

**PRODUCT CATALOGUE**

**Vol. 2**

Onboard wires

Connecting wires and installation cables

Shielding braids

Copper and copper nickel-plated wires with highly heat-resistant enamel insulation based on polyimides



## Dear partners!

JSC “Factory “Chuvashkabel” welcomes you on the pages of our catalogue. The company has been successfully operating since 1961 and is one of the main suppliers of cable and wire products for the Russian aerospace industry. The company is widely known in the market as a manufacturer of high quality products.

The company's quality management system is certified for compliance with the requirements of ISO 9001:2015, AS 9100C.

In order to maintain technological leadership in the manufacture of installation, onboard and other cables and wires, an extensive retrofitting program has been successfully implemented in recent years, which has enabled to move to a qualitatively new level of technical equipment of the enterprise. Our own research and development service in close cooperation with leading industry institutes, allows to develop and launch manufacture of new types of products, including those under import substitution programs. Products are not inferior, and sometimes even surpass the best world analogues, both in terms of the totality of characteristics and in terms of price/quality ratio.

Manufacture of cables and wires according to individual orders of consumers is possible.

The company applies a flexible pricing policy. A safety stock has been created and maintained for the most popular positions.

As a result, more than 1000 leading companies from Russia and the CIS countries are regular customers of JSC “Factory “Chuvashkabel” today.

JSC “Factory “Chuvashkabel” is always glad to cooperate and is open for long-term partnership.

Sincerely,  
the staff of JSC “Factory “Chuvashkabel”



The range of onboard and connecting wires manufactured by the enterprise includes a large number of standard sizes of single-core and multi-core designs. The wires are produced as multi-core and single-core of tinned copper, silver-plated copper, nickel-plated copper and copper wires. Wires can be unshielded and shielded in a protective sheath.

The onboard wires are flexible and easy to install, combined with good abrasion resistance and high mechanical characteristics, including puncturing resistance.

In addition to being used in well-known aircraft such as IL-96-300, TU-334 and space equipment, onboard wires can be used in numerous projects where chemical resistance, small size and weight, fire resistance, resistance to oils, fuels and other aggressive environments, resistance to arc discharge and high humidity are required. Wires of this class are used in the electrical, aviation, aerospace and other sectors of the industrial complex, where their excellent characteristics will ensure reliable operation and fire safety.

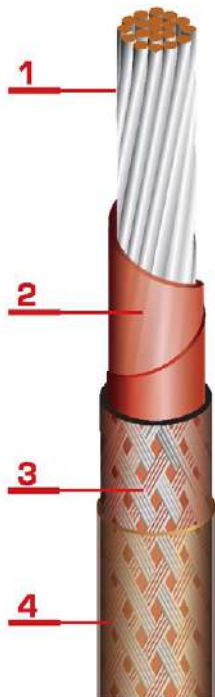
Connecting wires are able to work for a long time at temperatures from  $-150^{\circ}\text{C}$  to  $+250^{\circ}\text{C}$ . This enables to choose a product for almost any occasion, including advanced developments in the field of aviation and space technology.

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# Onboard wires

БИФ, БИФЭ, БИФЭЗ, БИФ-Н, БИФЭ-Н, БИФЭЗ-Н



## Design

- 1 **Inner conductor** is of silver-plated copper wire (for БИФ, БИФЭ, БИФЭЗ wires); of silver-plated wires of БрХЦрК alloy (for БИФбр, БИФЭбр, БИФЭЗбр wires); of copper nickel-plated wire (for БИФ-Н, БИФЭ-Н, БИФЭЗ-Н wires); of nickel-plated wire of БрХЦрК alloy (for БИФ-Нбр, БИФЭ-Нбр, БИФЭЗ-Нбр wires);
- 2 **Insulation** is of polyimide-fluoroplastic film ПМФ;
- 3 **Shield** is (braid density factor not less than 80%) of silver-plated copper wire (for БИФЭ (бр), БИФЭЗ (бр) wires); of nickel-plated copper wire (for БИФЭ-Н (бр), БИФЭЗ-Н (бр) wires);
- 4 **Protective coating** is of a polyimide-fluoroplastic film ПМФ in the form of a wrapping (for БИФЭЗ (бр) and БИФЭЗ-Н (бр) wires).

	БИФ, БИФЭ, БИФЭЗ	БИФ-Н, БИФЭ-Н, БИФЭЗ-Н
Regulatory documentation	TU 16-505.945-76	
National product classification code	35 8339	35 8332
Application	<ul style="list-style-type: none"> <li>For fixed installation of the onboard electrical network of aviation equipment and operation at voltage up to 250 VAC, frequency up to 6000 Hz (350 VDC) at atmospheric pressure up to 0.67 kPa or 600 VAC, frequency up to 6000 Hz (750 VDC) at atmospheric pressure up to 60 kPa.</li> </ul>	
Advantages	<ul style="list-style-type: none"> <li>The wires are resistant to abrasion and withstand at least 10 000 double strokes of the needle with a pressing force of 5.9 N, as well as vibration, shock and linear loads and acoustic noise.</li> <li>The wires are resistant to high atmospheric pressure up to 295 kPa (3 kgf/cm<sup>2</sup>), salt fog, atmospheric condensed precipitation (frost, dew), oils and mold fungi.</li> <li>Wires are flame-retardant.</li> </ul>	

## Specifications

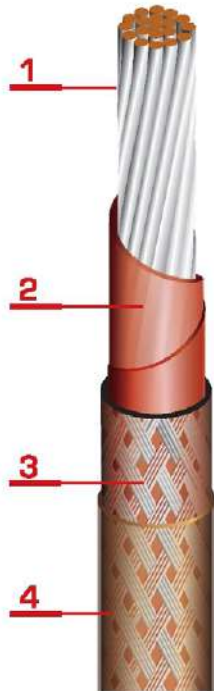
Operating temperature range	-60°C to +200°C
Test AC voltage with frequency of 50 Hz, 5 min, kV	2200
Operating AC voltage with frequency of 6 kHz at atmospheric pressure up to 0.67 kPa, V	250
Operating AC voltage with frequency of 6 kHz at atmospheric pressure up to 60 kPa, V	600
Operating DC voltage at atmospheric pressure up to 0.67 kPa, V	350
Operating DC voltage at atmospheric pressure up to 60 kPa, V	750
Construction length of БИФ-Н, min., m	30
Construction length of other grades, min., m	20
Electrical resistance of cable insulation, calculated per 1 m, MΩ, min.:	
- under normal climatic conditions	1x10 <sup>5</sup>
- at temperature of 200°C	1x10 <sup>4</sup>
- at a relative humidity of 98% and temperature of 35°C	
- after exposure for 48 hours	1x10 <sup>4</sup>
The wires withstand test with AC voltage with frequency of 50 Hz under normal climatic conditions:	
- without mechanical and climatic influences, V	2200
- after mechanical and climatic influences, V	1500

## Design parameters

Number and design cross section of conductor, mm <sup>2</sup>	Conductor flexibility class	Number and diameter of wires in the conductor, pcs. x mm	Nominal outer diameter, mm			Estimated weight, kg/km			Direct current electrical resistance of 1 km of conductor at 20°C, Ω, max.	
			БИФ, БИФ-Н	БИФЭ, БИФЭ-Н	БИФЭЭ, БИФЭЭ-Н	БИФ, БИФ-Н	БИФЭ, БИФЭ-Н	БИФЭЭ, БИФЭЭ-Н	БИФ, БИФЭ, БИФЭЭ	БИФ-Н, БИФЭ-Н, БИФЭЭ-Н
1x0.20	4	7x0.20	1.28	1.76	2.00	3.9	8.7	9.9	85.00	100.0
1x0.20 6p	4	7x0.20	1.28	1.76	2.00	3.9	8.7	9.9	100.00	118.0
1x0.35	5	19x0.15	1.43	1.91	2.15	5.2	11.0	12.3	58.03	66.4
1x0.35 6p	5	19x0.15	1.43	1.91	2.15	5.2	11.0	12.3	70.00	77.4
1x0.50	5	19x0.18	1.58	2.06	2.30	6.8	12.7	14.1	38.59	45.5
1x0.50 6p	5	19x0.18	1.58	2.06	2.30	6.8	12.7	14.1	46.00	53.8
1x0.75	4	19x0.23	1.83	2.31	2.55	10.1	16.8	18.3	23.68	27.6
1x1.00	4	19x0.26	1.98	2.46	2.70	12.4	20.1	21.7	19.00	21.9
1x1.50	4	19x0.32	2.28	2.76	3.00	17.7	25.8	27.7	12.60	14.4
1x2.50	4	19x0.42	2.78	3.26	3.50	28.8	38.8	41	7.10	8.3
2x0.20	4	7x0.20	–	3.04	3.52	–	17.2	21.3	90.0	105.5
2x0.20 6p	4	7x0.20	–	3.04	3.52	–	17.2	21.3	105.5	124.5
2x0.35	5	19x0.15	–	3.34	3.82	–	20.5	25.0	61.2	70.1
2x0.35 6p	5	19x0.15	–	3.34	3.82	–	20.5	25.0	73.9	81.7
2x0.50	5	19x0.18	–	3.64	4.12	–	26.4	31.3	40.7	48.0
2x0.50 6p	5	19x0.18	–	3.64	4.12	–	26.4	31.3	48.6	56.8
2x0.75	4	19x0.23	–	4.14	4.62	–	35.4	40.9	25.0	29.2
2x1.00	4	19x0.26	–	4.44	4.92	–	40.1	46.0	20.1	23.1
2x1.50	4	19x0.32	–	5.16	5.64	–	59.4	66.2	13.3	15.2
2x2.50	4	19x0.42	–	6.16	6.64	–	87.2	95.2	7.5	8.8
3x0.20	4	7x0.20	–	3.23	3.71	–	21.3	25.6	90.0	105.5
3x0.20 6p	4	7x0.20	–	3.23	3.71	–	21.3	25.6	105.5	124.5
3x0.35	5	19x0.15	–	3.55	4.03	–	28.1	32.8	61.2	70.1
3x0.35 6p	5	19x0.15	–	3.55	4.03	–	28.1	32.8	73.9	81.7
3x0.50	5	19x0.18	–	3.88	4.36	–	33.2	38.4	40.7	48.0
3x0.50 6p	5	19x0.18	–	3.88	4.36	–	33.2	38.4	48.6	56.8
3x0.75	4	19x0.23	–	4.41	4.89	–	45.8	51.6	25.0	29.2
3x1.00	4	19x0.26	–	4.74	5.22	–	52.9	59.1	20.1	23.1
3x1.5	4	19x0.32	–	5.50	5.98	–	77.8	85.0	13.3	15.2
3x2.5	4	19x0.42	–	6.58	7.06	–	118.0	127.0	7.5	8.8

# Onboard lightweight wires

БИФМ, БИФМЭ, БИФМЭЗ, БИФМ-Н, БИФМЭ-Н, БИФМЭЗ-Н



## БИФМ, БИФМЭ, БИФМЭЗ, БИФМ-Н, БИФМЭ-Н, БИФМЭЗ-Н

Regulatory documentation	TU 16-505.945-76
National product classification code	35 8332
Application	<ul style="list-style-type: none"> <li>For fixed installation of the onboard electrical network of aviation equipment and operation at voltage up to 250 VAC, frequency up to 6000 Hz (350 VDC) at atmospheric pressure up to 0.67 kPa or 600 VAC, frequency up to 6000 Hz (750 VDC) at atmospheric pressure up to 60 kPa.</li> </ul>
Advantages	<ul style="list-style-type: none"> <li>The wires are resistant to abrasion and withstand at least 10 000 double strokes of the needle with a pressing force of 5.9 N, as well as vibration, shock and linear loads and acoustic noise.</li> <li>The wires are resistant to high atmospheric pressure up to 295 kPa (3 kgf/cm<sup>2</sup>), salt fog, atmospheric condensed precipitation (frost, dew), oils and mold fungi.</li> <li>Wires are flame-retardant.</li> </ul>

## Specifications

Operating temperature range	-60°C to +200°C
Test AC voltage with frequency of 50 Hz, 5 min, kV	2200
Operating AC voltage with frequency of 6 kHz at atmospheric pressure up to 0.67 kPa, V	250
Operating AC voltage with frequency of 6 kHz at atmospheric pressure up to 60 kPa, V	600
Operating DC voltage at atmospheric pressure up to 0.67 kPa, V	350
Operating DC voltage at atmospheric pressure up to 60 kPa, V	750
Construction length of БИФМ-Н, min., m	30
Construction length of other grades, min., m	20
Electrical resistance of cable insulation, calculated per 1 m, MΩ, min.:	
- under normal climatic conditions	1x10 <sup>5</sup>
- at temperature of 200°C	1x10 <sup>4</sup>
- at a relative humidity of 98% and temperature of 35°C after exposure for 48 hours	1x10 <sup>4</sup>
The wires withstand test with AC voltage with frequency of 50 Hz under normal climatic conditions:	
- without mechanical and climatic influences, V	2200
- after mechanical and climatic influences, V	1500

## Design

- 1 Inner conductor** is of silver-plated copper wire (for БИФМ, БИФМЭ, БИФМЭЗ wires); of silver-plated wire of БрХЦрК alloy (for БИФМбр, БИФМЭбр, БИФМЭЗбр wires); of copper nickel-plated wire (for БИФМ-Н, БИФМЭ-Н, БИФМЭЗ-Н wires); of nickel-plated wire of БрХЦрК alloy (for БИФМ-Нбр, БИФМЭ-Нбр, БИФМЭЗ-Нбр wires);
- 2 Insulation** is of polyimide-fluoroplastic film ПМФ;
- 3 Shield** is (braid density factor not less than 80%) of silver-plated copper wire (for БИФМЭ (бр), БИФМЭЗ (бр) wires); of nickel-plated copper wire (for БИФМЭ-Н (бр), БИФМЭЗ-Н (бр) wires);
- 4 Protective coating** is of a polyimide-fluoroplastic film ПМФ in the form of a wrapping (for БИФМЭЗ (бр) and БИФМЭЗ-Н (бр) wires).



## Design parameters

Number and design cross section of conductor, mm <sup>2</sup>	Conductor flexibility class	Number and diameter of wires in the conductor, pcs. x mm	Nominal outer diameter, mm			Estimated weight, kg/km			Direct current electrical resistance of 1 km of conductor at 20°C, Ω, max.	
			БИФМ БИФМ-Н	БИФМЭ БИФМЭ-Н	БИФМЭЭ БИФМЭЭ-Н	БИФМ БИФМ-Н	БИФМЭ БИФМЭ-Н	БИФМЭЭ БИФМЭЭ-Н	БИФМ БИФМЭ БИФМЭЭ	БИФМ-Н БИФМЭ-Н БИФМЭЭ-Н
1x0.20	4	7x0.20	1.16	1.56	1.76	3.35	7.2	8.1	85.00	100.0
1x0.20 бр	4	7x0.20	1.16	1.56	1.76	3.35	7.2	8.1	100.0	118.0
1x0.35	5	19x0.15	1.31	1.71	1.91	4.68	8.9	10.0	58.03	66.4
1x0.35 бр	5	19x0.15	1.31	1.71	1.91	4.68	8.9	10.0	70.00	77.4
1x0.50	5	19x0.18	1.46	1.94	2.14	6.26	12.0	13.1	38.59	45.5
1x0.50 бр	5	19x0.18	1.46	1.94	2.14	6.26	12.0	13.1	46.00	53.8
1x0.75	4	19x0.23	1.70	2.19	2.39	9.47	15.5	16.7	23.68	27.6
1x1.00	4	19x0.26	1.86	2.34	2.54	11.7	19.1	20.4	19.0	21.9
1x1.50	4	19x0.32	2.16	2.64	2.84	16.9	24.4	25.8	12.60	14.4
1x2.50	4	19x0.42	2.66	3.14	3.34	27.3	37.2	38.9	7.10	8.3
2x0.20	4	7x0.20	–	2.80	3.20	–	14.8	17.8	90.0	105.5
2x0.20 бр	4	7x0.20	–	2.80	3.20	–	14.8	17.8	105.5	124.5
2x0.35	5	19x0.15	–	3.10	3.50	–	18.0	21.4	61.2	70.1
2x0.35 бр	5	19x0.15	–	3.10	3.50	–	18.0	21.4	73.9	81.7
2x0.50	5	19x0.18	–	3.40	3.80	–	21.7	25.2	40.7	48.0
2x0.50 бр	5	19x0.18	–	3.40	3.80	–	21.7	25.2	48.6	56.8
2x0.75	4	19x0.23	–	3.88	4.28	–	29.6	33.7	25.0	29.2
2x1.00	4	19x0.26	–	4.20	4.60	–	35.5	39.6	20.1	23.1
2x1.50	4	19x0.32	–	4.92	5.32	–	51.0	56.8	13.3	15.2
2x2.50	4	19x0.42	–	5.92	6.32	–	77.0	83.0	7.5	8.8
3x0.20	4	7x0.20	–	2.97	3.37	–	18.7	22.1	90.0	105.5
3x0.20 бр	4	7x0.20	–	2.97	3.37	–	18.7	22.1	105.5	124.5
3x0.35	5	19x0.15	–	3.30	3.70	–	23.9	27.8	61.2	70.1
3x0.35 бр	5	19x0.15	–	3.30	3.70	–	23.9	27.8	73.9	81.7
3x0.50	5	19x0.18	–	3.62	4.02	–	30.4	34.5	40.7	48.0
3x0.50 бр	5	19x0.18	–	3.62	4.02	–	30.4	34.5	48.6	56.8
3x0.75	4	19x0.23	–	4.14	4.54	–	42.1	46.7	25.0	29.2
3x1.00	4	19x0.26	–	4.48	4.88	–	49.5	54.4	20.1	23.1
3x1.5	4	19x0.32	–	5.24	5.64	–	72.0	77.7	13.3	15.2
3x2.5	4	19x0.42	–	6.32	6.72	–	109.0	116.0	7.5	8.8

# Onboard wires with insulation of Modified Radiation Cross-linked ETFE Polymer

**BC(Э)(0) 35-1298, BC(Э0) 36-1398, BC(Э0) 36-1498**  
 (analogues of 55PC02, 55PC12, 55PC32 wires)



## Design

- 1 **Inner conductor** is of twisted tinned copper wires for BC(Э0) 35-1298, silver-plated copper wires for BC(Э0) 36-1398, nickel-plated copper wires for BC(Э0) 36-1498 (flexibility class 5 for sections 0.20–0.50 mm<sup>2</sup>, flexibility class 4 for sections 0.75–6.0 mm<sup>2</sup> according to GOST 22483);
- 2 **Two-layer insulation** is of Modified Radiation Cross-linked ETFE Polymer;
- 3 **Shield** is in the form of braid of tinned copper wires for BC(Э0) 35-1298, silver-plated copper wires for BC(Э0) 36-1398, nickel-plated copper wires for BC(Э0) 36-1498;
- 4 **Sheath** is of Modified Radiation Cross-linked ETFE Polymer.

**BC(Э0) 35-1298, BC(Э0) 36-1398, BC(Э0) 36-1498**

Regulatory documentation	ПБМИ.358300.001–2014ТУ
National product classification code	3583
Application	<ul style="list-style-type: none"> <li>• The wires are designed for fixed installation of the onboard electrical network of aviation equipment and operation at voltage of 600 VAC, frequency up to 2 kHz (850 VDC).</li> </ul>
Advantages	<ul style="list-style-type: none"> <li>• Wires BC(Э0) 35-1298, BC(Э0) 36-1398, BC(Э0) 36-1498 show exceptional resistance to cutting and abrasion.</li> <li>• Despite the compact design and low weight, the wire BC(Э0) 35-1298, BC(Э0) 36-1398, BC(Э0) 36-1498 are strong enough and resistant to severe operating conditions. They are flame retardant and unaffected by aviation fluids and humidity.</li> <li>• Radiation modification greatly improves the abrasion resistance, improves the high temperature performance of the wire.</li> </ul>

## Specifications

Operating temperature range:	
- BC(Э0) 35-1298 .....	–65°C to +155°C
- BC(Э0) 36-1398, BC(Э0) 36-1498 .....	–65°C to +200°C
Electrical insulation resistance, calculated for length of 1 m and temperature of 20°C, MΩ, min.: .....	1x10 <sup>6</sup>
Minimum operating time of wires at maximum operating temperature, hour.....	10000
- at a value of elevated ambient temperature, during operation +100°C, hour .....	33000
- at a value of elevated ambient temperature, during operation +85°C, hour .....	100000
Operating AC voltage, V .....	600
Operating DC voltage, V .....	850
Wire service life .....	25 years

## Design parameters

Number of conductors	Nominal cross section of conductor, mm <sup>2</sup>	Number of wires in a conductor and nominal diameter, pcs. x mm	Wire outer diameter, mm								
			BC 35-1298 BC 36-1398 BC 36-1498		BC0 35-1298 BC0 36-1398 BC0 36-1498		BCЭ 35-1298 BCЭ 36-1398 BCЭ 36-1498		BCЭ0 35-1298 BCЭ0 36-1398 BCЭ0 36-1498		
			Min.	Nom.	Max.	Nom.	Max.	Nom.	Max.	Nom.	Max.
1	0.20	19x0.12	0.96	1.00	1.12	–	–	1.24	1.38	1.66	1.76
	0.35	19x0.15	1.11	1.15	1.25	–	–	1.39	1.53	1.81	1.91
	0.50	19x0.18	1.26	1.30	1.42	–	–	1.54	1.68	1.96	2.06
	0.60	19x0.20	1.36	1.40	1.52	–	–	1.64	1.78	2.06	2.16
	0.75	19x0.23	1.49	1.55	1.64	–	–	1.79	1.90	2.18	2.28
	1.0	19x0.25	1.61	1.65	1.77	–	–	1.89	2.03	2.31	2.41
	1.2	19x0.28	1.76	1.80	1.92	–	–	2.04	2.18	2.46	2.56
	1.5	19x0.32	1.96	2.00	2.12	–	–	2.24	2.38	2.66	2.76
	2.0	19x0.36	2.16	2.20	2.37	–	–	2.44	2.63	2.91	3.05
	2.5	19x0.42	2.66	2.73	2.93	–	–	2.97	3.18	3.38	3.52
	3.0	37x0.32	2.80	2.84	3.04	–	–	3.10	3.30	3.50	3.80
	4.0	49x0.32	3.17	3.23	3.68	–	–	–	–	–	–
5.0	37x0.40	3.36	3.40	3.60	–	–	–	–	–	–	
6.0	49x0.39	3.79	3.81	4.31	–	–	–	–	–	–	

## Design parameters

Number of insulated conductors	Nominal cross section of conductors, mm <sup>2</sup>	Number of wires in a conductor and nominal diameter, pcs. x mm	Wire outer diameter, mm								
			BC 35-1298 BC 36-1398 BC 36-1498			BCO 35-1298 BCO 36-1398 BCO 36-1498		BCЭ 35-1298 BCЭ 36-1398 BCЭ 36-1498		BCЭO 35-1298 BCЭO 36-1398 BCЭO 36-1498	
			Min.	Nom.	Max.	Nom.	Max.	Nom.	Max.	Nom.	Max.
2	0.20	19x0.12	1.92	2.00	2.24	2.40	2.74	2.26	2.26	2.66	3.04
	0.35	19x0.15	2.22	2.30	2.54	2.70	3.04	2.56	2.56	2.96	3.34
	0.50	19x0.18	2.52	2.60	2.84	3.00	3.38	2.86	2.86	3.26	3.64
	0.60	19x0.20	2.72	2.80	3.04	3.20	3.58	3.06	3.06	3.46	3.84
	0.75	19x0.23	3.02	3.10	3.28	3.44	3.82	3.30	3.30	3.70	4.08
3	0.20	19x0.12	2.06	2.15	2.41	2.55	2.91	2.41	2.41	2.81	3.20
	0.35	19x0.15	2.39	2.47	2.69	2.87	3.19	2.73	2.73	3.13	3.53
	0.50	19x0.18	2.71	2.80	3.05	3.20	3.55	3.05	3.05	3.45	3.85
	0.60	19x0.20	2.92	3.01	3.27	3.41	3.77	3.27	3.27	3.67	4.06
	0.75	19x0.23	3.20	3.33	3.53	3.73	4.03	3.52	3.52	3.97	4.32

Number of conductors	Nominal cross section of conductor, mm <sup>2</sup>	Estimated weight of 1 km of wire, kg			
		BC 35-1298 BC 36-1398 BC 36-1498	BCO 35-1298 BCO 36-1398 BCO 36-1498	BCЭ 35-1298 BCЭ 36-1398 BCЭ 36-1498	BCЭO 35-1298 BCЭO 36-1398 BCЭO 36-1498
1	0.20	2.93	-	4.62	6.33
	0.35	4.25	-	6.26	8.15
	0.50	5.75	-	7.99	10.05
	0.60	6.89	-	9.16	11.35
	0.75	8.38	-	11.02	13.34
	1.0	10.21	-	12.99	15.47
	1.2	12.54	-	15.72	18.37
	1.5	16.12	-	19.43	22.32
	2.0	21.15	-	24.79	28.32
	2.5	29.90	-	33.09	37.24
2	3.0	31.04	-	36.36	40.24
	4.0	41.74	-	-	-
	5.0	47.00	-	-	-
	6.0	60.21	-	-	-
	0.20	5.89	8.48	9.25	12.46
	0.35	8.48	11.42	12.41	16.00
	0.50	11.56	15.21	15.76	19.75
	0.60	13.86	17.76	18.54	22.78
	0.75	16.86	21.08	21.73	26.29
	3	0.20	8.85	11.62	12.37
0.35		12.73	15.88	16.73	20.18
0.50		17.35	20.88	21.84	25.67
0.60		20.79	24.57	25.64	29.72
0.75		25.31	29.40	30.62	35.00

**Foreign analogues**

Wire grade	Number of conductors	Nominal cross section of conductor, mm <sup>2</sup>	Foreign analogue
BC 35-1298	1	0.20	55PC0211-24
		0.35	55PC0211-22
		0.60	55PC0211-20
		1.0	55PC0211-18
		1.2	55PC0211-16
	2	2.0	55PC0211-14
		3.0	55PC0211-12
		5.0	55PC0211-10
		0.20	55PC0221-24
		0.35	55PC0221-22
3	0.60	55PC0221-20	
	0.20	55PC0231-24	
	0.35	55PC0231-22	
BCO 35-1298	2	0.60	55PC0231-20
		0.20	55PC4221-24
		0.35	55PC4221-22
	3	0.60	55PC4221-20
		0.20	55PC4231-24
		0.35	55PC4231-22
		0.60	55PC4231-20

Wire grade	Foreign analogue	Wire grade	Foreign analogue
BC 36-1398 0,20	55PC0212-24	BC 36-1498 0,20	55PC0213-24
BC 36-1398 0,35	55PC0212-22	BC 36-1498 0,35	55PC0213-22
BC 36-1398 0,60	55PC0212-20	BC 36-1498 0,60	55PC0213-20
BC 36-13981,0	55PC0212-18	BC 36-1498 1,0	55PC0213-18
BC 36-13981,2	55PC0212-16	BC 36-1498 1,2	55PC0213-16
BC 36-1398 2,0	55PC0212-14	BC 36-1498 2,0	55PC0213-14
BC 36-1398 3,0	55PC0212-12	BC 36-1498 3,0	55PC0213-12
BC 36-1398 5,0	55PC0212-10	BC 36-1498 5,0	55PC0213-10
BC 36-1398 2x0,20	55PC0222-24	BC 36-1498 2x0,20	55PC0223-24
BC 36-1398 2x0,35	55PC0222-22	BC 36-1498 2x0,35	55PC0223-22
BC 36-1398 2x0,60	55PC0222-20	BC 36-1498 2x0,60	55PC0223-20
BC 36-1398 3x0,20	55PC0232-24	BC 36-1498 3x0,20	55PC0233-24
BC 36-1398 3x0,35	55PC0232-22	BC 36-1498 3x0,35	55PC0233-22
BC 36-1398 3x0,60	55PC0232-20	BC 36-1498 3x0,60	55PC0233-20
BCO 36-1398 2x0,20	55PC4222-24	BCO 36-1498 2x0,20	55PC4223-24
BCO 36-1398 2x0,35	55PC4222-22	BCO 36-1498 2x0,35	55PC4223-22
BCO 36-1398 2x0,60	55PC4222-20	BCO 36-1498 2x0,60	55PC4223-20
BCO 36-1398 3x0,20	55PC4232-24	BCO 36-1498 3x0,20	55PC4233-24
BCO 36-1398 3x0,35	55PC4232-22	BCO 36-1498 3x0,35	55PC4233-22
BCO 36-1398 3x0,60	55PC4232-20	BCO 36-1498 3x0,60	55PC4233-20
BCЭ 36-1398 0,20	55PC3212-24	BCЭ 36-1498 0,20	55PC3213-24
BCЭ 36-1398 0,35	55PC3212-22	BCЭ 36-1498 0,35	55PC3213-22
BCЭ 36-1398 0,60	55PC3212-20	BCЭ 36-1498 0,60	55PC3213-20
BCЭ 36-13981,0	55PC3212-18	BCЭ 36-1498 1,0	55PC3213-18
BCЭ 36-13981,2	55PC3212-16	BCЭ 36-14981,2	55PC3213-16
BCЭ 36-1398 2,0	55PC3212-14	BCЭ 36-1498 2,0	55PC3213-14
BCЭ 36-1398 3,0	55PC3212-12	BCЭ 36-1498 3,0	55PC3213-12
BCЭ 36-1398 5,0	55PC3212-10	BCЭ 36-1498 5,0	55PC3213-10
BCЭ 36-1398 2x0,20	55PC3222-24	BCЭ 36-1498 2x0,20	55PC3223-24
BCЭ 36-1398 2x0,35	55PC3222-22	BCЭ 36-1498 2x0,35	55PC3223-22
BCЭ 36-1398 2x0,60	55PC3222-20	BCЭ 36-1498 2x0,60	55PC3223-20
BCЭ 36-1398 3x0,20	55PC3232-24	BCЭ 36-1498 3x0,20	55PC3233-24
BCЭ 36-1398 3x0,35	55PC3232-22	BCЭ 36-1498 3x0,35	55PC3233-22
BCЭ 36-1398 3x0,60	55PC3232-20	BCЭ 36-1498 3x0,60	55PC3233-20
BCЭO 36-1398 0,20	55PC1212-24	BCЭO 36-1498 0,20	55PC1213-24
BCЭO 36-1398 0,35	55PC1212-22	BCЭO 36-1498 0,35	55PC1213-22
BCЭO 36-1398 0,60	55PC1212-20	BCЭO 36-1498 0,60	55PC1213-20
BCЭO 36-13981,0	55PC1212-18	BCЭO 36-1498 1,0	55PC1213-18
BCЭO 36-13981,2	55PC1212-16	BCЭO 36-1498 1,2	55PC1213-16
BCЭO 36-1398 2,0	55PC1212-14	BCЭO 36-1498 2,0	55PC1213-14
BCЭO 36-1398 3,0	55PC1212-12	BCЭO 36-1498 3,0	55PC1213-12
BCЭO 36-1398 2x0,20	55PC1222-24	BCЭO 36-1498 2x0,20	55PC1223-24
BCЭO 36-1398 2x0,35	55PC1222-22	BCЭO 36-1498 2x0,35	55PC1223-22
BCЭO 36-1398 2x0,60	55PC1222-20	BCЭO 36-1498 2x0,60	55PC1223-20
BCЭO 36-1398 3x0,20	55PC1232-24	BCЭO 36-1498 3x0,20	55PC1233-24
BCЭO 36-1398 3x0,35	55PC1232-22	BCЭO 36-1498 3x0,35	55PC1233-22
BCЭO 36-1398 3x0,60	55PC1232-20	BCЭO 36-1498 3x0,60	55PC1233-20

# Onboard wire with two-layer polyimide-fluoroplastic insulation

БП-37-1499, БПЭО-37-1499, БП-36-1399 (analogues of wires as per EN 2267, EN 2714)



## БП(ЭО) 37-1499, БП 36-1399

Regulatory documentation	ПБМИ.358300.002ТУ
National product classification code	35 8300
Application	<ul style="list-style-type: none"> <li>The wires are designed for fixed installation of the onboard electrical network of aviation equipment and operation at voltage up to 600 VAC, frequency up to 6000 kHz or at up to 1000 VDC.</li> </ul>

## Specifications

Operating temperature range:	
- БП(ЭО)-37-1499	-65°C to +260°C
- БП-36-1399	-65°C to +200°C
Electrical insulation resistance, calculated for length of 1 and temperature of 20°C, MΩ. min.:	1.5x10 <sup>6</sup>
Minimum operating time of wires at maximum operating temperature, hour	10000
- at max. value of elevated ambient temperature, during operation +200°C	
for wires БП-37-1499 and БП(ЭО)-37-1499, hour	100000
- at a value of elevated ambient temperature, during operation +125°C for wires БП-37-1499, БП-36-1399 and БП(ЭО)-37-1499, hour	130000
- at a value of elevated ambient temperature, during operation +85°C for wires БП-37-1499, БП-36-1399 and БП(ЭО)-37-1499, hour	150000
Operating AC voltage, V	600
Operating DC voltage, V	1000
Wire service life	25 years

## Design

- 1 Inner conductor** is of twisted nickel-plated copper wires for БП(ЭО)-37-1499, silver-plated copper wires for БП-36-1399;
- 2 Two-layer PTFE polyimide wrapped insulation;**
- 3 Shield** is of nickel-plated copper wires for БП(ЭО)-37-1499;
- 4 Sheath** is polyimide-fluoroplastic for БП(ЭО)-37-1499.

## Design parameters

Number of insulated conductors	Nominal cross section of conductors, mm <sup>2</sup>	Number of wires in a conductor and nominal diameter, pcs. x mm	Wire outer diameter, mm		
			unshielded w/o sheath		shielded in sheath
			min.	max.	max.
1	0.20	19x0.12	0.85	0.96	1.45
	0.35	19x0.15	1.00	1.10	1.60
	0.50	19x0.18	1.15	1.24	1.80
	0.60	19x0.20	1.25	1.34	1.84
	0.75	19x0.23	1.35	1.45	2.00
	1.00	19x0.25	1.46	1.61	2.08
	1.20	19x0.28	1.69	1.90	2.43
	1.50	19x0.32	1.88	2.03	2.68
	2.00	19x0.36	2.04	2.24	2.74
	2.50	19x0.42	2.35	2.50	3.10
2	3.00	37x0.32	2.51	2.70	3.49
	0.20	19x0.12	-	1.92	2.40
	0.35	19x0.15	-	2.20	2.70
	0.50	19x0.18	-	2.48	3.18
	0.60	19x0.20	-	2.68	3.22
	0.75	19x0.23	-	2.90	3.65
	1.00	19x0.25	-	3.22	3.71
	1.50	19x0.32	-	4.06	4.90
3	2.50	19x0.42	-	5.00	5.80
	0.20	19x0.12	-	2.06	2.59
	0.35	19x0.15	-	2.37	2.91
	0.50	19x0.18	-	2.67	3.38
	0.60	19x0.20	-	2.88	3.48
	0.75	19x0.23	-	3.12	3.90

# Onboard wires with polyimide-fluoroplastic insulation

## БК-37-1499, БКЭО-37-1499

### БК-37-1499, БКЭО-37-1499

Regulatory documentation	ПБМИ.358300.002ТУ
National product classification code	35 8300
Description	Onboard wires with polyimide-fluoroplastic insulation БК-37-1499, БКЭО-37-1499
Application	<ul style="list-style-type: none"> <li>Designed for fixed installation of the onboard electrical network of aviation equipment and operation at voltage up to 600 VAC, frequency up to 6000 kHz or at up to 1000 VDC.</li> </ul>
Operating temperature range	Minus 65°C to 260°C

## Specifications

Electrical resistance of cable insulation, calculated per 1 m of length, MΩ, min.:	1.5x10 <sup>6</sup>
Electrical resistance of wire insulation at 95°C, calculated per 1 m of length, MΩ, min.:	15x10 <sup>3</sup>
Wire insulation is resistant to abrasion by a needle with a diameter of 0.60 mm with a pressing force of 5.9 N, min.:	3000 double strokes
Wire service life, years	25
Gamma-percentile operating time to failure	5000 h at 260°C
	7000 h at 200°C
	150000 h at 85°C

## Design parameters

Number of insulated conductors	Nominal cross section of conductors, mm <sup>2</sup>	Number of wires in a conductor and nominal diameter, PCS. X MM	Wire outer diameter, mm			Estimated weight of 1 km of wire, kg	
			БК-37-1499		БКЭО-37-1499	БК-37-1499	БКЭО-37-1499
			min.	max.	max.		
1	0.20	19x0.12	0.85	0.92	1.40	2.60	5.02
	0.35	19x0.15	0.90	1.05	1.52	3.70	6.46
	0.50	19x0.18	1.05	1.20	1.72	4.93	8.50
	0.60	19x0.20	1.15	1.29	1.82	6.16	9.68
2	0.20	19x0.12	–	1.84	2.24	5.23	8.88
	0.35	19x0.15	–	2.14	2.54	7.44	11.93
	0.50	19x0.18	–	2.40	2.84	9.92	17.65
	0.60	19x0.20	–	2.58	3.08	12.39	19.64
3	0.20	19x0.12	–	1.99	2.45	7.85	11.85
	0.35	19x0.15	–	2.31	2.85	11.18	17.32
	0.50	19x0.18	–	2.59	3.12	14.88	25.19
	0.60	19x0.20	–	2.78	3.33	18.59	27.99



## Design

- 1 Inner conductor** is of nickel-plated copper wires
- 2 Two-layer insulation** is of polyimide varnish and fluoroplastic film
- 3 Shield** is of nickel-plated copper wires
- 4 Sheath** is of polyimide-fluoroplastic film and fluoroplastic film

# Onboard irradiated wire with two-layer insulation

БПДО, БПДОЭ

	БПДО	БПДОЭ
Regulatory documentation	TU 16-505.941-76	
National product classification code	35 8311 6200	35 8313 6200
Application	<ul style="list-style-type: none"> <li>The wires are designed for fixed installation of the onboard electrical network of aviation equipment and operation at voltage up to 600 VAC, frequency up to 2000 Hz or 850 VDC.</li> </ul>	
Advantages	<ul style="list-style-type: none"> <li>The wire is resistant to puncturing, bending, abrasion, sinusoidal vibration, mechanical shock, acoustic noise, linear acceleration, low and high pressure, temperature changes, high humidity, static and dynamic dust, salt fog, solar and ultraviolet radiation, condensed precipitation (frost, dew), mold fungi, and also has high chemical resistance to aviation fluids (oil, gasoline, kerosene, hydraulic fluid).</li> </ul>	



## Specifications

Climatic version	V
Wire operating temperature	-60°C to +105°C
Maximum elevated temperature (single exposure for 5 minutes)	+300°C
Operating AC voltage with frequency up to 2000 Hz, V	600
Operating DC voltage, V	850
Test AC voltage with frequency of 50 Hz, 1 min., V	2200
Electrical insulation resistance per 1 m of length, MΩ, min.:	
- upon acceptance and delivery	1x10 <sup>4</sup>
- during operation and storage	1x10 <sup>3</sup>
Construction length, min., m	25
Minimum service life	15 years

## Design parameters

Conductor cross section, mm <sup>2</sup>	Number and diameter of wires in the conductor, pcs. x mm	Nominal outer diameter, mm		Estimated weight, kg/km		Direct current electrical resistance of 1 km of conductor at 20°C, Ω, max.
		БПДО	БПДОЭ	БПДО	БПДОЭ	
0.20	7x0.20	1.5	2.0	3.6	8.9	91.70
0.35	7x0.26	1.7	2.2	5.4	12.1	58.70
0.50	7x0.30	1.9	2.4	7.0	13.5	41.70
0.75	7x0.37	2.1	2.6	9.7	17.1	25.50
1.0	19x0.26	2.4	3.0	12.8	23.2	20.40
1.5	19x0.32	2.7	3.3	18.2	29.3	13.60
2.5	19x0.42	3.5	4.1	30.6	45.4	8.20
4.0	49x0.32	4.3	4.9	45.4	62.5	4.99
6.0	49x0.39	4.9	5.5	64.6	85.0	3.35

## Design

- Conductor** is of stranded copper tin-plated wires;
- Insulation** is of radiation grafted polyethylene;
- Protective layer** is of radiation grafted PTFE 2M;
- Shield for БПДОЭ** is in the form of a braid of tinned copper wires with a density of at least 80%.



# Connecting thermal resistant wires with PTFE insulation

## МГТФ, МГТФy, МГТФЭ



### Design

- 1 **Conductor** is of twisted copper wires;
- 2 **Insulation** is wrapping with PTFE-4 film;
- 3 **Shield** is performed as braid of tinned copper wires.

МГТФ, МГТФy, МГТФЭ	
Regulatory documentation	TU 16-505.185-71
National product classification code	35 8332
Application	• For intra- and inter-block mounting of various radio-electronic and electrical equipment and operation at a rated voltage of 250 VAC, frequency up to 5 kHz or 350 VDC.

### Specifications

Operating temperature range .....	-60°C to +220°C
Test AC voltage with frequency of 50 Hz for 1 minute, V:	
- for МГТФy wires .....	750
- for МГТФ wires .....	1500
- for МГТФЭ wires .....	1000
Electrical insulation resistance of 1 m of length, MΩ, min.:	
- under normal climatic conditions .....	1x10 <sup>5</sup>
- at temperature of 220°C .....	1x10 <sup>4</sup>
- at a relative humidity of 98% and temperature of 25°C without moisture condensation .....	1x10 <sup>2</sup>

\*Note: Wires МГТФ, МГТФЭ, МГТФy not specified in the specifications are manufactured according to the technical requirements of ToR of the customer.

### Design parameters

model / number of conductors / cross section (mm)	ToR, TU
МГТФ 1x0,50	ToR No. 21/04, TU 16.505.185-71
МГТФ 1x0,75	ToR No. 26/07, TU 16.505.185-71
МГТФ 1x1,0	ToR No. 01/05, TU 16.505.185-71
МГТФ 2x0,07	ToR No. 72/05, TU 16.505.185-71
МГТФ 2x0,12	ToR No. 73/05, TU 16.505.185-71
МГТФy 0,35	ToR No. 27/03, TU 16.505.185-71
МГТФy 1,0	ToR No. 32/03, TU 16.505.185-71
МГТФЭ 1x0,20	ToR No. 67/04, TU 16.505.185-71
МГТФЭ 1x0,35	ToR No. 66/05, TU 16.505.185-71
МГТФЭ 2x0,20	ToR No. 68/04, TU 16.505.185-71
МГТФЭ 2x0,35	ToR No. 35/02, TU 16.505.185-71
МГТФЭ 3x0,20	ToR No. 15/06, TU 16.505.185-71
МГТФЭ 3x0,35	ToR No. 35/02, TU 16.505.185-71
МГТФЭ 4x0,07	ToR No. 21/06, TU 16.505.185-71
МГТФЭ 4x0,12	ToR No. 99/04, TU 16.505.185-71
МГТФЭ 4x0,35	ToR No. 40/03, TU 16.505.185-71

## Design parameters

Number and design cross section of conductor, mm <sup>2</sup>	Conductor flexibility class	Number and diameter of wires in the conductor, pcs. x mm	Nominal outer diameter, mm			Estimated weight, kg/km			Direct current electrical resistance of 1 km of conductor at 20°C, Ω, max.		
			МГТФ	МГТФЭ	МГТФy	МГТФ	МГТФЭ	МГТФy	МГТФ	МГТФЭ	МГТФy
1x0.03	5	7x0.08	0.56	-	-	0.63	-	-	569.45	-	-
1x0.05	5	10x0.08	0.62	-	-	0.86	-	-	398.69	-	-
1x0.07	5	14x0.08	0.75	1.3	-	1.22	3.96	-	271.0	271.0	-
1x0.10	6	21x0.08	0.85	1.4	-	1.73	5.54	-	180.0	180.0	-
1x0.12	6	24x0.08	0.87	1.6	-	1.95	6.35	-	174.4	174.4	-
1x0.14	6	30x0.08	0.90	1.6	-	2.26	6.10	-	130.0	130.0	-
1x0.20	5	19x0.12	1.04	1.1	-	2.96	5.40	-	100.0	100.0	-
1x0.35	5	19x0.15	1.19	1.73	0.90	4.25	7.58	3.66	60.0	60.0	60.0
1x0.50	5	19x0.18	1.3	-	-	6.15	-	-	39.0	-	-
1x0.75	6	37x0.16	1.8	-	-	6.69	-	-	27.0	-	-
1x1.0	4	19x0.25	1.65	-	1.46	10.75	-	9.88	19.8	-	19.8
2x0.07	5	14x0.08	1.7	2.1	-	3.40	8.64	-	280.0	280.0	-
2x0.12	6	24x0.08	2.0	2.5	-	4.89	13.5	-	184.0	184.0	-
2x0.14	6	30x0.08	-	2.5	-	-	12.5	-	-	135.0	-
2x0.20	5	19x0.12	-	2.7	-	-	11.17	-	-	105.0	-
2x0.35	5	19x0.15	-	3.0	-	-	15.5	-	-	62.0	-
3x0.07	5	14x0.08	-	2.5	-	-	10.0	-	-	280.0	-
3x0.12	6	24x0.08	-	3.0	-	-	16.0	-	-	184.0	-
3x0.14	6	30x0.08	-	3.0	-	-	15.0	-	-	135.0	-
3x0.20	5	19x0.12	-	3.2	-	-	15.39	-	-	105.0	-
3x0.35	5	19x0.15	-	3.2	-	-	20.4	-	-	62.0	-
4x0.07	5	14x0.08	-	3.2	-	-	10.47	-	-	280	-
4x0.12	5	24x0.08	-	2.9	-	-	15.25	-	-	184	-
4x0.35	5	19x0.15	-	4.0	-	-	26.93	-	-	62	-

# Connecting thermal resistant wires with PTFE insulation

## МК 26-13 and МКЭ 26-13



	МК 26-13	МКЭ 26-13
Regulatory documentation	ПБМИ.358200.004ТУ	
National product classification code	35 8214	
Application	For intra- and inter-block mounting of various radio-electronic and electrical equipment and operation at a rated voltage of 250 VAC, frequency up to 5 kHz or 350 VDC.	
Advantage	<ul style="list-style-type: none"> <li>• МК 26-13 and МКЭ 26-13 wire with an outer insulation layer of sintered fluoroplastic film have increased moisture resistance, mechanical strength of insulation and improved electrical characteristics compared to wires МГТФ, МГТФЭ.</li> <li>• Unlike traditional МГТФ, МГТФЭ, МК 26-13, МКЭ 26-13 wires can be produced in various colors.</li> </ul>	

### Specifications:

Operating temperature range:

- МК 26-13 ..... -60°C to +200°C
- МКЭ 26-13 ..... -60°C to +200°C

Electrical insulation resistance per 1 m, MΩ, min.:

- under normal climatic conditions ..... 1x10<sup>6</sup>
- at temperature of 200°C ..... 1x10<sup>5</sup>
- at a relative humidity of 98% and temperature of 35°C without moisture condensation ..... 1x10<sup>4</sup>

Test voltage with frequency of 50 Hz for 1 minute, V ..... 2000

### Design

- 1 Conductor** is of twisted copper wires
- 2 Insulation** is wrapping with PTFE-4 and PTFE-4D film; insulation color is agreed with the consumer and can be: white or natural, yellow, orange, red, blue, brown, black
- 3 Shield** is performed as braid of tinned copper wires

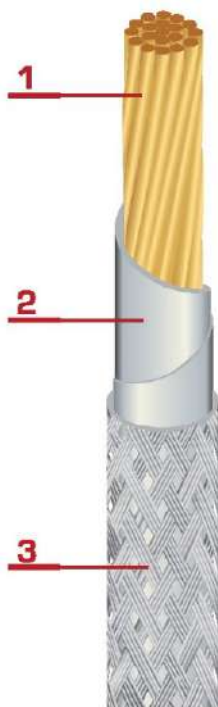
Conductor cross section, mm <sup>2</sup>	Electrical resistance of the cores to the conductor per 1 km of length, Ω, min.	
	single-core	multi-core
0.05	398.7	417.8
0.07	271.0	280.0
0.08	260.0	268.9
0.12	174.0	180.0
0.2	110.0	114.8
0.35	60.0	62.1
0.5	41.0	42.4

## Design parameters

Number of conductors	Nominal cross section of conductor, mm <sup>2</sup>	Number and nominal diameter of wires, pcs. x mm	МК 26-13		МКЭ 26-13	
			Maximum outer diameter, mm	Estimated weight of 1 km of wire, kg	Maximum outer diameter, mm	Estimated weight of 1 km of wire, kg
1	0.05	10x0.08	0.62	0.80	1.12	2.72
	0.07	14x0.08	0.75	1.14	1.25	3.27
	0.08	16x0.08	0.80	1.25	1.30	3.44
	0.12	24x0.08	0.87	1.82	1.37	4.35
	0.20	19x0.12	1.04	2.80	1.54	5.61
	0.35	19x0.15	1.19	4.04	1.69	7.21
2	0.50	19x0.18	1.40	5.92	1.90	9.64
	0.05	10x0.08	1.24	1.63	1.74	4.92
	0.07	14x0.08	1.50	2.30	2.00	6.03
	0.08	16x0.08	1.60	2.53	2.10	6.37
	0.12	24x0.08	1.74	3.69	2.24	9.24
	0.20	19x0.12	2.08	5.66	2.58	11.90
3	0.35	19x0.15	2.38	8.18	2.88	15.28
	0.50	19x0.18	2.80	11.99	3.30	20.40
	0.05	10x0.08	1.33	2.44	1.83	5.94
	0.07	14x0.08	1.61	3.46	2.11	7.43
	0.08	16x0.08	1.72	3.80	2.22	7.89
	0.12	24x0.08	1.87	5.54	2.37	11.46
4	0.20	19x0.12	2.24	8.50	2.74	15.16
	0.35	19x0.15	2.56	12.30	3.06	19.87
	0.50	19x0.18	3.01	18.01	3.51	27.00
	0.05	10x0.08	1.49	3.27	1.99	7.12
	0.07	14x0.08	1.81	4.62	2.31	9.01
	0.08	16x0.08	1.93	5.08	2.43	9.60
4	0.12	24x0.08	2.10	7.40	2.60	13.94
	0.20	19x0.12	2.51	11.37	3.01	18.73
	0.35	19x0.15	2.87	16.44	3.37	24.83
4	0.50	19x0.18	3.38	24.08	3.88	34.06

## Connecting wires

МП 35-110, МПЭ 35-110



	МП 35-110	МПЭ 35-110
Regulatory documentation	TU 16.K05.-018-2002	
National product classification code	35 8330	
Application	<ul style="list-style-type: none"> <li>The wires are designed for mobile and fixed installation of intra-block, inter-block, intra-device and inter-device connections in radio-electronic and electrical devices for rated AC voltage of 500 V with a frequency of 10 kHz and a DC voltage of 700 V.</li> </ul>	

### Specifications

Operating temperature range: .....	-60°C to +155°C
Test DC voltage for 1 min., V.....	3000
Test AC voltage with frequency of 50 Hz for 1 min., V:	
- under normal climatic conditions.....	2000
- after external influencing factors .....	1500
Electrical insulation resistance of 1 m of length, MΩ, min.: .....	
- under normal climatic conditions.....	1x10 <sup>5</sup>
- at temperature of 155°C.....	1x10 <sup>4</sup>
- at temperature of 35°C and relative humidity of 98%.....	1x10 <sup>2</sup>

### Design

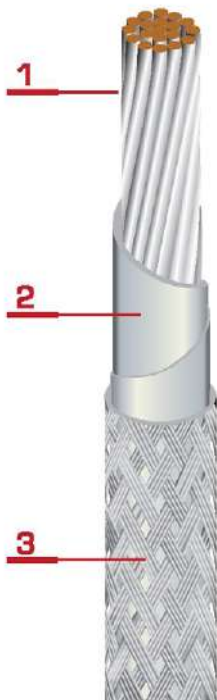
- 1 Conductor** is of twisted tinned copper wires;
- 2 Insulation** is wrapping with PTFE-4 film;
- 3 Shield** is performed as braid of tinned copper wires.

## Design parameters

Number and design cross section of conductor, mm <sup>2</sup>	МП 35-110		МПЭ 35-110		Direct current electrical resistance of 1 km of conductor at 20°C, Ω, max.
	Maximum outer diameter, mm	Estimated weight, kg/km	Maximum outer diameter, mm	Estimated weight, kg/km	
0.08	1.0	1.9	1.6	2.3	268.6
0.12	1.1	2.4	1.7	4.9	179
0.20	1.2	3.5	1.8	6.9	113.4
0.35	1.5	5.3	2.1	9.5	60.0
0.50	1.7	7.2	2.3	12.3	40.1
0.75	1.9	10.3	2.5	15.6	25.9
1.0	2.2	13.0	2.8	21.2	20.4
1.5	2.6	19.2	3.2	28.0	13.6
2x0.08	2.0	3.8	2.6	8.3	277.7
2x0.12	2.2	5.0	2.8	10.1	185.1
2x0.20	2.4	7.1	3.0	12.6	117.3
2x0.35	3.0	10.8	3.6	18.6	62.1
2x0.50	3.4	14.6	4.0	24.2	41.5
2x0.75	3.8	21.1	4.4	31.4	26.8
2x1.0	4.4	26.5	5.0	38.6	21.1
2x1.5	5.2	39.5	5.8	56.7	14.1
3x0.08	2.2	6	2.8	11	277.7
3x0.12	2.4	8	3.0	13	185.1
3x0.20	2.6	11	3.3	17	117.3
3x0.35	3.3	16	3.9	25	62.1
3x0.50	3.7	22	4.3	32	41.5
3x0.75	4.1	32	4.9	44	26.8
3x1.0	4.8	40	5.4	53	21.1
3x1.5	5.6	58	6.3	78	14.1
4x0.08	2.7	8	3.3	13	277.7
4x0.12	3.0	10	3.6	16	185.1
4x0.20	3.2	15	3.8	21	117.3
4x0.35	4.0	22	4.6	31	62.1
4x0.50	4.5	30	5.2	40	41.5
4x0.75	5.1	43	5.7	55	26.8
4x1.0	5.9	54	6.5	68	21.1
4x1.5	6.9	79	7.6	99	14.1

# Connecting wires

## МП 37-12, МПЭ 37-12



### Design

- 1 **Conductor** is of twisted silver-plated copper wires;
- 2 **Insulation** is wrapping with PTFE-4 film;
- 3 **Shield** is performed as braid of tinned copper wires.

	МП 37-12	МПЭ 37-12
Regulatory documentation	TU 16-505.191-80	
National product classification code	35 8339	
Application	<ul style="list-style-type: none"> <li>The wires are designed for mobile and fixed installation of intra-block, inter-block, intra-device and inter-device connections in radio-electronic and electrical devices for rated AC voltage of 500 V with a frequency of 10 kHz and a DC voltage of 700 V.</li> </ul>	

### Specifications

Operating temperature range:	-60°C to +250°C
Test DC voltage for 1 min., V:	3000
Test AC voltage with frequency of 50 Hz for 1 min., V:	
- without external influencing factors	2000
- after external influencing factors	1500
Electrical insulation resistance of 1 m of length, MΩ, min.:	
- under normal climatic conditions	1x10 <sup>5</sup>
- at temperature of 250°C	1x10 <sup>4</sup>
- at temperature of 35°C and relative humidity of 98%	1x10 <sup>2</sup>
Pulse voltage, V	700
Operating AC voltage with frequency of 10 kHz, V	500
Operating DC voltage, V	700
Construction length, min., m	15

### Design parameters

Conductor cross section, mm <sup>2</sup>	Number and diameter of wires in the conductor, pcs. x mm	Maximum diameter, mm		Estimated weight, kg/km		Direct current electrical resistance of 1 km of conductor at 20°C, Ω, max.
		МП 37-12	МПЭ 37-12	МП 37-12	МПЭ 37-12	
0.08	10x0.10	1.0	1.6	1.8	4.2	260.0
0.12	24x0.08	1.1	1.7	2.4	5.0	175.0
0.2	19x0.12	1.2	1.8	3.6	7.3	99.0
0.35	19x0.15	1.5	2.1	5.8	9.9	55.0
0.50	19x0.18	1.7	2.3	7.6	12.9	41.0
0.75	19x0.23	1.9	2.5	11.1	16.6	26.0
1.00	19x0.26	2.2	2.8	14.3	20.1	19.0
1.50	19x0.32	2.6	3.2	19.6	27.1	13.0

# Connecting wires

МПО 33-11, МПОЭ 33-11

	МПО 33-11	МПОЭ 33-11
Regulatory documentation	TU 16-505.324-80	
National product classification code	35 8332	
Application	<ul style="list-style-type: none"> <li>For operation at rated AC voltage up to 500 V, frequency up to 10 kHz and DC voltage up to 700 V.</li> </ul>	
Advantages	<ul style="list-style-type: none"> <li>At least 4 colors are used for color marking of the sheath of wires МПО 33-11, МПОЭ 33-11 in the form of a braid in agreement with the manufacturer. If not specified in the order, the wires can be made in any color.</li> </ul>	

## Specifications

Operating temperature range:	-60°C to +120°C
Test voltage without external influencing factors, V:	
- for wire МПО 33-11	2000
- for wire МПОЭ 33-11	1500
Test voltage after external influencing factors, V:	
- for wire МПО 33-11	1500
- for wire МПОЭ 33-11	1000
Electrical insulation resistance of 1 m of length, MΩ, min.:	
- under normal climatic conditions	1x10 <sup>5</sup>
- at temperature of 120°C	1x10 <sup>4</sup>
- at temperature of 35°C and relative humidity of 98%	1x10 <sup>2</sup>
Pulse voltage, V	700
Construction length, min., m	25

## Design parameters

Conductor cross section, mm <sup>2</sup>	Number and diameter of wires in the conductor, pcs. x mm	МПО 33-11			МПОЭ 33-11			Direct current electrical resistance of 1 km of conductor at 20°C, Ω, max.
		Conductor flexibility class	Maximum diameter, mm	Estimated weight, kg/km	Conductor flexibility class	Maximum diameter, mm	Estimated weight, kg/km	
0.12	15x0.10	5	1.3	2.5	5	1.8	6.7	171.0
0.20	19x0.12	5	1.5	3.7	5	2.0	9.8	108.3
0.35	19x0.15	5	1.6	5.0	5	2.1	11.3	58.3
0.50	19x0.18	5	2.2	7.7	5	2.7	15.5	39.0
0.75	23x0.20	5	2.5	10.8	5	3.0	19.0	26.0
1.00	19x0.25	4	2.6	13.1	5	3.1	21.4	19.8
1.50	19x0.32	4	2.9	18.4	4	3.4	27.6	13.2



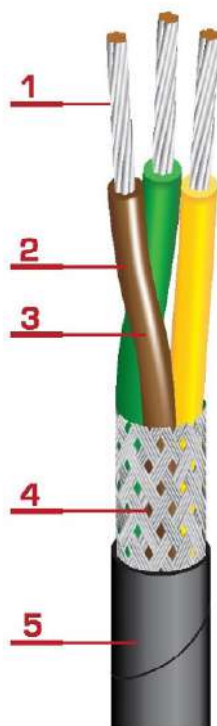
## Design

- 1 Conductor** is of twisted copper wires;
- 2 Insulation** is wrapping with PTFE-4 film;
- 3 Sheath** is performed in the form of a braid of polyester thread and coated with silicone varnish;
- 4 Shield** is performed as braid of tinned copper wires.



# Onboard connecting wires with sintered film insulation

MC(Э)(O) 16-13, MC(Э)(O) 16-33, MC(Э)(O) 26-13, MC(Э)(O) 26-33, MCЭO 16-13M



	MC(Э)(O) 16-13 MC(Э)(O) 16-33 MC(Э)(O) 26-13 MC(Э)(O) 26-33	MCЭO 16-13M
Regulatory documentation	TU 16-505.083-78	ToR No. 62/05, TU 16.505.083-78
National product classification code	35 8339	
Application	• For operation at rated AC voltage up to 100, 250 V, frequency up to 10 kHz or DC voltage up to 150, 350 V.	

## Specifications

Operating temperature range:	-60°C to +200°C
Electrical resistance of cable insulation, calculated per 1 m of length, MΩ, min.:	
- under normal climatic conditions	2x10 <sup>6</sup>
- at temperature of 200°C	1x10 <sup>5</sup>
- at a relative humidity of 98% and temperature up to 35°C	1x10 <sup>4</sup>
Minimum service life	20 years

## Design

- Conductor** —
  - normal strength — of silver-plated copper wires MCp or bimetallic wires BMC (for wires MC 16-13, MCЭ 16-13, MCЭO 16-13, MC 26-13, MCЭO 26-13);
  - normal strength — of copper wires (for wires MCЭO 16-13M);
  - high-strength conductor — of silver-plated wires of the БрXLpK alloy (for wires MC 16-33, MCЭ 16-33, MCЭO 16-33, MC 26-33, MCЭ 26-33, MCЭO 26-33);
- Insulation** is of a PTFE 4D film in the form of a wrapping; the color of the insulation is agreed with the consumer and can be of seven colors: white (natural), yellow, orange, red, blue, green, black;
- Insulated conductors** — stranded wires are twisted;
- Shield** is in the form of braids of silver-plated copper wires (made of tinned copper wires for wires MCЭO 16-13M);
- Sheath** is in the form of wrapping with PTFE-4D films.

## Design parameters

Nominal cross section of conductor, mm <sup>2</sup>	Direct current electrical resistance of wire conductors per 1 km of length, Ω, max.			
	conductors of normal strength		high-strength conductors	
	single-core	multi-core	single-core	multi-core
0.03	567	—	660	—
0.05	360	—	416	—
0.08	244	252	284	294
0.12	155	160	180	186
0.20	85	88	100	103.4
0.35	51	52.8	60	62
0.50	39	40.4	—	—
0.75	26.8	27.8	—	—
1.00	20.5	21.2	—	—
1.50	13.3	13.8	—	—
2.50	7.7	8.1	—	—

Direct current electrical resistance of conductors per 1 km of length must be not more than: 95.6 Ω for wires MCЭO 16-13M 2x0.20 and 64 Ω for MCЭO 16-13M 2x0.35.

Operating voltage, V	Test voltage, V upon acceptance and delivery	
	without external influencing factors	after external influencing factors
100	1500	1000
250	2000	1000

## Design parameters

Number of conductors	Nominal cross section of conductor, mm <sup>2</sup>	Conductor flexibility class	Maximum outer diameter of wires, mm, grades						
			MC 16-13	MC 16-33	MCЭ 16-13	MCЭ 16-33	MCЭО 16-13м	MCЭО 16-13	MCЭО 16-33
1	0.03	5	0.60	0.60	–	–	–	–	–
	0.05	5	0.66	0.66	–	–	–	–	–
	0.08	5	0.72	0.72	1.14	1.14	–	–	–
	0.12	4	0.81	0.81	1.23	1.23	–	–	–
	0.20	4	0.96	0.96	1.38	1.38	–	–	–
	0.35	4	1.25	1.25	1.75	1.75	–	–	–
	0.50	5	1.37	–	1.87	–	–	–	–
2	0.08	5	–	–	2.00	2.00	–	2.50	2.50
	0.12	4	–	–	2.18	2.18	–	2.68	2.68
	0.20	4	–	–	2.48	2.48	2.98	2.98	2.98
	0.35	4	–	–	3.18	3.18	3.68	3.68	3.68
	0.50	5	–	–	3.42	–	–	3.92	–
3	0.08	5	–	–	2.11	2.11	–	2.61	2.61
	0.12	4	–	–	2.30	2.30	–	2.80	2.80
	0.20	4	–	–	2.74	2.74	–	3.24	3.24
	0.35	4	–	–	3.37	3.37	–	3.87	3.87
	0.50	5	–	–	3.63	–	–	4.13	–
			MC 26-13	MC 26-33	MCЭ 26-13	MCЭ 26-33	MCЭО 26-13м	MCЭО 26-13	MCЭО 26-33
1	0.08	5	0.96	0.96	1.38	1.38	–	1.80	1.80
	0.12	4	1.05	1.05	1.55	1.55	–	2.00	2.00
	0.20	4	1.20	1.20	1.70	1.70	–	2.10	2.10
	0.35	4	1.38	1.38	1.90	1.90	–	2.34	2.34
	0.50	5	1.60	–	2.20	–	–	2.60	–
	0.75	4	1.85	–	2.45	–	–	2.85	–
	1.00	4	2.00	–	2.50	–	–	3.00	–
	1.50	4	2.30	–	2.90	–	–	3.30	–
	2.50	4	2.90	–	3.40	–	–	–	–
2	0.12	4	–	–	2.70	2.70	–	3.20	3.20
	0.20	4	–	–	3.00	3.00	–	3.50	3.50
	0.35	4	–	–	3.36	3.36	–	3.86	3.86
	0.50	5	–	–	3.80	–	–	4.30	–
	0.75	4	–	–	4.30	–	–	4.80	–
	1.00	4	–	–	4.60	–	–	5.10	–
	1.50	4	–	–	5.20	–	–	5.70	–
3	0.12	4	–	–	2.90	2.90	–	3.36	3.36
	0.20	4	–	–	3.20	3.20	–	3.66	3.66
	0.35	4	–	–	3.60	3.60	–	4.10	4.10
	0.50	5	–	–	4.10	–	–	4.60	–
	0.75	4	–	–	4.60	–	–	5.10	–
	1.00	4	–	–	4.95	–	–	5.45	–
1.50	4	–	–	5.60	–	–	6.10	–	

## Design parameters

Number of conductors	Nominal cross section of conductor, mm <sup>2</sup>	Estimated weight, kg/km			
		MC 16-13	MC 16-33	MC 26-13	MC 26-33
1	0.03	0.776	0.766	–	–
	0.05	1.03	1.03	–	–
	0.08	1.32	1.32	1.79	1.79
	0.12	1.85	1.85	2.36	2.36
	0.20	2.91	2.91	3.54	3.54
	0.35	4.92	4.92	5.26	5.26
	0.50	6.18	–	6.95	–
	0.75	–	–	10.30	–
	1.0	–	–	12.60	–
	1.5	–	–	18.00	–
	2.5	–	–	29.30	–

Number of conductors	Nominal cross section of conductor, mm <sup>2</sup>	Estimated weight of 1 km of wire, kg									
		MCЭ 16-13	MCЭ 16-33	MCЭ 26-13	MCЭ 26-33	MCЭО 16-13М	MCЭО 16-13	MCЭО 16-33	MCЭО 26-13	MCЭО 26-33	
1	0.08	3.85	3.85	4.48	4.48	–	–	–	6.50	6.50	
	0.12	4.35	4.35	5.11	5.12	–	–	–	7.30	7.30	
	0.20	5.54	5.54	6.38	6.38	–	–	–	8.70	8.70	
	0.35	8.71	8.71	9.35	9.35	–	–	–	12.00	12.00	
	0.50	10.50	–	13.00	–	–	–	–	15.90	–	
	0.75	–	–	16.60	–	–	–	–	20.00	–	
	1.00	–	–	19.20	–	–	–	–	22.80	–	
	1.50	–	–	25.90	–	–	–	–	29.80	–	
	2.50	–	–	39.00	–	–	–	–	44.90	–	
2	0.08	7.13	7.13	–	–	–	10.40	10.40	–	–	
	0.12	8.26	8.26	11.50	11.50	–	11.90	11.90	15.10	15.10	
	0.20	12.00	12.00	15.30	15.30	15.40	16.10	16.10	19.30	19.30	
	0.35	18.80	18.80	19.10	19.10	23.40	24.10	24.10	23.60	23.60	
	0.50	21.70	–	23.80	–	–	–	–	30.20	–	
	0.75	–	–	32.60	–	–	–	–	39.80	–	
	1.00	–	–	37.60	–	–	–	–	45.40	–	
	1.50	–	–	50.80	–	–	–	–	59.60	–	
3	0.08	8.52	8.52	–	–	11.90	11.90	–	–	–	
	0.12	10.20	10.20	14.10	14.10	–	14.00	14.00	17.90	18.00	
	0.20	15.10	15.10	19.10	19.10	–	19.40	19.40	23.30	23.30	
	0.35	24.10	24.10	25.70	25.70	–	31.00	31.0	31.70	31.70	
	0.50	29.10	–	31.50	–	–	–	–	38.30	–	
	0.75	–	–	43.20	–	–	–	–	50.90	–	
	1.00	–	–	52.50	–	–	–	–	60.80	–	
1.50	–	–	70.10	–	–	–	–	79.40	–		

# Connecting wires with PTFE-4 MB insulation

## MC16-14, MC16-34

	MC 16-14	MC 16-34
Regulatory documentation	TU 16-505.813–80	
National product classification code	35 8335	
Application	<ul style="list-style-type: none"> <li>The wire is designed to operate at rated voltage up to 100 VAC, frequency up to 50 MHz, direct or pulsed voltage up to 150 V.</li> </ul>	

### Specifications

Operating temperature range:	–60°C to +200°C
Test voltage with frequency of 50 Hz, V:	
- without external influencing factors	1500
- after external influencing factors	500
Electrical resistance of cable insulation, calculated per 1 m of length, MΩ, min.:	
- under normal climatic conditions	1x10 <sup>5</sup>
- at temperature of 200°C	1x10 <sup>4</sup>
- at a relative humidity of 98% and temperature up to 35°C	1x10 <sup>4</sup>
Atmospheric reduced operating pressure up to, Pa	666

### Design parameters

Nominal cross section of conductor, mm <sup>2</sup>	Direct current electrical resistance of wire conductors per 1 km of length, Ω			
	MC 16-14		MC 16-34	
	single-core wires		multi-core wires	
0.05	–	416	–	435
0.08	244	284	255	296
0.12	155	180	162	188
0.20	85	100	89	105
0.35	51	–	–	–
0.50	39	–	–	–

Number of conductors	Nominal cross section of conductor, mm <sup>2</sup>	MC 16-14				MC 16-34			
		Conductor flexibility class	Maximum diameter, mm	Estimated weight, kg/km	Insulation thickness, mm	Conductor flexibility class	Maximum diameter, mm	Estimated weight, kg/km	Insulation thickness, mm
1	0.05	–	–	–	–	5	0.70	1.05	0.16
	0.08	4	0.76	1.34	0.16	5	0.76	1.34	0.16
	0.12	4	0.85	1.89	0.16	4	0.85	1.89	0.16
	0.20	4	1.00	2.95	0.16	4	1.00	2.95	0.16
	0.35	4	1.25	4.88	0.20	–	–	–	–
	0.50	5	1.37	6.15	0.20	–	–	–	–
2	0.05	–	–	–	–	5	1.40	2.17	0.16
	0.08	4	1.52	2.77	0.16	5	1.52	2.77	0.16
	0.12	4	1.70	3.90	0.16	4	1.70	3.90	0.16
	0.20	4	2.00	6.09	0.16	–	–	–	–
	0.35	4	2.50	10.10	0.20	–	–	–	–
	0.08+0.12	4	1.61	3.33	0.16	–	–	–	–
0.12+0.20	4	1.85	5.00	0.16	–	–	–	–	



### Design

- Conductor** —
  - normal strength of silver-plated copper wires (MC 16-14);
  - high-strength conductor — of silver-plated wires of the БрХЦрК alloy (MC 16-34);
- Insulation** is solid of PTFE-4MB; the color of the insulation is agreed with the consumer and can be of eight colors: natural, yellow, orange, red or pink, blue or light blue, green, brown, black. Insulated conductors are twisted in pairs.

# Connecting thermal resistant wires with insulation of radiation grafted polyethylene

## МПО, МПОЭ



### Design

- 1 **Conductor** — of twisted tinned copper wires;
- 2 **Insulation** is of radiation grafted polyethylene. Insulation colors: red, blue, black, brown, yellow, green, white (natural);
- 3 **Shield for МПОЭ** is performed in the form of a braid of copper tinned wires with a density of at least 70%, **overlapped with one, two or three twisted insulated conductors.**

	МПО	МПОЭ
Regulatory documentation	TU 16-505.339-79	
National product classification code	35 8325 6500	35 8328 6200
Application	<ul style="list-style-type: none"> <li>The wires are designed for fixed intra- and inter-device installation of electrical devices at rated voltage up to 380 VAC, frequency up to 2 kHz and up to 160 V, frequency up to 4 kHz or 550 VDC.</li> </ul>	
Advantages	<ul style="list-style-type: none"> <li>The wire is resistant to impact and vibration loads, linear acceleration, acoustic noise, low atmospheric pressure, high relative humidity, mold fungi, static and dynamic dust.</li> </ul>	

### Specifications

Climatic version .....	V
Operating temperature range: .....	-60°C to +100°C
Maximum elevated temperature for 5 minutes (the total duration is not more than 30 minutes for the entire service life) .....	+200°C
Operating AC voltage with frequency up to 2 MHz, V .....	380
Operating AC voltage with frequency up to 4 MHz, V .....	160
Operating DC voltage, V .....	550
AC test voltage for with frequency of 50 Hz, V: .....	1000
Electrical insulation resistance per 1 m of length, MΩ, min.:	
- upon acceptance and delivery .....	1x10 <sup>5</sup>
- during operation and storage .....	5x10 <sup>2</sup>
Construction length, min., m .....	50
Minimum service life .....	15 years

### Design parameters

Conductor cross section, mm <sup>2</sup>	МПО		МПОЭ		Direct current electrical resistance of 1 km of conductor at 20°C, Ω, max.
	Max. wire outer diameter, mm	Estimated weight, kg/km	Max. wire outer diameter, mm	Estimated weight, kg/km	
0.12	1.1	1.9	1.7	8.3	170.3
0.20	1.3	2.9	1.9	9.3	91.7
0.35	1.6	4.9	2.2	11.5	60.0
0.50	1.8	6.4	2.4	12.9	40.1
0.75	2.0	9.3	2.6	15.9	25.5
1.00	2.1	11.6	2.7	18.2	20.4
1.50	2.5	16.8	3.1	28.0	13.6
2.50	3.1	28.1	3.7	43.7	8.20
4.00	3.8	42.2	4.4	61.9	4.99
6.00	4.4	61.1	5.0	81.8	3.35
2x0.12	—	—	2.8	12.5	170.3
2x0.20	—	—	3.2	17.6	91.7
2x0.35	—	—	3.8	20.8	60.0
2x0.50	—	—	4.2	24.8	40.1
3x0.12	—	—	3.0	14.5	170.3
3x0.20	—	—	3.4	20.7	91.7
3x0.35	—	—	3.8	25.5	60.0
3x0.50	—	—	4.5	34.3	40.1

# High-voltage wires

ВПФ, ВПФy

	ВПФ	ВПФy
Regulatory documentation	TU 16.K05-012-2001	
National product classification code	35 8200	
Application	• The wires are designed to work in the electric ignition device for gas stoves at voltage of up to 15 kV of pulsed current.	

## Specifications

Operating temperature range: .....	-60°C to +170°C
Electrical resistance of 1 km of conductor at 20°C, Ω, max.....	58.7
The wires withstand the DC voltage test for 1 minute:...	
- ВПФ .....	20 kV
- ВПФy .....	15 kV
Wire insulation withstand.....	at least 50 000 pulses of 15 kV
The wires withstand test with AC voltage with frequency of 50 Hz: .....	
- ВПФ .....	20 kV
- ВПФy .....	15 kV

## Design parameters

	Nominal cross section of conductor, mm <sup>2</sup>	Nominal cross section of conductor, mm <sup>2</sup>		Estimated weight of 1 km of wire, kg
		minimum	maximum	
<b>ВПФ</b>	0.35	1.9	2.2	8.5
<b>ВПФy</b>	0.35	1.6	1.9	6.9



## Design

- 1 Conductor** is of copper wires;
- 2 Insulation** is of solid PTFE-40 Sha.

# Connecting wires with fibrous and PVC insulation

## МГШВ, МГШВЭ



### Design

- 1 Conductor** — from stranded copper wires, tinned with tin-lead solder, with a nominal tin content of at least 40%;
- 2 Insulation** is combined: wrapping with polyester threads in two layers in mutually opposite directions;
- 3 External insulation** is of PVC plastic compound, the color of the insulation is agreed with the consumer and can be: white, natural, yellow, orange, red, pink, blue, light blue, green, brown, black, purple;
- 4 Shield** — for wire МГШВЭ — a braid of copper wires with a nominal diameter of not more than 0.15 mm, tinned with tin-lead solder with a nominal tin content of at least 40%.

	МГШВ	МГШВЭ
Regulatory documentation	TU 16-505.437-82	
National product classification code	35 8321 35 8322	
Application	<ul style="list-style-type: none"> <li>The wires are designed to operate at operating AC voltage up to 380 V for cross sections of 0.12; 0.14 mm<sup>2</sup> and 1000 V for cross sections of 0.20-1.50 mm<sup>2</sup>, with frequency up to 10 kHz and DC voltage up to 500 and 1500 V, respectively</li> </ul>	

### Specifications

Operating temperature range:	-50°C to +70°C
Test AC voltage with frequency of 50 Hz for 1 minute, V:	
- for cross sections of 0.12–0.14 mm <sup>2</sup>	800
- for cross sections of 0.20–1.50 mm <sup>2</sup>	2000
Electrical insulation resistance of 1 m of length, MΩ, min.:	
- under normal climatic conditions	2x10 <sup>4</sup>
- at temperature of 70°C	1x10 <sup>3</sup>
- at temperature of 35°C and relative humidity of 98%	1x10 <sup>2</sup>
Pulse voltage, V	
- for cross sections of 0.12–0.14 mm <sup>2</sup>	300
- for cross sections of 0.20–1.50 mm <sup>2</sup>	700
Construction length, min., m	50

### Design parameters

Number and design cross section of conductor, mm <sup>2</sup>	Conductor flexibility class	Number and diameter of wires in the conductor, pcs. x mm	Nominal PVC insulation thickness, mm	МГШВ		МГШВЭ		Direct current electrical resistance of 1 km of conductor at 20°C, Ω, max.
				Max. wire outer diameter, mm	Estimated weight, kg/km	Max. wire outer diameter, mm	Estimated weight, kg/km	
1x0.12	4	7x0.15	0.25	1.3	2.3	1.9	8.3	170.3
1x0.14	–	8x0.15	0.25	1.4	2.5	2.0	9.0	140.0
1x0.20	4	7x0.20	0.30	1.6	3.9	2.2	10.3	91.7
1x0.35	5	19x0.15	0.40	1.9	5.9	2.5	14.9	60.0
1x0.50	5	19x0.18	0.40	2.2	7.9	2.8	17.5	40.1
1x0.75	5	23x0.20	0.45	2.5	11.4	3.3	23.5	26.7
1x1.00	4	19x0.25	0.45	2.8	14.1	–	–	20.4
1x1.50	4	19x0.315	0.45	3.0	19.8	–	–	13.6

\* — for МГШВЭ wire as per ToR

# Connecting thermal resistant wires with PTFE insulation

МГЛФ

	<b>МГЛФ</b>
Regulatory documentation	TU 16.K05-025-2003
National product classification code	35 8332
Application	<ul style="list-style-type: none"> <li>Used for intra-block and inter-block connections of electrical devices and equipment for operation at rated AC voltage up to 600 V, frequency up to 1 kHz or DC voltage up to 840 V.</li> </ul>

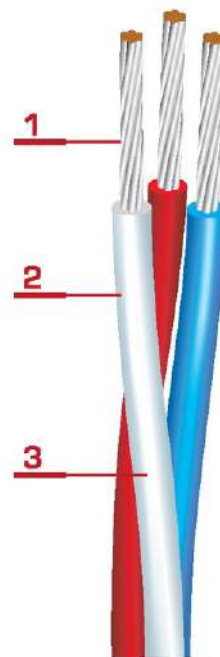
## Specifications

Operating temperature range:	..... -60°C to +155°C
Test AC voltage with frequency of 50 Hz for 1 min., V:	
- upon acceptance without the influence of external factors.....	2200
- upon acceptance after the influence of external factors.....	1800
- during operation (storage) at the consumer .....	1200
Electrical insulation resistance of 1 m of length, MΩ, min.:	
- under normal climatic conditions .....	1x10 <sup>6</sup>
- at temperature of 155°C .....	1x10 <sup>4</sup>
- at relative humidity of 98% (without moisture condensation) and temperature of 35°C.....	1x10 <sup>4</sup>

## Design parameters

Nominal cross section of conductor, mm <sup>2</sup>	Direct current electrical resistance of 1 km of conductor, Ω, max.			
	single-core wires		multi-core wires	
	Conductor class 4	Conductor class 5	Conductor class 4	Conductor class 5
0.20	91.7	113.4	94.9	117.4
0.35	58.7	60.0	60.8	62.1
0.50	41.7	40.1	43.2	41.5
0.75	25.9	26.7	26.8	27.7
1.0	20.4	20.0	21.2	20.7
1.5	13.6	13.7	14.1	14.2

Nominal cross section of conductor, mm <sup>2</sup>	Class of conductor	Maximum diameter, mm			
		1 conductor	2 conductors	3 conductors	4 conductors
0.20	4	1.45	2.9	3.15	3.5
	5				
0.35	4	1.55	3.1	3.35	3.75
	5				
0.50	4	1.7	3.4	3.65	4.1
	5				
0.75	4	2.1	4.2	4.55	5.1
	5				
1.0	4	2.25	4.5	4.85	5.45
	5				
1.5	4	2.5	5.0	5.4	6.0
	5				



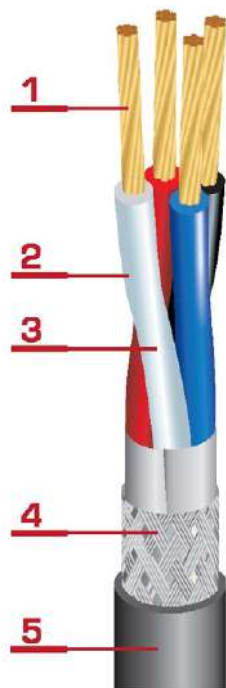
## Design

- 1 Conductor** — of copper tinned wires;
- 2 Insulation** is of PTFE-4MB;
- 3 Insulated conductors** is of multi-core wires are twisted and have different colors; the color of the insulation is agreed with the consumer and can be: natural, red or pink, yellow, orange, blue or light blue, green, brown, black.



# Installation cable with plastic insulation

## MKBB, MKBЭВ



	MKBB	MKBЭВ
Regulatory documentation	TU 16.K05-020-2002, ToR No. 14/07	
National product classification code	35 8200	
Application	• Designed for installation of alarm, security, communication systems, electrical networks for rated voltage of 600 and 1000 V.	

### Specifications

Operating temperature range:	.....-40°C to +70°C
Capacitance, pF/m, max:	.....200
Operating voltage (for all wires except for MKBЭВ 4x0.35 wire), V	.....600
Operating voltage (for wire MKBЭВ 4x0.35), V	.....1000
Electrical insulation resistance of 1 m of length, MΩ, min.:	.....1x10 <sup>4</sup>

### Design parameters

	MKBB 2X0.20	MKBB 4X0.35	MKBЭВ 4X0.20	MKBЭВ 2x0.35	MKBЭВ 4X0.35	MKBЭВ 2X2X0.35	MKBЭВ 3X2X0.30	MKBЭВ 2X0.50
Nominal cross section of conductor, mm <sup>2</sup>	0.2	0.35	0.2	0.35	0.35	0.35	0.3	0.5
Insulation thickness, mm	0.35	0.35	0.35	0.35	0.45	0.35	0.25	0.35
Insulated conductor diameter, mm	1.2	1.6	1.5	1.6	1.8	1.6	1.3	1.8
Insulated conductors	twisted	twisted	twisted	twisted	twisted	twisted in pairs and pairs are laid in parallel	twisted in pairs and pairs twisted	twisted
Type of shield	-	-	foiled+braid	foiled+braid	foiled+braid	PET+braid	PET+braid	Braid
Sheath thickness	0.5	0.8	0.6	0.6	0.4	0.7	1.5	1
Maximum cable diameter, mm	3.55	5.4	5	5	5.5	6	8.5	6
Estimated cable weight, kg/km	-	40.7	30	26	36.3	47.5	83	45

### Design

- Conductor** — multi-wire of copper or tinned copper wires of class 4;
- Insulation** is of PVC plastic compound, the color of the insulation is agreed with the consumer and can be: white, natural, yellow, orange, red, pink, blue, light blue, green, brown, black, purple;
- Insulated conductor twisting** — in groups (pair, etc.);
- Shield** is braid of tinned copper wires;
- Sheath** is of PVC plastic compound.

# Multi-core installation cable with plastic insulation

МК(Э)Ш

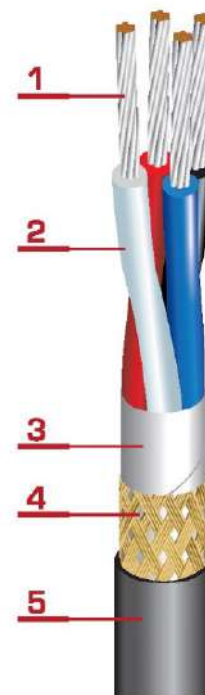
	МКШ	МКЭШ
Regulatory documentation	GOST 10348-80	
National product classification code	35 4833 0100	35 4833 0200
Application	• Cables are designed for fixed inter-device installation of electrical devices operating at voltage up to 500 VAC, frequency up to 400 Hz or up to 750 VDC	

## Specifications

Operating temperature range:	-50°C to +70°C
Test AC voltage with frequency of 50 Hz for 5 minutes, V:	
- under normal climatic conditions	2000
Electrical insulation resistance of 1 m of length, MΩ, min.:	
- under normal climatic conditions	1x10 <sup>4</sup>
- at temperature of 70°C	1x10 <sup>2</sup>
- at relative humidity of 98% (without moisture condensation) and temperature of 35°C	1x10 <sup>3</sup>

## Design parameters

Nominal cross section of conductor, mm <sup>2</sup>	МКШ		МКЭШ	
	Maximum diameter, mm	Estimated weight, kg/km	Maximum diameter, mm	Estimated weight, kg/km
2x0.35	6.7	37	7.5	61
3x0.35	6.9	40	7.7	64
5x0.35	8.2	57	9.0	97
7x0.35	8.8	73	9.6	113
10x0.35	11.6	108	12.4	158
14x0.35	12.4	137	13.2	190
2x0.5	7.0	44	7.8	68
3x0.5	7.2	48	8.0	73
5x0.5	8.5	70	9.5	110
7x0.5	9.2	90	10.0	132
10x0.5	12.2	133	13.0	180
14x0.5	13.1	171	13.9	219
2x0.75	7.5	55	8.3	80
3x0.75	7.7	60	8.5	86
5x0.75	9.2	88	10.0	130
7x0.75	10.0	115	10.8	160
10x0.75	13.2	170	14.0	227
14x0.75	14.2	220	15.0	280



## Design

- Conductor** — of twisted tinned copper wires;
- Insulation** is of PVC plastic compound; the color of the insulation is agreed with the consumer and can be of 7 colors: white or natural, yellow or orange, red or pink, blue or light blue, green, brown, black or purple;
- Over the insulated twisted cores** — polyethylene terephthalate film;
- Shield** is in the form of braid of tinned copper wires (for МКЭШ cables);
- Sheath** — of PVC plastic compound.

# Connecting wires with polyimide insulation resistant to pyrolysis

## MK 26-14, МКЭ 26-14, МКЭО 26-16



### MK 26-14, МКЭ 26-14, МКЭО 26-16

Regulatory documentation	TU 16.K76-210-2006
National product classification code	35 8200
Application	<ul style="list-style-type: none"> <li>The wires are intended for internal installation of electrical devices and radio-electronic equipment and operation at a voltage of 250 VAC, frequency up to 10 kHz or 350 VDC</li> </ul>
Advantages	<ul style="list-style-type: none"> <li>resistance to propagation of an electric arc at linear voltage of 200 V of a 3-phase power supply, with a frequency of 400 Hz;</li> <li>high processability of insulation removal;</li> <li>replacement of the fluoroplastic suspension with a fluoroplastic film wrapping eliminates the presence of fluoroplastic residues on the conductor, which improves the quality of wire soldering and reduces the time spent on this operation;</li> <li>the presence of colored wires in multi-core wires.</li> </ul>

### Specifications

Wire operating temperature:	-150°C to +200°C
Test DC voltage, V:	
- without external influencing factors	2000
- after external influencing factors	1500
Electrical resistance of cable insulation, calculated per 1 m of length, MΩ	1x10 <sup>-4</sup>
Atmospheric reduced operating pressure up to, Pa	1.33x10 <sup>-4</sup>
Atmospheric increased operating pressure up to, Pa	2.92x10 <sup>5</sup>

### Design

- Conductor** — of twisted silver-plated copper wire БМС or МСр;
- Insulation:**
  - inner layer of СКЛФ-4Д fluoroplastic tape;
  - outer layer of polyimide varnish АД-9103;
- Shield** — of tinned copper wires (for МКЭ 26-14) and silver-plated copper wires (for МКЭО 26-16);
- Sheath** is in the form of a wrapping with polyimide-fluoroplastic film ПИМФ-С-351ТП.

### Design parameters

Number and design cross section of conductor, mm <sup>2</sup>	Conductor flexibility class	Direct current electrical resistance of wire conductors per 1 km of length, Ω, max.	МК 26-14		МКЭ 26-14		МКЭО 26-16	
			Max. wire diameter, mm	Estimated weight, kg/km	Max. wire diameter, mm	Estimated weight, kg/km	Max. wire diameter, mm	Estimated weight, kg/km
1x0.08	4	252.0	0.75	1.239	1.05	2.488	1.25	2.991
1x0.12	4	160.0	0.85	1.789	1.14	3.046	1.34	3.718
1x0.20	4	88.0	1.02	2.909	1.29	4.307	1.49	5.221
1x0.35	4	52.8	1.23	4.590	1.49	6.291	1.69	7.448
1x0.50	5	40.4	1.33	5.720	1.58	7.466	1.78	8.622
2x0.08	4	252.0	1.50	2.502	1.75	4.916	1.95	5.655
2x0.12	4	160.0	1.70	3.603	1.95	6.086	2.15	7.171
2x0.20	4	88.0	2.04	5.876	2.29	8.816	2.49	10.155
2x0.35	4	52.8	2.48	9.270	2.73	12.885	2.93	14.340
2x0.50	5	40.4	2.66	11.539	2.91	15.334	3.11	16.971
3x0.08	4	252.0	1.62	3.764	1.87	6.192	2.08	7.182
3x0.12	4	160.0	1.83	5.415	2.08	8.030	2.28	9.397
3x0.20	4	88.0	2.20	8.801	2.45	11.996	2.65	13.391
3x0.35	4	52.8	2.67	13.936	2.92	17.730	3.12	19.336
3x0.50	5	40.4	2.86	17.353	3.11	21.618	3.33	23.176
4x0.08	4	252.0	1.82	5.009	2.07	7.586	2.27	9.050
4x0.12	4	160.0	2.06	7.251	2.31	10.188	2.51	11.672
4x0.20	4	88.0	2.47	11.751	2.72	15.262	2.92	17.010
4x0.35	4	52.8	3.00	18.580	3.25	22.733	3.45	24.920
4x0.50	5	40.4	3.22	23.101	3.47	27.673	3.67	29.978

# Connecting wire with polyimide insulation resistant to pyrolysis

МК 26-191, МКЭ 26-191, МКЭО 26-191

МК 26-191, МКЭ 26-191, МКЭО 26-191

Regulatory documentation	ПБМИ.358200.001–2012ТУ
National product classification code	35 8200
Application	<ul style="list-style-type: none"> <li>The wires are designed for mobile and fixed installation of intra-block, inter-block, intra-device and inter-device connections in radio-electronic and electrical devices for rated AC voltage of 380 V with a frequency of 10 kHz and a DC voltage of 500 V.</li> </ul>
Main wire advantages	<ul style="list-style-type: none"> <li>resistance to propagation of an electric arc at linear voltage of 200 V of a 3-phase power supply, with a frequency of 400 Hz;</li> <li>the possibility of use in habitable sealed compartments (conclusion of the FSBI State Scientific Center of the Russian Federation – IBMP of RAS);</li> <li>high processability of insulation removal;</li> <li>the presence of colored wires in multi-core wires.</li> </ul>

## Specifications

Wire operating temperature:	.....–150°C to +200°C
Test DC voltage, V:	
- without external influencing factors	.....2500
- after external influencing factors	.....2000
Electrical resistance of wire insulation, calculated per 1 m of length, MΩ	..... 1x10 <sup>5</sup>
Atmospheric reduced operating pressure up to, Pa	..... 1.33x10 <sup>-4</sup>
Atmospheric increased pressure up to, Pa	..... 2.92x10 <sup>5</sup>
Minimum operating time at 200°C, h	..... 1000

## Design parameters

Number and design cross section of conductor, mm <sup>2</sup>	Conduct or flexibility class	Direct current electrical resistance of wire conductors per 1 km of length, Ω, max.	МК 26-191		МКЭ 26-191		МКЭО 26-191	
			Max. wire diameter, mm	Estimated weight, kg/km	Max. wire diameter, mm	Estimated weight, kg/km	Max. wire diameter, mm	Estimated weight, kg/km
1x0.08	4	244.0	0.75	1.239	1.05	2.488	1.25	2.991
1x0.12	4	155.0	0.85	1.789	1.14	3.046	1.34	3.718
1x0.20	4	85.0	1.02	2.909	1.29	4.307	1.49	5.221
1x0.35	4	51.0	1.23	4.590	1.49	6.291	1.69	7.448
1x0.50	5	39.0	1.33	5.720	1.58	7.466	1.78	8.622
2x0.08	4	244.0	1.50	2.502	1.75	4.916	1.95	5.655
2x0.12	4	155.0	1.70	3.603	1.95	6.086	2.15	7.171
2x0.20	4	85.0	2.04	5.876	2.29	8.816	2.49	10.155
2x0.35	4	51.0	2.48	9.270	2.73	12.885	2.93	14.340
2x0.50	5	39.0	2.66	11.539	2.91	15.334	3.11	16.971
3x0.08	4	244.0	1.62	3.764	1.87	6.192	2.08	7.182
3x0.12	4	155.0	1.83	5.415	2.08	8.030	2.28	9.397
3x0.20	4	85.0	2.20	8.801	2.45	11.996	2.65	13.391
3x0.35	4	51.0	2.67	13.936	2.92	17.730	3.12	19.336
3x0.50	5	39.0	2.86	17.353	3.11	21.618	3.33	23.176
4x0.08	4	244.0	1.82	5.009	2.07	7.586	2.27	9.050
4x0.12	4	155.0	2.06	7.251	2.31	10.188	2.51	11.672
4x0.20	4	85.0	2.47	11.751	3.72	15.262	2.92	17.010
4x0.35	4	51.0	3.00	18.580	3.25	22.733	3.45	24.920
4x0.50	5	39.0	3.22	23.101	3.47	27.673	3.67	29.978



## Design

- Conductor** — of twisted silver-plated copper wire BMC or MCP;
- Insulation:**
  - inner layer of fluoroplastic tape;
  - outer layer of polyimide varnish;
- Shield** is of tinned copper wires (for МКЭ 26-191) and silver-plated copper wires (for МКЭО 26-191);
- Sheath** is in the form of a wrapping with polyimide-fluoroplastic film.

# Connecting thermal resistant wires

## MK 26-15, МКЭ 26-15, МКЭО 26-15

MK 26-15, МКЭ 26-15, МКЭО 26-15	
Regulatory documentation	ПБМИ.358200.002–2013ТУ
National product classification code	35 8234
Description	Connecting thermal resistant wires MK 26-15, МКЭ 26-15, МКЭО 26-15
Application	<ul style="list-style-type: none"> <li>Designed for indoor installation, making connections of radio-electronic equipment and operation at voltage up to 250 VAC, frequency up to 10000 Hz or 350 VDC</li> </ul>
Operating temperature range	Minus 150°C to 200°C

## Specifications

Electrical resistance of cable insulation, calculated per 1 m of length, MΩ, min.: ..... 1x10<sup>4</sup>  
 Wires are resistant to multiple bends (bending radius - ..... 5000 cycles  
 at least 10 external wire diameters, bending angle is +90°) ..... Bends  
 Wire service life, years ..... 30  
 Gamma-percentile operating time to failure ..... 1000 h at 200°C  
 ..... 150 000 h at 100°C

## Design parameters

Number of insulated conductors	Nominal cross section of conductors, mm <sup>2</sup>	Number of wires in a conductor and nominal diameter, PCS. X MM	Wire outer diameter, mm				Estimated weight of 1 km of wire, kg		
			MK 26-15		МКЭ 26-15	МКЭО 26-15	MK 26-15	МКЭ 26-15	МКЭО 26-15
			min.	max.	max.	max.			
1	0.08	7x0.12	0.52	0.61	0.91	1.11	1.06	2.07	2.43
	0.12	7x0.15	0.58	0.68	0.98	1.18	1.49	2.61	3.00
	0.20	7x0.20	0.70	0.83	1.13	1.33	2.44	3.68	4.12
	0.35	7x0.26	0.88	1.01	1.31	1.51	3.94	5.54	6.06
	0.50	19x0.18	1.00	1.13	1.43	1.63	5.08	6.72	7.29
2	0.08	7x0.12	–	1.25	1.55	1.75	2.13	3.78	4.37
	0.12	7x0.15	–	1.40	1.70	1.90	3.01	4.68	5.33
	0.20	7x0.20	–	1.70	2.00	2.20	4.91	6.83	7.59
	0.35	7x0.26	–	2.05	2.35	2.55	7.96	10.38	11.30
	0.50	19x0.18	–	2.30	2.60	2.80	10.22	12.82	13.84
3	0.08	7x0.12	–	1.32	1.62	1.82	3.20	5.25	5.88
	0.12	7x0.15	–	1.48	1.78	1.98	4.52	6.69	7.38
	0.20	7x0.20	–	1.80	2.10	2.30	7.38	9.84	10.65
	0.35	7x0.26	–	2.19	2.49	2.69	11.09	15.03	16.00
	0.50	19x0.18	–	2.45	2.75	2.95	15.37	18.81	19.89
4	0.08	7x0.12	–	1.48	1.78	1.98	4.28	6.64	7.33
	0.12	7x0.15	–	1.66	1.96	2.16	6.02	8.49	9.25
	0.20	7x0.20	–	2.02	2.32	2.52	9.88	12.65	13.54
	0.35	7x0.26	–	2.46	2.76	2.96	15.92	19.50	20.57
	0.50	19x0.18	–	2.75	3.05	3.25	20.49	24.36	25.56

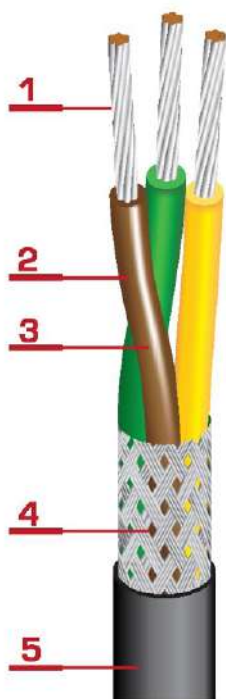


## Design

- 1 Inner conductor** is of nickel-plated copper wires
- 2 Two-layer insulation** is of polyimide varnish and fluoroplastic film
- 3 Shield** is of nickel-plated copper wires
- 4 Sheath** is of polyimide-fluoroplastic film

# Connecting wires

MC 15-18, MC 15-11, MCЭ 15-11, MCЭО 15-11



## MC 15-18, MC 15-11, MCЭ 15-11, MCЭО 15-11

Regulatory documentation	TU 16-705.199-81
National product classification code	35 8213
Application	• The wires are designed to operate on rated AC voltage of 100 V with frequency of up to 50 MHz or DC or pulse voltage of 150 V.

### Specifications

Wire operating temperature:.....	-60°C to +155°C
Electrical resistance of cable insulation, calculated per 1 m of length, MΩ, min.:	
- under normal climatic conditions.....	1x10 <sup>5</sup>
- at temperature of 155°C.....	1x10 <sup>4</sup>
- at a relative humidity of 98% and temperature up to 35°C.....	1x10 <sup>4</sup>
Test voltage, V:.....	
- without external influencing factors.....	1500
- after external influencing factors.....	500

### Design parameters

#### Design

- 1 **Conductor** — normal strength — of tinned copper wires;
- 2 **Insulation** is of solid PTFE-4MB; the color of the insulation is agreed with the consumer and can be of seven colors: white or natural, yellow or orange, red or pink, blue or light blue, green, brown, black or purple;
- 3 **Insulated conductors** — stranded wires are twisted;
- 4 **Shield** is performed as braid of tinned copper wires for wires MCЭ(O) 15-11;
- 5 **Sheath** is in the form of a tube of PTFE-4 MB

Nominal cross section of conductor, mm <sup>2</sup>	Direct current electrical resistance of wire conductors per 1 km of length, Ω			
	wire with conductor of tinned copper wires		wire with conductor of nickel-plated copper wires	
	single-core wires	multi-core wires	single-core wires	multi-core wires
0.05	383.7	402.9	425.1	446.4
0.08	254.6	267.3	287.0	301.4
0.12	170.3	178.8	183.6	192.8
0.20	91.7	96.3	103.2	108.4
0.35	58.7	61.6	66.1	69.4
0.50	40.1	42.1	45.2	47.5

Number and design cross section of conductor, mm <sup>2</sup>	Conductor flexibility class	MC 15-18		MC 15-11		MCЭ 15-11		MCЭО 15-11	
		Max. wire diameter, mm	Estimated weight, kg/km	Max. wire diameter, mm	Estimated weight, kg/km	Max. wire diameter, mm	Estimated weight, kg/km	Max. wire diameter, mm	Estimated weight, kg/km
1x0.08	4	0.68	1.27	0.80	1.58	1.20	4.2	-	-
1x0.12	4	0.77	1.85	0.89	2.13	1.29	4.7	-	-
1x0.20	4	0.92	2.81	1.04	3.23	1.44	5.8	-	-
1x0.35	4	1.16	4.60	1.29	4.91	1.69	8.8	-	-
1x0.50	5	1.28	5.90	1.40	6.2	1.80	10.1	-	-
2x0.08	4	-	-	1.60	3.26	2.00	7.2	2.60	11.2
2x0.12	4	-	-	1.78	4.41	2.18	8.4	2.78	12.7
2x0.20	4	-	-	2.08	6.69	2.48	12.0	3.08	16.8
2x0.35	4	-	-	2.58	10.17	3.06	17.8	3.66	23.4
2x0.50	5	-	-	2.80	12.82	3.28	20.5	3.88	26.5

# Connecting two-core wires with thinned insulation

## MCy

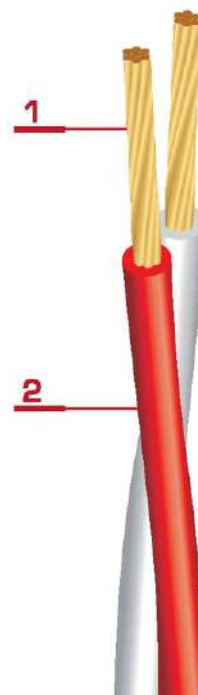
	<b>MCy</b>
Regulatory documentation	TU 16.K05-044–2011
National product classification code	35 8200
Application	<ul style="list-style-type: none"> <li>Wires are intended for internal installation of electrical devices and radio-electronic equipment at voltage up to 30 V, frequency up to 2000 Hz</li> </ul>

### Specifications:

Wire operating temperature:.....	–60°C to +200°C
Electrical resistance of cable insulation, calculated per 1 m of length, MΩ, min.:	
- under normal climatic conditions.....	1x10 <sup>5</sup>
- at temperature of 200°C.....	1x10 <sup>4</sup>
- at a relative humidity of 98% and temperature up to 35°C without moisture condensation.....	1x10 <sup>4</sup>
Test AC voltage with frequency of 50 Hz for 1 min. in water, V:.....	1000

### Design parameters

Number of conductors	Nominal cross section of conductor, mm <sup>2</sup>	Conductor design		Maximum diameter of the insulated core, mm	Wire maximum diameter, mm	Direct current electrical resistance of conductors, Ω, max., in terms of 1 km
		Number of wires	Wire nominal diameter, mm			
1	0.03	7	0.08	0.45	0.45	560
2	0.03	7	0.08	0.45	0.90	560



### Design

- 1 Conductor** — of silver-plated copper wire;
- 2 Insulation** is of a film of fluoroplastic grade 4D.

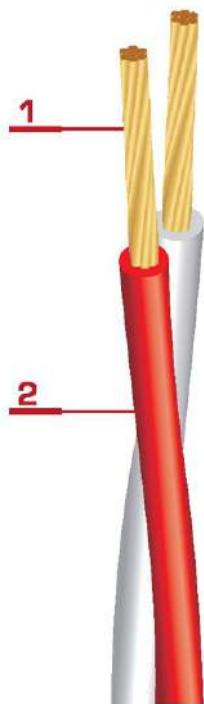
Two insulated conductors are twisted and have different colors.

Insulation color: white or natural (W), yellow (Y), orange (O), red (R), blue (B), black (Bl) colors.

The color of the insulation is agreed upon when ordering.

# Connecting two-core wires with thinned insulation

**MCy 16-13M 2x0,03**



<b>MCy 16-13M 2x0,03</b>	
Regulatory documentation	TU 16.K05-031-2006
National product classification code	35 8200
Application	• The wires are designed to operate at AC voltage up to 30 V with frequency of up to 2000 Hz.

## Specifications

Wire operating temperature: .....	-60°C to +200°C
Electrical resistance of cable insulation, calculated per 1 m of length, MΩ, min.:	
- under normal climatic conditions.....	1x10 <sup>5</sup>
- at temperature of 200°C.....	1x10 <sup>4</sup>
- at a relative humidity of 98% and temperature up to 35°C without moisture condensation.....	1x10 <sup>4</sup>
Test AC voltage with frequency of 50 Hz for 1 min. in water, V: .....	500

## Design

- 1 Conductor** — of copper wire;
  - 2 Insulation** is of a film of fluoroplastic grade 4D.
- Two insulated conductors are twisted and have different colors.  
 Insulation color: white or natural (W), yellow (Y), orange (O), red (R), blue (B), black (Bl) colors.  
 The color of the insulation is agreed upon when ordering.

## Design parameters

Number of conductors	Nominal cross section of conductor, mm <sup>2</sup>	Conductor design		Maximum diameter of the insulated core, mm	Max. wire diameter, mm	Direct current electrical resistance of wire conductors per 1 km of length, Ω, max.
		Number of wires	Wire nominal diameter, mm			
2	0.03	7	0.08	0.45	0.90	560



# Connecting wires with polyimide insulation

## MC 16-15, MCЭ 16-15, MC 16-35, MCЭ 16-35

### MC 16-15, MCЭ 16-15, MC 16-35, MCЭ 16-35

Regulatory documentation	TU 16.K76-011-88
National product classification code	35 8219
Application	<ul style="list-style-type: none"> <li>The wires are designed to operate at operating AC voltage up to 100 V, frequency up to 10 kHz or DC voltage up to 150 V, at temperatures from minus 150 to plus 200°C.</li> </ul>

## Specifications

Operating temperature range:	.....-150°C to +200°C
Test voltage with frequency of 50 Hz, V:	
- without external influencing factors.....	1000
- after external influencing factors.....	500
Electrical resistance of cable insulation, calculated per 1 m of length, MΩ, min.:	
- under normal climatic conditions.....	1x10 <sup>4</sup>
- at temperature of 200°C.....	1x10 <sup>2</sup>
- at a relative humidity of 98% and temperature up to 35°C.....	1x10 <sup>2</sup>
Atmospheric reduced operating pressure up to, Pa.....	1.32x10 <sup>-4</sup> (10 <sup>-6</sup> mm Hg)
Atmospheric increased pressure up to, kPa.....	295 (3.0 kgf/cm <sup>2</sup> )

## Design parameters

Number of conductors	Nominal cross section of conductor, mm <sup>2</sup>	Conductor flexibility class	Max. wire diameter, mm		Estimated weight, kg/km		Direct current electrical resistance of wire conductors in terms of 1 km of length, Ω	
			MC 16-15 MC 16-35	MCЭ 16-15 MCЭ 16-35	MC 16-15 MC 16-35	MCЭ 16-15 MCЭ 16-35	MC 16-15, MCЭ 16-15	MC 16-35 MCЭ 16-35
1	0.05	4	0.50*	–	0.689*	–	360.0	–
	0.08	4	0.56	0.96	0.898	2.63	244.0	294.0
	0.08	1	–	–	–	–	–	–
	0.12	4	0.65	1.05	1.35	3.06	155.0	186.0
	0.20	4	0.80	1.20	2.31	4.00	85.0	103.4
	0.35	4	0.98	1.38	3.82	6.31	51.0	62
2	0.08	4	1.12	1.52	1.86	4.36	244.0	294.0
	0.12	4	1.30	1.70	2.8	5.32	155.0	186.0
	0.20	4	1.60	2.00	4.78	8.12	85.0	103.4
	0.35	4	1.96	2.36	7.89	11.46	51.0	62
3	0.08	4	1.21	1.61	2.79	5.32	244.0	294.0
	0.12	4	1.41	1.81	4.20	6.78	155.0	186.0
	0.20	4	1.73	2.13	7.16	10.52	85.0	103.4
	0.35	4	2.12	2.52	11.84	16.27	51.0	62
4**	0.08	4	1.36	1.92	3.71	6.30	244.0	294.0
	0.12	4	1.58	2.17	5.60	8.98	155.0	186.0
	0.20	4	1.94	2.58	9.55	13.11	85.0	103.4
	0.35	4	2.38	3.07	15.78	20.31	51.0	62

\* — for wires MC 16-15

\*\* — for wires MC 16-15, MCЭ 16-15

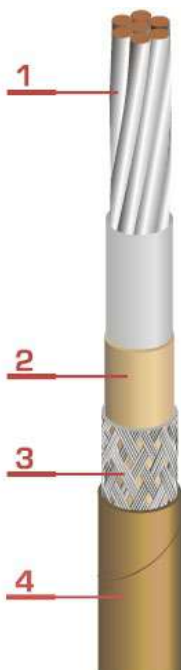


## Design

- Conductor** —
  - normal strength — of silver-plated copper wire БМС or МСр (MC 16-15, MCЭ 16-15);
  - high-strength conductor — of silver-plated wires of the БрХЦрК alloy (MC 16-35, MCЭ 16-35)
- Insulation** is of electrical insulating polyimide varnish АД-9103; under the insulation - an anti-adhesive layer of suspension of PTFE-4D;
- Shield** is in the form of braid of tinned copper wires with diameter of 0.08.

# Connecting wires with polyimide insulation

## MC 26-15, MCЭ 26-15, MCЭО 26-15



### MC 26-15, MCЭ 26-15, MCЭО 26-15

Regulatory documentation	TU 16.K76-160–2000
National product classification code	35 8219
Application	• The wires are designed to operate at operating AC voltage up to 250 V, frequency up to 10 kHz or DC voltage up to 350 V, at temperatures from minus 150 to plus 200°C.

### Specifications

Operating temperature range:	–150°C to +200°C
Test voltage with frequency of 50 Hz, V:	
- without external influencing factors	2000
- after external influencing factors	1500
Electrical resistance of cable insulation, calculated per 1 m of length, MΩ, min.:	
- under normal climatic conditions	1x10 <sup>4</sup>
- at temperature of 200°C	1x10 <sup>2</sup>
- at a relative humidity of 98% and temperature up to 35°C	1x10 <sup>2</sup>
Atmospheric reduced operating pressure up to, Pa	1.33x10 <sup>-4</sup>
Atmospheric increased pressure up to, kPa	295 (3.0 kgf/cm <sup>2</sup> )

### Design

- Conductor** — of silver-plated copper wire BMC or MCP;
- Insulation** is of electrical insulating polyimide varnish АД-9103; under the insulation — an anti-adhesive layer of suspension of PTFE-4D;
- Shield** is in the form of a braid of tinned copper wires (for MCЭ 26-15) and silver-plated copper wires (for MCЭО 26-15);
- Sheath** is in the form of a wrapping with polyimide-fluoroplastic film ПМФ-С-351ТП.

### Design parameters

Number of conductors	Nominal cross section of conductor, mm <sup>2</sup>	Conductor flexibility class	Max. wire diameter, mm			Estimated weight, kg/km			Direct current electrical resistance of wire conductors per 1 km of length, Ω
			MC 26-15	MCЭ 26-15	MCЭО 26-15	MC 26-15	MCЭ 26-15	MCЭО 26-15	
1	0.08	4	0.60	1.00	1.20	1.01	1.88	3.22	244.0
	0.12	4	0.70	1.10	1.30	1.51	2.78	3.88	155.0
	0.20	4	0.85	1.25	1.45	2.51	3.78	5.71	85.0
	0.35	4	1.03	1.41	1.61	4.03	5.46	7.33	51.0
	0.50	5	1.15	1.55	1.75	5.17	6.86	8.83	39.0
2	0.08	4	1.20	1.60	1.80	2.09	3.74	5.83	252.0
	0.12	4	1.40	1.80	2.00	3.12	4.74	7.39	160.0
	0.20	4	1.70	2.10	2.30	5.19	7.27	10.37	88.0
	0.35	4	2.06	2.42	2.62	8.33	10.82	14.16	52.8
	0.50	5	2.30	2.70	2.90	10.69	13.34	15.09	40.4
3	0.08	4	1.30	1.70	1.90	3.13	4.76	7.29	252.0
	0.12	4	1.51	1.91	2.20	4.68	6.64	9.11	160.0
	0.20	4	1.84	2.24	2.50	7.78	10.11	13.16	88.0
	0.35	4	2.21	2.58	2.78	12.50	15.01	18.77	52.8
	0.50	5	2.49	2.99	3.19	16.03	18.79	22.97	40.4
4	0.08	4	1.46	1.86	2.06	4.17	5.96	8.61	252.0
	0.12	4	1.70	2.10	2.30	6.24	8.25	10.97	160.0
	0.20	4	2.07	2.47	2.67	10.38	12.81	16.19	88.0
	0.35	4	2.48	2.95	3.15	16.66	19.53	23.68	52.8
	0.50	5	2.79	3.19	3.39	21.38	24.36	31.54	40.4

# Connecting wires with insulation of radiation grafted fluoroplastic composition

MC(ЭО) 15-199, MC(ЭО) 16-198, MC(ЭО) 16-199

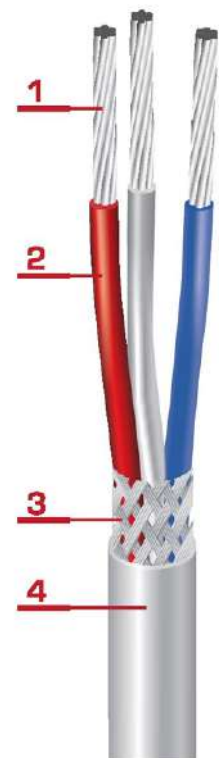
	<b>MC(ЭО) 15-199, MC(ЭО) 16-198, MC(ЭО) 16-199</b>
Regulatory documentation	ПБМИ.358200.003–2014ТУ
National product classification code	35 8213
Application	• The wires are intended for internal installation of electrical devices and radio-electronic equipment and operation at a voltage of 100 VAC, frequency up to 10 000 kHz or 150 VDC

## Specifications

Operating temperature range for MC(ЭО) 15-199	–65°C to +155°C
Operating temperature range for MC(ЭО) 16-198, MC(ЭО) 16-199	–65°C to +200°C
Electrical resistance of cable insulation, calculated per 1 m of length and temperature of 20°C, must be min., MΩ:	1x10 <sup>6</sup>
Minimum operating time of wires at maximum operating temperature:	
-for MC(ЭО) 16-198, MC(ЭО) 16-199	3000 h
-for MC(ЭО) 15-198	10 000 h
Wire service life	30 years

## Design parameters

Number of insulated conductors	Nominal cross section of conductors, mm <sup>2</sup>	Number of wires in a conductor and nominal diameter, pcs. x mm	Minimum insulation thickness, mm	Wire outer diameter, mm								
				MC15-199, MC16-199, MC 16-198			MC015-199, MC016-199, MC016-198		MCЭ15-199, MCЭ16-199, MCЭ 16-198		MCЭ015-199, MCЭ016-199, MCЭ016-198	
				min.	nom.	max.	nom.	max.	nom.	max.	nom.	max.
1	0.12	7x0.15	0.09	0.59	0.65	0.71	–	–	0.89	0.95	1.29	1.41
	0.15	19x0.10	0.09	0.67	0.70	0.76	–	–	0.94	1.00	1.34	1.46
	0.20	19x0.12	0.09	0.76	0.80	0.86	–	–	1.04	1.10	1.44	1.56
	0.35	19x0.15	0.09	0.91	0.95	1.01	–	–	1.19	1.25	1.59	1.71
	0.50	19x0.18	0.09	1.02	1.10	1.16	–	–	1.34	1.40	1.74	1.86
	0.60	19x0.20	0.09	1.16	1.20	1.26	–	–	1.44	1.50	1.84	1.96
	0.75	19x0.23	0.09	1.25	1.35	1.41	–	–	1.59	1.65	1.99	2.08
	1.0	19x0.25	0.09	1.36	1.45	1.51	–	–	1.69	1.75	2.09	2.21
	1.2	19x0.28	0.09	1.56	1.60	1.66	–	–	1.84	1.90	2.29	2.36
	1.5	19x0.32	0.09	1.76	1.80	1.86	–	–	2.04	2.10	2.44	2.56
1	2.0	19x0.36	0.09	1.98	2.00	2.11	–	–	2.24	2.32	2.64	2.85
	2.5	19x0.42	0.12	2.30	2.40	2.53	–	–	2.64	2.74	3.08	3.22



## Design

- Conductor** — of twisted tinned copper wires for MC(ЭО) 15-199, silver-plated copper wires for MC(ЭО) 16-199, nickel-plated copper wires for MC(ЭО) 16-198 (flexibility class 5 for sections 0.12–0.50 mm<sup>2</sup>, 4th flexibility class for sections 0.75–2.5 mm<sup>2</sup> according to GOST 22483)
- Insulation** is of radiation grafted fluoroplastic composition
- Core** is of twisted insulated wires (for multi-core wires)
- Shield** is a shield in the form of a braid of tinned copper wires for MC(ЭО) 15-199, silver-plated copper wires for MC(ЭО) 16-199, nickel-plated copper wires for MC(ЭО) 16-198
- Sheath** is of radiation grafted fluoroplastic composition

## Design parameters

Number of insulated conductors	Nominal cross section of conductors, mm <sup>2</sup>	Number of wires in a conductor and nominal diameter, pcs. x mm	Minimum insulation thickness, mm	Wire outer diameter, mm								
				MC 15-199, MC 16-199, MC 16-198			MCO 015-199, MCO 016-199, MCO 016-198		MCЭ 15-199, MCЭ 16-199, MCЭ 16-198		MCЭО 015-199, MCЭО 16-199, MCЭО 16-198	
				min.	nom.	max.	nom.	max.	nom.	max.	nom.	max.
2	0.12	7x0.15	0.09	–	1.30	1.42	1.70	1.92	1.54	1.66	1.94	2.18
	0.15	19x0.10	0.09	–	1.40	1.52	1.80	2.02	1.64	1.76	2.04	2.28
	0.20	19x0.12	0.09	–	1.60	1.72	2.00	2.22	1.84	1.96	2.24	2.52
	0.35	19x0.15	0.09	–	1.90	2.02	2.30	2.52	2.14	2.26	2.54	2.82
	0.50	19x0.18	0.09	–	2.20	2.32	2.60	2.86	2.44	2.56	2.84	3.12
	0.60	19x0.20	0.09	–	2.40	2.52	2.80	3.06	2.64	2.76	3.08	3.32
	0.75	19x0.23	0.09	–	2.70	2.82	3.14	3.30	2.94	3.06	3.38	3.56
3	0.12	7x0.15	0.09	–	1.40	1.53	1.80	2.03	1.64	1.77	2.04	2.28
	0.15	19x0.10	0.09	–	1.51	1.63	1.91	2.13	1.75	1.87	2.15	2.39
	0.20	19x0.12	0.09	–	1.72	1.85	2.12	2.35	1.96	2.09	2.36	2.65
	0.35	19x0.15	0.09	–	2.04	2.17	2.44	2.67	2.28	2.41	2.68	2.97
	0.50	19x0.18	0.09	–	2.37	2.49	2.77	2.99	2.61	2.73	3.05	3.29
	0.60	19x0.20	0.09	–	2.58	2.71	2.98	3.21	2.82	2.95	3.26	3.51
	0.75	19x0.23	0.09	–	2.90	3.03	3.30	3.53	3.14	3.27	3.58	3.76

Note — The minimum and maximum insulated diameters of all wires must correspond to the minimum and maximum outer diameters of single-core unshielded wires.

Number of conductors	Nominal cross section of conductors, mm <sup>2</sup>	Estimated weight of 1 km of wire, kg			
		MC 15-199, MC 16-199, MC 16-198	MCO 15-199, MCO 16-199, MCO 16-198	MCЭ 15-199, MCЭ 16-199, MCЭ 16-198	MCЭО 15-199, MCЭО 16-199, MCЭО 16-198
1	0.12	1.47	–	2.87	4.31
	0.15	1.77	–	3.14	4.68
	0.20	2.43	–	3.78	5.44
	0.35	3.64	–	5.11	6.97
	0.50	5.08	–	6.88	8.95
	0.60	6.17	–	7.97	10.19
	0.75	7.60	–	9.97	11.96
	1.0	9.36	–	11.60	14.17
	1.2	11.59	–	14.76	16.70
	1.5	15.06	–	17.65	20.79
2	2.0	19.96	–	21.74	26.60
	2.5	26.76	–	29.44	34.50
	0.12	2.97	4.73	5.02	7.22
	0.15	3.57	5.45	5.77	8.06
	0.20	4.91	7.03	7.26	10.28
	0.35	7.33	9.80	10.19	13.65
	0.50	10.25	13.38	13.48	17.25
3	0.60	12.43	15.82	15.89	20.25
	0.75	15.31	19.01	19.96	23.57
	0.12	4.43	6.27	6.70	8.97
	0.15	5.34	7.20	7.56	10.24
	0.20	7.33	9.44	9.80	13.27
	0.35	10.97	13.43	13.91	17.64
	0.50	15.32	18.19	18.71	23.01
3	0.60	18.60	21.61	22.21	26.80
	0.75	22.91	27.47	28.22	31.79

# Connecting wires with plastic insulation

## HB(Э), HBM(Э)

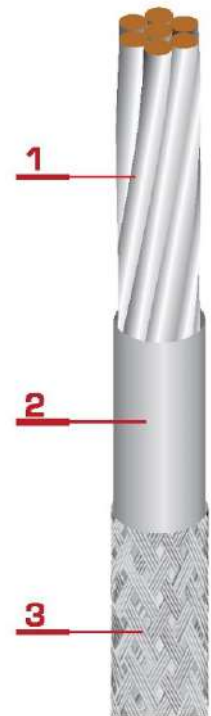
HB(Э), HBM(Э)	
Regulatory documentation	GOST 17515-72
National product classification code	35 8200
Application	• For operation at rated voltage 600 and 1000 V, frequency up to 10 kHz and DC voltage up to 840 and 1400 V, respectively, in circuits of electrical devices for industrial use.

### Specifications

Operating temperature range:	-50°C to +105°C
Test voltage with frequency of 50 Hz, V:	
- for 600 V wires	2000
- for 1000 V wires	3000
Electrical resistance of wire insulation, calculated per 1 m of length, MΩ, min.:	1x10 <sup>4</sup>

### Design parameters

Wire grade	Number and design cross section of conductor, mm <sup>2</sup>	Nominal insulation thickness, mm	Max. wire outer diameter, mm	Estimated weight, kg/km	Direct current electrical resistance of wire conductors per 1 km of length, Ω
<b>HB 1 600</b>	0.08	0.35	1.2	1.71	238.8
	0.12	0.35	1.3	2.38	138.6
	0.20	0.35	1.5	3.19	90.4
	0.35	0.35	1.6	4.78	51.8
	0.50	0.35	1.8	6.22	36.7
	0.75	0.35	2.1	8.59	24.8
<b>HB 4 600</b>	1.00	0.35	2.2	11.2	18.2
	0.08	0.35	1.2	1.86	254.6
	0.12	0.35	1.3	2.43	170.3
	0.20	0.35	1.5	3.54	91.7
	0.35	0.35	1.6	5.24	58.7
	0.50	0.35	1.8	6.57	41.7
<b>HB 3 600</b>	0.75	0.35	2.1	9.4	25.9
	1.00	0.35	2.2	11.6	20.4
	1.50	0.35	2.5	16.6	13.6
	0.75	0.35	2.1	9.3	26
<b>HB 1 1000</b>	1.00	0.35	2.2	11.5	22.3
	1.50	0.35	2.5	16.5	14.3
	2.50	0.35	3.2	26.8	7.63
	0.08	0.45	1.4	2.18	238.8
	0.12	0.45	1.5	2.88	138.6
	0.20	0.45	1.7	3.74	90.4
<b>HB 1 1000</b>	0.35	0.45	1.8	5.4	51.8
	0.50	0.45	2	6.88	36.7
	0.75	0.45	2.3	9.33	24.8
	1.00	0.45	2.4	12	18.2



### Design

- 1 Conductor** — of tinned copper wires — HB, HBЭ; of copper wires — HBM, HBMЭ;
- 2 Insulation** is of PVC plastic compound;
- 3 Shield** is copper wire braid (HBMЭ); of tinned copper wires (HBЭ).

## Design parameters

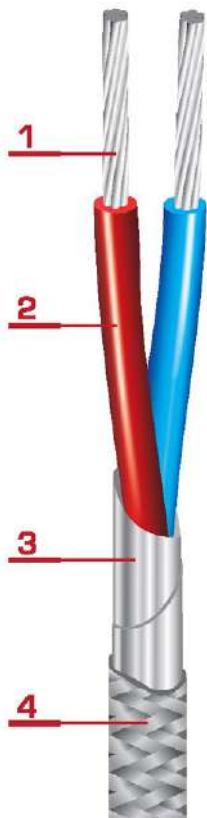
Wire grade	Number and design cross section of conductor, mm <sup>2</sup>	Nominal insulation thickness, mm	Max. wire outer diameter, mm	Estimated weight, kg/km	Direct current electrical resistance of wire conductors per 1 km of length, Ω
<b>HB 4 1000</b>	0.08	0.45	1.4	2.38	254.6
	0.12	0.45	1.5	2.99	170.3
	0.20	0.45	1.7	4.17	91.7
	0.35	0.45	1.8	5.94	58.7
	0.50	0.45	2	7.32	41.7
	0.75	0.45	2.3	10.3	25.9
	1.00	0.45	2.4	12.5	20.4
	1.50	0.45	2.7	17.7	13.6
<b>HB 3 1000</b>	0.75	0.45	2.3	10.1	26
	1.00	0.45	2.4	12.4	22.3
	1.50	0.45	2.7	17.5	14.3
	2.50	0.45	3.3	28.1	7.63
<b>HBM 4 600</b>	0.08	0.35	1.2	1.82	247.5
	0.12	0.35	1.3	2.37	165.3
	0.20	0.35	1.5	3.47	89.1
	0.35	0.35	1.6	5.13	57.0
	0.50	0.35	1.8	6.44	40.5
<b>HBM 1 600</b>	0.08	0.35	1.2	1.69	225.3
	0.12	0.35	1.3	2.35	130.8
	0.20	0.35	1.5	3.15	88.8
	0.35	0.35	1.6	4.72	50.7
	0.50	0.35	1.8	6.14	36.0
	0.75	0.35	2.1	8.48	24.5
	1.00	0.35	2.2	11.1	18.1
	1.50	0.35	2.5	15.8	12.1
	2.50	0.35	3.2	25.2	7.41
	3.50	0.35	4.0	38.1	4.84
<b>HBM 3 600</b>	0.75	0.35	2.1	9.12	25.5
	1.00	0.35	2.2	11.3	21.8
	1.50	0.35	2.5	16.5	14.0
	2.50	0.35	3.2	26.8	7.49
<b>HBM 1 1000</b>	0.08	0.45	1.4	2.16	225.3
	0.12	0.45	1.5	2.85	130.8
	0.20	0.45	1.7	3.7	88.8
	0.35	0.45	1.8	5.34	50.7
	0.50	0.45	2.0	6.8	36.0
	0.75	0.45	2.3	9.22	24.5
	1.00	0.45	2.4	11.9	18.1
	1.50	0.45	2.7	16.7	12.1
	2.50	0.45	3.3	26.3	7.41
	3.50	0.45	4.0	38.1	4.84
<b>HBM 3 1000</b>	0.75	0.45	2.3	9.96	25.5
	1.00	0.45	2.4	12.2	21.8
	1.50	0.45	2.7	17.5	14.0
	2.50	0.45	3.3	28.1	7.49
<b>HBM 4 1000</b>	0.08	0.45	1.4	2.34	247.5
	0.12	0.45	1.5	2.93	165.3
	0.2	0.45	1.7	4.1	89.1
	0.35	0.45	1.8	5.83	57.0
	0.5	0.45	2.0	7.19	40.5
	1x0.12	0.35	1.8	7.81	170.3
	1x0.20	0.35	2.0	8.95	91.7
	1x0.35	0.35	2.2	13.6	58.7
	1x0.50	0.35	2.3	15	41.7
	1x0.75	0.35	2.7	17.9	25.9
	1x1.00	0.35	2.8	20.1	20.4
	1x1.50	0.35	3.1	25.1	13.6
	2x0.12	0.35	3.2	16.4	170.3
	2x0.20	0.35	3.6	8.8	91.7
	2x0.35	0.35	3.8	22.4	58.7
	2x0.50	0.35	4.2	25.2	41.7
<b>HBM 3 600</b>	2x0.75	0.35	4.8	34.2	25.9
	2x1.00	0.35	5.0	38.9	20.4
	2x1.5	0.35	5.6	52.1	13.6
	3x0.12	0.35	3.4	19.1	170.3
	3x0.20	0.35	3.8	22.7	91.7
	3x0.35	0.35	4.1	28.2	58.7
	3x0.50	0.35	4.5	35.5	41.7
	3x0.75	0.35	5.1	44.4	25.9
	3x1.00	0.35	5.3	52.0	20.4
	3x1.5	0.35	6	72.5	13.6
	1x0.75	0.35	2.7	17.8	26.0
	1x1.00	0.35	2.8	20.0	22.3
	1x1.50	0.35	3.1	24.7	14.3
	1x2.5	0.35	3.8	36.3	7.63
	2x0.75	0.35	4.8	34.1	26.0
	2x1.00	0.35	5.0	38.8	22.3
2x1.50	0.35	5.6	51.7	14.3	
2x2.5	0.35	7.0	76.5	7.63	
<b>HBM 3 600</b>	3x0.75	0.35	5.1	44.1	26
	3x1.00	0.35	5.3	51.6	22.3
	3x1.50	0.35	6.0	71.4	14.3
	3x2.5	0.35	7.5	108.1	7.63

## Design parameters

Wire grade	Number and design cross section of conductor, mm <sup>2</sup>	Nominal insulation thickness, mm	Max. wire outer diameter, mm	Estimated weight, kg/km	Direct current electrical resistance of wire conductors per 1 km of length, Ω
<b>HBЭ 4 1000</b>	1X0.12	0.45	2.0	8.4	170.3
	1X0.2	0.45	2.2	9.62	91.7
	1X0.35	0.45	2.4	14.4	58.7
	1X0.5	0.45	2.5	15.8	41.7
	1X0.75	0.45	2.9	18.6	25.9
	1X1.00	0.45	3.0	21.2	20.4
	1X1.50	0.45	3.3	28.2	13.6
	2X0.12	0.45	3.6	17.6	170.3
	2X0.20	0.45	4.0	20.2	91.7
	2X0.35	0.45	4.2	26.9	58.7
	2X0.50	0.45	4.6	29.8	41.7
	2X0.75	0.45	5.2	36.4	25.9
	2X1.00	0.45	5.4	42.2	20.4
	2X1.50	0.45	6.0	55.6	13.6
	3X0.12	0.45	3.8	21.0	170.3
	3X0.20	0.45	4.3	24.9	91.7
	3X0.35	0.45	4.5	33.7	58.7
	3X0.50	0.45	4.9	38.2	41.7
	3X0.75	0.45	5.6	48.5	25.9
	3X1.00	0.45	5.8	56.8	20.4
3X1.50	0.45	6.4	75.9	13.6	
<b>HBЭ 3 1000</b>	1X0.75	0.45	2.9	18.6	26.0
	1X1.00	0.45	3.0	21	22.3
	1X1.50	0.45	3.3	28.2	14.3
	1X2.50	0.45	3.9	39.3	7.63
	2X0.75	0.45	5.2	36.0	26.0
	2X1.00	0.45	5.4	40.9	22.3
	2X1.50	0.45	6.0	55.6	14.3
	2X2.50	0.45	7.2	81.5	7.63
	3X0.75	0.45	5.6	47.3	26.0
	3X1.00	0.45	5.8	55.6	22.3
	3X1.50	0.45	6.4	74.9	14.3
	3X2.50	0.45	7.7	102.5	7.63
<b>HBMЭ 3 600</b>	1X0.75	0.35	2.7	17.2	25.5
	1X1.00	0.35	2.8	19.4	21.8
	2X0.75	0.35	4.8	33.0	25.5
	2X1.00	0.35	5.0	37.7	21.8
	3X0.75	0.35	5.1	42.8	25.5
	3X1.00	0.35	5.3	50.2	21.8
<b>HBЭ 4 600</b>	1x0.12	0.35	1.8	7.45	165.3
	1x0.20	0.35	2.0	8.57	89.1
	1x0.35	0.35	2.2	13.1	57.0
	1x0.50	0.35	2.3	14.4	40.5
	2x0.12	0.35	3.2	15.7	165.3
	2x0.20	0.35	3.6	18.1	89.1
	2x0.35	0.35	3.8	21.6	57.0
	2x0.50	0.35	4.2	24.4	40.5
	3x0.12	0.35	3.4	18.4	165.3
	3x0.20	0.35	3.8	22.0	89.1
	3x0.35	0.35	4.1	27.3	57.0
	3x0.50	0.35	4.5	34.4	40.5
	1x0.12	0.45	2.0	8.04	165.3
	1x0.20	0.45	2.2	9.24	89.1
	1x0.35	0.45	2.4	13.9	57.0
1x0.50	0.45	2.5	15.2	40.5	
<b>HBMЭ 4 1000</b>	2x0.12	0.45	3.6	17.0	165.3
	2x0.20	0.45	4.0	19.5	89.1
	2x0.35	0.45	4.2	26.0	57.0
	2x0.50	0.45	4.6	28.9	40.5
	3x0.12	0.45	3.8	20.3	165.3
	3x0.20	0.45	4.3	24.1	89.1
	3x0.35	0.45	4.5	32.6	57.0
	3x0.50	0.45	4.9	37.0	40.5
	1x0.75	0.45	2.9	18.1	25.5
	1x1.00	0.45	3.0	20.4	21.8
<b>HBMЭ 3 1000</b>	1x1.50	0.45	3.3	28.5	14.0
	1x2.50	0.45	3.9	39.3	7.49
	2x0.75	0.45	5.2	34.9	25.5
	2x1.00	0.45	5.4	39.8	21.8
	3x0.75	0.45	5.6	46.0	25.5
	3x1.00	0.45	5.8	54.1	21.8
<b>HB 5 600</b>	1x0.50	0.35	1.8	6.76	40.1
	<b>HBM 5 600 as per ToR 21/10</b>	1x0.14	0.35	1.3	2.62

# Thermal resistant cable based on twisted pair for data transmission

**КИФЭФ**



	<b>КИФЭФ</b>
Regulatory documentation	TU 16.K05-041-2011
National product classification code	35 7400
Application	<ul style="list-style-type: none"> <li>The cables are designed for data transmission onboard of vehicles, including for use in internal installations, and operation at voltages up to 100 V, frequencies up to 10 MHz.</li> </ul>
Advantages	<ul style="list-style-type: none"> <li>The cables are resistant to atmospheric precipitation, dust, salt fog, solar radiation, etc.</li> <li>The film shield protects the cable well against high-frequency interference, and the braided shield protects against low-frequency interference, that is, the two-layer shield provides reliable shielding of the cable core over the entire operating frequency range.</li> <li>To ensure the electrical continuity of the shield in case of accidental film breaks during laying and operation, a drain conductor was introduced into the structure of the shield.</li> </ul>

## Specifications

Operating temperature range: ..... -60°C to +150°C  
 Minimum operating time of cables 50 000 hours of which:  
 at elevated cable temperature of 155°C ..... 10 000 h  
 Cables service life ..... 20 years

## Design parameters

	<b>КИФЭФ-120 1x2x0.20</b>	<b>КИФЭФ-120 1x2x0.35</b>	<b>КИФЭФ-100 1x2x0.35</b>
Cross section, mm <sup>2</sup>	0.20	0.35	0.35
Self-surge impedance, Ω	120±10	120±10	100±20
Rated direct current electrical resistance of conductors, Ω/km, max.	81.3	48.1	48.1
Attenuation coefficient at sinusoidal current:			
- with frequency of 1 MHz, dB/m, max.	0.05	0.05	0.05
- with frequency of 3 MHz, dB/m, max.	0.06	0.06	0.06
Maximum cable diameter, mm	6.0	7.2	6.7
Cable weight, kg/m	56.3	76.9	59.2
Recommended data transmission standards	Standard TIA/EIA-485-A, CAN-protocol		LonWorks networks

## Design

- 1 Conductor** — of twisted tinned copper wires;
- 2 Insulation** is of PTFE;
- 3 Shield** is of copper tinned wires;
- 4 Insulation** is of PTFE.



# Connecting thermal and radiation resistant wires

МЛП, МЛПЭ, МЛТП, МЛТПЭ, МСТП, МСТПЭ

	МЛП	МЛПЭ	МЛТП	МЛТПЭ	МСТП	МСТПЭ
Regulatory documentation	TU 16-505.554-81					
National product classification code	35 8325 8000	35 8211 8200	35 8325 7700	35 8211 7900	35 8325 7300	35 8211 7600
Description	Connecting wire with lavsan and radiation grafted stabilized polyethylene insulation.	Same as МЛП, but shielded.	Connecting radiation and thermal resistant wire with lavsan and radiation grafted stabilized polyethylene insulation.	Same as МЛТП, but shielded.	Connecting radiation and thermal resistant wire with fiberglass and radiation grafted stabilized polyethylene insulation.	Same as МСТП, but shielded.
Application	<ul style="list-style-type: none"> <li>The wires are designed for mobile and fixed intra- and inter-device installation of electrical devices and output ends of electrical equipment at voltages up to 500 VAC, frequency up to 1000 Hz or 750 VDC.</li> <li>The wires can be used in equipment intended for operation in tropical conditions, provided that the wires are protected against direct exposure to sunlight.</li> </ul>					
Operating temperature range	-60°C to +100°C			-60°C to +150°C		

## Specifications

Test voltage without external influencing factors, V	
- for wire cross-sections from 0.08 to 0.12 mm <sup>2</sup> .....	1500
- for other cross sections .....	2000
Test voltage after external influencing factors, V	
- for wire cross-sections from 0.08 to 0.12 mm <sup>2</sup> .....	750
- for other cross sections .....	1000
Electrical insulation resistance of 1 m of length, MΩ, min.:	
- under normal climatic conditions.....	1x10 <sup>5</sup>
- at temperature of 35°C and relative humidity of 98%.....	1x10 <sup>4</sup>
Pulse voltage, V	
- for wire cross-sections from 0.08 to 0.12 mm <sup>2</sup> .....	350
- for other cross sections .....	750
Operating AC voltage with frequency of 1000 Hz, V.....	up to 500
Operating DC voltage, V .....	up to 750
Construction length, min., m.....	50



## Design

- Conductor** is of twisted tinned copper wires
- Insulation** is combined of:
  - one layer of lavsan and radiation grafted stabilized polyethylene (for МЛП);
  - double layer of lavsan and radiation grafted thermally-stabilized polyethylene (for МЛТП);
  - double layer of fiberglass or one layer of fiberglass and the second layer of lavsan and radiation grafted thermally-stabilized polyethylene (for МСТП).
- Shield (for МЛПЭ, МЛТПЭ, МСТПЭ)** is a braid of copper round tinned wires with a density of at least 70%.

## Design parameters

Nominal cross section of conductor, mm <sup>2</sup>	Conductor class as per GOST 22483-2012	МЛТП, МСТП			МЛТПЭ, МСТПЭ		
		Nominal diameter, mm	Estimated weight of 1 km of wire, kg		Nominal diameter, mm	Estimated weight of 1 km	
			МЛТП	МСТП		of wire, kg	МСТПЭ
0.08	4	1.20*	1.72	–	1.68*	7.11	–
0.12	4	1.35	2.39	2.66	1.83	7.81	8.08
0.20	4	1.56	3.58	3.83	2.04	9.07	9.40
0.35	5	1.81	5.48	5.76	2.29	11.20	11.40
0.50	5	2.00	7.03	7.38	2.48	14.50	14.08
0.75	4	2.21	10.00	10.40	2.69	21.20	21.50
1.00	4	2.36	12.30	12.80	2.84	23.60	24.10
1.50	4	2.66	17.70	18.30	3.14	29.20	29.08
2.50	5	3.40	29.20	29.60	4.00	41.30	41.60
4.00	4	4.14	43.90	44.30	4.74	64.20	64.40
6.00	4	5.00	64.50	64.90	5.60	87.40	87.80

\* Wires МСТП, МСТПЭ with a cross section of 0.08 are not manufactured

Nominal cross section of conductor, mm <sup>2</sup>	Conductor class as per GOST 22483-2012	МЛП		МЛПЭ	
		Nominal diameter, mm	Estimated weight of 1 km of wire, kg	Nominal diameter, mm	Estimated weight of 1 km of wire, kg
0.20	4	1.28	3.14	1.80	8.56
0.35	5	1.57	4.70	2.09	10.30
0.50	5	1.76	5.20	2.28	11.90
0.75	4	1.97	9.33	2.49	16.80
1.00	4	2.22	11.90	2.74	23.00

# Shielding metal braids

ПМЛ

	<b>ПМЛ</b>
Regulatory documentation	TU 4833-002-08558606-95
National product classification code	48 3387
Application	• Braids are designed for shielding wires, cables and other similar products.

## Design parameters

Wire grade	External dimensions, mm	Wire diameter, mm	Braiding density, %, min.	Weight, kg/km
<b>ПМЛ 2X4</b>	2x4	0.12	75	7.2
<b>ПМЛ 4X5</b>	4x5	0.12	75	8.8
<b>ПМЛ 3X6</b>	3x6	0.15	80	17.0
<b>ПМЛ 6X10</b>	6x10	0.15	80	34.0
<b>ПМЛ 10X16</b>	10x16	0.20	79.95	58.0
<b>ПМЛ 16X24</b>	16x24	0.30	80.4	125.0

Braid dimensions	<b>ПМЛ</b>			
	Minimum diameter of the shielded product, mm	Maximum diameter of the shielded product, mm	Braiding density, %	Weight of 1 km of braid in the delivery condition, max., kg
24x30	24	30	80	145.0
30x40	30	40	80	190.0
40x55	40	55	80	260.0



## Design

- ПМЛ** is a shielding metal braid of tinned copper wire.

# Shielding metal braids

ПМО-С, ПМО-Н, ПМО-Л



## ПМО-С, ПМО-Н, ПМО-Л

Regulatory documentation	TU 16.K05-045-2011
National product classification code	48 3387
Application	<ul style="list-style-type: none"> <li>Braids are designed for protection against electromagnetic fields and technical protection of both individual wires and cables, and bundles (harnesses) of wires and cables.</li> </ul>
Features	<ul style="list-style-type: none"> <li>ПМО braids are almost identical in their characteristics to traditional ПМЛ braids TU 4833-002-08558606-95, incl. in terms of shielding efficiency, while their mass is less by 45-70%.</li> </ul>

## Specifications

Operating temperature range:

- ПМО-С ..... -196 to +200°C
- ПМО-Н ..... -150 to +250°C
- ПМО-Л ..... -150 to +155°C

Minimum service life..... 25 years

## Design

**ПМО-С** is shielding metal braid of silver-plated copper wire;

**ПМО-Н** is shielding metal braid of nickel-plated copper wire;

**ПМО-Л** is shielding metal braid of tinned copper wire.

## Design parameters

Wire grade	External dimensions, mm	Wire diameter, mm	Braiding density, %, min.	Weight, kg/km	Electrical resistance, Ω/km
<b>ПМО-С,Н,Л</b>	2x4	0.06	70	3.6	50.0
<b>ПМО-С,Н,Л</b>	4x5	0.06	70	3.9	47.0
<b>ПМО-С,Н,Л</b>	3x6	0.06	70	6.1	35.0
<b>ПМО-С,Н,Л</b>	6x10	0.06	70	10.5	20.0
<b>ПМО-С,Н,Л</b>	10x16	0.08	70	26.8	11.0
<b>ПМО-С,Н,Л</b>	16x24	0.10	70	50.1	9.5
<b>ПМО-С,Н,Л</b>	24x30	0.12	70	83.2	7.5
<b>ПМО-С,Н,Л</b>	30x40	0.15	70	136.2	6.5

# Copper and copper nickel-plated wires with highly heat-resistant enamel insulation based on polyimides

ПЭТ-имид and ПНЭТ-имид

	ПЭТ-имид	ПЭТ-имид 1st grade	ПНЭТ-имид	ПНЭТ-имид 1st grade
Regulatory documentation	TU 16-505.489-78			
National product classification code	35 9118 0100	35 9118 0900	35 9118 0200	35 9118 1000
Description	<ul style="list-style-type: none"> <li>Copper wire, highly heat-resistant, coated with enamel polyimide insulation</li> </ul>		<ul style="list-style-type: none"> <li>Copper wire, nickel-plated, highly heat-resistant, coated with enamel polyimide insulation</li> </ul>	
Application	<ul style="list-style-type: none"> <li>The wires are intended for use in electrical machines, apparatus and devices.</li> </ul>			
Operating temperature range	<ul style="list-style-type: none"> <li>The minimum ambient temperature allowed during the operation of the wires is minus 60°C</li> </ul>			

## Specifications

Temperature index.....220°C

## Design parameters

Wire nominal diameter, mm	ПЭТ-имид, ПНЭТ-имид		ПЭТ-имид	ПНЭТ-имид
	Design outer diameter, mm		Estimated weight of 1 km of wire, kg	Estimated weight of 1 km of wire, kg
0.090	0.105		0.0591	0.0594
0.100	0.117		0.0741	0.0745
0.112	0.130		0.0919	0.0924
0.120	0.139		0.1056	0.1061
0.125	0.144		0.1142	0.1146
0.130	0.150		0.1235	0.1240
0.140	0.160		0.1427	0.1433
0.150	0.172		0.1653	0.1659
0.160	0.182		0.1874	0.1881
0.170	0.194		0.2110	0.2117
0.180	0.204		0.2361	0.2368
0.190	0.216		0.2622	0.2630
0.200	0.226		0.2900	0.2908
0.210	0.238		0.3190	0.3199
0.224	0.252		0.3656	0.3666
0.236	0.267		0.4060	0.4070
0.250	0.281		0.4539	0.4549
0.265	0.297		0.5093	0.5104
0.280	0.312		0.5661	0.5672
0.300	0.334		0.6499	0.6514
0.315	0.349		0.7136	0.7152
0.335	0.372		0.8073	0.8091
0.355	0.392		0.9045	0.9064



## Design

### ПЭТ-имид

- Conductor** is copper wire TU 16-705.492-2005
- Insulation** is polyimide varnish АД-9103 TU 6-19-283-85

### ПНЭТ-имид

- Conductor** is nickel-plated copper wire TU 16-505.939-76
- Insulation** is polyimide varnish АД-9103 TU 6-19-283-85

## Design parameters

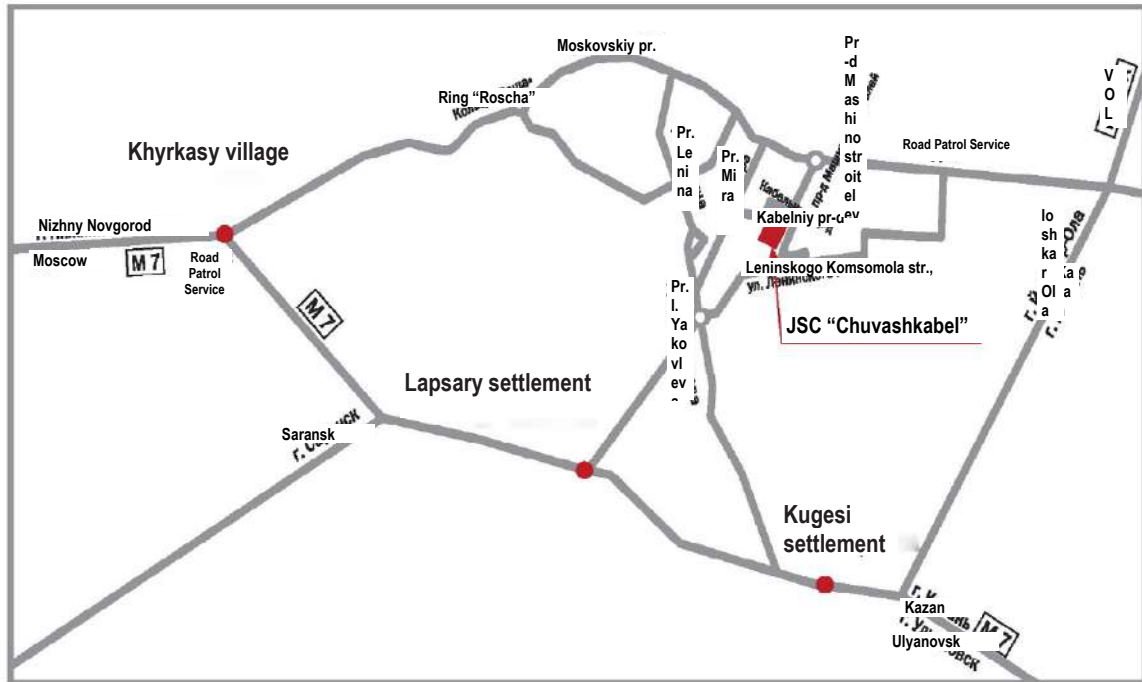
Wire nominal diameter, mm	ПЭТ-имид, ПНЭТ-имид	ПЭТ-имид	ПНЭТ-имид
	Design outer diameter, mm	Estimated weight of 1 km of wire, kg	Estimated weight of 1 km of wire, kg
0.380	0.419	1.0293	1.0314
0.400	0.439	1.1438	1.1460
0.425	0.466	1.2918	1.2942
0.450	0.491	1.4432	1.4456
0.475	0.519	1.6083	1.6109
0.500	0.544	1.7904	1.7930
0.530	0.576	2.0097	2.0126
0.560	0.606	2.2397	2.2426
0.600	0.649	2.5677	2.5727
0.630	0.679	2.8275	2.8309
0.670	0.722	3.1950	3.1987
0.690	0.742	3.3868	3.3906
0.710	0.762	3.5830	3.5869
0.750	0.804	3.9933	3.9984
0.770	0.825	4.2092	4.2145
0.800	0.855	4.5407	4.5462
0.830	0.887	4.8848	4.8905
0.850	0.909	5.1202	5.1259
0.900	0.959	5.7365	5.7427
0.930	0.990	6.1224	-
0.950	1.011	6.3858	-
1.000	1.062	7.1181	-
1.060	1.123	7.9860	-
1.080	1.144	8.2903	-
1.120	1.184	8.9102	-
1.180	1.245	9.8798	-
1.250	1.316	11.0788	-
1.320	1.387	12.3397	-
1.400	1.468	13.8738	-
1.450	1.519	14.8754	-
1.500	1.569	15.9118	-
1.560	1.630	17.2017	-
1.600	1.670	18.0868	-
1.700	1.771	20.4015	-
1.800	1.872	22.8623	-
1.900	1.973	25.4958	-
2.000	2.074	28.2388	-
2.120	2.196	31.7367	-
2.240	2.316	35.4312	-
2.360	2.440	39.2961	-
2.440	2.520	42.0055	-
2.500	2.580	44.0967	-

# Notes

Area with horizontal dotted lines for notes.



## Location map



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