



Standard Product Manual

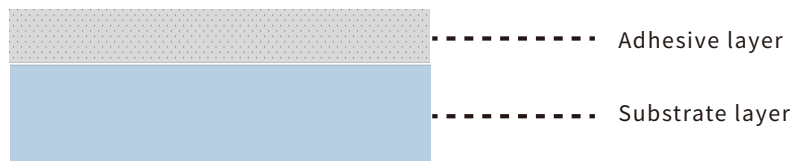
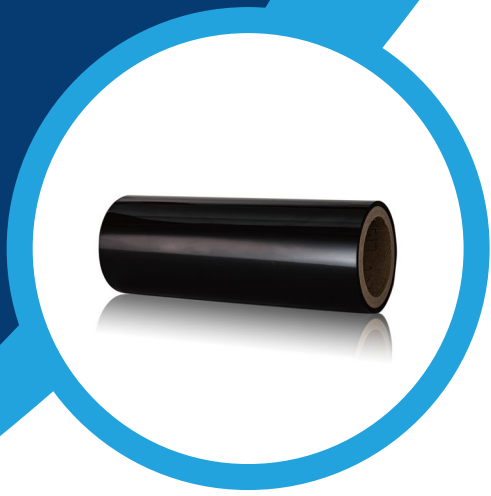
Energy Storage and Power Battery Solution

Invented for Materials

BETterial

CCS HOT PRESSING FILM

CCS hot-pressed film independently developed by Betterial uses biaxially oriented BOPET film as base material. It has excellent high-temperature bonding strength and strong adhesion to copper, aluminum and standard conductors. It also has excellent insulation, weather resistance and dimensional stability.



Technical Properties

Item	Unit	Test Method	Index
Thickness	μm	ASTM D 347	Substrate Film+30
Tensile Strength	MD	ASTM D 882	160
	TD	ASTM D 882	160
Tensile Elongation	MD	ASTM D 882	130
	TD	ASTM D 882	120
Heat Shrink	MD	ASTM D 1204	1.0
	TD	ASTM D 1204	0.5
Peel Strength Between	N/inch	ISO FDIS-8510 180°	38
Breakdown Voltage	KV	ASTM D 149	15
Flame Retardant	/	UL 94	VTM-0
Environmental Protection	/	RoSH	PASS

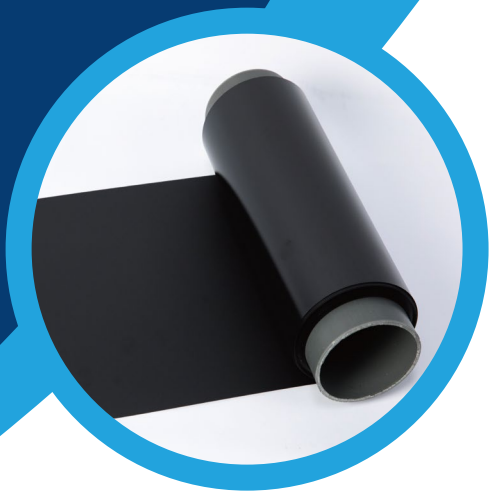
Recommended hot pressing conditions: Temperature 150~170°C, Time 5~10min, Pressure 10~20kg/cm².

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PC INSULATING AND FLAME RETARDANT MATERIAL

Betterial PC insulating and flame retardant material has excellent insulation, extensibility, dimensional stability, chemical corrosion resistance, high strength, heat resistance and cold resistance. It is also self-extinguishing, flame retardant, non-toxic and environmentally friendly. Relying on our own technical advantages, Betterial can customize the anti-counterfeit marking of insulation sheet according to customer requirements. The engraving height can be controlled within 0.005mm without affecting the use of product. It can also effectively prevent intermediate processors from using inferior materials so as to reduce inspection efforts of system manufacturers and ensure to make high-quality product.



Features

-  Anti-Fake
-  Scratch Resistant
-  Flame Retardant
-  High Stability
-  Strong Insulation
-  High/Low Temperature Resistant

Technical Properties

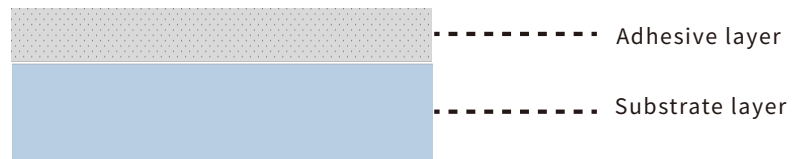
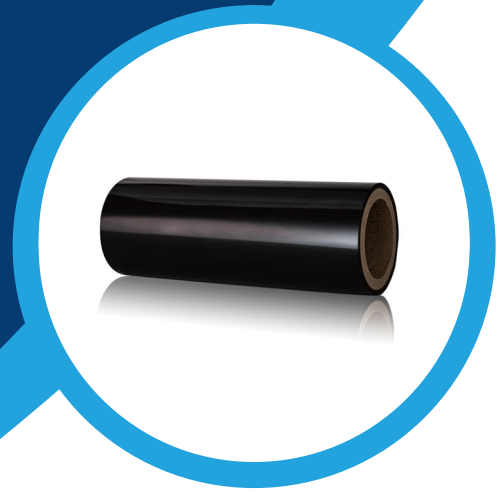
Item	Unit	Standard Values	
Thickness Range	mm	0.05-1.0	
Folding Performance	Frequency	Thickness < 0.25mm	≥ 10
	Frequency	0.25mm ≤ Thickness < 0.5mm	≥ 6
	Frequency	Thickness > 0.5mm	≥ 4
Tensile Strength	Mpa	MD	≥ 55
	Mpa	TD	≥ 55
Elongation At Break	%	MD	≥ 80
	%	TD	≥ 80
Flame Retardant UL94-V0	Burning time Of moving flame	T1	Continuous burning time after moving flame 10s. Dripping situation: no dripping
	Burning time Of moving flame	T2	
Heat Shrinkage (135°C ± 2, 10min)	%	Thickness ≤ 0.175mm	MD ≤ 1.5
	%	Thickness ≤ 0.175mm	TD ≤ 0.5
	%	Thickness > 0.175mm	MD ≤ 1.0
	%	Thickness > 0.175mm	TD ≤ 0.5
Environmental Requirements	Heavy metal conten (Pb Cr Hg) ppm	Pb Content Less than 1000	
	Heavy metal conten (Pb Cr Hg) ppm	Cr Content Less than 100	
	Heavy metal conten (Pb Cr Hg) ppm	Hg Content Less than 1000	
	HALOGEN ppm	Br Content Less than 50	

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INSULATING HOT-PRESSED FILM

Insulating hot-pressed film independently developed by Betterial uses biaxially oriented BOPET film as base material. It has excellent high-temperature bonding strength and strong adhesion to copper and aluminum. It also has excellent insulation, weather resistance and dimensional stability. It is widely used for module side panels.



Technical Properties

Item	Unit	Test Method	Index
Thickness	μm	ASTM D 347	basal lamina+30
Tensile Strength	MD	ASTM D 882	160
	TD	ASTM D 882	160
Tensile Elongation	MD	ASTM D 882	130
	TD	ASTM D 882	120
Heat Shrink	MD	ASTM D 1204	1.0
	TD	ASTM D 1204	0.5
Peel Strength Between Layers	N/inch	ISO FDIS-8510 180°	38
Breakdown Voltage	KV	ASTM D 149	15
Flame Retardant	/	UL 94	VTM-0
Environmental Protection	/	RoSH	PASS

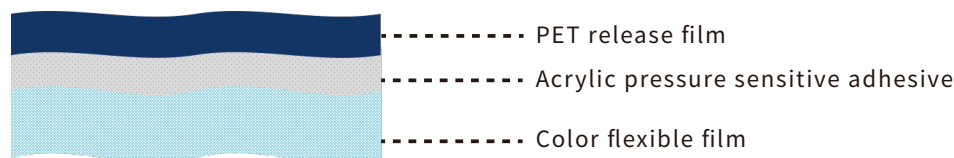
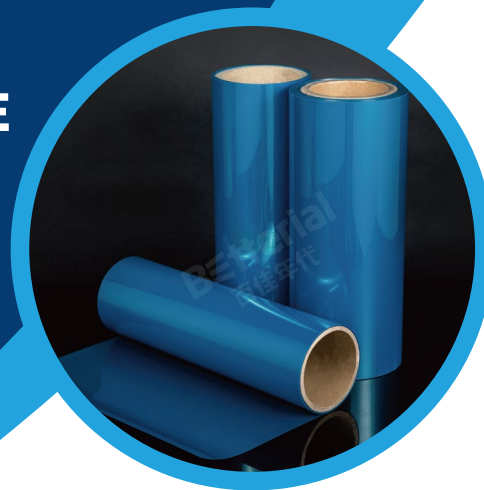
Recommended hot pressing conditions: Temperature 160-170°C, Time 15-20min, Pressure 10-20kg/cm².

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FLEXIBLE CELL INSULATION TAPE

The flexible cell insulation film was firstly developed by Betterial and the traditional double-layer PET structure was innovatively replaced by a single-layer flexible PTE. Compared with the traditional blue film, the flexible PET insulation film has higher coating accuracy, stronger adhesion and lighter weight. It uses independently developed special adhesive formula and precision coating process to further improve the functions of anti-aging, electrolyte resistance, insulation performance, cold/heat shock and puncture resistance, and ensure the safety and stability of energy storage batteries.



Technical Properties

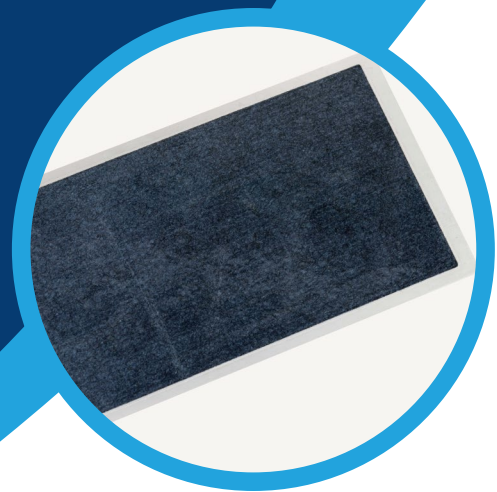
Item	Unit	Test Method	Index	
Tape Thickness	mm	GB/T 13542.2-2009	0.11±0.02	
Substrate Thickness	mm	GB/T 13542.2-2009	0.07	
180 °Peeling Force Of Steel Plate	Peeling Force At Room Temperature 8.75-17.5	N/25mm	GB/T 2792-2014	16
	65°C/85%RH, 24H The sStripping Force >8.75	N/25mm	GB/T 2792-2014	14.5
Retentivity	h	GB/T 4851	≥24	
Tensile Strength	N/25mm	GB/T 30776-2014	≥150	
Tensile Elongation	%	GB/T 30776-2014	≥30	
Insulation Resistance	Ω	GB/T 10064-2006	Dc at 1000V in 60 seconds > 20GΩ under voltage	
Leakage Current	(AC) ≥3000V@60S (DC) ≥4000V@60S Leakage Current ≤1mA	mA	GB/T 1408.1-2016	DC, ≤0.001mA AC, =0.07mA

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AEROGEL THERMAL PAD/SHEET

Silicon dioxide aerogel is a kind of inorganic material with 3d reticulated nanopore structure. Its porosity is as high as 80~99%, the pore size is mainly between 10-50nm and the thermal conductivity at room temperature can be as low as 0.013W/(m.k).



Product Characteristics

-  **Fire Resistance**
-  **Superior Thermal Insulation**
-  **lightweight**
-  **Ultra-high Hydrophobicity**
-  **High Temperature Resistance**

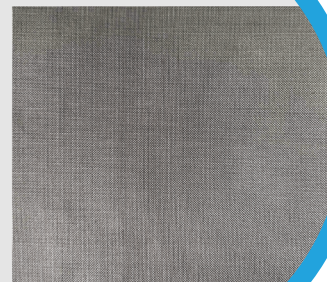
Technical Properties

Item	Test Method	Ceramic Aerogel Thermal Pad	Preoxygenated Silk Aerogel Heat Pad	Fiberglass Aerogel Insulation Mat
Thickness Range	547-301 thickness gauge	1-3.5mm	0.4-3.5mm	0.4-3.5mm
Fire Smoke Resistance	GB/T 6343-2009	high	medium	low
Thermal Conductivity	GB/T 10295-2008	≤0.03 W/(mK) @25°C	≤0.03 W/(mK) @25°C	≤0.03 W/(mK) @25°C
Flame Resistance Rating	UL94	PET film VTM - 0	PET film VTM - 0	PET film VTM - 0
	UL94	PI film V- 0	PI film V- 0	PI film V- 0
	UL94	Rubber frame V- 0	Rubber frame V-0	Rubber frame V-0
	UL94	Aerogel felt V- 0	Aerogel felt V-0	Aerogel felt V-0
Prohibited Items	RoHS & REACH &ELV	RoHS & REACH & ELV	RoHS & REACH & ELV	RoHS & REACH & ELV
Compressibility	/	40+5@2MPa	40+5@2MPa	35±5@2MPa
Fire-Resistant Insulation	GB/T 31838.4-2019	Insulation Resistance:1000VDC,60s,>1000MΩ; Withstand Voltage Current:3000VDC, 60s, < 1mA		





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CERAMIC SILICONE TAPE

Ceramic silicone tape is a new material made of high-strength special fiber cloth and special silicone gel. This product is featured by excellent electrical insulation, fire resistance, high/low temperature resistance and aging resistance. Compared with traditional battery protection materials, this material is ultra-thin, environmentally-friendly and super fire resistant. Apart from halogen free, toxic free and odorless, the product also has low salt spray concentration. The combustion residue is ceramic-like crust with good insulation and pressure resistance. The material is able to withstand an open flame of 1200°C and has excellent fire resistance performance. It is an ideal material for insulation and fire protection of new energy batteries.



Product Characteristics

-  **Excellent Electrical Insulation**
-  **Fire Resistance**
-  **High/Low Temperature Resistance**
-  **Aging Resistance**

Technical Properties

Item	Unit	Test Method	Index
Thickness	mm	/	0.2-3mm
Density	$\text{g}\cdot\text{cm}^{-3}$	ASTM D1056	1.6 ± 0.2
Reverse Thermal Conductivity Temperature	$^{\circ}\text{C}$	1000 $^{\circ}\text{C}$ /10min	$\leq 400^{\circ}\text{C}$
Tensile Strength	MPa	GB/T 528-2009	≥ 10
Breakdown Strength	KV/mm	GB/T 1408-2006	≥ 20
Water Absorption Rate	%	ASTM D 570	≤ 1.0
Environmental Testing	/	ROHS/ELV	PASS
Flame Spread index	/	ASTM E162-15b flaming mode	Average $Is=15(<35)$
Combustion Smoke Concentration	/	ASTM E 662-2015 flaming mode@4min	Average 71.5(<200)
Combustion Speed	mm/min	FMVSS 302	< 100
Low Temperature Bending	/	ASTM D1056 @-55 $^{\circ}\text{C}$	PASS
Insulation Resistance	M Ω	DC 1000V,60s	≥ 500
Volume Resistivity	$\Omega\cdot\text{cm}$	GB/T 1695-2005	$\geq 1.0\cdot 10^{15}$
Flame Retardancy	Vertical/Horizontal	UL94-2013	V-0/HF-1
Thermal Conductivity	W/(m.K)	ASTM C518	0.48

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