



BRANZ Appraised

Appraisal No.515 [2007]

BRANZ Appraisals

Technical Assessments of products
for building and construction

**BRANZ
APPRAISAL
No. 515 (2007)**

Amended 27 June 2008

**STOARMAT MIRAL
PLASTER SYSTEM**

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Product

1.1 The StoArmat Miral Plaster Systems consist of the StoArmat Miral Plaster System, which is a reinforced solid plaster system for use as a finishing system over a solid backing of concrete masonry, clay brick veneer, in-situ or pre-cast concrete, autoclaved aerated concrete block and EPS block, and the Sto Miral Plaster System, which is an un-reinforced solid plaster system for use as a finishing system over clay brick veneer.



Scope

2.1 The StoArmat Miral Plaster Systems have been appraised as solid plaster systems for buildings within the following scope:

- with substrates of concrete masonry, in-situ or pre-cast concrete, autoclaved aerated concrete block and EPS block up to 3 storeys, with a maximum height from ground to eaves of 10 m (StoArmat Miral Plaster System); and,
- with substrates of clay brick veneer designed and constructed in accordance with the scope limitations of NZS 3604, NZS 4210 and NZS 4229 (StoArmat Miral Plaster System and Sto Miral Plaster System); 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 Building Wind Zones up to, and including 'Very High'.

2.2 The StoArmat Miral Plaster System has also been appraised for bond, durability and weathertightness of the plaster system for concrete masonry, in-situ or pre-cast concrete, autoclaved aerated concrete block and EPS block buildings subject to specific design with no building height or wind exposure restriction.

2.3 The StoArmat Miral Plaster 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. The Sto Miral Plaster System must only be applied on vertical surfaces except for sills, which must have a minimum 10° slope and be waterproofed in accordance with the requirements of the Technical Literature and building designer.

2.4 The StoArmat Miral Plaster Systems for use on buildings within the scope detailed in Paragraph 2.1, are appraised for use with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. (*The Appraisal of the StoArmat Miral Plaster Systems relies on the joinery meeting the requirements of NZS 4211 for the relevant Building Wind Zone.*)

2.5 Installation of plasters and accessories supplied by Stoanz Limited and approved applicators must be carried out only by Stoanz Limited approved applicators.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, the StoArmat Miral Plaster Systems 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 B2 DURABILITY: Performance B2.3.1 (b), 15 years and B2.3.1 (c), 5 years. The StoArmat Miral Plaster Systems meet these requirements. See Paragraph 9.1.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2. The StoArmat Miral Plaster Systems contribute to meeting this requirement. See Paragraphs 13.1 and 13.3.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. The StoArmat Miral Plaster Systems meet 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 The StoArmat Miral Plaster System consists of a 5-10 mm thickness of polystyrene bead saturated polymer-modified, cement based levelling plaster applied to the concrete masonry, clay brick veneer, prepared in-situ or pre-cast concrete, autoclaved aerated concrete or EPS block substrate, a 2.5-3.0 mm thick coat of fibreglass mesh reinforced non-cement plaster, and an approximate 1-3 mm (as selected) thick coat of non-cement coloured finish plaster. The plaster is coated with a mineral silicone resin or a 100% acrylic paint.

4.2 The Sto Miral Plaster System consists of a 5-10 mm thickness of polystyrene bead saturated polymer-modified, cement based levelling plaster applied to the clay brick veneer substrate, a sealer and an approximate 1-3 mm (as selected) thick coat of non-cement coloured finish plaster. The plaster is coated with a 100% acrylic paint. The top coat plasters can be finished to give different texture appearances.

4.3 System components and accessories supplied by Stoanz Limited for the StoArmat Miral Plaster Systems are:

StoArmat Miral Plasters

- *LevelLite* is a polymer-modified, cement-based plaster comprising coarse sand, polypropylene fibres, polystyrene beads and adhesives. The plaster is supplied in 20 kg bags and mixed on site with clean water. It is trowel or pump-applied as a base coat in a 5 - 10 mm thick layer.
- *StoArmat RFP* is a plasticiser free, tintable, ready-to-use, polymer-modified, cement free reinforcement plaster comprising granulated quartz sands, calibration grain, polypropylene fibre and additives. It is supplied in 23 kg pails, and after mixing, is ready for use. It is trowel-applied in a 2.5-3.0 mm thick layer with the embedment of fibreglass mesh reinforcement in the outer surface.
- *Stolit MP/K* is a plasticiser free, tintable, ready-to-use, polymer-modified, cement free finishing plaster 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.
- *Sto Flexyl* is a cementitious waterproof paste. It is used as a waterproofing membrane over plastered reinforced concrete balustrades and parapets, window and door joinery sills and rebates. Sto Flexyl is supplied in 18 kg pails.

Sto Miral Plasters

- *LevelLite* is a polymer-modified, cement-based plaster comprising coarse sand, polypropylene fibres, polystyrene beads and adhesives. The plaster is supplied in 20 kg bags and mixed on site with clean water. It is trowel or pump-applied as a base coat in a 5 - 10 mm thick layer.
- *Stolit K* is a plasticiser free, tintable, ready-to-use, polymer-modified, cement free finishing plaster 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.
- *Sto Flexyl* is a cementitious waterproof paste. It is used as a waterproofing membrane over plastered reinforced concrete balustrades and parapets, window and door joinery sills and rebates. Sto Flexyl is supplied in 18 kg pails.

StoArmat Miral Paints

- *StoSilco Color G* is a ready-to-use, tintable, special dirt and algae resistant mineral silicone resin exterior paint system for application over finishing plasters. It is supplied in 15 litre pails, and may be brush, roller or spray applied. Where the StoArmat Plaster System is used over EPS block the paint colour selected must have a light reflectance value (LRV) of 40% minimum regardless of gloss value. Where the StoArmat Plaster System is used over concrete masonry, clay brick veneer, in-situ or pre-cast concrete or autoclaved aerated concrete blocks the paint colour selected must have an LRV of 25% minimum regardless of gloss value.
- *StoColor Maxicryl* is a ready-to-use, tintable, acrylic exterior paint system for application over finishing plasters. It is supplied in 15 litre pails, and may be brush, roller or spray applied. Where the StoArmat Plaster System is used over EPS block the paint colour selected must have a light reflectance value (LRV) of 40% minimum regardless of gloss value. Where the StoArmat Plaster System is used over concrete masonry, clay brick veneer, in-situ or pre-cast concrete or autoclaved aerated concrete blocks the paint colour selected must have an LRV of 25% minimum regardless of gloss value.
- *StoLastic Color* is a ready-to-use, tintable, satin matt, acrylic exterior paint system paint for application over finishing plasters. It is supplied in 15 litre pails, and may be brush, roller or spray applied. Where the StoArmat Plaster System is used over EPS block the paint colour selected must have a light reflectance value (LRV) of 40% minimum regardless of gloss value. Where the StoArmat Plaster System is used over concrete masonry, clay brick veneer, in-situ or pre-cast concrete or autoclaved aerated concrete blocks the paint colour selected must have an LRV of 25% minimum regardless of gloss value.

Sto Miral Paints and Primers

- *Sto Stoplex W* is a yellow tinted, ready-to-use, acrylic based primer available in 10 litre pails. It is used as a primer coat over the cured LevelLite base plaster in the Sto Miral Plaster System.
- *StoColor Maxicryl* is a ready-to-use, tintable, acrylic exterior paint system for application over finishing plasters. It is supplied in 15 litre pails, and may be brush, roller or spray applied. The paint colour selected must have an LRV of 20% minimum regardless of gloss value. Note: The Sto Miral Plaster System is limited to use on clay brick veneer only.
- *StoLastic Color* is a ready-to-use, tintable, satin matt, acrylic exterior paint system paint for application over finishing plasters. It is supplied in 15 litre pails, and may be brush, roller or spray applied. The paint colour selected must have an LRV of 20% minimum regardless of gloss value. Note: The Sto Miral Plaster System is limited to use on clay brick veneer only.

Accessories

- Reinforcing mesh - alkali-resistant fibreglass mesh with a nominal mesh size of approximately 6.0 x 6.0 mm and an approximate weight of 165 g/m², or with a nominal mesh size of approximately 4.0 x 4.0 mm and an approximate weight of 165 g/m².
- uPVC components – drip edge and control joint flashing.
- 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.

4.4 Accessories used with the plaster systems which are supplied by the approved applicator 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.

4.5 Accessories used with the plaster systems which are supplied by the building contractor are:

- Window and door trim cavity air seals – 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 approved applicator, whether on or off site, is under the control of the Stoanz Limited approved applicators. Dry storage must be provided for the fibreglass mesh and bags and pails of plaster mix. 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 StoArmat Miral Plaster Systems. 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. (AS/NZS 1170.)

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 NZS 4203 (AS/NZS 1170) using the design guidelines.

Clay Brick Veneer

7.3 Clay brick veneer must be designed and constructed in accordance with NZS 3604, NZS 4210 and NZS 4229. Ventilation and drainage opening requirements must be adhered to.

EPS Block

7.4 EPS block construction must be specifically designed in accordance with NZS 3101 and NZS 4203 (AS/NZS 1170) using the design guidelines.

Autoclaved Aerated Concrete Block

7.5 Autoclaved Aerated Concrete block construction must be specifically designed and constructed to meet the performance requirements of the NZBC. Autoclaved Aerated Concrete blocks must be manufactured in accordance with ASTM C 1386.

Control Joints

8.1 Control joints in the StoArmat Miral and Sto Miral Plaster Systems 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.

Durability

9.1 The StoArmat Miral Plaster Systems meet the performance requirements of NZBC Clause B2.3.1 (b), 15 years for the plaster finishes, and the performance requirements of NZBC Clause B2.3.1 (c), 5 years for the exterior paint system.

Serviceable Life

9.2 The StoArmat Miral and Sto Miral plaster system installations are expected to have a serviceable life of at least 15 years provided the paint finish system is maintained in accordance with this Appraisal and the NZBC external moisture and internal moisture provisions are met.

Maintenance

10.1 Regular maintenance is essential for the StoArmat Miral Plaster Systems installations to continue to meet the NZBC durability performance provision and to maximise their serviceable life.

10.2 Annual inspections must be made to ensure that all aspects of the plaster system remain in a weatherproof condition. Any damaged areas or areas showing signs of deterioration which would allow water ingress, must be repaired immediately. Sealant, paint coatings or the plaster system must be repaired in accordance with the relevant manufacturer's instructions. Any damage to the substrate must be repaired and the advice of the substrate manufacturer must be sought.

10.3 Regular cleaning (at least annually) of the StoArmat Miral Plaster Systems 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.

10.4 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 Stoanz Limited.

Control of External Fire Spread

11.1 Solid substrates finished with the StoArmat Miral Plaster Systems are considered to meet the performance provisions of NZBC C3.3.5 for use as an external wall cladding when restricted to:

- Single storey buildings 1 m or more from the relevant boundary for all purpose groups.
- Buildings with a building height of less than 7 m and located 1 m or more from the relevant boundary, for all purpose groups other than SC and SD.
- Fully sprinklered buildings with a building height of less than 25 m and located 1 m or more from the relevant boundary for all purpose groups other than SC, SD, SA and SR.
- Buildings containing purpose group SH, with a building height less than 10 m and located 1 m or more from the relevant boundary.

(Note: The scope of this Appraisal limits building heights to 10 m from ground to eaves. The building heights referenced in Paragraph 11.1 above are as defined in the Definitions Section of the Fire Safety Clauses of the NZBC.)

Outbreak of Fire

12.1 The StoArmat Miral Plaster Systems need not be separated from chimneys and flues. However, when used in conjunction with heat sensitive materials, the heat sensitive material 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

13.1 The StoArmat Miral Plaster Systems 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.

13.2 For buildings constructed in accordance with Paragraph 2.1 of this Appraisal, the ingress of moisture must be excluded by detailing joinery and wall interfaces as shown in the Technical Literature. For buildings constructed in accordance with Paragraph 2.2 of this Appraisal, the weathertightness detailing must be specifically designed and is the responsibility of the designer. 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.

13.3 The detailing of junctions between the StoArmat Miral Plaster Systems and other wall penetrations, e.g. 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.

Installation Information

Installation Skill Level Requirements

14.1 Installation and finishing of components and accessories supplied by Stoanz Limited and the approved applicator must be completed by trained applicators, approved by Stoanz Limited.

System Installation

StoArmat Miral Plaster Systems

15.1 Components and accessories supplied by Stoanz Limited and the approved applicator must be installed in accordance with the Technical Literature by Stoanz Limited approved applicators.

15.2 The StoArmat Miral Plaster Systems must only be applied when the air and substrate temperature is within the range of +5°C to +30°C.

Inspections

15.3 The Technical Literature must be referred to during the inspection of the StoArmat Miral Plaster Systems installations.

Health and Safety

16.1 Safe use and handling procedures for the components that make up the StoArmat Miral Plaster Systems are provided in the relevant manufacturer's Technical Literature.

Basis of Appraisal

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

Tests

- 17.1 The following testing has been completed by BRANZ:
- Durability testing of the Sto Flexyl waterproofing membrane to the requirements of AS/NZS 4858 Table 8, Parts (a) – (e), except that bleach and detergent immersion set out in Appendix A was not required.
 - Tensile bond strength of the Sto LevelLite plaster to EPS.
 - Tensile bond strength of the StoArmat Miral Plaster System to autoclaved aerated concrete block.

Investigations

17.2 Durability and weathertightness opinions have been given by BRANZ technical experts.

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

17.4 The Technical Literature for the StoArmat Miral Plaster Systems has been examined by BRANZ and found to be satisfactory.

Quality

18.1 The manufacture of the plasters and paints 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.

18.2 The quality management system of the plaster and paint manufacturer, Sto AG, has been assessed and registered as meeting the requirements of ISO 9001: 2000 by IQNet, Registration Number 003651 QM.

18.3 Sto External Wall Insulation Systems are the subject of a current British Board of Agrément (BBA) Certificate No 95/3132 and the manufacture of the systems continues to be checked by the BBA during the validity period of the Certificate. Plasters and paints used within the StoArmat Miral Plaster Systems and imported by Stoanz Limited are covered by the BBA Certificate.

18.4 The quality control system of the Sto LevelLite plaster manufacturer has been assessed and registered as meeting the requirements of the Telarc Q-Based Code by Telarc Limited.

18.5 The quality of materials, components and accessories supplied by Stoanz Limited are the responsibility of Stoanz Limited.

18.6 Quality on site is the responsibility of the Stoanz Limited approved applicators.

18.7 Designers are responsible for the building design, and building contractors are responsible for the quality of construction and installation of the solid substrates, joinery, flashing tapes, airseals and joinery flashings in accordance with the instructions of the building designer.

18.8 Building owners are responsible for the maintenance of the StoArmat Miral Plaster Systems in accordance with the instructions of Stoanz Limited.

Sources of Information

- ASTM C 1386-98 Standard Specification for Precast Autoclaved Aerated Concrete (PAAC) Wall Construction Units.
- AS/NZS 1170: 2002 Structural design action – General principles.
- NZS 3604: 1999 Timber framed buildings.
- NZS 3101: 1995 Concrete structures standard.
- NZS 4203: 1992 General structural design and design loadings for buildings.
- NZS 4210: 2001 Masonry construction: Materials and workmanship.
- NZS 4229: 1999 Concrete masonry buildings not requiring specific engineering design.
- NZS 4230: 2004 Design of reinforced concrete masonry structures.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005.
- New Zealand Building Code Handbook, Department of Building and Housing, Third Edition May 2007.
- The Building Regulations 1992, up to, and including June 2007 Amendment.



BRANZ

In the opinion of BRANZ, **StoArmat Miral Plaster 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.
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 **Stoanz Limited**.
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 **Stoanz Limited** or any third party.

For BRANZ

P Robertson
Chief Executive

Amendment No. 1, 27 June 2008

This Appraisal has been amended to include autoclaved aerated concrete block as a substrate for the StoArmat Miral Plaster System and StoLastic Color as an alternative paint.

Date of issue: 15 June 2007