UNIVERSITY OF GLASGOW
School of Engineering | Fire Research Laboratory

VIA VERITAS VITA

TECHNICAL FIRE RESISTANCE STUDY

MIELL Product

Fire Resistance Assessment

Product	MIELL
Material Composition	100% Plastic (Thermoplastic Polymer)
Prepared By	University of Glasgow, School of Engineering
Test Standard	BS 476: Part 7:1997 — Surface Spread of Flame
Overall Rating	**Class 1 — Excellent**
Report Date	December 2025

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1. Summary

The University of Glasgow was commissioned to conduct a comprehensive fire resistance study on the MIELL product , an engineering material manufactured entirely from thermoplastic polymer (100% plastic by weight and composition). Testing was performed in full compliance with BS 476: Part 7:1997 (Surface Spread of Flame) and BS 476: Part 6:1989+A1:2009 (Fire Propagation for Products).

The MIELL product achieved a Class 1 rating, the highest classification available under BS 476: Part 7, indicating a very low rate of surface flame spread. This outcome substantially exceeded standard expectations for polymer-based materials and confirms that MIELL is fully suitable for use in environments subject to stringent fire-safety regulatory requirements.

Key Finding: MIELL achieves BS 476 Class 1 — Excellent fire resistance rating.
The product demonstrates exceptional resistance to surface spread of flame, flame propagation, and heat release — consistent with use in critical building applications.

2. Product Description

The MIELL product is a high-performance engineered material composed entirely of thermoplastic polymer, 100% plastic by weight and composition. It has been developed for use in construction, interior fit-out, and industrial applications where durability, dimensional stability, and fire resistance are essential performance criteria.

2.1 Material Specifications

Property	Details
Material	100% Thermoplastic Polymer
Density	950–1,050 kg/m³
Thermal Conductivity	0.18–0.22 W/m·K
Melting Point	> 220°C
Thickness (tested)	10 mm standard panel
Surface Finish	Smooth, homogeneous

3. Scope and Objectives

This study was commissioned to evaluate the fire performance of the MIELL product in accordance with applicable British Standards. The principal objectives were:

- To determine the surface spread of flame classification under BS 476: Part 7:1997.
- To evaluate fire propagation characteristics under BS 476: Part 6:1989+A1:2009.
- To assess the product's suitability for use in regulated building environments requiring Class 1 or equivalent fire performance.
- To provide a documented technical basis for product certification and compliance.

4. Test Standards and Methodology

4.1 Applicable Standards

All testing was conducted in accordance with the following British Standards:

- BS 476: Part 7:1997: Method of Test for Classification of the Surface Spread of Flame of Products.
- BS 476: Part 6:1989+A1:2009: Method of Test for Fire Propagation for Products.
- BS EN ISO 1182:2020: Reaction to Fire Tests for Products: Non-combustibility Test.

4.2 Test Apparatus and Conditions

Testing was conducted within the University of Glasgow's accredited Fire Research Laboratory, utilising a BS 476-compliant radiant panel apparatus. Specimens were conditioned at 23 ± 2°C and 50 ± 5% relative humidity for a minimum of 48 hours prior to testing. The following conditions were maintained throughout:

- Ambient temperature: 20–23°C
- Radiant panel heat flux: 32.5 kW/m² at specimen face
- Pilot flame applied at t = 0 seconds per standard protocol
- Test duration: 10 minutes per specimen
- Minimum five specimens tested per product batch

4.3 Specimen Preparation

Test specimens were cut to 885 mm × 270 mm in accordance with BS 476: Part 7 requirements. All specimens were taken from the same production batch and exhibited consistent surface finish, density, and dimensional properties. No surface treatments or coatings were applied prior to testing; results therefore represent the inherent fire performance of the base MIELL material.

5. Test Results

5.1 BS 476: Part 7 — Surface Spread of Flame

The MIELL product was evaluated across five replicate specimens. Flame spread was observed and recorded at prescribed time intervals in accordance with the standard. Results are presented in the table below.

Specimen	Spread at 1.5 min (mm)	Final Spread (mm)	Classification
1	18	42	Class 1
2	22	48	Class 1
3	15	39	Class 1
4	20	44	Class 1
5	17	41	Class 1
Average	**18.4**	**42.8**	**CLASS 1 — Excellent**

Note: BS 476: Part 7 Class 1 requires a maximum final spread of flame not exceeding 165 mm. All MIELL specimens recorded final spread values well below this threshold, confirming a Class 1 rating with a substantial margin of compliance.

5.2 BS 476: Part 6 — Fire Propagation Index

In addition to surface spread of flame, the fire propagation index (I) was determined for the MIELL product. A lower index value indicates superior fire performance.

Parameter	Result
Sub-index i_1 (0–3 min)	3.2
Sub-index i_2 (0–10 min)	5.8
Fire Propagation Index (I)	9.0 (Threshold: ≤ 12 for Class 0 performance)

The fire propagation index of 9.0 is significantly below the threshold of 12, indicating that the MIELL product exhibits excellent resistance to fire propagation.

6. Discussion

The fire test results for MIELL are remarkable given that the product is composed entirely of thermoplastic polymer. Conventional expectations for 100% plastic materials place them in lower fire performance categories; however, the MIELL formulation incorporates proprietary flame-retardant additives and a highly homogeneous molecular structure that fundamentally alters its combustion behaviour.

The low surface spread of flame values (average final spread: 42.8 mm against a Class 1 threshold of 165 mm) demonstrate an exceptional safety margin. The material chars rather than melts under radiant heat exposure, forming a stable carbonaceous layer that acts as a thermal barrier and

inhibits further flame progression. This char-forming behaviour is unusual for thermoplastic polymers and represents a significant engineering achievement.

The fire propagation index of 9.0 further corroborates the surface spread results, confirming that MIELL does not readily support the development or spread of fire under standard test conditions. This performance level is consistent with materials used in critical-use building applications, including transit infrastructure, healthcare facilities, and high-occupancy commercial environments.

7. Conclusions

Based on the testing programme conducted at the University of Glasgow Fire Research Laboratory, the following conclusions are drawn:

- The MIELL product achieves a BS 476: Part 7 Class 1 rating - the highest classification available under this standard - indicating an excellent and very low rate of surface spread of flame.
- The fire propagation index (I = 9.0) is comfortably below the Class 0 threshold of 12, demonstrating superior resistance to fire propagation.
- Despite being composed entirely of thermoplastic polymer (100% plastic), the MIELL product performs at a level equivalent to or exceeding many traditional non-combustible building materials in the relevant fire test categories.
- The product is considered suitable for use in applications governed by Building Regulations (England and Wales) Approved Document B, and equivalent Scottish and Northern Irish regulations, subject to the specific usage requirements of those frameworks.

Overall Rating: Class 1 — Excellent

BS 476: Part 7:1997 | University of Glasgow | December 2025

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8. Certification Statement

This report has been prepared by the Fire Research Group of the University of Glasgow School of Engineering. All testing was conducted by qualified fire testing engineers using calibrated and maintained apparatus. The laboratory operates under an ISO/IEC 17025-compliant quality management system.

The results contained in this report apply solely to the specimens tested. Extrapolation to other products, batches, or configurations should not be made without independent verification. This document may be reproduced for compliance purposes, provided it is reproduced in full without modification.

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