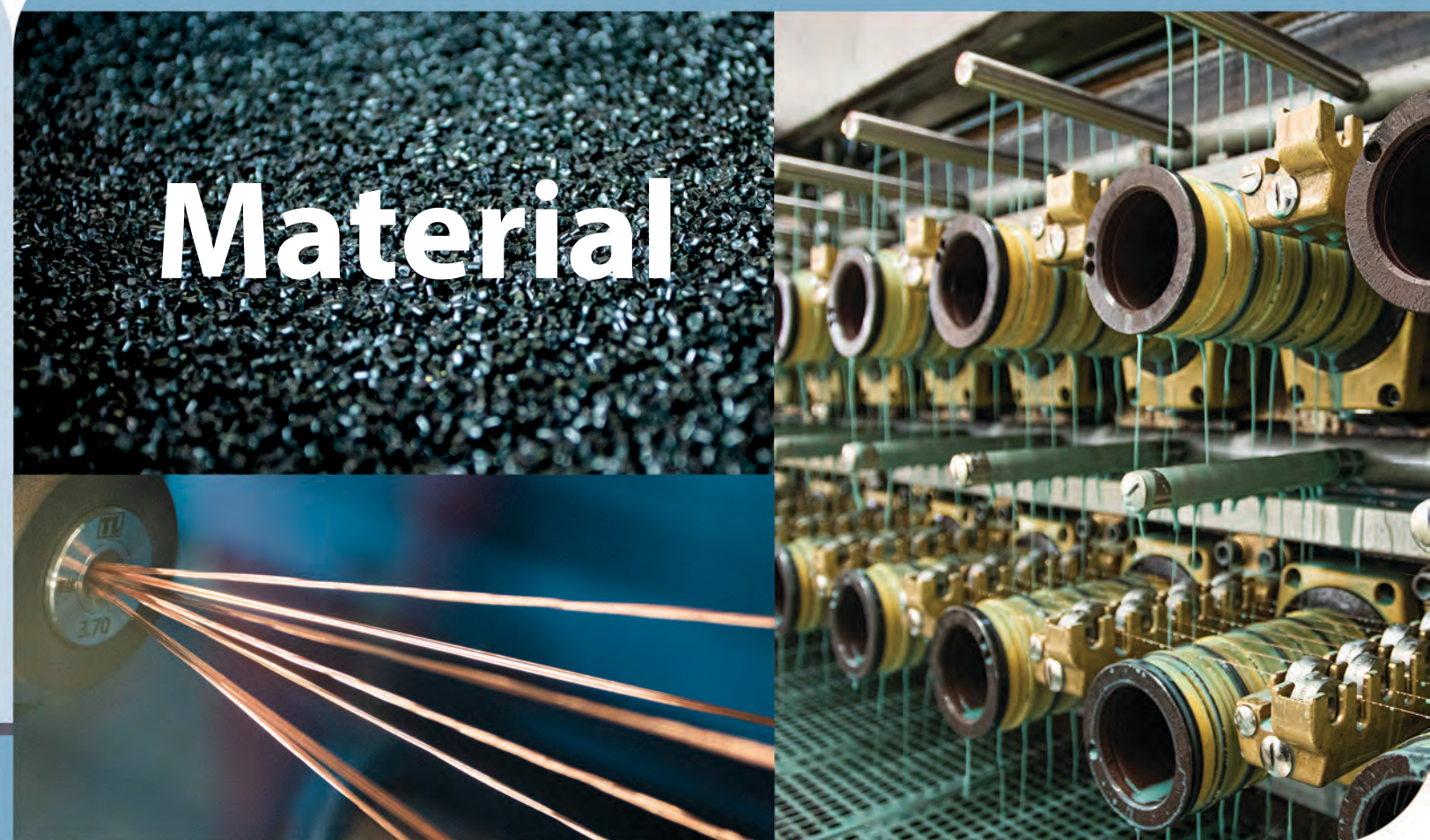


## ZTT GROUP

Established in 1992, ZTT started from optical fiber communications and was listed on Shanghai Stock Exchange (SSE) in 2002 (Stock Code in SSE: 600522). ZTT has pictured a diversified industrial portfolio for marine equipment, renewable energy, new materials, smart grid, optical communications and other diversified industrial products. ZTT Group is now hosting 80 subsidiary companies and over 16,000 employees, operating 5 overseas plants located in India, Brazil, Indonesia, Morocco and Turkey. ZTT owns more than 2500 patents with independent intellectual property rights, presided over or participated in more than 500 international and national industry standards. The products of ZTT are exported to 160 countries and regions. The company has ranked among the top 500 Chinese enterprises for consecutive years and broke through \$ 12.5 billion in sales revenue in 2021. ZTT follows the new economic model of fostering cleaner production and accelerating green and low-carbon development, works hard to serve as the pioneer of persistent endeavor to achieve national goal involving carbon dioxide emissions peaking by 2030 and carbon neutrality by 2060, emerging as a green manufacturing technology group assuming regional economy.





# COMPANY PROFILE



ZTT focuses on the cable material sector, The production base is located in Nantong Rudong Economic Development Zone, covers an area of more than 73500 square meters. Production base has 106 technical researchers, 326 production technicians, and 14 senior experts and doctors. Employees with a bachelor degree or above are more than 50% of all employees, high-quality talent team provides a strong guarantee for the company's sustainable development.

The products are mainly various types of copper rods, copper strips, copper tubes, copper bars, winding wires, and various cable sheath materials, fling materials, etc. Products are widely used in high-end fields such as precision electronics, automobiles, communications, new energy, high-speed rail, shipbuilding, wind power, dilling, submarine cable, etc. The annual output value exceeds 4 billion yuan.

ZTT focuses on product quality, social responsibility, environmental friendliness, and has successfully passed the certification such as ISO9001, ISO14001, CNAS, OHSAS18001, TL9000, energy management, measurement management, and Integration of industrialization and industrialization. Since its establishment, with Manufacturing Ingenuity as the culture of the company, committed to technological innovation. Through unremitting efforts, we have won National high-tech enterprise, National advanced enterprises implementing excellent performance model, Provincial enterprise technology center, Provincial green factory, and Provincial technology innovation demonstration enterprise.



# Copper products

## Oxygen free copper rod

Oxygen free copper rod used high purity cathode copper as row material, and uses the up-draw process to pull the copper rod billet. The standard size include  $\Phi$ 20.0mm 17.0mm 12.5mm 8.0mm. Copper rod can be reproduced 8.0mm hard copper rod after pressing and 2.0-3.5mm soft copper wire and hard copper wire after drawing. Our production line has an annual output of 80000 tons of oxygen free copper rod and copper wire.

### Application

Power cable/Electric machine/Enamelled wire

### Technical Reference

Brand	State	Diameter	Copper content	Oxygen content	Tolerance	Elongation	Torsional property	Volume resistivity $\rho_{20^\circ}$	Copper powder content
T1	M20	8.0mm	> 99.99%	$\leq 400$ ppm	$\pm 0.4$ mm	$\geq 40\%$	$\geq 25$	$\leq 0.01707$ $\Omega \cdot \text{mm}^2/\text{m}$	$\leq 8$ mg/250mm



## Copper products

## Copper wire

With high quality cathode copper and copper rod as raw material, relying on advanced double big pull machine, specializing in the production of tailored for customers, and is suitable for small and medium-sized state of the soft copper wire, specifications are available from 0.1 to 4.5mm, take up way for the line in the plum blossom and tightly closed line, the production of copper wire surface brightness, no burr and oxidation, discoloration resistance is strong, the performance indicators meet the national standards GB/T 3953-2009.

### Application

Power cable/Electric machine/ Instruments

### Technical Reference

Product Name	Model	Specification range mm	Tolerance mm	Elongation	Resistivity $\Omega \cdot \text{mm}^2/\text{m}$
Electrician round copper wire	TR	1.40-3.00	$\pm 1\%d$	$\geq 25$	$\leq 0.017241$
		3.01-4.50		$\geq 30$	
Electrician round tinned copper wire	TXR	1.40-2.00	+2% -1% d	$\geq 20$	$\leq 0.01760$
		2.00-4.50		$\geq 25$	
Electrician round doubling copper wire	TR	0.1-0.125	$\pm 0.003$	$\geq 15$	0.017241
		0.126-0.400	$\pm 0.004$	$\geq 20$	
		0.401-1.05	$\pm 1\%d$	$\geq 25$	
Electrician round doubling tinned copper wire	TXR	0.1-0.125	+0.006 -0.003	$\geq 12$	0.01802
		0.126-0.400	+0.010 -0.004	$\geq 15$	0.01770
		0.401-1.05	+2% -1% d	$\geq 20$	0.01760





## ■ Copper products

### Copper strip

Copper strips are used for radio frequency cable, cable shielding, photovoltaic solder strip, transformer, cylinder liner and electrical components, etc.

#### Application

Power cable/Transformer/ Electronic component

#### Technical Reference

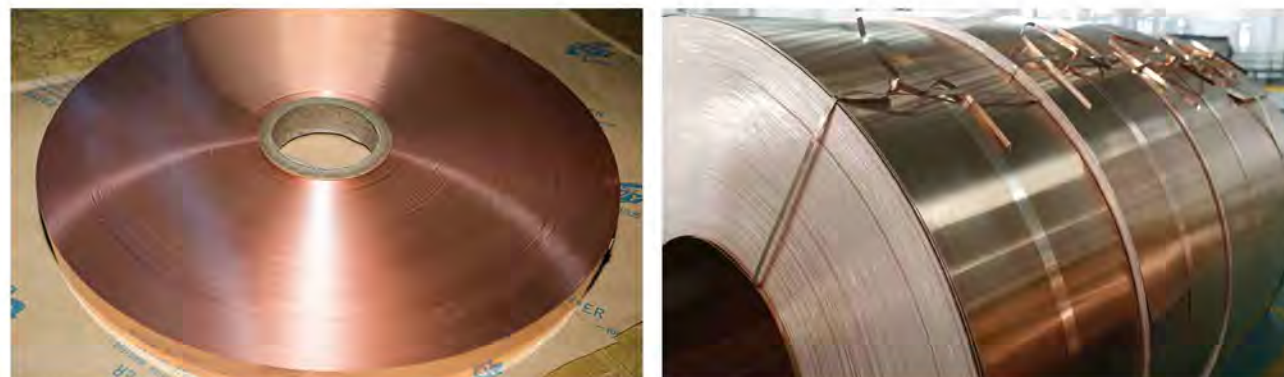
Trade Mark	State	Thickness	Width
T1 TU1 T2 TU2	M Y8(1/8) Y4(1/4) Y	0.05-2.0	10-500

#### Size and Tolerance

Thickness(mm)	Tolerance		Width(mm)	Tolerance	
	National Standard	Internal Standard		National Standard	Internal Standard
0.05-0.2	±0.008	±0.003	10-500	0.1	0.5
> 0.2-0.7	±0.010	±0.005			
> 0.7-2.0	±0.015	±0.008			

#### Electrical and Mechanical Properties

Trade Mark	State	Thickness	Width	Vickers Hardness (HV)	Electrical Conductivity(%IACS)	Electrical Resistivity (Ωmm <sup>2</sup> /m)
T1 TU1 T2 TU2	M	200-700	≥ 35	50-60	≥ 100	0.017241
	Y8	220-280	≥ 30	50-65	≥ 99	0.017415
	Y4	240-300	≥ 25	55-70	≥ 98	0.017593
	Y	> 260	-	> 70	≥ 98	0.017593



## ■ Copper products

### Copper bar

Apply to electrical engineering like high and low voltage electrical appliances, switch contact, power distribution equipment, bus duct, large current electrolysis refining project like metal smelting, electrochemical plating, chemical caustic soda etc.

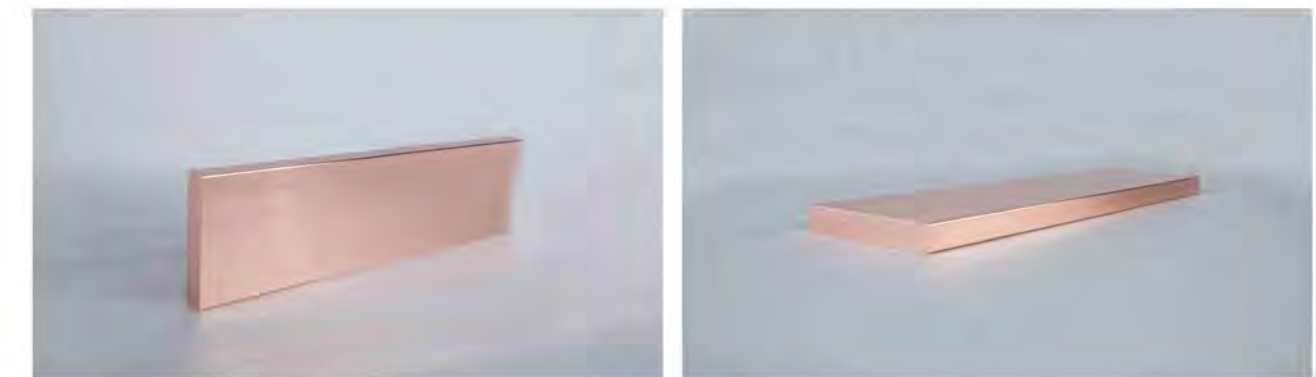
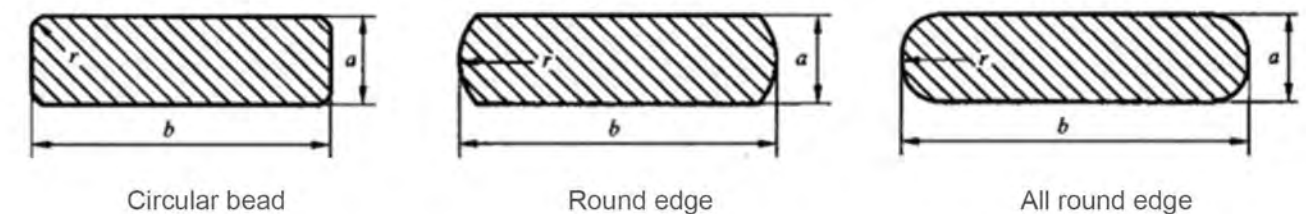
#### Application

Transformer/Switch/Busbar

#### Technical Reference

Type	Name	Thickness(mm)	Width(mm)	Chemical composition (Cu+Ag) %	
				National Standard	Internal Standard
TM	Copper busbar	2.24-50	16-400	99.9	99.95

#### Section shapes of copper busbar





## ■ Copper products

### Copper foil

Electronic copper foil is a metal material made by depositing copper ions on the cathode roller using an electrochemical method. It is mainly used for printed circuit board conductive materials and lithium ion battery negative current collectors.

They are the "nerves" and "blood vessels" of circuit boards and batteries.

#### Lithium electricity copper foil

##### Application

Lithium battery

Thickness	6μm	8μm	9μm	10μm
Weight g/m <sup>2</sup>	51-55	71-75	85-90	95-100
Tensile strength N/mm <sup>2</sup>	≥300	≥320	≥320	≥320
Normal temperature elongation %	≥3	≥5	≥5	≥5
Surface roughness (Smooth)Rz/μm	≤3	≤3	≤3	≤3
Surface roughness (Rough)Rz/μm	≤3	≤3	≤3	≤3
Wettability dyne	≥38	≥38	≥38	≥38
Width mm	300-1300	300-1300	300-1300	300-1300
Inoxidizability 140°C /15min	non-oxidation non-discolouring	non-oxidation non-discolouring	non-oxidation non-discolouring	non-oxidation non-discolouring

#### Lithium electricity copper foil

Thickness	12μm	18μm	35μm	70μm
Weight g/m <sup>2</sup>	107±3	153±5	285±5	585±8
Tensile strength N/mm <sup>2</sup>	Normal temperature	300-400	300-400	300-400
	180°C	180-250	180-250	180-250
Elongation %	Normal temperature	≥3	≥5	≥10
	180°C	≥3	≥5	≥5
Peel strength Kg/cm	≥1.05	≥1.35	≥1.80	≥2.00
Surface roughness (Smooth)Rz/μm	0.20-0.38	0.20-0.38	0.20-0.38	0.20-0.38
Surface roughness (Rough)Rz/μm	≤6.5	≤8.0	≤10.0	≤12.0
Inoxidizability 200°C /40min	non-oxidation non-discolouring	non-oxidation non-discolouring	non-oxidation non-discolouring	non-oxidation non-discolouring



## ■ Copper products

### Copper tube

Copper tube is used for inner conductor of radio frequency cable, tap water pipe, heating and cooling pipe etc.

##### Application

RF cable/ Pipeline

##### Size and Tolerance

Outside diameter	Tolerance	Wall thickness			
		0.25-0.40	0.40-0.60	0.60-0.80	0.80-1.50
4-15	±0.05	0.03	0.05	0.06	0.08
> 15-20	±0.06	0.03	0.05	0.06	0.09
> 20-22	±0.08	0.04	0.06	0.08	0.09

##### Size and Tolerance

Trade Mark	State	Tensile strength (MPa)	Elongation	Electrical Conductivity(%IACS)
TU1 T2 TU2	M	205-280	≥40	≥100





## Copper products

### Winding Wire

Apply to the winding of transformer, motors, generators and other electrical equipment, widely applicable to household appliances, electronics, communications equipment etc.

#### Paper Covered wire

##### Application

Transformer/ Electric machine

##### Paper insulated thickness(mm)

Thickness	Deviation (%)
≤0.50	-10
> 0.50-1.25	-7.5
> 1.25	-5

##### Paper insulated thickness(mm)

Trade Mark	Elongation	Angle of rebound(°)	20°C Electrical Resistivity Ω mm <sup>2</sup> /m	Conductivity %IACS
ZB	≥32	≤5	≤0.017241	≥100

#### Enamelled Rectangular Copper Winding wire

##### Application

Transformer/ Electric machine

##### Technical Reference:

Level	Paint film thickness(mm)			Minimum Breakdown Voltage	
	Min.	Nominal	Max.	Room temperature	High temperature
1	0.06	0.085	0.11	1000	750
2	0.12	0.145	0.17	2000	1500

##### Physical properties

Trade Mark	Elongation	Angle of rebound(°)	20°C Electrical Resistivity Ω mm <sup>2</sup> /m	Conductivity %IACS
ZB	≥32	≤5	≤0.017241	≥100



## Plastic products

### Polyethylene cable material

This product series uses the high quality polyethylene resin as the main raw material, through adding the antioxidant, the lubricant and other auxiliary agent (AT material adds the electric resistance trace auxiliary agent, the flame retardant polyethylene adds the flame retardant agent), through the specific process production to make the finished pellet. The product has excellent physical performance and processing performance, and the performance indexes meet the requirements of GB/T15065-2009 and DL/T 788-2003 standards.

##### Application

Power cable/Communication optical cable/ADSS cable



##### Technical Reference

Model	Name	Purpose
MDPE8002	Black MDPE sheath material	Communication optical cable and cable
H8005	Black HDPE sheath material	Communication optical cable and cable
LL6601 6002	Black linear low density polyethylene sheath	Communication cables
LL4003	Black linear low density polyethylene sheath	Indoor communication optical cable
H8008	Color HDPE sheath material	Communication optical cable and cable
H8004	Black HDPE laser marking sheath material	Communication optical cable and cable
AT8012	Black trace resistant polyethylene sheath material	Tracking resistance ADSS Cable
FR4022	Flame retardant polyethylene cable compound	Flame retardant power cable and fiber optic cable

Item	Test items	Typical value							
		MDPE8002	H8005	LL6601/02	LL4003	H8008	H8004	AT8012	FR40 22
01	Tensile strength MPa	18.7	28.69	17.56	23.74	31.28	28.62	22	13
02	Elongation %	715.89	960.04	650.89	709.24	732.62	876.50	700	420
03	Density g/cm <sup>3</sup>	0.95	0.942	0.939	0.922	0.944	0.940	1.20	1.30
04	MFR g/10 min	0.89	1.59	0.91	2.0	0.27	1.62	0.4	1.0
05	Volume resistivity 20°C Ω·cm	8.2×10 <sup>14</sup>	3×10 <sup>15</sup>	2.6×10 <sup>14</sup>	2.4×10 <sup>14</sup>	3.43×10 <sup>15</sup>	3×10 <sup>15</sup>	5.5×10 <sup>14</sup>	5.0×10 <sup>12</sup>
06	OIT 200°C min	45	50	45	50	50	50	45	-
07	Carbon black content %	2.45	2.38	2.75	2.60	/	2.58	-	-
08	Carbon black dispersion min	6	6	6	6	/	6	-	-
09	ESCR 1)F <sub>0</sub> .500h	0	0	0	0	0	0	0	-
10	Dielectric strength Kv/mm	26	26	25	25	26	25	35	25
11	low temperature impact embrittlement temperature C	-40	-70	-40	-40	-70	-70	-70	-70



## ■ Plastic products

### LSZH sheath material

The halogen-free low smoke flame retardant sheath material for communication cable is made of polyolefin resin as the base material, adding flame retardant, antioxidant and other special auxiliaries, and through mixed plasticization and granulation. It has the characteristics of smooth surface, good mechanical properties and excellent electrical properties. The cable material meet the requirements of Rosh and reach regulations, and it can be used for communication cables.

#### Application

Power cable/Communication optical cable

#### Product model and application

Model	Name	Purpose
FN2543	Cracking and halogen-free low smoke flame retardant polyolefin sheath for outdoor optical cable	Sheath material for cable
FN2545	Halogen free low smoke flame retardant polyolefin sheath for RF cable	
FN2612	Halogen free low smoke flame retardant polyolefin sheath material for indoor optical cable	Sheath material for communication optical cable
FR7012	Halogen free low smoke flame retardant polyolefin sheath material for indoor optical cable	
FR8018	Low friction, halogen-free and low smoke flame retardant polyolefin sheathing material for indoor optical cable	
FR8612	High flame retardant, halogen-free and low smoke flame retardant polyolefin sheath material for indoor optical cable	
FR8612WU	UV resistant, high flame retardant, halogen-free and low smoke flame retardant polyolefin sheath material for indoor optical cable	
FR6546	Cracking and halogen-free low smoke flame retardant polyolefin sheath for outdoor optical cable	
FR8546	Anti cracking, high flame retardant, halogen-free and low smoke flame retardant polyolefin sheath material for outdoor optical cable	

## ■ Plastic products

### Product performance

Item	Test items	Typical value									
		FN2543	FN2545	FN2612	FR7012	FR8018	FR8612	FR8612WU	FR6546	FR8546	
01	Density	1.49	1.52	1.52	1.52	1.48	1.52	1.47	1.48	1.47	
02	Tensile strength	13.2	13.2	12.7	13.5	12.97	13.5	12.5	12.8	12.5	
03	Elongation	192.7	192.7	188.6	166.8	164.2	166.8	155.8	190.6	188.9	
04	Aging performance (100°C, 168h)	Tensile strength	12.6	12.6	11.1	12.9	10.9	12.9	11.3	11.6	12.3
		Elongation	180.6	180.6	168.4	151.2	151.4	151.2	150.1	172.3	176.1
		Tensile strength change rate	-4.5	-4.5	-13.2	-4.4	-15.9	-4.4	-9.6	-9.3	-1.6
		Elongation change rate	-6.28	-6.28	-12.04	-9.35	-7.75	-9.35	-3.60	-9.60	-6.77
05	Volume resistivity 20°C	1.4×10 <sup>12</sup>	1.4×10 <sup>12</sup>	1.4×10 <sup>12</sup>	1.4×10 <sup>12</sup>	1.4×10 <sup>12</sup>	1.4×10 <sup>12</sup>	1.4×10 <sup>12</sup>	1.4×10 <sup>12</sup>	1.4×10 <sup>12</sup>	
06	Dielectric strength	20	20	20	21	21	21	22	20	22	
07	Oxygen index	30	27	27	33	33	33	33	33	33	
08	Low Temperature Brittleness(-25°C) ≤15/30	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	
09	Thermal deformation (90°C, 9.8N)	4.3	4.3	4.1	3.62	3.25	12	3.9	12	12	
10	PH	5.79	5.79	5.99	5.55	5.66	5.7	5.69	5.10	5.69	
11	Conductivity	0.497	0.497	0.487	0.428	0.475	2.2	0.410	1.78	0.41	
12	Halogen acid gas content	1.828	1.828	1.835	1.833	1.858	3.2	1.866	1.828	1.866	
13	Smoke density(flameless)	/	/	/	/	/	280	/	/	/	





## ■ Plastic products

### Nylon 6 cable material

The product uses PA6 resin as the main raw material, through adding antioxidants, lubricants and other additives with a specific process to produce finished pellets. The physical and processing properties of the nylon 6 cable material are excellent.

#### Application

Power cable/Communication optical cable

#### Product model and application

Model	Name	purpose
PA6H01	Black nylon sheath material	Communication optical cable and cable

#### Product performance

Serial number	Test items	Unit	Typical value
			PA6H01
01	Tensile strength	MPa	63
02	Density	g/cm <sup>3</sup>	1.109
03	Shore hardness HD	/	80
04	volume resistivity 20°C	Ω·cm	1.15×10 <sup>14</sup>



## ■ Plastic products

### PBT

PBT material for optical fiber loose tube is a kind of high performance PBT material obtained from common PBT particles after chain expansion and has excellent processing performance and good compatibility with common PBT color masterbatch. It is applied to micro cable, belt cable and other communication cables.

**Application:** Communication optical cable

#### Product model and application

Model	Name	Purpose
JD-3018	PBT loose tube material	Communication cable
JD-3019	High performance PBT loose tube material	

#### Product performance

Serial number	Test items	Unit	Typical value	
			JD-3018	JD-3019
01	Density	g/cm <sup>3</sup>	1.30	1.30
02	Melting point	°C	214	215
03	Melt index	g/10min	11.3	10.4
04	Yield strength	MPa	51	53
05	Yield elongation	%	7.1	6.1
06	Elongation at break	%	308	99
07	Modulus of elasticity for tension	MPa	2111	2167
08	Modulus of elasticity in static bending	MPa	2206	2214
09	Bending strength	MPa	71	82
10	IZOD Impact Strength (23°C)	kJ/m <sup>2</sup>	11.4	12.1
11	IZOD Impact Strength (-40°C)	kJ/m <sup>2</sup>	8.5	8.1
12	Load deformation temperature (1.8MPa)	°C	66	64
13	Load deformation temperature (0.45MPa)	°C	175	176
14	Saturated water absorption	%	0.2	0.2
15	Water content	%	0.02	0.01
16	Shore hardness HD	—	70	75
17	Volume resistivity	Ω·cm	>1.0×10 <sup>14</sup>	>1.0×10 <sup>14</sup>





## ■ Plastic products

### Filler material

The filling material for communication optical cable is based on polypropylene, adding toughening agent, inorganic filler, antioxidant, lubricant and other additives, and then mixed, plasticized and granulated. The product has excellent extrusion stability and high setting out speed, good mechanical properties and meets the Rosh instruction. It can be used to extrude the filling line of communication optical cable.

#### Application

Fillers for communication optical cable

#### Product model and application

Model	Name	Purpose
TC3002	Pure resin filling material for optical cable	Fillers for communication optical cables
PP3001	Modified filling material for optical cable	



## ■ Plastic products

### Product performance

Serial number	Test items	H8005	Typical value	
			LL6601/02	
01	Tensile strength	MPa	18.7	
02	Elongation	%	715.89	
03	Density	g/cm <sup>3</sup>	0.94	
04	MFR	g/10min	0.89	
05	Aging characteristic (100 °C, 10d)	Tensile strength	MPa	16.27
		Elongation	%	657.19
		Tensile strength change rate	%	-12.99
		Elongation change rate	%	-8.2
06	Volume resistivity 20 °C	Ω·cm	8.2×10 <sup>14</sup>	
07	OIT 200 °C	min	45	
08	Carbon black content	%	2.45	
09	Carbon black dispersion	—	6	
10	ESCR 1)F0, 96h	—	0	
11	Dielectric strength	Kv/mm	26	
12	low temperature impact embrittlement temperature	°C	-40	

Serial number	Test items	H8005	Typical value
			PP3001
01	Density	g/cm <sup>3</sup>	1.45
02	Tensile strength	MPa	15.5
03	Elongation	%	50
04	MFR	g/10min	4.5
05	Thermal deformation (18MPa)	%	58
06	Vicat softening point	°C	85
07	Notch impact strength	kJ/mm <sup>2</sup>	3.2
08	Bending strength (Distance 50mm)	MPa	30



## ■ Plastic products

### PVC-90

CVC-9002 is based on PVC resin as a base, adding plasticizers, stabilizers, colorants and other additives, by mixing, plasticizing, granulation and made of granular materials.



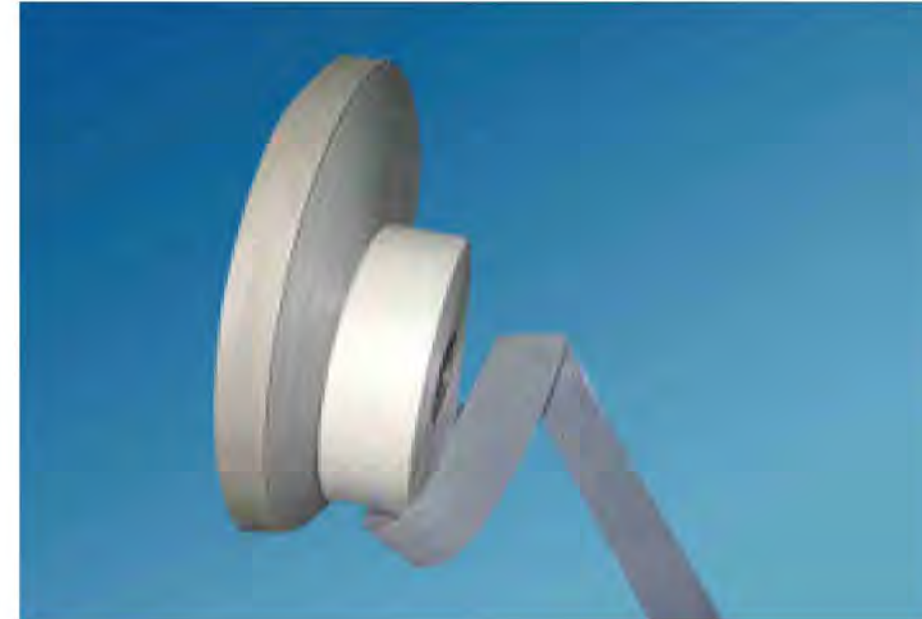
Entry name	Unit	Index value	Typical value
tensile strength	Mpa	≥16.0	20.0
elongation at break	%	≥180	330
Tensile strength after aging	Mpa	≥16.0	21.5
Change rate of tensile strength	%	Maximum±20	+8
Elongation after aging	%	≥180	310
Max change of Elongation at break	%	Maximum±20	-6
mass loss	g/m <sup>2</sup>	≤15	9
thermal deformation	%	≤40	28
Thermal stability time at 200	min	≥80	120
Low temperature impact embrittlement temperature	°C	-20adopt	-22
Volume resistivity at 20	Ω.cm	≥1.0×10 <sup>9</sup>	2.0×10 <sup>10</sup>



## ■ Plastic products

### Wrapped tape

PP winding (cotton belt) is made of polypropylene film extrusion film roll, honeycomb heat treatment cooling molding embossing, cutting made for manufacturing cable core wrapped with cushion.



PP winding (cotton belt) technical parameters			
Serial number	Name	index	
		thickness0.3	thickness0.4
1	Longitudinal breaking force ≥N/15mm	28±2	
2	Extension force≥%/15mm	300	
3	Voltage breakdown strength ≥KV/mm	20	
4	Volume resistivity coefficient at 20 C ≥Ω.cm	The 13 Party of 1.2*10	
5	single≤g/m <sup>2</sup>	126	156



## ■ Quality Management

ZTT always insists on "Quality comes first" and "Focusing on prevention"; and has already passed ISO9001 certification.

Meanwhile, ZTT has strictly managed and controlled the process of design, manufacturing, installation, service, and so on.

Nowadays, ZTT is fully implementing Environmental Management System (ISO14001) and Occupational Health Safety Management System (OHSAS18001); thus gradually established a more comprehensive enterprise standard and regulation. Furthermore, ZTT is constantly improving the environmental performance of products to follow out the Sustainable Development Strategy, and highlighting its sense of social responsibility.

Quality management is the wing of ZTT, and the life source of ZTT brand. In order to improve the reliability of products, our company strictly abides by the tenet of "high quality, high reliability" in every stage of system design, material selection, process production, test and so on, and guarantees the realization of the quality target of "100% of products pass".



### Testing Facilities

#### PC36C DC Resistance Measuring Instrument

DC resistance

#### JR-30A Winding and Torsion Testing Machine

winding and torsion test

#### DDB-303A Portable Conductivity Meter

conductivity of solution

#### PAL-1 Digital Display Handheld Refractometer

solution concentration

#### computer-controlled electronic universal testing machines

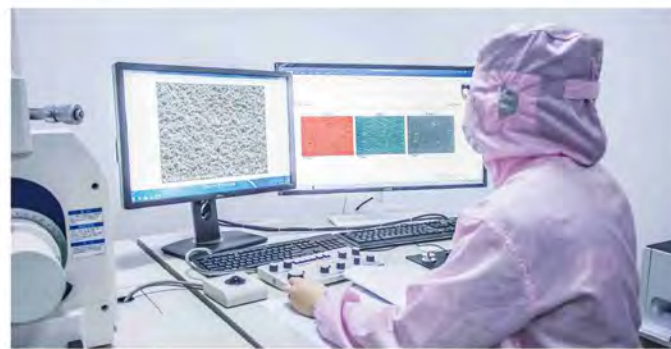
Tensile strength

#### TD5B Low Speed Centrifuge

centrifugal precipitation

#### PHS-3C PH Meter

sample analysis



## ■ Infrastructure



### CSR Activities

ZTT makes green manufacturing and sustainable development to be the value orientation of enterprise contribution to society while practicing the corporate social responsibility.

ZTT has made great achievement in developing and using of renewable energy resources based on the new technology. This initiative is not only a promising complement to existing energy supply system, but also a significant measure to implement environmental protection and ecological management.

ZTT has taken the lead in establishing the working mechanism of "Spiritual Home Engineer", and this creation has embodied the scientific managing principle of "people-oriented".

ZTT positively participates in the social philanthropy, and has founded "JDO Love Charity Foundation" to donate schools and help underprivileged children. JDO reacted immediately after natural disasters, donated and provided technology aids in the fight against catastrophic blizzards and icy rains disaster, Wenchuan Earthquake, Yushu Earthquake, and so on.



# Partner

