To:	Jane Dempster	SA Ceiling & Wall Systems	
Cc:			
From:	Jon Rudd	**Page** 1 of 1	
	Project memorandum	**Inspection Report**	
☐	**Fee memorandum**	**Meeting Record**	
Project:	Eco Energy Panels	Date:	12/12/2018
Subject:	Structural Certification – Eco Energy Panels		

DREW RUDD ENGINEERS

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Adelaide SA 5000

I Jonathon Dale Rudd BE(Hons) MBA MIEAust Member Civil College CPEng (Ret) hereby certify that the EcoEnergy® Panel manufactured by SA Ceiling and Wall Systems satisfies the parts of the National Construction Code (NCC) Building Code of Australia (BCA) nominated below:

System Description

EcoEnergy® panels are factory manufactured and transported to site where they installed onto the external wall framing of buildings. The system consists of:

- Expanded polystyrene (EPS), 50, 75 or 100 mm thick complying with Class M of AS 1366.3:1992, with factory installed 160 g/m2 alkali resistant fibreglass reinforcement and set in 5 mm cement render. Panel lengths vary, depending on the end-use application. Residential panels are commonly up to 5.0 m and fencing panels are commonly 2.4 m. Any panels that will be in close proximity to the ground are factory fitted with PVC moisture caps.

- Panels are site-fixed to stud framing, with or without battens, by Class 3 galvanised screws and 45 mm PVC washers.

- PVC weatherproof beading, flashings, drains, control joints and breather membranes are installed in accordance with the manufacturer's instructions. Pre-meshed aluminium angles are applied to all external corners, window and door reveals. 200mm wide adhesive-backed mesh is applied to all vertical and horizontal joints to reinforce the joints.

- The first stages of manufacture in the factory include bonding of fibreglass mesh using EESyShield™ (a fully acrylic impact coat). On site, all washers, angles and meshed joints are flushed over with a full coat of EESyTough™ and EESyWall™. While the initial coat is still damp, another skim coat of EESyWall™ and EESyTough™ is applied and floated to a flat finish over the entire wall. A tinted, acrylic texture coat is applied and finally two coats of a good quality exterior paint is applied to create the desired appearance, which also seals the texture coat completing the system.

Complies with National Construction Code (NCC) 2016 Building Code of Australia (BCA):

1. Volume One A03 and BCA Volume Two 1.2.2 Performance Solution in respect of structural performance, when designed and constructed in accordance with the following.

Required Minimum Number of Standard Fixings for EPS Cladding			
Factored pullout capacity		0.3	kN / fixing
Wind Class	EPS Thickness (mm)	Required number of standard fixings per m^2 of panel	
		Further than 1.2 m from corners	Within 1.2 m of the corners
N1	50, 75, 100	6	12
N2	50, 75, 100	6	12
N3	75, 100	6	12
N4	75, 100	7	14
C1	100	7	14
Pressures are determined in accordance with AS 4055:2012.			
Each Standard Fixing consists of a 45 mm diameter flexible PVC washer, fixed to the supports through the EPS panel by one Class 3 screw complying with the following specification.			
Screw shall be: • Self drilling, counter-sunk ribbed head with, coarse threaded, Class 3 ; • Grade 304 or 316 stainless steel or teflon-coated for applications within 1 km breaking surf; • Fixed through 45 mm diameter PVC washers. • At least 010 gauge (8 mm) for Wind Classifications N1, N2, N3, N4 and C1; • Of length at least 25 mm longer than the thickness of the EPS board plus the cavity width; • In accordance with the specified number of standard fixings per m2 of panel, as per the table; • At centres not exceeding 450 mm and not within 50 mm of a panel edge;			
Washers shall be 45 mm diameter flexible PVC, capable of being pulled flush with the surface of the EPS panel without rupture.			

Subject to the following conditions and limitations:

1. Product selection and incorporation 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.

Exclusions

This certification does not include considerations of fire resistance, fire hazard properties, weatherproofing or damp-proofing. These must be considered separately by the Building Certifier.

Test Reports

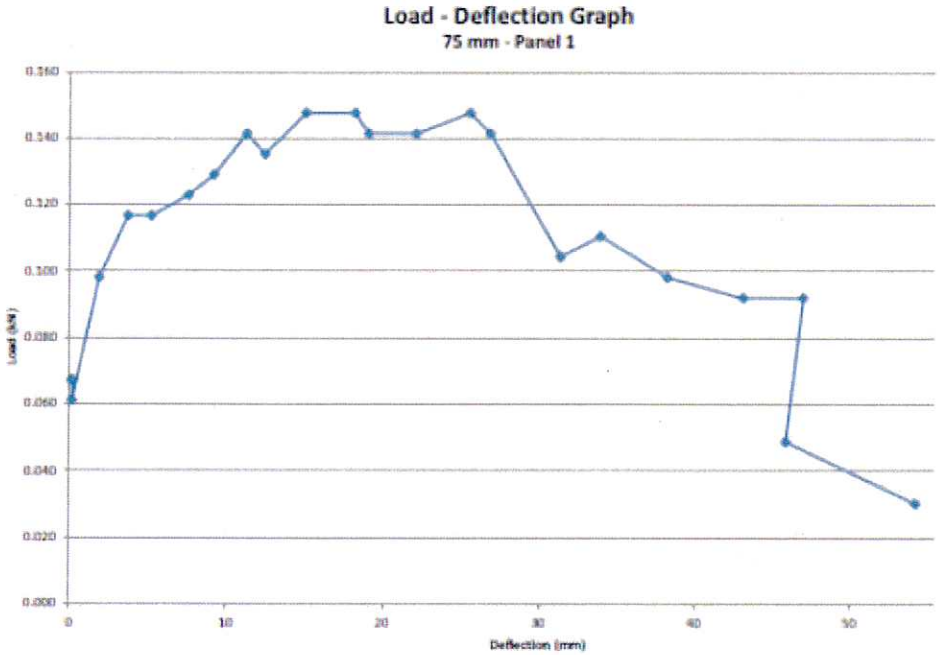
This certification draws on the information contained in the following test reports:

University of Newcastle - Discipline of Civil, Surveying and Environmental Engineering Project No. A / 564

A) Cross-Breaking Strength and Density of Panels
B) Flexural Strength Of Panels
C) Connections Tensile Strength

Justification of the Certification

The Load Vs Deflection plots of individual connections show that there is substantial plastic behaviour.
i.e. Even though some connections have relativly low capacity, they continue to exert that capacity while the EPS deforms. There was no evidence of any brittle failure. The following plot is typical of a "low strength" connection that undergoes extensive plastic deformation before finally rupturing. Refer to the University of Newcastle Test Report Project No. A / 564 C for other plots.



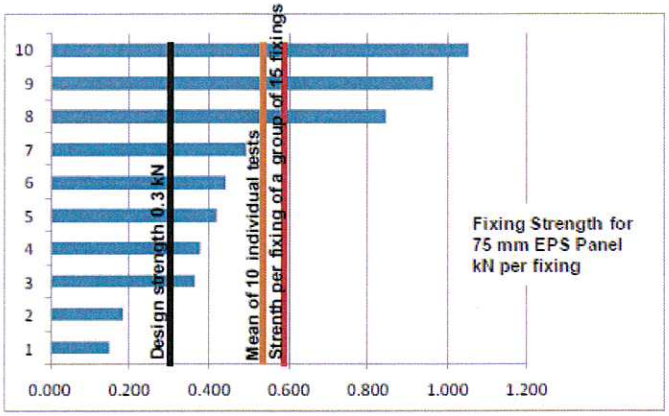
This demonstrated plastic behaviour leads to the conclusion that "mean" strength of a group of connectors is a better indicator of the ultimate strength of the group than the "95 percentile characteristic" strength of the group.

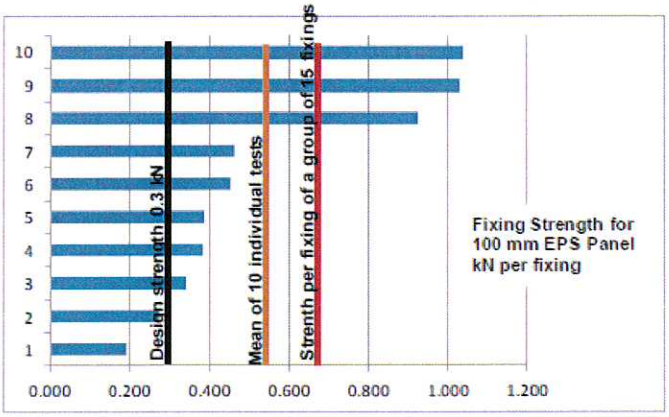
The two tests (75 mm EPS and 100 mm EPS) of "groups of 15 connectors acting together" indicated even better behaviour than the above conclusion . These two tests displayed behaviour where the strength per connectors, takes as one-fifteenth of the strength of a "group of 15" was 1.11 and 1.25 times (respectively) stronger than the "mean of individual connections acting separately". This phenomenon is probably due to the reduction of local failure in a group which is acting together.

Notwithstanding, a design strength of 0.3 kN / connector has been selected for design purposes. The following table and two charts demonstrate the conservative nature of this design value.

Comparison of Design Strength of EPS Connections to Test Results

Comparison of Design Strength of EPS Connections to Test Results			
Thickness of EPS	mm	75	100
Factored design tensile strength	kN / fixing	**0.30**	**0.30**
Mean strength of 10 individual fixings	kN / fixing	0.53	0.55
Factored design strength / mean of individual strengths	%	57%	55%
One-fifteenth of group strength of 15 fixings	kN / fixing	0.59	0.69
Factored design strength / one-fifteenth of group strength	%	51%	44%





Validity

This Professional Engineer's Certificate is valid for the shortest of the following periods:

- A period of five years from the date of publication; or
- Until superseded by more recent technical information or by other certification, such as CodeMark third-party certification; or
- Until the particular referenced parts of the NCC-BCA are superseded in the NCC-BCA or in State and territory Building Regulations.1; or
- Until the particular referenced Standards are superseded.

Sincerely yours
Drew Rudd Engineers

Jon Rudd
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