# Standard Product Manual

**PV Film Series** 



**Invented for Materials** 

# B602M

### **CO-EXTRUDED POE FILM**

B602M series is a POE & EVA co-extrusion adhesive film specially developed for encapsulation between backsheet and solar cell, can be applied on single or double-glass photovoltaic modules. To compare with EVA film, B602M POE has excellent water vapor barrier performance and weather resistance. To compare with POE film, it has lower cost advantage. To compare with other film products, the encapsulation of double glass modules has better anti-PID characteristics and better peel strength retention.



#### Category

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ltem	Normal Spec	Customized Spec
Thickness	0.55mm/0.65mm	0.2~0.8mm
Width	1000~1200mm	300~1300mm
Length	350m	150m/350m/400m

#### **Technical Properties**

ltems		Unit	Test Standard	B602M
Model/Using Instruction		/	1	High Transmittance
Shrinkaga	MD	%	GB/T29848	<3.0
Shrinkage	TD	%	GB/T29848	<1.5
Transmittance	380~1100nm	%	GB/T29848	>90
A. II	POE/Glass	N/cm	GB/T29848	>80
Adhesion	POE/Backsheet	N/cm	GB/T29848	>80
Crosslink Degree		%	GB/T29848	>70
Volume Resistivity		Ω·cm	GB/T29848	>1*10 <sup>15</sup>
Damp Heat Test		ΔΥΙ	GB/T29848	<3.0
UV Aging Test		ΔΥΙ	GB/T29848	<3.0

### **Laminating Process**

Laminated Parameters		Temperature (°C)	Vacuum Time (S)	Lamination Time (S)	
Single Chamber Laminator		142~148	300~360	1080±120	
Double Chamber Laminator -	A Cavity	120±10	300±60	240±60	
	The Second Chamber	145±10	10~30	540±60	

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#### Changzhou Betterial Film Technologies Co.,Ltd.

### B601HP & B601P

#### HIGH TRANSMITTANCE EVA ENCAPSULATION FILM

B601 series is a kind of anti-PID encapsulation film developed by Betterial Film Technologies to improve the potential induced Degradation (PID) of solar module.

It exhibits stable adhesion properties to both glass and backsheets, excellent long-term resistance to heat and humidity, UV and PID resistance. Perfect matching with various auxiliary materials of solar module, and good process compatibility with most laminating equipment.



#### Category

Item	Normal Spec	Customized Spec
Thickness	0.55mm/0.65mm	0.2~0.8mm
Width	1000~1030mm	300~1300mm
Length	350m	150m/350m/400m

#### **Technical Properties**

Performance Indicators		Unit	Test Standard	B601HP	B601P
Model/Using Instruction		/	1	Anti PID High Transmission	Anti PID UV Cut Off
Chrinkaga Datia	MD	%	GB/T29848	<3.0	<3.0
Shrinkage Ratio ——	TD	%	GB/T29848	<1.5	<1.5
Light	280~380nm	%	Betterial	>80	<20
Transmittance	380~1100nm	%	GB/T29848	>91	>91
Peel Strength	EVA/Glass	N/cm	GB/T29848	>80	>80
	EVA/Backsheet	N/cm	GB/T29848	>80	>80
Crosslink Degree		%	GB/T29848	>80	>80
Volume Resistivity		Ω∙cm	GB/T29848	>1*10 15	>1*10 <sup>15</sup>
Damp Heat Test		ΔYI	GB/T29848	<5.0	<5.0
UV Test		ΔYI	GB/T29848	<5.0	<5.0
Anti PID Performance		%	IEC62804	<5.0	<5.0

#### **Laminating Process**

Laminated Parameters		Temperature (°C)	Vacuum Time (S)	Lamination Time (S)
Single Chamber Laminator		142~148	300~360	480~600
Double Chamber Laminator	A Cavity	120±10	310±60	50±10
	The Second Chamber	145±5	10~30	350±60

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### B601W

#### WHITE EVA ENCAPSULATION FILM

B601W series is a white encapsulant film specially developed for encapsulation between backsheet and solar cell, can be applied on single or double-glass photovoltaic modules. B601W white EVA film its unique high reflectivity, which can improve the effective utilization rate of visible light and help PV module to increase generating power. At the same time, we have solved the problem of white film overflow after the module is laminated, and B601W has high reflectivity retention rate and high peel strength retention rate for long-term use.



#### Category

ltem	Normal Spec	Customized Spec
Thickness	0.6mm/0.65mm	0.2~0.8mm
Width	1010~1100mm	300~1300mm
Length	350m	150m/350m/400m

#### **Technical Properties**

Items		Unit	Test Standard	B601W
Model/Using Instruc	tion	/	1	High Reflective EVA Film
Shrinkage	MD	%	GB/T29848	≤3.0
Shrinkage -	TD	%	GB/T29848	<1.5
Transmittance	280~380nm	%	Betterial	<6.0
	380~1100nm	%	GB/T29848	<1.0
Adhesion	EVA/Glass	N/cm	GB/T29848	≥60
	EVA/Backsheet	N/cm	GB/T29848	≥60
Crosslink Degree		%	GB/T29848	>75
Volume Resistivity		Ω·cm	GB/T29848	>1*10 <sup>14</sup>
Reflectivity	400-700nm	%	Betterial	≥91
Pre-crosslink Degree	2	%	Betterial	<40

### **Laminating Process**

Laminated Parameters		Temperature (°C)		Vacuum Time (S)		Lamination Time (S)	
/		Single	Double	Single	Double	Single	Double
Single Chamber Lamina	ator	142~148	140~148	300~360	300~360	600±120	1080±120
Double	A Cavity	120±10	120±10	300±120	300±120	180±60	180±60
Chamber Laminator	The Second Chamber	145±10	145±10	10~30	10~30	480±60	480±60

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### **B601RS**

#### **BLACK INFRARED REFLECTIVE ENCAPSULATION FILM**

B601RS series is a black adhesive film developed for encapsulation between backsheet and solar cell of single or double-glass photovoltaic modules. The photovoltaic module will have a beautiful appearance because B601RS black adhesive film has the same hue to solar cells.

Its unique infrared high reflection performance can improve the effective utilization rate of visible light and help to increase the power yield of the module. At the same time, the products solve the problem of black film overflow after laminated, and has the characteristics of high reflectivity retention rate and low attenuation rate on peel strength.



Normal Spec	Customized Spec
0.45mm/0.5mm/0.55mm/0.65mm	0.2~0.8mm
970~1020mm	300~1300mm
150m	150m/350m/400m
	Normal Spec 0.45mm/0.5mm/0.55mm/0.65mm 970~1020mm 150m

#### **Technical Properties**

ltems		Unit	Test Standard	B601RS
Model/Using Instruction		/	/	Black EVA Film
Chrinkago	MD	%	GB/T29848	≤3.0
Shrinkage -	TD	%	GB/T29848	<2.0
Adhesion	EVA/Glass	N/cm	GB/T29848	≥60
	EVA/Backsheet	N/cm	GB/T29848	≥60
Gel Content		%	GB/T29848	>75
Volume Resistivity		Ω∙cm	GB/T29848	>1*10 14
Reflectivity	760-1100nm	%	Betterial	≥70
Pre-crosslink Degree		%	Betterial	<40

### **Laminating Process**

Laminated Parameters		Temperature (°C)		Vacuum Time (S)		Lamination Time (S)	
/		Single	Double	Single	Double	Single	Double
Single Chamber Laminat	or	142~148	140~148	300~360	300~360	600±120	1080±120
Double	A Cavity	120±15	120±15	300±120	300±120	180±60	180±60
Chamber Laminator	The Second Chamber	145±10	145±10	10~30	10~30	480±60	480±60

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# HS807&HS808 CARRIER FILM

HS807&HS808 series of bearing film are a new type of encapsulated film independently developed by Betterial Film company as per different application scenarios of HJT module. While the series of film are encapsulated with heterojunction batteries, it maintains strong adhesion, realizes the encapsulation betweenthe welding tape and the battery in one step, and plays an excellent plastictiy effect. After being packaged into HJT module, it can well protect the battery in hot and humid environment, reduce the problems of hot spots, delamination, corrosion and failure of the components in extreme environments, improve the stability of heterojunction components, and make it stable and efficient and widely used in different application scenarios .



High Transmittance

Low Aging Peel Strength Degradation

**\_\_\_\_\_** Low Corrosion

Double-Sided PID Resistance

One-Step Encapsulation For Ribbon Cells

#### **Technical Properties**

Item		Unit	Test Standard	HS807	HS808
Shrinkage Rate	MD	%	GB/T29848	<3.0	<5.0
	TD	%	GB/T29848	<0.5	<5.0
T	280-380nm	%	GB/T29848	>60.8	>80
Transmittance	380-1100nm	%	GB/T29848	>90.8	>91.5
	Glass	N/cm	GB/T29848	>130	>120
Adhesion	Cell	N/cm	Betterial	>60	>40
Crosslink Degree		%	GB/T29848	>60	>75
Volume Resistivity		Ω·cm	GB/T29848	>1.0*1015	>1.0*1015
Aging Properties (PCT 48h 121°C 100RH )	Yellowness Index	ΔΥΙ	GB/T29848	<3.0	<3.0
	Adhesion To Cell	N/cm	Betterial	>30	>30
UV Aging (UV 30kW/h 60°C)		ΔΥΙ	GB/T29848	/	<3.0

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# HC806 LIGHT-CONVERSION FILM

HC806 light-conversion film product is a new type of encapsulant film launched by Betterial Film company for different application scenarios of high-efficiency module and customer needs.The product converts ultraviolet light into visible light, protecting the cell and increasing the power of the component. At the same time, the product also has the characteristics of low aging peel strength degradation, PID resistance, low corrosion, excellent UV stability and so on.



#### **Features**

Anti-PID

Low Aging Peel Strength Degradation



Low Corrosion

UV-to-Visible Light Conversion For Power Enhancement

### **Technical Properties**

ltem		Unit	Test Standard	HC806
Shrinkage Rate	MD	%	GB/T29848	<3.0
Shirinkage Nate	TD	%	GB/T29848	<1.5
Transmittanco	280-380nm	%	GB/T29848	<30
Transmittance	380-1100nm	%	GB/T29848	>91
A dla a a i a u	Glass	N/cm	GB/T29848	>80
Adnesion	Cell	N/cm	Betterial	>60
Crosslink Degree		%	GB/T29848	>75
Volume Resistivity		Ω·cm	GB/T29848	>1.0*1015
Aging Properties (PCT 48h 121°C 100RH )	Yellowness Index	ΔΥΙ	GB/T29848	<3.0
	Adhesion To Cell	N/cm	Betterial	>30
UV Aging (UV 30kW/h 60°C)		ΔΥΙ	GB/T29848	<3.0

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### HI802 & HI803

#### HJT INTEGRATED ENCAPSULATION FILM

HI802/HI803 series of film are a new type of integrated encapsulation film independently developed by Betterial Film company as per different application scenarios of HJT module. The product plays a good role in positioning and shaping the welding belt during the lamination process. After being packaged into HJT module, it can well protect the battery in hot and humid environment, reduce the problems of hot spots, delamination, corrosion and failure of the components in extreme environments, improve the stability of heterojunction components, and make it stable and efficient and widely used in different application scenarios.

#### Category

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ltem	Normal Spec	Customized Spec
Thickness	0.45~0.6mm	0.2~0.8mm
Width	970~1297mm	300~1300mm
Length	300m	150~450m

#### **Technical Properties**

Items		Unit	Test Standard	HI802	HI803
Model/Using Instruction		/	/	High Transmission	High Transmission
Shrinkago Patio	MD	%	GB/T29848	<3.0	<3.0
Sillinkage Ratio –	TD	%	GB/T29848	<1.5	<1.5
Light	280~380nm	%	GB/T29848	>80	>80
Transmittance	380~1100nm	%	GB/T29848	>90	>90
Deal Strongth	Glass	N/cm	GB/T29848	>80	>80
Peel Strength	HJT Cell	N/cm	Betterial	>40	>40
Crosslink Degree		%	GB/T29848	>75	>75
Volume Resistivity		Ω·cm	GB/T29848	>1*10 <sup>15</sup>	>1*10 <sup>15</sup>
Aging Properties	Yellowness Index	ΔΥΙ	GB/T29848	<3.0	<3.0
PCT 48h 121°C 100RH	HJT Cell	N/cm	Betterial	>30	>30
UV Aging Test	30kW/h 60°C	ΔΥΙ	GB/T2984	<3.0	<3.0

#### Laminating Process

Laminated Parameters		Temperature (°C)	Vacuum Time (S)	Lamination Time (S)
Single Chamber Laminator		142~148	300~360	$900 \pm 180$
Double Chamber Laminator	A Cavity	$125 \pm 10$	300±60	300±60
	The Second Chamber	$148 \pm 10$	60±30	$540 \pm 60$

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## **B606L & B606LP** THERMOPLASTIC TPO ADHESIVE FILM

B606 series is a thermoplastic encapsulation film for perovskite solar module or thin-film solar module developed by Betterial Film Technologies. It is suitable for perovskite, CIGS, light weight modules.



**∫**<sup>†</sup>

Low Lamination

Temperature



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Low Water Vapor

Transmission Rate



Aging Stripping Force





Low Attenuation of No F

No Release of Small Molecules

### **Technical Properties**

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Performance Indica	ators	Unit	Test Method	B606L	B606LP
Model/Using Instru	ction	/	/	High Transparency	Deadline
Tensile Strength		MPa	ISO 527-3	≥10	≥10
Adhesion to Glass		N/cm	GB/T 2709	≥80	≥80
Shrinkage Ratio	MD	%	GB/T 29848	≤3.0	≤3.0
(120°C x 3min)	TD	%	GB/T 29848	≤2.0	≤2.0
Light Transmittance <sup>–</sup>	280~380nm	%	GB/T 29848	≥75	≤10
	380~1100nm	%	GB/T 29848	≥85	≥85
Volume Resistivity		Ω⋅cm	IEC62788-1-2	≥1*10 <sup>15</sup>	≥1*10 15
DC Breakdown Stre	ngth	KV/mm	IEC 60243	≥200	≥200
Aging Test DH2000hr	Yellowness Index	ΔΥΙ	GB/T 29848-2018	≤5.0	≤5.0
	Adhesion to Glass	N/cm	GB/T 29848-2018	≥40	≥40
UV Aging Test	120KW · h	ΔΥΙ	GB/T 29848-2018	≤5.0	≤5.0
WVTR	23°Cx85% RH 500um	g/m2·day	ISO 15106-3	≤5.0	≤5.0

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# **B606LW** THERMOPLASTIC TPO ADHESIVE FILM

The B606W series, developed by Betterial, is a thermoplastic white film specifically designed for the packaging of CIGS film components. Compared to conventional EVA film, it boasts several advantages: low packaging temperature, low water vapor transmittance, and exceptional weather resistance even under low temperature packaging conditions. provide higher power gain with solar module based on excellent UV reflectance property .This film series demonstrates excellent adhesion and can be widely applied in the packaging of CIGS film battery components and PC material components.





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Low Lamination Temperature



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Low Water Vapor

Transmission Rate







Low Attenuation of Aging Stripping Force

No Release of Small Molecules

### **Technical Properties**

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Performance Indica	itors	Unit	Test Method	B606W	B606LW
Model/Using Instru	ction	/	/	/	/
Tensile Strength		MPa	ISO 527-3	>10	>10
Adhesion to Glass		N/cm	GB/T 2709	≥80	≥80
Shrinkage Ratio	MD	%	GB/T 29848	≤3.0	≤3.0
(120°C x 3min)	TD	%	GB/T 29848	≤2.0	≤2.0
Treflectivity	280~380nm	%	ASTM-003	≥91	≥91
Volume Resistivity		Ω·cm	IEC62788-1-2	≥1*10 <sup>15</sup>	≥1*10 <sup>15</sup>
DC Breakdown Stre	ngth	KV/mm	IEC 60243	≥200	≥200
Aging Test DH2000hr	Yellowness Index	ΔΥΙ	GB/T 29848-2018	≤5.0	≤5.0
	Adhesion to Glass	N/cm	GB/T 29848-2018	≥40	≥40
UV Aging Test	120KW · h	ΔΥΙ	GB/T 29848-2018	≤5.0	≤5.0
WVTR	23°Cx85% RH 500um	g/m2·dav	ISO 15106-3	≤5.0	≤5.0

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