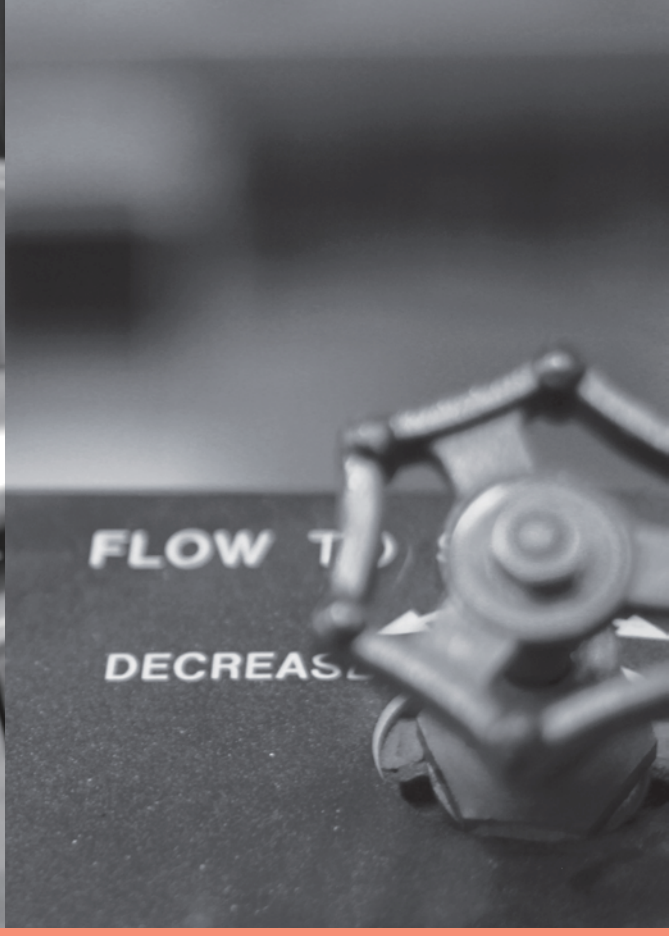

SIMULATED WIND DRIVEN DEBRIS IMPACT TEST

CLIENT: Shanghai Superhouse Building Material Co Ltd

REPORT NO: AZT0153.14

DATE: 26th June 2014

AZUMA Design

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NATA Accredited Laboratory No: 15147

SIMULATED WIND DRIVEN DEBRIS IMPACT TEST NO. AZT0153.14

CLIENT: Shanghai Superhouse Building Material Co Ltd

ADDRESS: 10 Hang Fan Road, Pudong New Area, Shanghai, China

TEST DATE: 9th November 2012

1 Test

This Test is a simulation of wind driven debris impact loading on external building products supplied by the Customer to the Azuma Design Pty Ltd Laboratory to AS/NZS1170.2 2002 Part 2, Section 2.5.7 and 5.3.2 and Queensland Government Department of Public Works Design Guidelines for Australian Public Cyclone Shelters Section 3.2(b).

2 Debris Loads Design Guidelines

The structural design guidelines for debris loads state that the external fabric of building to be a least capable of resisting wind debris defined as:

* One spherical steel ball of 2 grams mass and 8 mm diameter impacting at 0.4 x $V_{10,000}$ for horizontal trajectories and 0.3 x $V_{10,000}$ for vertical trajectories.

* a 100 mm x 50 mm piece of timber of 4 kg mass impacting end –on at 0.4 x $V_{10,000}$ horizontal trajectories and 0.1 x $V_{10,000}$ for vertical trajectories.

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3 Test Criteria and Procedures

- For Cyclonic Regions C or D debris test loads for the external fabric of building as follows:

  Test Load A: End-on impact of timber 4 kg in mass, with cross –section dimensions of 100 mm x 50 mm, impacting at the speed specified for the trajectory.

  Test Load B: Series of One steel ball of 2 grams mass and 8mm diameter, successively impacting at the speed specified for the trajectory.

- Test Sequence

  A test specimen shall be subject to successive test loads applied in the following order:

  1. Debris Test Load A
  2. Debris Test Load B

- Acceptance Criteria

  A test specimen shall:

  a. prevent a debris missile from penetrating through

  b. If perforated, have a maximum perforation width or less than 8 mm.

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4 Test Apparatus Procedure

The Test specimens were tested in the Azuma Design's air cannon testing facility. The air cannon consists of a cylinder which is pressurised by an air compressor. Once the required air pressure is reached a solenoid valve is triggered to instantaneously release the air, the projectile is fired and accelerates to the required velocity.

The test specimens were mounted on a target support frame located 3 meters from the exit opening of the barrel. A digital chronograph is installed at the exit of the barrel to measure the velocity of the projectile prior to impact on the test specimen.

5 Description of Specimens/Products Tested;

MODEL NAME: AWNING WINDOW

MODEL NO. Y.Y.88

FRAME DIMENSIONS: 900mmW x 1500mmH

INFILL MATERIAL: Clear Float

INFILL MATERIAL THICKNESS: 6mm/12/14mm IGU

APERTURE:

RETAINING SYSTEM: Glazing Bead

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6 Results

Projectile Description:

Load A 100mm x 50mm x 4kg Timber
Load B Spherical Steel Ball 2 grams mass x 8 mm diameter

A summary of the test results

Impact No.	Date Tested	Impact Location	Impact Velocity (m/s)	Results and Observations
1. Load A	9/11/12	Intersection 450mm from LH Stile and 750mm below the top rail	15m/s	Failed to Penetrate
2. Load B	9/11/12	5 Random impacts	15m/s	Failed to Penetrate

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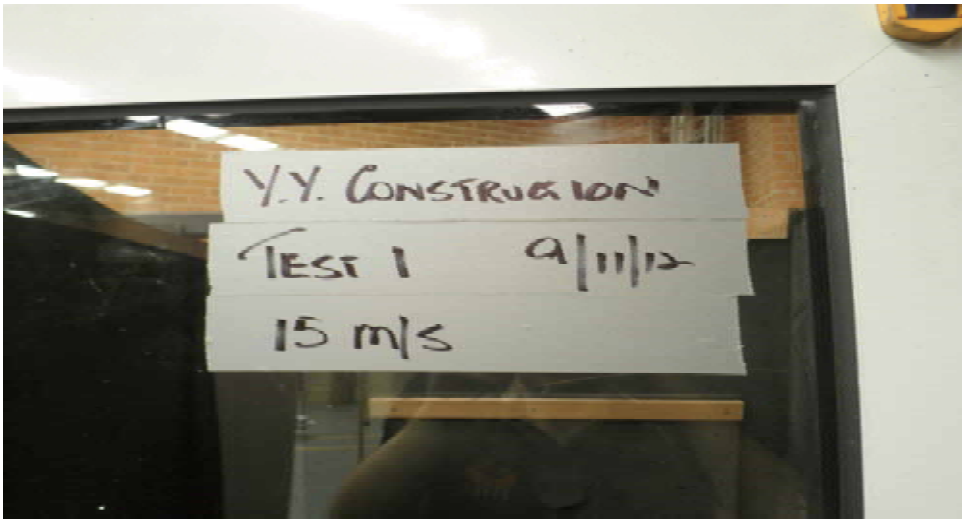
Conclusions:

Test Load A consisting of a 100mm x 50mm timber projectile with a mass of 4 kg impacted on the test sample at a velocity of 15m/s.

The location of the impact was the intersection of two points 450mm from the LH Stile and 750mm below the top rail. At 15m/s the impact was sufficient to shatter both the internal and external glazing but failed to penetrate or create a dominant opening.

Test Load B consisting of a spherical steel ball 2 grams mass and 8 mm diameter impacted on the test sample at 15m/s. Five impacts were made on the sample, they being centre, centre left, centre right, bottom right and bottom left. All 5 impacts failed to penetrate.



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NATA WORLD RECOGNISED ACCREDITATION

SIMULATED WIND DRIVEN DEBRIS IMPACT TEST NO. AZT0153.14

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