

NRG Green Board  
Bending Testing Report

COMPILED FOR

NRG PTY LTD

BY SUMMMERMORE PTY LTD

12 November 2012

## 1.0 Introduction:

The aim of this report is to investigate the behaviour of the NRG Green Board determine the ultimate design pressure for application of bending moments.

## 2.0 Sample Test Method:

The two samples were tested as detailed in the attached test report.

### 2.1 Selection of Materials

Summermore Pty Ltd had no input into the selection of materials used to manufacture the sample. NRG Pty Ltd manufactured the sample 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.

## 3.0 Detailed Analysis:

### 3.1 Bending Testing

The samples were loaded with an air bag. The deflection and load were measured by a data recorder. The raw data is included in the attached report for the laboratory.

#### 3.1.1 Test Load Analysis

The analysis of the test data was completed using plate formulae.

The following formulae were used

$$\delta = C_1 q X^4 E^{-1} t^{-3} \text{ for deflection to determine } E$$

$$M_x = C_2 q X^2 \text{ for bending}$$

$$M_y = C_3 q X^2 \text{ for bending}$$

$$V_x = C_4 q X \text{ for shear}$$

$$V_y = C_5 q X \text{ for shear}$$

Where  $C_1 - C_5$  are coefficients derived from plate theory.

Deflection	13.05	
C1	0.04436	
q	0.01138	MPa
x	900	mm
E	60.16023658	Mpa
t	75	mm
Moment	0.441440442	kNm
C2	0.04789	
q	11.38	kPa
x	0.9	m
Shear	4.28545764	kN
C4	0.41842	
q	11.38	kPa
x	0.9	m

Deflection	15.32	
C1	0.04436	
q	0.01534	kPa
x	900	mm
E	69.07874	Mpa
t	75	mm
Moment	0.595052	kNm
C2	0.04789	
q	15.34	kPa
x	0.9	m
Shear	5.776707	kN
C4	0.41842	
q	15.34	kPa
x	0.9	m

Using the results of this analysis, we further this by attributing coefficients of variation and standard deviation to derive an ultimate design bending pressure.

	Average	Minimum	STD Dev	Coeff Var	kt	Design Value
E (MPa)	64.62	60.16	6.30	0.0975	1.38	43.59
M (kNm)	0.518	0.441	0.108	0.2096	1.96	0.221
q (kPa)	13.36	11.38	2.80	0.2096	1.96	5.81
V (kN)	5.03	4.28	1.05	0.2096	1.96	2.18

These figures are based upon the sample size of 900 millimetres x 900 millimetres being a aspect ratio of 1.00. In practice the NRG Green Board would be used fixed to framing where the aspect ratio would be closer to 3.00 using 2700 high walls with studs at 450 centres and a central row of nogging.

This will provide an ultimate design pressure of 4.45kPa.

For cladding this will limit the wind classification where the product maybe used to N1—N6 and C1—C3 areas. The stud and noggin spacings would need to be assessed for C4 areas.

#### **4.0 Conclusion:**

The test results provide that the samples are capable of withstanding the required loadings for standard construction geometry for N1—N6 and C1—C3 wind classification areas.

## TEST REPORT

Test Method: Client Specified  
(Uniform Load Test)

### Sample Information:

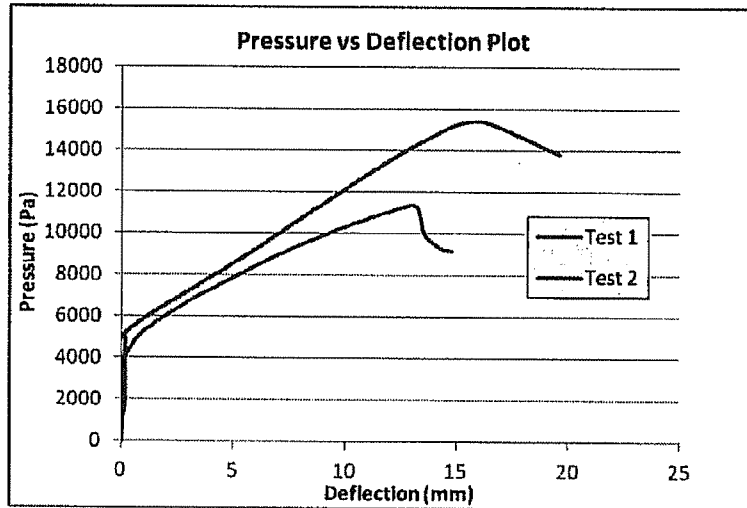
(A) Client Name:	Summermore Pty Ltd
(B) Mailing Address:	P.O. Box 1671
(C) Mailing Address:	Browns Plains BC
(D) Mailing Address:	Qld 4118
(E) Attn:	Ron Bell
(F) Phone:	07 38000973
(G) Fax:	07 38001860
(H) Client Job ID:	Uniform Load Test on NRG Green Board Panel
(I) Nominal Sample Dimensions:	900mm x 900mm x 75mm Thick
(J) STS Job Number:	STS-12-146
(K) Test Date:	19-09-2012
(L) Testing Technician:	W. Crowell

### Test Equipment Details:

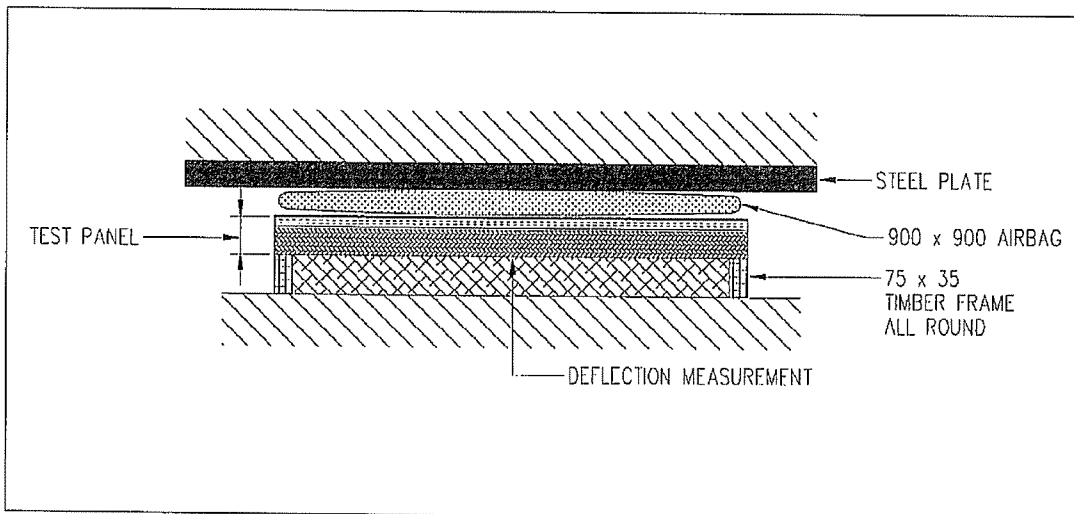
Test Location:	P11 Structures Laboratory, CEEFC, USQ
Load Application	Vetter Airbag
Pressure Measurement:	Gem 1 bar Pressure Transducer
Displacement Measurement:	UniMeasure Wire Drawn Potentiometer
Data Acquisition:	Vishay System 5000
Data Record Rate:	10 Hz

**Test Results:**

Specimen #	Max Pressure (kPa)	Deflection at Failure (mm)	Failure Mode
1	11.38	13.05	See photograph 2
2	15.34	15.32	See photograph 3



**Pressure vs Deflection Plot**



**Schematic of Test Setup**