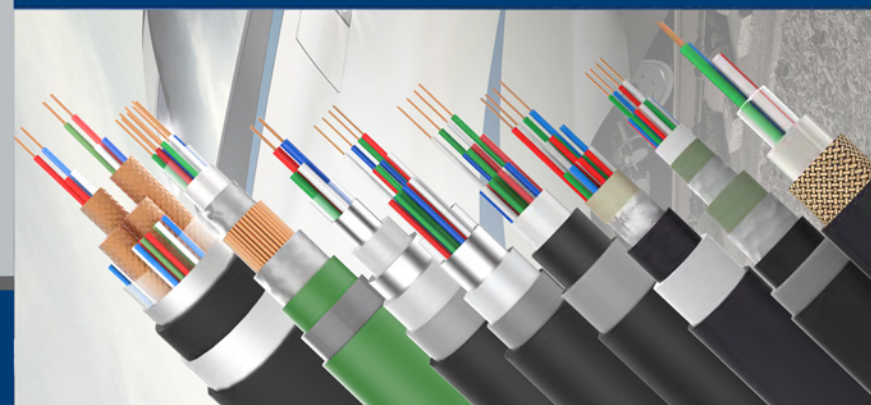


ZTT GROUP

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 employee, 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 \$13.4 billion in sales revenue in 2022. 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.



Railway Signal Cables



Type of Railway Signal Cables

- Railway signal cable
- (Internal shield) Railway digital signal cable
- Responder data transmission cable
- Copper wire braided shielded responder data transmission cable
- Railway axle cable
- Railway long-distance symmetrical communication cable
- Signal cable for urban rail transit
- Axle cable for urban rail transit
- Multi-composite high electromagnetic shielding rail traffic communication signal cable
- Rail transit loop cable



ZTT Focuses on Precise Manufacturing

Company profile

Zhongtian Radio Frequency Cable Co., Ltd. was established in 2004, as a high and new technology enterprise founded by Jiangsu Zhongtian Science and Technology Co., Ltd and Nanjing University of Posts and Telecommunications, which is located at Nantong Economic & Technological Development Zone of Jiangsu Province.

We provide products such as radio frequency cables, leaky coaxial cables, railway digital signal cables and accessories for mobile communications, which are widely used in over 20 countries. We have excellent R&D

ability and with advanced equipment such as Mallefer and Rosendahl. We have capacity of manufacturing 80,000km radio frequency cables, 10,000km leaky coaxial cables, 13,000km railway digital signal cables, 5,000km high temperature cables and accessories per year.

Our products have passed the tests in many third laboratories, such as TLC&ROHS. We devote ourselves to offering safe and reliable products and quick and thoughtful service for our customers.



Production progress



Zhongtian Radio Frequency Cable Co., Ltd(ZRF) has the industry's leading leather -bubble-leather physical foaming wire-drawing insulation series production lines, high-speed warping machine, inner shield longitudinally wrap line, argon arc welding line and other professional signal cable production equipment, professional and employs the industry renowned experts from outside to use technological advantages to build brand products.

ZRF imports international advanced brand RK-S wire-drawing insulation series line specifically for signal cable insulation wire production. This production line is equipped with the world's leading level of the 'Niehoff' wire- drawing and annealing machine, can guarantee the conductor diameter and elongation at break is stable and controllable. Leather-bubble-leather physical foaming three-layer co-extrusion extruder uses industry leading "EXTRUCELL" physical foaming technology, equipped with advanced monitoring and controlling system, can accurately control core diameter and the capacitance tolerance value, its precision manual adjustable machine head and high precision mold can effectively guarantee the conductor concentricity.



ZRF is equipped with international advanced brand high-speed warping machine, the machine uses constant tension alignment and have pre-twisting characteristic function, can guarantee the stability of four line set structure and its good symmetry properties, make work capacitance, capacitance coupling coefficient and other key indicators reach the best level. The machine also has on-line detection and feedback control function, realizes the purpose of products strictly conforming to the technological requirements.

Signal cables of ZRF has low attenuation, long distance train control signal transmission ability, excellent ability of anti-electromagnetic interference, they are suitable for electrified and nonelectrified section of various operating conditions.



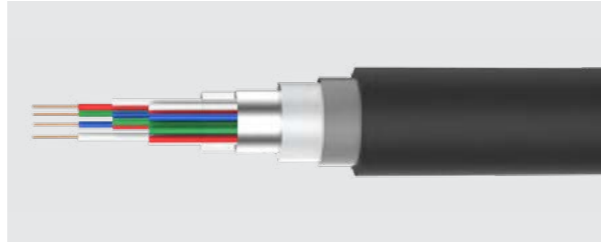
Main testing equipment list

No.	Equipment name	Model	Usage
1	Railway digital signal cable testing system	CTS-RW	Test the electrical properties of finished cables
2	Cable parameter analyzer at low frequency	LCTS-04	Test low frequency electrical performance of semi-finished cables
3	Frequency synthesis source	SSS08	Test the near-end crosstalk attenuation of the cable and the far end crosstalk defense
4	Frequency-selective level meter	SSL08	Test the near-end crosstalk attenuation of the cable and the far end crosstalk defense
5	Ideal shielding factor test system	CSF	Test the ideal shielding factor of finished cables
6	Digital dc bridge	SQJ23	Test cable core dc resistance
7	Tramegger	QZ2B	Test cable core insulation resistance
8	Cable fault locator	GZD-1C	Locate cable core fault point
9	Wave reflection method to locate fault points in cable	HDTDR-80	Locate cable core fault point
10	Capacitance coupling meter	QS36A	Test capacitance coupling coefficient,Earth capacitance unbalance,foreign terrain capacitance unbalance,etc.
11	Electron microscope	200M-620E	Measure cable core eccentricity
12	K-JGY	LGJ	High voltage test
13	LCR tester	3532-50	Test capacitance,inductance,impedance,phase angle,etc.
14	Elongation tester	SC-2J	Test conductor elongation at break
15	Electronic micrometer	-	Test dimension
16	Digital display vernier calipers	SF2000	Test dimension
17	Electronic tensile testing machine	WDW-20	Single wire insulation resistance to compression and tension test

Railway signal cables

Application

Railway signal cable is suitable for railway signal and audio signal transmission or some automatic device with fixed installation. Composite sheath and aluminum sheathed railway signal cables have a little shielding performance, which is applied to be laid in electrification area or other areas with high voltage interference.

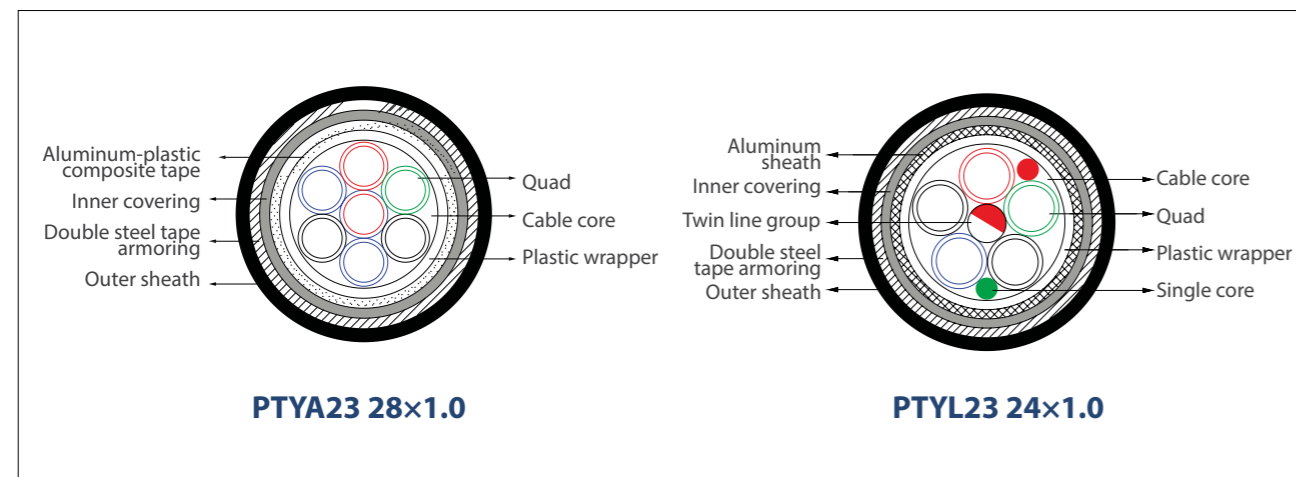


Product using characteristics

- ◆ The working temperature of cables is $-40^{\circ}\text{C} \sim +60^{\circ}\text{C}$.
- ◆ The long-term working temperature of conductor should not exceed $+70^{\circ}\text{C}$.
- ◆ Laying temperature of cables: PVC sheathed cable no lower than 0°C , PE sheathed cable no lower than -10°C .
- ◆ Permissible bending radius of cable: unarmored cable

should not be less than 10 times of cable diameter, armored cable should be not less than 15 times of cable diameter.
 ◆ Ideal shielding factor of composite sheathed railway signal cables ≤ 0.8 , Ideal shielding factor of aluminum sheathed railway signal cables ≤ 0.3 .

Product structure diagram



The specification of railway signal cable

No.	Specification (core number)	core structure			mm reference OD			
		Quad	Twin line group	Insulation Signal wire	Plastic sheath		Comprehensive sheath	Lead sheath
					Non-armor	Armor		
1	4	1	-	-	8.3	11.7	16.4	23.0
2	6	-	3	-	11.4	14.8	20.1	25.0
3	8	-	4	-	12.4	15.8	22.2	25.0
4	9	-	4	1	14.2	15.8	22.2	25.0
5	12	3	-	-	14.8	19.6	23.6	27.0
6	14	3	-	2	14.8	19.6	23.6	27.0
7	16	4	-	-	16.2	21.0	25.7	29.0
8	19	4	-	3	16.2	21.0	25.7	29.0
9	21	4	-	5	16.2	21.0	25.7	29.0
10	24	5	1	2	17.7	22.5	27.3	31.0
11	28	7	-	-	20.3	24.1	28.8	31.0
12	30	7	-	2	20.3	24.1	28.8	31.0
13	33	7	-	5	20.3	24.1	28.8	31.0
14	37	7	3	3	23.0	26.8	31.5	38.0
15	42	7	4	6	24.0	27.8	33.0	38.0
16	44	7	4	8	24.0	27.8	33.0	38.0
17	48	12	-	-	26.4	31.4	35.5	40.0
18	52	12	-	4	26.4	31.4	35.5	40.0
19	56	14	-	-	27.8	32.8	36.7	40.0
20	61	14	-	5	27.8	32.8	36.7	40.0

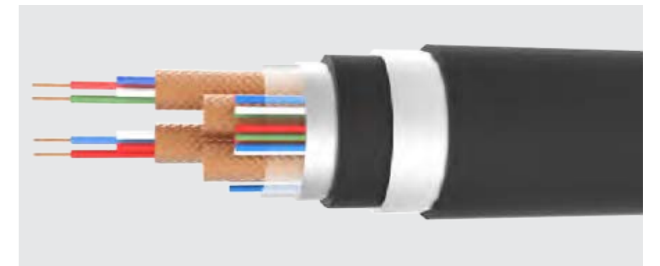
Electrical performance

No.	Item	Unit	Index	Test method	Reduction formula
1	20°C DC resistance				
1.1	DC resistance for every conductor	Ω/km	≤23.5	GB/T 3048.4	L/1000
1.2	The Resistance of the conductor to the working wire is unbalanced	%	≤2		
2	Insulation resistance	MΩ·km	≥3000	GB/T 3048.6	1000/L
3	Capacitance				
3.1	Working capacitance of twin line group	nF/km	≤70	GB 5441.2	L/1000
3.2	Working capacitance of star twist quad		≤50		
3.3	The Capacitance between any insulated core and other insulated cores connected to ground		≤100		
4	Capacity coupling				
4.1	k1 Average value	pF/km	≤100	GB 5441.3	√L/500
	Maximum value		≤330		L/500
4.2	k9 k12 Average		≤120		√L/500
	Maximum value		≤230		L/500
	Four cores cable k1 is Max				
5	Unbalanced to outer capacitance		pF/km		
	e a1 、 e a2 Average	≤1300			
	Maximum value	≤1300			
	Four cores cable ea1 、 ea2 is Max				
6	50Hz 2min Insulation voltage resistance 50Hz 2min				
6.1	between cores	V	1000	GB/T 3048.8	-
6.2	Core to other cores connected to ground		1800		

(Internal shield) Railway Digital signal cables

Application

Railway digital signal cable is suitable for transmitting control information, monitoring information and electric energy between signal equipment and control devices such as railway signal automatic blocking system, counting axis, station code, computer chain, computer monitoring, dispatching centralized, dispatching supervision, high power electric switch machine and so on. When applied to ZPW-2000, UM71 without insulation frequency shift automatic block system, the transmission distance up to 10km. Internal shielded railway digital signal cable can meet the requirements of electrified railway on the strong electric



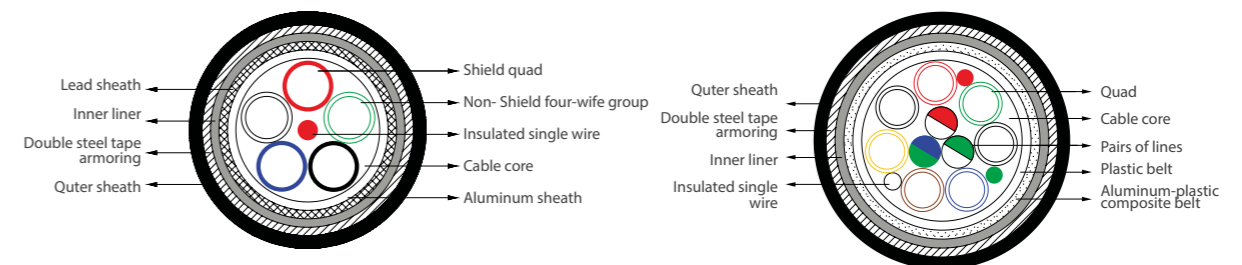
field interference, humidity, cold and other environmental requirements and the latest signal system standard and the latest equipment mating requirements.

Product using characteristics

- ◆ Use environment temperature of the cable is -40 °C ~ + 60 °C , the temperature of laying environment is not less than -10 °C .
- ◆ The long-term working temperature of cable conductor should not exceed + 70 °C .
- ◆ Permissible bending radius of cable: Non-armored cable's radius should not be less than 10 times of cable outer diameter; armored cable's radius should not be less than 15

- times of cable outer diameter; The inner shielded cable shall not be less than 20 times of cable outer diameter.
- ◆ Integrated sheath (inner shield) railway digital signal cable ideal shielding factor ≤ 0.8.
- ◆ Aluminum sheath (internal shield) railway digital signal cable ideal shielding factor ≤ 0.2.

Product structure diagram



SPTYWPL23 21A×1.0

SPTYWA23 37×1.0

The specification of Railway Digital signal cables

Program	Specification (number of cores)	Structure of cable core			Referential outer diameter (mm)			
		Quad	Twin line group	Insulation Single wire	Plastic sheath		Comprehensive sheath armor	Aluminum sheath armor
					Without armor	armor		
1	4	1	-	-	10	12	16	22
2	6	-	3	-	12	15	20	24
3	8	2	-	-	14	16	22	25
4	9	3	-	-	14	17	22	25
5	12	3	-	-	15	18	23	26
6	14	4	-	2	15	18	23	26
7	16	4	-	-	17	20	25	28
8	19	5	-	3	17	20	25	28
9	21	6	-	1	19	20	26	30
10	24	7	-	-	20	21	27	31
11	28	7	-	-	20	23	28	31
12	30	7	-	2	20	23	28	31
13	33	7	-	5	20	23	28	31
14	37	7	-	3	23	25	31	35
15	42	7	4	6	24	26	33	35
16	44	7	4	8	25	27	33	35
17	48	12	-	-	25	28	34	37
18	52	12	-	4	25	28	34	37
19	56	14	-	-	27	31	35	39
20	61	14	-	5	27	31	35	39

The specification of (Internal shield) Digital signal cables

Program	Specification (number of cores)	Structure of cable core			Referential outer diameter (mm)			
		Quad	Twin line group	Insulation Single wire	Plastic sheath		Comprehensive sheath armor	Aluminum sheath armor
					Without armor	armor		
1	8B	2	-	-	21	23	27	30
2	12A	2	1	-	21	23	27	32
3	12B	3	-	-	22	24	28	31
4	14A	2	1	2	21	23	27	30
5	14B	3	-	2	22	24	28	31
6	16A	2	2	-	22	26	28	32
7	16B	4	-	-	24	26	30	36
8	19A	3	1	3	22	24	28	33
9	19B	4	-	3	24	26	30	36
10	21A	3	2	1	25	27	31	35
11	21B	5	-	1	28	30	34	37
12	24A	4	2	-	27	29	33	37
13	24B	6	-	-	29	31	35	40
14	28A	4	3	-	27	29	33	40
15	28B	7	-	-	29	31	35	40
16	30A	4	3	2	27	29	33	38
17	30B	7	-	2	29	31	35	40
18	33A	4	4	1	29	31	35	39
19	37A	4	5	1	30	32	36	39
20	42A	5	5	2	33	35	39	42
21	44A	6	5	-	34	36	40	44
22	48A	6	6	-	34	36	40	44

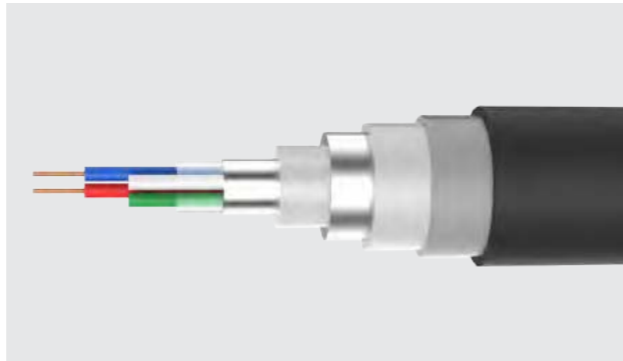
Electrical performance

Program	Project	Unit	index
1	DC Resistance at 20°C	Ω/km %	22.5±1.0 ≤1
1.1	DC Resistance of each conductor		
1.2	operating lines are unbalanced to conductor Insulation		
2	Insulation resistance DC 500V 20°C	MΩ·km	≥10000
2.1	Each Insulation wire core to others(connected with screen and metal sheath)	V	1000
3	strength of the dielectric medium 50Hz 2min		
3.1	One wire core to others		
3.2	All the connected wire cores(or one wire core) to screen and metal sheath		2000
4	Capacitance 0.8 ~ 1.0kHz	nF/km	28±3 (2) 35±4 ≤70
	Capacitance of 4-wire group		
	Capacitance of 2-wire group		
	Capacitance of one Insulation wire core to others connected to ground		
5	Capacitance Coupling Coefficient 0.8 ~ 1.0kHz	pF/km	≤81 330 ≤119 230
5.1	K1 Average value		
5.1	Maximum value		
5.2	k9~k12 Average value		
5.2	Maximum value		
5.3	Index k1 is the maximum value of cable with four cores		
6	Unbalanced external capacitance	pF/km	≤330 800
6.1	ea1、 ea2 On average		
6.1	Maximum value		
6.2	Index e _{a1} 、 e _{a2} are the maximum value of cable with four cores		
6.3	10% of drums are permitted e _{a1} 、 e _{a2} ≤1294		
7	near end crosstalk attenuation b entre 1000kHz loops (no less than 300m)	dB	≥37 (37) ≥42 (54)
	The same group		
	The different group		
8	The distal crosstalk ratio of 1000kHz loops	dB/km	≥39 (39) ≥49 (59)
	The same group		
	The different group		
9	characteristic impedances at 20°C	Ω	396±24 (16) 367±22 (15) 343±21 (14) 325±20 (13) 155±16 (16)
	1.7kHz		
	2.0kHz		
	2.3kHz		
	2.6kHz		
10	Line attenuation 20°C	dB/km	≤0.70 ≤0.75 ≤0.80 ≤0.83 ≤9.0
	1.7kHz		
	2.0kHz		
	2.3kHz		
	2.6kHz		
11	phase angle.	°	-39±3.9 (1.2) -38±3.8 (1.1) -37±3.7 (1.1) -36±3.6 (1.1)
	1.7kHz		
	2.0kHz		
	2.3kHz		
	2.6kHz		
12	Shielding group between the line core ground near-end crosstalk attenuation 2.6kHz minimum 300m two screens,each group has a line connects the ground another against the ground and the near end crosstalk attenuation	dB	≥89
	near-end impedance 55Ω, far-end impedance 325Ω		
13	Direct current resistance entre sheath screen and Discharge line 20°C	Ω	≤0.01

Responder data transmission cable

Application

The responder data transmission cable is used in a track circuit point-to-point transponder system, the connection between the devices point-to-point transponder and ground unit (LEU) signal control device, Transmission automatic block system, the data and information of the over-speed protection system, basic parameters of railway, the speed information of railway, the information of temporary speed restriction, the information of the train pulling in the station, the information of special positioning information, the target data, real-time data of the running train, and also the information of the fixed obstacles.

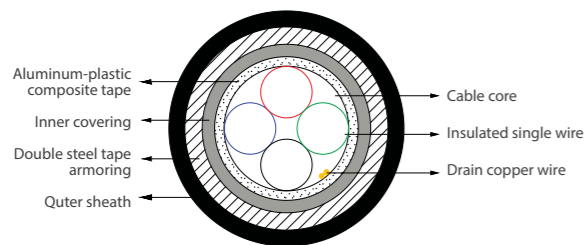


Product using characteristics

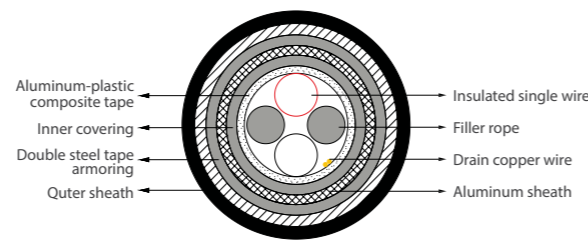
- ◆ The using temperature of cable is $-40^{\circ}\text{C} \sim +60^{\circ}\text{C}$, the installation temperature of cable laying should not lower than -10°C .
- ◆ Long term working temperature of cable conductor shall not exceed $+70^{\circ}\text{C}$.
- ◆ Allowable bending radius of cable: Aluminum sheath

cable shall be not less than 20 times of the diameter of the cable; integrated sheath cable should be not less than 15 times of the diameter of the cable.
 ◆ In the normal installation and normal operating conditions, the using life of the cable shall be not less than 20 years.

Product structure diagram



LEU-BSYA23 1x4x1.53



LEU-BSYL23 1x2x1.53

The specifications of transponder data transmission cable

Program	type	specification	Reference outside diameter
1	LEU-BSYA23	1x2x1.53 1x4x1.53 20	20
2	LEU-BSYL23	1x2x1.53 1x4x1.53	27

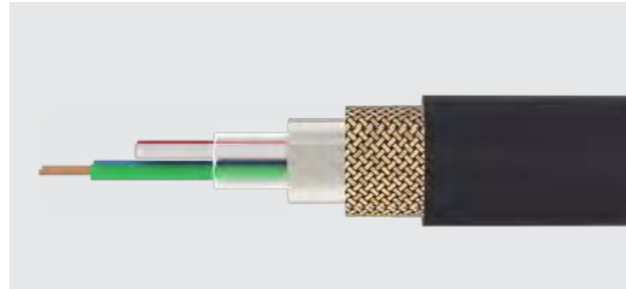
Electrical performance

Program	Project	Unit	index
1	DC Resistance at 20°C	Ω/km %	≤9.9 ≤1
1.1	DC Resistance of each conductor		
1.2	operating lines are unbalanced to conductor Insulation		
2	Insulation resistance DC 500V 20°C	MΩ·km	≥10000
3	Capacitance 0.8 ~ 1.0kHz	nF/km	≤42.3
4	strength of the dielectric medium 50Hz 2min	V	1500 3000
4.1	One wire core to others		
4.2	Wire cores to ground		
5	Characteristic resistance	Ω	150±2 120±12 120±5
5.1	8.82kHz		
5.2	282.5kHz、565kHz		
5.3	1800kHz		
6	Line attenuation at 20°C	dB/km	≤0.8 ≤5.0 ≤8.0
6.1	8.82kHz		
6.2	282.5kHz、565kHz		
6.3	1800kHz		
7	Ideal shielding index 50Hz The induced voltage on the cable metal sheath is 50V/km ~ 200V/km		≤0.2 (aluminum sheath) ≤0.8 (Integrated sheath)
8	Continuity of metal screen		electric circuit

Copper wire braided shielded responder data transmission cable

Application

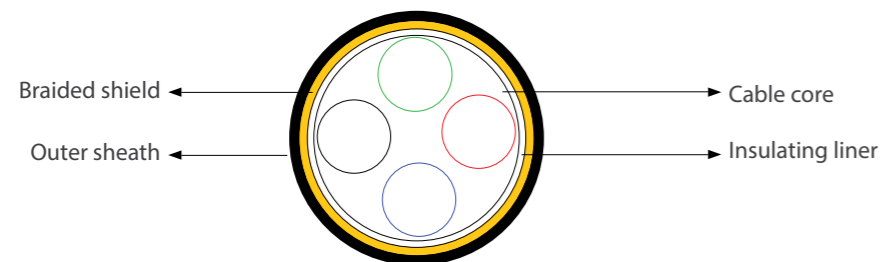
Copper wire braid shield responder data transmission cable can be used in the responder transmission system. It connects the indoor cabinets to the LEU devices or connects the outdoor cable terminal box to the transponder equipment. According to the specific use of environmental, Copper wire braid shield responder data transmission cable can use the different sheath materials. When used indoors, it can use the flame retardant sheath.



Product using characteristics

- ◆ The using ambient temperature of the cable is $-40\text{ }^{\circ}\text{C} \sim +60\text{ }^{\circ}\text{C}$ and the laying environment temperature should not be less than $-10\text{ }^{\circ}\text{C}$.
- ◆ The long-term operating temperature of the cable conductor should not be exceed $+70\text{ }^{\circ}\text{C}$.
- ◆ Under normal laying environment and normal operating conditions, the service life of the cable shall not be less than 20 years.

Product structure diagram

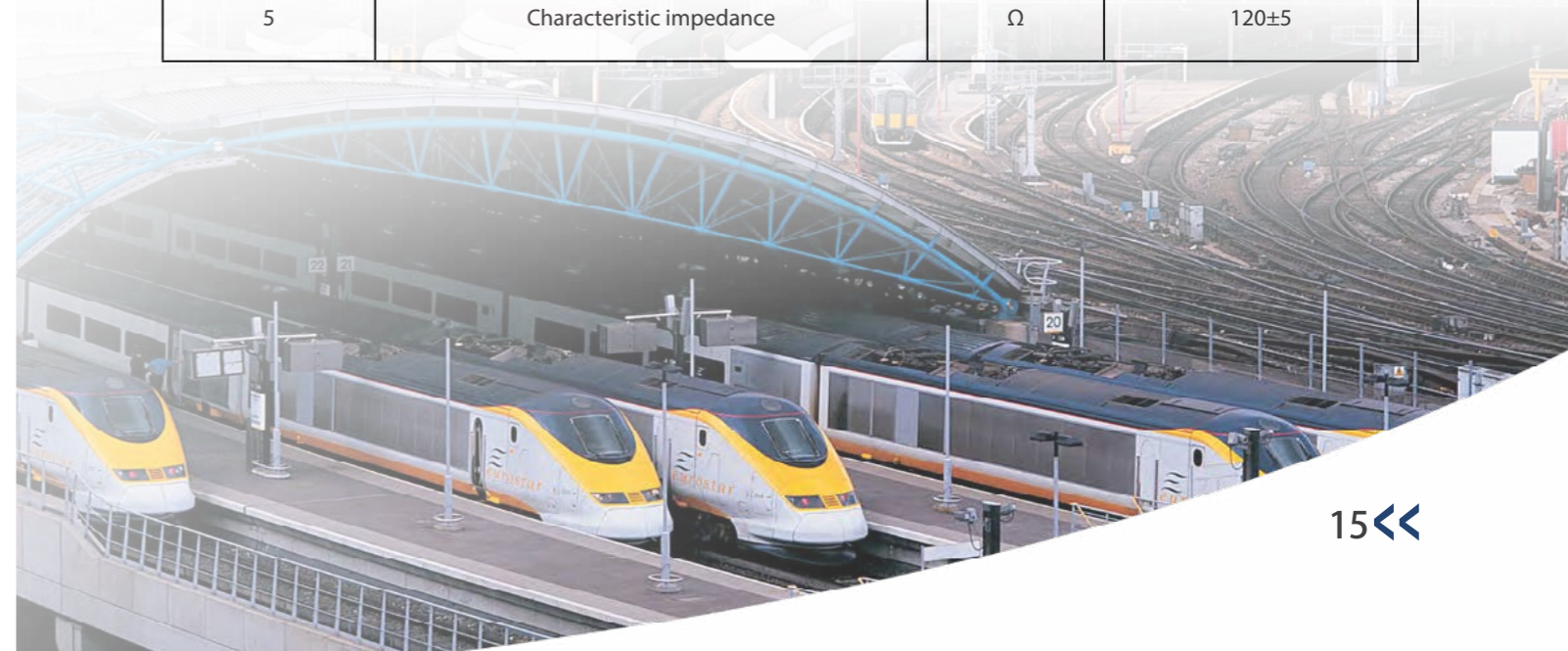


The specification for copper wire braided shielded transponder data transmission cable.

Serial number	Model	Specifications	Reference outside diameter
1	LEU.BSYYP	1*2*1.14 1*4*1.14	12

Electrical performance

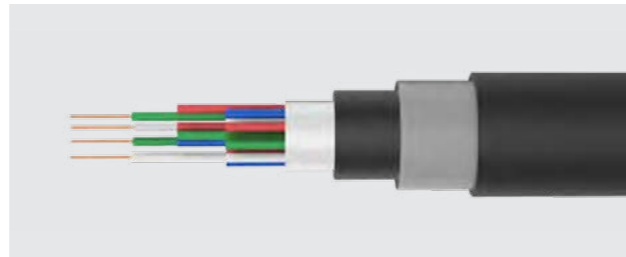
Serial number	Project	Unit	Index
1	DC resistance of each conductor 20°C	Ω/km	≤ 26.0
2	Insulation resistance DC 500V 20°C	$\text{M}\Omega\text{-km}$	≥ 10000
3	Working capacitance 0.8kHz~1.0kHz	pF/km	≤ 45.3
4	Strength of insulating medium 50Hz AC 1min Line core Core to ground	V	1000 2000
5	Characteristic impedance	Ω	120 ± 5



Railway axle cable

Application

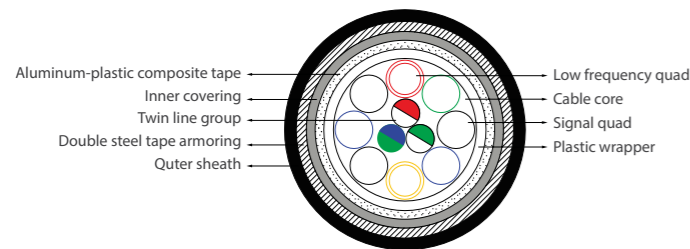
Railway axle cable is used for the signal equipment rated voltage AC 500V/ DC 1500V and below . the four quad axle low frequency communication as the data transmission communication road. It is suitable for transmission of audio information (data signals, analog signals); The four group is suitable for signal frequency or DC power transmission and can also be used in the audio range of transmission Transport.



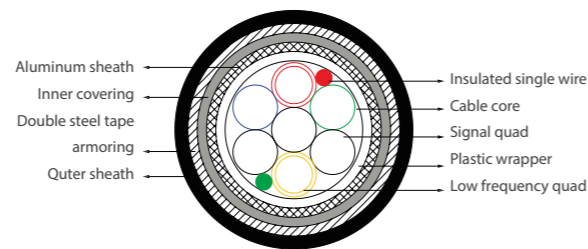
Product using characteristics

- ◆ The using ambient temperature of the cable is $-40^{\circ}\text{C} \sim +60^{\circ}\text{C}$.
- ◆ The laying environment temperature: PVC outer sheath cable should not be less than 0°C ; Polyethylene sheath cable should not be less than -10°C ;
- ◆ Allowable bending radius of cable: Armored cable should not be less than 15 times diameter of the cable.
- ◆ Ideal Shielding Coefficient of Composite sheathed railway axle cable should less than 0.8 ; Ideal Shielding Coefficient of Aluminum sheath railway axle cable should less than 0.2.

Product structure diagram



PJZA23 2×4×0.9+6×4×1.0+3×2×1.0



PJZL23 2×4×0.9+5×4×1.0+2×1.0

The specification of railway axle cable

Core number	Reference outside diameter		Core number	Reference outside diameter	
	Integrated sheath	Aluminum sheath		Integrated sheath	Aluminum sheath
12	19.9	26.0	36	26.9	34.0
14	19.9	26.0	38	27.2	34.0
16	21.3	28.0	40	28.5	36.4
22	22.8	30.0	42	28.5	36.4
24	22.8	30.0	44	30.2	36.4
26	22.8	30.0	46	30.2	36.4
28	24.4	31.0	48	30.5	36.4
30	24.4	31.0	50	30.5	36.4
32	24.4	31.0	56	32.9	39.8
34	26.9	34.0	-	-	-



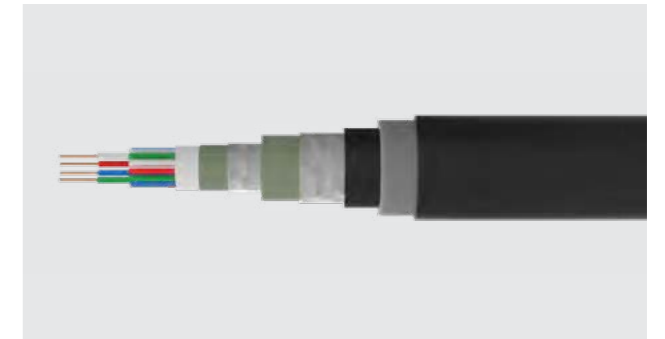
Electrical performance

Number	Item	Unit	Index	
			The quad, of low frequency communication	Single quad, the twin line group, insulated single-wire
1	DC resistance 20°C			
1.1	DC resistance of each conductor	Ω/km %	≤28.5	≤23.5
1.2	The conductor resistance of working twin wire is unbalance ^a		≤1	≤1
2	Insulated resistance DC 500V 20°C Each insulated wire core is connected with the other insulated wire core to shield and metal sleeve	MΩ·km	≥10000	≥10000
3	Insulation medium strength 50Hz 2min			
3.1	Voltage between wire core	V		
3.2	All cores are connected together (or each core wire) to the shield with a metal sleeve		1000 1800	1000 1800
4	Capacitance 0.8 ~ 1.0kHz			
4.1	Four line group capacitance	nF/km	≤40	≤50
4.2	Twin line working capacitance		-	≤70
4.3	Capacitance between each insulated wire core and the other grounded insulated wire core		-	≤100
5	Capacitance coupling coefficient 0.8 ~ 1.0kHz			
5.1	K ₁ Average value	pF/km	-	≤141
5.2	Maximum value		330	660
	k ₉ ~k ₁₂ Average value		≤168	≤170
5.3	Maximum value	230	460	
6	Unbalanced external capacitance 0.8 ~ 1.0kHz			
6.1	e _{a1} , e _{a2} Average value	pF/km	800	2600
	Maximum value			
6.2	There are 10% sets of cables allow the low frequency four line group which are e _{a1} and e _{a2} , maximum value ≤1000			
7	Linear attenuation constant ^b 0.8 ~ 1.0kHz	dB/km	≤0.65	-
8	Insulated wire is broken and mixed	-	No broken wire, no mixed wire	

Railway long-distance symmetrical communication cable

Application

Railway long-distance symmetrical communication cable is suitable for communication line in long distance trunk line and interval communication. Among them, 0.9mm high-frequency quad is used for 156 KHz analog communication system. 0.9mm low frequency quad is used for audio communication. 0.6mm, 0.7mm insulated single wire is used for signal transmission, alarm, remote control. This product is excellent shielding performance and suitable for laying in electrified sections or other strong interference area.

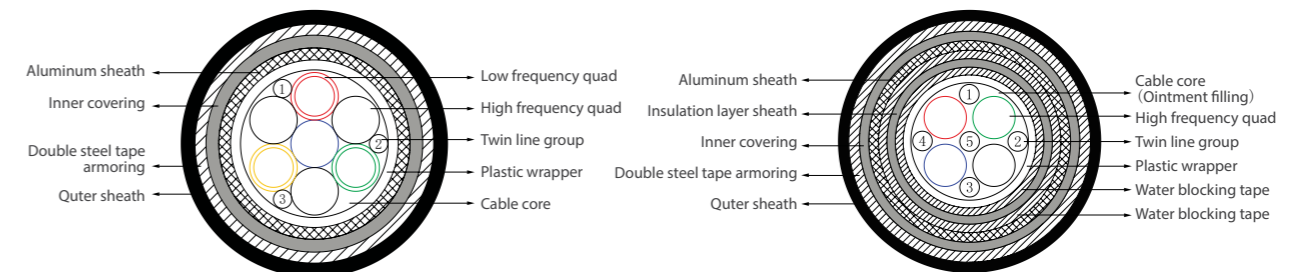


Product using characteristics

- ◆ Cable using temperature of is -40°C ~ +60°C .
- ◆ Long term working temperature of cable shall be no more than +70°C .
- ◆ Cable laying environment temperature: PVC outer sheath cable should not be less than 0 °C ; PE outer sheath cable should not be less than 10°C .

- ◆ Allowable bending radius of cable: no less than 15 times the diameter of the cable.
- ◆ Except the double steel tape armored cable and 1 group cable, when the induction voltage of metal sheath is 35v/km ~ 200v/km(50Hz), the ideal shielding coefficient of protective layer is less than 0.1

Product structure diagram



HEYFL23-156 3×4×0.9 + 4×4×0.9 + 3×2×0.7(0.6)

HEYFLT23 4×4×0.9 + 5×2×0.7 (0.6)

The specification for railway long - distance symmetrical communication cable

Group Number	Cable core structure			Reference outside diameter(mm)					
				Long distance symmetrical communication cable		Water blocking ointment filling long distance symmetrical communication cable		Long distance symmetrical high, low frequency comprehensive communication cable	
	Quad	Twin line group	Insulated core	Non armored	Armored	Non armored	Armored	Non armored	Armored
1	1	—	—	18.2	21.8	18.1	21.8	20.6	21.8
3	3	—	—	24.2	28.2	24.4	28.2	26.8	28.2
4	4	5	—	24.2	28.2	25.9	30.4	26.8	28.2
7	7	3	—	28.2	32.4	29.1	34.6	30.6	32.4
12	12	3	—	34.4	38.8	35.4	39.8	30.6	38.8
14	14	4	—	36.6	40.8	37.1	40.8	39.0	40.8

Electrical performance

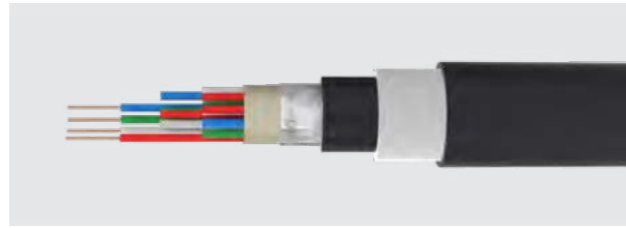
No.	Item	Index
1	Conductive wire core DC resistance 20°C Ω/km	
	Quad 0.9mm	≤28.5
	Twine 0.7mm	≤48.0
	Twine 0.6mm	≤65.8
2	Imbalance DC resistance of conductor	
	Quad	≤1%
	Twine	≤2%
3	insulation resistance MΩ·km	
	Each wire core to other (connect to metal screen)	
	Quad	≥10000
	Twine	≥5000
4	Dielectric strength of insulation 50Hz V 2min	
	Core to the earth(all cores connect to the screen and metal jacket)	≥1800
	Core to the earth	≥1000

No.	Item	Index
5	Operating capacitance nF/km 0.8kHz~1.0kHz	
	Non-filled cable	
	LF Quad 0.9mm	
	standard values	24.4
	Max values	27
	Twine 0.7mm、0.6mm	
	standard values	44
	Max values	50
	HF Quad 0.9mm	
	Average values	24.4
	allowable deviation	±1.6
	Filled cable	
	Quad 0.9mm	
	standard values	29
Max values	34	
6	Twine 0.7mm、0.6mm	
	standard values	50
	Max values	55
	Capacitance coupling coefficient 0.8kHz~1.0kHz	
	LF Quad	
	k ₁ Average values	≤81
Max values	330	
k ₉ ~ k ₁₂ Average values	≤168	
Max values	236	
7	HF Quad	
	K ₂ k ₃	≤600
	Earth capacitance unbalance coefficient pF/km 0.8kHz~1.0kHz	
8	e ₁ e ₂ Average values	≤330
	Max values	800
	Max values (Allows 10% of the plate e ₁ e ₂ ≤1294pF/km)	
9	HF group Degree of defense between Loop dB /500m 156kHz	
	within group	≥61
10	Between group	≥65
	HF Group	
	Absolute characteristic impedance Ω 156kHz	175
10	Nominal value	
	Absolute attenuation coefficient dB/km 20°C 156kHz	
	Nominal value	2.6
Allowable deviation	±0.2	

Signal cable for urban rail transit

Application

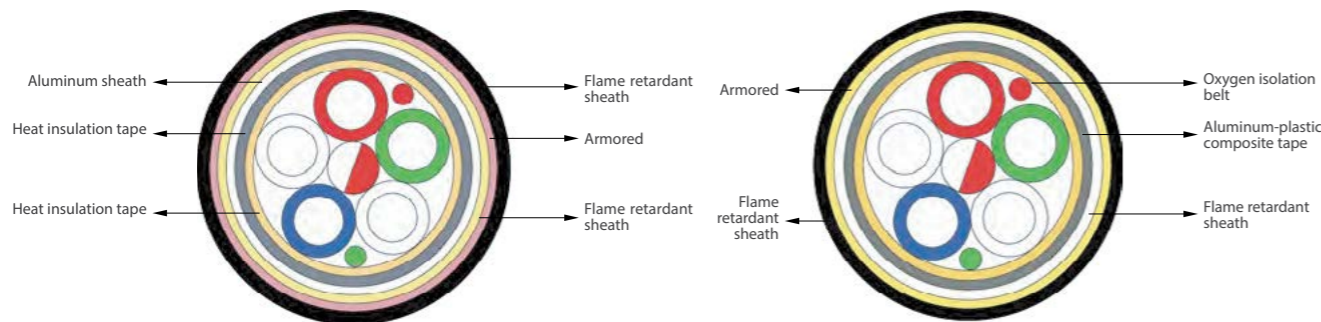
The product has a stronger flame retardant performance and anti-electromagnetic interference performance, able to adapt to a variety of different environments. In addition, its structure is more close and stable, to adapt to tunnel vibration caused by wind tunnel. At present, ZTT urban rail transit signal cable has been serving a number of domestic subway lines.



Product using characteristics

- ◆ The ambient temperature of cable is $-40 \sim +60 \text{ }^{\circ}\text{C}$.
- ◆ Cable laying ambient temperature: PVC outer sheath cable should not be lower than 0°C ; polyethylene outer sheath cable should not be lower than -10°C .
- ◆ Allowable bending radius of cable: Non-armored cable should be not less than 10 times the cable diameter; armored cable should be not less than 15 times the cable diameter.
- ◆ The ideal shielding coefficient of integrated sheathed railway signal cable is ≤ 0.8 ; the ideal shielding coefficient of aluminum sheathed railway signal cable is ≤ 0.3 .

Product structure diagram



WDZA-PTYL23 24×1.0

WDZA-PTYA23 24×1.0

The specification of signal cables for urban rail transit

No.	specification (cores)	Cable core structure			Reference outer diameter mm			
		Quad	twine	Insulated wire	Plastic sheath		Integrated sheath	Aluminum sheath
					Non-armored type	armored type	armored type	armored type
1	4	1	-	-	8.3	11.7	16.4	23.0
2	6	-	3	-	11.4	14.8	20.1	25.0
3	8	-	4	-	12.4	15.8	22.2	25.0
4	9	-	4	1	14.2	15.8	22.2	25.0
5	12	3	-	-	14.8	19.6	23.6	27.0
6	14	3	-	2	14.8	19.6	23.6	27.0
7	16	4	-	-	16.2	20.0	25.7	29.0
8	19	4	-	3	16.2	20.0	25.7	29.0
9	21	4	-	5	16.2	20.0	25.7	29.0
10	24	5	1	2	17.7	22.5	27.3	31.0
11	28	7	-	-	20.3	24.1	28.8	31.0
12	30	7	-	2	20.3	24.1	28.8	31.0
13	33	7	-	5	20.3	24.1	28.8	31.0
14	37	7	3	3	23.0	26.8	31.5	38.0
15	42	7	4	6	24.0	27.8	33.0	38.0
16	44	7	4	8	24.0	27.8	33.0	38.0
17	48	12	-	-	26.4	31.4	35.5	40.0
18	52	12	-	4	26.4	31.4	35.5	40.0
19	56	14	-	-	27.8	32.8	36.7	40.0
20	61	14	-	5	27.8	32.8	36.7	40.0

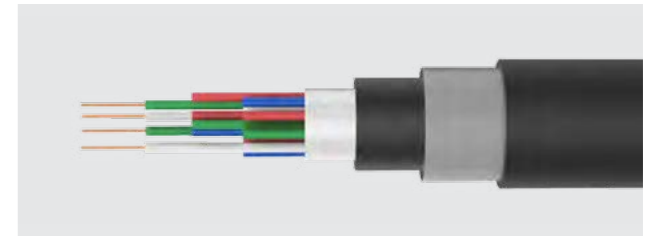
Electrical performance

No.	Item	unit	Index	Test method	Conversion formula		
1	Conductive wire core DC resistance in 20℃						
1.1	Each conductor DC resistance	Ω	≤23.5	GB/T 3048.4	L/1000		
1.2	Imbalance DC resistance of conductor		≤0.02				
2	Insulation resistance	MΩ	≥3000	GB/T 3048.6	1000/L		
3	Capacitance						
3.1	working capacitance of the wire group	nF	≤70	GB 5441.2	L/1000		
3.2	Star twisted quad working capacitance		≤50				
3.3	Capacitance between any of the insulated cores and other grounded insulated cores		≤100				
4	Capacitive coupling						
4.1	k ₁ Average values	pF	≤100	GB 5441.3	$\sqrt{L/500}$ L/500		
4.2	k ₉ ~ k ₁₂ Average values		≤120		$\sqrt{L/500}$ L/500		
	Max values		≤230				
	Four-core cable k1 indicators is maximum						
5	ground capacitance imbalance						
	e _{a1} 、e _{a2} Average values	pF	≤330	GB 5441.3	L/500		
	Max values		≤1300				
	Four-core e _{a1} , e _{a2} indicators is maximum						
6	Insulation withstand voltage 50Hz 2min						
6.1	Between cores	V	1000	GB/T 3048.8	-		
6.2	The core is grounded to the remaining cores		1800				
7	LSZH properties	Combustion Class A	Carbonization length	m	≤2.5	GB/T18380.3	-
		Halogen free performance	PH		≥4.3	GB/T 17650	
			Conductivity	μs/mm	≤10		
		Low smoke characteristics	Smoke density	%	≥60	GB/T17651.2	

Axle cable for urban rail transit

Application

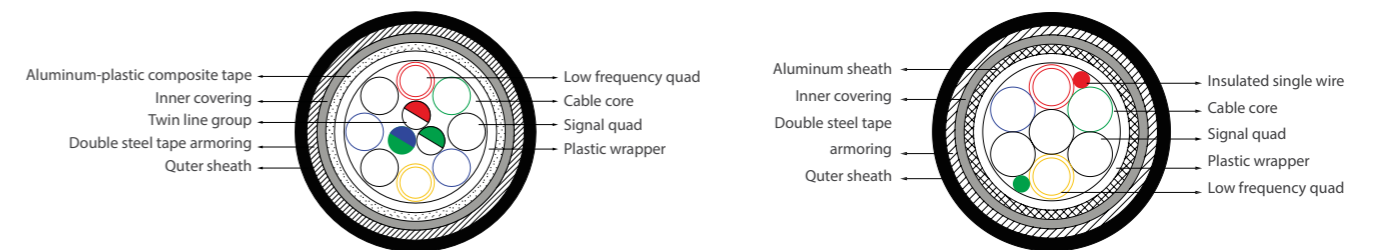
ZTT Independently developed for the urban track traffic axial cable. The product structure is stable and has excellent electrical performance and has characteristics such as corrosion resistance, resistance to ultraviolet radiation, anti-vibration, fire-retardant. The product has been widely applied to urban track traffic axial system.



Product using characteristics

- ◆ The ambient temperature of cable is -40 ~ +60 ℃ .
- ◆ Cable conductor long-term operating temperature does not exceed +70 ℃ .
- ◆ Cable laying Ambient temperature: PVC jacket cable should not be less than 0 ℃ ; polyethylene jacket cable should not be less than -10 ℃ .
- ◆ Permissible bending radius of the cable: armored cable should not be less than 15 times the cable diameter.

Product structure diagram



PJZA23 2×4×0.9+6×4×1.0+3×2×1.0

PJZL23 2×4×0.9+5×4×1.0+2×1.0

The specification of axle cable for urban rail transit

Cores	Reference diameter (mm)		Cores	Reference diameter (mm)	
	Integrated sheath	Aluminum sheath		Integrated sheath	Aluminum sheath
12	19.9	26.0	36	26.8	34.0
14	19.9	26.0	38	27.2	34.0
16	21.3	28.0	40	28.5	36.4
22	22.8	30.0	42	28.5	36.4
24	22.8	30.0	44	30.2	36.4
26	22.8	30.0	46	30.2	36.4
28	24.4	31.0	48	30.5	36.4
30	24.4	31.0	50	30.5	36.4
32	24.4	31.0	56	32.9	39.8
34	26.9	34.0			

Electrical performance

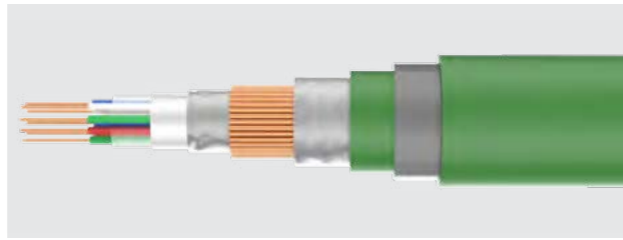
Number	Items	Unit	Index	
			Low-frequency communication quad	Signal quad、Twin line group、Insulated wire
1	DC resistance 20 °C	Ω/km %	≤28.5	≤23.5
1.1	DC resistance of each conductor			
1.2	The resistance of the working conductor to the conductor is unbalanced ^a			
2	Insulation resistance DC 500V 20°C Each insulated wire core is connected with the other insulated wire core to shield and metal sleeve	MΩ·km	≥10000	≥10000
3	Strength of insulating medium 50Hz 2min	V	1000	1000
3.1	Between cores			
3.2	All cores are connected together (or each core wire) to the shield with a metal sleeve			

Number	Items	Unit	Index		
			Low-frequency communication quad	Signal quad、Twin line group、Insulated wire	
4	Capacitance 0.8 ~ 1.0kHz	nF/km	≤40	≤50	
4.1	Four-wire working capacitance				
4.2	Pair-wire group working capacitance				
4.3	Each insulated wire core pair is connected to ground with other insulated wire core capacitance				
5	Capacitive coupling coefficient 0.8 ~ 1.0kHz	pF/km	-	≤141	
5.1	k_1 average				
5.2	$k_9 \sim k_{12}$ average				
5.3	maximum				
6	On the ground capacitance imbalance 0.8 ~ 1.0kHz	pF/km	-	≤660	
6.1	e_{a1} 、 e_{a2} average				
6.2	maximum				
	Allow 10% of the number of cables in its low-frequency quad e_{a1} 、 e_{a2} max≤1000		800	2600	
7	Low smoke zero halogen flame retardant properties	Flame retardant Class B	Carbonization length	Meter	≤2.5
		Halogen-free	PH	-	≥4.3
			Conductivity	μs/mm	≤10
		Low smoke	Smoke density	%	≥60

Multi-composite high electromagnetic shielding rail traffic communication signal cable

Application

Compared with ordinary signal cable, multi-composite high electromagnetic shielding track traffic signal cable use a variety of different materials to form composite shield layer which makes performance in strong electric field, strong magnetic field shielding greatly improved; as cable shielding with Copper wire shielding instead of copper tape shielding, a smaller radius of curvature can be flexibly laid in a small space for the convenient construction. Composite shielded special signal cable can be applied to the use of more harsh



environment of the electrification section or other areas of special electromagnetic interference particularly serious.

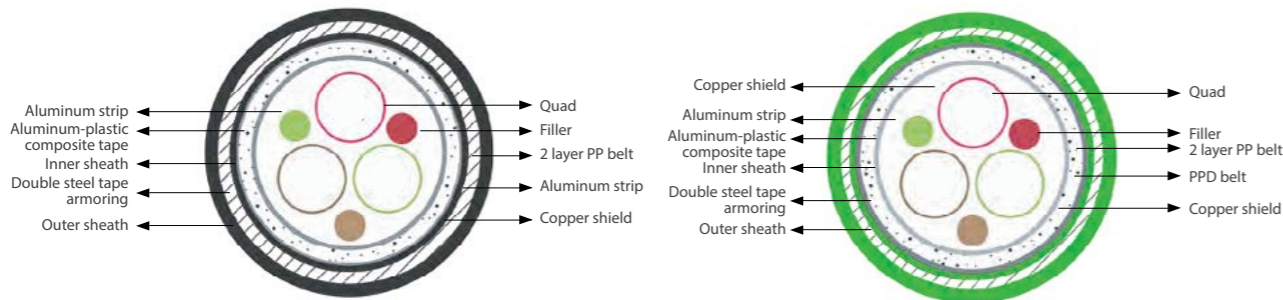
Product using characteristics

- ◆ Ambient temperature of the cable is $-40 \sim +60 \text{ }^{\circ}\text{C}$, the laying ambient temperature should not be lower than $-10 \text{ }^{\circ}\text{C}$.
- ◆ Cable conductor long-term operating temperature does not exceed $+70 \text{ }^{\circ}\text{C}$.
- ◆ Permissible bending radius of the cable: The bending radius

of the cable should not be less than 10 times of the outer diameter of the cable.

- ◆ The ideal shielding coefficient of cable sheath 2 groups and above cable ≤ 0.1 , 1 group of cable ≤ 0.15 .

Product structure diagram



DW-GJYWNPSA23 3x4x0.9

GJYWNPSA23 3x4x0.9

The specification of Multi composite high electromagnetic shielding rail traffic communication signal cable

Serial number	Specifications (Core number)	Cable core structure			Reference outside diameter (mm)	
		Quad	Twin	Insulated conductors	Non-armored	Armor
1	4	1	-	-	14.2	20.1
2	8	2	-	-	17.9	23.9
3	12	3	-	-	18.9	24.6
4	20	5	-	-	21.1	27.1
5	28	7	-	-	21.9	27.9

Electrical performance

No.	Item	Unit	Index
1	Direct-current resistance 20°C		
1.1	DC resistance of each conductor	Ω/KM	27.5 ± 1.0
1.2	Resistance unbalance of conductor working pair	%	≤ 1
2	Insulation resistant DC 500V 20°C Each insulated wire core versus others insulated cores (connected with shielding and metal sleeve)	$\text{M}\Omega \cdot \text{KM}$	≥ 35000
3	Insulating medium strength 50Hz AC 1min		
3.1	In the wire core	V	2000
3.2	All wires are connected together (or each wire core) to the shield and the metal sleeve.		2500
4	Capacitor $0.8 \sim 1.2\text{KHz}$		
4.1	Quad working capacitor	nF/Km	38 ± 3
5	Capacitance coupling coefficient $0.8 \sim 1.2\text{KHz}$		
5.1	k_1 Average value	pF/Km	≤ 76
	Maximum value		200
5.2	$K_9 \sim k_{12}$ Average value	pF/Km	≤ 76
	Maximum value		200

The K1 index of the four core cable is the maximum value

No.	Item	Unit	Index
6	Capacitance unbalance to earth 0.8 ~ 1.2KHz		
6.1	e_a1、e_a2 Average value		
6.2	Maximum value		≤330
6.2	Quad indicator e_a1、e_a2 is the maximum value	pF/Km	800
	e_a1、e_a2 allowing 10% of the number of discs≤1294 pF/Km		
7	Attenuation constant of line pair ^b 20℃		
7.1	1KHz		≤0.7
7.2	10KHz		≤1.6
7.3	30KHz		≤2.1
7.4	90 KHz		≤3.0
8	Near-end crosstalk attenuation between circuits150KHz		
	In the group	dB	≥51
	Between groups		≥55
9	Far-end crosstalk between circuits 150KHz		
	In the group	dB/Km	≥52
	Between groups		≥62
10	Characteristic impedance 20℃		
	90kHz	Ω	142±10
	120kHz		
	150kHz		
11	Insulated wire broken, mixed line	--	Continuous line not mixed line

Rail transit loop cable

Application

The rail transit loop cable is suitable for rail transit link coding device, receiving device and IATP next to the rail link, the PAC sends link, the PAC receives packet data transmission cables

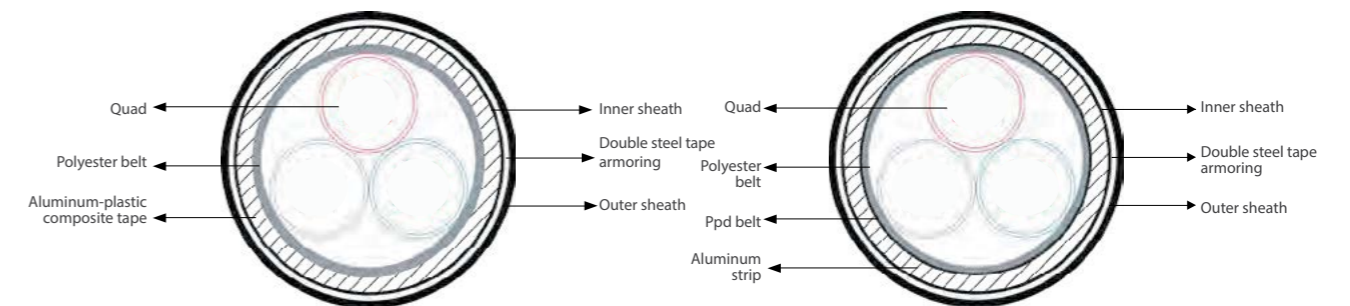
between the link and can also be used for high power device power supply transmission and information transfer within the audio.

Product using characteristics

- ◆ Ambient temperature of cable is -40 °C ~ + 60 °C ,
- ◆ Conductor of cable operating temperature should not higher than 70 deg.
- ◆ The ambient temperature laid in :PVC sheath cable not

- lower than 0 deg., PE sheath not lower than -10 deg.
- ◆ Mini bending radius: More than 15 times of cable outer diameter.

Product structure diagram



GHYA23 3x1.4

GHYL23 3x1.4

The specification of rail transit ring cable

Serial number	Specification (core number)	Core structure		
		Quad	Twin	Insulated single wire
1	4	1×4	-	-
2	6	-	3×2	-
3	8	-	4×2	-
4	9	-	4×2	1
5	12	3×4	-	-
6	14	3×4	-	2

Electrical performance

No.	Item	Unit	Index	
1	DC resistance 20℃	Ω/km	≤11.9	
	DC resistance of each conductor 1.4mm			
2	Unbalanced resistance of conductor working line pairs	%	≤2	
2.1	Insulation resistance (500VDC)	MΩ·km	≥35000	
	Each insulated wire core versus other cores grounding			
3	Dielectric voltage withstand 50Hz 2min	V	3000	
				3.1 Wire versus wire
				3.2 Wire versus ground
4	Working capacitance (0.8-1.0kHz)	nF/km	≤65	
				4.1 Maximum value
5	Capacitance unbalance (0.8-1.2kHz)	pF/500m	≤38	
				5.1 wire versus wire K1 average value
				5.1 wire versus wire K1 maximum value
				5.2 wire versus ground average value
6	Attenuation maximum	dB/km	≤1300	
				6.1 a) 1kHz
				6.1 b) 3kHz
				6.2 c) 5kHz
7	shielding coefficient	—	Composite sheath≤0.8 Aluminum sheath≤0.2	
				6.2 d) 10kHz

Certificates



ZTT establishes quality control system strictly according to ISO9001:2008, ISO14001:2004 international standards and takes the quality control department as the core, in order to

create ZTT brand and make efforts to contribute the mobile communications.

Excellent Test Facilities



All the test instruments for manufacturing are advanced equipment which adopted from home and abroad, and they are including Railway digital signal cable testing system, Ideal

shielding factor test instrument, Low frequency parameter analyzer for cable and LCR tester, etc.