

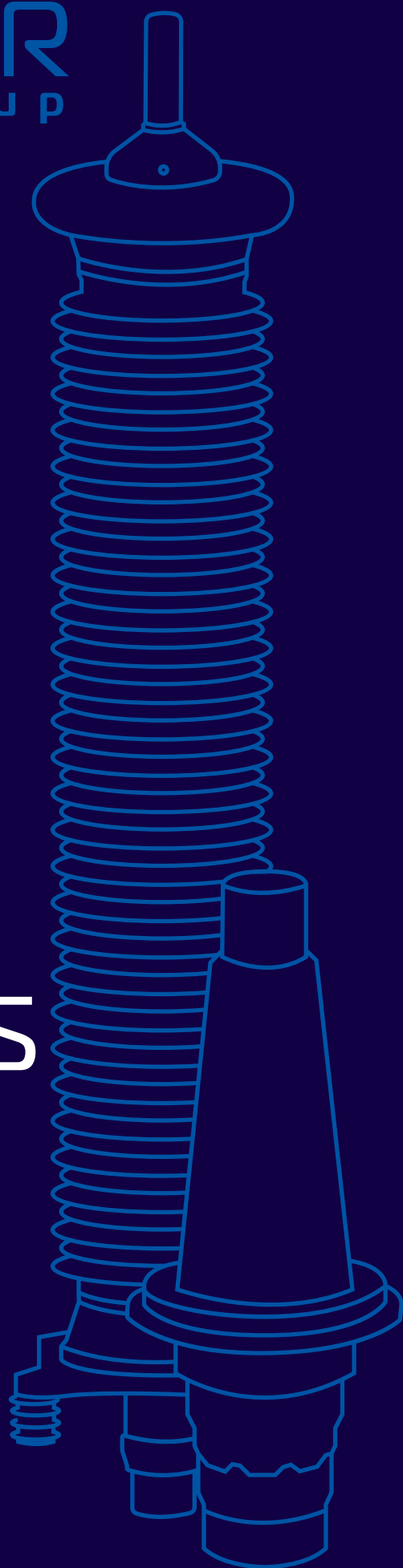


IZOLYATOR
group

HIGH VOLTAGE CABLE ACCESSORIES “IZOLYATOR-AKS”

VOLTAGE CLASSES
110-500 KV

2025





“Izolyator” is an international multi-product industrial group of companies, the main activities of which are design, production, sales, after-sales technical support and factory repair of high voltage AC/DC insulating equipment, including ultra-high voltage classes.

The whole history of origin and development of Russian high-voltage bushings as a class of electrical equipment is inextricably linked with the Izolyator plant founded in 1896. Over the century-long history, the Izolyator Group of Companies has accumulated vast experience of participation in the most large-scale national and international energy projects, experience of successful solution of the most complex scientific, technical, production and technological tasks.

“Izolyator” is an official supplier of the largest electrical and power engineering companies in the world, including nuclear power.

The Izolyator-VV production complex is a leading scientific and technical partner of the Russian National Committee of the International Council on Large High Voltage Electrical Systems (CIGRE). The National Research Committee D1 “Materials and Development of New Test Methods and Diagnostic Tools” operates on the basis of the complex.

Dr. Alexander Slavinsky

Head of Izolyator Group

Century-long experience technologies of the future



Our mission

By contributing to a stable and reliable energy supply, we help everyone realize their potential.

Our vision

We strive to be one of the world's leading companies in the industry and help fill the world with energy and light by creating quality power in different parts of the world through smart and forward-looking solutions in the power industry.



Social responsibility

We build our social policy on the basis of a harmonious combination of the interests of the company's owners, employees, local communities and society as a whole, while strictly complying with the laws of the Russian Federation.

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Introduction



The entrance group of Izolyator-AKS plant

Izolyator Group is the flagship of the domestic production of high-voltage cable connectors, including ultra-high voltage classes.

Over the century-long history, we have accumulated vast experience in the design and manufacture of cable glands for connection of transformers, as well as collected knowledge and accumulated practical skills in working with compounds, RIN-insulation and siliconorganic elastomers.

At the end of 2018, as part of the implementation of the state policy of import substitution, the management of the Izolyator Group of Companies decided to organize the "Cable Accessories for High and Extra High Voltage" business line. For its practical implementation, a new company, Izolyator-AKS LLC, was registered in April 2019.

Already in April 2020, the factory built from scratch produced its first products. Thus, Izolator-AKS LLC began to produce high quality cable accessories for cables with core cross-section up to 3000 mm² and for voltage classes 110–500 kV using innovative developments and equipment. By the end of 2020, the products of the Izolyator-AKS plant had successfully passed type tests, including a test for sealing.

In 2021, mechanical and climatic tests were completed. In June 2022, prequalification tests of cable accessories for 220 kV voltage class were completed.

In September 2022, cable accessories for the 220 kV voltage class were certified by PJSC Rosseti, in December cable accessories for the 110 kV voltage class were certified, and in May 2023 cable accessories for the 500 kV voltage class were certified.



Making a stress cone



Stress cones

Core business



Removal of a 110 kV deflector from a mold

Izolyator-AKS is a part of the Izolyator Group of Companies, a world leader in the development and production of high-voltage bushings, a company with a century-long history.

Izolyator-AKS is a manufacturer of innovative and high-tech cable accessories (cable joints and terminations, dry cable connectors) for high and extra-high voltage classes from 110 to 500 kV for power facilities in Russia, near and far abroad.

High-voltage cable accessories are used for connection and termination of cable lines and are widely used in construction and repair of power transmission lines.

The Izolyator-AKS plant carries out development, production, testing, delivery, installation and service maintenance of high-voltage cable accessories. The quality management system of these activities is certified and meets the requirements of ISO 9001:2015 international standard.

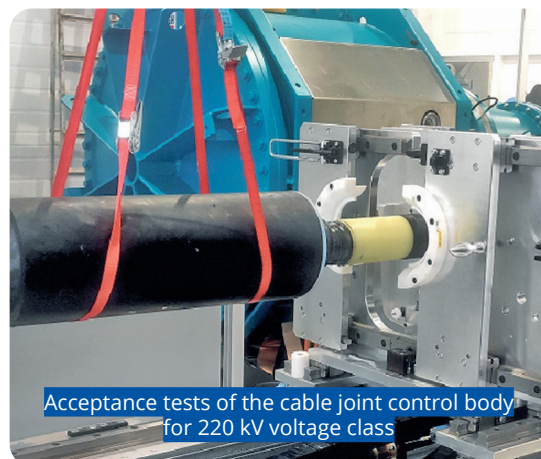
The company is a collective member of the Non-commercial partnership of cable manufacturers "International Association "Electrocable".



Stress cones and control bodies for terminations, cable joints and cable connectors



Deflectors for terminations and cable joints



Acceptance tests of the cable joint control body for 220 kV voltage class

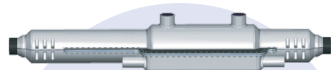
Cable accessories “IZOLYATOR-AKS”

CABLE ACCESSORIES FOR 110–500 kV VOLTAGE CLASSES

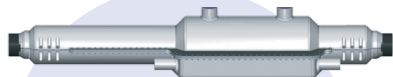
The Isolyator-AKS plant designs and manufactures high-voltage cable accessories for voltage classes from 110 to 500 kV for cable cross-section from 185 to 3000 mm² — a new business line of the Izolyator Group of Companies.

We produce cable accessories of all types for cables with cross-linked polyethylene insulation: cable connectors for connection of a power cable with an SF₆ gas-insulated switchgear or a transformer (IKV), outdoor terminations with composite insulator for transition of overhead power line into cable one (IKM), including dry terminations (ISKM), cable joints with direct connection of shields (ISM) and with separation of shields — transposition (ISMR).

CABLE JOINTS



ISM-126 (-172)
ISMR-126 (-172)
Max. operating voltage 126/172 kV
Cross-sections of cable cores for accessories, 185–2500 mm²



ISM-252
ISMR-252
Max. operating voltage 252 kV
Cross-sections of cable cores for accessories, 400–2500 mm²



ISM-550
ISMR-550
Max. operating voltage 363/550 kV
Cross-sections of cable cores for accessories, 500–3000 mm²

TERMINATIONS



IKM-126 (-172)
ISKM-126 (-172)
Max. operating voltage 126/172 kV
Cross-sections of cable cores for accessories, 185–2500 mm²



IKM-252
ISKM-252
Max. operating voltage 252 kV
Cross-sections of cable cores for accessories, 400–2500 mm²



IKM-550
Max. operating voltage 363/550 kV
Cross-sections of cable cores for accessories, 500–3000 mm²

CABLE CONNECTORS



IKV-126 (-172)
Max. operating voltage 126/172 kV
Cross-sections of cable cores for accessories, 185–2500 mm²



IKV-252
Max. operating voltage 252 kV
Cross-sections of cable cores for accessories, 400–2500 mm²



IKV-550
Max. operating voltage 363/550 kV
Cross-sections of cable cores for accessories, 500–3000 mm²

Advantages of cable accessories



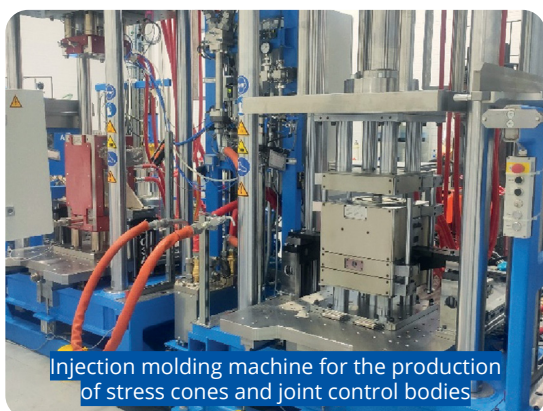
In-house development and optimization of cable accessories design is underway, taking into account the requirements and demands of the market. The production of semiconducting elements (deflectors) and reinforcing insulation of silicone stress cones and cable joint control bodies is carried out by trained highly qualified personnel on the most modern injection molding machines that ensure the highest quality and reliability of products due to vacuum preparation of the material.



High localization of components with strict selection of suppliers was achieved in order to ensure world-class quality of supplied products and significantly reduce the dependence of production on sanctions and other political and economic risks.

The use of the latest technologies has made it possible to reduce the weight and size parameters of the cable sleeve control bodies, while increasing their operational reliability. A qualified and multidimensional approach to the development and production of cable accessories allowed our company to:

- optimize prices for products;
- shorten production and delivery times;
- simplify installation and reduce the cost of related construction works.



In the company's laboratory, equipped with the latest technology, all manufactured stress cones of terminations and cable connectors, as well as cable joint control bodies, are subjected to acceptance tests with increased voltage with measurement of the partial discharge level, which should not exceed 5 pC.



Laboratory for acceptance testing of cable fittings

The company has established a multifunctional service center, which performs:

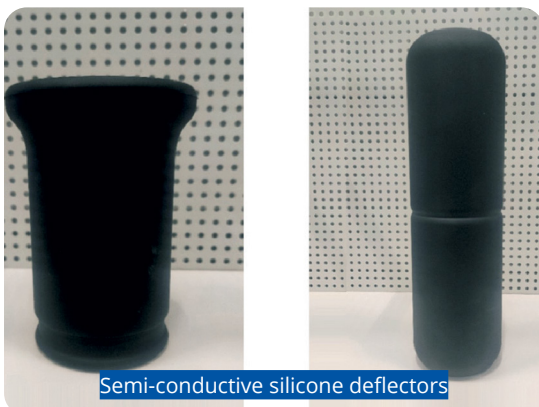
- conducting seminars and trainings for the personnel of customers and installation organizations on the technology of cable preparation and installation of cable accessories "Izolyator- AKS" (cable joints, terminations, cable connectors from 110 to 500 kV);
- supervising the processes of cable preparation and installation of accessories;
- installation of all types of manufactured cable accessories;
- technical support of partners, customers, designers, installation organizations and enterprises operating cable accessories manufactured by Izolyator-AKS.



Test bench for testing of fittings for 110–500 kV voltage classes

Cable connectors of the IKV type are intended for connection of high-voltage cable lines of voltage classes 110, 150, 220, 330 and 500 kV to GIS cells and transformers. Outdoor terminations with composite insulator of the IKM type are hermetic terminations designed for overhead connection of cable lines of voltage classes 110, 150 and 220, 330 and 500 kV with power supply system elements.

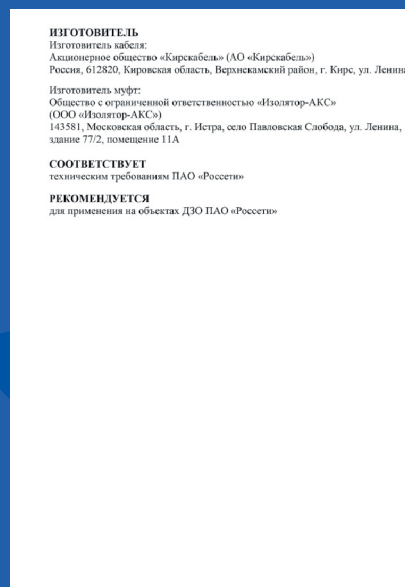
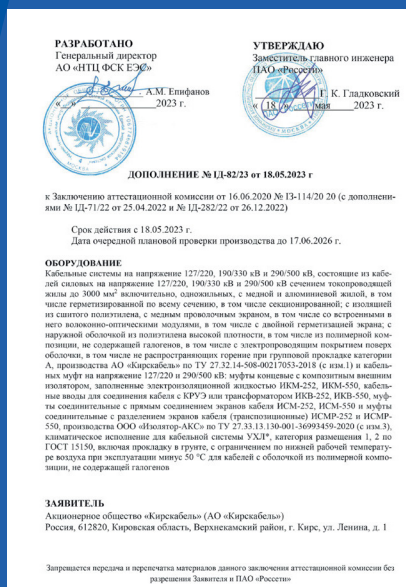
Outdoor dry terminations with composite insulator of the ISKM type are hermetic dry self-supporting terminations designed for overhead connection of cable lines of voltage classes 110, 150, 220 kV with power supply system elements.



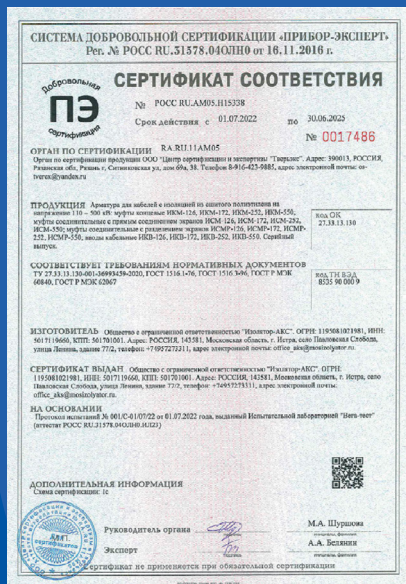
Semi-conductive silicone deflectors

Cable joints of the ISM type with direct connection of shields and cable joints of the ISMR type with separation (transposition) of shields are designed to connect high-voltage cables with crosslinked polyethylene insulation of voltage classes 110, 150, 220, 330 and 500 kV.

Certification and testing



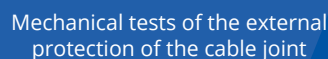
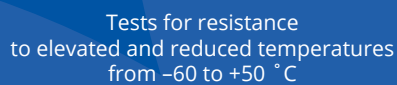
Certification of 550 kV cable accessories by Rosseti PJSC



Certification for compliance with the requirements of regulatory documents



Certification of the quality management system for compliance with the requirements of GOST R ISO 9001-2015 (ISO 9001:2015)



Cable connectors

Cable connectors of the IKV type are designed for connection of high-voltage cable lines of voltage classes 110, 220, 330 and 500 kV to GIS cells and transformers.

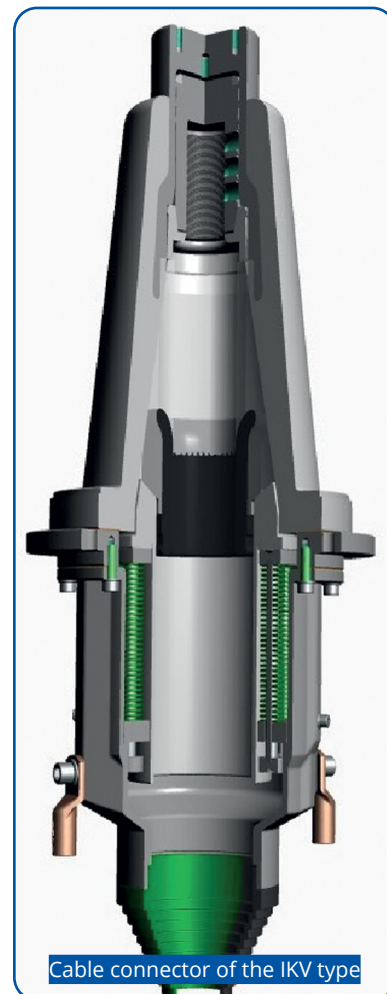
The connectors are mounted on power cable with copper or aluminum core and cross-linked polyethylene insulation. The connection dimensions of the cable connectors are fully compliant with IEC 62271-209.

Product characteristics	IKV-126	IKV-172	IKV-252	IKV-550
Max. operating voltage U_m , kV	126	172	252	363/550
Rated voltage U_o / U , kV	64/110	76/132; 87/150	127/220	190/330 290/500
Lightning impulse voltage, kV	550	750	1050	1550
Test voltage $2.5 U_o$ of industrial frequency 50 Hz, 30 min., kV	160	190; 218	318	580 (60 min.)
Partial discharge level at $1.5 U_o$, pC	no more than 5	no more than 5	no more than 5	no more than 5
Cable core cross-sections, mm ²	185–250	185–250	400–2500	500–3000
Diameter range of prepared cable insulation, mm	43.2–94.8	43.2–94.8	67.0–115.0	81.1–135.0
Maximum diameter of cable sheath, mm	124	124	140	166
Climatic version	NF 1 (UHL)	NF 1 (UHL)	NF 1 (UHL)	NF 1 (UHL)
Operating temperature, °C	–60...+50	–60...+50	–60...+50	–60...+50
Required temperature during installation, °C	+15...+40	+15...+40	+15...+40	+15...+40
Length of the “dry-type” (“oil-filled type”) cable connector, L, mm	967 (1252)	967 (1252)	1079 (1419)	1520 (1960)
Depth of the “dry-type” (“oil-filled type”) cell input, C, mm	470 (757)	470 (757)	620 (960)	960 (1400)
Diameter of the “dry type” cell (“oil-filled type”), D, mm	249	249	480	415
Net weight without extension adaptor (nominal), kg	60	60	90	180

All values are nominal and need to be specified when ordering accessories.

Cable connector design

- epoxy insulator (bushing) which can be supplied with an extension adapter, depending on the version of the GIS or transformer;
- bolted tip with breakaway heads (no special tools required);
- silicone stress cone;
- spring block, which ensures a tight fit of the stress cone to the insulator;
- flange, which presses the insulator to the GIS cell;
- cable sealing and alignment unit in the cable connector.



Outdoor terminations

Outdoor terminations of the IKM type with a composite insulator are hermetic terminations designed for overhead connection of cable lines with power supply system elements.

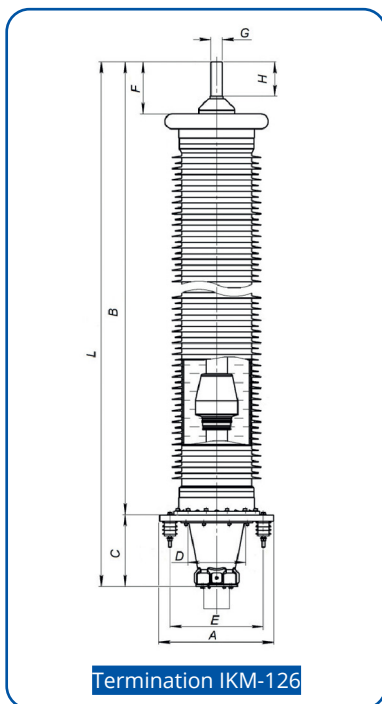
The terminations are used for outdoor and indoor installation on cables with cross-linked polyethylene insulation for voltage classes 110, 150, 220, 330 and 500 kV.

Product characteristics	IKM-126	IKM-172	IKM-252	IKV-550
Max. operating voltage U_m , kV	126	172	252	363/550
Rated voltage U_o / U , kV	64/110	76/132; 87/150	127/220	190/330; 290/500
Lightning impulse voltage, kV	550	750	1050	1550
Test voltage $2.5 U_o$ of industrial frequency 50 Hz, 30 min, kV	160	190; 218	318	580 (60 min.)
Partial discharge level at $1.5 U_o$, pC	no more than 5	no more than 5	no more than 5	no more than 5
Cross-sections of cable cores, mm ²	185–250	185–250	400–2500	500–3000
Diameter range of prepared cable insulation, mm	43.2–94.8	43.2–94.8	67.0–115.0	81.1–135.0
Maximum diameter of cable sheath, mm	124	124	140	166
Climatic version	NF 1 (UHL)	NF 1 (UHL)	NF 1 (UHL)	NF 1 (UHL)
Operating temperature, °C	–60...+50	–60...+50	–60...+50	– 0...+50
Required temperature during installation, °C	+15...+40	+15...+40	+15...+40	+15...+40
Maximum tilt angle from vertical, deg	30 (45)	30	30	30
Pollution class according to IEC 60815, GOST 9920-89	III–IV	III–IV	III–IV	III–IV
Leakage current path length, mm	4220	5300	8690	22 000
Maximum insulator bending force, kN	5.2	5	7.4	8
Length, L, mm	2225	2455	3505	6846
Width, A, mm	470	470	610	945
B, mm	1835	2065	3125	6496
C, mm	390	390	382	400
Cup diameter, D, mm	140	140	328	356
Securing hole spacing, E, mm	400 (345)	400 (345)	500 (400)	800
F, mm	279	279	279	–
Contact part diameter, G, mm	50 (60)	50 (60)	50 (60)	50 (60)
Contact part length, H, mm	185	185	185	185
Net weight (nominal), kg	165	165	362	960

All values are nominal and need to be specified when ordering accessories.

Termination design

- bolted tip with breakaway heads (no special tools required);
- head fitting;
- gray composite insulator (fiberglass pipe with silicone skirts);
- silicone stress cone;
- dielectric fluid (does not require heating before pouring);
- joint base;
- cable sealing and alignment unit in the joint.



Outdoor dry terminations

Outdoor dry terminations of the ISKM type with composite insulator are hermetically sealed dry self-supporting terminations designed for overhead connection of cable lines with power supply system elements.

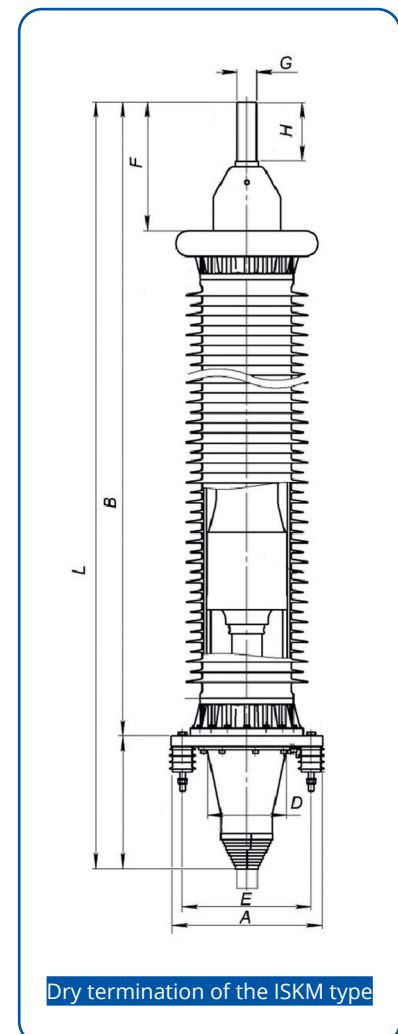
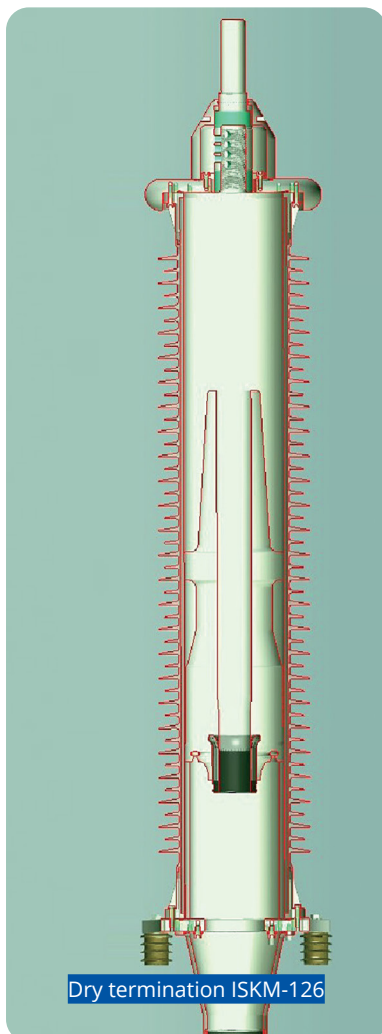
The terminations are used for outdoor and indoor installation at any angle on cables with crosslinked polyethylene insulation for voltage classes 110, 150 and 220 kV.

Product characteristics	ISKM-126	ISKM-172	ISKM-252
Max. operating voltage U_m , kV	126	172	252
Rated voltage U_o / U , kV	64/110	76/132; 87/150	127/220
Lightning impulse voltage, kV	550	750	1050
Test voltage $2.5 U_o$ of industrial frequency 50 Hz, 30 min., kV	160	190/218	318
Partial discharge level at $1.5 U_o$, pC	no more than 5	no more than 5	no more than 5
Cross-sections of cable cores, mm ²	185–2500	185–2500	400–2500
Diameter range of prepared cable insulation, mm	50,5–95,0	50,5–95,0	76–115
Maximum diameter of cable sheath, mm	140	140	140
Climatic version	NF 1 (UHL)	NF 1 (UHL)	NF 1 (UHL)
Operating temperature, °C	–60...+50	–60...+50	–60...+50
Required temperature during installation, °C	+15...+40	+15...+40	+15...+40
Maximum angle of inclination from the vertical, deg.	180	180	180
Pollution class according to IEC 60815	III–IV	III–IV	III–IV
Leakage current path length, mm	6417	6417	8690
Maximum insulator bending force, kN	3	3	4,3
Length, L, mm	2667	2667	3577
Width, A, mm	470	470	710
B, mm	2255	2255	3195
Cup diameter, D, mm	245	245	300
Securing hole spacing, E, mm	400 (345)	400 (345)	600 (400)
F, mm	400	400	400
Contact part diameter, G, mm	50 (60)	50 (60)	50 (60)
Contact part length, H, mm	185	185	185
Net weight (nominal), kg	97	97	391

All values are nominal and need to be specified when ordering accessories.

Dry termination design:

- bolted tip with breakaway heads (no special tools required);
- head fitting;
- gray composite insulator (fiberglass pipe with silicone skirts);
- silicone stress cone;
- joint base;
- cable sealing and alignment unit in the joint.



Cable joints

Cable joints of the ISM type with straight connection of screen and cable joints of the ISMR type with screen interruption (transposition) are designed to connect high-voltage cables with cross-linked polyethylene insulation of voltage classes 110, 150, 220, 330 and 500 kV.

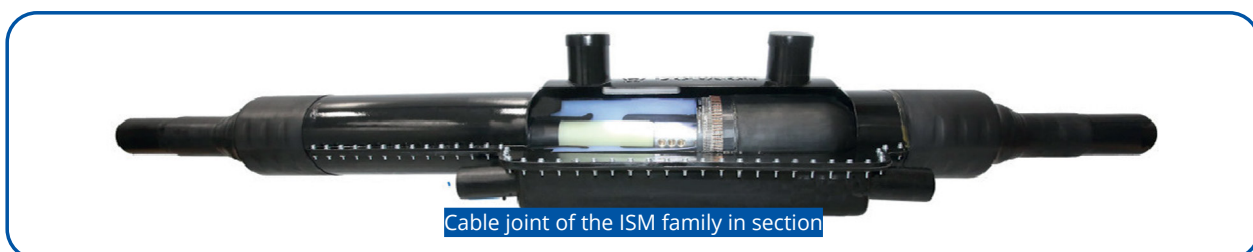
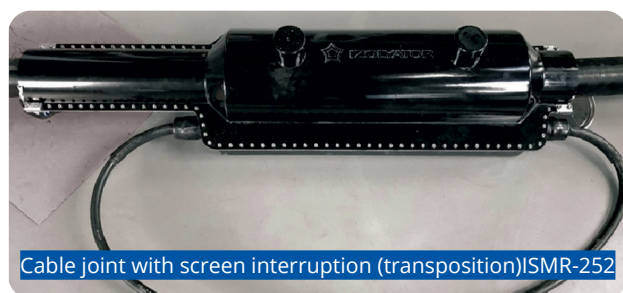
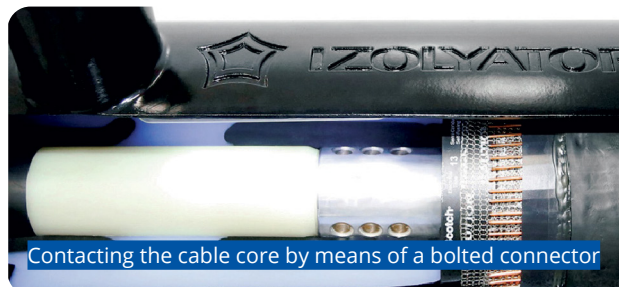
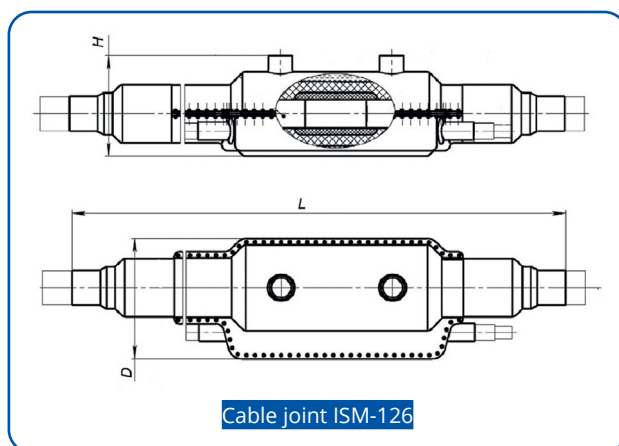
The main design element of the cable joints is a silicone control body, which undergoes highvoltage testing in factory conditions. The mounted joint body is protected from external influences by a durable fiberglass casing filled with hydrophobic compound.

Product characteristics	ISM(R)-126	ISM(R)-172	ISM(R)-252	ISM(R)-550
Max. operating voltage U_m , kV	126	172	252	363/550
Rated voltage U_o / U , kV	64/110	76/132; 87/150	127/220	190/330; 290/500
Lightning impulse voltage, kV	550	750	1050	1550
Test voltage $2,5 U_o$ of industrial frequency 50 Hz, 30 min., kV	160	190/218	318	580 (60 min.)
Partial discharge level at $1.5 U_o$, pC	no more than 5	no more than 5	no more than 5	no more than 5
Cross-sections of cable cores, mm ²	185–2500	185–2500	400–2500	500–3000
Diameter range of prepared cable insulation, mm	46.0–94.7	46.0–94.7	65.7–118.1	79.2–139.8
Maximum diameter of cable sheath, mm	124	124	140	166
Climatic version	NF 1 (UHL)	NF 1 (UHL)	NF 1 (UHL)	NF 1 (UHL)
Operating temperature, °C	–60...+50	–60...+50	–60...+50	–60...+50
Required temperature during installation, °C	+15...+40	+15...+40	+15...+40	+15...+40
Length of the “dry-type” (“oil-filled type”) cable connector, L, mm	967 (1252)	967 (1252)	1079 (1419)	1520 (1960)
Depth of the “dry-type” (“oil-filled type”) cell input, C, mm	470 (757)	470 (757)	620 (960)	960 (1400)
Diameter of the “dry type” cell (“oil-filled type”), D, mm	249	249	480	415
Net weight without extension adaptor (nominal), kg.	60	60	90	180

All values are nominal and need to be specified when ordering accessories.

Cable joint design:

- bolted connector with breakaway heads (no special tools required);
- silicone control body;
- mounting tapes;
- compound (provides increased mechanical protection and sealing);
- fiberglass cover;
- heat-shrinkable components.



Cable form

Project name	
Customer	
Cable type	
Manufacturer	
Date	
Contact details	



1. Conductive core

Core material	aluminum/copper
Core shape segmented	round solid drawn round multiwire round multiwire
Cross-section, mm ²	
Core diameter, mm	minimum /maximum
Diameter of the core PP shield, mm	minimum /maximum

2. Insulation

Insulation material	CLP / ethylene propylene rubber
Insulation diameter, mm	minimum /maximum
Insulation thickness, mm	

3. Semi-conductive insulation shield

Type of the PP shield	extruded / easy removable
Diameter of the PP shield, mm	minimum/maximum
Thickness of the PP shield, mm	

4. Metal shield

Material	aluminum/copper
Shield type	copper round wire copper flat wire copper corrugated copper ribbon lead sheath aluminum corrugated sheath
Cross-section, mm ²	
Metal shield diameter, mm	
Optical fiber in the tube	yes / no

5. Intermediate sheath

Material	PE/PVC
Diameter, mm	
Thickness, mm	
Laminated layer, material	aluminum/copper

6. Armoring

Material	aluminum/copper/steel
Type	ribbon / flat wire / round wire
Armoring diameter, mm	

7. Outer shea

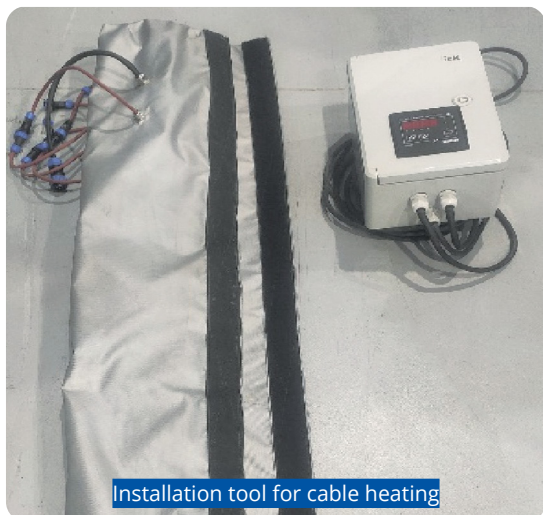
Material	PE / high density PE / pvc
Diameter, mm	
Thickness, mm	
PP layer on the sheath	yes / no

8. Power grid parameters

Rated voltage, kV	
Maximum operating voltage, kV	
Rated lightning impulse voltage, kV	
Core short-circuit current, kA	
Shield short-circuit current, kA	

Requirements for installation of cable accessories

Taking into account the special importance of qualitative installation of cable accessories to ensure their safety and reliability in operation and to minimize the risk of errors, installation should be carried out only by trained personnel in the presence of the chief engineer of "Izolyator-AKS".

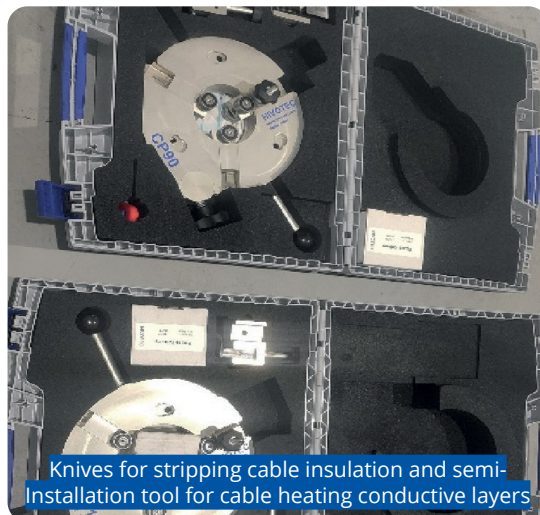


Installation tool for cable heating

Work on installation of cable accessories should be carried out in a prepared workplace at a temperature not lower than +15 °C, humidity not more than 65 %, and with sufficient electric lighting and power to connect the installation tool.

The workplace for installation should be protected from dust, dirt and precipitation.

The cable must be properly prepared, i.e. heated and straightened, before cutting and installation. Immediately at a distance up to 1 m from the input to the cable accessories, the cable must be straight and coaxial with the joint.



Knives for stripping cable insulation and semi-conductive layers
Installation tool for cable heating conductive layers

At the input into a termination, a cable connector or a steel structure-mounted cable joint, the cable must be secured in a straight section with at least two clamps: the first clamp at a distance of approx. 0.9 m from the joint input, the second clamp at a distance of approx. 1 m from the first clamp.

The construction for installing the termination shall have a gap for cable input and avoiding a closed loop of magnetic material around the one phase cable.

For further information on all questions concerning the design, manufacture and installation of Izolyator-AKS cable accessories, please contact us at office_aks@mosizolyator.ru

Izolyator Group of Companies



Production and sales

Izolyator-VV Production Complex

High-voltage AC/DC bushings manufactured in Russia, including ultrahigh voltage classes.

MIM Company

Manufacturing and testing of high voltage bushings in India, sales and after sales support in South Asian countries.

Izolyator-AKS Plant

Designing, manufacturing, testing and technical support of cable accessories for 110–500 kV voltage classes, including development of designs according to individual requirements.

Representative office of Izolyator Group of Companies in Uzbekistan

Sales of high-voltage equipment manufactured by Izolyator Group of Companies and development of cooperation in Central Asian countries.



Service

After-sales technical support of Izolyator high voltage bushings and Izolyator-AKS cable accessories at all stages of the life cycle, diagnostics of high voltage equipment of other manufacturers.



Science

Designing, prototyping and mastering in series production of highvoltage bushings, including development of advanced technologies and designs according to individual requirements.



Testing

Testing of Izolyator AC/DC high-voltage bushings, testing of Izolyator-ACS cable accessories, testing of high-voltage equipment of other manufacturers in accordance with the scope of accreditation according to the international standard ISO/IEC 17025:2017 (GOST ISO/IEC 17025-2019).



University

Advanced training for employees of the Izolyator Group of Companies and partner companies in full-time and distance learning on the basis of a license from the Ministry of Education of the Moscow Region.

Bushings of 10–1150 kV voltage classes

The Izolyator Group of Companies designs, manufactures, maintains and repairs AC/DC high voltage bushings of voltage classes from 10 to 1150 kV for use in “oil — air”, “oil — oil”, “air — air”, “SF6 gas — air”, “oil — SF6 gas”, “liquid nitrogen — air” operating environments.

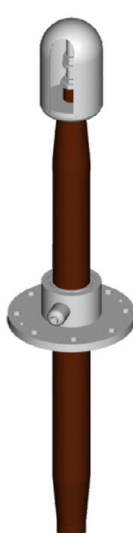
Innovative products

In the design of the majority of manufactured bushings the most perfect, solid internal insulation is used, which has high reliability and long service life.

There are two types of solid insulation: RIP and RIN. The RIN insulation is extremely hydrophobic and resistant to atmospheric moisture, which practically eliminates moisture in the insulation. The following are available as outer insulation: porcelain cover, polymer insulation directly applied to the inner insulation, composite cover with external silicone fins.



“Oil — air”
bushings for
oil switches



“Oil — oil”
bushings
for cable
connection of
transformers



“Oil — SF6 gas”
bushings for
GIS



“Air —
air” wall
bushings



“Oil — air”
bushings
for power
transformers
and shunt
reactors



Bushings
“SF6 gas —
air” for GIS



Bushings
“Oil — air”,
“air — air” for
DC systems



“Liquid
nitrogen —
air” bushings
for super-
conductor
current limiters



High current
“oil — air”
bushings
for power
transformers

Voltage:
35–220 kV
Current:
1000–3150 A
Insulation:
RIP or RIN

Voltage:
66–500 kV
Current:
630–2000 A
Insulation:
RIP or RIN

Voltage:
110–500 kV
Current:
800–3150 A
Insulation:
RIP or RIN

Voltage:
66–220 kV
Current:
2000–4000 A
Insulation:
RIP or RIN

Voltage:
10–1150 kV
Current:
315–5000 A
Insulation:
RIP or RIN
(up to 550 kV)

Voltage:
110 kV
Current: 2000 A
Insulation:
RIP or RIN

Voltage:
±110–820 kV
Current:
1800–5400 A

Voltage:
up to 220 kV
Current:
up to 1250 A

Voltage:
20–35 kV
Current: 6–20 kA



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SUSTAINABLE POWER SUPPLY

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Profile
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of Companies



Reference list
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