

FIRE ASSESSMENT REPORT

FC18766-01-3

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

CLIENT

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ASSESSMENT OBJECTIVE

To assess the fire performance of the Sculptform Click-on Timber Batten system, including variations to surface finish and batten configuration, in accordance with the Building Codes of Australia (NCC 2022 Amendment 1 Specification 7 Clause S7C4) and New Zealand (Verification Method C/VM2 Appendix A)

CONCLUSION

It is considered that the Sculptform Click-on Timber 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 Amendment 1 Specification 7 Clause S7C4 and AS 5637.1) and New Zealand (Verification Method C/VM2 Appendix A):

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

Building Code Document	Classification
NZBC Verification Method C/VM2 Appendix A	**Group Number 3**
NCC 2022 Amendment 1 Volume One Specification 7 Clause S7C4 determined in accordance with AS 5637.1:2015	**Group 3** $SMOGRA_{RC}$ less than 100 m^2/s^2 x 1000 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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DOCUMENT REVISION STATUS

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01	29 August 2024	Initial Issue	LFH	ES
02	10 December 2024	Addition of "Natural Accent" surface finish. Correction of typographical errors. (Proj# 20287)	LFH	ES
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1. COMPLIANCE WITH THE NATIONAL CONSTRUCTION CODE

1.1 Evidence of Suitability in Accordance with NCC 2022 A5G3

This report has been prepared to satisfy the evidence of suitability requirements of NCC 2022 Amendment 1, Part A5, Clause A5G3(1)(d), and Specification 7 Clause S7C4. These provisions recognise reports from Accredited Testing Laboratories that:

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.

An ATL includes a laboratory accredited by an organisation that has a mutual recognition agreement with NATA.

BRANZ is an Accredited Testing Laboratory (ATL), accredited by IANZ—an ILAC MRA signatory with mutual recognition by NATA—therefore meeting the NCC definition of an ATL.

1.2 Assessment Methodology

This assessment evaluates the fire performance of the Sculptform Click-on Timber Batten system, including variations in surface finish and batten configuration, to determine a Group Number classification in accordance with AS 5637.1.

A full-scale ISO 9705 room fire test was conducted on a representative reference configuration to establish a verified Group Number. This result serves as the benchmark for assessing untested variants using an empirical correlation method supported by published methodologies.

Small-scale cone calorimeter tests (AS 3837) were undertaken on product variants to measure key fire performance parameters—such as ignitibility, heat release rate, and smoke production—to support the assessment.

This tiered approach, combining full-scale testing with small-scale comparative analysis, aligns with NCC 2022 Clause A5G3, which permits technically justified evidence-based pathways for demonstrating compliance.

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2. INTRODUCTION

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

- Shape: Block, Dome, or Flute
- Sizes and Spacings: As listed in Table 2
- Substrates: Spotted Gum, American White Oak, or Eucalyptus Grandis
- Surface Finish: Mirotone, Cutek Euro, Rubio, Mirotec, Raw, or Aquashade w/ Aquasoyz (identified by the client as "Natural Accent")

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)	Timber Substrates	Surface Finishes
Timber Click-On Batten System	Block	30 x 19	Spotted Gum	Mirotone
		40 x 19		
		60 x 19		Cutek Euro
		30 x 30		
		22 x 40		
		40 x 40		
		30 x 60	Eucalyptus Grandis	Rubio
	Dome	30 x 19		
		30 x 30		
		40 x 30		Mirotec
		60 x 30		
		22 x 40		
		30 x 40	American White Oak	Raw
		30 x 60		
	Flute	30 x 19		Aquashade w/ Aquasoyz (Natural Accent)
		40 x 19		
		60 x 19		
		30 x 30		

Shaded Values – (AS) ISO 9705 tested configuration

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3. BACKGROUND

3.1 Small-Scale Cone Calorimeter Tests

The following small-scale cone calorimeter tests were conducted on various combinations of timber 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 #	Substrate	Density (kg/m³)	Coating	Total Thickness (mm)
FNKI 13090	Spotted Gum	990	Mirotone	19
23-003804			Cutek Euro	
23-003810			Rubio	
24-000910			Aquashade w/ Aquasoyz	30
FNKI 13089	American White Oak	750	Mirotec	19
23-003807			Cutek Euro	
23-003809			Rubio	
23-003856/7			Raw	
24-000918			Aquashade w/ Aquasoyz	30
23-003858	Eucalyptus Grandis	545	Raw	40
24-000959		540	Aquashade w/ Aquasoyz	19

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 3** Average Specific Extinction Area less than 250 m²/kg

3.2 Full-Scale Room Test

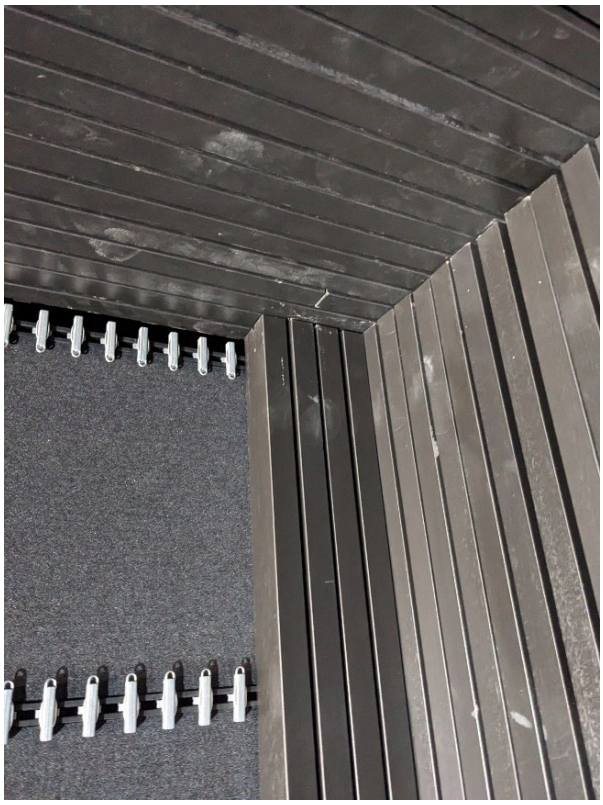
In the BRANZ ISO 9705 / AS ISO 9705 test report FI18182-01-1, the product submitted for testing was identified as Sculptform Timber Click-on Battens: Composed of Eucalyptus Grandis timber battens with a Mirotone Ebony surface finish and a 2,400 gsm PET acoustic backer. The battens measured 30 mm in width, 60 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 Installation of Test Specimen

As shown in test report FI18182-01-1



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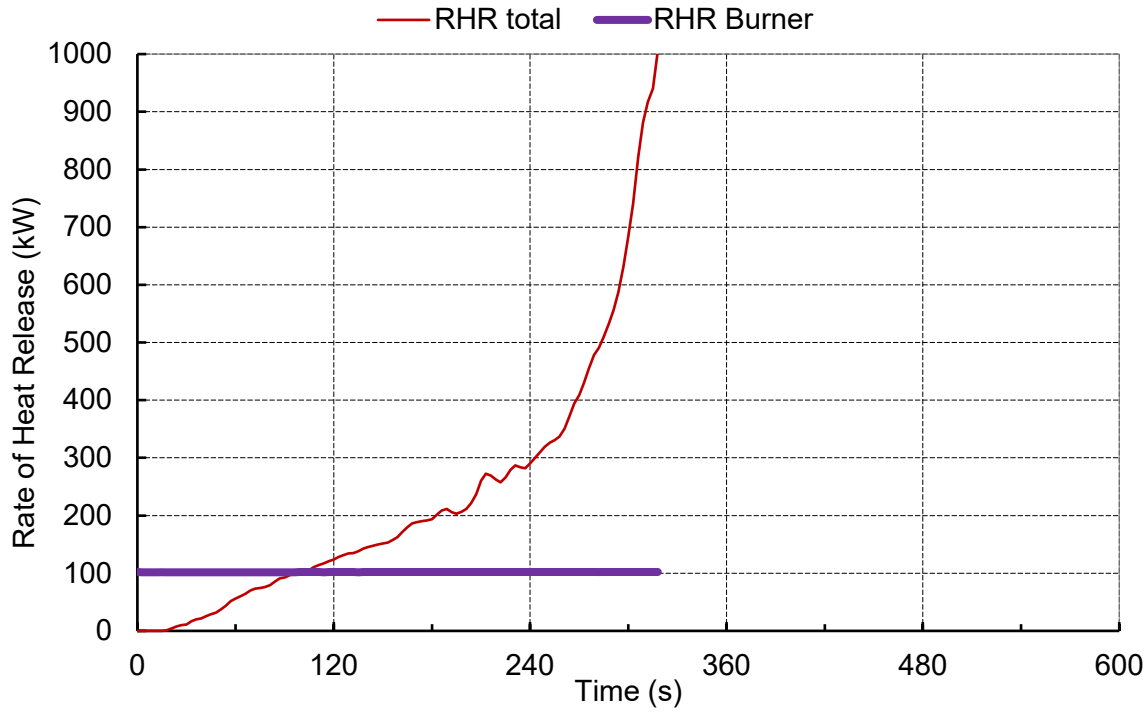
The above figure illustrates the installation of the Sculptform Timber Click-on Battens system, highlighting the arrangement of battens, the proprietary attachment system, and the placement of the PET acoustic backing panels.

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 FI18182-01-1



The rate of heat release (RHR) exceeded 1,000 kW at 318 seconds.

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 3**
NCC 2022 Volume One Specification 7 Clause S7C4 determined in accordance with AS 5637.1:2015	**Group 3** The $SMOGRA_{RC}$ was 10.7 m^2/s^2 x 1000 and therefore less than 100 m^2/s^2 x 1000 limit

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

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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 correlation 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 row – 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

Sculptform Click-on Battens are available with various surface finishes, each of which may influence fire performance. Fire performance data for these finishes was obtained through small-scale testing conducted in accordance with applicable standards. Key parameters measured included time to ignition (TTI), peak heat release rate (PHR), and average specific extinction area (ASEA), which collectively provide insight into the combustibility, heat release, and smoke production characteristics of the tested samples.

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

Test Report #	Timber Substrate	Surface Finish	TTI (sec)	PHR (kW/m²)	ASEA (m²/kg)	Group #
FNKI 13090	Spotted Gum	Mirotone	54	222	24	3
23-003804		Cutek Euro	70	240	27	
23-003810		Rubio	61	230	32	
24-000910		Aquashade w/ Aquasoyz	62	167	4	
FNKI 13089	American White Oak	Mirotec	37	249	130	
23-003807		Cutek Euro	66	231	10	
23-003809		Rubio	43	240	9	
23-003856/7		Raw	68	217	15	
24-000918		Aquashade w/ Aquasoyz	31	159	3	
23-003858	Eucalyptus Grandis	Raw	50	120	5	
24-000959		Aquashade w/ Aquasoyz	19	155	12	

Shaded Values – (AS) ISO 9705 tested configuration

The fire performance data summarized in Table 7 highlights that the Mirotec-coated sample exhibited the highest peak heat release rate (PHR) and the greatest smoke generation (ASEA) during small-scale testing, both critical factors influencing fire spread and visibility hazards. While the Aquashade/Aquasoyz-coated Eucalyptus Grandis sample (tested in report 24-000959) ignited more quickly, this faster ignition was likely due to the reduced thermal inertia provided by the lesser thickness of the timber substrate.

When considering the cumulative effect of all fire performance parameters, the Mirotec-coated specimen, as tested in report FNKI 13089, is identified as the worst-performing variation. Its combination of rapid ignition, high peak heat release, and significant smoke production collectively suggests poorer fire performance compared to other variants.

Thus, the Mirotec-coated sample is deemed a conservative worst-case reference. It provides a conservative basis for extrapolating fire performance characteristics to other tested samples, ensuring a precautionary approach in fire safety evaluations.

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Based on the Group Number 3 classification achieved by Mirotec-coated timber when tested at large-scale (BRANZ test report FI18182-01-1), it is expected that other surface finish types as listed in Table 7 would also likely achieve a Group Number 3 result if tested at large-scale.

4.2 Variations of Surface Finish Colours

Darker-coloured paints and coatings often contain more combustible materials due to certain pigments or higher binder concentrations. However, the overall combustibility of a paint is more significantly influenced by the type of binder, the presence of VOCs, and the specific formulation rather than just the colour. As long as the coating's composition remains consistent, its performance is unlikely to be worse than that of the darkest variation.

The client chose the Mirotec Ebony colour coating to represent the darkest and potentially most combustible variation. Since Mirotec Ebony achieved a Group Number 3 classification in large-scale testing (BRANZ test report FI18182-01-1), it is expected that other surface finishes of the same or lighter tone, as detailed in Table 5, will also likely achieve a Group Number 3 classification when composition remains consistent.

4.3 Variations in Timber Substrate

Three variations of timber substrate, differing in species and density, were tested at a small-scale, with densities ranging from 545 kg/m³ to 750 kg/m³. According to *Dietenberger, M. A. (2016)*, higher-density timbers generally have lower ignitability due to their greater heat absorption capacity, moisture retention, and slower surface heating. In contrast, lower-density timbers tend to ignite more easily due to faster heating, lower moisture content, and reduced thermal inertia.

Eucalyptus Grandis, with a density of 545 kg/m³, was chosen to represent the range of timber substrates in large-scale testing. Its significantly lower density when compared to Spotted Gum and American White Oak, is expected to provide less heat absorption during the initial stages of surface ignition, making it a worst-case scenario for the range of timber densities.

The timber substrates listed in Table 6 are not expected to affect the Group Number 3 classification achieved in BRANZ test report FI18182-01-1.

4.4 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 3.

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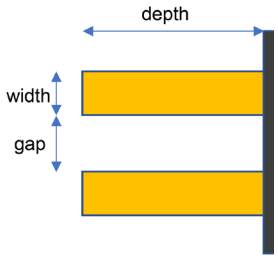
Figure 3 Calculation of Exposed Surface Area and Depth-to-Gap Ratio



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

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

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 (mm)	Depth (mm)	Exposed surface area (mm²)	Depth to Gap Ratio
Block	30	19	194	3.8
	40	19	173	3.8
	60	19	151	3.8
	30	30	225	6.0
	22	40	319	8.0
	40	40	267	8.0
	19	52	280	10.4
	30	60	429	12.0
Dome	30	19	194	3.8
	30	30	225	6.0
	40	30	200	6.0
	60	30	171	6.0
	22	40	319	8.0
	30	40	275	8.0
	30	60	375	12.0
Flute	30	19	194	3.8
	40	19	173	3.8
	60	19	151	3.8
	30	30	257	6.0

Shaded Values – (AS) ISO 9705 tested configuration

In fire test FI18182-01-1, the tested specimen had the maximum exposed surface area of 429% and a depth-to-gap ratio of 12.0. This configuration represents the variation of the 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.

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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.

5. CONCLUSION

It is considered that the Sculptform Click-on Timber 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 Amendment 1 Specification 7 Clause S7C4 and AS 5637.1) and New Zealand (NZBC 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 3**
NCC 2022 Amendment 1 Volume One Specification 7 Clause S7C4 determined in accordance with AS 5637.1:2015	**Group 3** $SMOGRA_{RC}$ not more than 100 m^2/s^2 x 1000 limit

REFERENCES

Dietenberger, M. A. (2016). "Wood Products: Thermal Degradation and Fire."

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