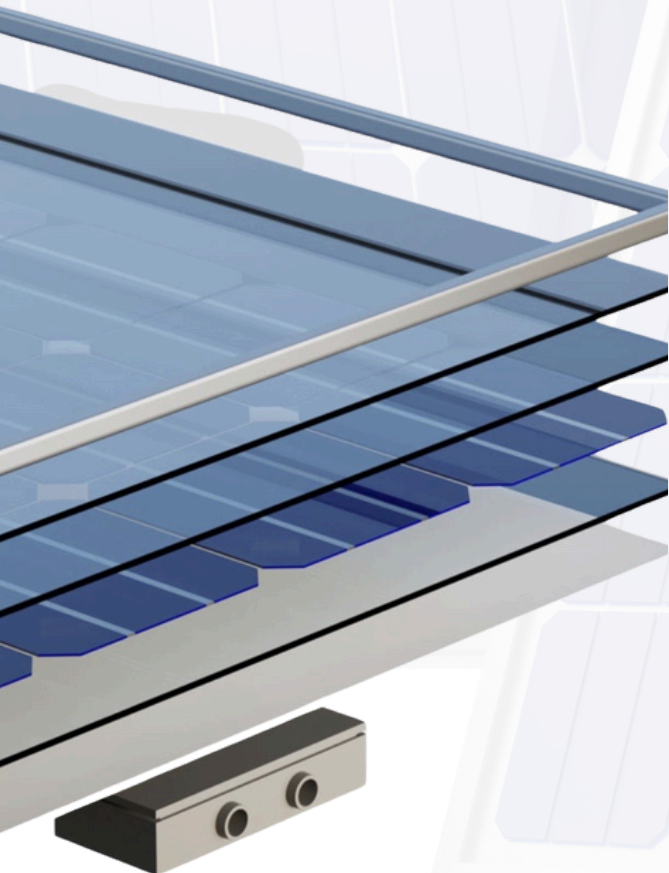




ALISHAN

GREEN ENERGY PVT. LTD.

ENCAPSULANTS BACKSHEETS



ALISHAN ENCAPSULANTS

ALISHAN BackPRO

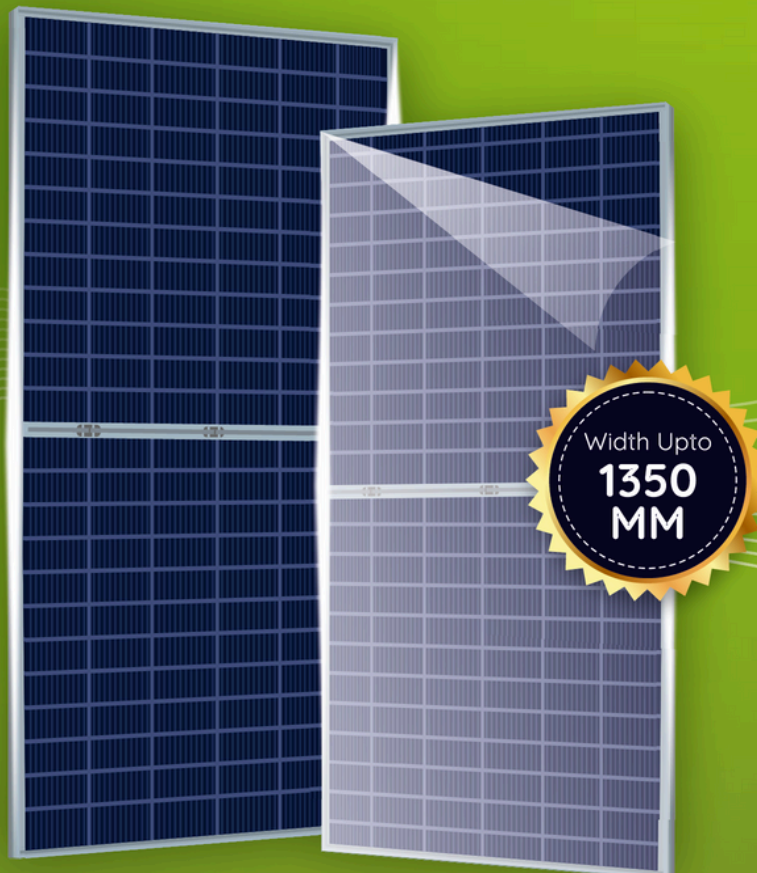


GREEN ENERGY PVT. LTD.

Alishan Encapsulants & Backsheets

Bigger Size
Better Performance
Best Solution

For
M10 & M12 Solar Cell Module



ALISHAN GROUP OF COMPANIES

Founded in 1988 in the small town of Kantabanji in Odisha under the leadership of Mr Kishanlal Agrawal, we have come a very long way. Starting with a small mining operation, Alishan Group has now many verticals under its varied portfolio. The group's diverse businesses include Mining, Construction, Hospitality, Textiles, FMCG, Entertainment and Energy. The group now has a presence in the states of Odisha, Chattishgarh and New Delhi.

Key Management Personels: Mr Kishan Lal Agrawal, Mr Sushil Kumar Agrawal, Mr Ashish Agrawal, Mr Akash Agrawal and Mr Nikhil Agrawal.



ABOUT US

Alishan Green Energy is one of the leading manufacturers of Solar Encapsulants and Backsheets, having a state of the art manufacturing facility of GW each at Raipur, C.G.

We have introduced advanced large-scale manufacturing equipment and the latest processes with core technologies to produce high-quality Encapsulants and Backsheets for PV modules. Our products are the best solution for solar modules' safety and durability.

Our strategies were defined in line with the focus on anticipating and satisfying customers' needs, providing high-quality products, and smoothly managing supply-chain. Our strength lies in innovation and creativity, technical know-how, long-standing dedicated employees and hassle free business with our customers and suppliers.

MISSION

We at Alishan Green Energy are committed to sustainable management of the environment and it's finite resources. We are serving the solar module manufacturing and strict supervision at every stage with the help of world class equipments make our products stand apart in the market.

VISION

Our objective is in line with the vision of our honorable Prime Minister to Make India 'Atma Nirbhar'. Our Vision is to create a world class ecosystem for complete indigenisation of Solar PV Modules by manufacturing all the key components locally.

CORE VALUES

To be leaders of the consumer convenience products industry and to establish ourselves as a global player by creating value for all stakeholders and contributing to society at large. We possess the capability to create the most advanced and innovative products and services using the latest technologies. Our expert design and engineering team helps you choose the right products with the best value to match your energy needs perfectly. At Alishan, we ensure that our products offer best reliability and performance, thus bringing the cost of ownership to lowest. Our in-house R&D team sees tremendous opportunity in harnessing solar as an alternative energy and thus, continuously strives towards developing new technologies & products to fulfil the ever-growing global energy needs.

OUR FACILITY

Integrating best people, machinery, processes and materials to deliver quality products and services.



Upcoming
4.2 GW
Manufacturing
Capacity of
EVA



3 GW
Manufacturing
Capacity of
Backsheet



State of the Art
Production Line



Quality
Controlled
Process



Best Rated
Manufacturing
Materials



100+
Customers

R&D

Boasting advanced technology with cutting-edge research and the latest technologies, we are deeply involved in developing custom-designed solutions for reliable solar modules. We strive for excellence through our innovative approaches and market research which keep our products always in demand from prestigious customers. We are proud to establish a 24X7 quality control lab which is a house of various climatic chambers, UV-VIS spectrophotometer, laminator, UTM, etc. The efforts will be increased towards the development of state of a art laboratory equipped with high-end and sophisticated instruments that are essential for coming up with innovative products each year.

Manufacturing Excellence

The Company's focus on manufacturing excellence is born out of its core philosophy of 'customer first'. This philosophy is visible in every aspect of its operations and is deeply embedded in the DNA of every division, process, team and member of the Alishan family. Manufacturing Excellence is achieved through a relentless focus on the four main pillars of:

- **Technology**
- **Quality**
- **Management Practices**
- **People**

TOP CLASS TESTING FACILITY

The combined expertise of our people and stringent quality checks for solar Encapsulants and backsheets ensure maximum output and reliability of solar PV modules.



UV CHAMBER



RELIABILITY HUMIDITY CHAMBER

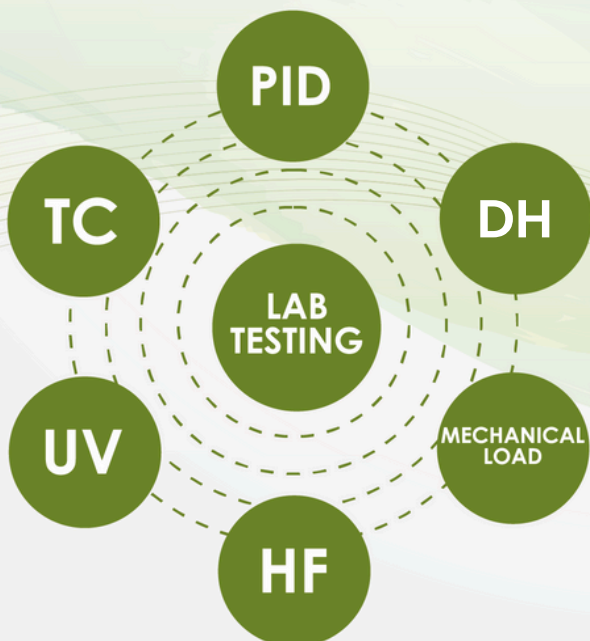


LAMINATOR



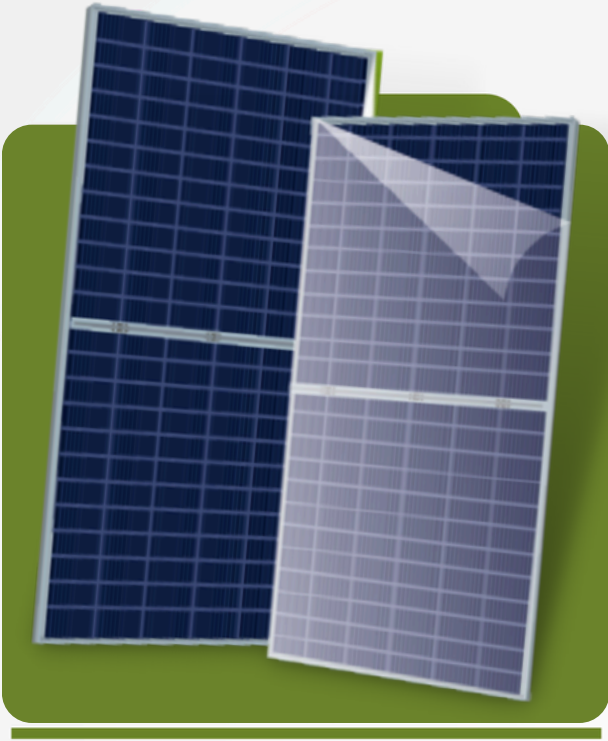
PRESSURE COOKER TEST (PCT)

Product You Can Rely On



Alishan Green Energy always believe in maintaining high reliability and solid performance based on our commitment to quality first policy.

QUALITY ASSURANCE & CUSTOMER SUPPORT



Corporate Quality Assurance

A well experienced team of Corporate Quality assurance is in place to ensure implementation of robust quality system across Alishan. CQA is acting as key function to implement quality policies, latest update in GMP, regulatory guidelines, guiding business unit quality team to deliver quality products in quality time.

Each department has well trained personnel for quality to implement and follow the quality system.

The Alishan Quality Guarantee

Alishan EVA Encapsulants are subjected to meticulous in-house and independent quality control, and are certified by the independent testing institutions UL.

We're passionate to develop a real partnership with our customers and suppliers throughout the entire supply chain in order to guarantee a total customer satisfaction. From introducing and recommending our products and services, and working on joint-cooperation proposals, to the preparation of transaction documents and help with logistics, Alishan provides full service from pre-sales through to after-sales requirements, always aiming to provide a professional and efficient response to all customer requests.

PRODUCT PORTFOLIO

Solar Encapsulants play an important part in enhancing the durability and performance of the solar panels. Alishan encapsulants are manufactured with proven raw materials with optimized process parameters. Our products are reliable for IEC 61730 tests and sequences. Featuring products in a wide range of sizes and types, our portfolio of encapsulants is a trusted source for many of the India's largest PV module manufacturers.

Alishan Fast Cure EVA is a fast cure encapsulant that is designed to work with PV modules with protection against UV-aging and weathering while helping to ensure maximum amount of visible light transmission to solar cells.

Alishan Ultra Fast Cure EVA is a Ultra fast-cure encapsulant which help to reduce lamination cycle time to 10mins-12mins. While the PV module productivity can be greatly increased with Ultra fast Cure EVA, excellent durability, as well as PID and snail trails resistance will be exhibited.

Alishan T (UV Transparent) functions as the top layer, taking extra light from the UltraViolet spectrum to help increase solar panel output.

Below are few properties of our EVA



Low Thermal Shrinkage



Short Lamination Cycle Time



Superior Bonding to Glass
& Backsheet



PID Resistant



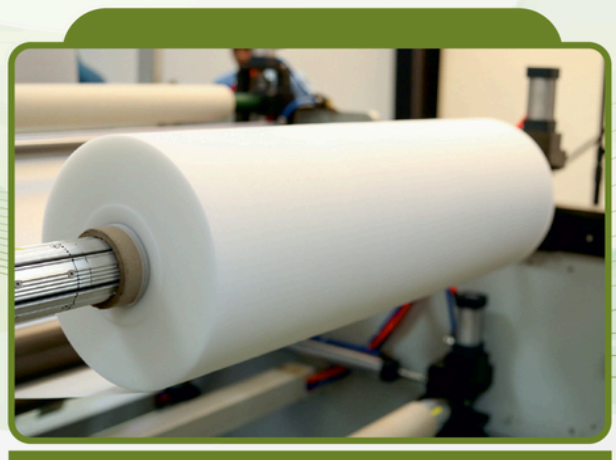
High Transmittance



Excellent UV and Damp-heat
Stability



Snail Trail Resistance



ALISHAN EPE ENCAPSULANT

Alishan EPE is multilayer coextruded film of EVA-POE manufactured by Alishan Green Energy with the cutting edge manufacturing facility. Alishan EPE is suitable for TopCon, PERC and HJT technologies for M10 or G12 configurations. Alishan EPE ensures acid free environment inside the module and hence provides excellent suitability with any metal grid.

Product	Alishan EPE				
Linear meter	Up to 300 meters				
Width	Up to 1350 mm				
Thickness	Up to 0.80 mm				
Properties	Description	Standard	UOM	Alishan EPE	Alishan EPE-T
Physical properties	Tensile strength	ASTM D 638	MPa	12 ± 3	12 ± 3
	Elongation		%	≥ 600	≥ 600
	Adhesion with Glass	ASTM D 903	N/cm	≥ 75	≥ 75
	Adhesion with Backsheet		N/cm	≥ 75	≥ 75
Thermal Property	Thermal Shrinkage	160 Deg C / 5 min	%	MD ≤ 3	MD ≤ 3
				TD ≤ 1	TD ≤ 1
Water Ingress	WVTR	ASTM F 1249	g/m ² .day	< 5	< 5
Electrical Property	Volume resistivity	ASTM D257-14	Ohm. cm	>1×10 ¹⁵	>1×10 ¹⁵
Gel content		ASTM D 2765	%	> 75	> 75
Optical Properties	Transmittance	ASTM E 424	%	≥ 91	≥ 91
	Yellowness Index		-	< 2	< 2
	UV-cut off		nm	360 ± 30	-
Lamination Parameters			UOM	Values	Values
	Vacuum / Evacuation Time		Minutes	5 - 8	5 - 8
	Lamination / Pressing Time		Minutes	10 - 14	10 - 14
	Lamination Temperature		°C	120 - 150	120 - 150

RELIABILITY DATA OF ALISHAN EPE

Ageing	Standard	Parameters	Value
DH 3000 hours 85% RH, 85°C	IEC 62788-2	Peel strength with Glass	> 50 N/10 mm
		Peel strength with Backpro-KPC	> 50 N/10 mm
		Peel strength with Backpro-KPC-T	> 40 N/10 mm
		Transmittance	> 91 %
		Yellowness Index	< 3
UV 180 kWh/m ²	IEC 62788-2	Peel strength with Glass	> 60 N/10 mm
		Peel strength with Backpro-KPC	> 50 N/10 mm
		Peel strength with Backpro-KPC-T	> 40 N/10 mm
		Transmittance	> 91 %
		Yellowness Index	< 2
PID Resistance	IEC 62804	Power degradation	<2%

RELIABILITY DATA OF ALISHAN EPE

(PID performance with Topcon cells)



GREEN ENERGY PVT. LTD.

3rd Cycle Results – Electrical Parameter & Electroluminescence (EL) Images					
Voc (V)	53.24	FF (%)	81.92		
Isc (A)	13.23	Efficiency (%)	22.34		
Vmp (V)	45.61	Rseries / Rshunt (Ohm)	0.27/535.81		
Imp (A)	12.65	Cal. ID (& Power)	RSEPT2060224003193 (576.65 Watt)		
Pmax (W)	576.78	Control ID (& Power)	RSEPT2060224000792 (577.51 Watt)		
IV Curve			Electroluminescence (EL) Image		
Visual Inspection Result after 3rd Cycle: No defects found.					
Wet Leakage Test Data - Final					
Measured Value	6033 MΩ	Pass Criteria	≥ 40 MΩ.m ²	Result	PASS
Power degradation after PID test					
Total Power Degradation in Watt : 3.60 Watt in % : 0.62 %				Criteria	Result
				≤ 5 %	PASS

Packing

The EPE rolls are wound a standard 3 inches (inner diameter) paper core, the standard length of EPE film in a roll is up to 300 meters. Each roll was wrapped in polyethylene film and placed in a carton box and 9 boxes are placed in a pallet.

Storage

Must be stored in a dry and temperature of ≤ 30°C and humidity ≤ 60%, the shelf life of this product is 9 months from the date of manufacturing.



ALISHAN POE ENCAPSULANT

Alishan POE is Polyolefin based encapsulant manufactured by Alishan Green Energy Private Limited, in the world-class manufacturing technology with proven raw materials. Alishan POEs are excellent PID and snail trail resistant and suitable for both Glass – Glass and Glass – back sheet modules. Our POE ensures the reliability and life of solar modules in the field.

Product	Alishan POE			
Linear meter	Up to 300 meters			
Width	Up to 1350 mm			
Thickness	Up to 0.80 mm			
Properties	Description	Standard	UOM	Alishan POE
Physical properties	Tensile strength	ASTM D 638	MPa	12 ± 3
	Elongation		%	≥ 500
	Adhesion with Glass	ASTM D 903	N/cm	≥ 70
	Adhesion with Backsheet		N/cm	≥ 70
Thermal Property	Thermal Shrinkage	160 Deg C / 5 min	%	MD ≤ 3 TD ≤ 1
Electrical Property	Volume resistivity	ASTM 257-14	Ohm. cm	>1×10 ¹⁶
Gel content		ASTM D 2765	%	> 60
Optical Properties	Transmittance	ASTM E 424	%	≥ 90
	UV cut off		nm	360 ± 30
	Yellowness Index		-	≤ 1
Lamination Parameters			UOM	Values
	Vacuum / Evacuation Time		Minutes	6 - 10
	Lamination / Pressing Time		Minutes	12 - 16
	Lamination Temperature		°C	140 - 160

RELIABILITY DATA OF ALISHAN POE

Ageing	Standard	Parameters	Value
DH 3000 hours 85% RH, 85°C	IEC 62788-2	Peel strength with Glass	> 50 N/10 mm
		Peel strength with Backpro-KPC	> 40 N/10 mm
		Peel strength with Backpro-KPC-T	> 40 N/10 mm
		Transmittance	> 90 %
		Yellowness Index	< 3
UV 180 kWh/m ² 85% RH, 85°C	IEC 62788-2	Peel strength with Glass	> 60 N/10 mm
		Peel strength with Backpro-KPC	> 50 N/10 mm
		Peel strength with Backpro-KPC-T	> 40 N/10 mm
		Transmittance	> 91 %
		Yellowness Index	< 2

Packing

The POE rolls are wound a standard 3 inches (inner diameter) paper core, the standard length of POE film in a roll is up to 300 meters. Each roll was wrapped in polyethene film and placed in a carton box and 9 boxes are placed in a pallet.

Storage

Must be stored in a dry and temperature of $\leq 30^{\circ}\text{C}$ and humidity $\leq 60\%$, the shelf life of this product is 9 months from the date of manufacturing.

ALISHAN POE - T ENCAPSULANT

Alishan POE - T is Polyolefin based encapsulant manufactured by Alishan Green Energy Private Limited, in the world-class manufacturing technology with proven raw materials. Alishan POEs are excellent PID and snail trail resistant and suitable for both Glass - Glass and Glass - back sheet modules. Our POE ensures the reliability and life of solar modules in the field.

Product	Alishan POE - T			
Linear meter	Up to 300 meters			
Width	Up to 1350 mm			
Thickness	Up to 0.80 mm			
Properties	Description	Standard	UOM	Alishan POE - T
Physical properties	Tensile strength	ASTM D 638	MPa	12 ± 3
	Elongation		%	≥ 500
	Adhesion with Glass	ASTM D 903	N/cm	≥ 70
	Adhesion with Backsheet		N/cm	≥ 70
Thermal Property	Thermal Shrinkage	160 Deg C / 5 min	%	MD ≤ 3 TD ≤ 1
Electrical Property	Volume resistivity	ASTM 257-14	Ohm. cm	>1×10 ¹⁶
Gel content		ASTM D 2765	%	> 60
Optical Properties	Transmittance	ASTM E 424	%	≥ 90
	UV cut off		nm	-
	Yellowness Index		-	≤ 1
Lamination Parameters			UOM	Values
	Vacuum / Evacuation Time		Minutes	6 - 10
	Lamination / Pressing Time		Minutes	12 - 16
	Lamination Temperature		°C	140 - 160

Packing

The POE - T rolls are wound a standard 3 inches (inner diameter) paper core, the standard length of POE - T film in a roll is up to 300 meters. Each roll was wrapped in polyethylene film and placed in a carton box and 9 boxes are placed in a pallet.

Storage

Must be stored in a dry and temperature of ≤ 30°C and humidity ≤ 60%, the shelf life of this product is 9 months from the date of manufacturing.

ALISHAN FC EVA ENCAPSULANT

Alishan FC is one of the fast-cure variants of EVA encapsulants manufactured by Alishan Green Energy Private Limited, in world-class manufacturing technology with proven raw materials. Alishan EVAs are PID and snail trail resistant. Our EVA ensures the reliability and life of solar modules in the field, these fast cure EVA encapsulants can be laminated in up to 15 minutes at a temperature varying from 140 - 150° C.

Product	Alishan FC			
Linear meter	Up to 300 meters			
Width	Up to 1350 mm			
Thickness	Up to 0.80 mm			
Properties	Description	Standard	UOM	Alishan FC
Physical Properties	Tensile strength	ASTM D 638	MPa	≥ 16
	Elongation		%	≥ 600
	Adhesion with Glass	ASTM D 903	N/cm	≥ 75
	Adhesion with Backsheet		N/cm	≥ 75
	VA Content	-	%	28 ± 2
Water Ingress	Water absorption	ISO 62	%	≤ 0.1
Thermal Properties	Thermal Shrinkage	160 Deg C / 5 min	%	MD ≤ 3 TD ≤ 1
	Thermal conductivity	ISO 22007	W/ m K	0.2475
Electrical Properties	Dielectric Strength	ASTM D 149	kV/mm	32
	CTI(Comparative Tracking Index)	IEC 60112	V	600
	Volume resistivity	ASTM 257-14	Ohm. cm	>1×10 ¹⁵
Gel content		ASTM D 2765	%	≥ 75
Optical Properties	Transmittance	ASTM E 424	%	≥ 91
	UV cut off		nm	360 ± 30
	Yellowness Index		-	≤ 1
	Refractive Index	ASTM D 1218	-	1.48
Lamination Parameters			UOM	Values
	Vacuum / Evacuation Time		Minutes	4 - 6
	Lamination / Pressing Time		Minutes	8 - 10
	Lamination Temperature		°C	140 - 150

Packing

The EVA rolls are wound on a standard 3 inches (inner diameter) paper core, the standard length of EVA film in a roll is up to 300 meters. Each roll was wrapped in polyethylene film and placed in a carton box and 9 boxes and placed in a pallet.

Storage

Must be stored in a dry and temperature of ≤ 30°C and humidity ≤ 60%, the shelf life of this product is 9 months from the date of manufacturing.

ALISHAN LOW ACID EVA

Alishan Low Acid EVA is specially formulated to overcome the corrosion issues related to traditional EVA. Our low Acid EVA can be used to ensure minimum water ingress and acid leaching for stable performance of sensitive cells surfaces like TOPCon or HJT.

Product	Alishan Low Acid EVA			
Linear meter	Up to 300 meters			
Width	Up to 1350 mm			
Thickness	Up to 0.80 mm			
Properties	Description	Standard	UOM	Alishan Low Acid EVA
Physical Properties	Tensile strength	ASTM D 638	MPa	≥ 16
	Elongation		%	≥ 600
	Adhesion with Glass	ASTM D 903	N/cm	≥ 75
	Adhesion with Backsheet		N/cm	≥ 75
	VA Content	-	%	28 ± 2
Water Ingress	Water absorption	ISO 62	%	≤ 0.1
Thermal Properties	Thermal Shrinkage	160 Deg C / 5 min	%	MD ≤ 3 TD ≤ 1
	Thermal conductivity	ISO 22007	W/ m K	0.2475
Electrical Properties	Dielectric Strength	ASTM D 149	kV/mm	32
	CTI(Comparative Tracking Index)	IEC 60112	V	600
	Volume resistivity	ASTM 257-14	Ohm. cm	>1×10 ¹⁵
Gel content		ASTM D 2765	%	≥ 75
Optical Properties	Transmittance	ASTM E 424	%	≥ 91
	UV cut off		nm	360 ± 30
	Yellowness Index		-	≤ 1
	Refractive Index	ASTM D 1218	-	1.48
Lamination Parameters			UOM	Values
	Vacuum / Evacuation Time		Minutes	4 - 6
	Lamination / Pressing Time		Minutes	8 - 10
	Lamination Temperature		°C	140 - 150

Packing

The EVA rolls are wound on a standard 3 inches (inner diameter) paper core, the standard length of EVA film in a roll is up to 300 meters. Each roll was wrapped in polyethylene film and placed in a carton box and 9 boxes and placed in a pallet.

Storage

Must be stored in a dry and temperature of ≤ 30°C and humidity ≤ 60%, the shelf life of this product is 9 months from the date of manufacturing.

ALISHAN FRONT EVA ENCAPSULANT

Alishan Front EVA is one of the fast-cure variants of EVA encapsulants manufactured by Alishan Green Energy Private Limited, in world-class manufacturing technology and proven raw materials. This is especially meant for front/top EVA solutions with UV transparency and better PID resistance. Our EVA ensures the reliability and life of solar modules in the field, these fast cures EVA encapsulants can be laminated in up to 15 minutes at a temperature varying from 140 - 150° C.

Product	Alishan Front EVA			
Linear meter	Up to 300 meters			
Width	Up to 1350 mm			
Thickness	Up to 0.80 mm			
Properties	Description	Standard	UOM	Alishan Front EVA
Physical Properties	Tensile strength	ASTM D 638	MPa	≥ 16
	Elongation		%	≥ 600
	Adhesion with Glass	ASTM D 903	N/cm	≥ 75
	Adhesion with Backsheet		N/cm	≥ 75
	VA Content	-	%	28 ± 2
Water Ingress	Water absorption	ISO 62	%	≤ 0.1
Thermal Properties	Thermal Shrinkage	160 Deg C / 5 min	%	MD ≤ 3 TD ≤ 1
	Thermal conductivity	ISO 22007	W/ m K	0.2475
Electrical Property	Dielectric Strength	ASTM D 149	kV/mm	32
	CTI(Comparative Tracking Index)	IEC 60112	V	> 600
	Volume resistivity	ASTM 257-14	Ohm. cm	>1×10 ¹⁵
Gel content		ASTM D 2765	%	≥ 75
Optical Properties	Transmittance	ASTM E 424	%	≥ 91
	UV cut off		nm	-
	Yellowness Index		-	≤ 1
	Refractive Index	ASTM D 1218	-	1.48
Lamination Parameters			UOM	Values
	Vacuum / Evacuation Time		Minutes	4 - 6
	Lamination / Pressing Time		Minutes	8 - 10
	Lamination Temperature		°C	140 - 150

Packing

The EVA rolls are wound on a standard 3 inches (inner diameter) paper core, the standard length of EVA film in a roll is up to 300 meters. Each roll was wrapped in polyethene film and placed in a carton box and 9 boxes are placed in a pallet.

Storage

Must be stored in a dry and temperature of ≤ 30°C and humidity ≤ 60%, the shelf life of this product is 9 months from the date of manufacturing.

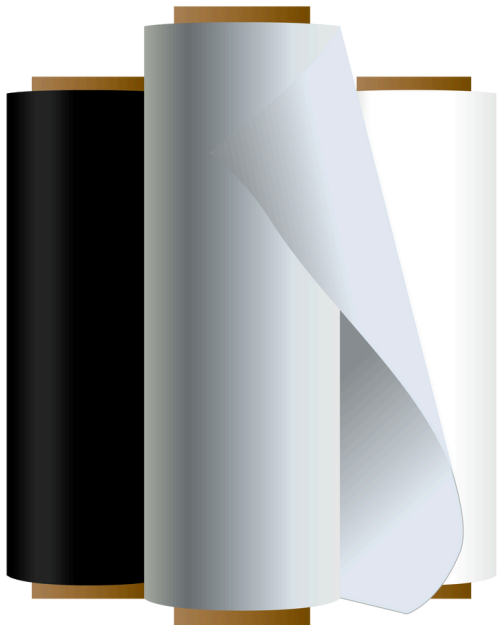
PRODUCT PORTFOLIO

BackPRO BACKSHEETS

Solar modules have to go through harsh environmental conditions like extreme heat & sunlight, and also excessive rain and humidity. They are expected to withstand such environmental stresses for 25 years without excessive degradation (<20%) in power for them to qualify for most applications.

Backsheet plays a key role in protecting the solar panel and giving it the required longevity. **Alishan BackPro** Backsheets provide everything required for protecting solar panels, such as:

BackPRO



FLUORO

NON FLUORO

TRANSPARENT

BLACK

Moisture Proof



0

Zero Decolouration

High Reflectance



Excellent UV
Withstanding

High Dielectric Strength



Superior Bonding
with EVA

High Electrical Resistance



Upto 1500 V System
Discharge

3X IEC Tested



Superior Interlayer
Adhesion

No Chalking



Near Zero Thermal
Shrinkage

Highly Reliable



BackPro ABS-PPC

Alishan Back Sheet BackPro ABS-PPC is available with 1000 & 1500 V system voltage with airside HPET layer and proprietary cell side Fluoro coating layer.

STRUCTURE DETAILS		ABS - PPC	
LAYER NO.	PARTICULARS		
1	Air side HPET layer		
2	Adhesive layer		
3	Middle PET layer		
4	Cell side Fluoro Coating		

S. NO.	PROPERTIES	UOM	TEST METHOD	ABS - PPC (1000 V)		ABS - PPC (1500 V)	
1	Thickness	µm	Micrometer	195 ± 5 %		310 (-10/+15)	
2	Width	mm	Scale	Up to 1350		Up to 1350	
3	Tensile Strength	MPa	ASTM D 882	MD	≥ 100	MD	≥ 100
				TD	≥ 100	TD	≥ 100
4	Elongation	%	ASTM D 882	MD	≥ 100	MD	≥ 100
				TD	≥ 90	TD	≥ 90
5	Thermal Shrinkage	%	150° C / 30 min	MD	≤ 1.0	MD	≤ 1.0
				TD	≤ 1.0	TD	≤ 1.0
6	Interlayer Adhesion	N/cm	ASTM D 903	HPET-PET	≥ 4	HPET-PET	≥ 4
		Grade	GB / T9286	Cell Side	Grade 0	Cell Side	Grade 0
7	Adhesion with EVA	N/cm	ASTM D 903	≥ 60		≥ 60	
8	MVTR	g/m ² /day	ASTM F 1249	≤ 0.5		≤ 0.5	
9	CTI	V	IEC 60112	> 600		> 600	

- Packing** : Up to 200 meters per roll, 9 or 12 rolls per pallet
- Storage Condition** : To be stored in sealed packing at temperature ≤ 30° C & Humidity ≤ 60 %
- Shelf life** : Recommended to use within 24 months from the date of manufacture

The above properties are a typical range of properties and are not to be used for designing or establishing the limits of specification.

BackPro **ABS-CPC**

Alishan Backsheet BackPro ABS-CPC are available in both 1000 V & 1500 V system voltage. The backsheet comes with a proprietary coating layer on both the airside and cell side.

CONSTRUCTION DETAILS		ABS - CPC
LAYER NO.	PARTICULARS	
1	Air Side Fluoro Coating	
2	Middle PET Layer	
3	Cell Side Fluoro Coating	

S. NO.	PROPERTIES	UOM	TEST METHOD	ABS - CPC - 1000 V		ABS - CPC - 1500 V	
1	Thickness	µm	Micrometer	275 ± 5 %		310 (-10/+15)	
2	Width	mm	Scale	Up to 1350		Up to 1350	
3	Tensile Strength	MPa	ASTM D 882	MD	≥ 100	MD	≥ 100
				TD	≥ 100	TD	≥ 100
4	Elongation	%	ASTM D 882	MD	≥ 100	MD	≥ 100
				TD	≥ 90	TD	≥ 90
5	Thermal Shrinkage	%	150° C / 30 min	MD	≤ 1.0	MD	≤ 1.0
				TD	≤ 1.0	TD	≤ 1.0
6	Coating Adhesion	Grade	GB / T9286	Air Side	Grade 0	Air Side	Grade 0
				Cell Side	Grade 0	Cell Side	Grade 0
7	Adhesion with EVA	N/cm	ASTM D 903	≥ 60		≥ 60	
8	MVTR	g/m ² /day	ASTM F 1249	≤ 2		≤ 2	
9	CTI	V	IEC 60112	> 600		> 600	

RELIABILITY DATA OF

BackPRO ABS-CPC

ALISHAN

GREEN ENERGY PVT. LTD.

Ageing	Standard	Parameters	Value
DH 3000 hours 85% RH, 85°C	IEC 62788-2	Peel strength with Alishan EPE	> 50 N/10 mm
		Peel strength with Alishan POE Appearance	> 40 N/10 mm Normal
UV 180 kWh/m ² 85% RH, 85°C	IEC 62788-2	Peel strength with Alishan EPE	> 60 N/10 mm
		Peel strength with Alishan POE Appearance	> 40 N/10 mm Normal

- Packing** : Upto 200 meters per roll, 9 or 12 rolls per pallet
Storage Condition : To be stored in sealed packing at temperature $\leq 30^{\circ}\text{C}$ & Humidity $\leq 60\%$
Shelf life : Recommended to use within 24 months from the date of manufacture

The above properties are a typical range of properties and are not to be used for designing or establishing the limits of specification.

BackPro **ABS-CPC-T**

Alishan Backsheet BackPro ABS-CPC-T are available in 1500 V system voltage. The backsheet comes with a proprietary coating layer on both the airside and cell side.

CONSTRUCTION DETAILS		ABS - CPC-T
LAYER NO.	PARTICULARS	
1	Air Side Fluoro Coating	
2	Middle PET Layer	
3	Cell Side Fluoro Coating	

S. NO.	PROPERTIES	UOM	TEST METHOD	ABS - CPC - T - 1500 V	
1	Thickness	μm	Micrometer	305 ± 2	
2	Width	mm	Scale	Up to 1350	
3	Transmittance	%	ASTM E 424	> 91	
4	Tensile Strength	MPa	ASTM D 882	MD	≥ 100
				TD	≥ 100
5	Elongation	%	ASTM D 882	MD	≥ 100
				TD	≥ 90
6	Thermal Shrinkage	%	150° C / 30 min	MD	≤ 1.0
				TD	≤ 1.0
7	Coating Adhesion	Grade	GB / T9286	Air Side	Grade 0
				Cell Side	Grade 0
8	Adhesion with EVA	N/cm	ASTM D 903	≥ 60	
9	MVTR	g/m ² /day	ASTM F 1249	≤ 2	
10	CTI	V	IEC 60112	> 600	

- Packing** : Upto 200 meters per roll, 9 or 12 rolls per pallet
- Storage Condition** : To be stored in sealed packing at temperature ≤ 30° C & Humidity ≤ 60 %
- Shelf life** : Recommended to use within 24 months from the date of manufacture

The above properties are a typical range of properties and are not to be used for designing or establishing the limits of specification.

RELIABILITY DATA OF

BackPRO (ABS-CPC-T)

ALISHAN

GREEN ENERGY PVT. LTD.

Ageing	Standard	Parameters	Value
DH 3000 hours 85% RH, 85°C	IEC 62788-2	Peel strength with Alishan EPE	> 50 N/10 mm
		Peel strength with Alishan POE	> 40 N/10 mm
		Yellowness Index	< 4
		Appearance	Normal
UV 180 kWh/m ²	IEC 62788-2	Peel strength with Alishan EPE	> 60 N/10 mm
		Peel strength with Alishan POE	> 40 N/10 mm
		Yellowness Index	< 4
		Appearance	Normal
Acid tests	24 hours immersion in acidic solutions	Visual	No Visual defects

- Packing** : Upto 200 meters per roll, 9 or 12 rolls per pallet
Storage Condition : To be stored in sealed packing at temperature $\leq 30^{\circ}$ C & Humidity ≤ 60 %
Shelf life : Recommended to use within 24 months from the date of manufacture

The above properties are a typical range of properties and are not to be used for designing or establishing the limits of specification.

Alishan Backsheet BackPro ABS-CPC-NON FLUORO are available in both 1000 V & 1500 V system voltage. The backsheet comes with a proprietary coating layer on both the airside and cell side.

CONSTRUCTION DETAILS		ABS - CPC - NON FLUORO
LAYER NO.	PARTICULARS	
1	Air Side Non Fluoro Coating	
2	Middle PET Layer	
3	Cell Side Non Fluoro Coating	

S. NO.	PROPERTIES	UOM	TEST METHOD	ABS - CPC - NON FLUORO - 1000 V		ABS - CPC - NON FLUORO - 1500 V	
1	Thickness	µm	Micrometer	275 ± 5 %		310 (-10/+15)	
2	Width	mm	Scale	Up to 1350		Up to 1350	
3	Tensile Strength	MPa	ASTM D 882	MD	≥ 100	MD	≥ 100
				TD	≥ 100	TD	≥ 100
4	Elongation	%	ASTM D 882	MD	≥ 100	MD	≥ 100
				TD	≥ 90	TD	≥ 90
5	Thermal Shrinkage	%	150° C / 30 min	MD	≤ 1.0	MD	≤ 1.0
				TD	≤ 1.0	TD	≤ 1.0
6	Coating Adhesion	Grade	GB / T9286	Air Side	Grade 0	Air Side	Grade 0
				Cell Side	Grade 0	Cell Side	Grade 0
7	Adhesion with EVA	N/cm	ASTM D 903	≥ 60		≥ 60	
8	MVTR	g/m ² /day	ASTM F 1249	≤ 2		≤ 2	
9	CTI	V	IEC 60112	> 600		> 600	

- Packing** : Upto 200 meters per roll, 9 or 12 rolls per pallet
- Storage Condition** : To be stored in sealed packing at temperature ≤ 30° C & Humidity ≤ 60 %
- Shelf life** : Recommended to use within 24 months from the date of manufacture

The above properties are a typical range of properties and are not to be used for designing or establishing the limits of specification.

BackPRO ABS-CPC-T-NON FLUORO

Alishan backsheet backpro ABS-CPC-T is available in 1500 V system voltage. The backsheet comes with a proprietary transparent non fluorocoating on both air and cell side.

CONSTRUCTION DETAILS		ABS - CPC-T-NON FLUORO
LAYER NO.	PARTICULARS	
1	Air Side Non Fluoro Coating	
2	Middle PET Layer	
3	Cell Side Non Fluoro Coating	

S. NO.	PROPERTIES	UOM	TEST METHOD	ABS - CPC - T - NON FLUORO - 1500 V	
1	Thickness	μm	Micrometer	305 ± 2	
2	Width	mm	Scale	Up to 1350	
3	Transmittance	%	ASTM E 424	> 91	
4	Tensile Strength	MPa	ASTM D 882	MD	≥ 100
				TD	≥ 100
5	Elongation	%	ASTM D 882	MD	≥ 100
				TD	≥ 90
6	Thermal Shrinkage	%	150° C / 30 min	MD	≤ 1.0
				TD	≤ 1.0
7	Coating Adhesion	Grade	GB / T9286	Air Side	Grade 0
				Cell Side	Grade 0
8	Adhesion with EVA	N/cm	ASTM D 903	≥ 60	
9	MVTR	g/m ² /day	ASTM F 1249	≤ 2	
10	CTI	V	IEC 60112	> 600	

- Packing** : Upto 200 meters per roll, 9 or 12 rolls per pallet
- Storage Condition** : To be stored in sealed packing at temperature ≤ 30° C & Humidity ≤ 60 %
- Shelf life** : Recommended to use within 24 months from the date of manufacture

The above properties are a typical range of properties and are not to be used for designing or establishing the limits of specification.

Alishan Back Sheet BackPro ABS-KPC is of 1500 V system voltage with airside PVDF layer and proprietary cell side Fluoro coating layer.

STRUCTURE DETAILS		ABS - KPC	
LAYER NO.	PARTICULARS		
1	Air side PVDF layer		
2	Adhesive layer		
3	Middle PET layer		
4	Cell side Fluoro Coating		

S. NO.	PROPERTIES	UOM	TEST METHOD	ABS - KPC - 1500 V	
1	Thickness	μm	Micrometer	315 ± 5 %	
2	Width	mm	Scale	Up to 1350	
3	Tensile Strength	MPa	ASTM D 882	MD	≥ 100
				TD	≥ 100
4	Elongation	%	ASTM D 882	MD	≥ 100
				TD	≥ 90
5	Thermal Shrinkage	%	150° C / 30 min	MD	≤ 1.0
				TD	≤ 1.0
6	Interlayer Adhesion	N/cm	ASTM D 903	PVDF-PET	≥ 4.0
7	Coating Adhesion	Grade	GB / T9286	Cell Side	Grade 0
8	Adhesion with EVA	N/cm	ASTM D 903	≥ 60	
9	MVTR	g/m ² /day	ASTM F 1249	≤ 0.5	
10	CTI	V	IEC 60112	> 600	

RELIABILITY DATA OF

BackPRO ABS-KPC

ALISHAN

GREEN ENERGY PVT. LTD.

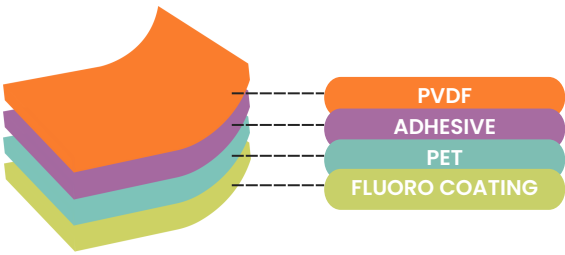
Ageing	Standard	Parameters	Value
DH 3000 hours 85% RH, 85°C	IEC 62788-2	Peel strength with Alishan EPE	> 50 N/10 mm
		Peel strength with Alishan POE Appearance	> 40 N/10 mm Normal
UV 180 kWh/m ² 85% RH, 85°C	IEC 62788-2	Peel strength with Alishan EPE	> 60 N/10 mm
		Peel strength with Alishan POE Appearance	> 40 N/10 mm Normal

- Packing** : Up to 200 meters per roll, 9 or 12 rolls per pallet
Storage Condition : To be stored in sealed packing at temperature ≤ 30° C & Humidity ≤ 60 %
Shelf life : Recommended to use within 24 months from the date of manufacture

The above properties are a typical range of properties and are not to be used for designing or establishing the limits of specification.

BackPRO (ABS-KPC-T)

Alishan Back Sheet BackPro ABS-KPC-T is of 1500 V system voltage with airside PVDF layer and proprietary cell side Fluoro coating layer. It comes with the benefits of superior transmittance and hydrophobicity for high efficiency M10 and M12 modules.

STRUCTURE DETAILS			ABS - KPC-T
LAYER NO	PARTICULARS	THICKNESS (μm)	
1	Air side transparent PVDF	25	
2	Adhesive layer	10	
3	Middle transparent PET	275	
4	Cell side Coating	6	

S. NO.	PROPERTIES	UOM	TEST METHOD	ABS-KPC-T (1500 V)	
1	Thickness	μm	Micrometer	315 ± 5 %	
2	Width	mm	Scale	Upto 1350	
3	Transmittance	%	ASTM E 424	>91	
4	Tensile Strength	MPa	ASTM D 882	MD	≥ 100
				TD	≥ 100
5	Elongation	%	ASTM D 882	MD	≥ 100
				TD	≥ 90
6	Thermal Shrinkage	%	150°C / 30 min	MD	≤1.0
				TD	≤1.0
7	Interlayer Adhesion	N/cm	ASTM D 903	PVDF-PET	≥4.0
8	Coating Adhesion	Grade	GB / T9286	Cell side	Grade 0
9	Adhesion with EVA	N/cm	ASTM D 903	≥ 60	
10	MVTR	g/m ² /day	ASTM F 1249	≤ 2	
11	CTI	V	IEC 60112	> 600	

- Packing** : Up to 200 meters per roll, 9 or 12 rolls per pallet
- Storage Condition** : To be stored in sealed packing at temperature ≤ 30° C & Humidity ≤ 60 %
- Shelf life** : Recommended to use within 24 months from the date of manufacture

The above properties are a typical range of properties and are not to be used for designing or establishing the limits of specification.

RELIABILITY DATA OF

BackPRO ABS-KPC-T

ALISHAN

GREEN ENERGY PVT. LTD.

Ageing	Standard	Parameters	Value
DH 3000 hours 85% RH, 85°C	IEC 62788-2	Peel strength with Alishan EPE	> 50 N/10 mm
		Peel strength with Alishan POE	> 40 N/10 mm
		Yellowness Index	< 4
		Appearance	Normal
UV 180 kWh/m ²	IEC 62788-2	Peel strength with Alishan EPE	> 60 N/10 mm
		Peel strength with Alishan POE	> 40 N/10 mm
		Yellowness Index	< 4
		Appearance	Normal
Acid tests	24 hours immersion in acidic solutions	Visual	No Visual defects

- Packing** : Up to 200 meters per roll, 9 or 12 rolls per pallet
- Storage Condition** : To be stored in sealed packing at temperature ≤ 30° C & Humidity ≤ 60 %
- Shelf life** : Recommended to use within 24 months from the date of manufacture

The above properties are a typical range of properties and are not to be used for designing or establishing the limits of specification.

UL CERTIFICATION

Certificate of Compliance

Certificate Number:
E522747

Report Reference:
E522747-20210720

Issue Date:
2024-03-27

Issued to:

Alishan Green Energy Pvt Ltd
F101, Sky villas, Sector 8A, Kamal vihar
Raipur Chhattisgarh, 492001 India

This certificate confirms that representative samples of:

PHOTOVOLTAIC POLYMERIC MATERIALS - COMPONENT
See Addendum Page for Product Designation(s).


Have been evaluated by UL in accordance with the component requirements in the Standard(s) indicated on this Certificate. UL Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for installation in complete equipment submitted for investigation to UL LLC.

UL746A, Standard for Polymeric Materials - Short Term Property Evaluations
UL 746B, Standard for Tests for Polymeric materials - Long term property evaluations

Additional information:
See UL Product IQ® at <https://iq.ulprospector.com> for additional information.

This Certificate of Compliance indicates that representative samples of the product described in the certification report have met the requirements for UL certification. It does not provide authorization to apply the UL Recognized Component Mark. Only the Authorization Page that references the Follow-Up Services Procedure for ongoing surveillance provides authorization to apply the UL Mark.

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David Plecuch
UL Mark Certification Program Manager



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CERTIFICATE OF COMPLIANCE

Certificate number E522747
Report reference E522747-20210720
Date 2024-03-27

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Component - Photovoltaic Polymeric Materials

MATERIAL DESIGNATION: ALISHAN FC, ALISHAN FRONT EVA, ALISHAN POE and ALISHAN EPE



David Plecuch
UL Mark Certification Program Manager



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UL CERTIFICATION

Certificate of Compliance

Certificate Number:
E522747

Report Reference:
E522747-20230825

Issue Date:
2024-03-27

Issued to:

Alishan Green Energy Pvt Ltd
F101, Sky villas, Sector 8A, Kamal vihar
Raipur Chhattisgarh, 492001 India

This certificate confirms that representative samples of:

PHOTOVOLTAIC POLYMERIC MATERIALS - COMPONENT

See Addendum Page for Product Designation(s).

Have been evaluated by UL in accordance with the component requirements in the Standard(s) indicated on this Certificate. UL Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for installation in complete equipment submitted for investigation to UL LLC.

UL 746A, Polymeric Materials - Short Term Property Evaluations

Additional Information:

See UL Product IQ® at <https://iq.ulprospector.com> for additional information.

This Certificate of Compliance indicates that representative samples of the product described in the certification report have met the requirements for UL certification. It does not provide authorization to apply the UL Recognized Component Mark. Only the Authorization Page that references the Follow-Up Services Procedure for ongoing surveillance provides authorization to apply the UL Mark.

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David Plecuch
UL Mark Certification Program Manager



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CERTIFICATE OF COMPLIANCE

Certificate number E522747
Report reference E522747-20230825
Date 2024-03-27

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Backsheets designated "ALISHAN PVDF, ALISHAN COATING, Backpro ABS- KPC-T and Backpro ABS- CPC-T"



David Plecuch
UL Mark Certification Program Manager



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ISO CERTIFICATIONS



WHY US?

End To End Solution



**Strong Customer
Connect**



**Experienced
in-house Team**



**Market
Acceptance**



**Quality
Certification**



Innovation



**Transparency
& Trust Factor**



Strong Network

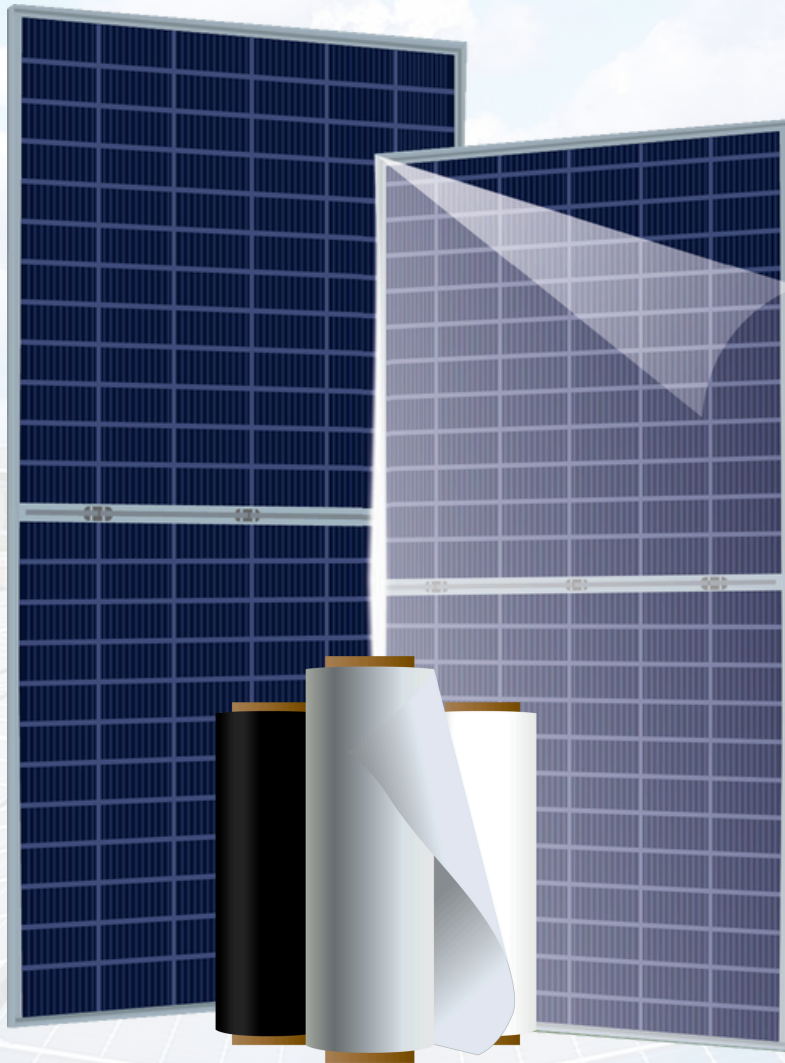


**On-Ground
Track Record**

Our Customer

Our products, which are produced using the latest technology and facilities, enjoy a high degree of user trust and as a result, we have achieved recognition as one of the leading suppliers of EVA Encapsulant in India.





REACH OUT TO US

Office: F101, Sky Villas, Sector 8A, Kamal Vihar,
Raipur, C.G., India, 492015

Manufacturing: Khasra No. 20, Village Seoni,
Raipur, C.G., India, 492101

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