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Load/Span Tables for Aluminium Faced Structural Insulated Panels with PIR Cores (Aspirespan and Aspirepanel)

For

Metalcraft Insulated Panels Limited

DOCUMENT CONTROL

ISSUE NUMBER	DATE OF ISSUE	EXPIRATION OF PS1	PURPOSE OF ISSUE
1	12 December 2023	N/A	Original Calculations
2	9 August 2025	N/A	Updated For Aspirespan & Aspirepanel

adding 'enginuity' to building projects

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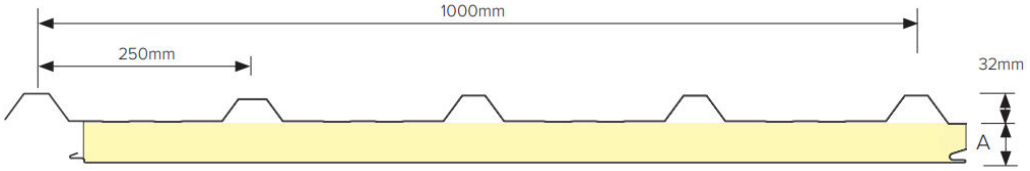
INTRODUCTION

This document provides guidance for engineers and architects looking to uses aluminium faced structural insulated panels (SIPs) incorporating a Polyisocyanurate (PIR) core.

Load-span tables and graphs are presented for the equivalents of the profiled Aspirespan and flat Aspirepanel products.

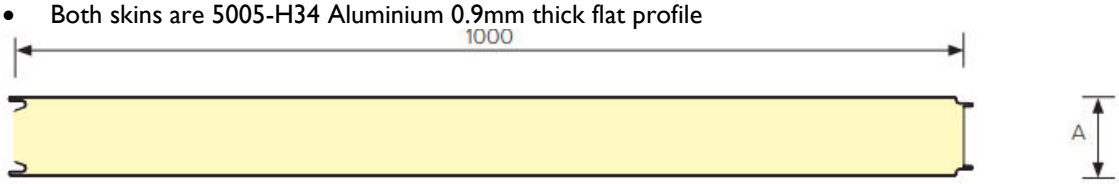
Aspirespan

- Top skin is 5005-H34 Aluminium 0.9mm thick 5-Rib trapezoidal profile
- Bottom skin is 5005-H34 Aluminium 0.9mm thick flat profile



Aspirepanel

- Both skins are 5005-H34 Aluminium 0.9mm thick flat profile



The values for loading on the panels are theoretical. Ideally these values should be confirmed by testing.

Notes for the load-span tables & graphs

1. The load span charts shown above are suitable only for roof and wall panels under wind loading @ ULS (Ultimate Limit State).
   a. Figures in red indicate capacity is limited by deflection.
   b. Figures in green indicate capacity is limited by fixing.
   c. Figures below 0.6kPa have been removed to allow for minimum factored roof loading due to gravity
2. For roof panels, min. roof slope of 3 degree applies.
3. The loading is shown for a simply supported single span.
4. For a continuous panel supported on multiple spans, deflection is reduced but the fixing load will be significantly higher and may be the governing design criteria.
5. Deflection limit of Span / 150 for SLS has been applied.
6. Self-weight of the panel has been ignored. For long-span thin panels, sagging under self-weight or additional dead load may be the governing design criteria.
7. Creep under loading over time has been ignored. When panels are subject to long-term gravity loading or snow loading, excess sagging due to creep may may be the governing design criteria.
8. Fixing with 14g tek screws (or equivalent) at 250mm crs are required. The maximum pull-out load on a fixing is 2.37kN at ULS. Minimum purlin thickness = 2mm. Always check that adequate fixing capacity is provided.
9. Design parameters as follows (to be confirmed by testing):

$k = 0.3$ | $f_{cv} = 90\ kPa$ | $\phi_m = 0.9$ | $\phi_v = 0.8$ | $t_{s1} = 0.9\ mm$ | $t_{s2} = 0.9\ mm$ | $f_{y1} = 130\ MPa$ | $f_{y2} = 130\ MPa$

Maximum Loading (kPa) Limited By Fixing Capacity @ ULS (Simply Supported)

	Span (m)									
	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7
Fixing	7.58	6.32	5.42	4.74	4.21	3.79	3.45	3.16	2.92	2.71

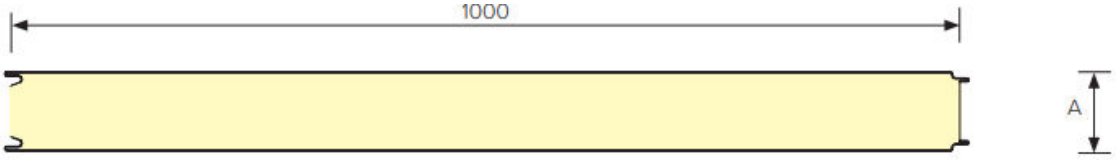
Panel Self Weight (kg/m^2)

	Thickness (mm)				
	50	75	100	150	200*
Aspirepanel	6.6	7.6	8.5	10.3	12.2
Aspirespan	7.2	8.1	9.1	10.9	12.8

**200mm is a non-standard thickness not readily available*

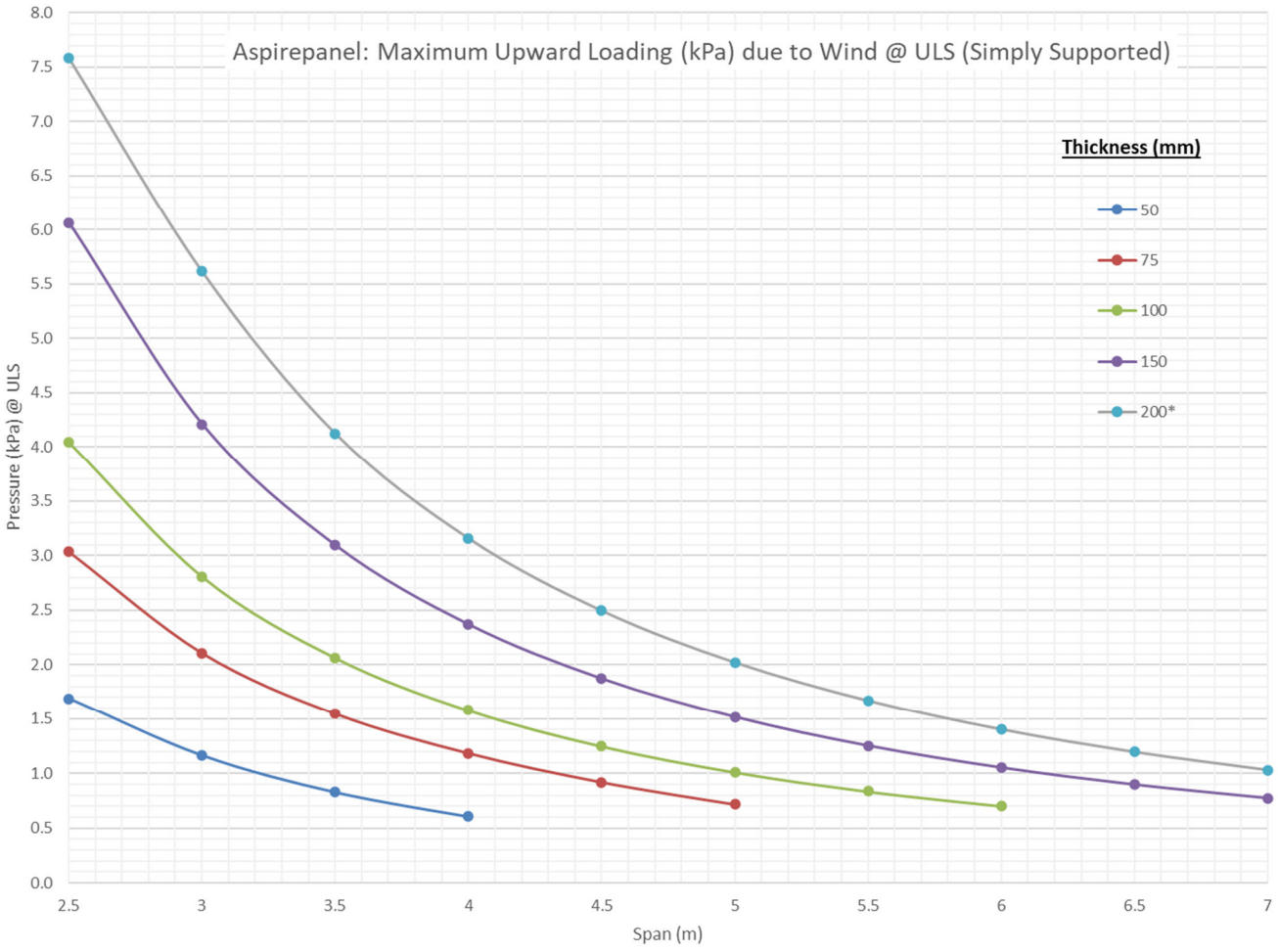
LOAD-SPAN TABLES & GRAPHS

1. ASPIREPANEL (0.9MM ALUMINIUM SKINS TOP & BOTTOM / EPS CORE) SIMPLY SUPPORTED SINGLE SPAN PANELS

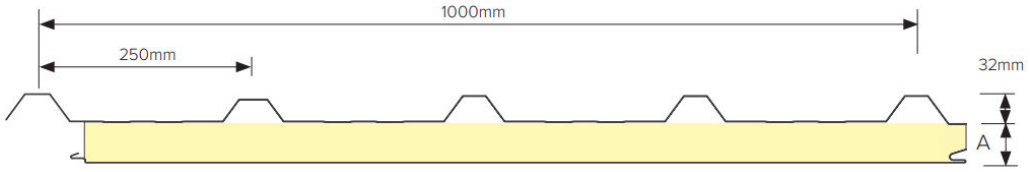


Maximum Upward Loading due to Wind @ ULS (Simply Supported)

Thickness (mm)	Span (m)									
	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7
50	1.69	1.16	0.83	0.61						
75	3.03	2.11	1.55	1.18	0.92	0.72				
100	4.04	2.81	2.06	1.58	1.25	1.01	0.84	0.70		
150	6.07	4.21	3.09	2.37	1.87	1.52	1.25	1.05	0.90	0.77
200*	*7.58*	5.62	4.13	3.16	2.50	2.02	1.67	1.40	1.20	1.03

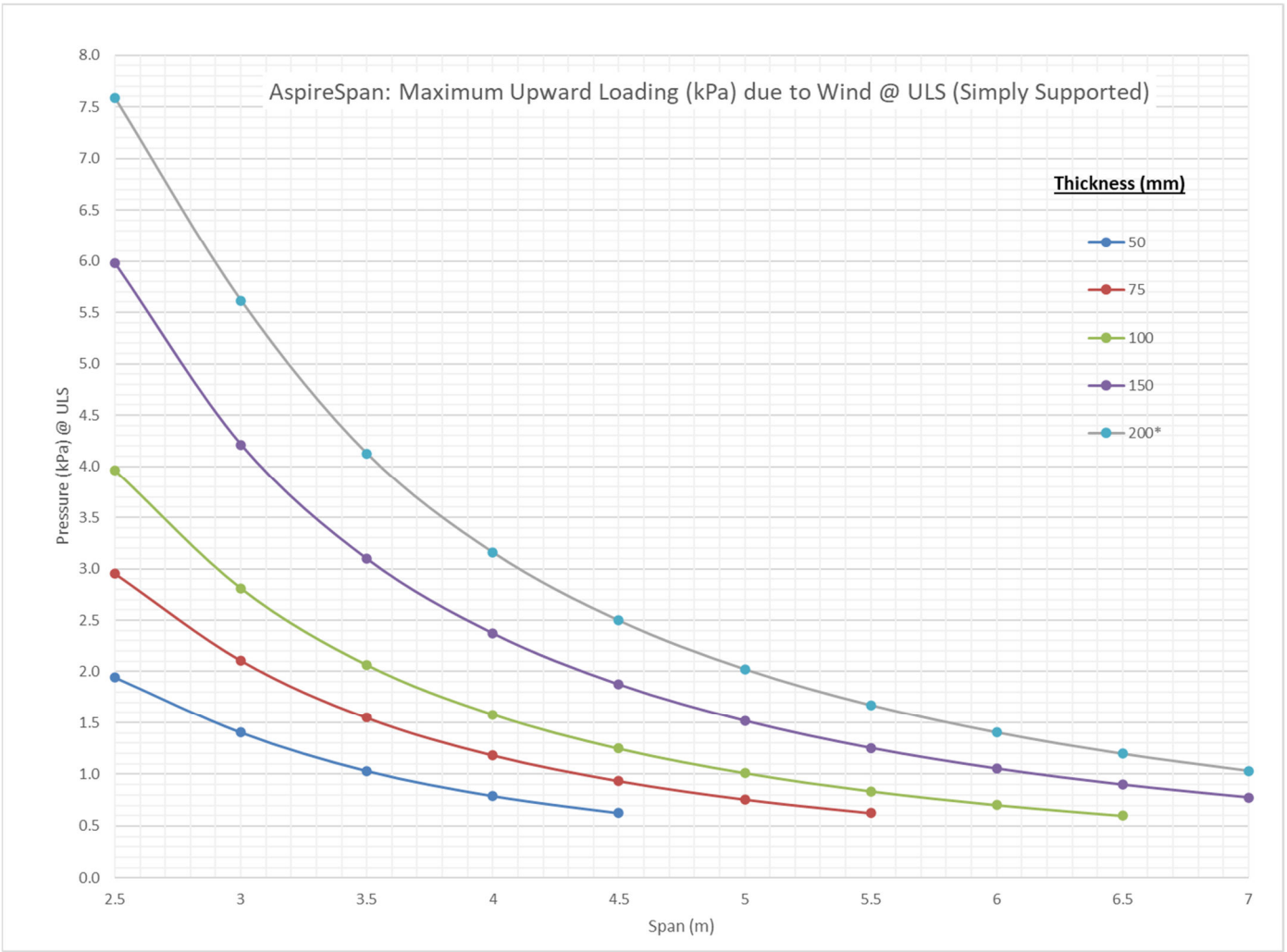


2. ASPIRESPAN (0.9MM ALUMINIUM SKINS TOP & BOTTOM / EPS CORE) SIMPLY SUPPORTED SINGLE SPAN PANELS



Maximum Upward Loading due to Wind @ ULS (Simply Supported)

Thickness (mm)	Span (m)									
	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7
50	1.94	1.40	1.03	0.79	0.62					
75	2.95	2.11	1.55	1.18	0.94	0.76	0.63			
100	3.96	2.81	2.06	1.58	1.25	1.01	0.84	0.70	0.60	
150	5.98	4.21	3.09	2.37	1.87	1.52	1.25	1.05	0.90	0.77
200*	*7.58*	5.62	4.13	3.16	2.50	2.02	1.67	1.40	1.20	1.03



APPENDIX A: MATERIAL DATA SHEET FOR ALUMINIUM SHEET

5005-H34 Aluminum

5005-H34 aluminum is 5005 aluminum in the H34 temper. To achieve this temper, the metal is strain hardened, and then stabilized, to a strength that is roughly halfway between annealed (O) and full-hard (H38).

The graph bars on the material properties cards below compare 5005-H34 aluminum to: 5000-series alloys (top), all aluminum alloys (middle), and the entire database (bottom). A full bar means this is the highest value in the relevant set. A half-full bar means it's 50% of the highest, and so on.

Mechanical Properties

Brinell Hardness

43

Elastic (Young's, Tensile) Modulus

68 GPa 9.9 x 10^6 psi

Elongation at Break

7.3 %

Fatigue Strength

74 MPa 11 x 10^3 psi

Poisson's Ratio

0.33

Shear Modulus

26 GPa 3.7 x 10^6 psi

Shear Strength

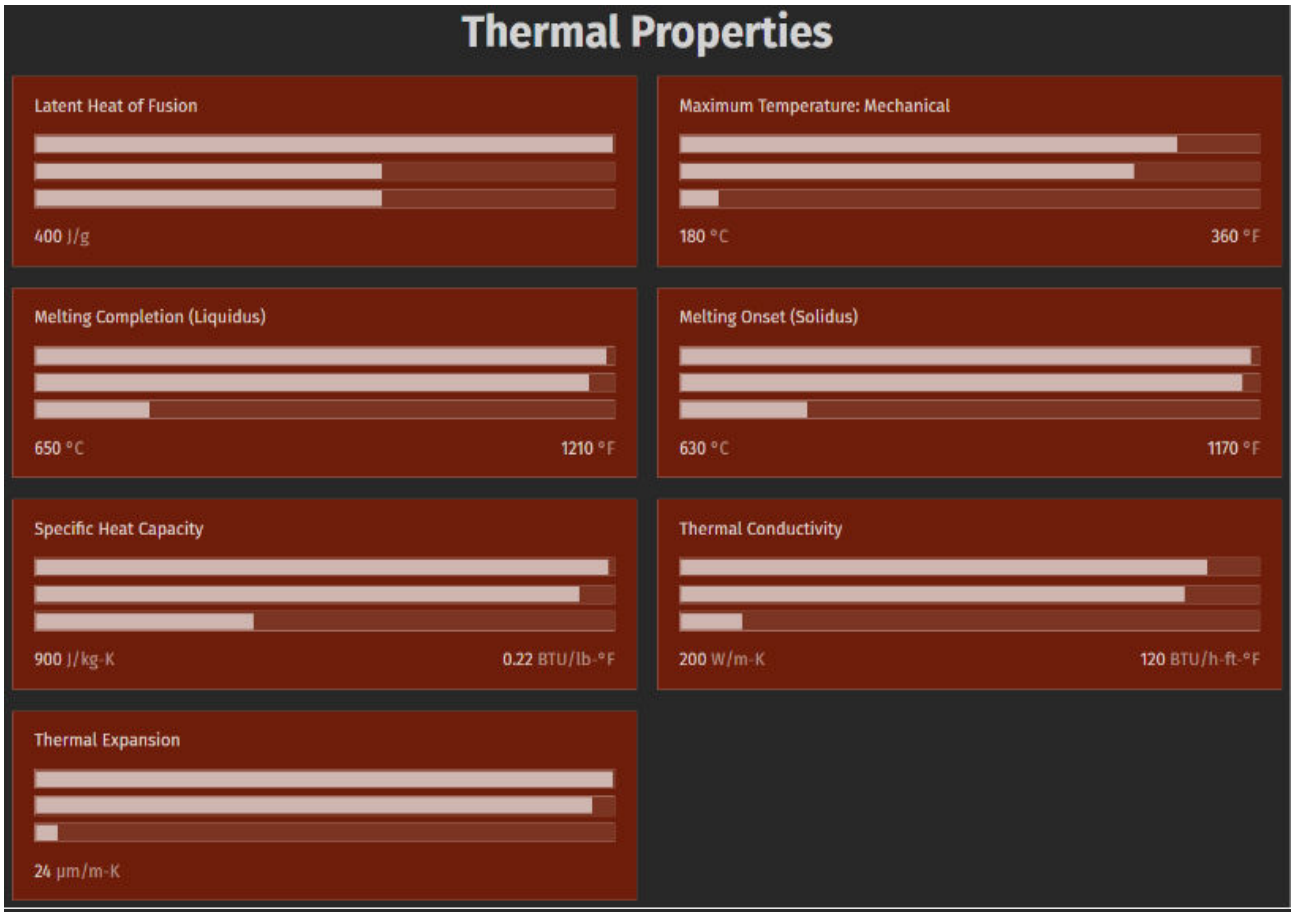
96 MPa 14 x 10^3 psi

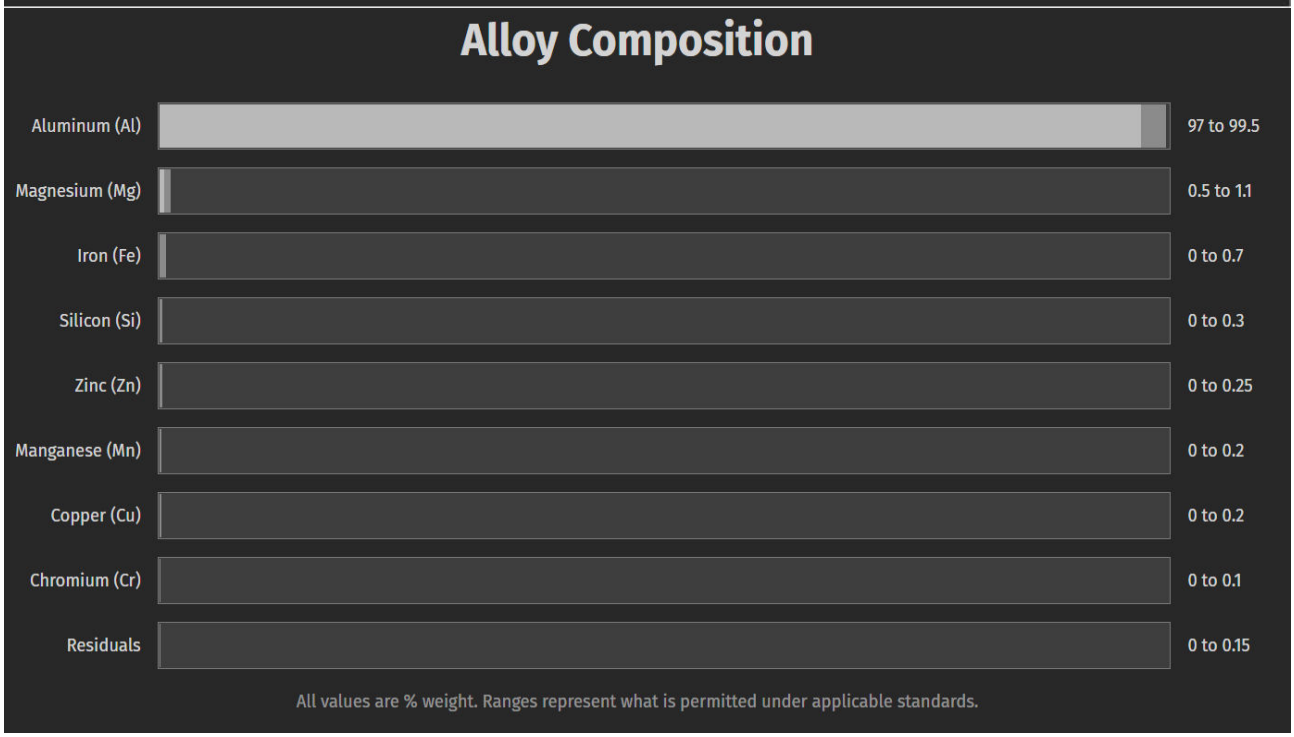
Tensile Strength: Ultimate (UTS)

160 MPa 23 x 10^3 psi

Tensile Strength: Yield (Proof)

130 MPa 19 x 10^3 psi


Thermal Properties
Latent Heat of Fusion
400 J/g
Maximum Temperature: Mechanical
180 °C
360 °F
Melting Completion (Liquidus)
650 °C
1210 °F
Melting Onset (Solidus)
630 °C
1170 °F
Specific Heat Capacity
900 J/kg-K
0.22 BTU/lb-°F
Thermal Conductivity
200 W/m-K
120 BTU/h-ft-°F
Thermal Expansion
24 µm/m-K


Alloy Composition
Aluminum (Al) 97 to 99.5
Magnesium (Mg) 0.5 to 1.1
Iron (Fe) 0 to 0.7
Silicon (Si) 0 to 0.3
Zinc (Zn) 0 to 0.25
Manganese (Mn) 0 to 0.2
Copper (Cu) 0 to 0.2
Chromium (Cr) 0 to 0.1
Residuals 0 to 0.15
All values are % weight. Ranges represent what is permitted under applicable standards.

APPENDIX B: MATERIAL DATA SHEETS FOR PIR

INSULATION BOARD

PRODUCT INFORMATION

Polyisocyanurate (PIR) insulation is suitable for use in buildings, extensions and renovations, and is one of the most effective insulation materials used in construction. PIR insulation core sandwiched between a choice of high performance fibreglass aluminium, embossed foil, or glass fabric creates a durable, light weight insulation board with superior performance and reduced material cost. Also, available in facing free.

R Value according to AS/NZS 4859.1 Part 2 Section 5.2													
Thickness (mm)	**20**	**25**	**30**	**40**	**50**	**60**	**70**	**75**	**80**	**90**	**100**	**140**	**150**
(mK/W)	0.93	1.17	1.40	1.87	2.34	2.80	3.27	3.50	3.74	4.21	4.67	6.54	7.01
Weight (kg/m²)	0.97	1.19	1.41	1.85	2.29	2.73	3.17	3.39	3.61	4.05	4.49	6.25	6.69

Weight for glass fabric/glass fabric facings

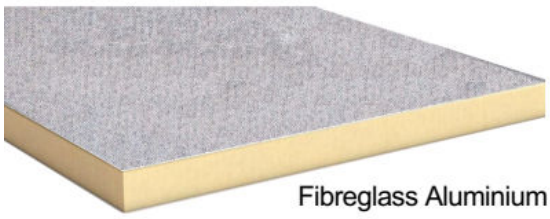
FIRE PERFORMANCE

Fibreglass Aluminium	
AS ISO 9705	
NCC Volume One Specification C1.10 Clause 4 determined in accordance with AS 5637.1	Group 2
NZBC Verification Method C/VM2	Group 2-S

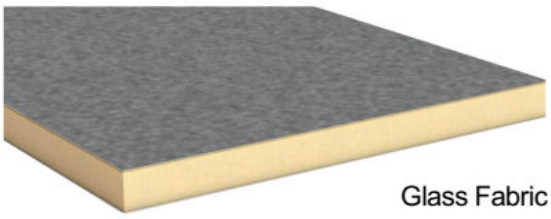
Embossed Foil	
AS ISO 9705	
NCC Volume One Specification C1.10 Clause 4 determined in accordance with AS 5637.1	Group 3
NZBC Verification Method C/VM2	Group 3

PRODUCT PROPERTIES

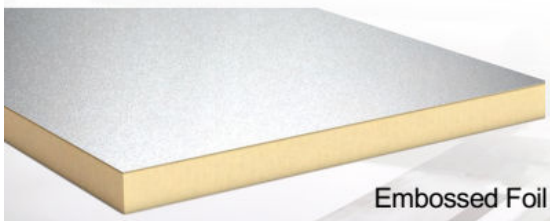
Density	38-42kg/m³
Compressive strength	≥0.15MPa
Shear strength	≥0.11MPa
Water vapour transmission rate	10-15 g/m2.24h
Standard width	1200mm
Standard length	2400mm
Thickness (mm)	20, 25, 30, 40, 50, 60, 70, 75, 80, 90, 100, 140 and 150



Fibreglass Aluminium



Glass Fabric



Embossed Foil

Facing Free

CNZ INSULATION

NEW ZEALAND MADE