS 2908.2.

### Accessories

4.3 Accessories used with Linea® Weatherboard which are supplied by James Hardie New Zealand Ltd are:

- Linea® Trim - a 16 mm thick fibre cement trim manufactured from a reduced density cellulose fibre cement formulation. Linea® Trim is pre-primed with an acrylic primer on the front face and both edges, and is available in sizes of 135 mm and 180 mm wide by 4200 mm long, and 84 mm and 100 mm wide by 2600 mm long.
- Z-flashings - boxed corner Z-flashing for use with Linea® Trim boxed corners. The Z-flashing is available in grey uPVC in 2700 mm lengths.
- External and internal corner mouldings - chromate treated aluminium external box corner, 90° internal corner 'W' mould and 135° internal corner 'W' mould. The mouldings are available in 2700 mm lengths.
- Corner soakers - 90° soakers are available for 135 mm, 150 mm and 180 mm Linea® Weatherboards. The soakers are available in chromate treated aluminium, copper and stainless steel.

4.4 Accessories used with Linea® Weatherboard which are supplied by the building contractor are:

- 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.
- Flexible sill, head and jamb flashing tape - flexible flashing 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 joinery openings.
- Joinery sill and head flashings - folded from aluminium or galvanised steel to suit the window or door trim opening. Refer to NZS 3604, Section 4 and NZBC Acceptable Solution E2/AS1, Table 20 for durability requirements.

- Planted sill and scribes - timber treated to Hazard Class H3.1, pre-primed before installation.
- 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.
- Flexible sealant - sealant complying with NZBC Acceptable Solution E2/AS1, or sealant covered by a valid BRANZ Appraisal Certificate for use as a weather sealing sealant for exterior use.
- Linea® Weatherboard fixings - 40 x 2.8 mm flat head hot-dip galvanised Hardiflex nails or stainless steel ring shank Hardiflex nails (for concealed nailing), and 60 x 3.15 mm jolt head hot-dip galvanised nails or stainless steel ring shank nails (for face nailing).
- Linea® Trim fixings - 60 x 3.15 mm or 75 x 3.15 mm hot-dip galvanised jolt head nails and stainless steel ring shank jolt head nails.

(Note: Stainless steel fixings must be Grade 316 and hot-dip galvanising must comply with AS/NZS 4680).

### Paint System Specification

4.5 Paint systems are not supplied by James Hardie Building Products and have not been assessed, therefore are outside the scope of this Certificate.

4.6 All exposed faces, including top edges at sills and all bottom edges of Linea® Weatherboard, Linea® Trim and accessories must be finished with a latex exterior paint system complying with any of Parts 7, 8, 9, or 10 of AS 3730.

## Handling and Storage

5.1 Handling and storage of all materials supplied by James Hardie Building Products or the building contractor, whether on site or off site, is under the control of the building contractor. Linea® Weatherboards must be stacked flat, off the ground and supported on a level platform. They must be kept dry at all times either by storing under cover or providing waterproof covers to the stack. Care must be taken to avoid damage to edges, ends and surfaces. Weatherboards must always be carried on edge.

5.2 Accessories must be stored so they are kept clean, dry and undamaged. All accessories must be used within the maximum storage period recommended by the manufacturer.

## Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Linea® Weatherboard. The Technical Literature must be read in conjunction with this Certificate. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Certificate must be followed.

## Framing

### Timber Treatment

7.1 Timber wall framing behind Linea® Weatherboards must be treated as required by NZS 3602.

### Timber Framing

7.2 Studsmustbeprovidedatmaximum600mmcentres. Nogs must be fitted flush between the studs at maximum 1200 mm centres.

7.3 Timber framing must comply with NZS 3604 or be to a specific design using NZS 3603 and NZS 4203. Where specific design is required, the framing must be of at least equivalent stiffness to the framing provisions of NZS 3604.

7.4 Timber framing must have a maximum moisture content of 24% at the time of the cladding application. *(If weatherboards are fixed to framing with a moisture content of greater than 24% problems may occur at a later date due to excessive timber shrinkage.)*

7.5 Timber wall framing must have a maximum moisture content of 18% before the weatherboards are painted.

## General

8.1 At ground level the bottom edge of Linea® Weatherboards must be kept clear of paved surfaces, such as footpaths, by a minimum of 100 mm and unpaved surfaces by 175 mm in accordance with NZBC Acceptable Solution E2/AS1, Table 18. The ground clearances to finished floor levels as set out in NZS 3604 must be adhered to.

8.2 At deck or low pitch roof/wall junctions, the bottom edge of Linea® Weatherboards must be kept clear of any adjacent surface, or above the top surface of any adjacent roof flashing by a minimum of 35 mm in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.3.6.

8.3 All buildings must have barriers to airflow in the form of interior linings with all joints stopped, or alternatively, unlined gables and walls must incorporate a rigid sheathing or an air barrier which meets the requirements of NZBC Acceptable Solution E2/AS1, Table 23. Where rigid sheathings are used, the fixing length must be increased by a minimum of the thickness of the sheathing.

8.4 Where Linea® Weatherboards abut other cladding systems, designers must detail the junction to meet their own requirements and the performance requirements of the NZBC. Details not included within the Technical Literature have not been assessed and are outside the scope of this Certificate.

## Structure

### Mass

9.1 The mass of the 135 mm wide Linea® Weatherboard when installed on the wall is 24.9 kg/m<sup>2</sup> at equilibrium moisture content (EMC). The mass of the 150 mm wide board is 25.7 kg/m<sup>2</sup> at EMC and the mass of the 180 mm wide board is 23.9 kg/m<sup>2</sup> at EMC. Linea® Weatherboard is therefore considered a light wall cladding in terms of NZS 3604.

### Impact Resistance

9.2 Linea® Weatherboards will resist human impacts likely to be encountered in normal residential use. The likelihood of impact damage to the cladding when used in light commercial situations should be considered at

the design stage, and appropriate protection such as the installation of bollards and barriers provided for vulnerable areas.

### Wind Zones

9.3 Linea® Weatherboard is suitable for use on buildings situated in all Building Wind Zones of NZS 3604, up to, and including Very High. *(For the scope limitations of buildings covered by this Certificate, refer to Paragraph 2.1.)*

## Durability

### Serviceable Life

10.1 Linea® Weatherboard installations are expected to have a serviceable life of at least 50 years provided the paint coating system is maintained in accordance with this Certificate to ensure the Linea® Weatherboards and fixings remain dry in service. Linea® Weatherboards must be painted within 3 months of fixing.

10.2 Areas of geothermal activity and coastal locations can be very corrosive to fasteners, especially coastal locations within distances of up to 500 metres of the sea including harbours, or 100 metres from tidal estuaries and sheltered inlets in some instances. These coastal locations are defined in NZS 3604 as Sea Spray Zone and Zone 1. To achieve a 50 year serviceable life in Sea Spray Zones and areas of geothermal activity, Linea® Weatherboard must be fixed with stainless steel fasteners. To achieve a 50 year serviceable life in Zone 1, Linea® Weatherboard must be fixed with stainless steel or protected hot-dip galvanised steel fasteners. Fasteners outside the Sea Spray Zone, Zone 1 and areas of geothermal activity may be hot-dip galvanised steel.

## Maintenance

11.1 Regular maintenance is essential for the Linea® Weatherboards to continue to meet the NZBC durability performance provision and to maximise their serviceable life.

11.2 Annual inspections must be made to ensure that all aspects of the cladding system, including the paint coating system, flashings and any sealed joints remain in a weatherproof condition. Any damaged areas or areas showing signs of deterioration which would allow water ingress must be repaired immediately. Sealant and paint coatings must be repaired in accordance with the sealant or paint coating manufacturer's instructions.

11.3 Regular cleaning (at least annually) of the paint coating surface is recommended to remove grime, dirt and organic growth and to maximise the life and appearance of the coating. Paint systems must be recoated at approximately 5-10 yearly intervals in accordance with the paint manufacturer's instructions.

11.4 Minimum ground clearances as set out in this Certificate must be maintained at all times during the life of the cladding. *(Failure to adhere to the minimum ground clearances given in this Certificate and the Technical Literature will adversely affect the long term durability of Linea® Weatherboards.)*

## Control of External Fire Spread

12.1 Linea® Weatherboard is suitable for use where a non-combustible material is specified. When Linea® Weatherboard is finished with a paint coating of not more than 1.0 mm in thickness, it is suitable for use as an external wall cladding in all building Purpose Groups in accordance

with NZBC Acceptable Solution C/AS1 Part 7, Paragraph 7.11.2(a).

## Outbreak of Fire

13.1 When Linea® Weatherboards are finished with a paint coating of not more than 1.0 mm in thickness, clearance separations from chimneys and flues are not required. However, when used in conjunction with, or attached to heat sensitive materials, the heat sensitive material must be separated from chimneys and flues in accordance with the requirements of NZBC Acceptable Solution C/AS1 Part 9 for the protection of combustible materials.

## External Moisture

14.1 Linea® Weatherboards, when installed in accordance with this Certificate and the Technical Literature will prevent the penetration of moisture that could cause undue dampness or damage to building elements.

14.2 Linea® Weatherboards allow excess moisture present at the completion of construction to be dissipated without permanent damage to building elements to meet code compliance with Clause E2.3.6.

14.3 The details given in the Technical Literature for weather sealing are based on the design principle of having a first and second line of defence against moisture entry for all joints, penetrations and junctions. The ingress of moisture must be excluded by detailing joinery and wall interfaces as shown in the Technical Literature. Weathertightness details that are developed by the designer are outside the scope of this Certificate and are the responsibility of the designer for compliance with the NZBC.

## Internal Moisture

15.1 NZBC Acceptable Solution E3/AS1 Paragraph 1.1.1(a) requires a minimum wall R-value of 1.5 for framed cavity wall construction and therefore the wall frame cavity must be insulated.

## Water Vapour

15.2 Linea® Weatherboard is not a barrier to the passage of water vapour, and when installed in accordance with this Certificate will not create or increase the risk of moisture damage resulting from condensation.

# Installation Information

## Installation Skill Level Requirements

16.1 Installation of Linea® Weatherboard and accessories supplied by James Hardie New Zealand Ltd and the building contractor must be completed by tradespersons with an understanding of bevel-back weatherboard installation, in accordance with instructions given within the Linea® Weatherboard Technical Literature and this Certificate.

## System Installation

### Building Wrap and Flexible Sill and Jamb Tape Installation

17.1 The selected building wrap and flexible sill and jamb tape system must be installed by the building contractor in accordance with the wrap and tape manufacturer's instructions prior to the installation of the Linea® Weatherboards. Particular attention must be paid to the installation of the building wrap and sill and jamb flashing tapes around window and door openings to ensure a continuous seal is achieved and all exposed timber in the opening is protected.

### Linea® Weatherboard Installation

17.2 Linea® Weatherboards may be cut on site by power saw. Holes and cut-outs may be formed by drilling a number of holes around the perimeter of the opening required and tapping out the centre with a hammer, or by using a hole saw.

17.3 Weatherboards must be dry prior to installation. Before the weatherboards are installed, cut ends and the back face of the bottom course must be sealed with an acrylic sealer to reduce the absorbency of the fibre cement.

17.4 Linea® Weatherboards must be installed starting at the bottom of the wall. A cant strip (H3.1 treated timber or fibre cement) must be fixed behind the bottom course of weatherboards to ensure the weatherboards are set at the correct angle. The cant strip must be continuous around the perimeter of the building. The bottom course of weatherboards must overhang the bottom plate by a minimum of 50 mm.

17.5 Before the weatherboards are installed, the corner detail must be prepared to suit the selected option, e.g. external box corner, corner soaker. The necessary flashings must be installed before commencing weatherboard fixing.

17.6 The first course of weatherboards must be full length, i.e. 4200 mm and commence from an external corner. Jointing of Linea® Weatherboards is made off the stud using the pre-cut tongue and groove joint. Tongue and groove joints may be located centrally between the studs, but must be no closer than 100 mm to the edge of a stud. A bead of sealant must be applied to the front side of the tongue before the corresponding board is inserted. Subsequent courses of weatherboards must be installed so that the tongue and groove joints are staggered by 600 mm minimum from joints in the previous course.

17.7 Linea® Weatherboards must have a minimum lap of 30 mm, and should be set out so as near to a full board as possible will finish under and over windows and doors and at the top of the wall. A storey rod can be used to accurately position weatherboard courses.

17.8 Linea® Weatherboards must be fixed to each stud using concealed fixings behind the lap of the boards or face nailing, except that face nailing must be provided at all corners and vertical edges of openings.

17.9 Concealed fixing must be carried out using 40 x 2.8 mm hot-dip galvanised or stainless steel Hardiflex nails depending on the location - see Paragraph 10.2. Nails must be fixed 25 mm from the top edge of the board and must be driven flush with the board surface.

17.10 Face nailing must be carried out using 60 x 3.15 mm hot-dip galvanised or stainless steel jolt-head nails depending on the location - see Paragraph 10.2. Nails must be fixed 15 mm up from the bottom of the board and punched a maximum of 2 mm below the surface of

the board. When stainless steel nails are used, the top board at each lap must be pre-drilled.

17.11 Linea® Weatherboards can be hand or gun nailed. Nails must not be closer than 25 mm to the end of the board when hand nailing, or closer than 50 mm when gun nailing.

*(Note: Gun nailing must only be used for concealed nailing.)*

### Aluminium Joinery Installation

17.12 Aluminium joinery and associated head and sill flashings must be installed by the building contractor in accordance with the Technical Literature. A 7.5 mm nominal gap must be 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.

17.13 After installing the window and door joinery; Linea® Trim, planted sills and scribes may be installed in accordance with the Technical Literature to provide additional weatherproofing for the joinery/weatherboard junction.

### Inspections

17.14 The Technical Literature must be referred to during the inspection of Linea® Weatherboard installations by building consent authorities and territorial authorities.

### Finishing

17.15 The paint coating manufacturer's instructions must be followed at all times for application of the paint finish. Linea® Weatherboards and trim must be clean and dry before commencing painting.

## Health and Safety

18.1 Cutting of Linea® Weatherboard must be carried out in well ventilated areas, and a dust mask and eye protection must be worn.

18.2 When power tools are used for cutting, grinding or forming holes, health and safety measures as set out in the Technical Literature must be observed because of the amount of dust generated.

18.3 Safe use and handling procedures for Linea® Weatherboard and the components that make up the cladding system are provided in the relevant manufacturer's Technical Literature.

## Basis of Appraisal

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

### Tests

19.1 The following testing has been completed by BRANZ:

- BRANZ expert opinion on NZBC E2 code compliance for Linea® Weatherboard was based on testing and evaluation of all details within the scope and as stated within this Certificate. Linea® Weatherboard was tested to AS/NZS 4284 with a BRANZ-designed extension. The testing was completed in three stages; the first being the standard AS/NZS 4284 test, the second being the modified AS/NZS 4284 test with defects introduced in the test panel, and the third being the modified AS/NZS 4284 test with the internal linings and building wrap removed. The testing assessed the performance of the foundation detail, window head,

jamb and sill details, internal and external corners. 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 direct fixed weatherboard claddings.

- Uniform wind face load tests to simulate wind pressures on 12 mm thick Linea® Weatherboards were carried out by BRANZ, and the results were used in assessing 16 mm thick Linea® Weatherboard.
- Cone Calorimeter testing to determine the peak rate of heat release and total heat release of Linea® Weatherboard was completed by BRANZ. The testing was carried out in accordance with AS/NZS 3837.

19.2 Linea® Weatherboards have been tested by a James Hardie NATA accredited laboratory in accordance with AS/NZS 2908.2. The testing covered: soak-dry, bending strength, warm water soaking, heat/rain, freeze/thaw and apparent density. The test methods and results have been reviewed by BRANZ and found to be satisfactory.

19.3 Testing has been carried out by James Hardie Building Products to determine the modulus of rupture and inter-laminar bond strength of carbonated and non-carbonated Linea® Weatherboard. The test methods and results have been reviewed by BRANZ and found to be satisfactory.

## Other Investigations

20.1 Weathertightness, structural, fire and durability opinions have been provided by BRANZ technical experts.

20.2 Site visits have been carried out by BRANZ to assess the practicability of installation, and to examine completed installations.

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

## Quality

21.1 The manufacture of Linea® Weatherboard has been examined by BRANZ, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

21.2 The quality of materials, components and accessories supplied by James Hardie New Zealand Ltd is the responsibility of James Hardie New Zealand Ltd. The quality control system of James Hardie New Zealand Ltd has been assessed and registered as meeting the requirements of ISO 9001: 2000 by Telarc Limited, Registration Number 409.

21.3 Quality on site is the responsibility of the installer.

21.4 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of Linea® Weatherboard and accessories in accordance with the instructions of James Hardie New Zealand Ltd.

21.5 Building owners are responsible for the maintenance of Linea® Weatherboard in accordance with the instructions of James Hardie New Zealand Ltd.

## Sources of Information

- AS 3730 Guide to the properties of paints for buildings.
- AS/NZS 2908.2: 2000 Cellulose-cement products - Flat sheet.
- AS/NZS 3837: 1998 Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter.
- AS/NZS 4284: 1995 Testing of building facades.
- AS/NZS 4534: 1998 Zinc and zinc/aluminium-alloy coatings on steel wire.
- AS/NZS 4680: 1999 Hot-dip galvanized (zinc) coatings on fabricated ferrous articles.
- NZS 3602: 2003 Timber and wood-based products for use in building.
- NZS 3603: 1993 Timber Structures Standard
- NZS 3604: 1999 Timber framed buildings.
- NZS 4203: 1992 General structural design and design loadings for buildings.
- 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

### Amendment No. 1, dated 6 March 2007.

The Appraisal Certificate has been amended to update the Certificate holders name; to remove reference to E2/AS1 Third Edition June 2004; to update the Technical Literature reference, and to amend Paragraphs 8.3, 8.4 and 14.1.



**BRANZ**

**In the opinion of BRANZ, Linea® Weatherboard 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, James Hardie New Zealand 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

J B Wanden

M E Reed

Date of issue: 4 February 2005