Technical Manual

Indurabond

M COMPOSITE PANELS



Version 2.0 July 2021



About this Manual.

This manual has been developed to effectively assist fabricators and contractors to work with Paneltec's Aluminium Composite Panel; Indurabond.

Due to the uncontrollable conditions and methods of job scope, as well as the variable skills and judgment of users/ installers and the quality of equipment, tools, etc, the suggestions and recommendations contained in this manual are provided without warranty.

The information and recommendations contained here in are believed to be correct at time of publishing 01/07/2021.

Paneltec reserves the right to revise the contents of this manual.





About Indurabond.

Indurabond Aluminium Composite Panel (ACP), is Paneltec's highly versatile façade cladding panel, offering excellent durability and extreme weather resistance. It is ideal for façades, fascia, soffits, awnings and many more applications such as standing seam cladding and balustrades.

The 4mm thick composite panel is comprised of a fire rated core, sandwiched between either two aluminium or other natural metal cover sheets. This results in an outstanding surface flatness and high workability, coupled with an excellent strength to weight ratio.

Indurabond can be easily and accurately installed by being fabricated into pre-made cassettes and then secret-fixed to a top hat sub-structure or packers with hidden mechanical fittings.

Indurabond requires minimal maintenance and has an up to 15 year warranty when installed by a licensed installer. With a long track record of consistency, reliability and quality, in addition to our large stock levels, unlimited colour range and continual product development; Indurabond is well-equipped to meet the requirements for every project.

Key Features.



FIRE RATED

Indurabond has been tested to the NFPA 285 test and has passed.

Indurabond has unrestricted use below 10m.



FULL COMPLIANCE

Indurabond has recived the PASS report showing pathways to compliance. Please contact the Paneltec team to recieve files.



COST EFFECTIVE

Indurabond has enjoyed consistent growth not only due to the desire for a clean and modern look, but also as a product offering rapid cost-effective installation.



LOW MAINTENANCE

The Indurabond finish has undergone 40+ years of exposure testing which is continuing to confirm the superior durability and low maintenance of fluorpolymer coatings.



PAINT SYSTEM

Indurabond only uses the highly recognised PVDF KYNAR 500 or FEVE paints known for their durability, providing the optimum weather and UV resistance.



WEATHERPROOFED

Indurabond is weatherproofed to E2 requirements and tested according to AS/NZS 4284 and passed to a high level.



CONCEALED FIX SYSTEM

Indurabond can be installed by routing and folding panels into the concealed fix z-angle cassette system.



WARRANTY

Indurabond has a long track record of consistency, reliability and quality allowing us to offer up to a 15 year warranty when installed by a licensed installer



PREFACE.

Manufacturing Quality.

A dedication to the total fulfilment of our client's and customer's expectations is reflected by a complete quality control system, beginning at the point of specification and continuing through to delivery of the guaranteed products.

All activities are carried out in a manner which:

- Uses the framework of ISO9001 Quality Standards to verify the quality of our systems
- Ensures that our products and services are of the highest standards
- Create continuous improvements to our product through the application of the best quality practices.

Acceptable Variation.

WIDTH	±2.0 mm
LENGTH	±4.0 mm
THICKNESS	±2% for 3 mm & 4 mm; 3% for 6 mm
BOW MAXIMUM	0.5% of the length and/or width
SQUARENESS MAXIMUM	5.0 mm
SURFACE DEFECTS	The surface shall not have any irregularities such as dents, scratches and other imperfec- tions in accordance with our quality assurance

Warranty.

A warranty of up to 15 years is offered, when installed by a licensed installer.







MATERIAL PROPERTIES.

Typical Composition.

- Peel-off Protective Film
 Clear/Nano Coating
 PVDF Coloured Coating
- 4. Primer Coating
- 5. 0.5mm Aluminium Skin
- 6. 3mm FR Core
- 7. 0.5mm Aluminium Skin
- 8. Polyester Anti-corrosion Coating



Aluminium Skins.

Surface material both sides: 0.5mm Aluminium sheets of a minimum 3003 series grade.

Core Material.

The standard Fire Retardant (FR) core has a minimum 70% non-combustible mineral filled core. The FR core contains hydroxide, a non-combustible mineral designed to release water vapour and supress fire spread. in



Dimensions.

Width	Length	Thickness
	2500	
1570	3200	4mm
	4000	
Custom sizes are available, please speak to the Paneltec team.		

Weight.

Thickness	Weight [Kg/M²]
4mm	7.3





Technical Data.

Classification	Test Standard	Unit	4mm Indurabond/FR
Panel Weight		[kg/m2]	7.3
Core Density	ASTM C271	kg/m3	1350kg/m3
Limit of Application		°C	-40C - +80C
Tensile Strength	ASTM E8	kg/m2	5.15
Yield Strength	ASTM E8	kg/m2	12.7
Elongation	ASTM E8	%	7.1
Flexural Stiffness (250mm span)	ASTM C393	kg/m2	6.7x10^8
Flexural Elasticity	ASTM C393	kg/m2	3666
Deflection Temperature	ASTM D648	°C	116
Thermal			
Thermal Expansion	ASTM D696	x10-6/ °C	24
Thermal Conductivity	ASTM D976	Kcal/mhr °C	0.39
Bond Integrity			
> Vertical Pull	ASTM C297	N/mm2	5.9
> Drum Peel	ASTM D1781	mmN/mm	368.7
> Flat Shear	ASTM D1002	N/mm2	6.84
Sound			
Sound Transmission Loss	ISO140/3		RW 26
Sound Transmission Class	ASTM E90		STC 25
Aluminium Skin			
Tensile Strength		N/mm2	Rm140
A0.2% Proof Stress		N/mm2	Rp0.2100
Elongation (50mm)		%	A501



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FINISHES.

Stove Lacquering.

Indurabond only uses the highly recognised PVDF KYNAR 500, FEVE or VITREFLON V700 paints known for their high durability. These premium paints provide an optimum resistance to weather and industrial pollution. More than 40 years of South Florida Exposure Testing is continuing to confirm the superior chemical and physical properties of fluoro polymer coatings.

Indurabond has unlimited colour options, we are able to match any colour, from any other colour range. For a full list of standard Indurabond colours, refer to our Paneltec colour chart.

Anodising.

Indurabond panels come in a range of Anodised finishes, offering both standard and customised colours and textures. It is possible to re-anodise Indurabond in custom colours or designs. Contact Paneltec for more information.

Natural Finishes.

Paneltec offers the following natural finished panels:

- Indurabond/ZN Natural zinc composite panel
- Indurabond /CU Natural copper composite panel
- Indurabond /SS Stainless steel composite panel
- Natural Aluminium Indurabond uncoloured or tinted aluminium finishes

Other coating Finishes.

The Indurabond range also offers the following finishes:

- REPEL A self-cleaning surface coating
- For an ultra-durable vitreous enamel coated panel, please refer to 'Vitranamel', another Fairview product.

Technical Data of KYNAR 500 PVDF Coating.

Classification	Test Standard	Result	Remarks	
Substrate	ASTM D1005	Pass	Aluminium	
Flexibility	ASTM D4145 ECCA T7 NCCA 11-19	Pass	1~2T - No Cracking	
DFT	ASTM D1400 ASTM D1005 NCCA 11-13, 14, 15	Pass		
Colour Difference	ASTM 2244	∆E<5	4000hrs	
Gloss Meter	ASTM D523	Pass		
Gloss Retention	ASTM 2244	85%	4000hrs	
Chalking Resistance	ASTM 2244	<8 units	4000hrs	
Pencil Hardness	ASTM D3363	2H		
Dry Film Adhesion Wet Adhesion Hot Adhesion	ASTM D3363	Pass Pass Pass	38°C, 24hrs 100°C, 24hrs	
Reverse Impact Resistance	ASTM D2794	No Cracking	12.7mm x 0.5kg x 500mm	
Bending/Gardner Impact	ASTM D3281	Pass	Normal	
Solvent Resistance	ASTM 2794	Pass	MEK double rubs	
Acid Resistance	ASTM 1308	Pass	7 days soaking in 10% H2SO4	
Alkali Resistance	ASTM 1308	Pass	7 days soaking in 10% NaOH	
Detergent Resistance	ASTM D2248	Pass	72 hrs soaking in 3% detergent	
Salt Resistance	ASTM B117	Includes the following:		
Gloss Retention	ASTM D523	0.8% change	5000hrs	
Colour Retention	ASTM 2244	E<0.68	5000hrs	
Chalk Resistance	ASTM 4214	Rating: 10	Top rating - no chalk (5000hrs)	
Humidity Resistance	ASTM D714	Pass	2000hrs	
	ASTM B117	Includes the following:		
Gloss Retention	ASTM D523	No visible change	5000hrs	
Colour Retention	ASTM 2244	E<0.52	5000hrs	
Chalk Resistance	ASTM 4214	Rating: 10	Top rating - no chalk (5000hrs)	
Weathering Resistance	ASTM G53	Includes the following:		
Gloss Retention	ASTM D523	6.2% Change	5000hrs	
Colour Retention	ASTM 2244	E<0.27	5000hrs	
Chalk Resistance	ASTM 4214	Rating: 10	Top rating - no chalk (5000hrs)	
	ASTM C207	Pass	Mortar, 24hrs	
Chemical Resistance		Pass	10% Hcl, 15 min	
	ASTM D1308	Pass	70% HN03 Vapours, 30 min	
		Includes the	following:	
Gloss Retention	ASTM D523	6.2% Change	16hrs	
Colour Retention	ASTM 2244	No Change	16hrs	
Chalk Resistance	ASTM 4214	Rating: 10	Top rating - no chalk (5000hrs)	





Fire Resistance.

The Fire Resistance standards achieved with Indurabond are as follows:

INDURABOND			
TEST STANDARD	RESULT		
	PASS	Ignitability Index	0
AS1530.3	PASS	Heat Evolved	0
	PASS	Spread of Flame	0
	PASS	Smoke Developed	0-1
EN13501	B-s1, d0		
ISO 9705	Group 2		
NFPA 285 (large scale wall test)	PASS		

Given the lack of flame propagation in extensive large scale testing, Indurabond FR can be used on a performance basis to meet fire resistance requirements and has unrestricted use below 10 metres.

However, for peace or mind and safety for compliance in the future use where non-combustible material is required and high-rise projects, see Paneltec's Induracore G2.





Windloading.

Capacities based on material properties taken from AS1664.1 and verified by tests provided by Fairview Architectural

Indurabond ACP Properties

- E = 70000 Mpa (MPa Elastic modulus)
- t = 4.0mm (Overall thickness of ACP)
- t1 = 0.5mm (Alumimium cover sheet thicknes)
- I = 3083mm4 / m (Second moment of area per m width)
- Z = 1542mm3 / m (Section modulus per m width)
 - FL = 82.875 MPa (Design flexural strength)

Panel Configuration

a Serviceability Limit = SPAN/150 b = span of panel a = length of panel (Max. a = 4000m)

b

Substructure minimum steel specification

Fy = 270Mpa Fu = 350Mpa

t = 115 mm BMT

			Limiting	Pressure	Scre	w Capacity,	Φ	
Panel Width	Panel Length	Ratio a/b	Strength	Servicability	0.718	0.821	0.941	1.078
b (mm)	a (mm)		Pu (mm)	P₅(kpa)	Max. Spacing	g of screws fixin	ig casette to sul	oscribe (mm)
(11111)	(1111)				No. 8	No. 10	No. 12	No. 14
	400	1.0	9.000	9.000	200	225	260	300
100	600	1.5	9.000	5.438	200	225	260	300
400	800	2.0	9.000	4.194	200	225	260	300
	1000	2.5	9.000	3.751	200	225	260	300
	1200	3.0	9.000	3.555	200	225	260	300
	600	1.0	9.000	3.126	130	150	170	200
	900	1.5	7.254	1.611	160	185	215	245
600	1200	2.0	5.899	1.243	200	230	265	300
	1500	2.5	5.417	1.111	220	250	285	300
	1800	3.0	5.204	1.053	225	260	300	300
	900	1.0	5.697	0.926	140	160	180	210
	1350	1.5	3.224	0.477	245	280	300	300
900	1800	2.0	2.622	0.368	300	300	300	300
	2250	2.5	2.408	0.329	300	300	300	300
	2700	3.0	2.313	0.312	300	300	300	300
	1200	1.0	3.205	0.391	185	210	240	280
	1800	1.5	1.813	0.201	300	300	300	300
1200	2400	2.0	1.475	0.155	300	300	300	300
	3000	2.5	1.354	0.139	300	300	300	300
	3600	3.0	1.301	0.132	300	300	300	300
	1500	1.0	2.051	0.200	230	265	300	300
	2250	1.5	1.161	0.103	300	300	300	300
1500	3000	2.0	0.944	0.080	300	300	300	300
	3750	2.5	0.867	0.071	300	300	300	300
	4000	3.0	0.852	0.070	300	300	300	300

Stiffeners can be used for panel configurations that do not meet the service ability criteria where strength is satisfied.

Stiffener to be 32x25x3.0mm U-section of A6005-T5 or A6105-T5 material fixed to the back of the Indurabond ACP with a continuous strip of 25mm wide 3M VHB tape 4956



Fixing Specification.

Indurabond ACP Fixing Specification:

Rivets / Cassette

- Minimum dia. 5mm rivets for fixing the Indurabond ACP to Z-section rails.
- Minimum 3 rivets per side, not including rivet securing the corner fold.
- Maximum spacing of rivets 300mm.
- Minimum 25mm edge fold in Indurabond ACP sheet.
- Minimum edge distance to edge of hole in Indurabond ACP e = 2xd f(= 10mm for 5mm rivet).

Thermal Insulation Properties.

Thermal Resistance		
FROM -50°C to +80°C		
Panel Thickness (mm)	Thermal Resistance (m2.K/W)	Heat Transmission Coefficient W/(m2.K)
3	0.0069	5.65
4	0.0103	5.54
6	0.0172	5.34

Average Expansion.

Material	Expansion Coefficient (x10 -6/°C)	Elongation per 1000mm T=50°C
Indurabond	23.8	1.2mm
Aluminium	23.8	1.2mm
Zinc	26.7	1.3mm
Steel	12.2	0.6mm
Concrete	12	0.6mm





FABRICATION METHODS.



Cutting.

Indurabond can be cut with a wall-saw, circular saw, bandsaw or jigsaw. The requirements for a circular saw are as follows:

The cutting tool material to be carbide tipped, thickness 2-4mm		
Tooth geometry:	Trapeze/flat	
Tooth pitch:	10-12mm	
Rake Angle:	5° (positive)	
Clearance Angle:	15°	
Max cutting speed:	500m/min	
Max feed speed:	30m/min	



Contour Cutting.

Indurabond panel can be contour cut with water jets, CNC routers, copy routers and jigsaws.



Routing/Folding

Indurabond panel can be cold shaped, enabling it to form various shapes and sizes. A rectangular or V-shaped groove can be routered on the back of the panel, following potential fold lines. A thin layer of core should remain at the base of the groove. The panel can then be hand folded along this groove, creating a precise and even fold. The outer radius of the fold can be determined by the shape and width of the routered groove.

There must be between 0.3mm and 0.5mm of core material left at the base of the routed groove. Too much material can cause delamination at the corner, cracking of the core when a back fold is preformed and result in a larger radius fold than desired. It will also make folding the panel more difficult and prevent the required fold angle from being obtained.





Shearing.

Shearing can be done with a guillotine. Ensure the blanking tools are padded. Shearing causes a slight roll down along the cut edge of the panel cover sheet.

	1	-		
	5	-	-	
6	_	_		_

Punching.

The punching of flat formed parts from Indurabond is performed in the same way as a solid aluminium sheeting, using sharp tools and dies with minimal cutting clearance. Varying shapes may easily be punched with normal aluminium punching machinery. As with shearing, a slight roll down may occur.



Roll Bending.

Indurabond panel can be bent with a roll-bending machine. Use polished rollers free of imperfections only. Minimum radius of 60mm.



Screwing.

Indurabond can be screwed with conventional stainless steel for wood and metal. For outdoor use allow for thermal expansion.



FABRICATION METHODS.



Riveting.

Riveting is possible with the usual equipment and solid rivets or blind rivets. For outdoor use allow for thermal expansion.



Drilling.

Indurabond panel can be drilled with centre point twist drills normally used for aluminium and plastics or machines common for metals. Drill material: High-Speed Steel (HSS).



Bending.

Bending is possible with a folding table or brake press. The inside bending radius is roughly 10 times the Indurabond panel thickness. Use protective foils. There is more spring-back effect than with solid aluminium sheet. For serial production, tests should be made on sample panels.



Gluing.

Usual metal adhesives or double sided VHB tape should be used. There is low adhesion to the core.



Edge close-out & Treatment details.







Fixing System.



Installation Guidelines.

- All sheets should be installed in the same direction as marked on the protective film to prevent possible finish variation
- As minor colour variation can occur between production lots, it is recommended to place total requirement for a project in one order to ensure colour consistency
- Where aluminium materials come in contact with dissimilar metals, a proper insulator or isolation tape should be applied to insulate between dissimilar materials in order to avoid corrosive and electrolytic action
- For Cassette Fix, the bend-in portions between panel joints should not be caulked before protective film is removed



MISCELLANEOUS.

Protective Film.

- Make sure no damage will occur to the panel following removal of protective film
- Remove protective film within 45 days of installation to avoid glue residuals on panel surface due to weathering
- Do not apply PVC tapes, polyurethane sealant or silicone sealant onto Indurabond protective film. The plasticiser contained in these materials can penetrate the protective film and cause a gloss change in the coating.
- Do not apply spray paint or permanent marker to the film as the colour may penetrate the film and affect the panel.

Handling and Storage.

- Considerable care should be taken in the handling of Indurabond
- Indurabond panels are sensitive to impact, particularly shocks from small, hard objects, which can dent the aluminium cover sheet
- A minimum of two people should be used when moving large sheets to avoid scratching
- To prevent surface damage when stacking Indurabond, there should be nothing between the panels
- Indurabond should be stored in a cool and dry area where temperature is relatively stable
- Pallets of Indurabond should be stored horizontally with adequate support to prevent sagging
- Stacked pallets should be identically sized and not more than four (4) pallets high.

Other coating Finishes.

Indurabond has been designed with an expected performance life of over 50 years.

All Paneltec products have been developed with the health of the environment and community in mind. As part of our commitment to using recyclable or reusable materials wherever possible; all Indurabond ACP is 100% recyclable.



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19

