



BRANZ Appraised

Appraisal No.633 [2009]

BRANZ Appraisals

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

**BRANZ
APPRAISAL
No. 633 (2009)**

**GRAPHEX CAVITY
SYSTEM**

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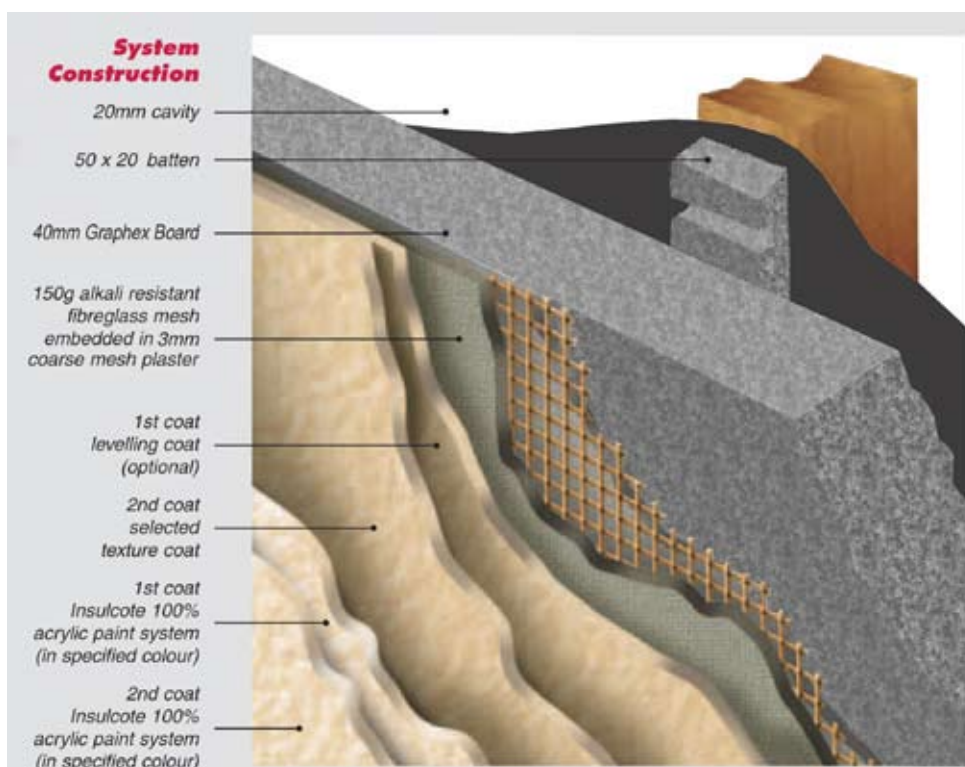


Product

1.1 The Graphex Cavity System is a cavity-based Exterior Insulation and Finishing System (EIFS) wall cladding. It is an external wall cladding system for residential and light commercial type buildings where domestic construction techniques are used.

1.2 The system consists of Neopor®, a graphite composite board fixed over polystyrene battens to form the cavity. The plaster coating system consists of a 3-4 mm thickness of fibreglass mesh reinforced, polymer-modified, cement-based plaster, which is finished with a cement-based finishing plaster that is then painted with a 100% acrylic-based paint system. The chosen finishing plaster is applied to give a range of different appearances, such as a sponge, patterned, adobe or spray textured finish.

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 The Graphex Cavity 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 Building Wind Zones up to, and including 'Very High'.

2.2 The Graphex Cavity System has also been appraised for weathertightness and structural wind loading when used for timber and steel framed buildings subject to specific design up to a design differential ultimate limit state (ULS) wind pressure of 2.5 kPa.

2.3 The Graphex Cavity System must only be installed on vertical surfaces (except for tops of parapets, sills and balustrades, which must have a minimum 15° 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 Graphex Cavity System relies on the joinery meeting the requirements of NZS 4211 for the relevant Building Wind Zone or wind pressure.*)

2.5 Installation of components and accessories supplied by PSL and approved installers must be carried out only by PSL approved installers.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, the Graphex Cavity System if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet or contribute to meeting the following provisions of the NZBC:

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. The Graphex Cavity System 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. The Graphex Cavity System meets these requirements. See Paragraphs 11.1 and 11.2.

Clause C3 SPREAD OF FIRE: Performance C3.3.5. The Graphex Cavity System meets this requirement. See Paragraphs 14.1 - 14.3.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. The Graphex Cavity System meets this requirement. See Paragraphs 16.1 - 16.5.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The Graphex Cavity 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 PSL are as follows:

Cavity Battens

- Graphex peel 'n' stick battens are manufactured from high density (Class H) expanded polystyrene (EPS) with an approximate density of 24 kg/m³. The battens are 21 mm thick by 45 mm wide and have a slotted face to allow air movement. The battens are coated on the back face with an acrylic adhesive, which is protected prior to installation by a removable film.

Neopor®

- Neopor® boards are 40 or 60 mm thick with an approximate density of 24 kg/m³. The boards are supplied in lengths ranging from 2.4 to 3.6 m x 1.2 m wide and are manufactured to meet the requirements of AS 1366 Part 3.

Plasters

- Coarse Mesh Render* is a polymer-modified, Portland cement-based plaster supplied in 20 kg bags and mixed on site with clean drinking water. It is applied as the base coat in a minimum 2 mm layer followed by the embedment of fibreglass mesh reinforcement in the outer surface. Coarse Mesh Render can also be used to achieve a spray textured finish.
- Ezytex* is a polymer-modified, Portland cement-based finishing plaster supplied in 20 kg bags and mixed on site with clean drinking water. It is available in three grades to provide a textured, patterned or sponge 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. Insulcote is a 100% acrylic-based exterior paint formulated for use over cement-based plasters and can be used over Coarse Mesh Render and Ezytex finishing plasters. Insulcote is supplied in 4 litre, 10 litre and 20 litre pails.

- PSL allows the use of other latex exterior paint systems over Coarse Mesh Render and Ezytex finishing plasters. A latex exterior paint system complying with any of Parts 7, 8, 9 or 10 of AS 3730 must be used over the finishing plasters to make the system weathertight and give the desired finish colour to exterior walls. Paint colours must have a light reflectance value of 40% minimum regardless of gloss value. Proprietary paint systems not supplied by PSL have not been assessed and are therefore outside the scope of this Appraisal.

Accessories

- Reinforcing mesh - alkali-resistant fibreglass mesh with a nominal mesh size of approximately 4 mm square and a weight of 150 g/m² for use in domestic and light commercial situations. Where a greater level of impact resistance is required, 360 g/m² alkali-resistant fibreglass mesh with a nominal mesh size of approximately 3 mm square is available.
- uPVC components - sill flashing, jamb flashing and head flashing, base caps, corner beads, cavity vent strip, Z-flashing and horizontal and vertical control joint flashings.
- Neopor® board fixings (timber frame) - 90 x 3.6 mm (for 40 mm thick) and 110 x 4.0 mm (for 60 mm thick) hot-dipped galvanised flat head nails with 22 or 40 mm diameter washers.
- Neopor® board fixings (steel frame) - 8-gauge x 75 mm (for 40 mm thick) and 8-gauge x 95 mm (for 60 mm thick) 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 screws in the sea spray zone with 40 mm diameter washers.
- Washers - 22 or 40 mm diameter polypropylene washers.

4.2 Accessories used with the system which are supplied by the approved applicator are:

- Waterproof membrane tapes - tapes covered by a valid BRANZ Appraisal for use as waterproofing membranes over 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 gluing uPVC components to the Neopor® boards 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 flashing 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 airseal - 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 PSL or the approved installer, whether on or off site, are under the control of PSL approved installers. Dry storage must be provided on site for the fibreglass mesh and bags of plaster. Neopor® boards, 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 Graphex Cavity 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. The Graphex Cavity System listing on the BRANZ website excludes specific details. These details are outside the scope of this Appraisal.

Design Information

Framing

Timber Treatment

7.1 Timber wall framing behind the Graphex Cavity System 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 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 for buildings designed to NZS 3604 and at maximum 400 mm centres for specifically designed buildings situated in Building Wind Zones above NZS 3604 defined 'Very High'. Dwangs must be fitted flush between the studs at maximum 800 mm centres.

7.3 Timber framing must have a maximum moisture content of 24% at the time of the cladding application. (*If Neopor® boards 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

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

7.5 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 minimum 0.55 mm.

7.6 For steel framed buildings situated within NZS 3604 defined Building Wind Zones up to, and including, 'Very High', studs must be at maximum 600 mm centres. For all other buildings studs must be at maximum 400 mm centres. Dwangs must be fitted flush between the studs at maximum 800 mm centres.

Neopor® Board Setout

7.7 All vertical Neopor® board edges must be supported and fixed through the cavity battens to the framing. Horizontal board edges must be supported at fixing locations with 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 Neopor® boards must hang 50 mm below the supporting framing.

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

General

8.1 When the Graphex Cavity System is used for specifically designed buildings up to 2.5 kPa design differential ULS wind pressure, only the weathertightness aspects of the cladding and maximum framing centres and sheet 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 Openings in the cavity vent 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).

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 Graphex Cavity 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 Graphex Cavity 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 the Neopor®. When cables must penetrate the Neopor® for exterior electrical connections, the cable must be directly supported by passing through an electrical conduit.

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 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.

(Note: Horizontal and Vertical Control joints must be located over structural supports. The design of vertical control joints where the system abuts different cladding types is outside the scope of this Appraisal and is the responsibility of the designer - see Paragraph 8.7.)

Inter-storey Junctions

9.2 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 Graphex Cavity System is approximately 7 kg/m², therefore it is considered a light wall cladding in terms of NZS 3604.

Impact Resistance

10.2 The system has adequate resistance to hard body impacts likely to be encountered in normal residential use. Where a greater level of impact protection is required a heavier grade of reinforcing mesh may be used. The heavy-grade fibreglass reinforcing mesh (360 g/m²) embedded in 5 mm thick plaster provides approximately 4 times the hard body impact strength of the standard grade mesh in 3 mm thick plaster. 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 Graphex Cavity System 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 design differential ULS wind pressure where buildings are specifically designed.

Neopor® Board Fixing

10.4 Neopor® boards must be fixed through the cavity battens and cavity spacers to the wall framing at maximum centres specified in Table 1.

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

NZS 3604 Building Wind Zone with studs at maximum 600 mm centres	Maximum fixing centres (mm) beyond 1.5 m from an external corner	Maximum fixing centres (mm) within 1.5 m of an external corner
Low	300	300
Medium	300	200
High	300	150
Very High	300	150

Note: One fixing is also required into each dwang at mid-dwang length.

Note: In Low, Medium or High Building Wind Zones, 22 or 40 mm diameter washers may be used. In Very High Building Wind Zones, 40 mm diameter washers must be used.

Specifically designed buildings up to 2.5 kPa design differential ULS wind pressure with studs at maximum 400 mm centres.		
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

Note: 40 mm diameter washers must be used in all situations.

Durability

11.1 The Graphex Cavity System meets code compliance with NZBC Clause B2.3.1 (b), 15 years for the cavity system and plaster finish, and code compliance with NZBC Clause B2.3.1 (c), 5 years for the exterior paint system.

Serviceable Life

11.2 The Graphex Cavity 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 Neopor® boards, 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 5-10 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 would allow water ingress, must be repaired immediately. Sealant, coatings and the like must be repaired in accordance with the instructions of PSL.

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. (Failing to adhere to the minimum ground clearances given in this Appraisal and the Technical Literature will adversely affect the long term durability of the Graphex Cavity System.)

Control of Internal Fire and Smoke Spread

13.1 The Neopor® board used with the system meets the flame propagation criteria of AS 1366. The Neopor® board 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 The Graphex Cavity System has a performance level A in accordance with NZBC 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.

14.2 For buildings of three or more floors 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 The Graphex Cavity System 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 The Graphex Cavity 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.

16.2 The cavity must be sealed off from the roof and sub-floor space to meet code compliance with Clause E2.3.5.

16.3 The Graphex Cavity System allows 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.

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 the Graphex Cavity 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

17.1 The Graphex Cavity 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

17.2 The Graphex Cavity 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.

17.3 When the Graphex Cavity System 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.

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. 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 the Graphex Cavity System, unless better information is available for a specific case, the R-value of the Neopor® layer must be taken as R0.69 (40 mm thick) and R1.03 (60 mm thick) based on a thermal conductivity (k value) of 0.032 W/m °C.

Installation Information

Installation Skill Level Requirements

19.1 Installation and finishing of components and accessories supplied by PSL and the approved installers must be completed by P.P.C.S. qualified tradespersons, approved by PSL.

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 Graphex Cavity System 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 Graphex Cavity 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 and associated head flashings 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.

Graphex Cavity System

20.3 The system must be installed in accordance with the Technical Literature by PSL approved installers.

20.4 The Graphex 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 Graphex Cavity System installations.

Finishing

20.6 Insulcote or other 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 the Graphex Cavity 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

22.1 The following testing has been completed by BRANZ:

- BRANZ expert opinion on NZBC E2 code compliance for the Graphex Cavity System was based on testing and evaluation of the Insulclad Cavity System incorporating all of the details within the scope and as stated within this Appraisal. The Insulclad Cavity System 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 EIFS cladding systems. BRANZ determined design wind suction pressures, and by comparing these pressures with NZS 4203 pressure coefficients, the fixing requirements were determined for timber and steel framed walls.
- Cone Calorimeter testing of the Graphex plaster system over 40 mm EPS. The testing was carried out in accordance with AS/NZS 3837.

Other Investigations

23.1 The performance of Insulclad External Insulation and Finishing Systems in New Zealand since 1985 has been considered.

23.2 Structural and durability opinions have been given by BRANZ technical experts.

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

23.4 The manufacturer's Technical Literature 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 quality management system of PSL is covered by the Nuplex Industries Ltd quality management system which has been assessed and registered as meeting the requirements of AS/NZS ISO 9001:2000 by Telarc Limited, Registration Number 158.

24.3 Quality on site is the responsibility of the PSL approved installers.

24.4 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, air seals and joinery head flashings in accordance with the instructions of PSL.

24.5 Building owners are responsible for the maintenance of the Graphex Cavity System in accordance with the instructions of PSL.

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/NZS 1170: 2002 Structural design action – General principles.
- AS/NZS 3837: 1998 Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter.
- 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 4211: 2008 Specification for performance of windows.
- NZS 4214: 2006 Methods of determining the total thermal resistance of parts of buildings.
- 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 August 2008 Amendment



BRANZ

In the opinion of BRANZ, the **Graphex Cavity 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 **Nuplex Industries 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. **Nuplex Industries 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 **Nuplex Industries Ltd**.
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 **Nuplex Industries Ltd** or any third party.

For BRANZ

P Burghout
Chief Executive

Date of issue: 30 October 2009