



BRANZ Appraised

Appraisal No. 769 [2012]

CELCRETE 50 MM PANEL VENEER CAVITY CLADDING SYSTEM

Appraisal No. 769 [2012]

Amended 15 June 2016



BRANZ Appraisals

Technical Assessments of products
for building and construction.



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Product

- 1.1 The Celcrete 50 mm Panel Veneer Cavity Cladding System 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 autoclaved aerated concrete (AAC) panels fixed either over timber battens to form a 20 mm or 40 mm cavity when fixed to timber framing, or fixed over EPS battens to form a 20 mm cavity when fixed to steel framing. The coating system consists of a minimum 5 mm thickness of fibreglass mesh reinforced polymer-modified plasters. The plaster system is finished with a 100% acrylic exterior paint system. The top coat plasters can be finished to give different texture appearances.
- 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 or 40 mm drained cavity.

Scope

- 2.1 The Celcrete 50 mm Panel Veneer Cavity Cladding System 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 Wind Zones up to, and including Extra High.
- 2.2 The Celcrete 50 mm Panel Veneer Cavity Cladding System has also been appraised for weathertightness and structural wind loading when used as a wall cladding system for buildings within the following scope:
 - the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regards to building height and floor plan area; and,
 - constructed with timber or steel framing complying with the NZBC; and,
 - situated in specific design wind pressures up to a maximum design differential ultimate limit state (ULS) of 2.5 kPa.
- 2.3 The Celcrete 50 mm Panel Veneer Cavity Cladding System 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 the Celcrete 50 mm Panel Veneer Cavity Cladding System relies on the joinery meeting the requirements of NZS 4211 for the relevant Wind Zone or design wind pressure.]*
- 2.5 Installation of components and accessories supplied by Celcrete International Ltd must be carried out only by Celcrete International Ltd approved applicators.

Building Regulations

New Zealand Building Code [NZBC]

- 3.1 In the opinion of BRANZ, the Celcrete 50 mm Panel Veneer Cavity Cladding System if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:
- Clause B1 STRUCTURE:** Performance B1.3.1, B1.3.2 and B1.3.4. The Celcrete 50 mm Panel Veneer Cavity Cladding System meets the requirements for loads arising from self-weight, earthquake, wind, impact and creep [i.e. B1.3.3 (a), (f), (h), (j) and (q)]. See Paragraphs 10.1 – 10.5.
- Clause B2 DURABILITY:** Performance B2.3.1 (b), 15 years, B2.3.1 (c), 5 years, and B2.3.2. The Celcrete 50 mm Panel Veneer Cavity Cladding System meets these requirements. See Paragraphs 11.1 – 11.3.
- Clause E2 EXTERNAL MOISTURE:** Performance E2.3.2. The Celcrete 50 mm Panel Veneer Cavity Cladding System meets this requirement. See Paragraphs 15.1 – 15.5.
- Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. The Celcrete 50 mm Panel Veneer Cavity Cladding System 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 Celcrete International Ltd are as follows:

Cavity Battens

- Timber framing – manufactured from H3.2 treated timber. The standard batten is 200 mm long by 40 mm thick by 40 mm wide. The batten for use where there is plywood bracing sheets fixed to the back of the cavity is 200 mm long by 33 mm thick by 40 mm wide. Both are angled at the top and bottom with a 22° slope. The sloping faces are parallel.
- Steel framing – manufactured from high density [Class H] expanded polystyrene with an approximate density of 28 kg/m³. The battens are 40 mm wide by 20 mm thick and are supplied in 2.4 m lengths.

Celcrete Panels

- The Celcrete panels are 50 mm thick, manufactured from autoclaved aerated concrete [AAC] with an approximate density of 31 kg/m². Celcrete panels are supplied 2.2 m long x 600 mm wide.
- Fixings [panels to timber battens] – 10 g x 75 mm long countersunk head, square drive wood screws, stainless steel grade 316.
- Fixings [panels to steel frame] – 14 g x 100 mm long, Type 17, AS 3566 Corrosion Class 4 screws with a head diameter of 14 mm and a shank diameter of 5.1 mm in NZS 3604 defined Exposure Zones B and C, and stainless steel grade 304 in Exposure Zone D.

Celcrete Mortar Glue

- Celcrete Mortar Glue is a polymer-modified, Portland cement-based thin section jointing plaster supplied in 25 kg bags and mixed on site with clean water. It is trowel applied to the joints of the Celcrete Panels.

Plasters

- Rendertek Base Render is a dry mix, cement-based, polymer-modified plaster supplied in 25 kg bags and mixed on site with clean water. It is used as a base coat for bonding and bedding the fibreglass mesh and is trowel or pump-applied to an approximate thickness of 2-3 mm.
- Rendertek Sponge Finish Render is a dry mix, cement-based, polymer-modified plaster supplied in 25 kg bags and mixed on site with clean water. It is used as a finish coat and is trowel-applied to an approximate thickness of 1-2 mm.
- Rendertek Adobe Finish Render is a dry mix, cement-based, polymer-modified plaster supplied in 25 kg bags and mixed on site with clean water. It is used as a finish coat and is trowel-applied to an approximate thickness of 1-2 mm.

Accessories

- Reinforcing mesh – alkali-resistant fibreglass mesh with a nominal mesh size of 4 x 4 to 6 x 6 mm square and a minimum weight of 150 g/m².
 - uPVC components – reveal bead, sill flashing, window head moulding, soffit moulding, base cap/vermin strip, control joint moulding.
- 4.2 Accessories used with the system which are supplied by the Celcrete International Ltd approved applicator are:
- Cavity batten fixings – 75 x 3.06 mm hot-dip galvanised D-head, ring shank nails in NZS 3604 defined Exposure Zones B, C and D for timber.
 - Adhesive for temporarily adhering uPVC trims to Celcrete panels prior to plastering – BRANZ Appraised adhesive suitable for AAC and uPVC.
 - Expanding foam for filling vertical gaps between panels and at external and internal corners – Gorilla NailPower.
 - 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.
 - Metal Primer applied to the exposed Celcrete panel reinforcing.
- 4.3 Accessories used with the system which are supplied by the building contractor are:
- Flexible wall underlay – building paper complying with NZBC Acceptable Solution E2/AS1 Table 23, or breather-type membranes covered by a valid BRANZ Appraisal for use as wall underlays.
 - Flexible wall underlay support – polypropylene strap, 75 mm galvanised mesh, galvanised wire, or additional vertical battens for securing the flexible building underlay in place and preventing bulging of the bulk insulation into the drainage cavity. *[Note: mesh and wire galvanising must comply with AS/NZS 4534.]*
 - Rigid wall underlay – plywood or fibre cement sheet complying with NZBC Acceptable Solution E2/AS1 Table 23, or rigid wall underlay covered by a valid BRANZ Appraisal for use as rigid air barrier systems.
 - 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.
 - Joinery head flashings – as supplied by the joinery manufacturer or contractor.
 - 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.

Paint System Specification

- 4.4 Paint systems are not supplied by Celcrete International Ltd and have not been assessed by BRANZ and are therefore outside the scope of this Appraisal.
- 4.5 All exposed faces, including top edges at sills and all bottom edges of the plastered Celcrete panels must be finished with at least two coats of an exterior grade latex acrylic paint complying with any of Parts 7, 8, 9 or 10 of AS 3730. Paint colours must have a light reflective value (LRV) of minimum 25% regardless of gloss value.

Handling and Storage

- 5.1 Handling and storage of all materials supplied by Celcrete International Ltd or the approved applicators, whether on or off site, are under the control of Celcrete International Ltd approved applicators. Dry storage must be provided on site for the Celcrete panels, fibreglass mesh and bags of plaster. EPS battens, 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 the Celcrete 50 mm Panel Veneer Cavity Cladding System. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

Framing

Timber Treatment

- 7.1 Timber wall framing behind the Celcrete 50 mm Panel Veneer Cavity Cladding System must be treated as required by NZBC Acceptable Solution B2/AS1.

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 AS/NZS 1170. 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. Dwargs must be fitted flush between the studs at maximum 800 mm centres.
- 7.3 For specifically designed timber framed buildings situated in Wind Zones above NZS 3604 defined 'Extra High', the minimum timber framing size is 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 Celcrete 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 0.75 mm.
- 7.7 In all cases studs must be at maximum 600 mm centres. Dwargs must be fitted flush between the studs at maximum 800 mm centres.

Celcrete Panel Setout

- 7.8 Celcrete panels are installed horizontally. Vertical panel edges may be jointed on-stud or off-stud. Horizontal Celcrete 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 for each row. Celcrete panels must be supported at fixing locations with vertical cavity battens or cavity spacers in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.2 [f]. At the base of the wall, the Celcrete panels must hang 50 mm below the supporting framing.

General

- 8.1 When the Celcrete 50 mm Panel Veneer Cavity Cladding System is used for specifically designed buildings up to design differential 2.5 kPa ULS wind pressure, only the weathertightness aspects of the cladding, maximum framing centres and Celcrete 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 starter strip 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]. Where the Celcrete panels sit on a rebated concrete slab edge, vents which provide the equivalent minimum ventilation opening area can be used.
- 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.
- 8.4 At balcony, deck or roof/wall junctions, the bottom edge of the Celcrete 50 mm Panel Veneer Cavity Cladding 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.
- 8.5 All external walls of buildings must have barriers to airflow in the form of interior linings with all joints stopped for Wind Zones up to and including 'Very High', and rigid wall underlays for buildings in the 'Extra High' Wind Zone and specifically designed buildings up to 2.5 kPa design differential ULS wind pressure. Unlined gables and walls must incorporate a rigid wall underlay or an air barrier which meets the requirements of NZBC Acceptable Solution E2/AS1, Table 23. For attached garages, wall underlays must be selected in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.3.4. Where rigid wall underlays up to 7 mm thick are used, the 33 mm thick Celcrete battens must be used. Where rigid wall underlays greater than 7 mm are used, the cavity batten fixing lengths must be increased by a minimum of the thickness of the underlay.
- 8.6 Where penetrations through the Celcrete 50 mm Panel Veneer Cavity Cladding 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 cavity battens. 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 Celcrete panels.

Control Joints

9.1 Control joints must be constructed in accordance with the Technical Literature and be provided as follows:

- Horizontal control joints – at maximum 6.0 m centres and at inter-storey floor levels where unseasoned timber floor joists are used.
- Vertical control joints – at maximum 8.0 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

9.2 Inter-storey junctions must be constructed in accordance with the Technical Literature. Inter-storey joints must be provided to limit continuous cavities to the lesser of 2-storeys or 7 metres in height, in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.9.4[b].

Structure

Mass

10.1 The mass of the Celcrete 50 mm Panel Veneer Cavity Cladding System is approximately 36 kg/m², therefore it is considered a medium wall cladding in terms of NZS 3604.

Impact Resistance

10.2 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

10.3 The Celcrete 50 mm Panel Veneer Cavity Cladding System is suitable for use in all Wind Zones of NZS 3604, up to and including 'Extra High' where buildings are designed to meet the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 1.1, or design wind pressures up to and including design differential 2.5 kPa ULS where buildings are specifically designed.

Celcrete Panel Fixing – Timber Framing

10.4 For timber framed buildings, installations in NZS 3604 Wind Zones up to, and including, 'Extra High' and specific design wind pressures up to and including design differential 2.5 kPa ULS, the cavity battens must be fixed to the timber framing with two 75 mm long galvanised or stainless steel ring-shank nails in accordance with the Technical Literature. Battens are fixed to studs at maximum 600mm horizontal centres, at all horizontal joints between the Celcrete panels. Additional battens may be required at corners and around openings in accordance with the Technical Literature. The Celcrete panels are fixed to the battens with 10 g x 75 mm long, countersunk head, stainless steel screws. The fixings must be positioned 50 mm minimum from the edge of the panel and the fixing heads must finish 5 mm below the panel surface.

Celcrete Panel Fixing – Steel Framing

10.5 For steel framed buildings, installations in NZS 3604 Wind Zones up to, and including, 'Extra High' and specific design wind pressures up to and including design differential 2.5 kPa ULS, EPS cavity battens are fixed to the steel framing in accordance with the Technical Literature. EPS thermal breaks are fixed to all framing members not covered by battens [see Paragraph 16.3]. The Celcrete panels are fixed to the steel framing with 100 mm long self-drilling screws with a head diameter of 14 mm and a shank diameter of 5.1 mm. The fixings must be positioned 50 mm from the edge of the panel and the fixing heads must finish flush with the panel surface.

Durability

- 11.1 The Celcrete 50 mm Panel Veneer Cavity Cladding System 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 The Celcrete 50 mm Panel Veneer Cavity Cladding System is expected to have a serviceable life of at least 30 years provided the system is maintained in accordance with this Appraisal, and the Celcrete panels, fixings and plaster are continuously protected by a weathertight coating and remain dry in service.
- 11.3 Microclimatic conditions, including geothermal hot spots, industrial contamination and corrosive atmospheres, and contamination from agricultural chemicals or fertilisers can convert mildly corrosive atmosphere into aggressive environments for fasteners. The fixing of Celcrete panels and timber battens in areas subject to microclimatic conditions requires specific design in accordance with NZS 3604 Paragraph 4.2.4, and is outside the scope of this Appraisal.

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, plasters, 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 Celcrete 50 mm Panel Veneer Cavity Cladding System must be repaired in accordance with the instructions of Celcrete International 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 Celcrete 50 mm Panel Veneer Cavity Cladding System.]*

Control of External Fire Spread

- 13.1 The Celcrete 50 mm Panel Veneer Cavity Cladding System has a peak heat release rate of less than 100kW/m² and a total heat released of less than 25MJ/m². In accordance with NZBC Acceptance Solution C/AS1, Table 5.1 the system is suitable for use on buildings with a SH Risk Group classification, at any distance to the relevant boundary. Refer to NZBC Acceptable Solutions C/AS2- C/AS6, Paragraph 5.8.1 for the specific exterior surface finish requirements for other building Risk Groups.

[Note: The scope of this Appraisal limits building heights to 10 m in accordance with the limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1[a]. The building heights referenced in Paragraph 13.1 above are as defined in the Definitions Sections of NZBC Clauses C1 – C6 Protection from Fire.]

Prevention of Fire Occuring

- 14.1 Separation or protection must be provided to the Celcrete 50 mm Panel Veneer Cavity Cladding System from heat sources such as fire places, heating appliances, flues and chimneys. Part 7 of NZBC Acceptable Solutions C/AS1 – C/AS6 and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

- 15.1 The Celcrete 50 mm Panel Veneer Cavity Cladding System, 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.
- 15.2 The cavity must be sealed off from the roof and sub-floor space to meet the performance requirements of Clause E2.3.5.
- 15.3 The Celcrete 50 mm Panel Veneer Cavity Cladding System 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.
- 15.4 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.
- 15.5 The use of the Celcrete 50 mm Panel Veneer Cavity Cladding System 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

- 16.1 The Celcrete 50 mm Panel Veneer Cavity Cladding System 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

- 16.2 The Celcrete 50 mm Panel Veneer Cavity Cladding System 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 Paragraph 16.3 below for specific requirements for steel framed buildings.
- 16.3 When the Celcrete 50 mm Panel Veneer Cavity Cladding System is installed over a steel frame, an expanded polystyrene thermal break must be installed over the wall underlay 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]. When EPS cavity battens are used, a 10 mm thick Class H EPS thermal break must be installed over the wall underlay over each steel member not covered by a cavity batten. Cavity battens must not be used horizontally. The remainder of the Celcrete 50 mm Panel Veneer Cavity Cladding System is then installed over top of the thermal break in accordance with the Technical Literature and this Appraisal.

Installation Information

Installation Skill Level Requirements

- 17.1 Installation and finishing of components and accessories supplied by Celcrete International Ltd and the approved applicators must be completed by trained applicators, approved by Celcrete International Ltd.
- 17.2 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 Celcrete 50 mm Panel Veneer Cavity Cladding System Technical Literature and this Appraisal.

System Installation

Building Underlay and Flexible Sill and Jamb Tape Installation

- 18.1 The selected building underlay and flexible sill and jamb tape system must be installed by the building contractor in accordance with the underlay and tape manufacturers' instructions prior to the installation of the cavity battens and the rest of the Celcrete 50 mm Panel Veneer Cavity Cladding System. Flexible building underlay must be installed horizontally and be continuous around corners. Underlay must be lapped 75 mm minimum at horizontal joints and 150 mm minimum over studs at vertical joints. Generic rigid wall underlay materials must be installed in accordance with NZBC Acceptable Solution E2/AS1 and be overlaid with a flexible wall underlay. Proprietary systems shall be installed in accordance with the manufacturer's instructions. Particular attention must be paid to the installation of the building underlay 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.
- 18.2 Where studs are at greater than 450 mm centres and a flexible wall underlay is being used, a wall underlay support must be installed over the underlay at maximum 300 mm centres horizontally.

Aluminium Joinery Installation

- 18.3 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 45 mm off the wall frame to allow the Celcrete 50 mm Panel Veneer Cavity Cladding System flashings to be installed.

The Celcrete 50 mm Panel Veneer Cavity Cladding System

- 18.4 The system must be installed in accordance with the Technical Literature by Celcrete International Ltd approved applicators.
- 18.5 The Celcrete 50 mm Panel Veneer Cavity Cladding System plaster system must only be applied when the air and substrate temperature is within the range of +5°C to +30°C.

Inspections

- 18.6 The Technical Literature must be referred to during the inspection of Celcrete 50 mm Panel Veneer Cavity Cladding System installations.

Finishing

- 18.7 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

- 19.1 Cutting of Celcrete panels must be carried out in well ventilated areas, and a dust mask and eye protection must be worn.
- 19.2 When power tools are used for cutting, grinding or forming holes, health and safety measures must be observed because of the amount of dust generated.
- 19.3 Safe use and handling procedures for the components that make up the Celcrete 50 mm Panel Veneer Cavity 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

- 20.1 Small-scale fastener withdrawal and wind face load testing for the Celcrete 50 mm Panel Veneer Cavity Cladding System was completed by BRANZ. BRANZ determined design wind suction pressures, and by comparing these with the NZS 3604 design wind speeds and AS/NZS 1170 pressure coefficients, the fixing requirements were determined for timber and steel framed walls.
- 20.2 In-plane shear testing of the Celcrete 50 mm Panel Veneer Cavity Cladding System to determine the system's ability to resist its self-weight.
- 20.3 A racking test was completed to examine the performance of the Celcrete 50 mm Panel Veneer Cavity Cladding System when the system was subjected to both serviceability level and ultimate level seismic racking deflections, taken to be ± 8 mm and ± 36 mm respectively. The plaster system did not crack or show signs of damage for the entire test program.
- 20.4 BRANZ expert opinion on NZBC E2 code compliance for the Celcrete 50 mm Panel Veneer Cavity Cladding System was based on testing and evaluation of all details within the scope and as stated within this Appraisal. The Celcrete 50 mm Panel Veneer Cavity Cladding System was tested to the version of E2/VM1 contained within the NZBC Clause E2 Amendment 5. 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 joints, 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 drained cavity claddings.
- 20.5 Durability testing of the Celcrete panels to verify the durability of the system. The testing included compressive strength, length change during moisture movement, corrosion protection of steel reinforcement and mineralogy by x-ray diffraction crystallography.
- 20.6 Cone Calorimeter testing to determine the peak rate of heat release and total heat release of the Celcrete 50 mm Panel Veneer Cavity Cladding System was completed by BRANZ. The testing was carried out in accordance with ISO 5660.

Other Investigations

- 21.1 Structural and durability opinions have been provided by BRANZ technical experts.
- 21.2 Site visits of Celcrete 50 mm Panel Veneer Cavity Cladding System installations have been carried out by BRANZ to assess the practicability of installation, and to examine completed installations.
- 21.3 The Technical Literature for the Celcrete 50 mm Panel Veneer Cavity Cladding System has been examined by BRANZ and found to be satisfactory.

Quality

- 22.1 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.
- 22.2 The manufacture of the Celcrete panels has been examined by an agent of 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.
- 22.3 The quality of materials, components and accessories supplied by Celcrete International Ltd is the responsibility of Celcrete International Ltd.
- 22.4 Quality on site is the responsibility of Celcrete International Ltd approved applicators.
- 22.5 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of framing systems and joinery, building underlays, flashing tapes and air seals in accordance with the instructions of Celcrete International Ltd.
- 22.6 Building owners are responsible for the maintenance of the Celcrete 50 mm Panel Veneer Cavity Cladding System installations in accordance with the instructions of Celcrete International Ltd.



Sources of Information

- AS 3566 – 2002 Self-drilling screws for the building and construction industries.
- AS 3730 Guide to the properties of paints for buildings.
- AS/NZS 1170: 2002 Structural design actions.
- ISO 5660 Reaction to fire tests - Heat release, smoke production and mass loss rate.
- NZS 3603: 1993 Timber Structures Standard.
- NZS 3604: 2011 Timber-framed buildings.
- NZS 4211: 2008 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 [Amendment 5, 1 August 2011].
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.

Amendments

Amendment No. 1, dated 7 June 2013.

This Appraisal has been amended to update clause changes as required by the introduction of NZBC Fire Clauses C1 – C6 Protection from Fire and A3 Building Importance Levels.

Amendment No. 2, dated 11 June 2015.

This Appraisal has been amended to update the minimum light reflective value for paint coatings applied to plastered Celcrete panels.

Amendment No. 3, dated 15 June 2016.

This Appraisal has been amended to update the Control of External Fire Spread statements following completion of cone calorimeter testing.



In the opinion of BRANZ, **Celcrete 50 mm Panel Veneer Cavity Cladding System** is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Celcrete International 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. **Celcrete International Ltd:**
 - a) continues to have the product reviewed by BRANZ;
 - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
 - c) abides by the BRANZ Appraisals Services Terms and Conditions.
 - d) Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
 - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
 - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
 - c) any guarantee or warranty offered by **Celcrete International Ltd**.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to **Celcrete International Ltd** or any third party.

For BRANZ



Pieter Burghout

Chief Executive

Date of Issue:

05 October 2012