

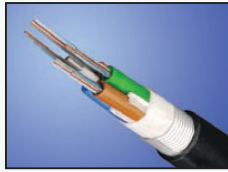
# Solar Backsheet



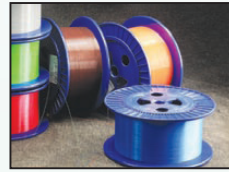
# ZTT Focuses on Precision Manufacturing

ZTT Group provide all kinds of high-end optical and electric cables and services for telecommunications and power operators and customers of energy, defense, transportation, new energy and many other areas all over the world.

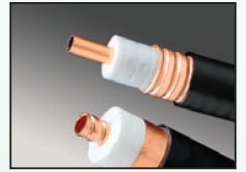
## Information Communication



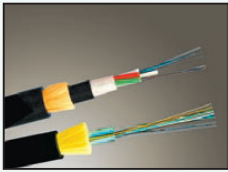
**1992**  
Communication optical fiber cable



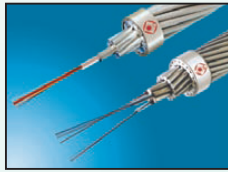
**2002**  
All kinds of optical fiber



**2004**  
High frequency coaxial cable



**1996**  
ADSS



**2000**  
OPGW

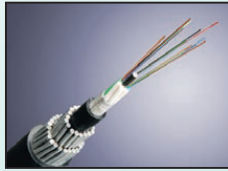


**2004**  
ACS wire



**2005**  
High strength and heatresistant aluminum alloy conductor

## Submarine Cable



**1995**  
Underwater cable



**1999**  
Shallow sea optical cable



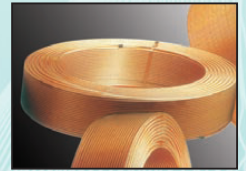
**2003**  
Submarine power cable  
submarine optical fiber  
composite power cable



**2010**  
Marine cable, locomotive cable,  
new energy cable



**2010**  
Exported optical fiber and cable  
production equipment



**2010**  
Upgrading alloying industry

## New Energy



**2011**  
Solar backsheet

# ZTT Focuses on Precision Manufacturing



**2007**  
Leaky cable



**2009**  
Optical fiber preform



**2010**  
Realized the integration of rod, filament and cable



**2012**  
Industrial chain of optical fiber preform, optical fiber, optical fiber cable



**2008**  
Series of double capacity conductors



**2010**  
Series of middle-strength aluminum alloy conductors



**2012**  
Series of large cross-section energy-saving conductors

## Power Transmission



**2007**  
Deep-sea optical cable



**2009**  
International submarine cable UJ certification



**2010**  
Developed American market



**2012**  
Exported flexible DC cable to Europe



**2012**  
Alloying industry chain

## Equipment & Precision



**2011**  
New energy micro network



**2012**  
Lithium-ion battery



**2012**  
New energy residence

## Company Profile

Zhongtian Photovoltaic Materials Co., Ltd., a subsidiary company of ZTT, is a joint venture established by ZTT & Shanghai Jiaotong University, with a registered capital of 200 million CNY. The company specializes in R&D, production and sales of solar cell backsheet.

As a high-tech precise production enterprise, ZTT has independently developed the core technology of solar backsheet. Focusing on technology research and development, the company has established a top-ranking R&D testing center with advanced detection and analysis instruments introduced from United States, Japan and other countries.

Based on precision manufacturing, the company has advanced backsheet production line, high-precision coating equipment and standard purification plant. Currently, the annual production capacity of solar backsheet is 15 million m<sup>2</sup> 2GW components, and it is expected to reach 40 million m<sup>2</sup> 6GW components by 2015.

ZTT has more than 20 years' experience and technical accumulation in the fields of outdoor electrical safety and long-time weather-proof materials all over the world. With the increasingly large scale and standardization of photovoltaic industry, ZTT has dedicated to provide photovoltaic modules with solar backsheet which can retain stability and high efficiency for more than 25 years. Having passed comprehensive performance tests, ZTT solar has obtained TUV and UL certificates.



# ZTT New Energy Industry Chain



1. High-performance Solar Backsheet

2. PV Supporting System

3. New Energy Cable

4. DC/AC Smart Junction Box

5. Photovoltaic Junction Box

6. Small Wind Turbine

7. High-performance Energy Storage Battery

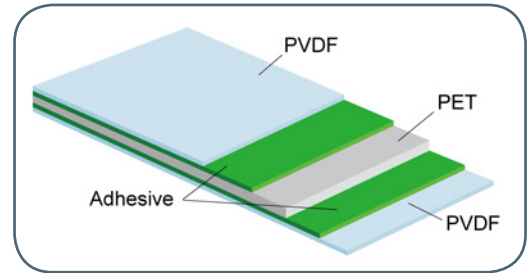
8. Integration & Construction of Distributed Power Station System

9. New Energy Residence

# ZTT-Apollo II Solar Backsheet

## Characteristics:

- double-sided PVDF to provide double protection
- high-quality PET dielectric grassroots of anti-hydrolysis, anti-embrittlement and stable insulation
- adhesives of proprietary formulation, which can provide stable bonding, effective block and durative sustainment
- superior performance to meet all kinds of severe environment



## Supply Information:

- coil material: 0-300m/coil
- sheet material: specified size according to customers
- warehousing: temperature <38°C humidity <55%RH
- validity: 12months (need re-corona once expired)



## Product Specification and Appearance

Item	Unit	Test Standard	Value
Color	/	/	White
Backsheet thickness	μm	GB/T13542-09	320±10
PVDF thickness	μm	GB/T13542-09	25
Adhesive thickness	μm	GB/T13542-09	10
PET thickness	μm	GB/T13542-09	250
Width	mm	IPV NO.4	800~1100
Unit density	g/m <sup>2</sup>	/	425±20

## Mechanical Performance

Item	Unit	Test Standard	Value	
Tensile strength	MD	MPa	ASTM D882	≥100
	TD			≥100
Elongation at break	MD	%	ASTM D882	≥100
	TD			≥80
PVDF/PET Peeling strength	MD	N/cm	ASTM D3330	≥4
	TD			≥4
Peeling strength with EVA	N/cm	ASTM D3330	≥40	

## Physical and Chemical Property

Item	Unit	Test Standard	Value	
150°C×30min Dimensional stability	MD	%	ASTM D-1204	≤1.0
	TD			≤1.0
(38°C/90%H) Water vapor permeability	g/m <sup>2</sup> .day	ASTM F-1249	≤2.0	
Flame retardant rating	Grade	UL94/ASTM E162	/	
Surface tension	dyn	ASTM D2578	≥50	

## Electrical Performance

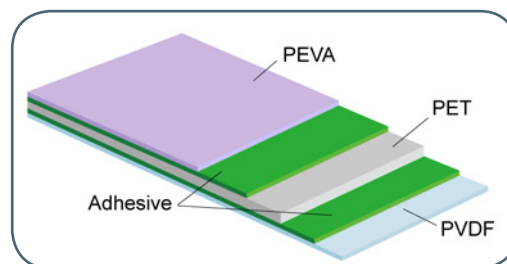
Item	Unit	Test Standard	Value
Breakdown voltage	kV	ASTM D-149	≥18
Partial Discharge	VDC	IEC 60664-1	≥1000
Volume resistivity	Ω•m	GB/T 1410-06	/

Note: Due to continuous, research and product improvement, the specifications in this product information sheet are subject to change without prior notice. The specifications may deviate slightly and are not guaranteed.

# ZTT-Shine II Solar Backsheet

## Characteristics:

- with high-quality PVDF outer layer to provide ongoing protection
- high-quality PET dielectric grassroots of anti-hydrolysis, anti-embrittlement and stable insulation
- adhesives of proprietary formulation, which can provide stable bonding, effective block and durative sustainment
- PVDA of proprietary formulation with good bonding, efficient reflections and long-term stability
- superior performance to achieve the optimum component



## Supply Information:

- coil material: 0-300m/coil
- sheet material: specified size according to customers
- warehousing: temperature <38°C humidity <55%RH
- validity: 12months (need re-corona once expired)



## Product Specification and Appearance

Item	Unit	Test Standard	Value
Color	/	/	White
Backsheet thickness	μm	GB/T13542-0	365±10
PVDF thickness	μm	GB/T13542-0	25
Adhesive thickness	μm	GB/T13542-0	10
PET thickness	μm	GB/T13542-0	250
PEVA thickness	μm	GB/T13542-0	70
Width	mm	IPV NO.4	800~1100
Unit density	g/m <sup>2</sup>	/	480±20

## Mechanical Performance

Item	Unit	Test Standard	Value	
Tensile strength	MD	MPa	ASTM D882	≥100
	TD			≥100
Elongation at break	MD	%	ASTM D882	≥100
	TD			≥80
PVDF/PET Peeling strength	MD	N/cm	ASTM D3330	≥4
	TD			≥4
PEVA/PET Peeling strength	MD	N/cm	ASTM D3330	≥4
	TD			≥4
Peeling strength with EVA	N/cm	ASTM D3330	≥40	

## Physical and Chemical Property

Item	Unit	Test Standard	Value	
150°C×30min Dimensional stability	MD	%	ASTM D-1204	≤1.0
	TD			≤1.0
(38°C/90%H) Water vapor permeability	g/m <sup>2</sup> .day	ASTM F-1249	≤2.0	
Flame retardant rating	Grade	UL94/ASTM E162	/	
Surface tension	dyn	ASTM D2578	≥50	

## Electrical Performance

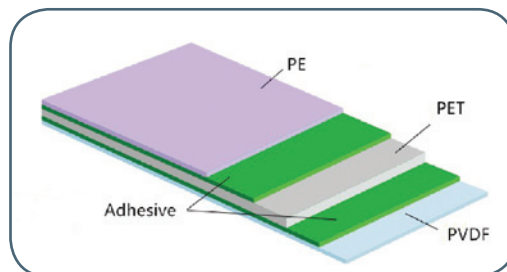
Item	Unit	Test Standard	Value
Breakdown voltage	kV	ASTM D-149	≥18
Partial Discharge	VDC	IEC 60664-1	≥1000
Volume resistivity	Ω·m	GB/T 1410-06	/

Note: Due to continuous, research and product improvement, the specific cations in this product information sheet are subject to change without prior notice. The specifications may deviate slightly and are not guaranteed.

# ZTT-Shine III Solar Backsheet

## Characteristics:

- High high-quality PVDF outer layer to provide ongoing protection
- High-quality PET dielectric grassroots of anti-hydrolysis, anti-embrittlement and stable insulation
- Adhesives of proprietary formulation, which can provide stable bonding, effective block and durative sustainment
- PE of proprietary formulation with good bonding, efficient reflection and long-term stability
- Superior performance to achieve the optimum component



## Product Specification and Appearance

Item	Unit	Test Standard	Value
Color	/	/	White
PVDF Thickness	μm	GB/T13542-09	20±2
PET Thickness	μm	GB/T13542-09	188±5
PE Thickness	μm	GB/T13542-09	100±10
Adhesives Thickness	μm	GB/T13542-09	10±2
Backsheet thickness	μm	GB/T13542-09	328±10
Unit density	g/m <sup>2</sup>	IPV NO.4	437±20

## Mechanical Performance

Item	Unit	Test Standard	Value	
Tensile strength	MD	MPa	ASTM D882	≥100
	TD			≥100
Elongation at break	MD	%	ASTM D882	≥100
	TD			≥80
Starting /Boiled peeling strength	MD	N/cm	180°peel	≥4
	TD			≥4
Peeling strength with PEVA	N/cm	180°peel	≥40	

## Physical and Chemical Property

Item	Unit	Test Standard	Value	
Dimensional stability	MD	%	ASTM D-1204	≤1.0
	TD			≤1.0
(38°C/90%H) Water vapor permeability	g/m <sup>2</sup> .day	ASTM F-1249	≤2.5	

## Electrical Performance

Item	Unit	Test Standard	Value
Breakdown voltage	kV	ASTM D-149	≥18
Partial Discharge	VDC	IEC 60664-1	≥1000

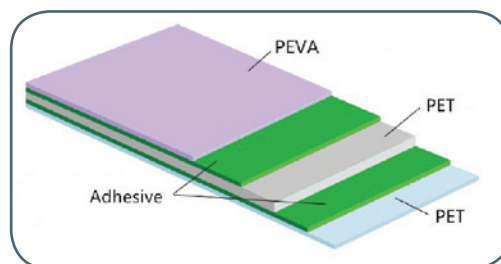
Note: Due to continuous innovation, research and product improvement, the specifications in this product information sheet are subject to change without prior notice. The specifications may deviate slightly and are not guaranteed.



# ZTT-Armor II Solar Backsheet

## Characteristics:

- High Weather Resistance PET out layer to provide ongoing protection.
- High-quality PET dielectric grassroots of anti-hydrolysis, anti-embrittlement and stable insulation.
- Adhesives of proprietary formulation, which can provide stable bonding, effective block and reflections, long-term stability and durative sustainment.
- Exclusive formula PEVA film , good adhesion , high reflectivity, long-term stability
- Superior performance and low cost to achieve the optimum component



## Product Specification and Appearance

Item	Unit	Test Standard	Value
Color	/	/	White
PET Thickness	μm	GB/T13542-09	50±3
Middle PET Thickness	μm	GB/T13542-09	188±5
Adhesives Thickness	μm	GB/T13542-09	10±2
PEVA Thickness	μm	GB/T13542-09	100±10
Backsheet Thickness	μm	GB/T13542-09	358±10
Unit density	g/m <sup>2</sup>	IPV NO.4	450±20

## Mechanical Performance

Item	Unit	Test Standard	Value	
Tensile strength	MD	MPa	ASTM D882	≥100
	TD			≥100
Elongation at break	MD	%	ASTM D882	≥100
	TD			≥80
Starting /Boiled peeling strength	MD	N/cm	180°peel	≥4
	TD			≥4
Peeling strength with PEVA	N/cm	180°peel	≥40	

## Physical and Chemical Property

Item	Unit	Test Standard	Value	
Dimensional stability	MD	%	ASTM D-1204	≤1.5
	TD			≤1.0
Water vapor permeability (38°C/90%RH)	g/m <sup>2</sup> .day	ASTM F-1249	≤2.5	

## Electrical Performance

Item	Unit	Test Standard	Value
Breakdown voltage	kV	ASTM D-149	≥18
Partial Discharge	VDC	IEC 60664-1	≥1000

Note: Due to continuous innovation, research and product improvement, the specifications in this product information sheet are subject to change without prior notice. The specifications may deviate slightly and are not guaranteed.

# Dust-free Production Workshop

ZTT has brought in highly ranked international backsheet production line, and the core parts have been independently researched by ZTT experts. Furthermore, with independent intellectual property rights, this production line was equipped with advanced defect detection device.



Substrate unwinding



Winding device



Film unwinding



Glue supply device



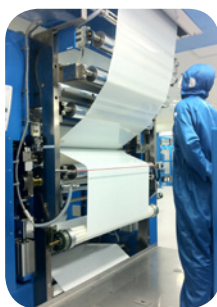
Backsheet cutting edge machine



Coating workshop



Coating bake



Composite device



After curing Oven

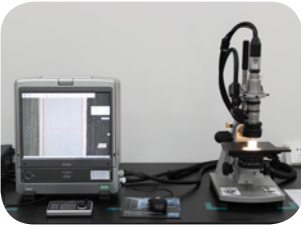


Double check machine

# R&D Test Center

ZTT focuses on “Precision Manufacturing”, and its products are strictly monitored from developing, purchasing and manufacturing.

## •Analysing Laboratory for Physical and Chemical



Metallographic microscope



FTIR Spectrometer



Constant temperature drying box



Water-bath

## • High-Temperature Lab

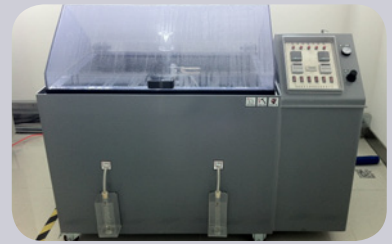
## • Accelerated Aging Lab



Constant temperature and humidity test chamber



Multi-daylight press



Salt fog corrosion test box



PCT ageing oven

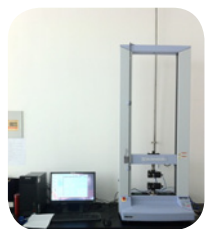


Ultraviolet aging test chamber



Breakdown voltage tester

## • Testing Laboratory for Physical Performances



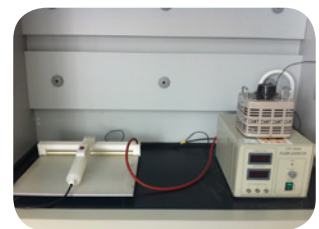
Electronic universal testing machine



Full automatic micro moisture meter



Chemical synthesis equipment



Corona machine

## • Chemical synthesis Lab

## ► Quality Assurance

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### ZTT solar backsheet — stably and efficiently generate electricity for more than 25 years

#### Professional and High-quality Design

- Classic five-layers-structure to provide stable protection.
- Outermost layer: high-quality strengthen weather resistance PVDF film
- Middle layer: low shrinkage rate, hydrolysis resistance, high barrier, stable electric insulation PET of high quality.
- Innermost layer: high-quality weather resistance PVDF film, white PEVA film with uvioresistant and stable cementation.
- Bonding layer: the material between three layers are perfectly bonded by high-performance binder with independent intellectual property rights.

#### Outstanding Weather Resistance

- QUV ageing(90Kwh/m<sup>2</sup>), no layering, no foaming, no folding, no obvious color change.
- Double 85 (85°C \*85%RH) for ageing 3000h with no layering, no foaming, no stickiness, no obvious color change.
- Thermal cycling (-40°C ~ 85°C) for 1200h with no layering, no foaming, no folding, no obvious color change.
- PH and salt spray test for 48h with no layering, no foaming, no efflorescence, no obvious color change.
- Wind resistance coefficient  $\geq 15L/\mu m$

#### Good Application Performance

- Well-matched with EVA film, silica gel and sealant.
- Meet different requirements with various specification of backsheet coil and sheet.
- The backsheet can be separated from EVA under the high temperature (about 150°C ) to meet the module repairing requirements.
- White PVDF/PEVA film with high reflectance can increase the output power effectively.
- Satisfy the operating requirements of photovoltaic module in the ground, roof, gobi, desert, coastal and so on for more than 25 years.

ZTT Cable pays close attention to talent training and technological innovation, emphasizes on quality management and continuous improvement, and has acquired certificates of ISO9001, ISO14001 and OHSAS18001.

ZTT solar backsheet has passed the comprehensive performance test of moist heat ( Double 85 °C ), QUV, humidity freeze, thermal cycling, salt spray, acid-base, shakeout, partial discharge and breakdown voltage.

ZTT Cable has established a global brand; ZTT solar cell backsheet has passed the international authority test and certification of TUV and UL, which is the first one in China to complete a comprehensive certification test.



# ▶ Cooperative Partner



# ▶ Application



ZTT Optic Fiber Micro Network Power Station



Photovoltaic Power Station Module for Mud Flat

**EACH PIECE OF HIGH SOLAR MODULE HAS**



Photovoltaic Power Station Module for Desert

# ▶ Application



Solar Module for Street Lamps



Photovoltaic Power Station Module for Gobi

**PERFORMANCE  
OUR SUPPORT**



Roof Photovoltaic Power Station Module



# ZTT GROUP

ZTT is a diversified group which concentrates in Information Communication, Power Transmission, Submarine Cable, Equipment & Precision and New Energy; with its rich heritage of highly advanced R&D results, ZTT owns the cutting-edge technology within the industry.

ZTT was established in 1992 and became a listed company in 2002. Up to now, ZTT has been a large high-tech enterprise group, which owns more than 33 subsidiaries and over 7000 employees; furthermore, ZTT achieved 12.6 billion USD annual sales and in excess of 150 million USD value of exports in 2012. For global marketing, ZTT has supplied its products over 106 countries, and has more than 42 overseas offices. What's more, ZTT has successfully established factories in India and Brazil.

ZTT has always committed to be market-oriented, meeting various demands of its customers and providing economical & reliable solutions. With innovative product design, ZTT can also guarantee the high-end engineering capabilities and life cycle maintenance services.

