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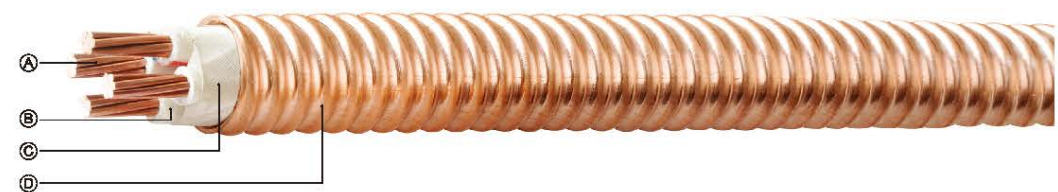
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一、RTTZ电缆结构 RTTZ Cables structure

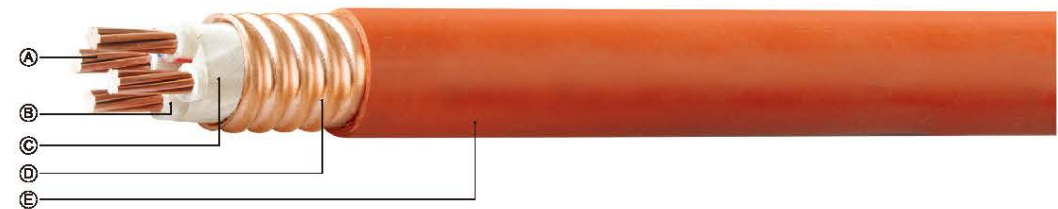
1. 电缆导体：由多股铜线绞合而成，具有良好的弯曲特性。
2. 绝缘层：采用耐高温、不燃烧的云母带矿物绝缘带材
3. 保护层：采用低烟无卤的高阻燃带材
4. 铜护套：铜质材料，经特殊加工有良好的弯曲特性，并可作为PE线。
5. 外护套：采用低烟无卤或聚氯乙烯的塑性材质，有良好的防腐蚀特性。

1. Cable conductor: it is made up of stranded copper wires, with favorable flexural property.
2. Insulation layer: it adopts high-temperature resistant inorganic insulating materials
3. Protective layer: it adopts LSZH high flame retardant tape.
4. Copper sheath: copper materials, through special machining, with favorable flexural property, used as PE wire.
5. Outer sheath: it is made of plastic materials of low-smoke non-toxicity, with favorable corrosion protection.

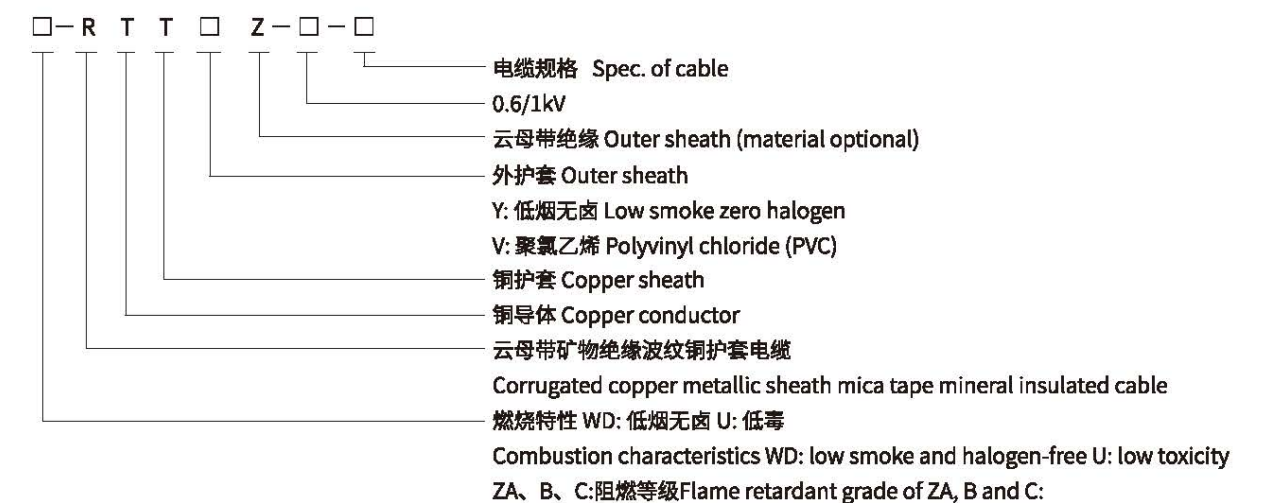
- Ⓐ 绞合铜导体 Stranded copper conductor
- Ⓑ 无机绝缘材料 Inorganic insulation
- Ⓒ 保护层 Protective layer
- Ⓓ 铜护套 Copper sheath



- Ⓐ 绞合铜导体 Stranded copper conductor
- Ⓑ 无机绝缘材料 Inorganic insulation
- Ⓒ 保护层 Protective layer
- Ⓓ 铜护套 Copper sheath
- Ⓔ 外护套 (可选) Outer sheath



二、RTTZ电缆型号 RTTZ Cables model



例1: RTTZ-0.6/1 kV 4×50 GB/T 34926-2017
表示: 额定电压0.6/1 kV铜芯云母带矿物绝缘波纹铜护套电力电缆 规格为4×50mm²
例2: RTTVZ-0.6/1 kV 4×95 GB/T 34926-2017
表示: 额定电压0.6/1 kV铜芯云母带矿物绝缘波纹铜护套聚氯乙烯外护套电力电缆 规格为4×95mm²
例3: WDZB-RTTYZ-0.6/1 kV 3×70+1×35 GB/T 34926-2017
表示: 额定电压0.6/1 kV铜芯云母带矿物绝缘波纹铜护套聚烯烃外护套低烟无卤阻燃B类电力电缆 规格为3×70+1×35mm²

eg.1: RTTZ 4×50
It means 4 Metal Sheathed Inorganic Mineral Insulated Cables of 50mm² in sectional area.
eg.2: RTTZ 4×(1×150)
It means 4 flexible fire-proof cables single core of 150mm² in cross section

三、RTTZ执行标准 The implementation of standards

● 产品制造标准

GB/T 34926-2017 额定电压0.6/1kV及以下云母带矿物绝缘波纹铜护套电力电缆及终端

● 产品检测标准

1. BS 6387:2013 在火焰条件下线路完整性试验耐火试验方法
2. BS8491:2008 用于烟和热控制系统及特定的其它仍在继续的火灾安全系统部件的大直径电力电缆着火完整性的评定方法
3. GB/T 34926-2017 额定电压0.6/1kV及以下云母带矿物绝缘波纹铜护套电力电缆及终端

● 检测项目

电气性能: 导体电阻、绝缘电阻、耐电压试验
机械性能: 弯曲试验、压扁试验及结构尺寸
耐火试验: 必须按照950°C~1000°C 180min规定进行试验
产品实测外径≤20mm按照BS 6387:2013规定的C、W、Z进行试验, 线路保持完整。
产品实测外径>20mm试验程序按照BS8491:2008规定的在同一根电缆上进行耐火、喷淋、撞击试验, 线路保持完整。

● Product manufacturing standard

1. JG/T313-2014 Metal sheathed inorganic mineral insulated cables and terminals under rated voltage of 0.6/1 kv or lower
2. IEC60702-2002 Mineral insulated cables and terminals under rated voltage of 750V or lower

● Product testing standards

1. BS6387-1994 Keeping cable performance of circuit integrity under fire condition
Test item: circuit integrity (simple fireproof C, fireproof and waterproof W, fireproof and high impact Z)
2. GA306.2-2007 Classification and requirements of flame retardant and fireproof cable, plastic insulated and flame retardant and fireproof cables
Part II fireproof cable
3. JG/T313-2014 Metal sheathed inorganic mineral insulated cables and terminals under rated voltage of 0.6/1kv or lower
Test item: Electric insulation performance, dielectric strength test, mechanical flattening and bending test and fire-resistance test
C-simple fireproof (950-1000°C, 3H)
W-Fireproof and waterproof(watering after 15min of treatment in fire and then continuous another 15min of fire treatment)
Z-Fireproof and impact resistant (treatment in fire and under impact for 15min)
Note: For the same sample, the above three tests shall be performed in a sequence of C, W and Z

四、RTTZ适合规范 For specifications

1. JGJ16-2008民用建筑电气设计规范
2. GB50045-95 高层民用建筑设计防火规范
3. GB50016-2014 建筑设计防火规范
4. GB50217-2018 电力工程电缆设计规范
5. GB50168-2016 电气装置安装工程电缆线路施工及验收规范
6. 民用建筑电气设计与安装图集

1. JGJ16-2008 Code for electrical design of civil architectures
2. GB50045-95 Code for fire protection design of high rise civil buildings
3. GB50016-2014 Code for fire protection design of buildings
4. GB50217-2018 Code for design of power engineering cables
5. GB50168-2016 Code for construction and acceptance inspection of cable lines in the installation engineering of electrical units
6. Atlas of electrical design and installation of civil architectures.

五、RTTZ电缆性能 Cable characteristics

● 生产工艺先进

电缆的生产工艺均在机械化及自动流水线上生产完成;
导体: 采用多股符合国标的铜线绞合而成, 阻抗小、载流量大、具有柔软性;
绝缘: 采用耐高温(1300°C以上)无机矿物绝缘带绕包而成, 绝缘厚度均匀, 工频耐压高; 抗电老化特强, 使用寿命达百年以上;
护套: 采用铜护套(耐1083°C高温)火灾中能坚固保护绝缘层不松散, 不烧坏, 保持通电线路的完整性。

● 耐高温

在火焰温度950~1000°C燃烧3个小时的条件下, 能保持电路的完整性。

● 连续长度长

由于机械化连续生产, 电缆长度可以满足配电长度需要, 无需中间连接; 大量降低了接点阻抗及接点故障。

● 有较大截面的多芯电缆

铜护套多芯电缆电气性能优良, 阻抗均匀, 无涡流及环流损耗, 而且比单芯电缆相对便宜。

● Advanced production technology

Cables are produced in the mechanical and automatic production line.
Conductor: twisted by the multistrand copper wires, with small impedance, fixed and high ampacity, and the flexibility;
Insulation: wrapped by high temperature resistant (1300°C) inorganic mineral insulated tapes, with uniform thickness of insulation, high withstand ability of power frequency voltage; strong anti electric aging and long service life;
Sheath: the copper sheath (resistant to high temperature of 1083°C) to protect the insulated layer from the fire that will not be loosened or burned, keeping the integrity of power lines.

● High temperature resistant

In the combustion flame temperature of 950 to 1000°C for 3 hours, the circuit integrity maintains.

● Long continuous length

Because of the continuous mechanical production, the length of cable can meet the need of distribution length, without intermediate joints; contact resistance and contact fault are reduced greatly.

● Large section of multi-core cables

Copper jacketed multi-core cable has excellent electrical performance, uniform impedance, no eddy currents and circulation loss. Furthermore, it is relatively cheaper than the single core cable.

RTTZ系列云母带矿物绝缘波纹铜护套电缆

RTTZ Series inorganic mineral insulated corrugated copper sheathed cable



● 中间接头耐高温

对于必须要加中间连接器的电缆，其接头的性能和电缆本体属同一个电气性能等级。

● 过载能力大

过载能力大，是针对无机矿物绝缘材料而言，如在高温场所，对电缆表面高温无触摸、无可燃材料以及电缆末端压降无要求时，使护套温度可提高到105°C，甚至更高。但一般场所，电缆载流量必须按本表格中规定选择。

● 具有一定的柔性

电缆具有一定的柔性，会带来诸多优点：①可以盘在电缆盘上，运输不会受到损坏；②方便现场敷设；③在通电后，不会受到自然力(热胀冷缩)及电力的破坏。

● 环保特性优良

电缆在火焰中受热不燃烧，无烟无毒。由于电缆整体材料均属于不燃体，不会产生助燃。废弃后的电缆也无毒、铜可以回收。

● 抗潮性优良

抗潮性是防火电缆特别重要的技术指标，因为防火电缆在长期不通电(无火灾)情况下，绝缘会严重受潮，绝缘电阻大大降低，此时一旦发生火灾、易发生漏电、短路事故、影响灭火。RTTZ是采用优质高耐潮无机矿物带，即使电缆长期不通电，其绝缘电阻仍然能保持在安全的通电状态，任何时候发生火灾，都能即时启动消防设备进行灭火。

● 耐辐射

不产生电磁干扰。RTTZ电缆全部采用无机材质，对辐射不受影响，材质不会变质，绝缘特性不会变坏。电缆铜护套具有屏蔽作用，通电时对周围通讯系统不产生干扰。

● Intermediate joints is resistant to high temperature

For an extra long cable, an intermediated joint must be added, of which the fire characteristics shall be the same with that of the main cable. Full length of cable (including joints) shall be thermal resistant.

● High overload capacity

High overload capacity is defined for the inorganic mineral insulated materials. For example, in high temperature places, the temperature of protective sheath can be increased to 105°C even higher in case of no contact to high temperature surface of cable, no flammable materials or no requirements on voltage drop at the cable terminal. But in common places, the cable current-carrying capacity must be selected according to the sample list.

● With certain flexibility

Certain flexibility the cable has certain flexibility: will bring many advantages: 1. Be wound on cable tray, for protection during transportation; 2. Convenient to on-site installation; 3. After power-on, it will not be damaged by the natural force (thermal expansion) and electromotive force.

● Excellent environmental protection characteristic

Cable can be burned in the flame, smoke-free non-toxic. Because the overall cable materials belong to non-combustible component, which will not produce combustion-supporting. The cable after being disposed is also non-toxic. Waste copper can be recovered.

● Fine moisture resistance

Moisture resistance is a particularly important technical index of fireproof cable. Because if the fireproof cable is not powered on in the long term(no fire) the insulation will be seriously affected with damp, and the insulation resistance will greatly reduced, now once a fire happens, it is likely to lead to electric leakage, shortage accident and the extinguishment may be affected. RTTZ adopts high-quality high-damp resistant inorganic mineral tapes. Though the cable is not powered on for a long time, the insulation resistance will remain the performance of extinguishment immediately after a fire happens.

● Radiation resistant

No electromagnetic interference. All RTTZ cables are made of inorganic materials, not affected by irradiation. The material will not turn bad, neither the insulation characteristics. Copper sheath of cable has shielding function, not generating interference to the surrounding communication systems during power on.

● 安装方便

RTTZ电缆的安装像普通电缆一样，不需要专门的技术，也不需要专业培训，工厂派技术员到安装现场指导即可。

● 使用寿命长

无机绝缘材质，具有较好的热、电稳定性，它的耐老化性要比有机(橡塑之类)材质高许多倍。如塑料电缆一般使用寿命≤30年，无机绝缘电缆使用寿命是有机绝缘电缆的5倍以上。

● 综合经济效益明显

RTTZ采用无机材料绝缘，铜作为护套，对于一次投资同等规格电缆价格比有机材质电缆高。但是从综合经济效益比较，无机绝缘电缆具有明显的优势；

①铜护套无机绝缘电缆外护套可以做PE线，四芯代替五芯，电缆差价大大缩小；

②省去穿管、桥架等配件，可以直接敷设，节省附件费用；

③低烟无卤有机绝缘电缆，燃烧时还是产生低烟低毒，与无机矿物绝缘电缆无烟无毒不能相比；

④有机及无机电缆使用寿命，前者仅是后者的1/5。由此可以说明无机电缆比有机电缆综合价格便宜很多；

● Easy to install

The installation of RTTZ cables is just like that of the ordinary cables, which can be done by ordinary operators without special training, asking for on-site guidance by personnel dispatched from the factory.

● Long service life

The inorganic insulated material has good thermal and electrical stability. its aging resistance is far optimal than organic materials (such as plastics). For example, the service life of plastic cable is generally 30 years or less, and that of mineral insulated cable is 5 times of organic insulated cable.

● Comprehensive economic benefit is obvious

RTTZ insulation is made of inorganic materials. When the copper is used for the sheath, the price of the same size is higher than that of organic material cable. But from the comprehensive economic benefit, the inorganic insulated cables have obvious superiority:

①The outer sheath of copper sheathed mineral insulated cable can make PE line, four core cables can substitute five core cables, greatly reducing the price difference;

②Without accessories of through tubes and trays, such cables can be directly laid, saving the cost of accessories;

③The low smoke halogen-free organic insulated cables will still produce low smoke and low toxic during burning. It can't be compared with the ability of smoke-free non-toxic of inorganic mineral insulated cables.

④The service life of organic cable is only 1/5 of that of inorganic cables. So we can see that the comprehensive price of inorganic cables would be much cheaper than the organic cables.

● 电缆安装时的最小允许弯曲半径

Minimum allowable bending radius for cable installation

电缆外径 Cable diameter D (mm)	电缆最小弯曲半径 Permissible cable bending radius	靠近连接盒和终端的电缆最小弯曲半径* Minimum bending radius of cable near junction box and terminal
D≤12	6D	4D
12<D≤20	10D	8D
20<D≤40	15D	13D
D>40	20D	18D

注：D为成品电缆的实际外径。

*弯曲时应小心控制，如采用成型导板等。

RTTZ系列云母带矿物绝缘波纹铜护套电缆

RTTZ Series inorganic mineral insulated corrugated copper sheathed cable



六、RTTZ电缆抗火灾能力 Fire resistance

6.1 电缆在火焰中应有条件

无论是在工厂还是建筑物中，电气线路的安全性至关重要。据国家有关部门统计，在火灾起因中，由于电气引起的火灾占36%以上。而由电缆引起的火灾又占电气火灾的36%以上。因而要求电缆不但要有抗外在火焰破坏的能力，而且要有自身不会产生和传播火源的特性，防止老化。由于矿物绝缘电缆构成材料均为无机物，绝缘体合成云母带不会老化，由它构成的线路，也不会导致火情的发生和传播。如一旦由其它原因引发火灾，该电缆在火烧中不仅能受熊熊大火的考验，还会受到其它坠物的不断冲击和消防笼头水的喷淋。此时，电缆在不产生烟雾和毒性气体的同时，还能保证消防设备的正常启动、火情扑灭及人员的撤离，是评价该线路抗火灾能力的关键。

6.1 Essential conditions of cable in the flame

Whether in the factory or in the building, the security of electric circuit is of paramount importance. According to the statistics from some relevant departments, more than 36% of fires are caused by the electric cause, and more than 36% of which are caused by cable. Accordingly, on one hand, the cable must have the ability to resist the destroy from external flame, on the other hand, the cable must have the character that it should not produce or transmit fire source, and should be able to anti aging. Since the material of MI cable is inorganic, the insulator magnesia would not age, the circuit consisted by MI cable would not cause or transmit fire. Once the fire is caused for other reasons, the cable should be able to withstand the test of fire and the continuous impact of other precipitations as well as the fire hydrant spraying. While not producing the smoke and poisonous gas, the cable can guarantee the normal start of fire fighting equipment, extinction of fire, and evacuation of personnel that is the key to evaluate the fire resistance of circuit.

6.2 耐火性能试验方法 Fire-resistive performance test method

试验项目 Test item	BS 6387	BS 8491	IEC 60331、GB/T19216
耐火试验 Resistance to fire alone	C级950°C 180min	830°C 10min后在此火焰温度下每10min撞击1次，分30、60、90、120min等级，然后喷水5sec停60sec，共重复进行5次	750°C 90min
耐火与喷淋试验 Resistance to fire with water	W级650°C 15min		无Without
耐火与撞击试验 Resistance to fire with mechanical shock	Z级950°C 15min		830°C 下每5min撞击1次，分30、60、90、120 (GB/T只用120) min等级



耐火试验 Fire-resistive test



喷淋试验 Water spray test



冲击试验 Impact test

加温到950°C时
耐火试验比较图
Fire-resistive test



6.3 电缆防火能力

从前述内容看，RTTZ电缆产品标准GB/T 34926-2017 所规定的950°C~1000°C 180min试验要求，明显高于BS 8491标准，对于外径超过20mm的RTTZ电缆，其耐火性能优于发达国家的水平。

6.3 Fire-proof capability

From the above content, the test requirements of 950 °C ~ 1000 °C and 180min specified in the RTTZ cable product standard GB / T 34926-2017 are significantly higher than those specified in BS 8491, and the fire resistance of RTTZ cable with an outer diameter of more than 20mm is better than that of developed countries.

七、电缆规格及流量表 Cable size and ampacity

表1. 环境温度为40°C时，单芯电缆载流量及其参数

Table 1. Ampacity and other parameters of single-core cables, ambient temperature 40°C

标称截面 Nominal section mm ²	铜护套(PE线)截面 Copper sheath (PE wire) Sectional area (mm ²)	绝缘厚度 Insulation thickness (mm)	保护层厚度 Protective layer thick- ness (mm)	近似外径 Approximate O.D. (mm)	参考重量 Reference weight (kg/km)	额定电流 Rated current (A)	额定电流 Rated current (A)	单位电压降 Potential drop V/A·km
1.5	12.32	0.90	0.60	11.4	209	32	26	15.40
2.5	12.32	0.90	0.60	11.4	215	42	34	9.48
4	12.32	0.90	0.60	11.4	233	56	44	5.90
6	12.32	0.90	0.60	11.4	249	70	56	3.90
10	12.32	1.10	0.60	11.4	290	97	77	2.33
16	13.80	1.10	0.60	12.6	367	125	100	1.47
25	12.47	1.10	0.60	13.9	474	165	130	0.92
35	12.47	1.20	0.60	13.9	568	200	160	0.67
50	22.46	1.30	0.60	15.4	769	245	195	0.49
70	26.39	1.30	0.60	17.9	1000	305	245	0.34
95	28.86	1.30	0.60	19.5	1280	375	300	0.25
120	30.32	1.30	0.60	20.4	1522	435	350	0.20
150	31.82	1.50	0.60	22.8	1828	500	400	0.16
185	34.98	1.50	0.60	24.8	2196	580	465	0.13
240	50.14	1.50	0.80	29.2	2897	685	500	0.10
300	62.67	1.80	0.80	31.2	3628	795	635	0.08
400	71.03	1.80	0.80	35.0	4485	930	745	0.06
500	75.87	2.00	0.80	37.2	5549	990	860	0.04
630	83.57	2.20	0.80	40.7	6939	1250	1080	0.03

注:1 表1 单芯电缆用于3相4线系统时单位电压降应乘以 $\sqrt{3}$ ，用于单相系统时单位电压降应乘以2，单芯3+1电缆也符合PE线要求。
Note:1. The values in the Voltage drop column shall be multiplied by $\sqrt{3}$ when the cable is used in a 3-phase 4-wire system and multiplied by 2 when the cable is used in a single phase system. Single core cable is also in line with the requirements of 3+1 PE line.

RTTZ系列云母带矿物绝缘波纹铜护套电缆

RTTZ Series inorganic mineral insulated corrugated copper sheathed cable



表2. 环境温度为40°C时, 2芯电缆载流量及其参数

Table 2. Ampacity and other parameters of 2-core cables, ambient temperature 40°C

标称截面 Nominal section mm ²	铜护套(PE线)截面 Copper sheath (PE wire) Sectional area (mm ²)	绝缘厚度 Insulation thickness (mm)	保护层厚度Pro- tective layer thickness (mm)	近似外径 Approximate O.D. (mm)	参考重量 Reference weight (kg/km)	额定电流 Rated current (A)	单位电压降 Potential drop V/A·km
2×2.5	12.32	0.45	0.60	15.0	228	33	18.96
2×4	13.80	0.45	0.60	16.2	277	44	11.80
2×6	13.80	0.45	0.60	16.2	320	57	7.80
2×10	16.49	0.55	0.60	21.5	498	78	4.66
2×16	16.49	0.55	0.60	21.5	617	104	2.86
2×25	31.82	0.55	0.60	26.4	937	135	2.52
2×35	31.82	0.60	0.60	26.4	1123	168	2.24
2×50	34.98	0.65	0.60	28.4	1396	204	1.64
2×70	34.98	0.65	0.80	28.7	1740	263	1.42
2×95	37.76	0.65	0.80	30.7	2254	320	1.08
2×120	45.08	0.65	0.80	35.5	2776	373	0.98
2×150	57.30	0.75	0.80	37.6	3413	358	0.29

表3. 环境温度为40°C时, 3芯电缆载流量及其参数

Table 3. Current carrying capacity and parameters of three-cores cable at ambient temperature 40°C

标称截面 Nominal section mm ²	铜护套(PE线)截面 Copper sheath (PE wire) Sectional area (mm ²)	绝缘厚度 Insulation thickness (mm)	保护层厚度Pro- tective layer thickness (mm)	近似外径 Approximate O.D. (mm)	参考重量 Reference weight (kg/km)	额定电流 Rated current (A)	单位电压降 Potential drop V/A·km
3×2.5	12.32	0.45	0.60	15.0	258	29	16.40
3×4	13.80	0.45	0.60	16.2	322	38	10.20
3×6	12.47	0.45	0.60	17.5	402	46	6.74
3×10	16.49	0.55	0.60	21.5	612	65	4.03
3×16	18.07	0.55	0.60	23.1	814	85	2.54
3×25	31.82	0.55	0.60	26.4	1195	118	1.59
3×35	34.98	0.60	0.60	28.4	1498	150	1.16
3×50	40.37	0.65	0.80	32.0	1945	192	0.85
3×70	45.13	0.65	0.80	30.6	2566	228	0.59
3×95	53.91	0.65	0.80	35.5	3387	273	0.43
3×120	66.63	0.65	0.80	37.5	4197	314	0.35
3×150	75.87	0.75	0.80	41.9	5054	358	0.29

表4. 环境温度为40°C时, 4芯电缆载流量及其参数

Table 4. Current carrying capacity and parameters of 4 cores cable at ambient temperature 40°C

标称截面 Nominal section mm ²	铜护套(PE线)截面 Copper sheath (PE wire) Sectional area (mm ²)	绝缘厚度 Insulation thickness (mm)	保护层厚度Pro- tective layer thickness (mm)	近似外径 Approximate O.D. (mm)	参考重量 Reference weight (kg/km)	额定电流 Rated current (A)	单位电压降 Potential drop V/A·km
4×2.5	13.80	0.45	0.60	16.2	306	29	16.40
4×4	12.47	0.45	0.60	17.5	385	38	10.20
4×6	13.97	0.45	0.60	19.0	487	46	6.74
4×10	28.86	0.55	0.60	23.1	818	65	4.03
4×16	31.82	0.55	0.60	26.4	1103	85	2.54
4×25	34.98	0.55	0.60	28.4	1482	118	1.59
4×35	37.76	0.60	0.60	30.3	1876	150	1.16
4×50	41.94	0.65	0.80	33.2	2430	192	0.85
4×70	57.30	0.65	0.80	37.2	3354	228	0.59
4×95	65.22	0.65	0.80	41.7	4410	273	0.43
4×120	83.57	0.65	0.80	45.4	5501	314	0.35

表5. 环境温度为40°C时, 3+1芯等截面电缆载流量及其参数

Table 5. Current carrying capacity and parameters of 3+1 core constant section cable at ambient temperature 40°C

标称截面 Nominal section mm ²	铜护套(PE线)截面 Copper sheath (PE wire) Sectional area (mm ²)	绝缘厚度 Insulation thickness (mm)	保护层厚度Pro- tective layer thickness (mm)	近似外径 Approximate O.D. (mm)	参考重量 Reference weight (kg/km)	额定电流 Rated current (A)	单位电压降 Potential drop V/A·km
3×10+1×6	28.86	0.55/0.45	0.60	23.1	769	65	4.03
3×16+1×10	31.82	0.55/0.55	0.60	26.4	1045	85	2.54
3×25+1×16	34.98	0.55/0.55	0.60	28.4	1394	118	1.59
3×35+1×16	37.76	0.60/0.55	0.60	30.1	1699	150	1.16
3×50+1×25	45.08	0.65/0.55	0.80	35.1	2255	192	0.85
3×70+1×35	57.30	0.65/0.60	0.80	37.1	3039	228	0.59
3×95+1×50	65.22	0.65/0.65	0.80	41.6	3973	273	0.43
3×120+1×70	75.87	0.65/0.65	0.80	41.8	4951	314	0.35

RTTZ系列云母带矿物绝缘波纹铜护套电缆

RTTZ Series inorganic mineral insulated corrugated copper sheathed cable

表6. 环境温度为40°C时, 5芯等截面电缆载流量及其参数

Table 6. Current carrying capacity and parameters of 5-core constant section cable at ambient temperature 40°C

标称截面 Nominnal section mm ²	绝缘厚度 Insulation thick- ness (mm)	保护层厚度 Protective layer thickness (mm)	铜护套厚度 Copper sheath thickness (mm)	近似外径 Approximate O.D. (mm)	参考重量 Reference weight (kg/km)	额定电流 Rated current (A)	单位电压降 Potential drop V/A·km
5×2.5	0.45	0.60	0.40	17.5	354	29	16.40
5×4	0.45	0.60	0.40	19.0	450	38	10.20
5×6	0.45	0.60	0.40	19.0	554	46	6.74
5×10	0.55	0.60	0.50	26.4	986	65	4.03
5×16	0.55	0.60	0.50	26.4	1277	85	2.54
5×25	0.55	0.60	0.50	30.2	1771	118	1.59

表7. 环境温度为40°C时, 3+2芯等截面电缆载流量及其参数

Table 7. Current carrying capacity and parameters of 3+2-core constant section cable at ambient temperature 40°C

标称截面 Nominnal section mm ²	绝缘厚度 Insulation thick- ness (mm)	保护层厚度 Protective layer thickness (mm)	铜护套厚度 Copper sheath thickness (mm)	近似外径 Approximate O.D. (mm)	参考重量 Reference weight (kg/km)	额定电流 Rated current (A)	单位电压降 Potential drop V/A·km
3×10+2×6	0.55/0.45	0.60	0.50	23.1	838	65	4.03
3×16+2×10	0.55/0.55	0.60	0.50	26.4	1154	85	2.54
3×25+2×16	0.55/0.55	0.60	0.50	30.1	1586	118	1.59
3×35+2×16	0.60/0.55	0.60	0.50	31.9	1883	150	1.16
3×50+2×25	0.65/0.55	0.80	0.60	32.2	2527	192	0.85
3×70+2×35	0.65/0.60	0.80	0.60	37.2	3400	228	0.59
3×95+2×50	0.65/0.65	0.80	0.60	41.7	4456	273	0.43

表8. 环境温度为40°C时, 4+1芯等截面电缆载流量及其参数

Table 8. Current carrying capacity and parameters of 4+1-core constant section cable at ambient temperature 40°C

标称截面 Nominnal section mm ²	绝缘厚度 Insulation thick- ness (mm)	保护层厚度 Protective layer thickness (mm)	铜护套厚度 Copper sheath thickness (mm)	近似外径 Approximate O.D. (mm)	参考重量 Reference weight (kg/km)	额定电流 Rated current (A)	单位电压降 Potential drop V/A·km
4×10+1×6	0.55/0.45	0.60	0.50	24.0	901	65	4.03
4×16+1×10	0.55/0.55	0.60	0.50	26.4	1221	85	2.54
4×25+1×16	0.55/0.55	0.60	0.50	30.1	1685	118	1.59
4×35+1×16	0.60/0.55	0.60	0.60	32.0	2191	150	1.16
4×50+1×25	0.65/0.55	0.80	0.60	37.1	2841	192	0.85
4×70+1×35	0.65/0.60	0.80	0.60	41.5	3782	228	0.59
4×95+1×50	0.65/0.65	0.80	0.60	45.3	4946	273	0.43

八、电缆载流量的说明 Cable current carrying capacity

电缆铜导体的直流电阻 DC resistance of copper conductor in cable

标称截面 Nominnal section mm ²	20°C时最大直流电阻 Maximum DC resis- tance at 20 °C (Ω / km)	标称截面 Nominnal section mm ²	20°C时最大直流电阻 Maximum DC resis- tance at 20 °C (Ω / km)	标称截面 Nominnal section mm ²	20°C时最大直流电阻 Maximum DC resis- tance at 20 °C (Ω / km)
1.5	12.1	35	0.524	240	0.0754
2.5	7.41	50	0.387	300	0.0601
4	4.61	70	0.268	400	0.0470
6	3.08	95	0.193	500	0.0366
10	1.83	120	0.153	630	0.0283
16	1.15	150	0.124		
25	0.727	185	0.0991		

本公司参照IEC60287标准定出电缆的载流量, 依据是环境温度40°C, 线芯温度90°C。由于无机绝缘电缆优良的耐高温特性, 是否能提高线芯温度, 缩减截面, 节省投资? 当然可以, 但会大大增加铜损, 从综合经济效益来看是不合算的。

The company with reference to the IEC60287 standard set the cable carrier flow, based on the ambient temperature of 40 degrees, the core temperature of 90. Due to the excellent high temperature resistance characteristics of inorganic insulated cables, is it capable of increasing the temperature of the wire, reducing the cross section and saving the investment? Of course, but it will greatly increase the copper loss, from the comprehensive economic benefits of view is not cost-effective.

关于电缆敷设方式及载流量的修正系数, 请查阅供电设计手册。

For the cable laying mode and the load flow rate correction factor, please refer to the power distribution design manual.



九、电缆设计参考 References for design of cables

● 电缆的选择

选择多芯电缆，多芯电缆主要优点是三相阻抗均匀，适合于三相电机及变频系统。

选择单芯电缆，优点是比同等截面的多芯电缆载流量大，阻抗均匀要求不高，照明系统等均采用，尤其较大电流系统。

● 载流量选择

RTTZ电缆的载流量因无机绝缘耐温极高，固有载流量可以很大，但受到配电系统的要求限制，载流量不能定的太高，RTTZ电缆的载流量是按照塑料绝缘电缆所制定的环境温度40°C，线芯温度90°C，其载流量是比较保守的，在选用时载流量不必打系数。

● 末端压降计算

为了保证消防电机正常启动，电缆末端压降必须满足要求，下面提供压降计算公式。

理论计算公式

$$X=0.1445 \lg \frac{D_j}{D_z} \quad (\text{查配电设计手册})$$

$$\text{电压降: } \Delta U = \sqrt{3} I L (R \cos \phi + x \sin \phi)$$

一般取 $\cos \phi = 0.9$; $\sin \phi = 0.435$

式中 I—计算电流(A); L—电缆长度(m)

R—导体电阻(Ω)(样本提供) X—感抗(Ω)

(计算得)

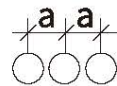
工程简化计算公式:

● 三相四线系统(多芯电缆,表3表4表5)

$$5) \Delta U = K \times I \times L \times R = I \times L \times V_0 (V)$$

单相铜护套电缆两端接地时的末端压降计算

● 计算图例:



a—电缆中心间距
D—电缆外径



● 单位长度交变感抗: $X_M = \omega M = 22\pi f M$

式中: ω —角频率 $\omega = 2\pi f$, f—工频(Hz) f=(Hz)

● 金属护套的单位长度电阻: $R_M = 1/qmK$

式中: qm—金属护套的截面(mm^2)
 $k_{90} = 41.7(1/\Omega\text{m})$

由于铜套两端接地,铜护套与“地”引成回路产生变压器效应,铜护套为二次回路,导线为一次回路,通以交变电流时,铜护套有感应电流,产生铜损,使导体增加附加电阻。

式中 $V_0 = KR$ —单位电压降 (见表3表4表5 最右项)

例1: RTTZ-3 \times 70+1 \times 35

若计算电流200A; 电缆长100m

$V_0 = 0.59(V/A \cdot \text{KM})$ (见表4)

$$\Delta U = 200 \times 100 \times 0.59 \times 10^{-3} = 11.8(V)$$

● 单相二线系统 (单芯电缆表1)

$$\Delta U = K \times I \times L \times R = I \times L \times 2R (V)$$

例2: RTTZ-2(1 \times 25)

若计算电流 130A; 电缆长80m,

$$\Delta U = 130 \times 80 \times 2 \times 0.92 \times 10^{-3} = 19.136(V)$$

● 互感计算公式: $\frac{\mu_0}{2\pi} \ln \frac{2a}{dMn}$

式中: $d_{Mn} = d_M - \delta_M$

d_{Mn} —金属保护套的平均直径(mm)

d_M —金属保护套外径

δ_M —金属护套的厚度

μ_0 —电感常数(空气的导磁率) $\mu_0 = 4\pi \times 10^{-7}(\text{H/m})$

a—电缆轴距(中心距)(mm)

● 单位长度附加电阻计算公式: $\Delta R = R_M \frac{1}{(\frac{RM}{XM})^2 + 1}$

● 单位长度导体总电阻: $R = R_{90} + \Delta R(\Omega/m)$

注: R_{90} 是指样本中导体的直流电阻,未考虑集肤与邻近效应。

● 自感计算公式 (平均电感): $L = \frac{\mu_0}{2\pi} \ln \frac{a}{p}$

式中: a—平均几何间距

$a^3 \sqrt{2a} = 1.26a(\text{mm})$

p —导线的等效半径 $p = 0.779r(\text{mm})$

r—导线的半径(mm)

● 单位长度感抗: $X_L = \omega L = 2\pi f L$

● 末端压降计算:

单相(二线) $\Delta U = 2I \sqrt{R^2 \cos^2 \phi + X_L^2 \sin^2 \phi}$

三相四线 $\Delta U = \sqrt{3} I \sqrt{R^2 \cos^2 \phi + X_L^2 \sin^2 \phi}$

式中: I—计算电流(实际电流) (A)

l —电缆(导体)长度(m)

设: $\cos \phi = 0.9$ $\sin \phi = 0.435$

注: 在应用所有计算公式时, 必须注意单位的统一。

● 电缆的动热稳定性验算

RTTZ电缆既有耐高温的无机绝缘, 以有一定的柔性, 不需要验算动热稳定性。

● 防腐蚀

RTTZ电缆的铜护套及无机绝缘材质有很好的耐腐蚀性, 一般场所不需要考虑防腐蚀措施。若安装在地下或有强腐蚀性气体场所, 应标明电缆有PVC防护外套。

● 电缆接地

RTTZ电缆的铜护套是良好的PE线, 其截面均满足标准规定要求。四芯可以代替五芯的有机绝缘电缆, 节约投资。多芯电缆铜护套一端接地即可, 单芯电缆铜护套应两端接地, 为了节能采用单端接地时, 另一端必须有电气绝缘隔离。铜护套可以多个接地点。

● 分支箱及预分支电缆

在树干式配电系统中, 可采用分支箱或预分支电缆。

● 电缆配件

RTTZ电缆像普通电缆一样需要配件, 可以在现场制作中间连接器、终端及线鼻子。

● 电缆敷设

RTTZ电缆可以直接明敷, 省去电缆桥架, 多芯电缆可以穿越楼板预埋铁管, 可以用铁制紧固件固定。单芯电缆严禁单根穿铁管及用高导磁闭合材质绑箍。

● 树干式配电用预制分支电缆

型号与规格 FZ-RTTZ—主干单芯电缆最大截面为400 mm^2 , 主干多芯电缆最大截面为4 \times 120 mm^2 , 预分支电缆主干上端应预制好吊环并在相应安装位置预埋好吊钩。(吊钩的负重应为受用分支电缆重量的三倍)。

十、电缆安装注意事项 Matters needing attention for installation of cables

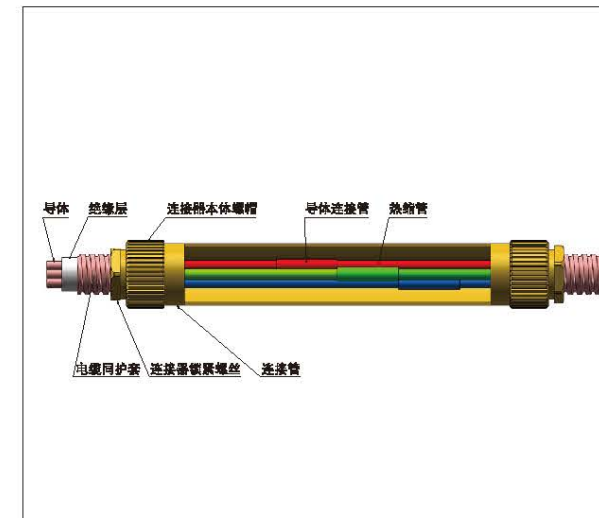
- RTTZ电缆敷设时同普通电缆一样安装不需要特殊专业人员，也不需要安装培训，必要时制造厂可提供安装视频文件或派技术人员到现场指导安装。安装终端连接器时，按照《终端连接器安装示意图》安装即可。
- 可直接将电缆盘运到现场进行放线，放线时应按照电缆盘上标明的放线方向操作。电缆放线可以从下至上，也可以从上至下。
- 电缆的支架及固定
 - a、水平吊架允许跨距 1) 电缆外径20mm, 允许跨距400mm 2) 电缆外径>20mm, 允许跨距800mm
 - b、垂直支架允许跨距 1) 电缆外径20mm, 允许跨距1500mm 2) 电缆外径>20mm, 允许跨距1000mm
 - c、在电缆桥架中敷设, 固定电缆的允许跨距可参照项;
 - d、单芯电缆绑箍固定严禁采用导磁材质, 例如铁丝等;
 - e、单芯电缆不能单根穿越导磁材质管及闭合的任何形状的导磁构件, 此时可参考用塑料或树脂类管材及构件。
- 电缆配件

RTTZ电缆终端按产品国家标准的型号为RZDF, 所用的终端和中间连接器的截面规格必须和电缆本体的截面规格相一致。

 - a、根据需要, 电缆可采用中间连接器在现场连接, 其耐火等级等同于本体;
 - b、根据用户需要, 可配终端和线鼻子, 在现场制作终端时, 应剥去端头导体绝缘约300mm后压制线鼻子, 用兆欧表检测铜护套与导体及导体之间的绝缘电阻, 合格后套上热缩套管, 或用绝缘胶带包扎, 以保护耐火绝缘层。
- 放线中有转角时, 应用圆弧形弯曲, 严禁扭曲及直角弯曲。
- 放线时应顺畅, 严禁电缆卡壳时硬拉, 不准损坏铜护套。
- The installation of RTTZ cables is just like that of the ordinary cables, which can be done by ordinary operators without special training, not asking for on-site guidance by personnel dispatched from the factory. Professional technicians are needed when the terminal connectors are installed.
- The cable tray can be payed off directly after being delivered to the site. During this process, it shall be done from the bottom to the top or reversely according to the pay-off direction marked on the cable tray.
- Holder and fixing of cable
 - a. The allowable span 1 of horizontal 1) cable diameter is less than or equal to 20mm, allowing a span of 400mm 2) cable diameter>20mm, allowing span of 800mm
 - b. The allowable span 2 of vertical support 1) cable diameter is less than or equal to 20mm, allowing a span of 1500mm 2) cable diameter>20mm, allowing span of 1000mm
 - c. During laying of cable bridge, the allowable span for fixing cable can refer to item a and b;
 - d. The binding and fixing of single-core cable shall not adopt magnetic conductive materials, such as iron wires etc;
 - e. Single core cable can not be a single through the guide magnetic materials and closure of any shape of the magnetic conductive member, then you can reference plastic or resin pipes and components.
- Cable accessories
 - a. According to the need, the cable can be connected on site by adoption of intermediate joints. Its fire resistance rating is equal to that of the main body;
 - According to user needs, the cable can be equipped with terminals. When the terminals are fabricated on site, strip off the copper sheath and remove post-pressing terminal after stripping about 30mm of the insulation. Use a megohmmeter to test the resistance between copper sheath and the conductor or that among conductors. After passing the test, cover with a heat shrinkable sleeve, or tied with the insulating tape, so as to protect the fireproof insulating layer.
 - b. When there is a turning corner during the process of paying-off, the bending shall be made in circular arc and the distortion or the bending in right angle is strictly prohibited.



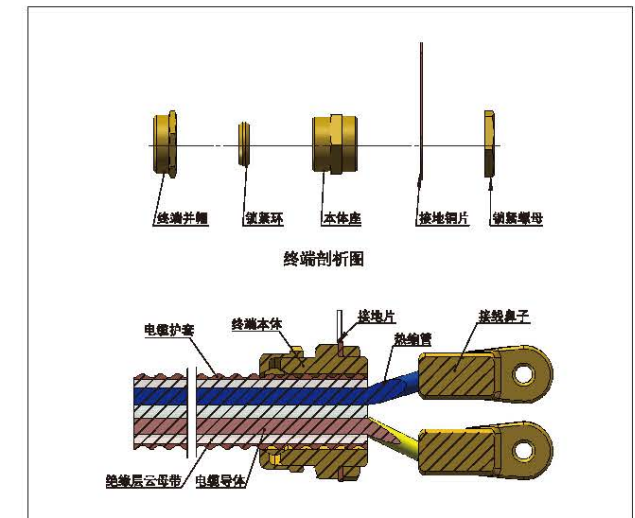
安装视频及安装注意事项请扫二维码后即可观看。
Please scan the QR code for installation video and installation precautions.



电缆连接器整体剖视图
Cable connector profile as a whole



中间连接器安装示意图
Straight-through connector installation diagram



电缆终端安装图
Cable terminal installation drawing



终端连接器安装示意图
Termination installation diagram

- 电缆分割
 - a、在现场电缆可以按需要任意分割, 分割面不必采用喷灯烘烤去湿; 不小心端头浸水后, 只需用热风吹干即可。
 - b、剥除铜护套时, 严禁铜屑嵌入绝缘层, 除肉眼查看外, 应用兆欧表检测绝缘电阻(铜护套及导体间), 如绝缘电阻不合格说明铜护套的边缘刺入绝缘中与导体接触, 必须清除。
- 电缆接地
 - a、多芯电缆铜护套两端或多处接地无特殊要求。
 - b、单芯电缆铜护套两端或多处接地, 同时所有电缆铜护套作紧密电气连接。
 - c、电缆接地可用终端封套, 也可用铜带, 铜卡紧固在铜护套上, 用铜导体引到接地点。若采用铁制卡件, 必须镀锌、镀铬件。
- 电缆通电
 - a、电缆两端制作好终端, 在接到电气设备之前, 必须用千伏兆欧表检测绝缘电阻。单芯电缆检测导体与铜护套之间的绝缘电阻, 多芯电缆因检测导体与导体、导体与铜护套之间的绝缘电阻。
 - b、电缆两端接到电气设备, 对整个系统应用千伏兆欧表检测绝缘电阻, 若 $\geq 0.5M$ 才可以通电。

● Cable segmentation

- The cable can be segmented freely according to the site demand. The cable surface under segmentation shall not be treated by blowtorch baking for wetting; the terminal is wetted by careless movement, dry it by hot air.
- When the copper sheath is stripped off, it is strictly prohibited to embed the copper scrap in an insulating layer. In addition to visual inspection, the insulation resistance (between copper sheath and the conductor) shall be tested by megameter. If the insulation resistance is disqualified, the edge stab of copper sheath may have pierced into the insulation and contacted with the conductor, which must be removed.

● Cable earthing

- There are no special requirements to two ends or many earthing points of multi-core copper sheath;
- The single core copper sheath shall be earthed at both ends or multiple points, while all copper sheaths of cable shall be under close electrical connection.
- Cable earthing can be realized by enveloping terminals or copper tapes. Copper holders are fastened to the copper sheath, lead to the earthing point via copper conductor. If iron fasteners are used, they must be galvanized. Chrome plated parts can be used.

Power-on of cables

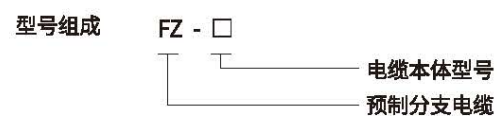
- Terminals can be prepared at two ends of cable. Before being connected to electrical equipment, the insulation resistance must be tested by kV megameter. For the single core cable, the detection is made between the conductor and the copper sheath. For the multi-core cables, the detection is made among conductors or between the conductor and the copper sheath.
- When two ends of cable are connected to the electrical equipment, the insulation resistance of whole system can be tested by a kV megameter. The power-on is allowed only when it is higher than 0.5M Ohm.

十一、预制分支电缆 Prefabricated branch cable

RTTZ系列云母带矿物绝缘波纹铜护套电缆，可以采用预制分支电缆，实现树干式配电（见右图），其单芯和多芯电缆均可制作预制分支电缆。

预制分支电缆由厂家根据现场需求，实地测量确定联接体位置、主干电缆及分支电缆的长度加工生产，现场安装方便、简单。

参照上海市企业标准Q31/0115000421C005-2016《额定电压0.6/1KV及以下预制分支金属护套无机矿物绝缘电缆》，预制分支电缆型号组成及规格。



电缆规格表

型号	芯数	导体标称截面积 (mm ²)	
		主干电缆	分支电缆
FZ-RTTZ	1 芯	10 ~ 400	1.5 ~ 150
FZ-RTTVZ	2-5 芯	4 ~ 120	2.5 ~ 50
FZ-RTTYZ			



产品表示方法

示例1: 云母带矿物绝缘波纹铜护套预制分支电缆, 额定电压为0.6/1KV, 单芯, 主干电缆标称截面120mm²、分支电缆为35mm²表示为:

FZ-RTTZ 0.6/1KV 1*120/1*35

示例2: 云母带矿物绝缘波纹铜护套聚烯烃外护套预制分支电缆, 额定电压为0.6/1KV, 主干电缆标称截面4*25+1*16mm²、分支电缆为5*10mm²表示为:

FZ-RTTZV 0.6/1KV 4*25+1*16/5*10

产品部分专利:

- 专利名称: 柔性防火电缆预分支连接器
专利号: ZL 2015 2 0527666.2
- 专利名称: 柔性防火电缆预分支连接器及其加工安装方法
专利号: 201510428052.3
- 专利名称: 电缆接头外观
专利号: ZL 2015 3 0262060.6

Product presentation

Example 1: Mica tape mineral insulated corrugated copper sheathed prefabricated branch cable, rated voltage of 0.6/1KV, single core, trunk cable nominal section 120mm², branch cable for 35mm²:

0.6/1KV 1*120/1*35 FZ-RTTZ

Example 2: Mica tape mineral insulation corrugated copper sheath polyolefin outer sheath prefabricated branch cable rated voltage of 0.6/1KV, trunk cable nominal cross-section 4*25+1*16mm², branch cable for 5*10mm²:

0.6/1KV 4*25+1*16/5*10 FZ-RTTZV

Part patent of product:

- patent name: flexible fireproof cable pre branch coupler
Patent No.: ZL 201520527666.2
- patent name: branch connector and its installation method of pre processing flexible fireproof cable
Patent No.: 201510428052.3
- patent name: cable joint appearance
Patent No.: ZL 201530262060.6

RTTZ分支联接体尺寸规格表 RTTZ branch connection body size table

序号	分体联接体尺寸 (mm)	尺寸	芯数	主干电缆规格 (mm ²)
1	63 × 208	小	单芯	10/16/25/35/50
2	63 × 208	小	单芯	70/95/120/150
3	88 × 300	中	单芯	185/240
4	90 × 300	大	单芯	300
5	110 × 300	大	单芯	400
6	88 × 300	中	多芯	4 × 25 及以下
7	94 × 350	大	多芯	4 × 35/4 × 50
8	94 × 350	大	多芯	4 × 70/4 × 95/4 × 120

RTTZ系列云母带矿物绝缘波纹铜护套电缆

RTTZ Series inorganic mineral insulated corrugated copper sheathed cable

十二、电缆分支箱 Cable branch box

RTTZ系列云母带矿物绝缘波纹铜护套电缆,除了可以采用预制分支电缆实现树干式配电外,也可以采用分支箱分支实现树干式配电(配电箱见下图片)。

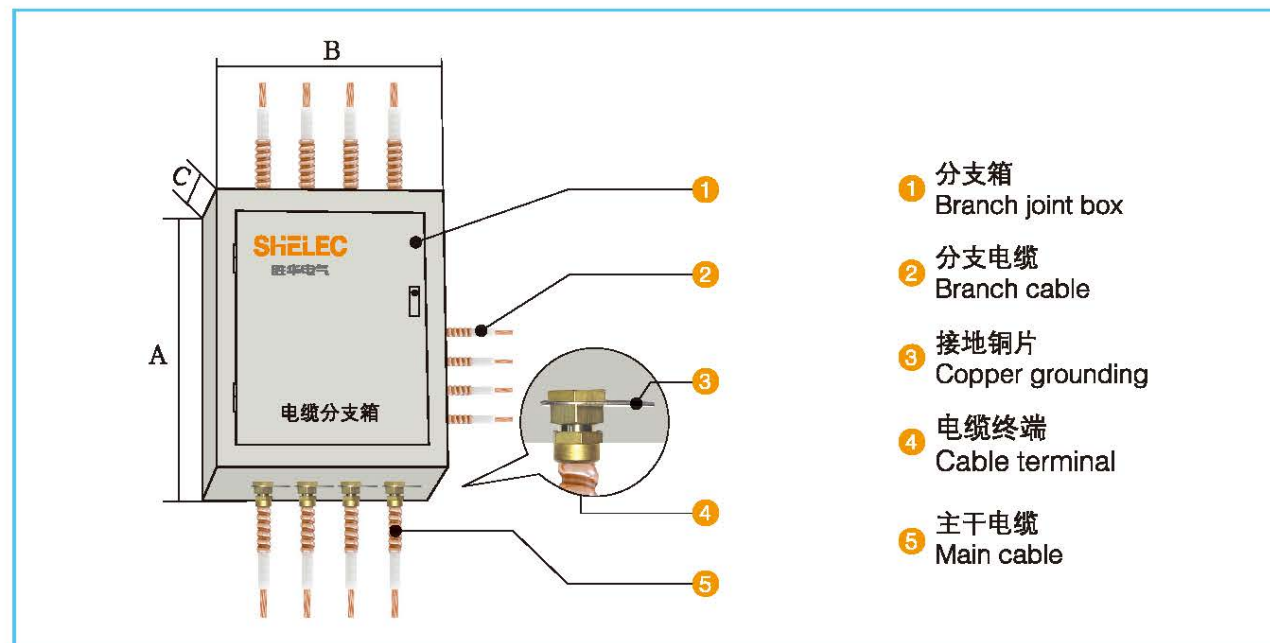
其单芯和多芯均可实现分支箱分支,须在现场制做,尺寸及规格见下表,供参考。

RTTZ series inorganic mineral insulated cable metal sheath, in addition to adopting prefabricated branch cable trunk type distribution, also can use branch box branch trunk type distribution distribution box (see picture below).

The single core and multicore can achieve branch, branch box must be made at the scene, see table size and specifications, for your reference.

RTTZ电缆分支箱尺寸规格表 RTTZ branch connection body size table

单芯主干电缆规格	A (长/mm)	B (宽/mm)	C (宽/mm)
25 以下	360	260	140
35、50	410	260	160
70、95	430	300	180
120、150	500	300	180
185、240	500	400	180
300、400	600	400	180
多芯主干电缆规格	A (长/mm)	B (宽/mm)	C (宽/mm)
4 × 16、4 × 25	360	310	140
4 × 35	410	340	160
4 × 50	450	400	180
4 × 70、4 × 95	500	400	180
4 × 120、4 × 150	600	500	180



十三、电缆的应用范围 Cable application range

1. 各类建筑物中的消防设备及消防电梯等供电;
2. 重要建筑或人员密集的建筑中设备及照明系统供电;
3. 环境温度较高的场所,如钢铁厂、冶炼厂、玻璃厂等设备供电;
4. 易燃易爆的重要场合,例石油化工、煤矿等设备的供电;
5. 需要特别清洁卫生的场所,如:医院、食品厂等供电设备;
6. 重要的军工、国防、航天、卫星基地设备的供电;
7. 电厂、核电站重要设备的供电。



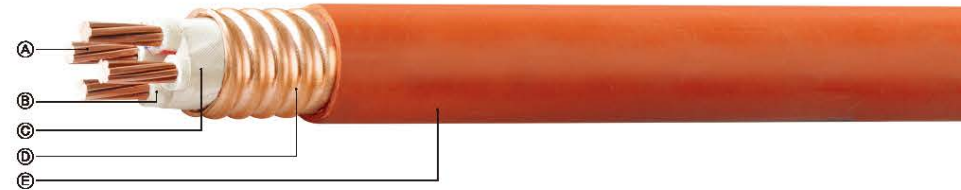
1. 54米以上高层建筑
54 meters above the high-rise buildings
2. 购物中心 Shopping Center
3. 百货大楼 Department Store
4. 学校 School
5. 医院 Hospital
6. 体育馆 Gymnasium
7. 火车站 Railway Station
8. 会展中心 Convention & Exhibition Center
9. 飞机场 Airport
10. 星级宾馆 Star Hotel
11. 地铁 Subway
12. 军工单位 Military Unit
13. 商务楼 Commercial Building
14. 钢铁工业 Steel Industry

一、电缆结构 Cables structure

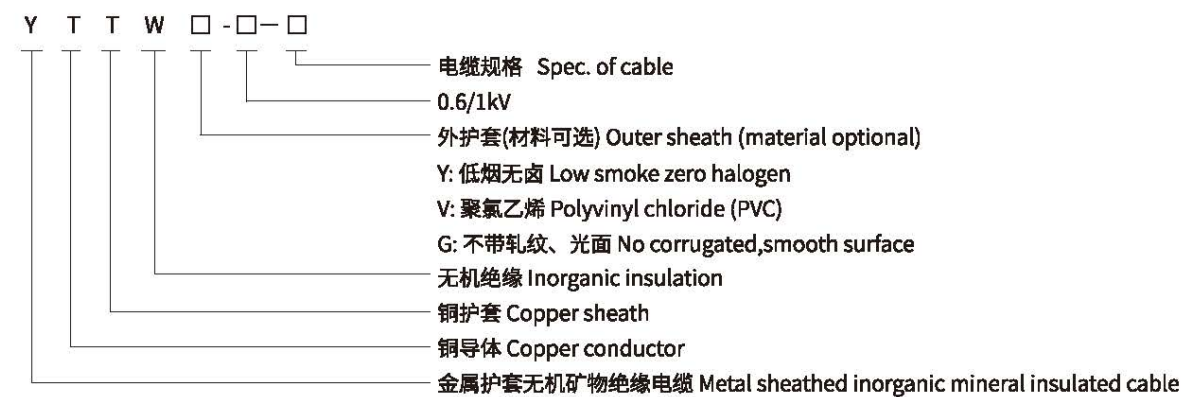
1. 电缆导体：由多股铜线绞合而成，具有良好的弯曲特性。
2. 绝缘层：采用耐高温，不燃烧的无机绝缘材质。
3. 铜护套：铜质材料，经特殊加工有良好的弯曲特性，并作为PE线。
4. 外护层：采用低烟无卤及聚氯乙烯的塑性材质，有良好的防腐蚀特性。

1. Cable conductor: it is made up of stranded copper wires, with favorable flexural property.
2. Insulation layer: it adopts high-temperature resistant inorganic insulating materials
3. Copper sheath: copper materials, through special machining, with favorable flexural property, used as PE wire.
4. Outer sheath: it is made of plastic materials of low-smoke non-toxicity, with favorable corrosion protection.

- Ⓐ 绞合铜导体 Stranded copper conductor
- Ⓑ 无机绝缘材料 Inorganic insulation
- Ⓒ 保护层 Protective layer
- Ⓓ 铜护套 Copper sheath
- Ⓔ 外护套(可选) Outer sheath



二、电缆型号 Cables model



例1: YTTW 4×50

表示: 4芯, 4根50mm²截面的金属护套无机矿物绝缘电缆。

例2: YTTW 4×(1×150)

表示: 4根单芯150mm²截面拼凑的金属护套无机矿物绝缘电缆。

例3: YTTWV-0.6/1 kV-(4x95)

表示: 铜芯轧纹铜护套无机矿物绝缘聚氯乙烯外套电缆, 额定电压0.6/1kV, 规格(4x95)mm²

例4: WD-YTTWY-0.6/1 kV-(3x70+1x35)

表示: 铜芯轧纹铜护套无机矿物绝缘无卤低烟聚烯烃外套电缆, 额定电压0.6/1 kV, 规格(3x70+1x35)mm²

eg.1: YTTW 4×50

It means 4 Metal Sheathed Inorganic Mineral Insulated Cables of 50mm² in sectional area.

eg.2: YTTW 4×(1×150)

It means 4 flexible fire-proof cables single core of 150mm² in cross section

三、执行标准 The implementation of standards

● 产品制造标准

1. JG/T313-2014 额定电压0.6/1kV及以下金属护套无机矿物绝缘电缆及终端
2. IEC60702-2002 额定电压750V及以下矿物绝缘电缆及终端

● 产品检测标准

1. BS6387-1994 在火灾条件下保持电路完整性的电缆性能要求
检验项目: 线路完整性(单纯耐火C、耐火防水W、耐火耐冲击Z)
2. GA306.2-2007 阻燃及耐火电缆塑料绝缘阻燃及耐火电缆分级和要求
第二部分: 耐火电缆
检测项目: 电气性能绝缘、耐电压试验、机械性能压扁、弯曲试验、耐火特性检测
C-单纯耐火(950-1000°C、3h)
W-耐火防水(受火15min洒水和继续受火15min)
Z-耐火耐冲击(受火和冲击15min)
注: C、W、Z三项试验均在同一根试样上按C、W、Z的顺序进行试验。

● Product manufacturing standard

1. JG/T313-2014 Metal sheathed inorganic mineral insulated cables and terminals under rated voltage of 0.6/1 kv or lower
2. IEC60702-2002 Mineral insulated cables and terminals under rated voltage of 750V or lower

● Product testing standards

1. BS6387-1994 Keeping cable performance of circuit integrity under fire condition
Test item: circuit integrity (simple fireproof C, fireproof and waterproof W, fireproof and high impact Z)
2. GA306.2-2007 Classification and requirements of flame retardant and fireproof cable, plastic insulated and flame retardant and fireproof cables
Part II fireproof cable
3. JG/T313-2014 Metal sheathed inorganic mineral insulated cables and terminals under rated voltage of 0.6/1kv or lower
Test item: Electric insulation performance, dielectric strength test, mechanical flattening and bending test and fire-resistance test
C-simple fireproof (950-1000°C, 3H)
W-Fireproof and waterproof(watering after 15min of treatment in fire and then continuous another 15min of fire treatment)
Z-Fireproof and impact resistant (treatment in fire and under impact for 15min)
Note: For the same sample, the above three tests shall be performed in a sequence of C, Wand Z

四、电缆规格及流量表 Cable size and ampacity

表1. 环境温度为40°C时，单芯电缆载流量及其参数

Table 1. Ampacity and other parameters of single-core cables, ambient temperature 40°C

标称截面 Nominnal section mm ²	铜护套(PE线)截面 Copper sheath (PE wire) Sectional area (mm ²)	绝缘厚度 Insulation thick- ness (mm)	近似外径 Approximate O.D. (mm)	导体电阻 90°C(Ω/km) Core resistance 90°C(W/km)	额定电流 Rated current (A) ●●●●	额定电流 Rated current (A) ●●●	单位电压降 Potential drop V/A·km
10	9.26	1.00	7.80	2.33	97	77	2.33
16	10.55	1.00	8.80	1.47	125	100	1.47
25	12.69	1.00	10.50	0.92	165	130	0.92
35	13.94	1.00	11.50	0.67	200	160	0.67
50	20.57	1.20	13.60	0.49	245	195	0.49
70	23.24	1.20	15.30	0.34	305	245	0.34
95	27.95	1.20	18.30	0.25	375	300	0.25
120	30.30	1.20	19.80	0.20	435	350	0.20
150	33.44	1.40	21.80	0.16	500	400	0.16
185	35.95	1.40	23.40	0.13	580	465	0.13
240	48.04	1.40	26.10	0.10	685	500	0.10
300	53.12	1.60	28.80	0.08	795	635	0.08
400	58.59	1.60	31.70	0.06	930	745	0.06
500	67.07	1.80	36.20	0.04	990	860	0.04
630	78.95	2.00	40.00	0.03	1250	1080	0.03

注:1 表1 单芯电缆用于3相4线系统时单位电压降应乘以 $\sqrt{3}$, 用于单相系统时单位电压降应乘以2, 单芯3+1电缆也符合PE线要求。
Note:1.The values in the Voltage drop column shall be multiplied by $\sqrt{3}$ when the cable is used in a 3-phase 4-wire system and multiplied by 2 when the cable is used in a single phase system. Single core cable is also in line with the requirements of 3+1 PE line.

表2. 环境温度为40°C时，2芯电缆载流量及其参数

Table 2. Ampacity and other parameters of 2-core cables, ambient temperature 40°C

标称截面 Nominnal section mm ²	铜护套(PE线)截面 Copper sheath (PE wire) Sectional area (mm ²)	绝缘厚度 Insulation thick- ness (mm)	近似外径 Approximate O.D. (mm)	导体电阻 90°C(Ω/km) Core resistance 90°C(W/km)	额定电流 Rated current (A)	单位电压降 Potential drop V/A·km
2×2.5	9.49	0.80	7.96	9.48	33	18.96
2×4	11.18	0.80	9.30	5.90	44	11.80
2×6	12.94	0.80	12.70	3.90	57	7.80
2×10	17.33	1.0	14.20	2.33	78	4.66
2×16	20.60	1.0	16.80	1.43	104	2.86
2×25	23.74	1.0	19.30	1.26	135	2.52
2×35	26.57	1.10	21.55	1.12	168	2.24
2×50	30.14	1.20	*19.70	0.82	204	1.64
2×70	33.60	1.20	*21.90	0.71	263	1.42
2×95	37.05	1.20	*24.10	0.54	320	1.08
2×120	38.47	1.20	*25.00	0.49	373	0.98

注:2 *表示导体芯采用半圆形或扇形。
Note: 2. *indicates that the conductor is semi-circular or sector-shaped.

表3. 环境温度为40°C时，3芯电缆载流量及其参数

Table 3. Current carrying capacity and parameters of three-cores cable at ambient temperature 40°C

标称截面 Nominnal section mm ²	铜护套(PE线)截面 Copper sheath (PE wire) Sectional area (mm ²)	绝缘厚度 Insulation thick- ness (mm)	近似外径 Approximate O.D. (mm)	导体电阻 90°C(Ω/km) Core resistance 90°C(W/km)	额定电流 Rated current (A)	单位电压降 Potential drop V/A·km
3×2.5	10.55	0.80	8.80	9.48	29	16.40
3×4	12.31	0.80	10.20	5.90	38	10.20
3×6	13.69	0.80	11.30	3.90	46	6.74
3×10	18.09	1.0	14.80	2.33	65	4.03
3×16	21.73	1.0	17.70	1.47	85	2.54
3×25	31.25	1.0	20.40	0.92	118	1.59
3×35	34.85	1.10	22.70	0.67	150	1.16
3×50	35.01	1.20	*22.80	0.49	192	0.85
3×70	47.10	1.20	*25.60	0.34	228	0.59
3×95	52.57	1.20	*28.50	0.25	273	0.43
3×120	59.84	1.20	*31.30	0.20	314	0.35

表4. 环境温度为40°C时，3+1芯电缆载流量及其参数

Table 4. Current carrying capacity and parameters of 3+1 cores cable at ambient temperature 40°C

标称截面 Nominnal section mm ²	铜护套(PE线)截面 Copper sheath (PE wire) Sectional area (mm ²)	绝缘厚度 Insulation thick- ness (mm)	近似外径 Approximate O.D. (mm)	导体电阻 90°C(Ω/km) Core resistance 90°C(W/km)	铜套电阻 70°C(Ω/km) Resistance of copper sheath 70°C(Ω/km)	额定电流 Rated current (A)	单位电压降 Potential drop V/A·km
3×16+1×10	28.73	1.00	18.80	1.47	0.449	85	2.54
3×25+1×16	33.13	1.00	21.60	0.92	0.334	118	1.59
3×35+1×16	36.43	1.10	23.70	0.67	0.296	150	1.16
3×50+1×25	37.36	1.20	*24.30	0.49	0.228	192	0.85
3×70+1×35	51.99	1.20	*28.20	0.34	0.197	228	0.59
3×95+1×50	60.66	1.20	*32.80	0.25	0.171	273	0.43
3×120+1×70	68.95	1.20	*38.50	0.20	0.139	314	0.35

YTTW 金属护套无机矿物绝缘电缆

YTTW metal sheathed inorganic mineral insulated cable

表5. 环境温度为40°C时, 4芯等截面电缆载流量及其参数

Table 5. Current carrying capacity and parameters of 4-core constant section cable at ambient temperature 40°C

标称截面 Nominal section mm ²	铜护套(PE线)截面 Copper sheath (PE wire) Sectional area (mm ²)	绝缘厚度 Insulation thick- ness (mm)	近似外径 Approximate O.D. (mm)	导体电阻 90°C(Ω/km) Core resistance 90°C(W/km)	额定电流 Rated current (A)	单位电压降 Potential drop V/A·km
4×6	15.32	0.80	12.60	3.90	46	6.74
4×10	20.72	1.00	16.90	2.33	65	4.03
4×16	29.36	1.00	19.20	1.47	85	2.54
4×25	34.07	1.00	22.20	0.92	118	1.59
4×35	38.31	1.10	24.90	0.67	150	1.16
4×50	38.47	1.20	*25.00	0.49	192	0.85
4×70	51.99	1.20	*28.20	0.34	228	0.59
4×95	59.53	1.20	*32.20	0.25	273	0.43
4×120	64.81	1.20	*38.50	0.20	314	0.35

五、适合规范 Suitable for specification

YTTW电缆的适合规范、电缆性能、抗火灾能力、电缆规格及载流量、电缆安装注意事项、预分支电缆等均参考本样本RTTZ系列相应内容。

YTTW cable for the appropriate specifications , cable performance, fire resistance, cable specifications and carrying capacity, cable installation attention, pre - branch cable and so on refer to the corresponding contents of the RTTZ series of this sample.

38	企业法人营业执照
39	质量管理体系认证证书
40	环境管理体系认证证书
41	职业健康安全管理体系认证证书
42	知识产权管理体系认证证书
43	高新技术企业证书
43	科技进步奖证书
44	上海浦东新区科学技术奖
44	上海专精特新证书
45	军队装备入网证书
45	浦东新区企业研发机构证书
46	AAA级信用企业证书
46	守合同重信用企业证书
47	质量检测国家标准合格产品证书
47	中国建筑学会建筑电气分会特殊贡献奖
48	全国工业产品生产许可证
49	上海市高新技术成果转化项目证书
50	专利证书
51	中华人民共和国国家标准
52	检验报告
70	部分工程业绩
75	质量保证方案及确保质量的技术组织措施