

17 October 2022

Masons Plastabrick Limited
18 David McCathie Place
Silverdale 0932

ATTENTION: Arthur Whitfield

Masons 6mm Barricade Weather Defense System
Out-of-Plane Wind Pressure Compliance

Dear Arthur

Proconsult Limited has been engaged to assess and observe testing for out-of-plane wind capacities for Masons 6mm Barricade Weather Defense System. These tests were for various wind zones complying with NZS3604:2011 *Timber-Framed Buildings* with typical nail fixings as specified for the bracing element.

Table 1 – ULS and SLS wind speeds and pressures - BRANZ Engineering Basis of NZS 3604

Wind zone	Ultimate limit state (W_u)		Serviceability limit state (W_s)	
	Wind speed (V_{des})	Design wind pressure (p)	Wind speed (V_{des})	Design wind pressure (p)
Low	32 m/s	0.62 kPa	26 m/s	0.40 kPa
Medium	37 m/s	0.82 kPa	32 m/s	0.53 kPa
High	44 m/s	1.16 kPa	35 m/s	0.76 kPa
Very high	50 m/s	1.50 kPa	40 m/s	0.98 kPa
Extra high	55 m/s	1.82 kPa	44 m/s	1.16 kPa

The testing was undertaken on site at the Masons Plastabrick Limited (Masons) factory, 18A David McCathie Place, Auckland. A description of the apparatus, methodology and testing regime is described below:

Tests were undertaken for out-of-plane wind pressures for the 6mm Barricade Weather Defense system with typical nail fixings as specified for the bracing element. Water pressure was used to represent wind pressure for various wind zones as per NZS3604:2011 *Timber-Framed Buildings*. Generally, samples were set up with free-moveable plastic wrap all round, and water pressure was applied over the surface area of the underlay to the point of failure. A correction factor was applied to the loads based on the number of tests undertaken as referred to below.

It is noted that tests were undertaken on framing at 600 mm and 400 mm centres, which are the most common framings used for braced walls. One test was conducted for each frame. The testing frame set up is as shown in Figure 1 below:

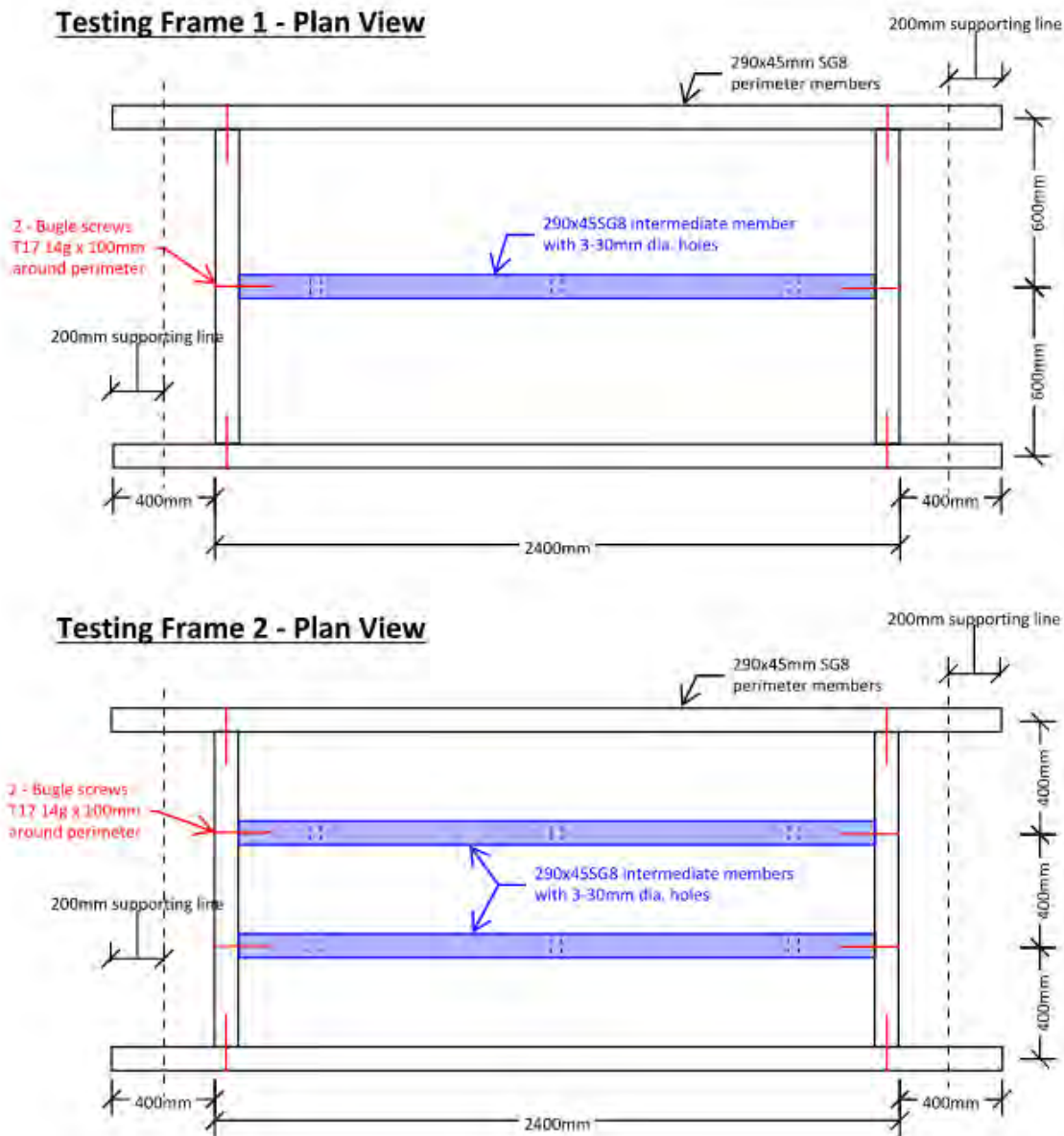


Figure 1 – Testing Frame 1 and 2 Set-ups

Interpretation of Prototype Testing Results

Reference is made to AS/NZS 1170: Part 0 Appendix B *Use of test data for design*. Table B1 (Values of k_t to allow for variability of structural units) specifies modification factors to be used for test results dependent on the number of tests conducted and the coefficient of variation of structural characteristics (V_{sc}). To this end, as one sample for each frame was tested, we have assumed a V_{sc} value of 5% (due to likely variability of material) and this yields a modification factor of 1.20 which has been applied to all tests.

Masons 6mm Barricade Weather Defense System Basis of Analysis

As most applications for the building wrap will be for buildings under 25m in height, reference is made to AS/NZS 1170.2 Tables 5.2 (A, B and C) whereby positive pressures apply to the windward walls for a $C_{p,e}$ factor of 0.7, which is greater than negative pressures to leeward/side walls for nail pull out loads. Therefore, using a positive wind pressure for tests is considered conservative. It is noted that internal wind pressures do not apply to a Rigid Wall Underlay.

The test result figures have also been assessed on the basis of a 6-month wind return period for Importance Level 2 structure, assessed in terms of NZS 1170.0:2002 Table 3.3, i.e. 1/100 for wind. Accordingly, the wind design pressures referred to in NZS 3604:2011 *Timber-Framed buildings*, which are based on 1/500 annual probability of exceedance, need to be modified by the ratio of 1/100:1/500 wind speeds (89%). In addition, a factor was applied to compensate for the loaded surface area of water which would be less than the positive wind pressure loaded due to the presence of the framing.

The overall modification factors are thus:

- 1) for 600mm centres testing frame, $C_{mod} = 1.20 \times 0.89 \times 600\text{mm}/(600\text{mm}-45\text{mm}) = 1.16$; and
- 2) for 400mm centres testing frame, $C_{mod} = 1.20 \times 0.89 \times 400\text{mm}/(400\text{mm}-45\text{mm}) = 1.20$.

Therefore, $q = W_{test} / (C_{shp} \times C_{Mod})$

Where:

W_{test} = Test pressure

$C_{shp} = 0.7$

$C_{Mod} = 1.16$ for 600mm centres framing; and

1.20 for 400mm centres framing

Therefore, the positive wind pressure test requirements for both frames are shown in Tables 2 and 3 below:

Table 2 – Testing Design Table for Frame 1 – 600mm centres

Testing Design Table (for Frame 1 - 600mm centres)		
Wind Zone	Design Wind Pressure [kPa]	Depth of Water for Testing (*0.81 factor) [mm]
Low	0.61	51
Medium	0.82	68
High	1.16	96
Very High	1.50	124
Extra High	1.82	151
*	2.1 (max. ULS)	174
Note: The testing frame should hold water for minimum 15 mins.		

Table 3 - Testing Design Table for Frame 2 – 400mm centres

Testing Design Table (for Frame 2 - 400mm centres)		
Wind Zone	Design Wind Pressure [kPa]	Depth of Water for Testing (*0.84 factor) [mm]
Low	0.61	53
Medium	0.82	71
High	1.16	100
Very High	1.50	129
Extra High	1.82	156
*	2.1 (max. ULS)	180
Note: The testing frame should hold water for minimum 15 mins.		

It is noted that the above assumes that the Barricade Weather Defense System will not be exposed on site for a period of more than 5 months.

Masons 6mm Barricade Weather Defense System Testing Results

The following test results were observed:

- 1) for 600mm centres testing frame, water was held for 19mins and 24mins for Max. ULS and Extra High wind pressure, respectively; and
- 2) for 400mm centres testing frame, water was held for 25mins and 31mins for Max. ULS and Extra High wind pressure, respectively.

Masons 6mm Barricade Weather Defense System Testing Summary

Based on the testing results above, we confirm that Masons 6mm Barricade Weather Defense System, with typical nail fixings as specified for the bracing element to both 600mm and 400mm centres framings, is capable of withstanding out-of-plane Extra High wind pressure referred to in NZS3604:2011 *Timber-Framed Buildings* with a maximum Ultimate Limit State pressure of 2.1 kPa.

We trust that this information is suitable for your current requirements. Should you have any queries regarding the above or any other matters, please do not hesitate to contact us.

Report

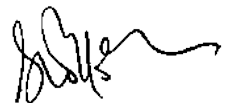
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Report

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Appendix A – Testing Photos



Photo 1: Fixing of 0.4 mm plastic very loosely to frame to allow movement under the water



Photo 2: Water holding at minimum specified time (15 minutes) prior to failure