

Rendex[®]
Lightweight Building Products

EXTERNAL CLADDING SYSTEM

Rendex[®] Cladding System Data
Technical Manual
BCA Compliance AS/NZS4284:2008



www.rendex.com.au

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Preface

RendeX®

RendeX® Panel, manufactured by Prestige Wall Systems, provides a rendered weatherproof building cladding system of high thermal resistance. It consists of Grade M expanded polystyrene, coated on two sides with polymer modified render and alkaline resistant fibreglass mesh, mechanically secured to the exterior wall frame, ready for application of render, texture and finish coatings on site.

Technical Manual to be used by Professional Architects, Engineers and Builders

This manual is intended for use by qualified and experienced architects, engineers and builders. The authors, publishers and distributors of this manual, sample specification and the associated drawings do not accept any responsibility for incorrect, inappropriate or incomplete use of this information.

Using this Manual

This manual, including the design recommendations, sample specification and the associated drawings, are available in electronic format, with the express intention that designers will edit them to suit the particular requirements of specific construction projects.

Basis of the Specification and Drawings

This manual has been prepared in the context of the Building Code of Australia. Architects, engineers and builders should make themselves aware of any recent changes to these documents, to any Standards referred to therein or to local variations or requirements. The authors, publishers and distributors of this specification and the associated drawings do not accept any responsibility for failure to do so.

In the preparation of this manual, the following convention has been adopted.

- All building design and construction must comply with the Building Code of Australia and any relevant Australian Standards referred to therein.
- If the construction is not covered by either Building Code of Australia or Australian Standards, construction should comply with a balanced combination of current practice, engineering principles and supplier's information.

Acknowledgements

This manual draws on a variety of technical material published by the Concrete Masonry Association of Australia.

RendeX® Applications

Composition

RendeX® panel, manufactured by Prestige Wall Systems, is made of M - grade expanded polystyrene, coated with polymer-modified render and alkaline-resistant fibreglass mesh, mechanically secured to the exterior wall surface, ready for application of render, texture and finish coatings on site.

Sizes

RendeX® panel is available as a 1.2m x 2.4m sheets in the following thicknesses:

- 40mm, 75mm, coated on one side which is ideal for curving
- 40mm, 75mm, 100mm coated on both sides.

Also 75mm and 100mm panel are available in 2.7m and 3.0m length.

The RendeX® external cladding system is lightweight and therefore easy to install. It also has great insulation

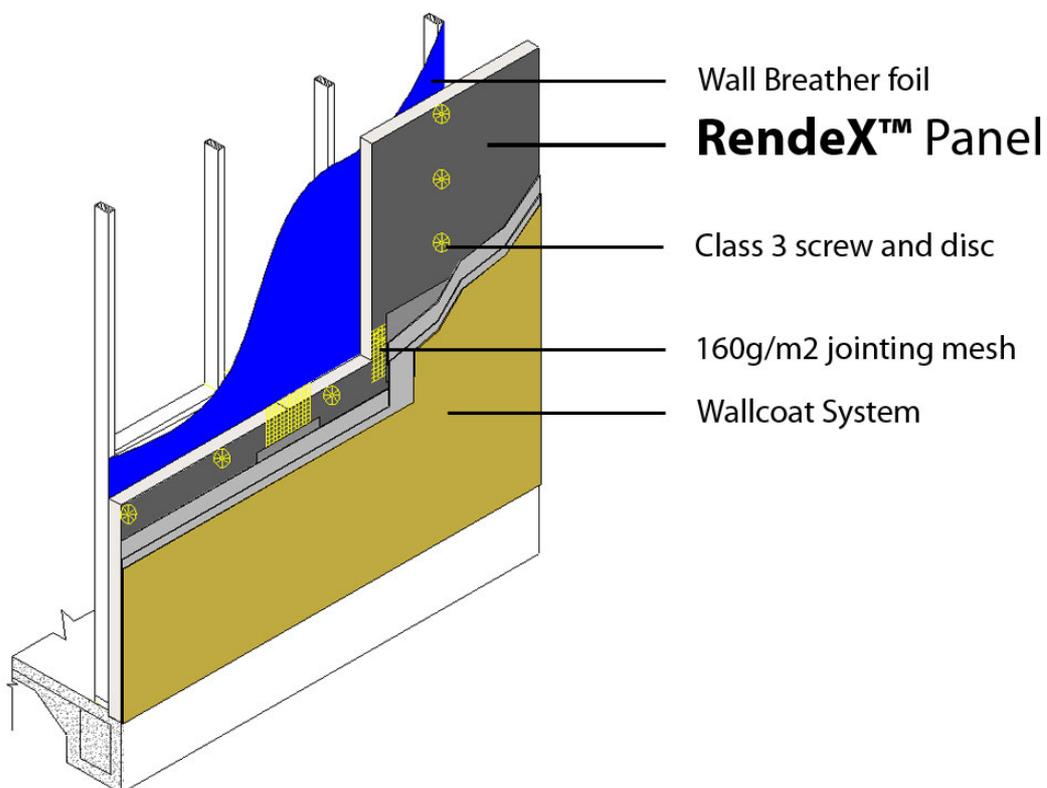
properties and it is typically fixed to timber or steel framing. It has many uses in residential and low rise commercial buildings, such as external walls, extensions, fences etc.

Fire and Thermal

RendeX® panel comprises of an EPS core that is made of fire - retardant expanded polystyrene, it is NOT fire rated, but it self-extinguishes when the source of the flame is removed.

A RendeX® panel system consisting of 75mm Grade M EPS with 10mm plasterboard on a 90mm stud will generate a thermal resistance R2.5, according to AS1366.3 and BCA Part 3.12. Other thicknesses of EPS will yield other thermal resistance.

RendeX® panel will provide an appearance of a rendered brick wall with depth of reveal at windows that enhances its architectural appearance.



Structural Design

Scope

This section covers the structural design of RendeX® external cladding system for compliance with the structural requirements of the Building Code of Australia.

Building Code of Australia

The structural design of RendeX® external cladding system within buildings is regulated by the Building Code of Australia. Refer to the section “Compliance with the Building Code of Australia”.

Loads

RendeX® external cladding system should be designed to withstand the loads set out in the Building Code of Australia and Standards:

AS/NZS 1170.0	Structural design actions Part 0: General principles
AS/NZS 1170.1	Structural design actions Part 1: Permanent, imposed and other actions
AS/NZS 1170.2	Structural design actions Part 2: Wind actions
AS/NZS 1170.3	Structural design actions Part 3: Snow and ice actions
AS 1170.4	Structural design actions Part 4: Earthquake actions in Australia
AS 4055	Wind loads for housing

1. The standard system (detailed in this manual) is designed for wind loading N1, N2 and N3 in accordance with AS 4055.

2. The standard system (detailed in this manual) is not designed for wind loading N4, N5, N6 or cyclonic wind in accordance with AS 4055.

3. The cladding system applies direct compression to the supporting battens, as a uniform line load. The battens must be designed accordingly.

4. The fixings of the cladding systems are designed to transmit direct tension to the supporting battens under the action of wind suction, as a number of point loads. The battens must be designed accordingly.

5. The cladding system is not intended to resist racking loads. These must be resisted by structural plywood bracing systems complying with AS 1684, which provide both strength and a high degree of stiffness against in-plane racking loads.

6. Top and bottom battens shall be positioned within 150 mm of the ends of the panels.

Lateral Pressures

The following tables set out the requirements for fixings of vertical RendeX® panels, 1,200 mm wide, to horizontal light-gauge steel top-hat sections; and the fixing of these sections to the building studs.

Wind Classification	Ultimate Suction kPa Over 1.2m from corners	Number of top hat supports	Number of screws on		Stud Spacing mm
			top & bottom supports	internal supports	
N1	0.7	5	5	5	600
N2	1.0	5	5	5	600
N3	1.5	5	5	5	600

Wind Classification	Ultimate Suction kPa		Number per square metre of standard fixings to top-hats		Spacing (mm) of standard fixings to top-hats at 600 mm centres	
	Over 1.2m from corners	Under 1.2m from corners	Over 1.2m from corners	Under 1.2m from corners	Over 1.2m from corners	Under 1.2m from corners
N1	0.7	1.0	5	5	300	300

N2	1.0	1.4	5	5	300	300
N3	1.5	2.3	5	8	300	250

Thermal Performance

Thermal Resistance of RendeX® External Cladding System.

RendeX® external cladding system consisting of expanded polystyrene (EPS) have excellent thermal resistance. Relevant values are set out in the following table.

Material	External thickness mm	Thermal resistance, R m ² .K/W
75 mm studs + 40 mm EPS		
External air film		0.04
40 mm Class M Expanded Polystyrene Insulation	40	0.96
75 mm Air Gap	75	0.17
10 mm Gypsum plasterboard	10	0.06
Internal air film		0.12
Total	125	1.35
75 mm studs + 75 mm EPS		
External air film		0.04
75 mm Class M Expanded Polystyrene Insulation	75	1.8
75 mm Air Gap	75	0.17
10 mm gypsum plasterboard	10	0.06
Internal air film		0.12
Total	160	2.19
75 mm studs + 100 mm EPS		
External air film		0.04
90 mm Class M Expanded Polystyrene Insulation	90	2.4
75 mm Air Gap	75	0.17
10 mm gypsum plasterboard	10	0.06
Internal air film		0.12
Total	175	2.79

Notes

1. This table provides the thermal resistance of RendeX® panel single leaf walls, without added insulation.
2. Thermal resistance of RendeX® is based on AS 1366.3 Class M Expanded Polystyrene EPS board.
3. Steel studs should incorporate a thermal break in accordance with BCA.
4. Allowances for air films and air spaces are included. There is no allowance for reflective foil.
5. 90 mm studs may be substituted for 75 mm studs.

Detailing and Installation

Introduction

All buildings are required to be built such that:

- The cladding panels are properly supported to resist horizontal wind and earthquake loads, together with vertical gravity loads.;
- The building is weatherproof and durable; and
- The required thermal resistance can be achieved.

Qualifications and Experience of Installers

RendeX® external cladding system shall be installed only by qualified and experienced carpenters or other tradesmen, who are conversant with the techniques set out in this the “Detailing and installation” section of the RendeX® panel Technical Manual. Suitable training in the techniques may be acquired by accessing the training manual on www.electronicblueprint.com.au

Structural Support

The connections and supporting structure must have sufficient combined capacity to transmit the horizontal in-plane and out-of-plane loads from the wall to the supports. The straightness and squareness of the frames should be checked before commencement of the installation.

Weather-Proofing

Buildings must be constructed such that they are weather proof. This may be achieved by ensuring that:

Damp-proof Course

The Building Code of Australia Volume 2 provide rules for construction and specifications of appropriate damp-proof courses to exclude rising ground water and the accompanying salts from contaminating the masonry.

Flashings

Attention to detail is important.

- Flashings should be constructed in accordance with the Building Code of Australia Volume 2 as appropriate.
- Building must be correctly detailed to account for weatherproofing requirements, foundation movement, shrinkage and the efficient removal of rain water.
- Gutters and rainwater downpipes must be regularly inspected and kept clean, free of corrosion, and connected to a functioning stormwater system.
- Flashing must be secured and joints sealed with flexible sealant (e.g. silicone or similar), which should be renewed over time as they deteriorate.

Installation of RendeX® Panel Systems

1. Studs

Check the stud spacings (450 or 600 mm) and ensure that all panels will be supported at the edges, as well as internally. Extra studs may be required where joints do not correspond to studs.

2. Starter Trim

Install damp-proof course (DPC) and/or render starter trim.

3. Foil

Fix the Enviroseal Wall Breather (vapour barrier) foil.

4. Cutting

Measure the required lengths and cut the RendeX® panel using a straight-edge and diamond-masonry blade in a circular saw.

5. Fixing

Erect each panel, ensuring it is square. Apply expanding foam to the joints, and fix to the stud through the fixing disks using appropriate size Class 3 Galv. screws.

Screws 75mm to 40mm Panel

Screws 100mm to 75mm Panel

Screws 125mm to 100mm Panel

6. Mesh

At all joints (apart from control joints), install a layer of 200mm fibreglass mesh and render patching compound, ensuring that it overlaps the sheet by 100mm.

7. Openings

At window and door openings:

- Provide a 3mm expansion gap between the RendeX® sheets and aluminium, timber or pvc window frames.
- Provide for a 1 in 6 slope at window sills.
- Install mesh reinforced corner trim
- Install butterfly meshing on corners
- Install RendeX® WeathersealTape for rain / moisture and wind protection around windows and door as per installation details page 15 and 16.

8. Control Joints

Provide horizontal movement joints every 3.0 m vertically

Provide vertical movement joints every 4.8 m horizontally, as well as at openings.

9. Vertical Control Joints

Install Expansion/Control Joints trim with extra mesh along each side of the trim.

10. Horizontal control joint and dissimilar substrates expansion joint:

Install backing rod, flexible sealant and cover moulding.

11. External Corners

Install mesh reinforced corner trim with extra 200mm mesh to the side where raw polystyrene is visible.

12. Finish

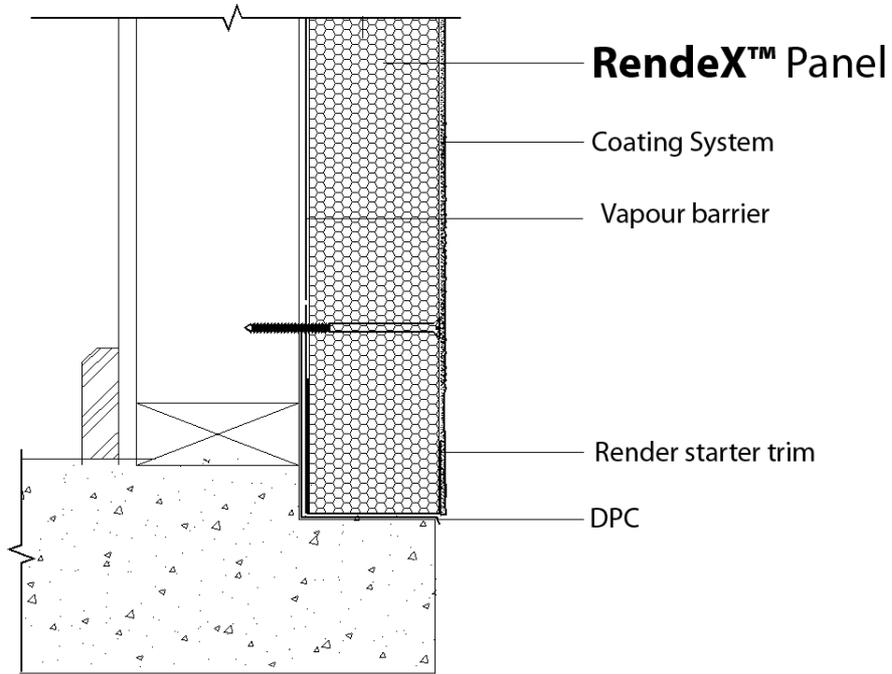
Apply the acrylic finish coats in accordance to manufacturer specifications.

13. Flashing

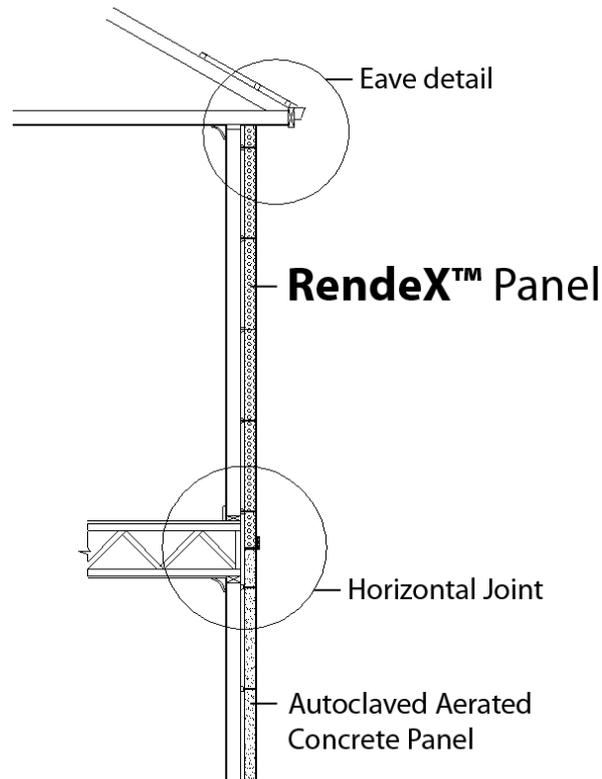
Fix all flashings as per the specifications.

Installation Details

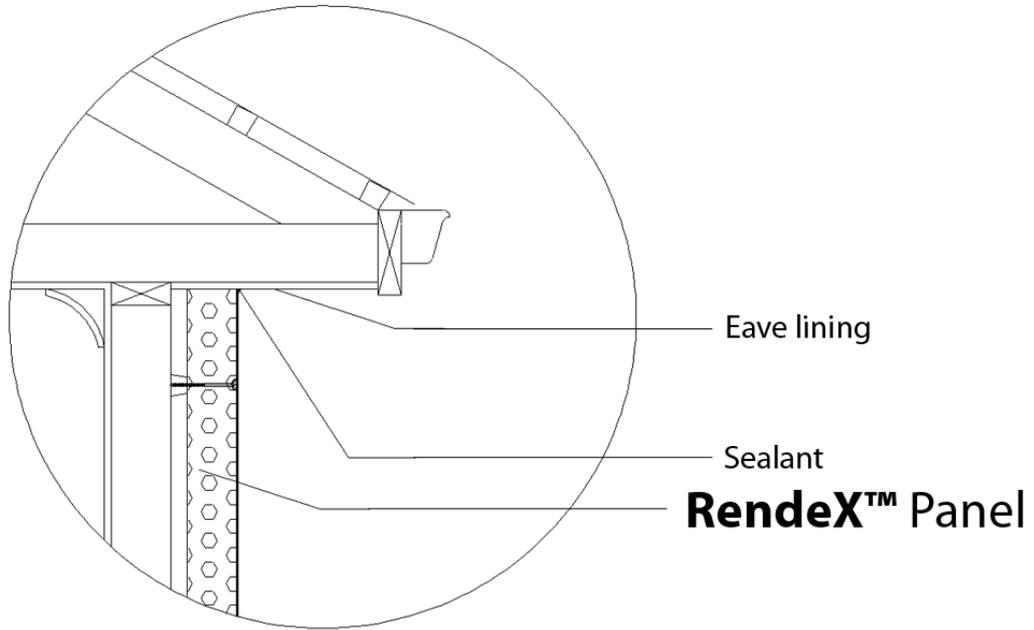
STARTER TRIM / DPC



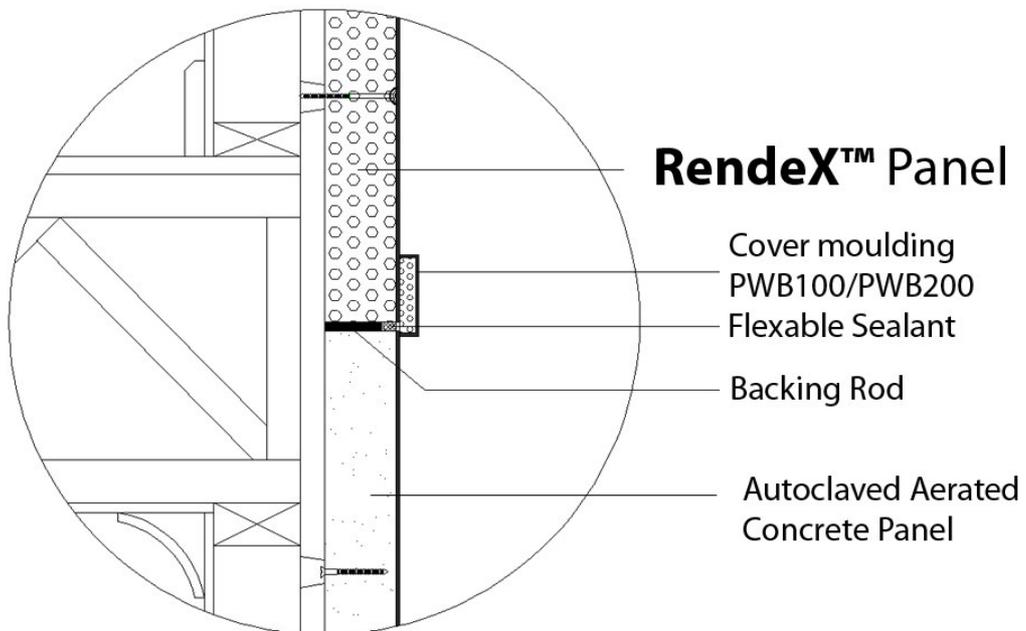
RendeX® AND CONCRETE PANEL



Eave Detail

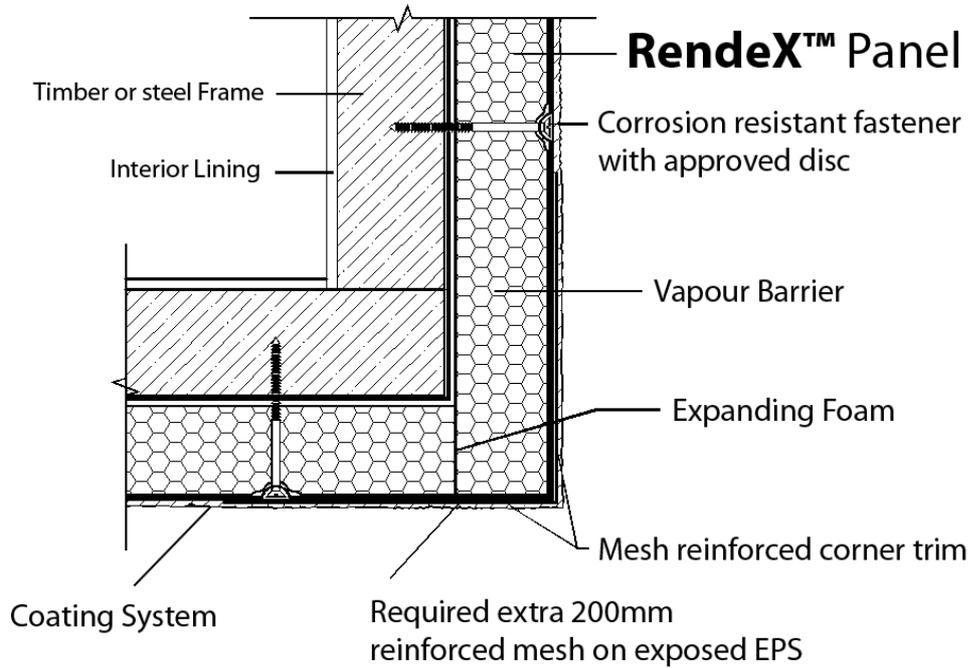


Horizontal Joint Detail

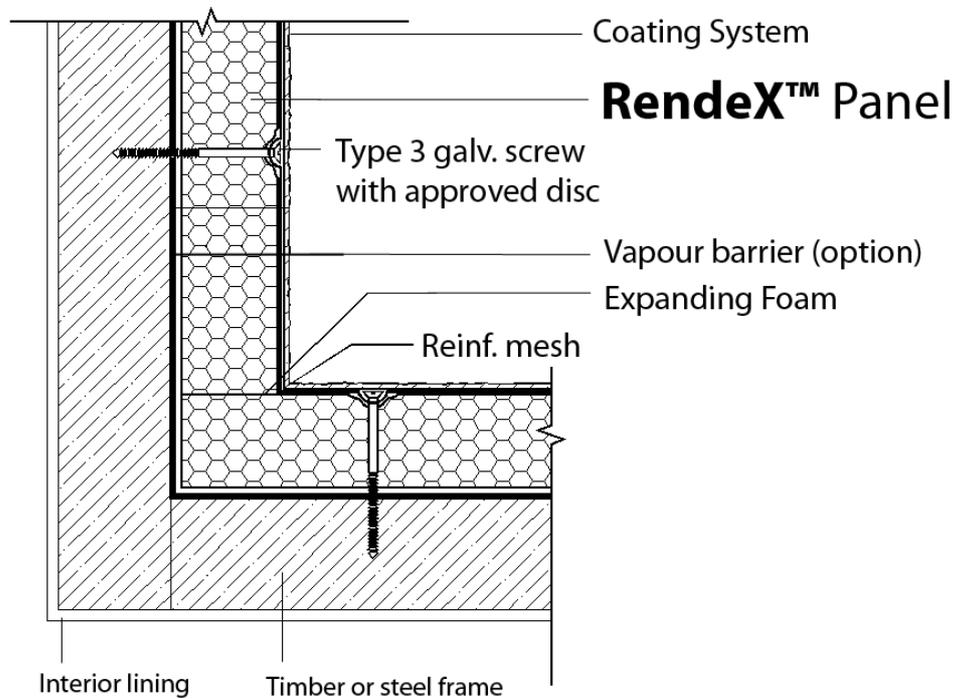


EXTERNAL AND INTERNAL CORNERS

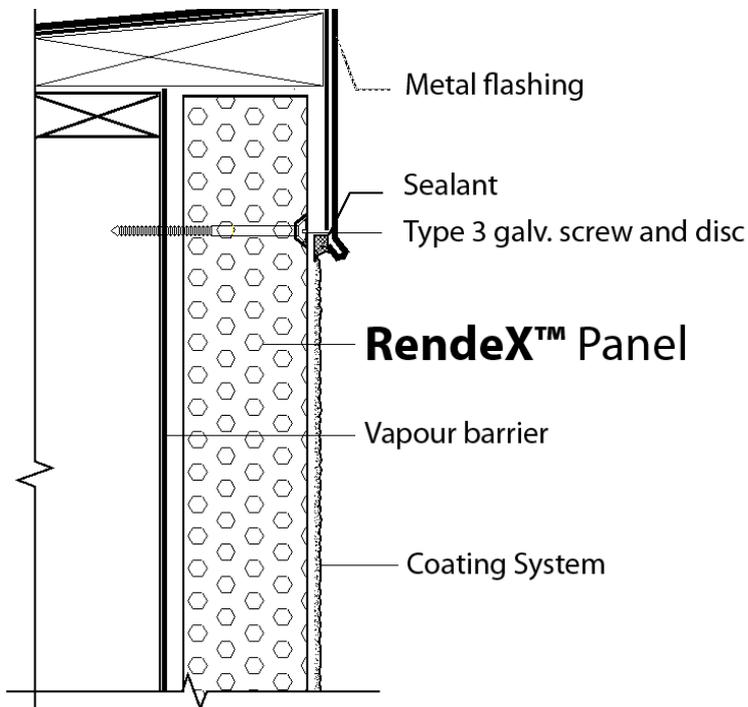
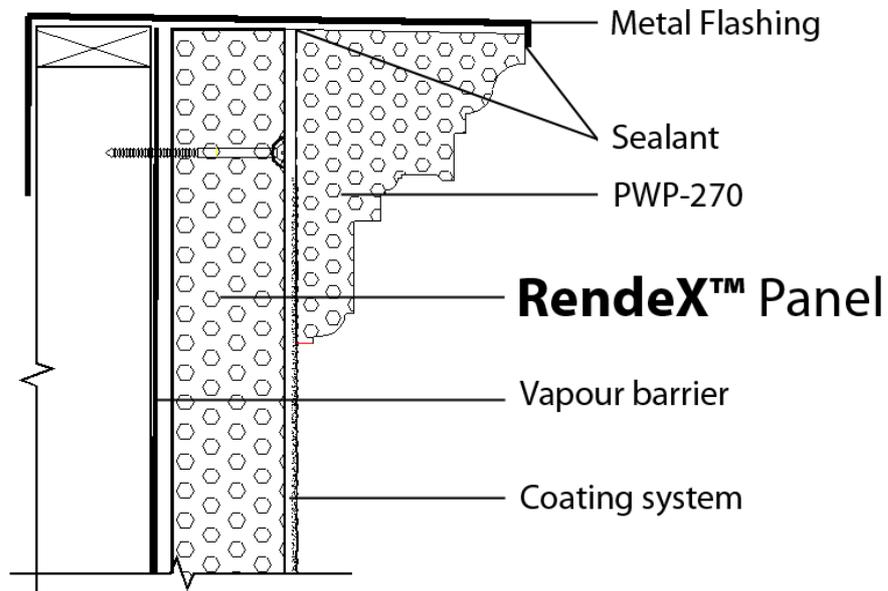
External Corner Detail



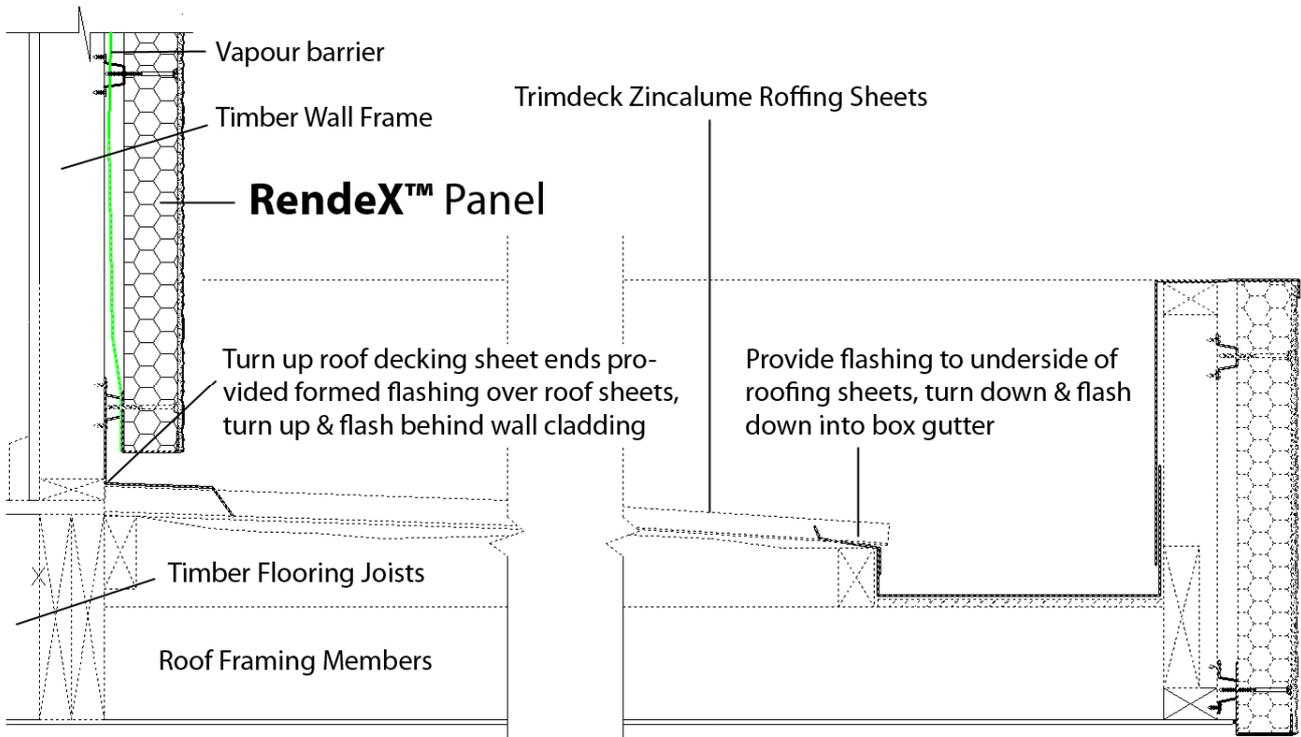
Internal Corner Detail



PARAPETS

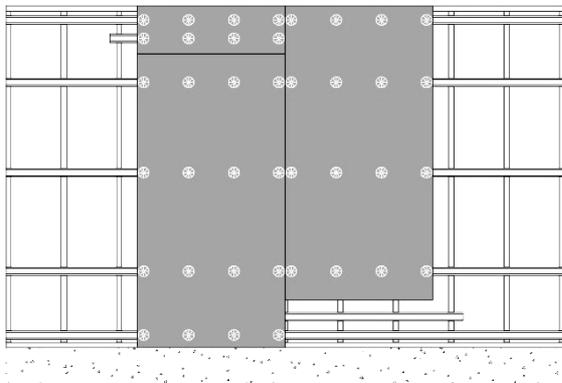


ROOF AND BOX GUTTER DETAIL

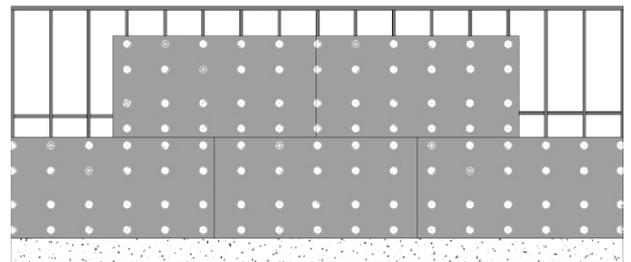


PANEL LAYOUT

Panel layout on timer or steel frame

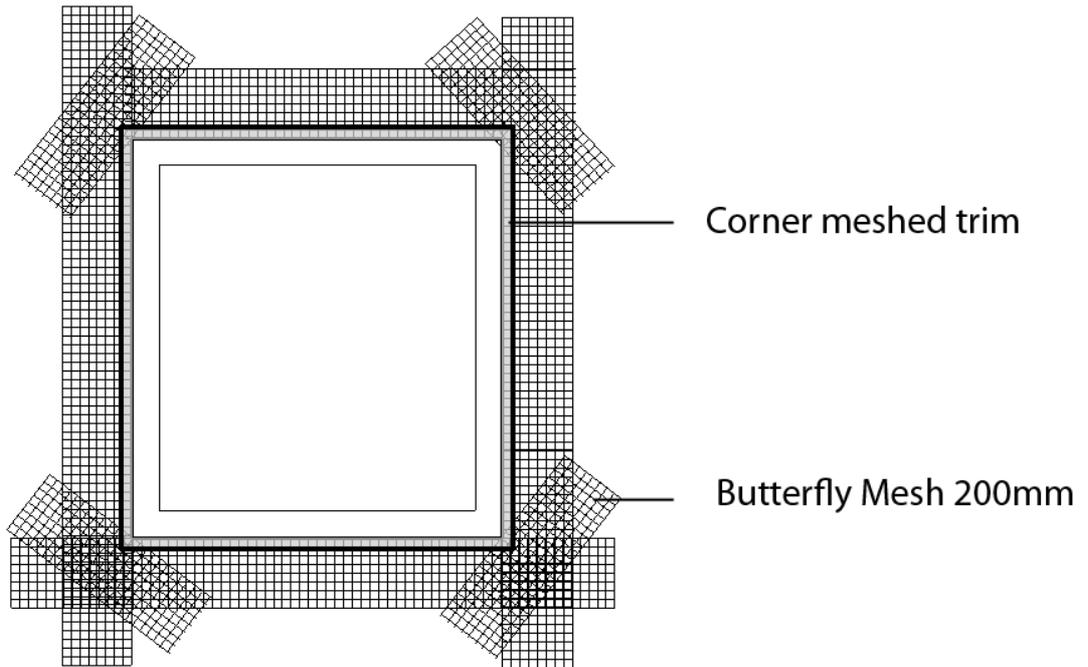


Panel layout on top hat section



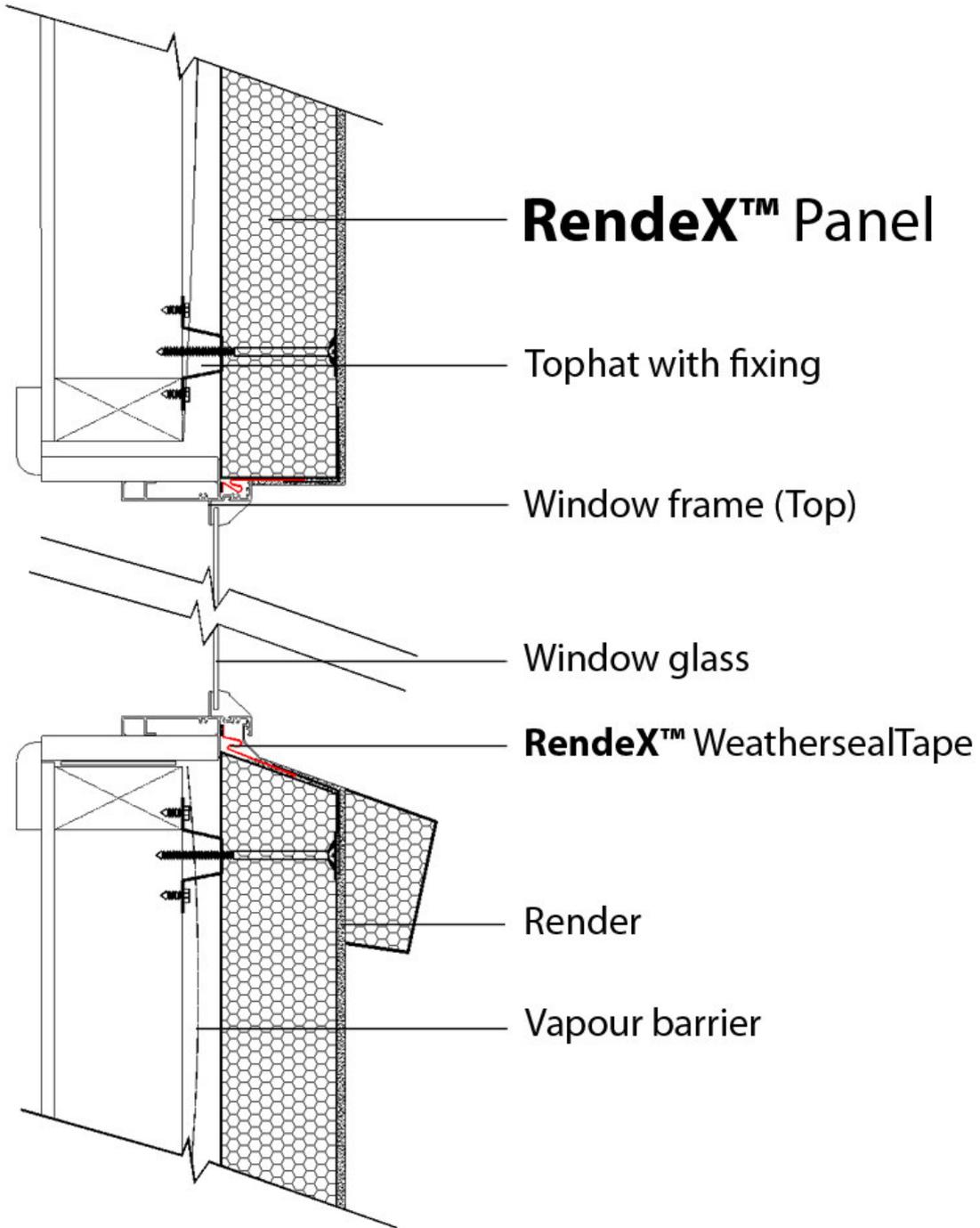
OPENINGS

Meshing Windows

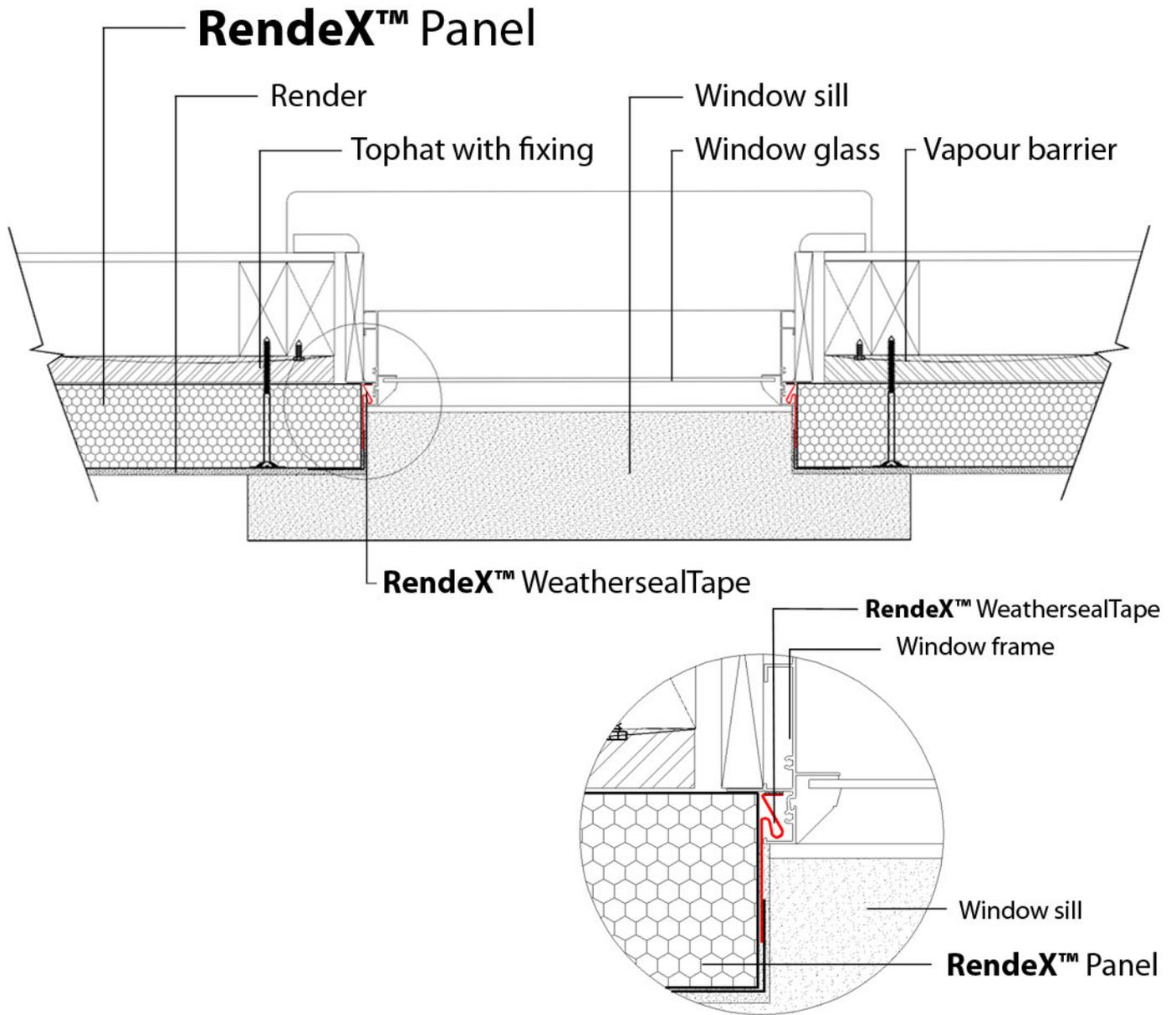


WEATHERSEAL

Window side elevation



Window top elevation



Specifications

Introduction

The building design and construction process involves three principle functions:

- Design, including product selection;
- Manufacture and supply of all components; and
- Construction, including the attendant supervision, inspections and certification.

Design

The design process must encompass the selection of the appropriate product for the particular design application. The Architect and Engineer for any building project share responsibility (and authority) to determine and communicate the design (within the constraints of Building Code of Australia) to the builders. They are required to consider all relevant matters affecting the building and its components, and determine their designs drawing on professional training, experience, peer practices, ethics, client requirements, published standards, research and the like. Building Code of Australia DTS (Deemed-to-Satisfy) provisions play an important part in this decision making (and in many cases will be adopted by the Engineer or Architect), although there are also many cases where the Engineer or Architect may specify details that are different from these. This information is communicated to builders by Drawings and Specifications.

Manufacture and supply

There are two principal requirements of manufacturers.

- Ensure that the Company has a properly functioning Management System, capable of delivering consistent product and service to predetermined specifications. Substantial compliance with the provision of AS/NZS ISO 9001 is considered to be an indicator of such a properly functioning system.
- Ensure that the nominated products satisfy the requirements of nominated Building Code of Australia clauses.

Construction

The construction process must faithfully ensure that the design expectations have been met, and that the product has been installed in accordance with the manufacturer's instructions. However, the Builder and the Contractors must assume responsibility for the quality of the construction work.

Designers often take it for granted that builders and tradesmen understand the detailed requirements for the construction of good quality buildings. This is not so - They need to be clearly guided by competent and informed designers.

Specification - External Wall Insulated Cladding System

Scope

This section covers the specification and detailing of the Rendex® External Cladding System.

Building Regulations and Standards

All materials and construction shall comply with the most recent version of:

- the relevant parts of the Building Regulations;
- the Standards referred to therein;
- other Standards nominated in this specification; and
- other relevant Regulations.

Relevant Standards

AS 1366.3	Rigid cellular plastics sheets for thermal insulation - Rigid cellular polystyrene - Moulded (RC/PS - M)
AS 2498	Methods of testing rigid cellular plastics
AS 1684.2	Residential Timber Framed Construction – Non – cyclonic areas
AS 1684.3	Residential Timber Framed Construction – Cyclonic areas
AS 1530	Methods for fire tests on building materials, components and structures
AS 3660	Protection of buildings from subterranean termites
AS 3959	Construction of buildings in bushfire prone areas

Commencement

Work shall commence as soon as practical after, but not before,

(a) the Builder has issued:
a written order

- a written order
- the relevant contract drawings, specifications and schedule of work
- written approval of any details provided by the Contractor

(b) the structural framework has reached a stage to permit the work to proceed.

Installation

All installations in wet areas shall comply with the Drawings, Building Regulations and relevant Standard. Installation shall be by qualified carpenters or other appropriate tradesmen.

Preparation

Before fixing cladding to the framing or substrate, check and, if necessary, rectify the alignment to ensure both levels and plumb.

Fixing to Frames

Cladding shall be screwed through washers to timber or steel framing.

Accessories

All necessary accessories and trim shall be installed.

External Wall Insulated Cladding System

External wall insulated cladding and associated render components shall comply with the Drawings, Building Regulations and relevant Standard (AS 1366.3) and shall consist of:

Extruded Polystyrene (EPS) Board

Extruded Polystyrene (EPS) board shall be M Grade, fire retarded, vermin retarded, termite resistant, in accordance with AS 1366.3, with the following properties:

- Thermal resistance at a mean temperature of 23° of a 50 mm sample in accordance with AS/NZS 4859.1 not less than 1.2 m².K/W.
- Compressive strength in accordance with AS 2498.3 Method 3 not less than 105 kPa.
- Cross breaking strength in accordance with AS 2498.4 Method 4 not less than 200 kPa.
- Water Vapour Transmission in accordance with AS 2498.5 Method 5 not more than 520 mg/m².
- Dimensional stability in accordance with AS 2498.6 Method 6 not more than 1%.
- Flame Propagation Surface Ignition of Vertically Oriented Specimens in accordance with AS 2122.1 Method 6
- Residue for 2 second Ignition Median Percent not less than 30%, Standard Deviation not less than 27%,
- Flame duration 5 second Median Percent not more than 2 seconds, Standard Deviation not more than 3 seconds.

PVC Beading

PVC Beading shall be polyvinyl chloride virgin material, mesh reinforced, UV stabilised, marine grade extruded to the specified shapes.

Screws

Screws shall be self-drilling steel, Teflon coated, counter-sunk ribbed head with coarse thread, Class 3 - Sizes STS55 & MS 65 (10-8 x 65 for 40 mm board), TS90 & MS100 (10-8 x 100 for 75 mm board), TS125 & MS125 (10-8 x 125 for 100 mm board). For applications closer to breaking surf than 1 km, Grade 304 or 316 stainless steel screws shall be used.

Washers

Washers shall be minimum 40 mm diameter, PVC.

Fibreglass Mesh

Factory-installed fibreglass 5 x 5 mm mesh, 130 g/m² mesh, shall be alkali resistant
Site-installed fibreglass 5 x 5 mm mesh, 160 g/m² mesh, shall be alkali resistant

Construction Adhesive

Construction adhesive shall be:

- Synthetic rubber-based thixotropic gunable heavy paste, of
- Viscosity approximately 110,000 cps at 25°C, Low odour,
- Colour beige (unless specified otherwise),
- Solids content 77% +/- 5%,
- Specific gravity 1.16 +/- 0.05 ,
- Flammability flashpoint approximately -20°C,
- Service temperature -30°C to +80°C, with
- High green strength,
- High initial grab,
- High flexibility,
- Temperature resistant,
- Slump resistant,
- Water resistant,
- Styrene safe,
- Working time 5 to 10 minutes depending on temperature,

- Open time 20 to 30 minutes depending on temperature, Maximum bond achieved within 12 to 72 hours depending on temperature and thickness.

Sealant

Sealant shall be an acrylic based texture coating suitable for external application over cement rendered surfaces.

Render

Render shall be pre-blended polymer modified cement render, suitable for mixing with mortar immediately before use to provide a smooth trowel able past.

Membrane Coating

Coating shall consist of an acrylic sand based membrane product.

Steel Brackets

Steel brackets shall consist of steel fabricated in accordance with AS 4100 and shall be galvanized in accordance with the following specification. All painting and galvanising shall comply with AS/NZS 2312. For surface preparation, refer to AS 1627.4 and AS 1627.5. When galvanising is specified, it shall consist of hot dip galvanising to AS 4680 to a minimum of 300 g/m².

Notes

1. The total thermal resistance, R, of thermal wall systems comprising insulation board, fixings and high-build multi-layered weatherproof coating shall be not less than the following.
 - The value specified in the Building Regulations for the particular application. Where total thermal resistance is specified, an allowance shall be made for internal air film of 0.12, external air film of 0.03, and appropriate values for render, plasterboard, reflective or non-reflective cavities and other wall components, if incorporated into the construction.
 - Any value specified for purposes of enhanced comfort or energy saving.
2. The stated thermal resistances are the minimum values required for compliance for AS 1366.3 Class M for the expanded polystyrene.

Thickness of Expanded Polystyrene, mm	Thermal Resistance R m ² K/W
40	0.96
75	1.80
100	2.40

3. These values may be used, in conjunction with the thermal properties of other components, to satisfy:
 - Performance requirement BCA Vol 1 JP1, using verification methods JV1 or JV3.
 - Performance requirement BCA Vol 2 P2.6.1 using verification methods V2.6.2.1 or V2.6.2.2.
 - Deemed-to-Satisfy provision BCA Vol 1 J1.5, using Tables J1.5a and J1.5b.
 - Deemed-to-Satisfy provision BCA Vol 2 3.12.1.4, using Table 3.12.1.3.

Cladding of Domestic Dwelling

The following specification is generally suitable for cladding domestic dwellings, subject to confirmation by the Designer and the Engineer. A suitable support framing system must also be provided.

RendeX® Panels shall be screw fixed to horizontal light-gauge steel battens, which are fixed to vertical steel studs. There shall be not less than four horizontal battens per panel, with this number increasing for higher wind loads and for panels within 1,200 mm of the building corners.

Panels within 1,200 mm of each end of each external wall of a building are subject to higher local wind pressures and suctions, and therefore require more battens and more screw fixing than other panels.

Unless specified otherwise by the designer, the following details and tables shall be used for the cladding of domestic dwellings with 100 mm thick RendeX® Panels.

Light Gauge Steel Battens

Light gauge steel battens shall comply with the Drawings, Building Regulations and relevant Standards (AS/NZS 4600, AS 3623). Cold-formed sections and accessories shall be manufactured from Z350 galvanised steel (Grade G550) complying with AS 1397, with a zinc coating not less than 350 g/m² and shall comply with AS4600. All battens shall be Lysaght Topspan 22 (22.5 x 63 x 0.55 BMT, Grade G550) or equivalent.

The surfaces of zinalume battens that are in contact with the AAC panel shall be painted with a suitable high build paint to guard against adverse chemical reaction.

All screws shall be No 14 x 125 mm Bugle-headed self drilling stainless steel screws, fixed from the outside of the building through the RendeX® Panels into the horizontal steel light gauge battens behind.

General Notes:

1. The standard system (detailed in this manual) is designed for wind loading N1, N2 and N3 in accordance with AS 4055.
2. The standard system (detailed in this manual) is not designed for wind loading N4, N5, N6 or cyclonic wind in accordance with AS 4055.
3. The cladding system applies direct compression to the supporting battens, as a uniform line load. The battens must be designed accordingly.
4. The fixings of the cladding systems are designed to transmit direct tension to the supporting battens under the action of wind suction, as a number of point loads. The battens must be designed accordingly.
5. The cladding system is not intended to resist racking loads. These must be resisted by structural plywood bracing systems complying with AS 1684, which provide both strength and a high degree of stiffness against in-plane racking loads.
6. Top and bottom battens shall be positioned within 150 mm of the ends of the panels.

Inspections and Tests

The following inspections shall be performed.

Item or Product	Inspection Required	Accept Criteria	Hold / Witness
Drawings & Specifications	Inspect controlled documents	Controlled copy of latest issue on site	Hold
Frame			
Position	Spot check	+,- 5 mm	Hold
Square	Spot check	+,- 5 mm	Hold
Samples	Visual	As per spec.	Hold
Finished cladding etc	Visual + Open and close all doors and windows	As per drawing and spec. Must operate correctly	Witness

Building Code auf Australia Compliance

Scope

This section describes the means whereby RendeX® panel satisfies the performance requirements of the Building Code of Australia.

Performance Requirements, Deemed-to-Satisfy & Alternative Solutions

All building design must comply with the relevant state regulations, which are incorporated into the Building Code of Australia Volume 1 and Volume 2. These define the performance requirements, generally in very broad terms, and the means of compliance through the following paths, each of which has equal status under the Building Code of Australia.

- Deemed-to-Satisfy Provisions, which may include:
 - Acceptable Construction Manuals (e.g. nominated Standards)
 - Acceptable Construction Practice (e.g. forms of construction reproduced in the Building Code of Australia itself)
- Alternative Solutions (e.g. Designs based on test results and engineering principles).

Definitions

These definitions are taken from the Building Code of Australia Volume 2. Some of the definitions of in Volume 1 have slightly different wording, but essentially mean the same.

Objective ... means a statement contained in the Building Code of Australia which is considered to reflect community expectations.

Functional Statement ... means a statement which describes how buildings and building elements achieve the Objectives.

Performance Requirement ... means a requirement which states a level of performance which a Building Solution must meet.

Deemed-to-Satisfy Provisions ... means the provisions contained in Section 3 which are deemed to comply with the Performance Requirements.

Alternative Solution ... means a Building Solution which complies with the Performance Requirements other than by reason of complying with the Deemed-to-Satisfy Provisions.

Compliance Statement

RendeX® panel External Wall insulation and render components, consisting of:

- Expanded polystyrene, 40, 75 or 100 mm thick complying with Class M of AS 1366.3 1992 with 130 g/m² alkali resistant fibreglass reinforcement and 5 mm cement render
- Fixed to stud framing by type 3 Galv. screws and PVC washers
- PVC weatherproof beading
- Acrylic based texture membrane coating.

Complies with Building Code of Australia (BCA):

1. BCA Volume 1 - J1.2(a), FP1.4
2. BCA Volume 2 - 3.12.1.1(a), P2.2.2
3. State Additions: Nil

Notes

1. The stated thermal resistances are the minimum values required for compliance AS 1366.3 for Class M for the expanded polystyrene.

Thickness of Expanded Polystyrene, mm	Thermal Resistance R m ² K/W
40	0.96
75	1.80
100	2.40

2. These values may be used, in conjunction with the thermal properties of other components, to satisfy:

- Performance requirement BCA Vol 1 JP1, using verification methods JV1 or JV3.
- Performance requirement BCA Vol 2 P2.6.1 using verification methods V2.6.2.1 or V2.6.2.2.
- Deemed-to-Satisfy provision BCA Vol 1 J1.5, using Tables J1.5a and J1.5b.
- Deemed-to-Satisfy provision BCA Vol 2 3.12.1.4, using Table 3.12.1.3.

3. To determine the total thermal resistance of the wall system, the following should be added to these values - 0.00 for the render, 0.04 for the external air film, 0.12 for the internal air film and appropriate values for plasterboard, reflective or non-reflective cavities and other wall components, should they be incorporated into the construction.

4. A RendeX® external cladding system, consisting of up to 100 mm Grade M EPS with 10mm plasterboard on a either 75 mm or 90mm studs will provide total thermal resistances tabulated below.

Material	External thickness mm	Thermal resistance, R m ² .K/W
75 mm studs + 40 mm EPS	125	1.35 (1.3)
75 mm studs + 75 mm EPS	160	2.19 (2.2)
75 mm studs + 100 mm EPS	175	2.79 (2.8)

Notes

1. This table provides the thermal resistance of RendeX® panel single leaf walls, without added insulation.
2. Thermal resistance of RendeX® is based on AS 1366.3 Class M Expanded Polystyrene EPS board.
3. Steel studs should incorporate a thermal break in accordance with BCA.
4. Allowances for air films and air spaces are included. There is no allowance for reflective foil.
5. 90 mm studs may be substituted for 75 mm studs.

Subject to the following conditions and limitations:

1. Product selection, and incorporation into the building design, shall be made by a person who:
 - Is conversant with the application and technical aspects of the product; and
 - Has ready access to the relevant technical information related to the product use.

2. Product installation shall be carried out by a competent carpenter or other tradesman under the direction of a Builder, both of whom:
 - Are conversant with the method of product installation; and
 - Have access to all relevant technical information on product installation.

Checklist of BCA Compliance Issues

The following checklist provides commentary on the performance of the Rendex® system against the BCA requirements.¹

Issues to be addressed

Compliance requirements are set out in BCA Volume 2 Part P2.1 and Part P2.2.2, together with structural capacity to resist wind loads, water penetration, dampness, moisture removal and ventilation. Indoor air quality, as per BCA Volume 2 Part 2.4.5 may also be affected due to moisture.

EPS Panel fixing

Question: *What is the environment in which the system is being used? – are the fixings suitable to resist the corrosive affect of a seaside or polluted environment?*

The standard system (as detailed in this manual) is suitable for use up to 1 km of breaking surf. For applications closer to breaking surf than 1 km, Grade 304 or 316 stainless steel screws shall be used.

Question: *What is the local wind loading or other racking forces? What twisting or movement of the building can be expected?*

- The standard system (detailed in this manual) is designed for wind loading N1, N2 or N3 in accordance with AS 4055.²
- The standard system (detailed in this manual) is not designed for wind loading N4, N5, N6 or cyclonic wind in accordance with AS 4055.
- The cladding system applies direct compression to the supporting battens, as a uniform line load. The battens must be designed accordingly.
- The fixings of the cladding systems are designed to transmit direct tension to the supporting battens under the action of wind suction, as a number of point loads. The battens must be designed accordingly.
- The cladding system is not intended to resist racking loads. These must be resisted by structural plywood bracing systems complying with AS 1684, which provide both strength and a high degree of stiffness against in-plane racking loads.

¹ Acknowledgement

This checklist has been developed from the following publication:
Nassau, P., 2009, *The Use of Non-Compliant External Wall Cladding Systems in Residential Buildings in Victoria*, Victorian Building Commission.

It is acknowledged that the questions above are those posed in the original documents. For background to the questions, reference should be made to the original documents.

² Test results on page 34

Question: Are the fixings suitable for use in hardwood, green timber, softwood or steel framing? What length of fixings is required and what is the adequate penetration into the fixing element?

The fixings are designed to be screwed into:

- Galvanised light-gauge steel battens 15 mm through the steel; or
- Galvanised light-gauge steel battens 15 mm through the steel;; or
- Softwood timber frames. 25 mm into timber.

The design of the fixing of the battens to the structural frames is the responsibility of the engineer and is outside the scope of this manual. These fixings must be properly design for the intended frame material, e.g. hardwood, green timber, softwood or steel framing.

Question: What number of fixings per panel is required to resist wind loading (especially due to negative pressures)? Should additional fastenings be provided on corners?

The specification requires 25-30 fixings per panel as follows:

- For horizontal panels - 5 fixings per stud
- For vertical panels -minimum of 5 top hat sections, 5 screws per top hat

Question: Is the washer system rigid, flexible or robust enough to prevent localised stress cracking? (Washers must be flexible but strong enough not to crack – too flexible will allow foam to cladding to pull).

Washers are flexible, minimum 40 mm diameter, PVC

Question: Should a batten system be used to provide physical separation and movement between the cladding and structural wall frame?

No – The standard system is intended for use only up to wind classification N3, where the racking forces are relatively small. The use of structural plywood bracing (rather than steel diagonal bracing) will provide both stiffness and strength to resist racking loads. There are also horizontal movement joints every 3.0 m vertically, and vertical movement joints every 4.8 m horizontally, as well as at openings.

Question: Battens may allow moisture to escape and cavity to ventilate but what flashing and weephole details are required at the base of walls?

The standard system does not call for weep holes or flashings, but the designer should determine whether there is a particular risk of moisture accumulation.

Question: Should the back of the panel be ribbed so that moisture may escape from behind cladding/frame/batten interface?

The panel is not ribbed. However, the system incorporates the use of perforated breather paper for this purpose.

Question: If a batten system is used how should it be lapped, and what type of batten is most suitable (timber, steel)?

Steel top hat sections are specified. These should not be lapped, but the end of each batten should be securely fixed to the supporting stud.

Question: What spacing is necessary? What relationship is there between batten spacings and thickness of cladding?

The battens should be spaced as follows:

- 100 mm – 600 mm max
- 75 mm – 600 mm max
- 40 mm – 450 mm max

Question: How panels should be joined? Over studs, with blocking?

Extra studs or extra top hat should be provided at joins in panels . (Back blocking will not work when there is breather paper). Edge distance should not exceed 150 mm for top hats (5 top hats on 2400 panel). Edge distance should not exceed 200 mm for studs

Question: Should mesh systems be used – what is the mesh size and openness of weave, is it compatible with other materials (alkaline resistant), will the grid system allow render to get through and fully bind with strands?

Mesh systems are used. The specification is:

Factory-installed fibreglass 5 x 5 mm mesh, 130 g/m² mesh, shall be alkali resistant

Site-installed fibreglass 5 x 5 mm mesh, 160 g/m² mesh, shall be alkali resistant

Question: What is the optimum placement of the mesh in the render – near the surface or against the cladding?

Embedded in render (1.0 to 1.5 mm render thickness) embedded in factory. On site coated with 3 coats of acrylic render.

Control joints

Question: How often and where should control joints be placed? What is the method of fixing and what type of backing material/system should be used? Should bond breaking tape be used?

There are horizontal movement joints every 3.0 m vertically, and vertical movement joints every 4.8 m horizontally, as well as at openings.

- For horizontal joints polystyrene backer rod + polyurethane joint material
- For vertical joints pvc extruded joint bead

Bond breaking tape is not used

Question: What precautions need to be made where panels are fixed across wall frames and onto other framing systems such as a trussed gable roof?

Horizontal control joint is specified All joints should have cover moulds
Cover moulds are fixed to the top panel (but not to the bottom – use flexible sealant)

Question: What precautions are taken in regard to shrinkage of frame particularly over a two or more storey building?

Horizontal control joint is specified (10 mm joint) All joints should have cover moulds

Question: What precautions need to be taken at base and frame interphase for horizontal control joints?

Horizontal control joint should line up around the corner. All joints should have cover moulds.

Question: What effect has the site (soil classification) on number and location of control joint? What are the effects of heave and distortion from ground movement?

Control joints are required at 4.8 m maximum centres and at openings; BUT the engineer can override this requirement for particularly reactive soils

Question: What effect do different bases have – masonry, mega anchors, concrete slab, pole, structural steel?

Not applicable, since the cladding system is always fixed to the frame.

Question: All houses deflect –how will the cladding system accommodate deflection?

See previous comment on fixings and control joints

Question: What is the coefficient of expansion of the materials used? Steel frame buildings will expand and contract more than a timber frame building. Should more control joints be used?

#

Waterproofing

Question: What system of sealing is used around windows and doors, other claddings, balconies, plumbing and electrical penetrations?

Expanding foam to bring up the dimensions and to leave a 3 to 5 mm gap sealed with polyurethane sealant. Flashings are provided on the bottom of the window sills.

Question: What is the compatibility and flexibility of sealants -are the material suitable for use with aluminium or timber framework, the cladding and the textured finish?

Bostic polyurethane

Question: Is there eaves and what eave widths should be used?

No eaves are required. The system is may be used to form a parapet wall (properly flashed or with moulding with fall). The top of the parapet should be sloped.

Question: What is the wind speed? – is the building envelope able resist high wind driving rain? (air flowing gaps, impact of rain splashes and bounces behind laps and over flashings).

N3 (non-cyclonic, subject to further test). Can resist wind-driven rain (no tests)

Question: How effective are corner mouldings? Are they UV resistant, how they are keyed into rendering?

Mouldings are UV Resistant PVC.

Question: Does the cladding system “breath”?

Rendered EPS doe not breath, but breather paper between the frame and the panel (intended to inhibit the condensation from touching the frame).

Question: Are “drips” provided on sills?

EPS coated with fibreglass mesh and polymer modified cement render sill mouldings are available, and may be provided with a drip (when specified by the designer).

Question: *What is the long term effect of sliding doors, air conditioning units and other vibrations on seals – what system of isolation is used?*

No data available

Ground Contact

Question: *Can the system be in contact with the ground, paving, etc? Will the cladding deteriorate, will moisture be drawn up the wall by capillary action, what sort of flashing system should be used?*

No contact with the ground is permitted. Therefore there will be no capillarity, provided the starter trims and coating are correctly fixed and applied.

Question: *What is the effect of splash back at ground level?*

No structural effect – The coating protects the system. However, the system must be protected from salt attack from rising damp.

Workmanship

Question: *What is the level of skill of the applicator?*

Experienced renders may do the complete job.
Alternatively, experienced carpenters fix the system, and renders apply coatings.

Question: *Is the tradesman aware of the technical specifications and their scope and limitations? What is their technical knowledge?*

Manuals will be made available, and training (via a Distance Learning Package) will be provided.

Question: *How long has the cladding been left prior to rendering? How much water entrapment has occurred, has the surface oxidised or reacted with the environment prior to application of the render? Has the cladding started to breakdown under UV exposure (will depend on time of year as to the amount of UV.)?*

The system must be rendered within two weeks. No significant break-down will not occur within this two-week limit.

Question: *What is the compatibility of render to cladding?*

Compatible - Acryloc guarantees 7 years.

Question: *Are there residual chemicals that need to be removed? (Cladding & beading may have residual films from the manufacturing process). Are sprayed on applications more effective?*

No

Question: *Renderers will always shrink – how does the applicator deal with this?*

Acrylic based render – total thickness 5 -8 mm over mesh

Question: *Alignment of sheets will affect the thickness of render – how careful is the fixer?*

Panel is cut to a tolerance of +/- 1 mm.
All joints have 160 gsm fibreglass mesh 200 mm wide – then render
Installer will pack the panel if necessary.

Question: *Is the render mixed on site or premixed (quality control)?*

Bagged Acrylic-modified render
Texture coating is premixed

Question: *Will over screwing of washers results in increase thickness of render and therefore uneven stresses?*

Screw until washer sinks in – it is only a local effect (40 mm dia)

Question: *Will over-screwing of washers on thin sheets reduce the strength and performance of sheet?*

No – there is already has mesh and render

Question: *What is the best number of coats? One thick coat is more prone to cracking – two of more coats may result in delamination.*

One factory coat, plus three site coats. Then the system is painted. (Extra at joining mesh)

Question: *Are corners of openings provided with adequate stress reinforcement?*

Yes – Butterfly mesh (see details)

Question: *What effect has temperature on the material being applied?*

Render should not be applied above 35°C.

Question: *What effect has the formation of dew, rain or frost on the cladding when render is being applied?*

Do not place render under these circumstances.

Question: *Is detailing around parapets, box gutters, windows etc adequate? How skilled is the roof plumber in fitting effective flashing systems – is the roof plumber aware of compatibility of sealant systems?*

Yes – There are standard details, but the Architect can modify them.

Sources of moisture

Question: *What is the effect of condensation and how will it escape the building?*

Breather paper – but subject to verification by future monitoring.

Question: *What is the residual moisture in the cladding material?*

The material is installed in a dry condition, and must be protected from rain on site.

Question: *Will there be a breakdown at control joints, penetrations, flashings?*

No

Question: *Is the cladding system suitable for exposed parapets?*

Yes – see details

Polystyrene panels

Question: *What is the grade of polystyrene being used, the chemical compounds used and the entrapment of air and oxygen? What quality controls are in place during the manufacturing process- are the materials made overseas?*

Class M – Purchased from Foamex

Question: *Are the adhesives compatible?*

Subject to further verification

Question: *What ability has the material to resist insect, vermin and mould attack?*

Subject to further verification

Question: *What are the fire properties?*

The EPS material includes a fire retardant (self extinguish), but does not provide fire resistance.

Paint system

Question: *Is the paint system flexible enough?*

Compatible with the system

Question: *Does the paint system need to “breathe”?*

Not required.

Question: *What is the texture of the finished product? Course textures will pick up contaminants in the air –pores will be filled and may result in a build up of acid particles.*

Architect to specify – smooth to coarse

Question: *Is the paint system robust enough to prevent UV breakdown of the cladding system?*

Yes

Warranty

Prestige Wall Systems Pty Ltd as the manufacturer of RendeX® Cladding System products, provides a seven year warranty as follows:

1. PWS provides the warranty from date of purchase for replacement of defective product only.
2. PWS will be in no circumstances liable for any loss or damage (including consequential loss), whether direct or in direct to persons or property.
3. PWS will not be responsible and/ or liable to any person in any way for incorrect fixing, installing, finishing and rendering by any person.

Warranty is null and void if product is not installed in accordance with guidelines given and set by this manual.

Tests

The following tests have been carried out to verify the properties of the RendeX® External Cladding System, and the relevant reports are available on request. This data has been used to prepare the Structural Design Tables on Page 5 of this Manual.

Laboratory	Report No and Date	Comments
Ian Bennie and Associates	2011-057-S2 August 2011	RendeX® 75 mm cladding <u>without render</u> , with fixings at 280 mm centres fixed to metal top hat battens on a 90 x 45 timber frame Ultimate test pressure 3.21 kPa One test specimen, Coefficient of variation = 15%, $k_t = 1.79$ (AS/NZS 1170.0 B1) Design ultimate pressure 1.80 kPa
Ian Bennie and Associates	2011-057-S2 August 2011 Test date 15/7/11	RendeX® 75 mm cladding and <u>acrylic render</u> , with fixings at 300 mm centres fixed to metal top hat battens on a 90 x 45 timber frame. Weatherproofing test to AS/NZS 4284. Air infiltration Test - "The sample passed test requirement" (Leakage under 0.1 l/m ² .s for pressures +75, -75, +150, -150, +300, -300 Pa. Water Test - "The sample passed test requirement as no water penetration was observed during the test". Structural Test at Ultimate Limit State – "The sample passed the test requirements as no sign of collapse was observed at test pressures of ± 3.3 kPa" Ultimate test pressure 3.3 kPa One test specimen, Coefficient of variation = 15%, $k_t = 1.79$ (AS/NZS 1170.0 B1) Design ultimate pressure 1.84 kPa
Ian Bennie and Associates	2011-057-S4 August 2011 Test date 19/7/11	RendeX® 75 mm cladding and <u>stone fabric render</u> , with fixings at 300 mm centres fixed to metal top hat battens on a 90 x 45 timber frame. Weatherproofing test to AS/NZS 4284. Air infiltration Test - "The sample passed test requirement" (Leakage under 0.1 l/m ² .s for pressures +75, -75, +150, -150, +300, -300 Pa. Water Test - "The sample passed test requirement as no water penetration was observed during the test". Structural Test at Ultimate Limit State – "The sample passed the test requirements to pressure of ± 2.3 kPa as no sign of collapse was observed. When the negative pressure was being increased some of the fixing washers began to pull though the panels at a pressure of -3.2 kPa." Ultimate test pressure 2.2 kPa One test specimen, Coefficient of variation = 15%, $k_t = 1.79$ (AS/NZS 1170.0 B1) Design ultimate pressure 1.22 kPa

NOTES

www.rendex.com.au



Tel 1300 663 118
Fax 1300 676 233
sales@rendex.com

SA 24 Humphries Tce, Kilkenny, South Australia 5009
VIC 11A Salvator Dr, Campbellfield, Victoria 3061