



BRANZ Appraised
Appraisal No. 706 [2018]

GRAPHEX MASONRY OVERLAY SYSTEM

Appraisal No. 706 [2018]

This Appraisal replaces BRANZ
Appraisal No. 706 [2011].



BRANZ Appraisals

Technical Assessments of products
for building and construction.



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Product

- 1.1 The Graphex Masonry Overlay System is an exterior insulating and finishing system for concrete masonry, in-situ or pre-cast concrete walls.
- 1.2 The system consists of Neopor®, a graphite composite board or EPS board fixed to the concrete masonry or concrete walls with adhesive mortar and mechanical anchors. The plaster coating system consists of a 5 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.

Scope

- 2.1 The Graphex Masonry Overlay System has been appraised as an exterior insulating and finishing system for buildings within the following scope:
 - with substrates of concrete masonry, in-situ or pre-cast concrete, up to 3 storeys, with a maximum height from ground to eaves of 10 m; and,
 - with floor plan area limited only by seismic and structural control joints; and,
 - with supporting structures designed and constructed in accordance with the NZBC; and,
 - situated in NZS 3604 Wind Zones up to, and including Extra High.
- 2.2 The Graphex Masonry Overlay System has also been appraised for bond/fixing, durability and weathertightness of the exterior insulating and finishing system for concrete masonry, in-situ or pre-cast concrete buildings subject to specific design up to a differential design ultimate limit state [ULS] wind pressure of 2.5 kPa.
- 2.3 The Graphex Masonry Overlay System must only be applied on vertical surfaces except for sills, concrete reinforced parapets and concrete reinforced balustrades which must have a minimum 10° slope and be waterproofed in accordance with the requirements of the Technical Literature and building designer.
- 2.4 Installation of components and accessories supplied by Resene Construction Systems and its approved applicators must be carried out only by Resene Construction Systems approved applicators.



Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, the Graphex Masonry Overlay 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 Masonry Overlay 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 – 10.3.

Clause B2 DURABILITY: Performance B2.3.1 (b), 15 years and B2.3.1 (c), 5 years. The Graphex Masonry Overlay System meets these requirements. See Paragraphs 11.1 and 11.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. The Graphex Masonry Overlay System contributes to meeting this requirement. See Paragraphs 16.1 and 16.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The Graphex Masonry Overlay System meets this requirement and will not present a health hazard to people.

Clause H1 ENERGY EFFICIENCY: Performance H1.3.1 (a) and H1.3.2E. The Graphex Masonry Overlay System contributes to meeting these requirements. See Paragraphs 17.1 and 17.2.

Technical Specification

4.1 System components and accessories supplied by Resene Construction Systems are as follows are:

Neopor®

- **Neopor® boards** are 40-100 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.

EPS Sheets

- EPS Sheets are 40 - 100 mm thick Class H with an approximate density of 24 kg/m³, or 50 or 60 mm thick Class S with an approximate density of 16 kg/m³. The sheets 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.

Bedding Compound

- Rockcote MultiStop FRP Bedding Compound is a polymer-modified, Portland cement-based thin section jointing plaster supplied in 15 kg bags and mixed on site with clean drinking water. It is applied with a broad knife to the joints of the boards.

Adhesive Plaster

- **Glue Bond Coat Mortar** is a polymer modified, cement-based adhesive plaster. The plaster is supplied in 20 kg bags and is mixed on site with Resene Construction Systems Resin. It is trowel applied to the back face of the Neopor® boards prior to them being applied to the wall.

Base, Levelling and Waterproofing Plasters

- A base (mesh) coat is applied using one of the following renders, followed by a subsequent coat of the same render to level the surface.
- **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.
- **Rockcote PM100 Quick Render** is a dry mix, cement-based, polymer-modified plaster supplied in 20 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-applied to an approximate thickness of 4-5 mm.
- **Resene Construction Systems RMaxx** is a high-yielding, cement-free dispersion based basecoat plaster supplied in 20 kg pails. It is applied as the base coat in a minimum 1.5 mm layer followed by the embedment of fibreglass mesh reinforcement in the outer surface. An additional 1.0-1.5 mm is applied to fully encase the mesh.

- **HydroPlast** is an acrylic dry powder with cement activator, that when mixed with water creates a flexible waterproofing render for use over plastered balustrade and fixing blocks. It is supplied in 10 kg bags and is applied over the levelling render with a trowel in a 1 mm layer followed by the embedment of fibreglass mesh reinforcement in the outer surface.

Primer

- **Rockcote Render Prime** is a water-borne acrylic, polymer dispersion, tintable coating supplied in 15 litre pails. It is brush or roller-applied as a primer between the selected base coat and acrylic texture.
- **Resene Limelock** is a water-borne acrylic, polymer dispersion, tintable coating supplied in 10 litre pails. It is brush or roller applied as a primer between the mineral textures and the finishing system.

Mineral Texture Coating

- **Resene Construction Systems Mineral Textures** are dry mix, cement-based, polymer-modified plasters, supplied in 20 kg bags and mixed on site with clean water. They are trowel or spray applied to an approximate thickness of 1.0-3.0 mm.

Acrylic Texture Coating

- **Resene Construction Systems acrylic texture coatings** are ready mixed, tintable, mineral-filled, polymer-based, elastomeric high-build coating with in pail and dry film preservatives, supplied in 15 litre pails. They are spray or trowel applied to an approximate thickness of 0.5 – 2.0 mm. The selected Resene Construction Systems texture colour must have a minimum light reflectance value [LRV] of 25%.

uPVC Primer, Plaster Modifier, Waterproofing Plaster and Finishes

- **Multistop bedding compound** – used as a uPVC primer when mixed with diluted Acrylbond resin or water.
- **Acrylbond** is a water-based co-polymer resin supplied in 4 and 15 litre pails used as a plaster modifier.
- **Rockcote Premium Armour** is a water-borne 100% acrylic-based protective finish for use over Rockcote Textures. It is supplied in 4 and 15 litre pails and is brush or roller applied. The protective finish coat must have a minimum LRV of 25%.
- **Resene X200** is an acrylic waterproofing membrane for use as a protective finish over Rockcote Textures. It is supplied in 4 and 10 litre pails and is brush, roller or spray applied. The protective finish coat must have a minimum LRV of 25%.

Accessories

- **Reinforcing mesh** – alkali-resistant fibreglass mesh with a nominal mesh size of approximately 5 x 4 mm and a weight of 160 g/m² for use in domestic and light commercial situations.
- **uPVC components** – base caps, corner beads, and horizontal and vertical control joint flashings.
- **Hilti IDP Insulation Fastener** – IDP fasteners with a length to suit the substrate thickness. The IDP fasteners have an integrated 60 mm diameter polypropylene washer and sleeve.
- **Sticky Mesh** – alkali-resistant fibreglass, 150 mm wide corner pieces.

4.2 Accessories used with the plaster systems which are supplied by the approved installer are:

- **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** – polystyrene compatible adhesive for adhering uPVC components to the Neopor® boards, as and where required.

Handling and Storage

- 5.1 Handling and storage of all materials supplied by Resene Construction Systems or the approved installer, whether on or off site, is under the control of the Resene Construction Systems approved installers. Dry storage must be provided for the fibreglass mesh and bags and pails of plaster mix. Neopor® boards, 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 the site is 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 Masonry Overlay 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

Solid Substrates

Concrete Masonry

- 7.1 Concrete masonry must be designed and constructed in accordance with NZS 4210 and either NZS 4229 or NZS 4230. The concrete masonry walls must be fully grouted.

In-situ and Pre-cast Reinforced Concrete

- 7.2 In-situ and pre-cast reinforced concrete walls must be specifically designed in accordance with NZS 3101 and AS/NZS 1170 using the design guidelines.

General

- 8.1 When the Graphex Masonry Overlay System is used for specifically designed buildings up to a differential design ULS wind pressure of 2.5 kPa, only the bond, durability and weathertightness aspects of the Neopor® boards, plaster and finishing system 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 A minimum of 28 days must be allowed following placement of the concrete or grout before the installation of the Graphex Masonry Overlay System begins. The approved installer must be satisfied that the substrate is sufficiently cured and dry before starting.
- 8.3 The ground clearance to finished floor levels as set out in NZBC Acceptable Solution E2/AS1, Table 18 must be adhered to at all times.
- 8.4 Where the system abuts other cladding systems, designers must detail the junction to meet their own requirements and the performance requirements of the NZBC. Details not included within the Technical Literature have not been assessed and are outside the scope of this Appraisal.

Electrical Cables

- 8.5 PVC sheathed electrical cables must be prevented from direct contact with the Neopor® / EPS boards. When cables must penetrate the Neopor® / EPS boards for exterior electrical connections, the cable must be directly supported by passing through an electrical conduit.

Control Joints

- 9.1 Control joints in the Graphex Masonry Overlay System must be constructed in accordance with the Technical Literature, and be provided as follows:
 - aligned with any control joint in the solid substrate; and,
 - where the system covers different solid substrates.

Structure

Impact Resistance

- 10.1 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

- 10.2 The system is suitable for use in all Wind Zones of NZS 3604 up to, and including Extra High where buildings are within the scope as detailed in Paragraph 2.1, or up to a differential design ULS wind pressure of 2.5 kPa where buildings are specifically designed.

Neopor®/ EPS boards

- 10.3 Neopor®/ EPS boards must be installed in a brick pattern. Glue Bond Coat Mortar must be applied to the back face of the panel with a notched trowel. After adhering the Neopor®/EPS boards to the wall and leaving to set overnight, the panels must be mechanically fixed with the selected anchors at 600 mm horizontal and vertical centres along the panel edges and in the middle of the board.

Durability

- 11.1 The Graphex Masonry Overlay System meets the performance requirements of NZBC Clause B2.3.1 [b], 15 years for the plaster system, and the performance requirements of NZBC Clause B2.3.1 [c], 5 years for the exterior paint system.

Serviceable Life

- 11.2 The Graphex Masonry Overlay System is expected to have a serviceable life of at least 30 years provided it is maintained in accordance with this Appraisal, the Neopor® boards, fixings and plasters are continuously protected by a weathertight paint system and remain dry in service and the NZBC external moisture and internal moisture provisions are met.

Maintenance

- 12.1 Regular maintenance is essential for Graphex Masonry Overlay System installations to continue to meet the NZBC durability performance provision and to maximise their serviceable life.
- 12.2 Annual inspections must be made to ensure that all aspects of the cladding system, including the paint 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, paint coatings and the like must be repaired in accordance with the sealant or Resene Construction Systems instructions.
- 12.3 Regular cleaning [at least annually] of the Graphex Masonry Overlay System is recommended to remove grime, dirt and organic growth, to maximise the life and appearance of the coating. Grime may be removed by brushing with a soft brush, warm water and detergent.
- 12.4 Recoating of the paint system will be necessary throughout the life of the plaster system. The interval between recoats depends on the paint colour, orientation and quality of the application, and will be at approximately 5-10 yearly intervals in accordance with the instructions of Resene Construction Systems.

Control of Internal Fire and Smoke Spread

- 13.1 Neopor® / EPS boards used with the system must meet the flame propagation criteria of AS 1366 as specified in NZBC Acceptable Solution C/AS1 Paragraph 4.2.2, or NZBC Acceptable Solutions C/AS2 to C/AS6 Paragraph 4.17.2. The completed wall system must achieve the Group Number for internal surface finish requirements as specified in the relevant NZBC Acceptable Solutions C/AS1 to C/AS6.

Control of External Fire Spread

- 14.1 The Graphex Masonry Overlay System using Neopor® or EPS boards, Rockcote PM100 Quick Render base coat with mineral texture finish, Rockcote Render Prime and Resene Construction Systems Premium Armour protective finishing coat have and exterior surface finishes peak heat release rate of less than 100 kw/m² and a total heat released of less than 25 MJ/m². Testing was carried out as per NZBC Acceptable Solutions C/AS1-C/AS6 Paragraph 5.8.1.
- 14.2 The Graphex Masonry Overlay System using any other substrate, Rockcote texture or surface finish has not been assessed for a peak heat release or total heat released rating.
- 14.3 When buildings in all Risk Groups, apart from SH and VP, are three or more storeys, and the cladding system extends to cover three or more floors, the vertical fire spread requirements of NZBC Acceptable Solutions C/AS2 to C/AS6 Paragraph 5.7.17 must be met.
- 14.4 Refer to NZBC Acceptable Solutions and Verification Methods C/AS1-C/AS7 and C/VM2 for Requirements for fire rating and exterior surface finish requirements of external walls.

Prevention of Fire Occurring

- 15.1 Separation or protection must be provided to the Graphex Masonry Overlay 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

- 16.1 Graphex Masonry Overlay System installations when installed and maintained in accordance with this Appraisal and the Technical Literature will contribute to the building meeting code compliance with NZBC Clause E2.3.2 by providing a weatherproof coating system to the substrate.
- 16.2 The weathertightness detailing of junctions between the Graphex Masonry Overlay System and wall penetrations, e.g. window and door joinery, meter boxes, and other cladding and roofing junctions are the responsibility of the designer for compliance with the NZBC. Details not included within the Technical Literature have not been assessed and are outside the scope of this Appraisal.

Energy Efficiency

Building Thermal Envelope

- 17.1 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

- 17.2 The thermal resistance [R-values] of building elements may be verified by using NZS 4214. The BRANZ House Insulation Guide provides thermal resistances of common building elements and is based on calculations from NZS 4214. For this system, unless better information is available for a specific case, the R-value of the Neopor® boards must be taken as R0.69 [40 mm thick], R0.86 [50 mm thick], R1.03 [60 mm thick], R1.20 [70 mm thick], R1.38 [80 mm thick], R1.55 [90 mm thick] and R1.72 [100 mm thick] based on a thermal conductivity [k value] of 0.032 W/m °C.
- 17.3 The R-value of Class H EPS must be taken as R0.58 [40 mm thick], R0.72 [50 mm thick], R0.87 [60 mm thick], R1.01 [70 mm thick], R1.16 [80 mm thick], R1.30 [90 mm thick] and R1.44 [100 mm thick] based on a k value of 0.038 W/m°C, and the R-value of Class S EPS must be taken as R0.67 [50 mm thick] and R0.80 [60 mm thick] based on a k value of 0.041 W/m°C.

Installation Information

Installation Skill Level Requirements

- 18.1 Installation and finishing of components and accessories supplied by Resene Construction Systems and its approved installers must be completed by trained applicators, approved by Resene Construction Systems.
- 18.2 Installation of the accessories supplied by the building contractor must be carried out in accordance with the Graphex Masonry Overlay System Technical Literature and this Appraisal by, or under the supervision of, a Licensed Building Practitioner [LBP] with the relevant Licence Class.

System Installation

Graphex Masonry Overlay System

- 19.1 Components and accessories supplied by Resene Construction Systems and the approved installer must be installed in accordance with the Technical Literature by Resene Construction Systems approved installers.
- 19.2 The Graphex Masonry Overlay System must only be applied when the air and substrate temperature is within the range of +5°C to +30°C.

Inspections

- 19.3 The Technical Literature must be referred to during the inspection of Graphex Masonry Overlay System installations.

Finishing

- 19.4 The paint manufacturer's 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

- 20.1 Safe use and handling procedures for the components that make up the Graphex Masonry Overlay 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

- 21.1 The following testing has been completed by BRANZ:
 - Tensile bond strength of the Graphex Masonry Overlay System to concrete masonry.
 - Cone Calorimeter testing of the Graphex Masonry Overlay System plasters over EPS. The testing was carried out in accordance with AS/NZS 3837.

Other Investigations

- 22.1 BRANZ expert opinion on NZBC B1 code compliance for the Graphex Masonry Overlay System was based on the tensile adhesion strength of the Glue Bond Coat Mortar. Using the data from this testing, the characteristic strength of the glue bond was calculated using the BRANZ EM1 method. By factoring in a strength reduction factor, the maximum resistance of the glue bond was determined. By comparing the resistance of the glue bond with the demand wind pressures using the NZS 3604 stipulated wind speeds and AS/NZS 1170 pressure coefficients, an opinion was given by BRANZ technical experts that determined the suitability of the cladding system for use in the relevant NZS 3604 Wind Zones and specific design wind pressures.
- 22.2 A durability opinion has been given by BRANZ technical experts.
- 22.3 Site visits have been carried out by BRANZ to assess the practicability of installation, and to examine completed installations.
- 22.4 The Technical Literature for the Graphex Masonry Overlay System has been examined by BRANZ and found to be satisfactory.



Quality

- 23.1 The manufacture of the plasters and finishes 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.
- 23.2 The quality of materials, components and accessories supplied by Resene Construction Systems is the responsibility of Resene Construction Systems.
- 23.3 Quality on site is the responsibility of the Resene Construction Systems approved installers.
- 23.4 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of solid substrates, joinery, flashing tapes, airseals and joinery flashings in accordance with the instructions of the building designer.
- 23.5 Building owners are responsible for the maintenance of the Graphex Masonry Overlay System in accordance with the instructions of Resene Construction Systems.

Sources of Information

- AS/NZS 1170: 2002 Structural design action – General principles.
- NZS 3101: 1995 Concrete structures standard.
- NZS 4210: 2001 Masonry construction: Materials and workmanship.
- NZS 4214: 2006 Methods of determining the total thermal resistance of parts of buildings.
- NZS 4229: 1999 Concrete masonry buildings not requiring specific engineering design.
- NZS 4230: 2004 Design of reinforced concrete masonry structures.
- BRANZ House Insulation Guide, Fifth Edition.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005 [Amendment 7, 1 January 2017].
- Ministry of Business, Innovation and Employment Record of Amendments for Compliance Documents and Handbooks.
- The Building Regulations 1992.



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22 November 2018

GRAPHEX MASONRY OVERLAY
SYSTEM



In the opinion of BRANZ, the **Graphex Masonry Overlay 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 **Rockcote Resene Ltd T/A Resene Construction Systems**, 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. **Rockcote Resene Ltd T/A Resene Construction Systems**:
 - 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 **Rockcote Resene Ltd T/A Resene Construction Systems**.
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 **Rockcote Resene Ltd T/A Resene Construction Systems** or any third party.

For BRANZ

Chelydra Percy

Chief Executive

Date of Issue:

22 November 2018