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Fire performance of a Breezway window assembly incorporating steel mesh screens when tested in accordance with AS 1530.8.1-2007 for BAL 29 exposure

Assessment Report

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		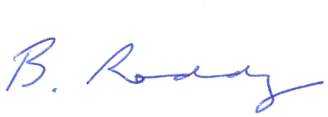
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Important disclaimer

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1 Introduction

This report provides an assessment of the Fire performance of a Breezway window assembly incorporating steel mesh screens when tested in accordance with AS 1530.8.1-2007 for BAL 29 exposure.

This report reviews and confirms the extent to which the reference fire resistance tests listed in section 2 meet the requirements of the standard fire test standards listed in section 4 of the report. The proposed variations to the tested construction presented in section 3 are subject to an analysis in Appendix B and the conclusions are presented in Section 5 of this report.

The field of applicability of the results of this assessment report is presented in Section 6.

2 Supporting Data

This assessment report refers to various test reports to support the analysis and conclusions of this report. They are listed below;

Report Reference	Test Standard	Outline of Test Specimen
FSZ 1572	AS 1530.8.1-2007	Six glass window installations, mounted into a 2400-mm wide x 2400-mm high opening in a double brick wall
2519600.1	AS 1530.4:2005	Test determination of radiant heat attenuation of a Screenguard security screen.
2553300b.1	AS 1530.4:2005	Test determination of radiant heat attenuation of a Stainless View security screen.
EP1210317	AS 1530.8.1	Invisi-Gard Stainless steel security screen
FSZ 1552	The test method was specified by the sponsor. The specimen was exposed to peak radiant heat flux level of 60 kw/m2 fir a minimum 60 minutes.	ForceField metal window screen protecting a 1000-mm x 1000-mm opening in a brick wall
2284200a	AS 1530.4:2005	Fire-resistance test on a 1000-mm x 1000-mm Capral Security Screen to determine the Screen Attenuation Factor for Radiant Heat

CSIRO report numbered FSZ 1572, was sponsored by Breezway Australia Pty Ltd.

Exova Warringtonfire report numbered 2519600.1, was sponsored by Screenguard Pty Ltd. Screenguard Pty Ltd have given permission for the test data to be used to support this assessment.

Exova Warringtonfire report numbered 2553300b.1 was sponsored by SecureView Australia Pty Ltd. SecureView Australia Pty Ltd have given permission for the test data to be used to support this assessment.

CSIRO report numbered EP1210317, was sponsored by Aluminium Specialties Group Pty Ltd (Alspec). Aluminium Specialties Group Pty Ltd (Alspec) have given permission for the test data to be used to support this assessment.

CSIRO report numbered FSZ 1552, was sponsored by Gerswhin t/a Prowler Proof. Prowler Proof have given permission for the test data to be used to support this assessment.

Bodycote Warringtonfire report numbered 2284200a, was sponsored by Capral Ltd. Capral Ltd have given permission for the test data to be used to support this assessment.

3 Proposed Variations

The proposed construction shall be as tested and reported on in FSZ 1572 and subject to the variations below:

- substitute the tested Tensile-Tuff Crimsafe 304 grade stainless steel security mesh in FSZ1572 with an alternative security screen listed below;
  - Screenguard stainless steel security screen reported in EWFA Report Numbered 2519600.1;
  - Stainless View stainless steel security screen reported in EWFA Report Numbered 2553300b.1;
  - Invisi-Gard stainless steel security screen reported in CSIRO Report Numbered EP1210317;
  - ForceField window screen reported in CSIRO Report Numbered FSZ 1552;
  - Capral stainless steel security screen reported in BWA Report Numbered 2284200a; or
  - Any screen constructed in accordance to Clause 7.5.1A of Australian Standard AS 3959-2009.
- Variation to the height of the glazing blades on the Altair and Louvre windows FSZ 1572 when they decrease from 152-mm to 102-mm and overlap remain as tested.

4 Referenced Standards

Standards:

AS 1530.8.1-2007	Methods for fire tests on building materials, components and structures - Tests on elements of construction for buildings exposed to simulated bushfire attack - Radiant heat and small flaming sources

5 Conclusion

On the basis of the analysis presented in this report, it is the opinion of this Accredited Testing Laboratory that the tested prototypes described in Section 2 when varied as described in Section 3 will achieve the BAL performance stated below when submitted to a test in accordance with the test method referenced in Section 4 and subject to the requirements of Section 7.

BAL 29 (Crib Class A)

6 Direct Field of Application of Results

The results of this report are applicable to windows exposed to the effects of bushfire form the side tested in the referenced tests.

7 Requirements

Any variations with respect to size, constructional details, loads, stresses, edge or end conditions that are other than those identified in this report, may invalidate the conclusions drawn in this report.

8 Term of validity

This assessment report will lapse on 31st October 2023. Should you wish us to re-examine this report with a view to the possible extension of its term of validity, would you please apply to us three to four months before the date of expiry. This Division reserves the right at any time to amend or withdraw this assessment in the light of new knowledge.

9 Limitations

The conclusions of this assessment report may be used to directly assess the fire resistance performance under such conditions, but it should be recognised that a single test method will not provide a full assessment of the fire hazard under all fire conditions.

Because of the nature of fire resistance testing, and the consequent difficulty in quantifying the uncertainty of measurement, it is not possible to provide a stated degree of accuracy. The inherent variability in test procedures, materials and methods of construction, and installation may lead to variations in performance between elements of similar construction.

This assessment report does not provide an endorsement by CSIRO of the actual products supplied to industry. The referenced assessment can therefore only relate to the actual prototype test specimens, testing conditions and methodology described in the supporting data, and does not imply any performance abilities of constructions of subsequent manufacture.

This assessment is based on information and experience available at the time of preparation. The published procedures for the conduct of tests and the assessment of test results are the subject of constant review and improvement and it is recommended that this report is reviewed on or, before, the stated expiry date.

The information contained in this assessment report shall not be used for the assessment of variations other than those stated in the conclusions above. The assessment is valid provided no modifications are made to the systems detailed in this report. All details of construction should be consistent with the requirements stated in the relevant test reports and all referenced documents.

Appendix A Supporting Test Data

CSIRO Sponsored Investigation report numbered FSZ 1572

On 10 January 2013, this Division conducted a bushfire test on behalf of Breezway Australia on six glass window installations, mounted into a 2400-mm wide x 2400-mm high opening in a double brick wall.

The glass window assembly was mounted into an Easyscreen aluminium frame. The glass window assembly was retro-fitted into the opening in a double brick wall using masonry anchors spaced at nominally 600-mm centres.

A fire retardant altair louvre aluminium framed window including mk2 clips

The specimen comprised an 1194-mm high x 799-mm wide Altair Louvre window, mounted into an aluminium Easyscreen Frame and Easyscreen Mullions.

The adjustable louvre system comprised eight sections of 720-mm long x 152-mm wide x 6-mm thick toughened glass fitted within MK2 clips. The MK2 clips, stated to be made of Retpol PDR 9044 UVA copolymer polypropylene compound, were held to the aluminium frame by MK4 bearings, retainers, pins and stabilisers stated to be made of Acetal. A nominal 3.2-mm clearance between the glass edges and the clips was maintained along the vertical sides The Low Profile Handle was stated to be made of stainless steel. Along the bottom of the glass window, a Marcott SCE17-27 FR weatherseal was installed.

On the exposed face of the window, an 1194-mm high x 800-mm wide x 0.9-mm thick Tensile-Tuff Crimsafe 304 grade stainless steel security mesh was fixed to the aluminium frame by 22-mm self drilling pan head screws at 300-mm centres.

A fire retardant altair louvre aluminium framed window including mk2 clips

The specimen comprised an 1194-mm high x 798-mm wide Altair Louvre window, mounted into an aluminium Easyscreen frame and mullions.

The adjustable louvre system comprised eight sections of 720-mm long x 152-mm wide x 6-mm thick toughened glass fitted within Stronghold clips. The Stronghold clips, stated to be made of Retpol PDR 9044 UVA copolymer polypropylene compound, were held to the aluminium frame by Stronghold bearings, retainers, pins and stabilisers stated to be made of Acetal. A nominal 3.2-mm clearance between the glass edges and the clips was maintained along the vertical sides. The Low Profile Handle was stated to be made of stainless steel. Along the bottom of the glass window, a Marcott SCE17-27 FR weatherseal was installed.

On the exposed face of the window, an 1194-mm high x 800-mm wide x 0.9-mm thick Tensile-Tuff Crimsafe 304 grade stainless steel security mesh was fixed to the aluminium frame by 22-mm self drilling pan head screws at 300-mm centres.

A standard altair louvre aluminium framed window including mk2 clips

The specimen comprised an 1194-mm high x 799-mm wide Altair Louvre window, mounted into an aluminium Easyscreen frame and mullions.

The adjustable louvre system comprised eight sections of 720-mm long x 152-mm wide x 6-mm thick toughened glass fitted within MK2 clips. The MK2 clips, stated to be made of POLYCOMP CA03 UVH copolymer polypropylene compound, were held to the aluminium frame by MK4 bearings, retainers, pins and stabilisers stated to be made of Acetal. A nominal 3.2-mm clearance between the glass edges and the clips was maintained along the vertical sides. The Standard Handle was stated to be made of stainless steel. Along the bottom of the glass window, a Santoprene PVC weatherseal was installed.

On the exposed face of the window, an 1194-mm high x 800-mm wide x 0.9-mm thick Tensile-Tuff Crimsafe 304 grade stainless steel security mesh was fixed to the aluminium frame by 22-mm Self Drilling Pan Head screws at 300-mm centres.

Fire retardant stronghold louvre aluminium framed window including stronghold clips

The specimen comprised an 1194-mm high x 798-mm wide Altair Louvre window, mounted into an aluminium Easyscreen frame and mullions.

The adjustable louvre system comprised eight sections of 720-mm long x 152-mm wide x 6-mm thick toughened glass fitted within Stronghold clips and sealed with silicone sealant. The Stronghold clips, stated to be made of POLYCOMP CA03 UVH copolymer polypropylene compound, were held to the aluminium frame by Stronghold bearings, retainers, pins and stabilisers stated to be made of Acetal. A nominal 3.2-mm clearance between the glass edges and the clips was maintained along the vertical sides. The Standard Handle was stated to be made of stainless steel. Along the bottom of the glass window, a Santoprene PVC weatherseal was installed.

On the exposed face of the window, an 1194-mm high x 800-mm wide x 0.9-mm thick Tensile-Tuff Crimsafe 304 grade stainless steel security mesh was fixed to the aluminium frame by 22-mm self-drilling pan head screws at 300-mm centres.

The systems as tested achieved a Bushfire Attack Level (BAL) A29.

CSIRO Sponsored Investigation report numbered FSZ 1552

On 2 August 2012, this Division conducted a radiation test on behalf of Gerswhin t/a Prowler Proof on a ForceField metal screen protecting a 1000-mm x 1000-mm opening in a brick wall.

The ForceField window screen comprised a 0.8-mm thick stainless steel mesh fixed to an FFW9 aluminium frame by ForceField glue and PVC ForceField retainer.

A steel support perimeter frame, made out of 40-mm x 40-mm x 1.6-mm thick steel sections, was fixed to the brick opening flush with the exposed face of the wall by M8 X 75-mm dynabolts at 400 mm centres. The ForceField screen window was then fixed to the exposed face of the steel support perimeter frame by 25-mm long pan head screws at 300 mm centres.

The specimen was exposed to an average radiant heat of 60 kW/m2. The radiant heat flux recorded at 1000-mm from the screen did not exceed 8 kW/m^2.

CSIRO report numbered EP1210317

On 25 October 2012, this Division conducted a bushfire test on behalf of Aluminium Specialties Group Pty Ltd (Alspec) on a 1000-mm x 1000 Invisi-Gard metal screen.

The Invisi-Gard screen comprised an IWF1 black powder coated aluminium frame and GR 316 stainless steel mesh (0.8-mm thickness) with mesh apertures being 1.6-mm. Hence open area ratio is approximately 44%. PVC inserts were located between frame and mesh. The frame channel interior dimension was 25-mm and the mesh depth into the channel was approximately 23-mm.

The specimen was exposed to the conditions of AS 1530.8.1-2007 according to BAL40 exposure level. There was no flaming on the unexposed face or gaps larger than 3-mm diameter noted during the test. The radiant heat flux recorded at 365-mm from the screen did not exceed 15 kW/m^2.

Exova Warringtonfire report numbered 2519600.1

On 25 November 2010 Exova Warringtonfire conducted a radiation test on behalf of Screenguard Pty Ltd on an 1160-mm x 1160-mm Screenguard stainless steel screen.

The Screenguard screen mesh comprised 316 marine grade stainless steel with a 0.89-mm coated wire thickness. The mesh aperture was 1.6-mm. The screen comprised an AU01002 Darley aluminium security window frame. The mesh was fixed to the aluminium frame at nominal 350-mm centres using 29-mm 10g 16TPI needle point stainless steel screws. A flame resistant PVC flexible extrusion seat was located on the exposed face of the screen while a flame resistant PVC flexible co-extrusion wedge was located on the unexposed face.

The specimen was exposed to an average radiant heat flux of 40 kW/m2. The average radiant heat flux recorded at 365-mm from the screen was 17.7 kW/m^2.

Exova Warringtonfire report numbered 2553300b.1

On 25 March 2010 Exova Warringtonfire conducted a radiation test on behalf of SecureView Australia Pty Ltd on an 1160-mm x 1160-mm SecureView stainless steel screen.

The SecureView screen mesh comprised 316 marine grade stainless steel with a 0.81-mm coated wire thickness. The mesh aperture was 1.6-mm. The screen comprised a Window Frame 11-mm (HAR160) extruded aluminium security window frame. The mesh was fixed to the aluminium frame at nominal 180-mm centres using 32-mm 4g 10TPI drill point button head screws. A 310 Series Hybrid Plug retainer was installed around the perimeter of the mesh, inside the aluminium frame.

The specimen was exposed to an average radiant heat flux of 39.9 kW/m2. The average radiant heat flux recorded at 365-mm from the screen was 21.7 kW/m^2.

Bodycote Warringtonfire report numbered 2284200a

On 11 December 2008 Bodycote Warringtonfire conducted a radiation test on behalf of Capral Ltd on a 1000-mm x 1000 Capral stainless steel screen.

The Capral Supascreen mesh comprised 316 Marine grade stainless steel with a 0.8-mm coated wire thickness. The mesh aperture was 1.6-mm. The screen comprised a 6060-T5 aluminium security window frame. A 22-mm deep x 2-mm thick retainer was folded into the u-channel of the aluminium frame and holding the steel mesh in the frame.

The specimen was exposed to an average radiant heat of 39.7 kW/m2. The average radiant heat flux recorded at 365-mm from the screen was 16.3 kW/m^2.

Appendix B Analysis of Variations

With reference to the results of CSIRO test report FSZ 1572, it demonstrated that the Breezway Altair and Louvre aluminium window assemblies tested can achieve a BAL A29 when exposed to the conditions stated in AS 1530.8.1-2007. The assemblies comprised Tensile-Tuff Crimsafe 304 grade stainless steel security mesh held within aluminium frames incorporating Santoprene PVC and Marcott SCE17-27FR weather seals encased within the window frame. The distance from the screen to the glass windows was 85-mm.

Clause 7.5.1A of Australian Standard AS3959-2009 states:

"…Where fitted, screens for windows and doors shall have a mesh or perforated sheet with a maximum aperture of 2-mm, made of corrosion-resistant steel, bronze or aluminium. Gaps between the perimeter of the screen assembly and the building element to which it is fitted shall not exceed 3-mm.

The frame supporting mesh or perforated sheet shall be made from –

(a) Metal; or

(b) Bushfire-resisting timber"

Clause 14.4 (d) Performance criteria of AS1530.8.1-2007 states that when exposed to the design bushfire conditions, the building exterior shall not permit the following:

"…Radiant heat flux 365 mm from the non-fire side of the specimen in excess of 15 kW/m^2 from glazed and uninsulated areas during the 60 min test."

The proposed alternative steel mesh screens, to be installed in Breezway Altair and Louvre aluminium window assemblies, have been exposed to radiant heat flux levels higher than the required 29 kW/m2 exposure of BAL29. All the screens attenuated the radiant heat flux to a level that, at 365-mm from the screens, was in the range of 14-22 kW/m^2 when exposed to an emitted radiant heat flux levels of 40-60 kW/m^2.

When the proposed screens are installed protecting the Breezway Altair and Louvre aluminium windows, the screens are to be located not closer than 85-mm from the glass windows. Therefore the effective radiant heat flux measuring distance from the screen increases from 365-mm to 450-mm. This effect, together with the protection provided by the glazing barrier, would result in a received radiant heat flux at 365-mm from the glass window under 15 kW/m^2.

A timber crib is used to evaluate the effects of burning debris and ember attack to horizontal surfaces. During the bushfire test on the Breezway Altair and Louvre aluminium window assemblies, cribs of size A were utilised. The effect of the cribs on the assemblies are not expected to vary provided any PVC wedge and seal, holding the steel mesh within the aluminium fame, are fully fitted within the frame.

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