

**SUMMERMORE Pty Ltd** ABN 42 108 898 433  
**PO Box 1671,**  
**Browns Plains BC,**  
**Queensland, 4118**  
Tel: 07 3800 0973 Fax: 07 3800 1860

Sunday, 5 December 2010

Mr Scott Lehn  
NRG Building Systems  
Unit 4, 32—38 Dover Drive  
West Burleigh  
QLD, 4220.

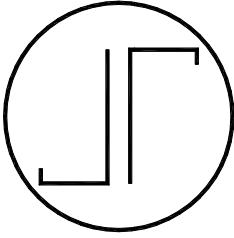
**RE: Report on NRG Greenboard™ Cladding Fixing Requirements**

We have pleasure in presenting the enclosed report and certification to you with respect to the testing of the NRG Greenboard™ Cladding Fixing Requirements.

Should you have any queries with regard to the contents of the report, please do not hesitate to contact us.

Yours Faithfully

Ron Bell  
Summermore Pty Ltd



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Unit 4, 32—38 Dover Drive  
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QLD, 4220.

**RE: NRG Greenboard™ Cladding Fixing Requirements**

The purpose of this letter is to certify the results of testing of the NRG Greenboard™ Cladding Fixing Requirements as supplied by NRG Building Systems.

**Observation:**

Ronald Bell of this office supervised and witnessed the testing of the NRG Greenboard™ Cladding Fixing Requirements at University of Southern Queensland.

**Certification**

We, **Summermore Pty Ltd**, being Registered Structural and Civil Engineers, hereby confirm that the NRG Greenboard™ Cladding shall be connected to timber wall framing in accordance with the following table. The table does not cater for local pressure effects.

NRG Greenboard™ Cladding Fixing Requirements

50mm NRG Greenboard™ Cladding			75mm NRG Greenboard™ Cladding		
Wind Classification	Stud Spacing (mm)	Fastener Spacing Vertically (mm)	Wind Classification	Stud Spacing (mm)	Fastener Spacing Vertically (mm)
N1	450	300	N1	450	300
N2	450	300	N2	450	300
N3	450	300	N3	450	300
N4	450	300	N4	450	300
N5	450	200	N5	450	275
C1	450	300	C1	450	300
C2	450	200	C2	450	250
C3	450	130	C3	450	175
C4	450	90	C4	450	115

This certificate is limited to the compliance with the requirements of the published codes of practice listed and should not be used for any other purpose. Summermore Pty Ltd accepts no responsibility for information that has not been expressly identified as part of this certification. This certificate can only be relied upon by the addressee and cannot be relied upon by any third party. Summermore Pty Ltd accepts no responsibility for any third party that seeks to rely upon this certificate.

If we can be of any further assistance in this matter, please do not hesitate to contact this office.

Certified by

Ronald Bell  
Grad Cert (Tech Mgt), BEng Civil (Hons), PEng, MIEAust (891940), RPEQ (6715), RBP(Vic)(EC27967), RBP(Tas)(CC5556C), RBP(NT)(60596ES), ABSA (BE40212), MAIB (9225), JP(Qual).  
Director  
Summermore Pty Ltd

NRG Greenboard™  
Cladding Fixing Requirements  
TESTING REPORT

COMPILED FOR

NRG BUILDING SYSTEMS

BY SUMMMERMORE PTY LTD

04<sup>TH</sup> DECEMBER 2010

## 1.0 Introduction:

The aim of this report is to investigate the behaviour of the NRG Greenboard™ Cladding Fixing and assess the fixing centres for timber framing.

### 1.1 Objectives:

The focus is primarily on determining the connection capacity for wall cladding. The findings are used to recommend fixing spacings.

### 1.2 Format:

Section Two presents a brief description of the test samples, the layout of the testing station and the test method. A brief synopsis of the test results is presented.

The detailed analysis of the test results is presented in Section Three.

## 2.0 Panel Test Method:

Ten samples were delivered to Summermore Pty Ltd. The samples were connected to the test rig at the testing station. They were identified as Sample Numbers 1—6.

### 2.1 Selection of Materials

Summermore Pty Ltd had no input into the selection of materials used to manufacture the sample. NRG Building Systems manufactured the samples with no preference to sampling materials.

The samples were then transported The University of Southern Queensland—Toowoomba Campus and the samples were intact on delivery.

### 2.2 Test Method

The test rig used is shown below.



### 2.2.1 Test Method

The samples were tested by placing them into the testing machine. The samples were loaded until failure and logged with an electronic data collection system.

All of the samples were noted to fail with fastener withdrawal through the panel being the mode of failure.



## 3.0 Detailed Analysis:

### 50mm Samples

#### 3.1 Assembly Description

The sample material is 50mm thick expanded polystyrene. The samples were all 300mm x 300mm.

##### 3.1.1 Summary of Test Results

The mean ultimate load reached for the samples was 345N as determined by the failure of the EPS. The standard deviation of the samples was 17N with a coefficient of variation of 5% giving  $k_t=1.15$  and a capacity of  $345/1.15=300N$ .

### 75mm Samples

#### 3.1 Assembly Description

The sample material is 75mm thick expanded polystyrene. The samples were all 300mm x 300mm.

##### 3.1.1 Summary of Test Results

The mean ultimate load reached for the samples was 467N as determined by the failure of the EPS. The standard deviation of the samples was 31N with a coefficient of variation of 6.7% giving  $k_t=1.21$  and a capacity of  $467/1.21=385N$ .

## 4.0 Discussion of Results:

The test results were treated statistically to provide fixing spacings for the NRG Greenboard™ Cladding.

The results of the analysis have been used to provide a table of fixing spacings for the NRG Greenboard™ Cladding for the various wind classifications.

## 4.1 Determination of Load Capacity

The fixing spacings were determined by using the mean value for ultimate failure factored by  $k_t$  to account for testing variation. The resulting load was used to determine the fixing spacings based on stud centres of 450mm .

The Table below is taken from AS4055—Wind Loads for Housing.

TABLE 2.1  
DESIGN GUST WIND SPEED ( $V_b$ ) FOR CLASSIFICATION

Wind class		Design gust wind speed ( $V_b$ ) at height ( $h$ ) m/s	
Regions A and B (non-cyclonic)	Regions C and D (cyclonic)	Serviceability limit state ( $V_{b,s}$ )	Ultimate limit state ( $V_{b,u}$ )
N1	—	26	34
N2	—	26	40
N3	C1	32	50
N4	C2	39	61
N5	C3	47	74
N6	C4	55	86

For example, in a C3 wind classification using 75mm NRG Greenboard™ Cladding,  $P=385N$ . Stud Spacing= 450mm,  $q_u = \rho_{air}/2 * V_{500}^2 * F_c^2 * C_{pn} = 0.6 * 74^2 * 1.05^2 * 1.35 = 4890N/m^2$ . Now,  $385/4890/0.45 = 0.175$ , so the maximum spacing is 175mm.

NRG Greenboard™ Cladding Fixing Requirements

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C2	450	200	C2	450	250
C3	450	130	C3	450	175
C4	450	90	C4	450	115

NRG Greenboard™ Cladding Fixing Spacings

## 5.0 Conclusion:

The samples tested were found to be adequate for use as a wall cladding with fixing spacings as detailed in the enclosed table.

# SCREW PULLOUT TEST REPORT

Test Method: Client Specified

Test Date:  
03/12/2010

Operator:  
Wayne Crowell

## Sample Information:

(A) Client Name:	<b>Summermore Pty Ltd</b>
(B) Address:	P.O. Box 1671
(C) Address:	Browns Plains BC
(D) Address:	Qld 4118
(E) Attention:	Ron Bell
(F) Phone:	07 38000973
(G) Fax:	07 38001860
(H) Client Job ID:	<b>Polystyrene Blocks - Screw Pull-Out Test</b>
(I) STS Job Number:	STS-10-258-P
(J) Specimen Orientation:	Flatwise
(K) Sample Description:	Foam Material (Approx. Density 20 kg/m <sup>3</sup> )
(L) Conditioning Temp. & RH:	23°C, 50% RH Constant for 24 Hours
(M) Test Room Temp. & RH:	20°C, 46% RH
(N) Test Speed (mm/min):	20
(O) Timber:	MGP12 – 70 x 30

## Test Equipment Details:

Test Machine:	MTS Insight
Location:	P9 110 Test Laboratory, Fibre Composites Research Centre, USQ
Accuracy Grading:	Grade A

Testing Officer:

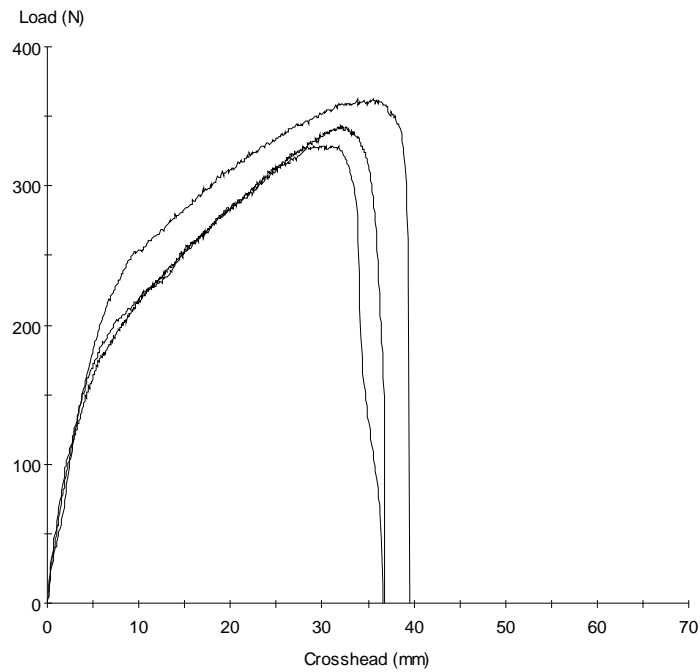
\_\_\_\_\_   
 W.Crowell

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**Specimen Results: 55mm Thick Samples**

<b>Specimen #</b>	<b>Peak Load N</b>	<b>Failure Mode</b>
1	363	Washer pull-thru foam
2	343	Washer pull-thru foam
3	329	Washer pull-thru foam
<b>Mean</b>	<b>345</b>	-
<b>Std Dev</b>	<b>17</b>	-

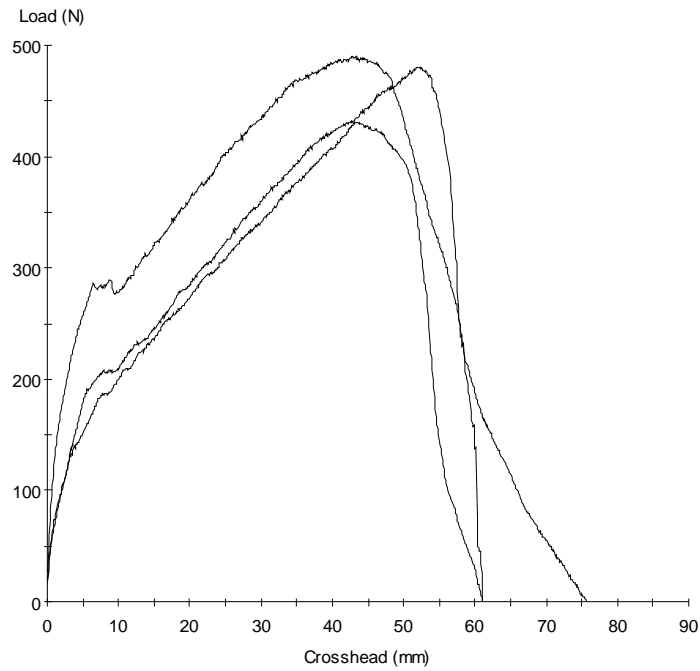


**Load vs Extension Plot**



**Specimen Results: 73mm Thick Samples**

Specimen #	Peak Load N	Failure Mode
1	480	Washer pull-thru foam
2	490	Washer pull-thru foam
3	432	Washer pull-thru foam
<b>Mean</b>	<b>467</b>	-
<b>Std Dev</b>	<b>31</b>	-

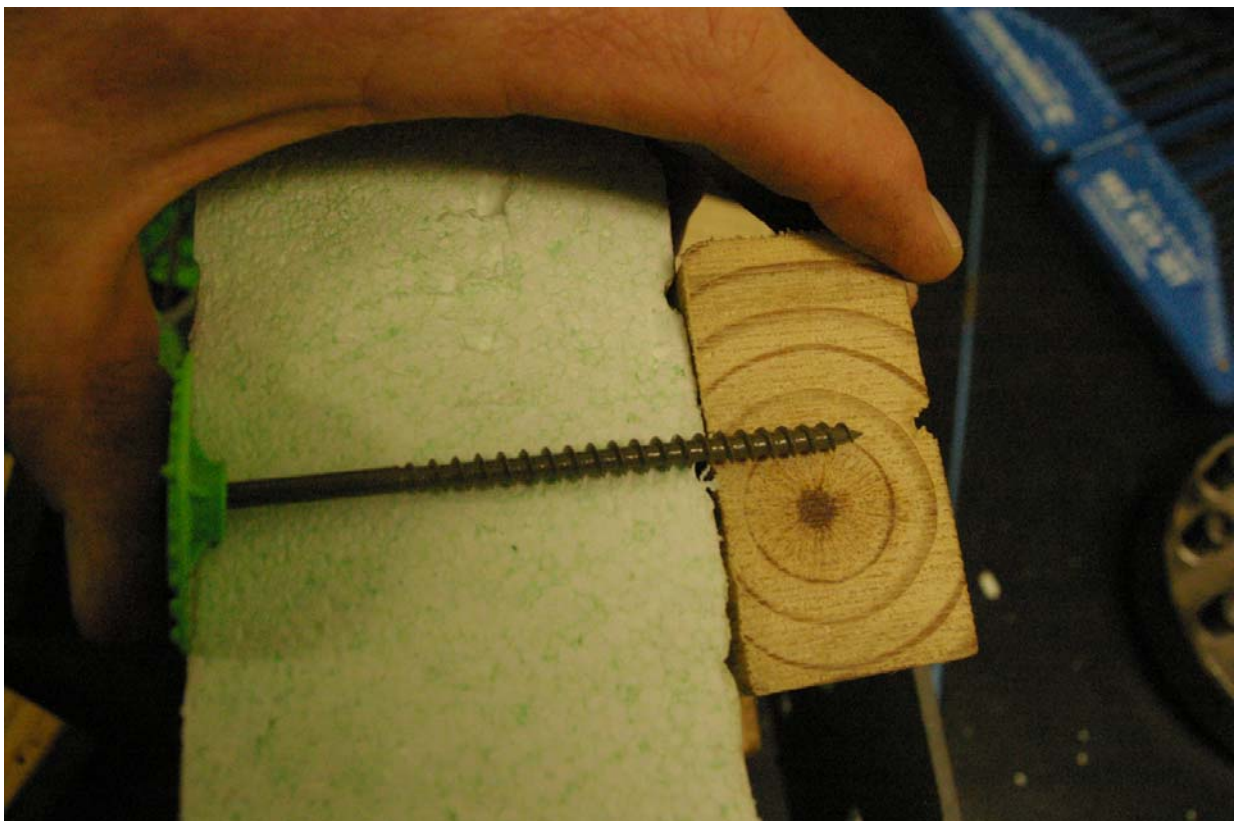


**Load vs Extension Plot**

**Photographs:**



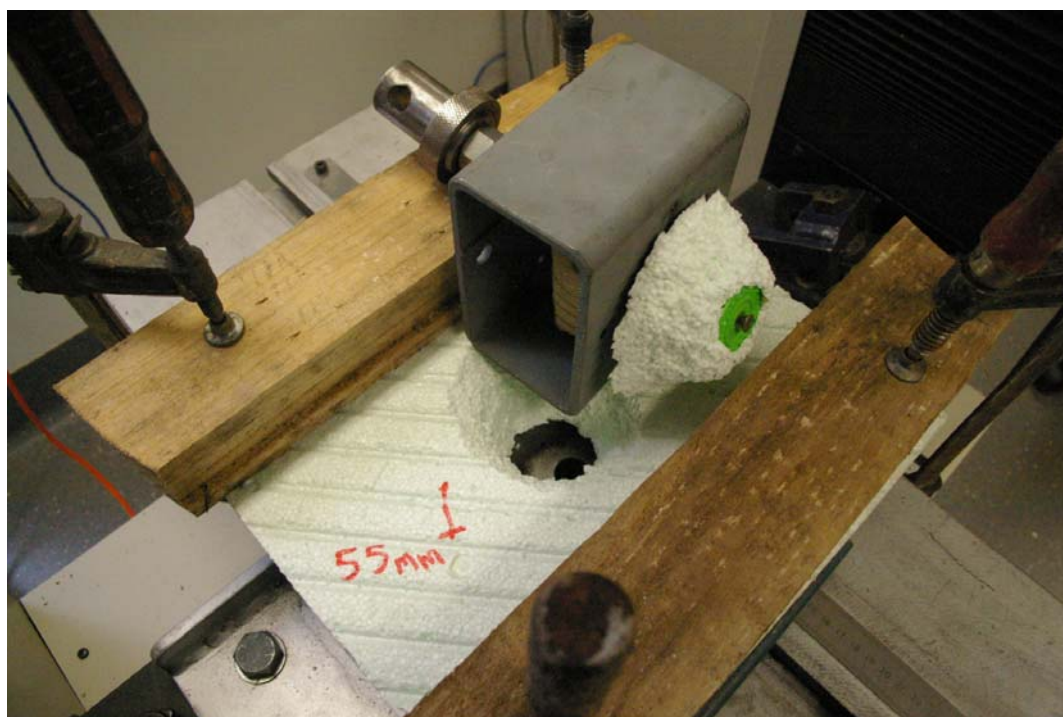
**Photograph 1 – Screw and Washer used for test**



**Photograph 2 – Showing screw length (73mm thick sample)**



**Photograph 3 – Typical test setup**



**Photograph 4 – Typical failure mode**