

IAN BENNIE & ASSOCIATES PTY. LTD.

Building Performance Testing

ACN : 007 133 253

HAIL IMPACT TEST

CERTIFICATE NUMBER 2012-084-S5

Test Client: Velux Australia Pty Ltd.
78 Henderson Road, Alexandria, NSW

Sample Details:

Model: VS S06 2004A
Glazing: 3 mm toughened outer light
9 mm gap
Laminate comprising 2x2.3 mm sheets with a 0.76 mm interlayer inner light

Test Method: Testing was conducted in accordance with ASTM E822-2009 Standard Practice for Determining Resistance of Solar Collector Covers to Hail by impact With Propelled Ice Balls. The sample was impacted at normal incidence at all four corners (150 mm in from each edge) with nominal impact velocities calculated as the resultant of the terminal velocity of the ball with a 20 m/s side wind. Calculations were according to the equations specified in ASTM E822.

RESULTS

Diameter (cm)	Nom velocity (m/s)	Actuals (m/s)	Observations
5.0	37	38, 37, 38 & 38	No breakage
7.2	43	46, 42, 43 & 44	No breakage

Result: The sample remained intact when subjected to four impacts from both the 5 cm and 7.2 cm diameter ice balls.

Test Date(s): 18 February 2013.

Test Location: IBA Test Centre, Melbourne.

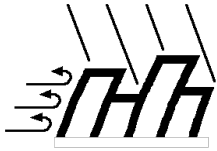
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Building Performance Testing

ACN : 007 133 253

HAIL IMPACT TEST

CERTIFICATE NUMBER 2012-084-S4

Test Client: Velux Australia Pty Ltd.
78 Henderson Road, Alexandria, NSW

Sample Details:

Model: FS S06 2004A
Glazing: 3 mm toughened outer light
9 mm gap
Laminate comprising 2x2.3 mm sheets with a 0.76 mm interlayer inner light

Test Method: Testing was conducted in accordance with ASTM E822-2009 Standard Practice for Determining Resistance of Solar Collector Covers to Hail by impact With Propelled Ice Balls. The sample was impacted at normal incidence at all four corners (150 mm in from each edge) with nominal impact velocities calculated as the resultant of the terminal velocity of the ball with a 20 m/s side wind. Calculations were according to the equations specified in ASTM E822.

RESULTS

Diameter (cm)	Nom velocity (m/s)	Actuals (m/s)	Observations
5.0	37	38, 38, 38 & 39	No breakage
7.2	43	42, 44, 44* & 43	No breakage

- Estimate as timer failed to trigger

Result: The sample remained intact when subjected to four impacts from both the 5 cm and 7.2 cm diameter ice balls.

Test Date(s): 18 February 2013.

Test Location: IBA Test Centre, Melbourne.

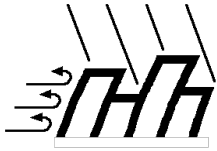
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Building Performance Testing

ACN : 007 133 253

HAIL IMPACT TEST

CERTIFICATE NUMBER 2012-084-S1

Test Client: Velux Australia Pty Ltd.
78 Henderson Road, Alexandria, NSW

Sample Details:

Model: FCM4646 2004AB
Glazing: 3.9 mm toughened outer light
8.5 mm gap
Laminate comprising 2x2.3 mm sheets with a 0.76 mm interlayer

Test Method: Testing was conducted in accordance with ASTM E822-2009 Standard Practice for Determining Resistance of Solar Collector Covers to Hail by impact With Propelled Ice Balls. The sample was impacted at normal incidence at all four corners (150 mm in from each edge) with nominal impact velocities calculated as the resultant of the terminal velocity of the ball with a 20 m/s side wind. Calculations were according to the equations specified in ASTM E822.

RESULTS

Diameter (cm)	Nom velocity (m/s)	Actuals (m/s)	Observations
2.5	30	36, 31, 31 & 31	No Breakage
3.5	33	33, 34, 35 & 35	No Breakage
5.0	37	43, 38, 44 & 41	No Breakage
7.2	43	44, 48, 42 & 43	No Breakage

Result: The sample remained intact when subjected to impacts from the 7.2 cm and smaller diameter ice balls.

Test Date(s): 3 December 2012 to February 2013.

Test Location: IBA Test Centre, Melbourne.

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