ELDORADO STONE™ VENEER AND HARD AS ROCKS APPLICATION SYSTEM TECHNICAL MANUAL PRODUCT DESCRIPTION AND INSTALLATION DETAILS VERSION 1.1 AUGUST 2012

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Eldorado Stone™ and the Hard as Rocks Application System

1. PRODUCT DESCRIPTION

Eldorado Stone™ veneer and Hard as Rocks Application System is a simulated stone veneer cladding system designed to imitate the look of natural stone. The materials used in the manufacture of Eldorado Stone™ veneer are lightweight aggregates, Portland cement and iron oxide pigments that are cast to mimic different styles of stone. The weight of the cladding system in total does not exceed 80kg/m^2.

Hard as Rocks' New Zealand installation procedure of this stone veneer cladding is generally over conventional timber framing with studs at not more than 400 mm centres, a nominal 20mm drained and ventilated cavity and a fibre-cement backing sheet sealed with a proprietary moisture resistant coating. Proprietary stainless steel ties are used as a mechanical fixing between the timber framing and the mortar/stone veneer. This cast stone veneer and its New Zealand installation system can be used on domestic and light commercial buildings where domestic construction techniques are used as well as solid construction buildings as detailed below.

2. SCOPE OF USE

The Eldorado Stone™ veneer and Hard as Rocks Application System has been appraised as an external wall cladding system for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
- constructed with timber framing complying with the NZBC; and,
- with a risk score of 0-20, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
- situated in NZS 3604 Wind Zones up to, and including, Extra High.

The Eldorado Stone™ veneer and Hard as Rocks Application System has also been appraised for weathertightness and structural wind loading when used as an external wall cladding for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with regard to floor area and building height; and
- constructed with timber complying with the NZBC; and,
- situated in specific design wind pressures up to a maximum design differential ultimate limit state (ULS) of 2.5 kPa.

The Eldorado Stone™ veneer and Hard as Rocks Application System must only be installed on vertical surfaces (except for sills which must have a minimum 10º slope and be waterproofed in accordance with the Technical Literature).

The system is appraised for use with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. *(The Appraisal of the Eldorado Stone™ veneer and Hard as Rocks Application System relies on the joinery*

meeting the requirements of NZS 4211 for the relevant Wind Zone or design wind pressure.)

Builder Requirements:

The builder is to supply and install the fibre cement board, all relevant watertight flashings, sealant between the sheet joints and sealing around joinery.

Installation of the stone veneer and the stone veneer accessories supplied by Hard as Rocks Ltd and approved installers must be carried out only by Hard as Rocks Ltd licensed applicators.

3. RESPONSIBILITIES

- Hard as Rocks is responsible for the quality of Eldorado Stone™ veneer and its installation system including all associated accessories and fixing elements supplied as part of the cladding system.
- Quality on site is the responsibility of Hard as Rocks registered installers.
- Building designers are responsible for all components of the building and substrate design, to comply with NZBC, and for the incorporation of the *Hard as Rocks Application System* into their design in accordance with the instructions of Hard as Rocks literature.
- Building owners are responsible for the maintenance of *Eldorado Stone™ veneer and Hard as Rocks Application System* in accordance with the instructions of Hard as Rocks literature.

4. BUILDING REGULATIONS

Eldorado Stone™ veneer and Hard as Rocks Application System, when installed in accordance with the Hard as Rocks technical literature, will meet or contribute to meeting the provisions of the New Zealand Building Code requirements for the following Clauses:

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. Loads arising from self-weight, earthquake, wind, impact and creep and shrinkage [i.e. B1.3.3 (a), (f), (h), (j) and (q)]

Clause B2 DURABILITY: Performance B2.3.1 (a), not less than 50 years, and (b) not less than 15 years.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1.
Reference: Eldorado Stone™ Veneer MSDS 01 (Material Safety Data Sheet)

Additional Compliance and Manufacturing Quality Control Documents and References:

International Code Council Compliance assessment of Eldorado Stone™ ICC-ES 1215

5. SUBSTRATES AND SUPPORT BACKINGS & OTHER COMPONENTS

Building Underlays

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. 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.

BUILDING UNDERLAY AND FLEXIBLE SILL AND JAMB TAPE INSTALLATION

The selected building underlay and flexible sill and jamb tape system must be installed by the building contractor in accordance with the underlay and tape manufacturer's instructions prior to the installation of the cavity battens and the rest of the Eldorado Stone™ and Hard as Rocks Application System. Flexible building underlay must be installed horizontally and be continuous around corners. Underlay must be lapped 75mm minimum at horizontal joints and 150mm 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 building underlay and sill and jamb tapes around window and door openings to ensure a continuous seal is achieved and all exposed wall framing in the opening is protected.

ALUMINIUM JOINERY INSTALLATION

Aluminium joinery and associated head flashings must be installed 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.

CAVITY BATTENS

The cavity vent strip must be in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.8.3. The vent strip must be manufactured from PVC, aluminium or stainless steel, and be punched with 3 - 5 mm holes or slots which provide a minimum ventilation opening area of 1000 mm2 per lineal metre of wall. The selected cavity vent strip must be installed with the bottom of the vent strip flush with the underside

of the cavity battens. Note: A minimum 15 mm drip edge to the bottom of the fibre cement sheet must be maintained at all times.

Minimum 45 mm wide x 18 mm thick H3.1 treated timber cavity battens, or proprietary cavity battens covered by a valid BRANZ Appraisal must be installed over the building underlay to the studs at maximum 400 mm centres. The battens must be fixed in place with 30 x 2.5 mm hot-dipped galvanised flat head nails at maximum 800 mm centres.

FIBRE-CEMENT SHEET

Minimum 7.5 mm thick fibre cement sheets complying with AS/NZS 2908 Part 2 may be installed vertically or horizontally. All vertical sheet edges must be supported and fixed through the cavity battens to the wall framing. At the base of the wall, the sheets must hang 50 mm below the supporting framing.

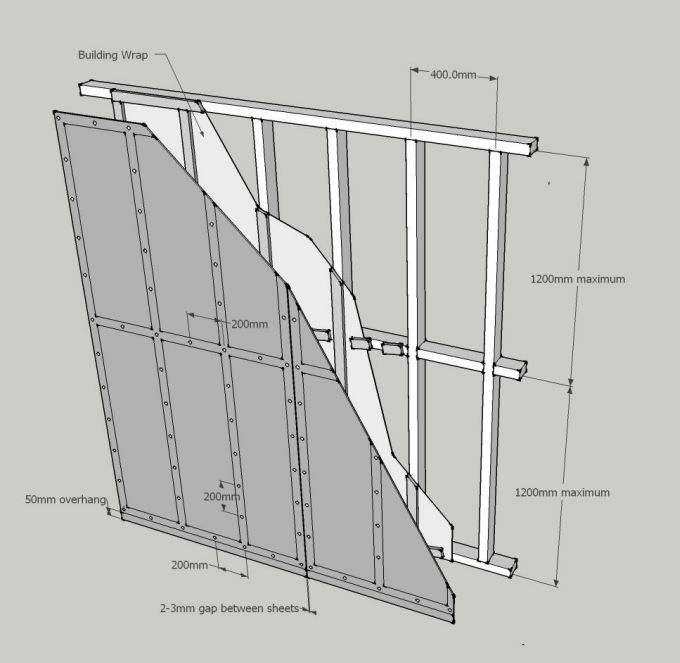
BGC Fibre Cement Board

Eldorado Stone™ and the Hard as Rocks Installation System specify installation over BGC Stonesheet 7.5mm.

Installation of the BGC Stonesheet fibre cement board and relevant flashings is the responsibility of the builder and must be carried out in accordance with the manufacturer's technical instructions to ensure compliance with the requirements set out in E2 *External Moisture* of the New Zealand Building Code.

All flashings must be installed in accordance with building code requirements. To maintain the weather-resistance of the exterior wall on which the stone products are installed, rigid, corrosion-resistant flashings and a means of drainage shall be installed at all penetrations and terminations of the stone cladding. Flashing type and locations shall be in accordance with the requirements of the applicable code.

Diagram: Batten and Fibre Cement board set-out



Technical Specification:

Timber framing is completed to comply with NZS 3604 for buildings or parts of buildings within the scope limitations of NZS 3604, or to specific design in accordance with NZS 3603 and AS/NZS 1170. Stud interval is set at a maximum 400mm centres.
See table below for fixing centres for relevant 'Wind Zone' and 'Earthquake Zone' requirements.

Wind Zone Vertical Anchor Tie Spacing (mm)		
Wind Zone	**Within 1200 mm of building corner**	**More than 1200 mm from building corner**
Low	400	400
Medium	400	400
High	300	400
Very High	200	300
Extra High	180	200
Specific Design 2.5 kPa	180	180

Note: The maximum horizontal Anchor Tie spacing to studs is 400mm.

Earthquake Zone Vertical Anchor Tie Spacing (mm)		
Earthquake Zone	**Single Storey** **3 m maximum**	**Buildings up to** **10 m maximum**
Zone 1	400	300
Zone 2	400	225
Zone 3	250	150
Zone 4	200	120

Note: The maximum horizontal Anchor Tie spacing to studs is 400mm.

The fixing is designed to allow sufficient purchase into the timber stud and a 8 mm purchase into the mortar layer when the subsequent mortar and stone is applied The fibre-cement sheet is sealed using a 2:1 ratio Portland cement and 'StoneTite' slurry mix as a sealant. The sealing /bonding coat is not more than 2mm thick.
The stone veneer component in a wide variety of cast shapes, but with an approximately uniform depth is then mortared in place (maintaining a 8mm mortar depth) using a proprietary mortar-mix incorporating 'StoneTite' as a mortar additive. The average thickness of the stone veneer itself is approximately 40mm. Joints between the veneer elements, can be pointed, or raked back depending on the style and look of laying required. The over-all visual effect of the finished cladding is an imitation of natural stone construction.

6. SYSTEM COMPONENTS

Components supplied by Eldorado Stone™ LLC, USA Component	Material
Simulated stone veneer. (Multiple "stone" styles)	Portland cement, lightweight aggregates, & pigments
Components	**Material**
Fibre-cement Sheet (builder to install – available from hardware merchants, i.e. Placemakers, ITM, Carters or directly from BGC Fibre Cement)	BGC Stonesheet 7.5mm
Proprietary Fixing – Hard as Rocks 'Tag'	Stainless steel, 20mm wide
StoneTite as a sealant	Styrene-butadiene co-polymer latex
StoneTite as a mortar additive (20L pail)	Styrene-butadiene co-polymer latex
StoneTite mortar-mix (25kg bags)	5:2 mix of fine washed sand and Portland cement
Accessories	Portland cement, aggregates and pigments

6.1 STONETITE™ ADDITIVE & SEALER

Hard as Rocks StoneTite Additive and Sealer is an aqueous emulsion of styrene-butadiene copolymer latex which will improve durability, bonding, waterproofing and wear resistance.
Substrates must be prepared and sealed with StoneTite™ Sealer prior to installing stone veneer. StoneTite is used both in the form of a waterproofing and bonding slurry applied to the surface and is also added to the StoneTite Mortar mix for stone application.

Benefits :

- Improved flexibility
- Greatly reduced shrinkage
- Earlier hardening
- Increased durability and toughness
- High resistance to water penetration

6.2 STONETITE™ MORTAR

Available in 25kg bags, StoneTite™ mortar is a pre-mixed blend that ensures the perfect ratio of ingredients that forms part of the tested installation system.

Mixing Instructions:

Mix 3 litres of clean, fresh water with 600ml of StoneTite™ Additive. Add one bag of 25kg StoneTite™ Mortar to this solution and mix with a mixing drill. Mix to a workable consistency adding additional clean, fresh water to suit. The mortar should stick to the trowel when turned on its side but slide off easily when given a quick shake.
Each 25kg bag of mixed StoneTite™ Mortar will cover 1 – 1.5m2 of substrate with 8mm of mortar.

Adding Oxide

Tinting the StoneTite™ Mortar can be achieved by adding oxide colouring as recommended by the manufacturer's instructions.

Handling and Storage

Eldorado Stone™ veneer is available in pallets of 12 boxes each. Each box can weigh up to 70kg and requires a two-man lift to avoid injury.

It is recommended that pallets and boxes be stored in a dry environment protected from the elements.

6.3 HARD AS ROCKS TAGS

A proprietary Hard as Rocks Ltd stainless steel fixing anchor (tag) and screw, providing mechanical fixing between timber frame and mortar/stone veneer layer, is to be used with this application system. The anchor is approximately 60 mm x 20 mm pre-formed from 304 stainless steel 1.6mm thick (16 gauge) and pre-punched with a 5mm hole for the screw.
Screws are 12 Gauge 65 mm 304 stainless steel square drive.

6.4 ELDORADO STONE™ARCHITECTURAL STONE VENEER

6.4.1 MANUFACTURED INDIVIDUAL STONE

Stone type:	Rustic Ledge
Colour:	West Coast - Predominantly grey with highlights of brown and rust
	Alexandra - Brown, grey and rust colours with hints of gold
	Cambridge - Pale creams, greys and yellows
Weight:	Approximately 45 kg/m²
Size:	25 -125mm in height and 150 - 500mm in length
Thickness:	Varies with each piece, 50mm average
Corner pieces:	Matching corner stones

Stone type:	River Rock
Colour:	Alpine - Predominantly grey with highlights of brown and rust
Weight:	Approximately 48 kg/m²
Size:	100 – 380mm
Thickness:	Varies with each piece, 50mm average
Corner pieces:	Matching corner stones

Stone type:	Country Rubble
Colour:	Serrano - Brown, grey and tan hues
Weight:	Approximately 44 kg/m²
Size:	50 - 100mm in height and 100 - 450mm in length
Thickness:	Varies with each piece, 50mm average
Corner pieces:	Matching corner stones

Stone type:	Hillstone
Colour:	Molano – Sage, hints of tan and ochre
Weight:	Approximately 53kg/m²
Size:	25 - 300mm in height and 75 - 450mm in length
Thickness:	Varies with each piece, 50mm average
Corner pieces:	Matching corner stones

Stone type:	Pahoehoe
Colour:	Kona
Weight:	Approximately 56 kg/m²
Size:	25 -125mm in height and 150 - 500mm in length
Thickness:	50mm
Corner pieces:	Matching corner stones

Stone type:	Field Rock
Colour:	Mauka, Kiholo
Weight:	Approximately 62 kg/m²
Size:	25 -125mm in height and 150 - 500mm in length
Thickness:	Varies with each piece, 50mm average
Corner pieces:	Matching corner stones

Stone type:	Lava Rock
Weight:	Approximately 60kg/m²
Size:	25 -125mm in height and 150 - 500mm in length
Thickness:	Varies with each piece, 50mm average
Corner pieces:	Matching corner stones

Stone type:	Shadow Rock
Colour:	Teton, Mountain Blend -
Weight:	Approximately 48kg/m²
Size:	50 - 250mm in height and 130 - 600mm in length
Thickness:	Varies with each piece, 50mm average
Corner pieces:	Matching corner stones

Stone type:	Coastal Reef
Colour:	Sanibel – Off white/ecru. Pearl White - Pearl
Weight:	Approximately 45 kg/m²
Size:	100 - 400mm in height and 100 - 300mm in length
Thickness:	Varies with each piece, 50mm average
Corner pieces:	Matching corner stones

6.4.2 MANUFACTURED STONE PANELS

Stone type:	Stacked Stone
Colour:	Slate Grey - various shades of blueish grey, odd touch of rose Old English - white, creams and touches of grey and amber Castaway - Brown, touches of browns and rusts

Weight:	Approximately 42 kg/m²
Size:	3 panel sizes – 100mm high panels 200mm/300mm/500mm long
Thickness:	Varies with each piece, 50mm average
Corner pieces:	Matching corner stones

6.5 ACCESSORIES

6.5.1 MANUFACTURED CAPSTONES

Type:	450X450X40mm Pillar Cap
Colour:	West Coast, Alexandra, White, Natural
Type:	550X550X40mm Pillar Cap
Colour:	West Coast, Alexandra, White, Natural
Type:	600X600X40mm Pillar Cap
Colour:	West Coast, Alexandra, White, Natural
Type:	500x300x40mm Standard Wall Cap
Colour:	West Coast, Alexandra, White, Natural

6.5.2 MANUFACTURED SILLS

Type:	80mm Sill 500x80mm 60mm back with 15 degree slope
Colour:	West Coast, Alexandra, White, Natural
Type:	500x110mmx40mm thick Sill
Colour:	West Coast, Alexandra, White, Natural
Type:	500x150mmx40mm Sill
Colour:	West Coast, Alexandra, White, Natural

7. APPLICATION

7.1 WATERPROOFING AND PRIMING THE SUBSTRATE

Substrates must be prepared and sealed with StoneTite™ Additive prior to installing stone veneer. Wet down absorbent surfaces such as concrete, brick and stone, etc., ensuring that they are saturated, but free of surface water. Prepare a bonding slurry of 1.5 parts powdered cement to 1 part StoneTite Additive, mixed to a lump free, creamy

consistency. Using a brush or paint roller, work the bonding slurry well into the damp surface, ensuring that no pinholes are visible. Do not apply bonding slurry at a thickness in excess of 2mm. If a second coat is necessary, it must be applied after the first coat is touch-dry. The second coat must be applied at right angles to the first to ensure complete coverage.

7.2 MIXING THE STONETITE MORTAR

Mix 3 litres of clean, fresh water with 600ml of StoneTite™ Additive. Add one bag of 25kg StoneTite™ Mortar to this solution and mix with a mixing drill. Mix to a workable consistency adding additional clean, fresh water to suit. The mortar should stick to the trowel when turned on its side but slide off easily when given a quick shake.

7.3 WETTING THE STONE AND/OR SUBSTRATE

Under certain conditions the stone and substrate may need to be wetted. If the stone is being installed onto a very hot/dry surface or in a hot/dry climate, the stone and wall surface should be wet to prevent excessive absorption of moisture from the mortar. This can be done by spraying water onto the wall surface and back of the stone (you may also dip the stone into a container of water). In either case the stone and the wall surface should not be allowed to dry for a few minutes after wetting to eliminate excess surface water. For cold weather installations, applications should be protected from temperatures below freezing so the mortar may set properly.

7.4 STONE APPLICATION

Once substrate is fully waterproofed and has a bonding slurry coat applied, you can begin laying. Install corners first for easiest fitting. Corner pieces have a long and short return, these should be alternated in opposite directions on the wall corner. Using a masons trowel apply 30mm thick even layer of mortar to the entire back of the stone then press the stone firmly into place on the prepared wall surface, squeezing the mortar out around all edges to ensure 'blanket' coverage. Using a gentle 'wiggling' action while pressing the stone onto the wall will ensure a good bond. Continue laying, selecting appropriate stones leaving excess mortar in place to ensure all gaps are filled and entire substrate area has a minimum 10mm mortar coverage.
Note: For panel installation, where no visible mortar joints are required, once the stone has been pressed onto the wall clean off excess mortar or smear excess mortar up the wall enabling the next stone to have a tight fit against all edges.
Chalk lines should be snapped every 100mm-200mm as a guide for keeping the installation level. It is of particular importance to frequently stagger the joint lines both vertically and horizontally.
For best fit, stone can be cut or shaped using a hatchet, wide-mouthed nippers or masons trowel edge. Straight cuts can be made with a diamond or carbide saw blade. Cut edges should be turned so they are not visible (down when below eye-level and up when above eye-level). To conceal cut or broken edges, colour them by smearing

mortar on the cut edge (back-cutting the stone edges with also help with concealment).

Note*: *Eye protection should be worn when cutting stone. If cutting with a blade a dust mask should be worn as well.

When the mortar joints between stones become tacky, but not too firm (normally 20-40 minutes), strike away excess mortar with a pointing tool or narrow bristled brush to smooth the joints and clean away any loose mortar from the joints and the stone face.

Note: Finished pointing is a major component of the stones finished look as well as ensuring blanket wall coverage for further waterproofing. The utmost attention should be paid to ensuring that a high quality standard of finish is achieved. If necessary a piping bag can be used to squirt mortar into voids or to fill holes.

7.5 CONTROL JOINTS

Where control joints are in place in either fibre cement board or masonry substrates, careful attention should be paid to ensure that stonework is finger jointed over the control joint to allow for any expansion or contraction. This is achieved by mortaring 75% of the back of the stone to the wall leaving 25% of stone floating where it crosses the control joint. Alternating this application as you go up in layers will ensure that the control joint is concealed but still allowed to move freely if necessary preventing any cracking in stone.

7.6 CLEAN UP

Use a brush or whisk broom to clean away any loose and dry mortar from the joints and stone face. Loose mortar and mortar spots, which have set for only a few hours, clean up easily and should never be allowed to set overnight.

Caution: Do not use wet brushed or sponges to wipe the joints or clean mortar off the face the stone as it will smear and stain. Also, never use wire brushes or acid on the stone surfaces.

7.7 KEY NOTES

Eldorado Stone™ should only be installed on substrates that are structurally sound and conform to all NZBC requirements.

Eldorado Stone™ must not be used inside the firebox of fireplaces or be exposed to extreme heat.

Retaining walls must be waterproofed on the fill side and incorporate provisions for adequate drainage

8. MAINTENANCE

Regular maintenance is required to ensure the finished system performs to meet the NZBC.

Yearly inspections should be made to ensure that there are no cracks or damage to the system that could allow water ingress or the system to lose its structural integrity.

Weep holes should be checked to make sure they are unobstructed and ground

clearance regulations must be maintained at all times. Damaged areas of the stonework must be replaced or repaired immediately.
Every 6 months the stone surface should be cleaned from dirt, grime and organic growth.
To clean dirt or other particles from the stone, use a granulated type detergent mixed with water and a soft bristle brush.
If efflorescence occurs, as it does with most masonry products, it is usually caused by moisture migration through the masonry substrate when the stone is saturated. Once the moisture is on the masonry surface, it evaporates, depositing the dissolved salts in the form of efflorescence. The efflorescence will disappear gradually with time. To clean the efflorescence right away, scrub the surface with a soft bristle brush and a solution of 1 part white household vinegar mixed with 5 parts water.

9. WARRANTY

The materials and components used in the Hard as Rocks Application system have a minimum warranty of (15) fifteen years from date of producer statement issuance by a Hard as Rocks certified applicator.
This is compliant with the standard set by the NZBC for external cladding.
Independent applicators that have been certified by Hard as Rocks Ltd will offer an independent minimum (5) five year labour warranty for the application of the stone.