



BRANZ Appraised

Appraisal No. 478 [2019]

STOTHERM INSULATED FACADE SYSTEM

Appraisal No. 478 (2019)

This Appraisal replaces BRANZ
Appraisal No. 478 (2008)

Amended 03 September 2021



BRANZ Appraisals

Technical Assessments of
products for building and
construction.



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Product

- 1.1 The StoTherm Insulated Facade System is a cavity-based Exterior Insulation and Finishing System (EIFS) wall cladding. It is designed to be used as an external cladding system for residential and light commercial type buildings where domestic construction techniques are used.
- 1.2 The StoTherm Insulated Facade System consists of StoTherm or StoTherm+ expanded polystyrene (EPS) panels fixed over polystyrene battens to form the cavity. The coating system consists of a nominal 5 mm thick cement-based render applied to the polystyrene panels, an approximate 2.5 mm thick coat of fibreglass mesh reinforced synthetic resin render (StoArmat render system only), and an approximate 1-3 mm thick coat of coloured finishing render. The render system is finished with a Sto coating.
- 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 wide cavity. The cavity allows for any occasional ingress of water that may get past the external skin to drain to the exterior of the building, and any remaining moisture to dry by evaporation.

Scope

- 2.1 The StoTherm Insulated Facade 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,
 - 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 StoTherm Insulated Facade System has also been appraised for weathertightness and structural wind loading when used as an external 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 and steel framing subject to specific engineering design; and,
 - situated in specific design wind pressures up to a maximum design differential ultimate limit state (ULS) of 2.5 kPa.
- 2.3 The StoTherm Insulated Facade 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. *[Note: The Appraisal of the StoTherm Insulated Facade System relies on the joinery meeting the requirements of NZS 4211 for the relevant Wind Zone or wind pressure.]*
- 2.5 Installation of components and accessories supplied by Stoanz Limited and Sto registered contractors must be carried out only by Sto registered contractors.

Building Regulations

New Zealand Building Code [NZBC]

- 3.1 In the opinion of BRANZ, the StoTherm Insulated Facade 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 StoTherm Insulated Facade 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 StoTherm Insulated Facade System meets these requirements. See Paragraphs 11.1 and 11.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. The StoTherm Insulated Facade System meets this requirement. See Paragraphs 16.1–16.5.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The StoTherm Insulated Facade System meets this requirement.

Technical Specification

- 4.1 System components and accessories supplied by Stoanz Limited are as follows:

Polystyrene

- **Cavity battens** are manufactured from high density [Class VH] expanded polystyrene (EPS) with a nominal density of 28 kg/m³. The battens are 20 mm thick by 50 mm wide and are supplied in 1,200 mm lengths.
- **StoTherm Panels** are 40, 50, 60, 80 or 100 mm thick Class H or M EPS with a nominal density of 24 or 19 kg/m³ respectively. The panels are supplied in lengths of 2,400, 2,700 and 3,000 mm x 1,200 mm wide and must be manufactured to meet the requirements of AS 1366.3.
- **StoTherm+ Panels** are 40, 50, 60, 80 or 100 mm thick graphite polystyrene with a nominal density of 24 kg/m³. The panels are supplied in lengths of 2,400, 2,700 and 3,000 mm x 1,200 mm wide and must be manufactured to meet the requirements of AS 1366.3.

Primer

- **Stoplex W** is a yellow tinted, ready-to-use, acrylic-based primer available in 10 L containers.

Renderers

- **StoLevell Uni** is a dry mix, cement-based mineral render supplied in 25 kg bags and mixed on-site with clean water. It is used as a base coat in a 3–4 mm thick layer, followed by the embedment of fibreglass mesh in the outer surface [StoMiral render system only]. An additional 1–2 mm layer is applied to fully encase the mesh. StoLevell Uni is applied to a minimum 4 mm thickness when used as the base coat for the StoArmat render system.
- **StoLevell Novo** is a polymer-modified, lightweight, cement-based render supplied in 15 kg bags and mixed on-site with clean water. It is used as a base coat in a 3–4 mm thick layer, followed by the embedment of fibreglass mesh in the outer surface [StoMiral render system only]. An additional 1–2 mm layer is applied to fully encase the mesh. StoLevell Novo is applied to a minimum 5 mm thickness when used as the base coat for the StoArmat render system.



- **Multiscreed** is a cement-based adhesive render comprising graded sand, white cement, lime, fibres and additives. The render is supplied in 25 kg bags and is mixed on-site with clean water. It is used as a base coat in a 3-4 mm thick layer, followed by the embedment of fibreglass mesh in the outer surface [StoMiral render system only]. An additional 1-2 mm layer is applied to fully encase the mesh. Multiscreed is applied to a minimum 4 mm thickness when used as the base coat for the StoArmat render system.
- **StoArmat Classic** is a plasticiser-free, tintable, ready-to-use, polymer-modified, cement-free reinforcement render comprising granulated quartz sands, calibration grain, polypropylene fibre and additives. It is supplied in 23 kg pails, and after diluting with water as necessary and mixing, is ready for use. It is trowel-applied in a 2 mm thick layer followed by the embedment of fibreglass mesh reinforcement in the outer surface. Once dry, a further coat of StoArmat Classic approximately 1 mm thick is applied to cover the mesh and leave a flat, even surface.
- **Stolit K** is a plasticiser-free, tintable, ready-to-use, polymer-modified, cement-free finishing render with a 1, 1.5, 2 or 3 mm grain size. It is supplied in 25 kg pails and is trowel-applied to an approximate thickness of 1-3 mm, gauging to the thickness of the aggregate size.
- **Stolit MP and MP Natural** are plasticiser-free, tintable, ready-to-use, polymer-modified, cement-free finishing renders. They are supplied in 25 kg pails, are trowel-applied in two coats and are either float finished, or lightly sponged to the selected pattern.
- **Stolit Milano** is a smooth, plasticiser-free, tintable, ready-to-use, polymer-modified, cement-free finishing render. It is supplied in 25 kg pails, is trowel-applied in two coats and is either steel troweled, floated, or lightly randomly sponged to the selected pattern.
- **Sto Flexyl** is a cementitious waterproofing paste. It is mixed on site with a 1:1 ratio of fresh cement and is used as a waterproofing membrane over rendered balustrades and fixing blocks. Sto Flexyl is supplied in 18 kg pails.

StoColor Paints and Clear Sealers

- **StoColor Maxicryl** is a ready-to-use, tintable, matt, acrylic paint for application over finishing renders. It is supplied in 15 L pails, and may be brush, roller or spray-applied. The paint colour selected must have a light reflectance value [LRV] of 35% minimum when used with the StoMiral Render System, and an LRV of 25% minimum when used with the StoArmat render system.
- **StoColor Lotusan** is a ready-to-use, tintable, special dirt and algae resistant mineral silicone resin paint for application over finishing renders. It is supplied in 15 L pails, and may be brush, roller or spray-applied. The paint colour selected must have an LRV of 35% minimum when used with the StoMiral Render System, and an LRV of 25% minimum when used with the StoArmat render system.
- **StoColor Lastic** is a ready-to-use, tintable, satin matt, acrylic paint for application over finishing renders. It is supplied in 15 L pails, and may be brush, roller or spray-applied. The paint colour selected must have an LRV of 35% minimum when used with the StoMiral Render System, and an LRV of 25% minimum when used with the StoArmat render system.
- **StoColor X-Black** is a ready-to-use, tintable, matt, heat reflective acrylic paint for application over finishing renders. It is supplied in 15 L pails, and may be brush, roller or spray-applied. The paint colour selected must have an LRV of 25% minimum when used with the StoMiral Render System, and an LRV of 10% minimum when used with the StoArmat render system.
- **S-Protect SC** is an invisible, silane-based, hydrophobic sealer for application over Stolit MP, MP Natural and Milano finishing renders. It is supplied in 10 and 20 L pails, and is applied in a flood coat using a low pressure sprayer and Sto block brush.
- **StoPur WV200** is a two-component PUR, water-based, matt transparent sealer for application over Stolit Milano finishing render. It is applied by brush and Sto Micro roller.

Accessories

- **Reinforcing mesh** - alkali-resistant fibreglass mesh with a nominal mesh size of approximately 7 x 7 mm or 4 x 4 mm and an approximate weight of 165 g/m².
- **uPVC components** - sill and jamb flashings, control joint and foot tray flashing.
- **StoTherm and StoTherm+ panel fixings (timber frame)** - 90 x 3.55 [for 40 mm thick], 100 x 4.0 mm [for 50 mm thick] and 110 x 4.0 mm [for 60 mm thick] hot-dip galvanised steel flathead nails. All nails must be used with 42 mm diameter Sto washers. *[Note: Hot-dip galvanising must comply with AS/NZS 4680.]*
- **StoTherm Anchors (timber frame)** - 120 mm long [for 80 mm thick StoTherm and StoTherm+ panels] or 140 mm long [for 100 mm thick StoTherm and StoTherm+ panels] screw-applied anchors with a 60 mm diameter HDPE washer and an electroplated galvanised steel screw for use in NZS 3604 defined Exposure Zones B and C, or stainless steel screw for use in Exposure Zone D, or where the cavity batten or wall framing timber has been treated with a copper based treatment.
- **Washers** - 42 mm diameter, yellow high density polyethylene [HDPE].
- **ST Insulation Caps** - 60 mm diameter polystyrene caps for use with StoTherm Anchors.
- **Sto Pageris foam** - polyurethane foam for joining the StoTherm and StoTherm+ panels.
- **Sto pre-meshed corner beads** - uPVC and fibreglass mesh corner mouldings.
- **Sto Joint Sealing Tape 2D** - black, compressed polyurethane foam. The foam is coated on one side with a pressure sensitive adhesive, which is covered by a release paper. The tape is available 2 and 5 mm thick, expanding to maximum 6 and 12 mm thick after installation, and is supplied in rolls 15 mm wide and 18 and 9 m long respectively.

4.2 Accessories used with the systems which are supplied by the Sto registered contractor are:

- **StoTherm and StoTherm+ fixings (steel frame)** - 6 g self-drilling AS 3566 Corrosion Class 4 screws in NZS 3604 defined Exposure Zones B and C and Grade 304 Stainless Steel 6 g screws in Exposure Zone D, used with 42 mm diameter washers. The screw length must allow a minimum 10 mm penetration through the steel frame.
- **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 StoTherm and StoTherm+ panels, as and where required.

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 wall 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 sheathing 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.
- **Cavity battens** - nominal 50 mm wide by 25 mm thick [minimum finished size of 45 mm wide by 18 mm thick] timber treated to Hazard Class H3.1.
- **Cavity batten fixings** - 40 x 2.5 mm flat head hot-dip galvanised nails. *[Note: Hot-dip galvanising must comply with AS/NZS 4680.]*
- **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.

Handling and Storage

- 5.1 Handling and storage of all materials supplied by Stoanz Limited or the Sto registered contractor, whether on-site or off-site, is under the control of the Sto registered contractor. Dry storage must be provided for the fibreglass mesh and bags and pails of render mix. StoTherm or StoTherm+ Panels and 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-site or off-site is under the control of the building contractor. Materials must be handled and stored in accordance with the relevant manufacturer's instructions.
- 5.3 Render must be used within the designated shelf life from the date of manufacture.

Technical Literature

- 6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the StoTherm Insulated Facade 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 StoTherm Insulated Facade 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 a building within the scope limitations of NZS 3604. Buildings or parts of a building outside the scope of NZS 3604 must be to a specific design in accordance with NZS 3603 and AS/NZS 1170.
- 7.3 For buildings situated in NZS3604 defined 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.
- 7.4 For specifically designed timber-framed buildings situated in Wind Zones above NZS 3604 defined Extra High, there must be a minimum timber framing size of 90 x 45 mm, and a minimum timber grade of MSG8.
- 7.5 The framing must have a maximum moisture content of 24% at the time of the cladding installation. *[Note: If StoTherm or StoTherm+ 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

- 7.6 Steel framing must be to a specific design meeting the requirements of the NZBC.
- 7.7 The minimum framing specification is 'C' section studs and dwangs with an overall section size of 75 mm web and 32 mm flange. Steel thickness must be a minimum 0.55 mm.
- 7.8 For buildings situated in NZS 3604 defined 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.

StoTherm and StoTherm+ Panel Set-out

- 7.9 All vertical StoTherm and StoTherm+ panel edges must be supported and fixed through the cavity battens to framing. Horizontal panel edges must be supported at fixing locations with cavity spacers in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.2 f). At the base of the wall, the StoTherm or StoTherm+ Panel must hang 50 mm below the supporting framing.
- 7.10 Additional battens and framing will be required at soffits, internal and external corners and window and door openings for the support and fixing of panel edges.

General

- 8.1 When the StoTherm Insulated Facade System is used for specifically designed buildings up to 2.5 kPa design differential ULS wind pressure, only the weathertightness aspects of the cladding, maximum framing centres and sheet and panel fixing centres are within the scope of this Appraisal. All other aspects of the building also need to be specifically designed and are outside the scope of this Appraisal.
- 8.2 Holes in the foot tray flashing provide a ventilation opening area of 1,000 mm² per lineal metre of wall in accordance with 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 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 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 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 sheathing 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 underlays are used, the fixing lengths must be increased by a minimum of the thickness of the underlay.
- 8.6 Where penetrations through the StoTherm Insulated Facade 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 systems abut other cladding systems, designers must detail the junction to meet their own requirements and the performance requirements of the NZBC. Details not included within the Technical Literature have not been assessed and are outside the scope of this Appraisal.

Electrical Cables

- 8.8 PVC sheathed electrical cables must be prevented from direct contact with the polystyrene. When cables must penetrate the StoTherm or StoTherm+ panels 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 structural framing; where the system abuts different cladding types; or where the system covers different construction materials.

[Note: Horizontal and vertical control joints must be located over structural supports. The design of vertical control joints where the systems abut 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 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 m in height, in accordance with the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 9.1.9.4 b). [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 StoTherm Insulated Facade System is approximately 10 kg/m² at equilibrium moisture content. It is therefore considered a light 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 type situations should be considered at the design stage, and appropriate protection such as the installation of barriers or bollards should be provided for vulnerable areas. [Note: Additional coats of reinforced render or a heavier grade mesh can be used to increase impact resistance. This has not been assessed and is outside the scope of this Appraisal.]

Wind Zones

10.3 The 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 up to 2.5 kPa design differential ULS wind pressure where buildings are specifically designed.

StoTherm and StoTherm+ Panel Fixing

10.4 StoTherm and StoTherm+ panels must be fixed through the cavity battens and cavity spacers to the wall framing at the maximum centres specified in Table 1.

Table 1: StoTherm and StoTherm+ Fixing Centres for Edges and Intermediate Studs

NZS 3604 Wind Zone	Maximum Fixing Centres [mm]
Low ¹	300
Medium ¹	300
High ¹	300
Very High ²	200

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

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

NZS 3604 Wind Zone Extra High and specifically designed buildings up to 2.5 kPa 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 nogs
150	200	150

Durability

Serviceable Life

- 11.1 The StoTherm Insulated Facade System meets the performance requirements of NZBC Clause B2.3.1 [b] 15 years for the cavity system and render finish, and the performance requirements of NZBC Clause B2.3.1 [c] 5 years for the Sto coating system.
- 11.2 The StoTherm Insulated Facade System is expected to have a serviceable life of at least 30 years, provided it is maintained in accordance with this Appraisal, and the StoTherm and StoTherm+ panels, fixings and renders 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 StoTherm and StoTherm+ panels 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 Annual inspections must be made to ensure that all aspects of the cladding system, including the coating system, render, 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 sealant manufacturer or Stoanz Limited's instructions.
- 12.3 Although the paint system is designed as a special dirt and algae resistant type, regular cleaning [at least annually] is still required to remove any grime, dirt and organic growth that may have accumulated, and 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 render system. The interval between recoats depends on the paint colour, orientation and quality of the application, and will be at approximately 8-10 yearly intervals in accordance with the instructions of Stoanz Limited. Clear sealer systems require recoating at 5-7 yearly intervals.
- 12.5 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. *[Note: Failure to adhere to the ground clearances given in this Appraisal and the Technical Literature will adversely affect the long term durability of the StoTherm Insulated Facade System.]*

Control of Internal Fire and Smoke Spread

- 13.1 The StoTherm Insulated Facade System includes a polystyrene [combustible insulant], therefore the interior surface finish must achieve a Group Number of not more than 3 as per NZBC Acceptable Solution C/AS1 Section 4.3 and NZBC Acceptable Solution C/AS2 Paragraph 4.17.2. The StoTherm Insulated Facade System will not meet this requirement alone and will need to be enclosed by an interior surface lining so that the completed system achieves a Group Number of not more than 3.
- 13.2 The polystyrene used in the StoTherm Insulated Facade System has been tested and complies with the flame propagation criteria of AS 1366, as required by NZBC Acceptable Solution C/AS1 Section 4.3 and NZBC Acceptable Solution C/AS2, Paragraph 4.17.2.

Control of External Fire Spread

StoTherm Render System

Vertical Fire Spread

14.1 This Appraisal only covers buildings 10 m or less in height. NZBC Functional Requirement C3.2 identifies that external vertical fire spread to upper floors only needs be considered for buildings with a building height greater than 10 m. Control of external vertical fire spread is therefore outside the scope of this Appraisal.

Horizontal Fire Spread

14.2 The StoTherm Insulated Facade System exterior surface finishes has a 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 Paragraph 5.4 of NZBC Acceptable Solution C/AS1 and Paragraph 5.8.1 of NZBC Acceptable Solution C/AS2, achieving a Type A performance. The StoTherm Insulated Facade System can therefore be used within 1 m of the relevant boundary.

14.3 Refer to NZBC Acceptable Solutions C/AS1 and C/AS2 and Verification Method C/VM2 for fire resistance rating and control of external fire spread requirements for external walls.

Prevention of Fire Occurring

15.1 Separation or protection must be provided to the StoTherm Insulated Facade System from heat sources such as fireplaces, heating appliances and chimneys. Part 7 of NZBC Verification Method C/VM1 and Acceptable Solution C/AS1, and Acceptable Solution C/AS2 provide methods for separation and protection of combustible materials from heat sources.

External Moisture

16.1 The StoTherm Insulated Facade System, when installed in accordance with this Appraisal and the Technical Literature, prevent 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 compliance with NZBC Clause E2.3.5.

16.3 The StoTherm Insulated Facade System allow excess moisture present at the completion of construction to be dissipated without permanent damage to building elements to meet compliance with NZBC 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 StoTherm Insulated Facade 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 StoTherm Insulated Facade 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 StoTherm Insulated Facade 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 StoTherm Insulated Facade 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 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 StoTherm Insulated Facade System, unless better information is available for a specific case, the R-value of H Grade StoTherm panel must be taken as R0.58 [40 mm thick], R0.72 [50 mm thick], R0.87 [60 mm thick], R1.16 [80 mm thick] and R1.45 [100 mm thick] based on a thermal conductivity [k- value] of 0.038 W/m °C; the R-value of M Grade StoTherm panel must be taken as R0.54 [40 mm thick], R0.67 [50 mm thick], R0.80 [60 mm thick], R1.07 [80 mm thick] and R1.34 [100 mm thick] based on a thermal conductivity [k- value] of 0.041 W/m °C; and the R-value of StoTherm+ panel must be taken as R0.69 [40 mm thick], R0.86 [50 mm thick], R1.03 [60 mm thick], R1.38 [80 mm thick] and R1.72 [100 mm thick] based on a thermal conductivity [k- value] of 0.032 W/m °C.

Installation Information

Installation Skill Level Requirement

- 19.1 Installation and finishing of components and accessories supplied by Stoanz Limited and the Sto registered contractor must be completed by trained applicators, approved by Stoanz Limited.
- 19.2 Installation of the accessories supplied by the building contractor must be carried out in accordance with the instructions given within the StoTherm Insulated Facade System Technical Literature and this Appraisal, by, or under the supervision of a Licensed Building Practitioner [LBP] with the relevant Licence Class.

System Installation

Wall underlay and Flexible Sill and Jamb Tape Installation

- 20.1 The selected wall underlay and flexible sill and jamb tape system must be installed by the building contractor in accordance with the underlay and tape manufacturer's instructions prior to the installation of the cavity battens and the rest of the StoTherm Insulated Facade System. Flexible wall 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 sheathing 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 wall 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.
- 20.2 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

- 20.3 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.

StoTherm Insulated Facade System

- 20.4 The system must be installed in accordance with the Technical Literature by a Stoanz Limited registered contractor.
- 20.5 The StoTherm render systems must only be applied when the air and substrate temperature is within the range of +5°C to 30°C.

Inspections

- 20.6 The Technical Literature must be referred to during the inspection of StoTherm Insulated Facade System installations.

Health and Safety

- 21.1 Safe use and handling procedures for the components that make up the StoTherm Insulated Facade System are provided in the relevant manufacturer's Technical Literature.

Basis of Appraisal

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

Tests

The following testing has been completed by BRANZ:

- 23.1 BRANZ expert opinion on NZBC clause E2 code compliance for the StoTherm Insulated Facade System was based on testing and evaluation of all details within the scope as stated within this Appraisal. The StoTherm Insulated Facade System and balustrade to wall junction details were tested to NZBC 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 rendered 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 NZBC Acceptable Solution E2/AS1 for EIFS drained cavity claddings.
- 23.2 Wind face load and fastener pull through testing for EIFS cladding systems. BRANZ determined design wind suction pressures, and by comparing these pressures with the NZS 3604 design wind speeds and AS/NZS 1170 pressure coefficients, the fixing requirements were determined for timber and steel framed walls.
- 23.3 Fastener pull through testing of StoTherm Anchors to determine the characteristic pull through strength.
- 23.4 Cone calorimeter testing of the StoTherm render systems over EPS. The testing was carried out in accordance with AS/NZS 3837 and ISO 5660.
- 23.5 Testing has been undertaken by the British Board of Agrément (BBA) on Sto External Wall Insulation Systems covering thermal cycling (heat and moisture cycles), freeze-thaw, resistance to hard body impact, indentation test, water vapour permeability, ash content, sieve grading, density, mass per unit volume and pyrolysis – gas chromatography (liquid component). The test methods and results have been reviewed by BRANZ and found to be satisfactory.
- 23.6 The Centre Scientifique et Technique du Batiment (CSTB) has undertaken a European Technical Approval of the StoTherm Classic External Thermal Insulation Composite System (Approval No. ETA-03/0027). Testing undertaken includes water absorption, hygrothermal behaviour, freeze/thaw, impact resistance, water vapour permeability and bond strength. The test methods and results have been reviewed by BRANZ and found to be satisfactory.

Other Investigations

- 24.1 Structural and durability opinions have been provided by BRANZ technical experts.
- 24.2 Site inspections have been carried out by BRANZ to assess the practicability of installation, and to examine completed installations.
- 24.3 The Technical Literature for the StoTherm Insulated Facade System has been examined by BRANZ and found to be satisfactory.

Quality

- 25.1 The manufacture of the LevelLite and Multiscreed base renders 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. The quality control system of the LevelLite and Multiscreed render manufacturer has been assessed and registered as meeting the requirements of the Telarc Q-Based Code.
- 25.2 The manufacture of the Sto renders and finishes has not been examined by BRANZ, but details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory. The quality management system of Sto SE & Co. KGaA has been assessed and registered as meeting the requirements of ISO 9001.
- 25.3 The environmental management system of Sto SE & Co. KGaA has been assessed and registered as meeting the requirements of ISO 14001.
- 25.4 Sto External Wall Insulation Systems are the subject of a current British Board of Agrément (BBA) Certificate No. 95/3132 Sto External Wall Insulation Systems, and the manufacture of the systems continues to be checked by the BBA during the validity period of the Certificate. Renders and paints used within the StoTherm Insulated Facade System and imported by Stoanz Limited are covered by the BBA Certificate.
- 25.5 Sto External Wall Insulation Systems are the subject of Certifications and Evaluations in countries such as Canada, Austria, Germany, United Kingdom, Sweden, France, Switzerland, Netherlands and Czech Republic.
- 25.6 The quality of materials, components and accessories supplied by Stoanz Limited are the responsibility of Stoanz Limited.
- 25.7 Quality on site is the responsibility of the Stoanz Limited registered contractor.
- 25.8 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of framing systems and joinery, wall underlays, flashing tapes, air seals and joinery head flashings in accordance with the instructions of Stoanz Limited.
- 25.9 Building owners are responsible for the maintenance of the StoTherm Insulated Facade System in accordance with the instructions of Stoanz Limited.

Sources of Information

- AS 1366.3-1992 Rigid cellular plastic sheets for thermal insulation - Rigid cellular polystyrene - Moulded [RC/PS-M].
- AS/NZS 1170:2011 Structural design actions.
- AS/NZS 4680:2006 Hot-dip galvanised [zinc] coatings on fabricated ferrous articles.
- BRANZ House Insulation Guide 5th Edition, 2014.
- NZS 3603:1993 Timber Structures Standard.
- NZS 3604:2011 Timber-framed buildings.
- NZS 4211:2008 Specification for the performance of windows.
- NZS 4214:2006 Methods of determining the total thermal resistance of parts of buildings.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.



Amendments

Amendment No. 1, dated 03 September 2021.

This Appraisal has been amended to reflect building code updates relating to fire.



BRANZ Appraised
Appraisal No. 478 [2019]

BRANZ Appraisal
Appraisal No. 478 [2019]
21 June 2019

STOTHERM INSULATED FACADE
SYSTEM



BRANZ

In the opinion of BRANZ, the **StoTherm Insulated Facade 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 **Stoanz Limited**, 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. **Stoanz Limited**:
 - 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 **Stoanz Limited**.
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 **Stoanz Limited** or any third party.

For BRANZ

Chelydra Percy

Chief Executive

Date of Issue:

14 June 2019