



BRANZ Appraised

Appraisal No.510 [2008]

BRANZ Appraisals

**Technical Assessments of products
for building and construction**

BRANZ APPRAISAL No. 510 (2008)

This Appraisal replaces Appraisal No.
510 (2006) issued 2 June 2006.

CAVITECLAD WALL CLADDING SYSTEM

**Specialized Construction
Products Ltd**
P O Box 101 127
North Shore Mail Centre
Auckland

Tel: 09 414 4499
Fax: 09 414 4489
email: specialized@extra.co.nz
web: www.specialized.co.nz



BRANZ Limited
Private Bag 50 908
Porirua City
New Zealand
Tel: +64 4 237 1170
Fax: +64 4 237 1171
www.branz.co.nz

BRANZ Pty Ltd
P O Box 830
Brookvale
NSW 2100
Australia
Tel: +61 2 9938 6011
Fax: +61 2 9938 6911
www.branz.com.au



Product

1.1 Caviteclad is a cavity-based external wall cladding system for residential and light commercial type buildings where domestic construction techniques are used.

1.2 The system consists of expanded polystyrene (EPS) sheets or mineralised woodwool panels (Permapanel) fixed over polystyrene battens to form a 20 mm cavity. The coating system consists of a 2-3 mm thickness of fibreglass mesh reinforced base coat plaster, followed by the application of 1-2 mm thick Spanish Finish, Float Finish, Texture Finish or Stucco Texture finishing plaster, which is then finished with a 100% acrylic or latex exterior paint system.

1.3 The system incorporates a primary and secondary means of weather resistance (first and second line of defence) against water penetration by separating the cladding from the external wall framing with a nominal 20 mm drained cavity.



Scope

2.1 Caviteclad has been appraised as an external wall cladding system 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 0-20, 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 Caviteclad has also been appraised for weathertightness and structural wind loading when used for timber and steel framed buildings subject to specific design up to an ultimate limit state (ULS) wind pressure of 2.5 kPa.

2.3 Caviteclad must only be installed on vertical surfaces (except for tops of parapets, sills and balustrades, which must have a minimum 10° slope and be waterproofed in accordance with the Technical Literature).

2.4 The 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 Caviteclad relies on the joinery meeting the requirements of NZS 4211 for the relevant Building Wind Zone or be specifically designed for use in specifically designed buildings.*)

2.5 Installation of components and accessories supplied by Specialized Construction Products Ltd, its certified distributors and certified plasterers must be carried out only by Specialized Construction Products Ltd certified plasterers.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, Caviteclad 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. Caviteclad meets the requirements for loads arising from self-weight, wind, impact and creep [i.e. B1.3.3 (a), (h), (j) and (q)]. See Paragraphs 10.1 - 10.4.

Clause B2 DURABILITY: Performance B2.3.1 (b), 15 years, B2.3.1 (c), 5 years, and B2.3.2. Caviteclad meets these requirements. See Paragraphs 11.1 and 11.2.

Clause C3 SPREAD OF FIRE: Performance C3.3.5. Caviteclad meets this requirement. See Paragraphs 14.1 and 14.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. Caviteclad meets this requirement. See Paragraphs 16.1 - 16.5.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Caviteclad meets 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.

Technical Specification

4.1 System components and accessories supplied by Specialized Construction Products Ltd are as follows:

Polystyrene

- Cavity battens are manufactured from high density (Class H) expanded polystyrene (EPS) with a density of no less than 24 kg/m³ for use with EPS sheets and very high density (Class VH) EPS with a density of no less than 28 kg/m³ for use with Permapanel panels. The battens are 45 mm wide by 21 mm thick and are supplied in 1200 mm lengths.
- EPS sheets are 50 mm thick Class H with a density of no less than 24 kg/m³. The sheets are supplied in lengths ranging from 2.4 to 3.6 m x 1.2 m wide and must be manufactured to meet the requirements of AS 1366 Part 3.

Permapanel

- Permapanel panels are 50 mm thick, manufactured from mineralised woodwool with an approximate density of 26 kg/m². Permapanel panels are supplied in lengths ranging from 1.2 to 2.4 m long x 600 mm wide.

Plasters (EPS)

- Coarse Mesh Coat is a polymer modified, Portland cement-based plaster supplied in 20 kg bags and is mixed on site with clean water. It is applied as the base coat in a minimum 2-3 mm layer followed by the embedment of fibreglass mesh reinforcement in the outer surface.
- Fine Mesh Coat is a polymer modified, Portland cement-based plaster supplied in 20 kg bags and is mixed on site with clean water. It is applied as the base coat around window and door joinery penetrations in a minimum 2-3 mm layer followed by the embedment of fibreglass mesh reinforcement in the outer surface. It is also used to achieve a heavy stucco texture finish when sprayed through a hopper gun or a sagola gun.

Plasters (Permapanel)

- Stopit is a polymer modified, Portland cement-based plaster supplied in 20 kg bags and is mixed on site with clean water. It is applied as the jointing plaster between

Permapanel edges to bond the panels together once they have been nailed in place.

- Solid is a Portland cement-based plaster supplied in 25 kg bags and is mixed on site with clean water. It is applied as the levelling base coat in a minimum 2-3 mm layer.
- Coarse Mesh Coat is a polymer modified, Portland cement-based plaster supplied in 20 kg bags and is mixed on site with clean water. It is applied in a minimum 2-3 mm layer followed by the embedment of fibreglass mesh reinforcement in the outer surface.

Finishing Plasters

- Spanish Finish is a polymer modified, Portland cement-based finishing plaster supplied in 20 kg bags and is mixed on site with clean water. It is trowel applied in various thicknesses over the mesh coat to achieve an undulating style finish.
- Float Finish is a polymer modified, Portland cement-based finishing plaster supplied in 20 kg bags and is mixed on site with clean water. It is trowel applied in two coats (1-2 mm per layer) over the mesh coat and is polished flat to achieve a fine granular finish.
- Texture Finish is a polymer modified, Portland cement-based finishing plaster supplied in 20 kg bags and is mixed on site with clean water. It is spray applied in a 1-2 mm layer over the base coat to achieve a fine stippled finish.

Paint System Specification

- At least two coats of a 100% acrylic-based exterior paint must be used over the finishing plasters to make the system weathertight and give the desired finish colour to exterior walls. Plastershield is a 100% acrylic-based exterior paint formulated for use over Specialized Construction Products Ltd cement-based finishing plasters. Plastershield is supplied in 10 litre and 20 litre pails.
- Specialized Construction Products Ltd allows the use of other latex exterior paint systems over the finishing plasters. A latex exterior paint system complying with any of Parts 7, 8, 9 or 10 of AS 3730 may be used. Paint colours must have a light reflectance value of 40% minimum regardless of gloss value. Proprietary paint systems not supplied by Specialized Construction Products Ltd have not been assessed and are therefore outside the scope of the Appraisal.

Accessories

- Reinforcing mesh - alkali-resistant fibreglass mesh with a nominal mesh size of 4 mm square and a weight of 160 g/m² for use in domestic and light commercial situations.
- uPVC components - base bead, sill flashing, jamb flashing, head flashing, lipped L-Bead, 50 mm U-Channel, 50 mm high backed U-Channel, 70 mm U-Channel, 20 x 20 L-Bead, 50 x 20 L-Bead and flat U-Channel.
- EPS sheet fixings (timber frame) - 100 x 4.0 mm hot-dip galvanised flat head nails with 22 or 42 mm diameter washers.
- Permapanel fixings (timber frame) - 100 x 4.0 mm hot-dip galvanised flat head nails with 22 mm diameter washers, or 100 mm hot-dip galvanised D-head gun nails.
- Washers - 22 or 42 mm diameter polypropylene.

4.2 Accessories used with the system which are supplied by the Specialized Construction Products Ltd certified plasterers are:

- Cavity batten fixings - 30 x 2.5 mm hot-dip galvanised steel flat head nails for timber frame, or construction adhesive for temporary fixing to building wrap over timber or steel frame.
- EPS sheet fixings (steel frame) - 6-gauge x 90 mm self-drilling AS 3566 Corrosion Class 3 or 4 screws in NZS 3604 defined Corrosion Zones 1, 2, 3 and 4 and Grade 304

Stainless Steel 6-gauge screws in the sea spray zone, used with 42 mm diameter washers.

- Permapanel fixings (steel frame) - 6-gauge x 90 mm self-drilling AS 3566 Corrosion Class 3 or 4 screws in NZS 3604 defined Corrosion Zones 1, 2, 3 and 4 and Grade 304 Stainless Steel 6-gauge screws in the sea spray zone, used with 22 mm diameter washers.
- Waterproof membrane tapes – tapes covered by a valid BRANZ Appraisal for use as waterproof membranes over the tops of plastered parapets, balustrades, fixing blocks and the like.
- Flexible sealant – sealant complying with NZBC Acceptable Solution E2/AS1, or sealant covered by a valid BRANZ Appraisal for use as a weather sealing sealant for exterior use.
- Adhesive - EPS compatible adhesive for adhering uPVC components to the EPS sheets and Permapanel as and where required.

4.3 Accessories used with the system 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 for use as wall wraps.
- Building wrap support - polypropylene strap for securing the building wrap in place and preventing bulging of the bulk insulation into the drainage cavity where cavity battens are installed at greater than 450 mm centres. (Note: additional vertical battens may also be installed to provide support.)
- Flexible sill and jamb tapes - flexible flashing tapes complying with NZBC Acceptable Solution E2/AS1 Paragraph 4.3.11, or flexible flashing tapes covered by a valid BRANZ Appraisal for use around window and door joinery openings.
- 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 for use around window, door and other wall penetration openings.

Handling and Storage

5.1 Handling and storage of all materials supplied by Specialized Construction Products Ltd or the certified plasterers, whether on or off site, are under the control of Specialized Construction Products Ltd certified plasterers. Dry storage must be provided on site for the fibreglass mesh and bags of plaster. EPS sheets and battens, Permapanel panels, uPVC flashings and profiles must be protected from direct sunlight and physical damage, and should be stored flat and under cover. Liquid components must be stored in frost-free conditions.

5.2 Handling and storage of all materials supplied by the building contractor, whether on or off site, are under the control of the building contractor. Materials must be handled and stored in accordance with the relevant manufacturer's instructions.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Caviteclad. 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. Reference can also be made to the BRANZ Texture Coated Claddings Good Practice Guide for general design and installation information. The Caviteclad listing on the BRANZ website excludes specific details. These details have not been assessed by BRANZ and are outside the scope of the Appraisal.

Framing

Timber Treatment

7.1 Timber wall framing behind Caviteclad must be treated as required by NZS 3602.

Timber Framing

7.2 Timber framing must comply with NZS 3604 for buildings or parts of buildings within the scope limitations of NZS 3604. Buildings or parts of buildings outside the scope of NZS 3604 must be to a specific design in accordance with 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. In all cases studs must be at maximum 600 mm centres for buildings designed to NZS 3604 and 400 mm centres for specifically designed buildings situated in Building Wind Zones above NZS 3604 defined 'Very High' when EPS sheets are used. Dwargs must be fitted flush between the studs at maximum 800 mm centres.

7.3 For specifically designed timber framed buildings situated in Building Wind Zones above NZS 3604 defined 'Very High', there must be a minimum timber framing size of 90 x 45 mm, and a minimum timber grade of MSG8.

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

Steel Framing

7.5 Steel framing must be to a specific design meeting the requirements of the NZBC.

7.6 The minimum framing specification is 'C' section studs and nogs of overall section size of 75 mm web and 32 mm flange. Steel thickness must be a minimum 0.55 mm.

7.7 For steel framed buildings situated in NZS 3604 defined Building Wind Zones up to, and including, 'Very High' studs must be at maximum 600 mm centres. For all other buildings where EPS sheets are used, studs must be at maximum 400 mm centres. Dwargs must be fitted flush between the studs at maximum 800 mm centres.

EPS Sheet Setout

7.8 All vertical EPS sheet edges must be supported and fixed through the cavity battens to the framing. Horizontal sheet edges must be supported at fixing locations with cavity spacers 100 mm long maximum in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.2(f). At the base of the wall, the EPS sheets must hang 50 mm below the supporting framing.

7.9 Additional framing will be required at soffits, internal and external corners and window and door openings for the support and fixing of sheet edges.

Permapanel Setout

7.10 Permapanel panels are installed horizontally. Vertical panel edges must be jointed on-stud. Horizontal Permapanel panel edges do not require edge fixing, except at soffits and window and door openings where additional framing will be required for the support and fixing of panel edges. Vertical panel joints must be staggered each row. Permapanel panels must be supported at fixing locations with vertical cavity battens or cavity spacers 100 mm long maximum in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.2(f). At the base of the wall, the Permapanel panels must hang 50 mm below the supporting framing.

General

8.1 When Caviteclad is used for specifically designed buildings up to 2.5 kPa ULS wind pressure, only the weathertightness aspects of the cladding and maximum framing centres and EPS sheet and Permapanel panel fixing centres are within the scope of this Appraisal. All other aspects of the building need to be specifically designed and are outside the scope of this Appraisal.

8.2 Punchings in the base bead and head flashing provide a minimum ventilation opening area of 1000 mm² per lineal metre of wall in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.3(b).

8.3 The ground clearance to finished floor levels as set out in NZS 3604 must be adhered to at all times. At ground level paved surfaces, such as footpaths, must be kept clear of the bottom edge of the cladding system by a minimum of 100 mm, and unpaved surfaces by 175 mm in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Table 18. (A detail showing Caviteclad carried closer to the ground is included in the Technical Literature. This detail is outside the scope of this Appraisal and approval for its use is by specific design.)

8.4 At balcony, deck or roof/wall junctions, the bottom edge of the Caviteclad system 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 the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.3.6.

8.5 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.

8.6 Where penetrations through the Caviteclad system are wider than the cavity batten spacing, allowance must be made for airflow between adjacent cavities. A minimum 10 mm gap must be left between the bottom of the vertical cavity batten and the flashing to the opening.

8.7 Where the system abuts other cladding systems, designers must detail the junction to meet their own requirements and the performance requirements of the NZBC. The Technical Literature provides some guidance. Details not included within the Technical Literature have not been assessed and are outside the scope of this Appraisal.

Electrical Cables

8.8 PVC sheathed electrical cables must be prevented from direct contact with EPS sheets. When cables must penetrate the EPS for exterior electrical connections, the cable must be directly supported by passing through an electrical conduit. There is no separation requirement for PVC sheathed electrical cables passing through Permapanel panels.

Control Joints

9.1 Control joints where EPS sheets are used must be constructed in accordance with the Technical Literature, and be provided as follows:

- Horizontal control joints - at maximum 6 m centres.
- Vertical control joints - at maximum 20 m centres; aligned with any control joint in the structural framing; where the system abuts different cladding types, or where the system covers different structural materials.

9.2 Control joints where Permapanel panels are used must be constructed in accordance with the Technical Literature and be provided as follows:

- Horizontal control joints - at maximum 5.4 m centres and at inter-storey floor levels.

- Vertical control joints - at maximum 5.4 m centres; aligned with any control joint in the structural framing, or where the system abuts different cladding types.

(Note: Horizontal and vertical control joints must be located over structural supports. The Technical Literature provides some guidance for the design of vertical control joints where the system abuts different cladding types. Details not included within the Technical Literature are outside the scope of this Appraisal and are the responsibility of the designer - see Paragraph 8.7.)

Inter-storey Junctions

9.3 Inter-storey drained joints must be provided for walls over 2 storeys in height in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.9.4(b). Inter-storey junctions must be constructed in accordance with the Technical Literature.

(Note: Refer to Paragraph 14.2 for the requirements for barriers to vertical fire spread at inter-storey junctions for buildings of three or more floors.)

Structure

Mass

10.1 The mass of the Caviteclad system incorporating EPS sheets is approximately 7 kg/m², therefore it is considered a light wall cladding in terms of NZS 3604.

10.2 The mass of the Caviteclad system incorporating Permapanel panels is approximately 36 kg/m², therefore it is considered a medium wall cladding in terms of NZS 3604.

Impact Resistance

10.3 The system has adequate resistance to impact loads likely to be encountered in normal residential use. The likelihood of impact damage to the system when used in light commercial situations should be considered at the design stage, and appropriate protection such as the installation of bollards and barriers should be considered for vulnerable areas.

Wind Zones

10.4 Caviteclad is suitable for use in all Building Wind Zones of NZS 3604, up to, and including 'Very High' where buildings are designed to meet the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 1.1, or up to 2.5 kPa ULS wind pressure when the buildings are specifically designed.

Polystyrene Sheet Fixing

10.5 EPS sheets must be fixed through the cavity battens and cavity spacers to the wall framing at maximum centres specified in Table 1 and Table 2.

Table 1: EPS Sheet Fixing Centres for Edges and Intermediate Studs

NZS 3604 Building Wind Zone with studs at maximum 600 mm centres	Fixing centres (mm) 42 mm diameter washers	Fixings centres (mm) 22 mm diameter washers
Low	300 ¹	200 ²
Medium	300 ¹	200 ²
High	300 ¹	Not permitted
Very High	200 ²	Not permitted

¹ One fixing is required into each dwang and top and bottom plates at mid-dwang length.

² Fixings are also required into each dwang at 200 mm centres and top and bottom plates at mid-dwang length.

Table 2: EPS Sheet Fixing Centres for Edges and Intermediate Studs - Specific Design Wind Zones

Specifically designed buildings up to 2.5 kPa ULS wind pressure with studs at maximum 400 mm centres (42 mm diameter washers must be used in all situations)		
Maximum vertical fixing centres (mm) along studs	Maximum horizontal fixing centres (mm) along top and bottom plates	Maximum horizontal fixing centres (mm) along dwangs
150	200	150

Permapanel Fixing

10.6 Permapanel panels must be fixed through the cavity battens and cavity spacers to the wall framing at maximum centres specified in Tables 3, 4 and 5.

Table 3: Permapanel fixing centres using 100 mm hot-dip galvanised D-Head Gun Nails

NZS 3604 Building Wind Zone with studs at maximum 600 mm centres	Fixing centres (mm) to studs, dwangs, and top and bottom plates
Low	200
Medium	150
High	125
Very High	100

Note: All nails must be fixed with an edge clearance of minimum 10 mm.

Table 4: Permapanel fixing centres using 100 x 4 mm hot-dip galvanised FH Nails or 6-gauge x 90 mm self-drilling screws with 22 mm washers

NZS 3604 Building Wind Zone with studs at maximum 600 mm centres	Fixing centres (mm) to studs, dwangs, and top and bottom plates
Low - Very High	200

Note: All nails and screws must be fixed with an edge clearance of minimum 10 mm.

Table 5: Permapanel fixing centres using 100 x 4 mm hot-dip galvanised FH Nails or 6-gauge x 90 mm self-drilling screws with 22 mm washers

Specifically designed buildings up to 2500 Pa ULS wind pressure with studs at maximum 600 mm centres	Fixing centres (mm) to studs, dwangs, and top and bottom plates
	125

Note: All nails and screws must be fixed with an edge clearance of minimum 10 mm.

Durability

11.1 Caviteclad meets the performance requirements of NZBC Clause B2.3.1 (b), 15 years for the cladding system and plaster finish, and the performance requirements of NZBC Clause B2.3.1 (c), 5 years for the exterior paint system.

Serviceable Life

11.2 Caviteclad is expected to have a serviceable life of at least 30 years provided the system is maintained in accordance with this Appraisal, and the EPS sheets, Permapanel panels, fixings and plaster are continuously protected by a weathertight coating and remain dry in service.

Maintenance

12.1 Regular maintenance is essential to ensure the performance requirements of the NZBC are continually met and to ensure the maximum serviceability of the system.

12.2 Regular cleaning (at least annually) of the paint coating is required to remove grime, dirt and organic growth and to maximise the life and appearance of the coating. Grime may be removed by brushing with a soft brush, warm water and detergent. Paint systems must be recoated at approximately 5-8 yearly intervals in accordance with the paint manufacturer's instructions.

12.3 Annual inspections must be made to ensure that all aspects of the cladding system, including the coating system, plaster, flashings and any sealed joints remain in a weatherproof condition. Any cracks, damaged areas or areas showing signs of deterioration which could allow water ingress, must be repaired immediately. The Caviteclad system must be repaired in accordance with the instructions of Specialized Construction Products Ltd.

12.4 Minimum ground clearances as set out in this Appraisal and the Technical Literature must be maintained at all times during the life of the system. *(Failure to adhere to the minimum ground clearances given in this Appraisal and the Technical Literature will adversely affect the long term durability of the Caviteclad system.)*

Control of Internal Fire and Smoke Spread

13.1 Polystyrene used with the system must meet the flame propagation criteria of AS 1366. The polystyrene must also be protected from ignition in accordance with the requirements of NZBC Acceptable Solution C/AS1 Part 6, Paragraphs 6.20.11 and 6.20.12. Where required by NZBC Acceptable Solution C/AS1 Part 6, Table 6.3, flame barriers meeting the requirements of C/AS1 Part 6, Paragraph 6.20.13 and Appendix C, Paragraph C10.1 must be provided.

Control of External Fire Spread

14.1 Caviteclad incorporating EPS sheets and Permapanel panels has a performance level A in accordance with NZBC Acceptable Solution C/AS1, Table 7.5. The system is suitable for use as an external wall cladding system on buildings in all Purpose Groups, at any distance to the boundary.

(Note: The building heights referenced in Paragraph 14.1 above are as defined in the Definitions Section of the Fire Safety Clauses of the NZBC.)

14.2 For buildings of three or more floors where EPS sheet is used, and where the cladding system extends to cover the walls of at least three floors, the requirements for barriers to vertical fire spread in the cladding as set out in NZBC Acceptable Solution C/AS1 Part 7, Paragraphs 7.9.18 and 7.9.19 must be met. These joints are not covered by the Technical Literature, and are outside the scope of this Appraisal. Design of the barrier joint must be specifically detailed by the designer to meet the NZBC, including blocking of the cladding cavity and wall framing cavity, and installation of flashing and sealing systems to collect and direct any moisture to the outside of the cladding system at this point.

Outbreak of Fire

15.1 Caviteclad 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

16.1 Caviteclad, when installed in accordance with this Appraisal and the Technical Literature, prevents the penetration of moisture that could cause undue dampness or damage to building elements.

16.2 The cavity must be sealed off from the roof and sub-floor space to meet the performance requirements of Clause E2.3.5.

16.3 Caviteclad allows excess moisture present at the completion of construction to be dissipated without permanent damage to building elements to meet the performance requirements of Clause E2.3.6.

16.4 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 Appraisal and are the responsibility of the designer for compliance with the NZBC.

16.5 The use of Caviteclad where there is a designed cavity drainage path for moisture that penetrates the cladding, does not reduce the requirement for junctions, penetrations, etc to remain weather resistant.

Internal Moisture

17.1 Caviteclad alone does not meet NZBC Acceptable Solution E3/AS1, Paragraph 1.1.1(a). Buildings must be constructed with an adequate combination of thermal resistance and ventilation, and space temperature must be provided to all habitable spaces, bathrooms, laundries and other spaces where moisture may be generated or may accumulate.

Water Vapour

17.2 Caviteclad is not a barrier to the passage of water vapour, and when correctly installed will not create or increase the risk of moisture damage resulting from condensation. Refer to Paragraphs 17.3 and 17.4 below for specific requirements for steel framed buildings.

17.3 When the Caviteclad system using EPS sheet is installed over a steel frame, the EPS battens and insulated drainage cavity will act as a thermal break to the steel frame in accordance with NZBC Acceptable Solution E3/AS1.

17.4 When the Caviteclad system using Permapanel panels is installed over a steel frame, an expanded polystyrene thermal break must be installed **over the building wrap over each steel member** to provide a thermal break in accordance with the requirements of NZBC Acceptable Solution E3/AS1, Paragraph 1.1.4(d). The cavity battens and the rest of the Caviteclad system are then installed over top of the thermal break in accordance with the Technical Literature and this Appraisal.

Energy Efficiency

Building Thermal Envelope

18.1 NZBC Acceptable Solution H1/AS1 or NZBC Verification Method H1/VM1 can be used for housing, communal residential, communal non-residential and commercial buildings.

Determining Thermal Resistance

18.2 The thermal resistance (R-values) of building elements may be verified by using NZS 4214. The BRANZ 'House Insulation Guide' Third Edition provides thermal resistances of common building elements and is based on calculations from NZS 4214.

18.3 Calculations in accordance with NZS 4214 require that the ventilated air gap and the thermal resistance of each layer between the ventilated air gap and outside air be de-rated by a factor of 0.45. Therefore, in this system, unless better information is available for a specific design case, the R-value of the EPS sheet or Permapanel panel must be taken as set out in Table 5.

Table 5: R-value (including 0.45 de-rating)

	Thickness
	50 mm
EPS Class H ¹	R0.80
Permapanel	R0.28

¹ Based on a thermal conductivity k value of 0.034 W/m°C.

Installation Information

Installation Skill Level Requirements

19.1 Installation and finishing of components and accessories supplied by Specialized Construction Products Ltd and the certified plasterers must be completed by trained applicators, certified by Specialized Construction Products Ltd.

19.2 Installation of the accessories supplied by the building contractor must be completed by tradespersons with an understanding of cavity construction, in accordance with instructions given within the Caviteclad Technical Literature and this Appraisal.

System Installation

Building Wrap and Flexible Sill and Jamb Flashing Tape

20.1 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 cavity battens and the rest of the Caviteclad system. Building wrap must be installed horizontally and be continuous around corners. The wrap must be lapped 75 mm minimum at horizontal joints and 150 mm minimum over studs at vertical joints. Particular attention must be paid to the installation of the building wrap and sill and jamb tapes around window and door openings to ensure a continuous seal is achieved and all exposed wall framing in the opening is protected.

Aluminium Joinery Installation

20.2 Aluminium joinery must be installed by the building contractor in accordance with the Technical Literature. A 7.5 - 10 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. The joinery must be spaced 22 - 23 mm off of the wall frame to allow the Caviteclad flashings to be installed.

Caviteclad

20.3 The system must be installed in accordance with the Technical Literature by Specialized Construction Products Ltd certified plasterers.

20.4 The Caviteclad plaster system must only be applied when the air and substrate temperature is within the range of +5°C to +30°C.

Inspections

20.5 The Technical Literature must be referred to during the inspection of Caviteclad installations.

Finishing

20.6 The paint manufacturers' instructions must be followed at all times for application of the paint finish. The plaster must be cured for a minimum of 2-3 days and must be dry before commencing painting.

Health and Safety

21.1 Safe use and handling procedures for the components that make up Caviteclad are provided in the relevant manufacturer's Technical Literature.

Basis of Appraisal

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

Tests

22.1 The following testing has been undertaken by BRANZ:

- BRANZ expert opinion on NZBC E2 code compliance for Caviteclad was based on testing and evaluation of all details within the scope and as stated within this Appraisal. Caviteclad was tested to 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 and horizontal control joints, internal and external corners and balustrade to wall junction with a plastered cap. 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 Acceptable Solution E2/AS1 for drained cavity claddings.
- Wind face load and fastener pull through testing for the Caviteclad system incorporating both EPS sheets and Permapanel panels. BRANZ determined design wind suction pressures, and by comparing these pressures with the NZS 3604 design wind speeds and NZS 4203 pressure coefficients, the fixing requirements were determined for timber and steel framed walls.
- In-plane shear testing of the Caviteclad system incorporating Permapanel panels to determine the systems ability to resist its self-weight.
- Durability testing of the Caviteclad system incorporating Permapanel panels to verify the durability of the system. The testing included cyclic heat rain, tensile bond, modulus of rupture and material characterisation.
- Tensile bond strength of the Caviteclad plaster system to the EPS substrate. The testing was carried out in accordance with ASTM E2134-01.
- Cone Calorimeter testing of the Caviteclad plaster system over 50 mm EPS. The testing was carried out in accordance with AS/NZS 3837.
- Zinc coating thickness of the nail fixings. The testing was carried out to determine compliance with AS/NZS 4680.

Other Investigations

23.1 Structural and durability opinions have been provided by BRANZ technical experts.

23.2 Site visits of cavity-based EIFS cladding systems have been carried out by BRANZ to assess the practicability of installation, and to examine completed installations.

23.3 The Technical Literature for Caviteclad has been examined by BRANZ and found to be satisfactory.

Quality

24.1 The manufacture of the plasters has been examined by BRANZ, including methods adopted for quality control. Details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

24.2 The manufacture of the Permapanel panels and EPS sheets has been examined by BRANZ, including methods adopted for quality control. Details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory.

24.3 The quality of materials, components and accessories supplied by Specialized Construction Products Ltd is the responsibility of Specialized Construction Products Ltd.

24.4 Quality on site is the responsibility of the Specialized Construction Products Ltd certified plasterers.

24.5 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of framing systems and joinery, building wraps, flashing tapes and air seals in accordance with the instructions of Specialized Construction Products Ltd.

24.6 Building owners are responsible for the maintenance of Caviteclad installations in accordance with the instructions of Specialized Construction Products Ltd.

Sources of Information

- AS 1366.3 - 1992 Rigid cellular plastic sheets for thermal insulation - Rigid cellular polystyrene - Moulded (RC/PS-M).
- AS 3566 - 2002 Self-drilling screws for the building and construction industries.
- AS 3730 Guide to the properties of paints for buildings.
- AS/NZS 3837: 1998 Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter.
- AS/NZS 4680: 1999 Hot-dip galvanised (zinc) coatings on fabricated ferrous articles.
- ASTM E2134-01 Standard test method for evaluating the tensile-adhesive performance of an Exterior Insulation and Finish System (EIFS).
- 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.
- NZS 4214: 2006 Methods of determining the total thermal resistance of parts of buildings.
- BRANZ House Insulation Guide, Third Edition.
- BRANZ Texture Coated Cladding Good Practice Guide, May 2007.
- 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 Department of Building and Housing, Third Edition May 2007.
- The Building Regulations 1992, up to, and including June 2007 Amendment.



BRANZ

In the opinion of BRANZ, [Caviteclad](#) 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 [Specialized Construction Products 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. [Specialized Construction Products 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.
3. 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.
4. 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 [Specialized Construction Products](#).
5. 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.
6. BRANZ provides no certification, guarantee, indemnity or warranty, to [Specialized Construction Products](#) or any third party.

For BRANZ

C Preston
Chief Executive

Date of issue: 20 February 2008