

FIRE ASSESSMENT REPORT

FC18766-02-1

ASSESSMENT REPORT ON THE FIRE PERFORMANCE OF SCULPTFORM ALUMINIUM CLICK-ON BATTEN SYSTEM WITH VARIATIONS TO THE TESTED SPECIFICATION

CLIENT

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ASSESSMENT OBJECTIVE

To assess the fire performance of the Sculptform Aluminium Click-on Batten system, including variations to surface finish and batten configuration, in accordance with the Building Codes of Australia (NCC 2022 Specification 7 Clause S7C4) and New Zealand (Verification Method C/VM2 Appendix A)

CONCLUSION

It is considered that the Sculptform Aluminium Click-on Batten systems, including variations to surface finish and batten configuration as listed in Table 2, would achieve the following Group Number Classification if tested accordance with the Building Codes of Australia (NCC 2022 Specification 7 Clause S7C4 and AS 5637.1) and New Zealand (Verification Method C/VM2 Appendix A):

Table 1 Assessed Performance of Sculptform Aluminium Click-on Batten Systems

Building Code Document	Classification
NZBC Verification Method C/VM2 Appendix A	**Group Number 1-S** Average smoke production rate less than 5.0 m^2/s
NCC 2022 Volume One Specification 7 Clause S7C4 determined in accordance with AS 5637.1:2015	**Group 1** $SMOGRA_{RC}$ less than 100 m^2/s^2 x 1,000 limit

LIMITATION

This report is subject to the accuracy and completeness of the information supplied.

BRANZ reserves the right to amend or withdraw this assessment if information becomes available which indicates the stated fire performance may not be achieved.

This assessment report may only be quoted or reproduced in full.

TERMS AND CONDITIONS

This report is issued in accordance with the Terms and Conditions as detailed and agreed in BRANZ Services Agreement for this work.

The results reported here relate only to the item/s described in this report.

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1. INTRODUCTION

This report presents BRANZ's assessment of the Group Number Classification for the Sculptform Aluminium Click-On Batten System, considering the following variations:

- Shape: Block, Dome, or Flute
- Sizes and Spacings: As listed in Table 2
- Surface Finish: Anodized, Powder Coating, Polyolefin, Real Timber Veneer.

Table 2 details the configurations of the Sculptform Click-On Batten System assessed in this report.

Table 2 Product Configurations to be Assessed

Product Name	Batten Shape	Batten Sizes (Width x Depth mm)	Surface Finishes
Aluminium Click-On Batten System *(6160/T6 Hollow Aluminium Extrusion)*	Block	40 x 20	Anodized 15 – 20 µm
		120 x 20	
		30 x 30	
		25 x 50	Powder Coating 80 µm
		50 x 50	
		30 x 60	
		40 x 100	Real Timber Veneer 0.36 mm
		50 x 150	
	Dome	30 x 30	Polyolefin 0.16 mm
	Flute	50 x 30	

Shaded Values – ISO 9705 tested configuration

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2. COMPLIANCE WITH THE NATIONAL CONSTRUCTION CODE

This assessment report has been prepared to meet the evidence of suitability requirements given in the National Construction Code NCC 2022 Part A5, clause A5G3 (1) (d), for compliance with NCC 2022 BCA Specification 7 Clause S7C4, which states that evidence may be:

A report issued by an accredited Testing Laboratory that,

(i) Demonstrates that a material, product or form of construction fulfils specific requirements of the BCA; and

(ii) Sets out the tests the material, product or form of construction has been subjected to and the results of those tests and any other relevant information that has been relied upon to demonstrate it fulfils specific requirements of the BCA,

The tests carried out in accordance with AS ISO 9705:2003 referenced in section 3 were undertaken by an Accredited Testing Laboratory and the testing is within their scope of accreditation.

3. BACKGROUND

3.1 Small-Scale Cone Calorimeter Tests

The following small-scale cone calorimeter tests were conducted on various combinations of aluminium substrates and surface finishes. All tests were performed in accordance with AS/NZS 3837 or ISO 5660 test standards. The Group Number Classification was determined in accordance with the requirements of NCC 2022 Specification 7, Clause S7C4 (AS 5637.1).

Table 3 Small-Scale Test Specimen

Test Report No.	Substrate	Substrate Thickness	Coating	Coating Thickness
19-003930	Aluminium	2	Anodized Bronze	15 – 20 µm
19-002991	Aluminium	2	Powder coated	80 µm
19-003929	Aluminium	2	Polyolefin (Wood Finish)	0.16 mm
FNK 11672	Aluminium	2	Timber Veneer	0.3 mm

The following Group Number Classification was attributed to all test specimens as listed in Table 3:

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Table 4 Test Result for Small-Scale Test Specimens

Building Code Document	Classification
NCC 2022 Volume One Specification 7 Clause S7C4 determined in accordance with AS 5637.1:2015	**Group 1** Average Specific Extinction Area less than 250 m²/kg

3.2 Full-Scale Room Test

In the BRANZ ISO 9705/AS ISO 9705 test report FI18182-02-1, the product submitted for testing was identified as Sculptform Aluminium Click-on Battens System composed of 2 mm thick hollow Aluminium extrusion battens with nominally 0.3 mm Real Timber Veneer surface finish and a 2,400 gsm PET acoustic backer. The battens measured 50 mm in width, 150 mm in depth, and approximately 2,200 mm in length, with 35 mm spacing between centres.

The battens were mounted to the burn room walls using a proprietary attachment system. This system included steel tracks installed horizontally on the walls and across the ceiling at approximately 600 mm intervals. The tracks were fitted with aluminium clips at designated points, onto which the battens were pressed. The PET acoustic backing panels were placed between the steel tracks behind the battens.

The partially installed system is shown in Figure 1.

Figure 1 Partial Installation of Test Specimen FI18182-02-1

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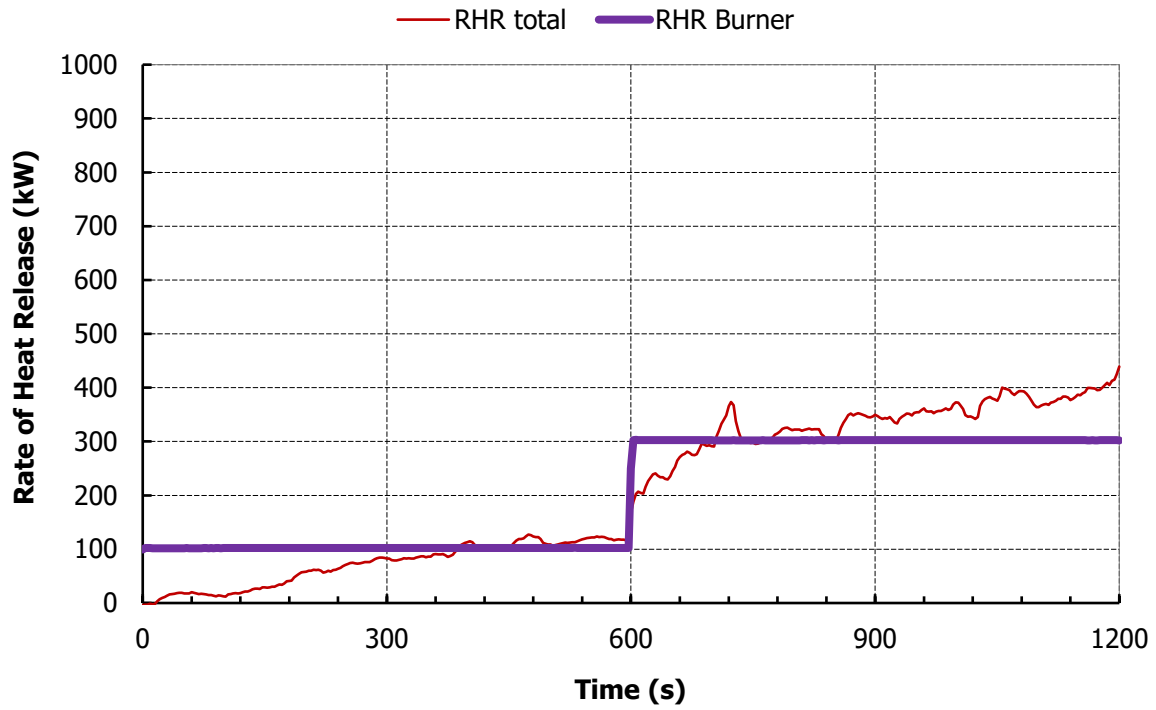
The above figure illustrates the installation of the Sculptform Aluminium Click-on Battens system, highlighting the arrangement of battens, the proprietary attachment system, and the placement of the PET acoustic backing panels.

The results of the test, conducted in accordance with AS ISO 9705 and AS 5637.1, and ISO 9705 in accordance with NZBC C/VM2 Appendix A, are shown in Figure 2.

Figure 2 Rate of Heat Release (RHR) Measured During Fire Test FI18182-02-1



The rate of heat release (RHR) did not exceed 1,000 kW during the 1,200 sec test period.

The following Group Number Classification was attributed to the tested system:

Table 5 Test Result for Large-Scale Test Specimen FI18182-01-1

Building Code Document	Classification
NZBC Verification Method C/VM2 Appendix A	**Group Number 1-S** The average smoke production rate was 0.4 m^2/s and therefore within the 5.0 m^2/s limit
NCC 2022 Volume One Specification 7 Clause S7C4 determined in accordance with AS 5637.1:2015	**Group 1** The $SMOGRA_{RC}$ was 10.7 m^2/s^2 x 1,000 and therefore less than 100 m^2/s^2 x 1,000 limit

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3.3 Relationship Between Time to Flashover and Group Numbers

The Group Number system indicates how likely a material on walls or ceilings is to spread flames and contribute heat to a fire when tested in accordance with (AS) ISO 9705. It ranges from Group Number 1 (best) to Group Number 4 (worst). A Group 1 surface lining has minimal impact on fire spread, while a Group 4 lining causes rapid fire spread, leading to total heat release rate ≥ 1,000 kW (flashover) and full room involvement. Maximum allowed Group Numbers for various building areas are set to ensure appropriate safety levels.

Small-scale fire tests conducted in accordance with ISO 5660 or AS/NZS 3837 may be used for comparative purposes to ensure a certain level of performance. The test measures the heat and smoke production rates which have a bearing on the fire performance and in turn are used to determine the final Group Number classification by prediction for a test specimen.

The following figure illustrates the relationship between small-scale cone calorimeter tests conducted at an irradiance of 50 kW/m², the Time to Flashover (TTF) in large-scale tests conducted according to AS ISO 9705, and the resulting Group Number classification.

Table 6 Relationship between Time to Flashover and Group Number Classifications

Test Method		
ISO 5660 / AS/NZS 3837	**(AS) ISO 9705 (TTF)**	**Classification:**
IQ1 > IQ2.10 min and IQ2 > IQ.2 min	Before 2 min	Group 4
IQ1 > IQ2.10 min and IQ2 ≤ IQ.2 min	Between 2 and 10 min	Group 3
IQ1 ≤ IQ2.10 min and IQ2 > IQ.2 min	Between 10 and 20 min	Group 2
IQ1 ≤ IQ2.10 min and IQ2 ≤ IQ.2 min	No flashover within 20 min	Group 1
Material fails to ignite or attain a heat release of 50 kW	No flashover within 20 min	Group 1

Shaded rows – Performance Determined During Small-Scale and Large-Scale Tests on the Subject Product

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4. DISCUSSION

4.1 Variation of Surface Finish Types

The Sculptform Aluminium Click-on Battens are available in various surface finishes. Fire performance data was obtained from small-scale tests, including measurements of the time to ignition (TTI), peak heat release (PHR), and average specific extinction area (ASEA).

Table 7 Comparative Performance of Surface Finishes Tested at Small-Scale

Test Report #	Surface Finish	TTI	PHR	ASEA
19-003930	Powder coated	241	76	49
19-002991	Wood finish (polyolefin)	72	122	46
19-003929	Bronze	NIL	5	9
FNK 11672	Timber Veneer (0.3 mm)	41.2	146	139

Shaded Values – ISO 9705 tested configuration

Based on the surface finish results in Table 7, the Timber Veneer surface finish exhibited the fastest ignition (TTI), highest peak heat release rate (PHR), and the most smoke generation (ASEA) during small-scale tests. This suggests that when selecting a representative specimen for large-scale performance testing, the Timber Veneer surface finish, as tested in report FNKI 11672, would likely represent the worst-performing variation. Its rapid ignition and high peak contribute to a shorter time to flashover, indicating poorer performance.

Based on the Group Number 1 classification achieved by Timber Veneer surface finish on Aluminium substrate when tested at large-scale (BRANZ test report FI18182-02-1), it is expected that other surface finish types as listed in Table 7 would also likely achieve a Group Number 1 result if tested at large-scale.

4.2 Variation of Batten Configuration

The Sculptform Click-On Battens are available in the configurations listed in Table 1. Variations in batten shape and spacing can affect the fire performance of the tested specimens. Key factors influencing fire performance include surface exposure, which determines the total amount of combustible material, and the depth-to-gap ratio, which can create conditions that promote rapid flame spread through enhanced thermal feedback and a chimney effect.

The magnitude of the fuel load is assessed based on the exposed surface area of the available fuel. This is calculated as the sum of the surface area of the slats that project into the room and the two surfaces between slats that face each other. This total surface area is then divided by the projected area of the slats and the spaces between them, and expressed as a percentage, as illustrated in Figure 2

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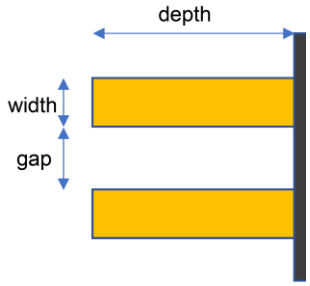
Figure 3 Calculation of Exposed Surface Area and Depth-to-Gap Ratio



$$\textbf{Exposed surface area} = \frac{(\textbf{width} + 2 \times \textbf{depth})}{(\textbf{width} + \textbf{gap})} \times 100\%$$

$$\textbf{Depth to gap ratio} = \frac{\textbf{depth}}{\textbf{gap}}$$

Table 8 provides the range of batten configurations to be assessed, including variations in exposed surface area and depth-to-gap ratios, with a minimum batten gap of 5 mm.

Table 8 Batten Configuration

Batten Shape	Width	Depth	Exposed surface area	Depth to Gap Ratio
Block	40	20	178	4
	120	20	128	4
	30	30	257	6
	25	50	417	10
	50	50	273	10
	30	60	429	12
	40	100	533	20
	50	150	636	30
Dome	30	30	231*	6
Flute	30	30	220**	6

Shaded Values – ISO 9705 tested configuration
* Reduced by 10% to allow for convex curve
** Increased by 10% to allow for concave curve

In fire test FI18182-02-1, the tested specimen had the maximum exposed surface area of 636% and a depth-to-gap ratio of 30. This configuration represents the variation of the Aluminium Click-on Battens with both the highest exposed surface area and the most significant depth-to-gap ratio. Consequently, this setup is expected to exhibit the highest level of combustibility among the configurations listed in Table 8.

As such, the performance of this configuration can be used as a benchmark to evaluate the combustibility of other batten variations. If other configurations exhibit lower exposed surface areas or different depth-to-gap ratios, their fire performance is expected to be less severe compared to this maximum-exposure setup.

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5. CONCLUSION

It is considered that the Sculptform Aluminium Click-on Batten systems, including variations in surface finish and batten configuration as listed in Table 2, would achieve the following Group Number Classification if tested accordance with the Building Codes of Australia (NCC 2022 Specification 7 Clause S7C4 and AS 5637.1) and New Zealand (Verification Method C/VM2 Appendix A):

Table 9 Assessed Performance of Sculptform Click-on Timber Batten Systems

Building Code Document	Classification
NZBC Verification Method C/VM2 Appendix A	**Group Number 1-S** Average smoke production not more than 5.0 m^2/s limit
NCC 2022 Volume One Specification 7 Clause S7C4 determined in accordance with AS 5637.1:2015	**Group 1** $SMOGRA_{RC}$ not more than100 m^2/s^2 x 1000 limit

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