

IAN BENNIE AND ASSOCIATES

TEST REPORT NO. 2017-053-S2

**“SMARTSTONE SYSTEMS” EXTERNAL
WALL CLADDING**

**STATIC ULTIMATE WIND LOAD TESTS
to AS4040.2**

for

Stone Clad Pty Ltd

October 2017



Accreditation No. 2371
Accredited for compliance with ISO/IEC 17025.



TEST REPORT NUMBER 2017-053-S2

Test Client Stone Clad Pty Ltd
c/- Bernie Trounce 49-54 Douglas St, Noble Park VIC 3174

Sample Identification A sample of “Smartstone Systems” External Wall Cladding was installed for testing on a timber stud frame. The sample consisted of 90 x 45 timber stud frame measuring 1800 mm by 1800 mm with 600 mm stud centres. Six rows of SmartStone panels were installed on the stud frame with aluminium brackets. Details of the sample and material descriptions provided by Stone Clad Pty Ltd, are given in Appendix A.

Test Method Strength limit state testing was conducted in accordance with AS4040.2 Methods of testing sheet roof and wall cladding, Method 2: Resistance to wind pressures for non-cyclone regions.

Procedure: AS4040.2 nominates for Strength limit state testing test loads shall be applied for a period of 1 minute. In order to determine the strength limit of the system a series of positive and negative pressures increasing in 500 Pa steps were applied with the load maintained at each pressure for 1 minute.

Test Location: IBA Test Centre Dandenong, Melbourne. **Test Date(s):** 1st August 2017

Observations:

The sample sustained all the loads up to +4.5 and –5.5 kPa for periods of 1 minute each. There was no visible sign of damage to any of the panels up to that point of the test. When the load was increased to –6.0 kPa the polystyrene backing of several panels broke off around the fixing clips, see Photograph 1 below.

Photograph 1. Indoor view of the sample after the test.



Requirement:

AS1562.1 Design and installation of sheet roof and wall cladding specify that the cladding system remain substantially in position, notwithstanding any permanent distortion, fracture or damage that might occur in the sheeting or fastenings.

Conclusion:

AS 4040.2 nominates that design pressures should be multiplied by the appropriate variability factor to determine the test pressures. For Strength Limit State tests, AS/NZS 1170.0 nominates that for one sample being tested the variability factor is 1.46. Based on this factor, the “Smartstone Systems” External Wall Cladding sample passed the Strength Limit State test requirements of Australian Standard AS4040.2 Methods of testing sheet roof and wall cladding, Method 2: Resistance to wind pressures for non-cyclone regions up to the strength limit state pressures of **+3.1 and – 3.8 kPa**.

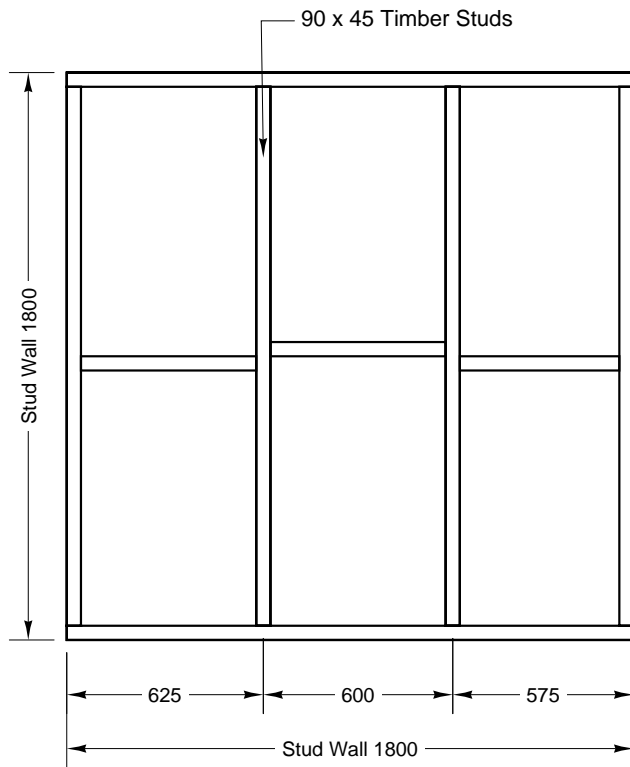
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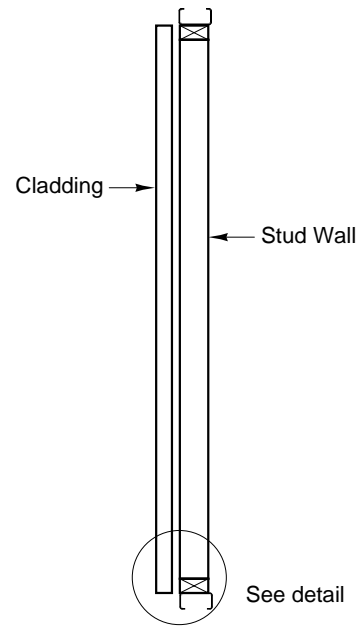
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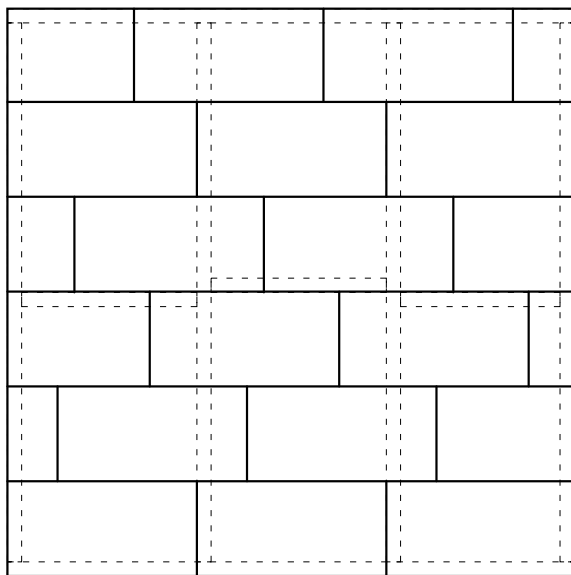
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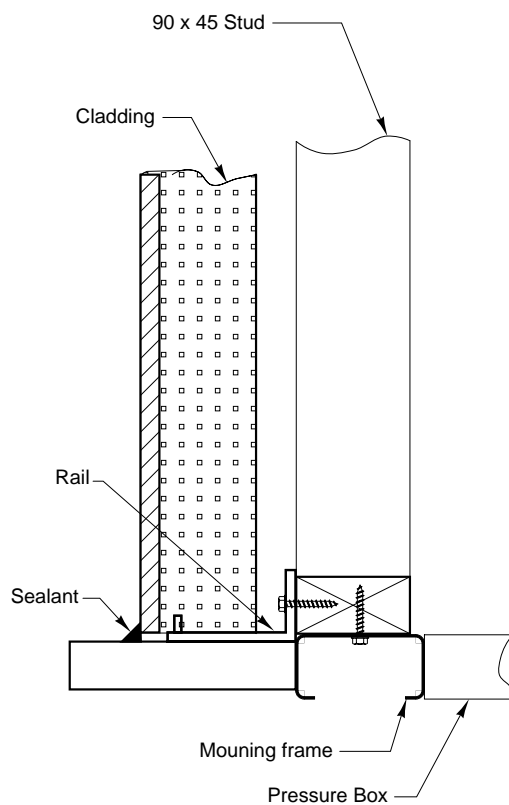
STUD DETAIL



SECTION



PANEL DETAIL



DETAIL

Configuration of test sample.

Technical Data Overview for Smartstone Systems

As installed for static & cyclonic wind load testing

Smartstone Systems comprises a natural stone, reconstituted stone, or porcelain veneer of between 6 & 12mm average thickness bonded to a backing panel under controlled conditions using an industrial polyurethane adhesive less than 1mm thick. The system is fixed to a structural wall using a series of continuous rail and clip extrusions made from 6063 grade aluminium that fit into a 4mm wide slot cut into the backing panel.

There are two system variants, Smartstone Systems Residential and Smartstone Systems Commercial. Both have a range of finishes available in all materials, but not all materials are available in both systems. The samples tested were Smartstone Systems Residential with basalt natural stone facing of nominal 8mm thickness.

Smartstone Systems Residential:

Veneer thickness between 6mm and 15mm thick depending on material
50mm thick XPS Thermoplastic Extruded Insulation sheet backing
Density of XPS panel 43 > 45 Kgs per m³
Thermal Conductivity 0.28 W/(m.k)
Flexural Strength 962Kpa
Dimensional Stability 0.7%
Compressive Strength 590Kpa
Fire Retardant chemicals added in production
Maximum weight of system including veneer, extrusions & sealant 42kgs per m²
Maximum size of individual panel 300 high x 1200 wide
Overall system thickness (back of clip to face of veneer) nominally 80mm


Installation commences with a continuous aluminium L-shaped extrusion with flanges that fit into a 4mm wide and 12mm deep groove cut into the edges of the backing panel on all sides. The centre of the groove is calibrated to 15mm back from the face of the face of the veneer panel. On subsequent courses 74mm wide aluminium clips are fixed back to the structural wall. The clips also have aluminium flanges that fit into the groove in the backing material of the panels. These clips are identical to the Clip Rail, having been cut from the same extrusion.

Between the panels wherever there are not clips or rails a PVC extruded joiner is set into the groove in the backing board. A silicone or polyurethane sealant is applied to all adjoining faces as the panels are assembled to fill gaps between panels, clips, extrusions and joiners as the panels are set in place. This 'tongue and groove' method of inserting the joiners physically lock panels together to prevent movement, help keep the faces of panels in line due to the calibration of the groove from the face, reduce lateral movement of the panel and improve water tightness of the system, but are not considered to bear load vertically.

Reveal & End Cap extrusions are used to provide continuous support to vertical and horizontal boundaries as required at wall junctions, over windows, at soffits, and at the top of the wall. In extremely high wind-load areas continuous clip rail extrusions may be used in horizontal and/or vertical joints rather than individual clips to increase the overall strength of the system. The system was tested using clips only on studs at 600mm centres.

The variety of possible veneer finishes available are too numerous to be described here. For the purposes of calculation a nominal maximum weight of 2,800 kgs per m³ has been specified as this represents the mass of the heaviest veneer material offered when saturated with water.

Technical data on backing board, adhesive and other elements:



XPS (Extruded Closed Cell Polystyrene):
Manufactured to GB/T 10801.2-2002 Standards for Rigid Polystyrene.
Blowing agent HFC 152a
Nominal Density 41kgsM³ > 45KgsM³
Water Absorption by Immersion (28 days) <0.5%
K- Value /Thermal Conductivity, (per 25mm thickness) 0.28
R-Value (per 25mm thickness) 0.9
Fire Resistant to B-1 level

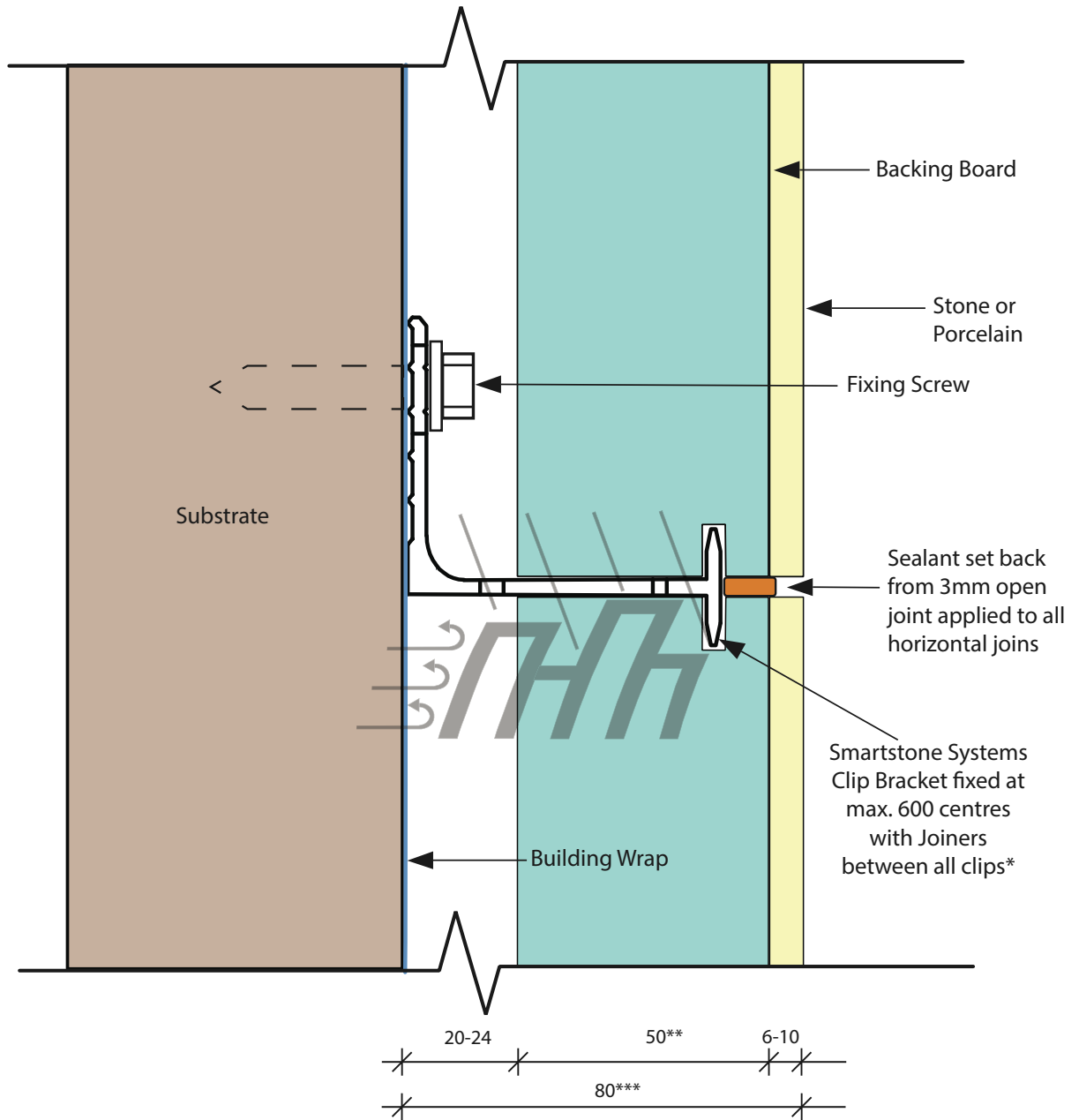
Laminating Adhesive:
Polyurethane (Expanding)
Water Absorption <0.4%
Adhesion Test GB6329 standard - 15Mpa

System was fixed to frame using 12g 'Type 17' 65mm roofing screws.

Sealant used was neutral cure silicone.

Ametalin Silverwrap medium duty breather wall wrap reflective insulation was used as sarking on the frame.

Smartstone Systems Typical Horizontal Joint Detail - Section View



NOTES:

* Maximum space between joiners or joiners & clips to be 20mm. Care must be taken to ensure sealant is applied along all extrusions and clips, and that particular care is taken to ensure adequate sealant applied to ensure spaces are filled.

**Thickness of backing may vary between 20 and 50mm.

*** Overall thickness of systems using Smartstone Systems Commercial extrusions is 50mm

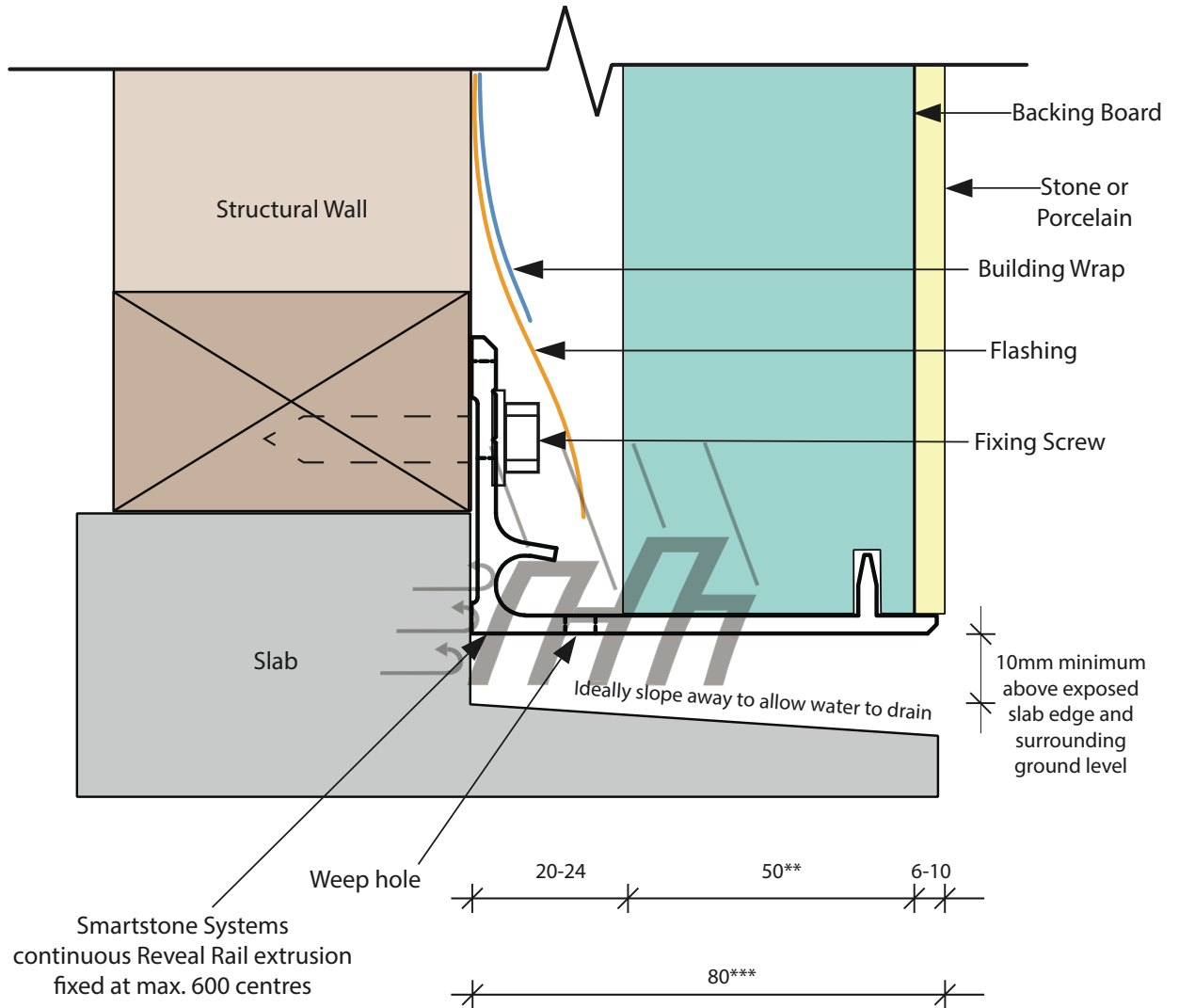
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Not to Scale



Smartstone Systems

Typical Starting Detail - Section View



NOTES:

**Thickness shown for Smartstone Systems XPS Backing. MPS Backing may be between 25 and 50mm.

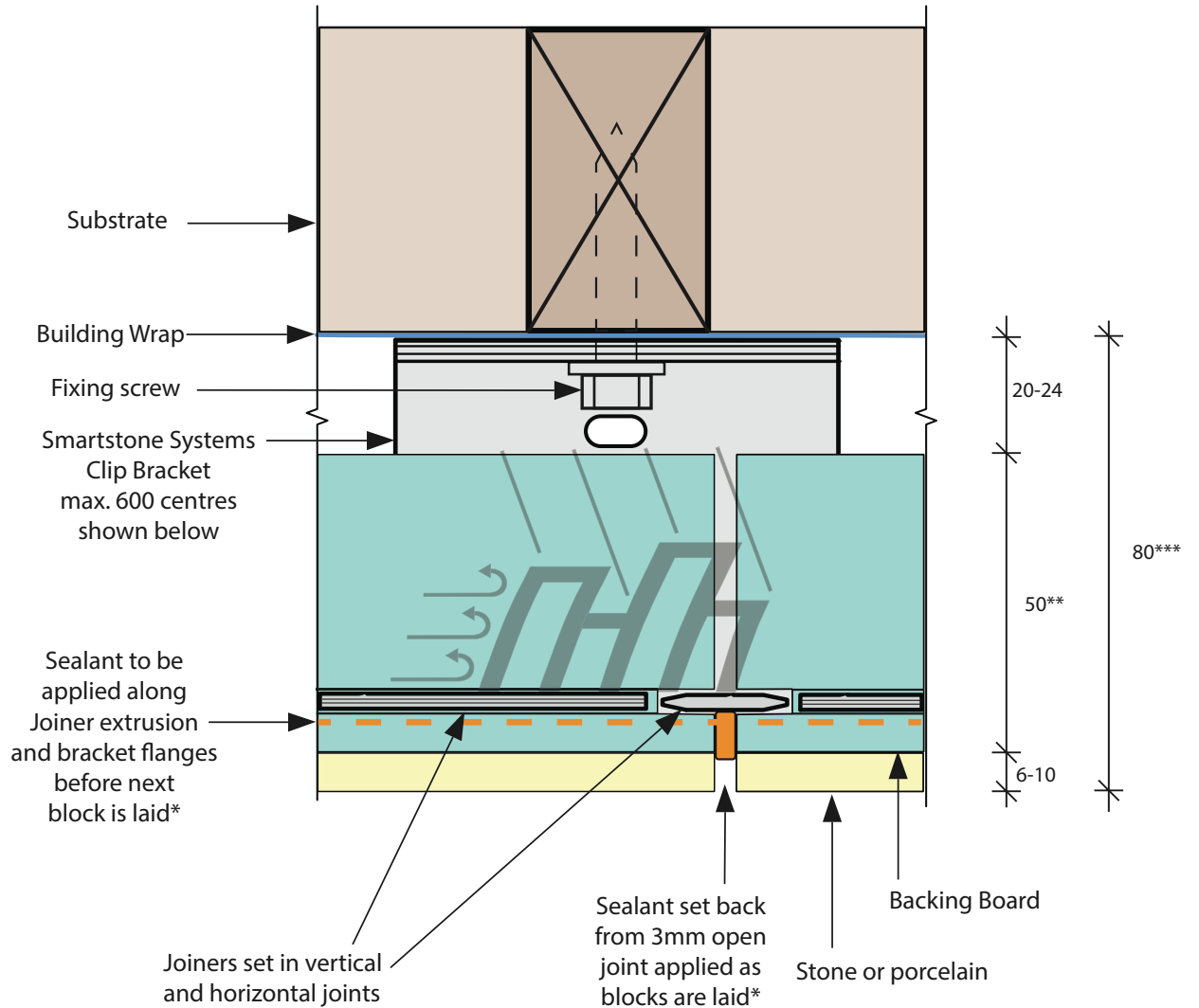
*** Overall thickness of systems using Smartstone Systems Commercial extrusions is 50mm

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Not to Scale



Smartstone Systems Vertical Joint Detail - Plan View



NOTES:

* Maximum space between joiners or joiners & clips to be 20mm. Care must be taken to ensure sealant is applied along all extrusions and clips, and that particular care is taken to ensure adequate sealant applied to ensure spaces are filled.

**Thickness shown for Smartstone Systems XPS Backing. MPS Backing may be between 25 and 50mm.

*** Overall thickness of systems using Smartstone Systems Commercial extrusions is 50mm

19/8/17
Not to Scale



Smartstone Systems
 Typical Fixings Layout
 Fixings @ 600 Centres
 Maximum System weight of 42kgs per m2

