



GLASS INSULATORS FOR 10–1150 kV OVERHEAD LINES AND SUBSTATIONS

Products catalogue
2019



GLOBAL INSULATOR GROUP

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GLOBAL INSULATOR GROUP

Global Insulator Group (GIG) is an international industrial holding investing in production and development in the field of glass, composite, porcelain insulation and line fittings. The basic enterprises – Yuzhnouralsky Insulators and Fittings Plant, YuAIZ AO (Russia), Lviv Insulator Company LLC (Ukraine), Kazakh Insulators and Fittings Plant (Kazakhstan), and modern production of composite insulators GIG Polymer (Estonia).

Suspension disc-type glass insulators – 13 million units per year. Suspension string toughened glass insulators for HVTL and substations for the voltage range of 35–1150 kV for AC systems and up to 800 kV for DC lines as well.

Porcelain insulators – 7 000 ton per year. Porcelain insulators for HVTL for the voltage range of 0.4–20 kV and for 0.4–110 kV substations.

Composite insulators – 500 000 units per year. Line suspension insulators for voltage of 15–765 kV, pin insulators for traction lines, line post insulators, post insulators for substations and hardware-controlled insulators for 765 kV.

High-voltage transmission and distribution line fittings – 4 000 ton per year, for 35–1150 kV HVTL.

More than 300 companies from Russia, the CIS countries and from more than 100 countries of Europe, America, Africa, Middle East, Asian-Pacific region are the constant consumers of the holding's products. The wide geography of deliveries provides manufacturing of the insulation units for different environmental conditions.

The new constructive designs are based on the 60-year-old operating experience in the field of insulation at the important high-voltage objects in harsh environmental conditions. Thanks to constant cooperation of **GIG** technical centre with the TL service departments there were developed the products with special requirements: Super-FOG glass insulators, glass insulators with a waterproof (composite) coating, insulators for DC lines, pin glass-porcelain insulators, seamless composite insulators for HVTL and substations up to 500 kV, line fittings for tight and high-temperature conductors.

The products of **Global Insulator Group** comply with the quality management systems of ISO 9001, 14001, and 18001. The products are subjected to testing in the factory laboratories and international independent test centers to confirm the customer's requirements and national standards.

Technical support of the **GIG** clients is carried out by the technical consulting service "GIG-Operation division".

Yuzhnouralsky Insulators and Fittings Plant (YuAIZ AO)

Yuzhnouralsky Insulators and Fittings Plant (YuAIZ AO) was founded in 1957 and now it is a unique enterprise in the energy sector, uniting several production facilities in the same area: glass insulator production, ceramic insulator production, forging and casting workshops.

In 1996 the quality management system in compliance with ISO 9001 was implemented on the plant; and in 2009 the company's planned development made the compliance with the new version of ISO 9001:2008 possible. Test Centre of YuAIZ AO has been accredited by the Federal Agency for Technical Regulation and Metrology, and meets requirements of the Russian State standard GOST R ISO/IEC 17025:2006 and international standard ISO/IEC 17025:2005.

Environmental management system and Labor protection system meet the requirements of international standards ISO 14001:2004 and BS OHSAS 18001:2007 respectively.

As part of the investment program the new glass furnace was installed in 2006. In the beginning of 2008 WALTEC production line for the manufacturing of glass insulating parts was put into operation (second WALTEC line was installed in 2013). Today the comprehensive modernization process of the enterprise is continuing. The production of YuAIZ is subjected to type and periodical tests in independent national and international test centers. The plant has the possibility to carry out additional tests according to the special requirements of the customers.

Lviv Insulator Company LLC (LLC "LIC")

Lviv Insulator Company LLC (LLC "LIC") was founded in 1965 in Lviv, and is the only Ukrainian producer of glass high-voltage insulators for power systems of different climatic zones.

In 2003, LLC "LIC" was introduced and certified in accordance with ISO 9001:2000 Quality Management System. Being improved from year to year, the management system of the enterprise integrated system of quality management, occupational safety and health and environmental management, and in 2013 was certified in accordance with ISO 9001, ISO 14001, BS OHSAS 18001. In 2016 ERP system was certified in accordance with ISO 9001:2015, ISO 14001:2015, OHSAS 18001.

Constantly developing, LLC "LIC" is modernizing production. In 2011, the technical re-equipment was made in the manufacture of glass insulators, including new glass furnace and line WALTEC were put into operation, which made it possible to develop new types of glass insulators. In 2012, the testing laboratory was remodeled and certified by State Standard of Ukraine. Since 2014 Testing Laboratory LLC "LIC" has the ability to make tests in accordance with the additional requirements of the customer.

Excellent quality of produced products is confirmed by Reports of Type and Periodic Tests carried out by independent domestic and international testing centers.

Advantageous geographical position of Lviv at the crossroads of roads and railways of Western part of Ukraine, leading to domestic, foreign seaports and developed transport infrastructure of the European Union provides an uninterrupted supply of products of LLC "LIC" anywhere in the world.

Kazakh Insulators and Fittings Plant LLP

Kazakh Insulators and Fittings Plant LLP was found in 2013 and is the only manufacturer of wide range of glass suspension insulators for mechanical loads 40–530 kN in Central Asia.



Glass insulator production shop produces high-voltage overhead line insulators of various types withstanding mechanical failing load from 40 kN to 530 kN in compliance with the State and international standards requirements. Toughened glass is used as insulating material which has a high insulating properties, mechanical strength, thermal and chemical stability.

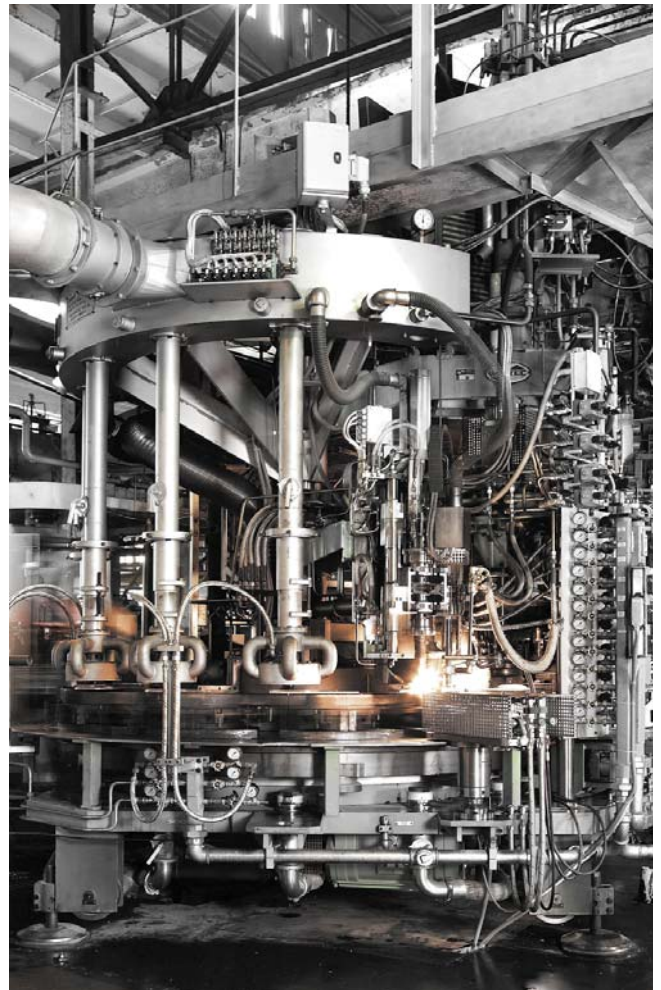
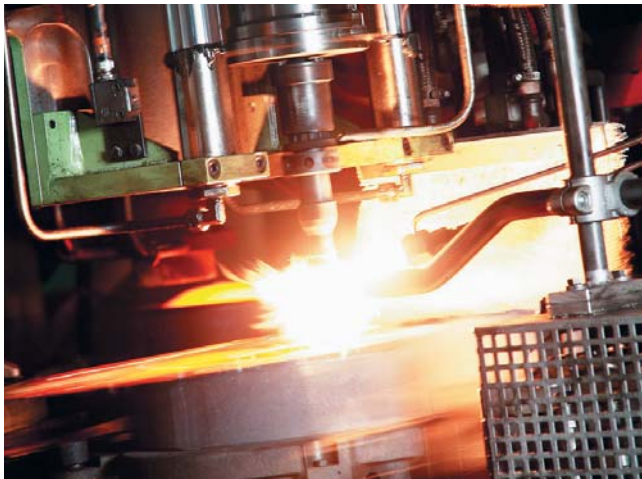
According to the customer requirements for areas with the high air pollutions, factory produces insulators using pins equipped with zinc sleeves, being the "sacrificial electrode" which prevent for a long time the corrosion caused by DC and the environment.

Thermal treatment of glass (hardening) provides high mechanical and electrical properties and thermal strength of the insulator. After subsequent thermal tests defective items are rejected. It guarantees the specified characteristics of insulators.

After thermal tests all glass parts are subjected to the visual inspection and verification of dimensions.

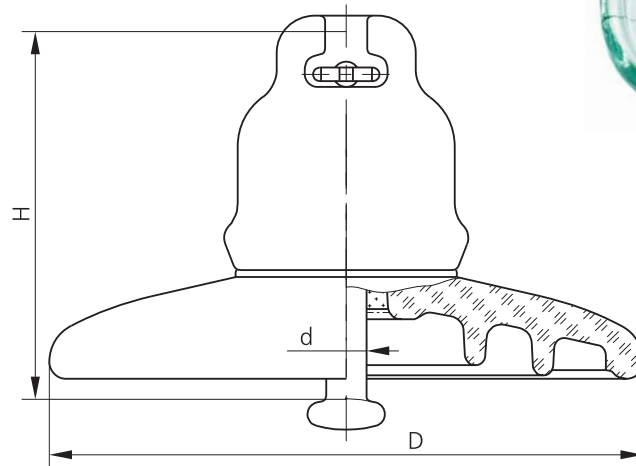
After the assembly of glass insulators routine mechanical and electrical tests are carried out.

In 2007, Steep wave front (puncture in air) tests were carried out to meet the standard requirements of IEC 61211:2004.



HV glass suspension insulator of U40B type

Ball and socket type
Standard profile

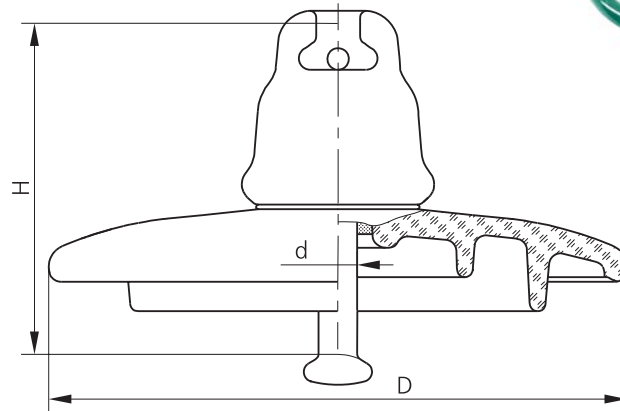


Reference designation	IEC 60305	U40B
Minimum mechanical failing load	kN	40
Minimum mechanical residual strength	kN	32
Diameter of the insulating part, D	mm	175
Spacing, H	mm	110
Nominal creepage distance	mm	190
Ball and socket coupling, d (IEC 60120)	mm	11
Puncture voltage in insulating medium	kV	110
50 Hz withstand voltage (dry)	kV	55
50 Hz withstand voltage (wet)	kV	33
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	70/70
Radio interference voltage at 0.5 MHz	dB	34
	kV	10
	dB	86
	kV	25
Weight	kg	1.7

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulators of U70BS and U70BL type

Ball and socket type
Standard profile

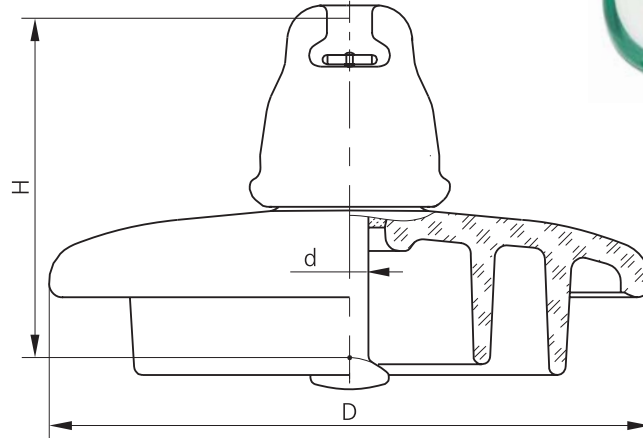


Reference designation	IEC 60305	U70BS	U70BL
Minimum mechanical failing load	kN	70	70
Minimum mechanical residual strength	kN	56	56
Diameter of the insulating part, D	mm	255	255
Spacing, H	mm	127	146
Nominal creepage distance	mm	320	320
Ball and socket coupling, d (IEC 60120)	mm	16A	16A
Puncture voltage in insulating medium	kV	130	130
50 Hz withstand voltage (dry)	kV	70	70
50 Hz withstand voltage (wet)	kV	40	40
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	105/105	105/105
Radio interference voltage at 0.5 MHz	dB	60	60
	kV	20	20
	dB	86	86
	kV	25	25
Weight	kg	3.6	3.6

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of PS70I type with extended protrusion of the rib

Ball and socket type
Standard profile

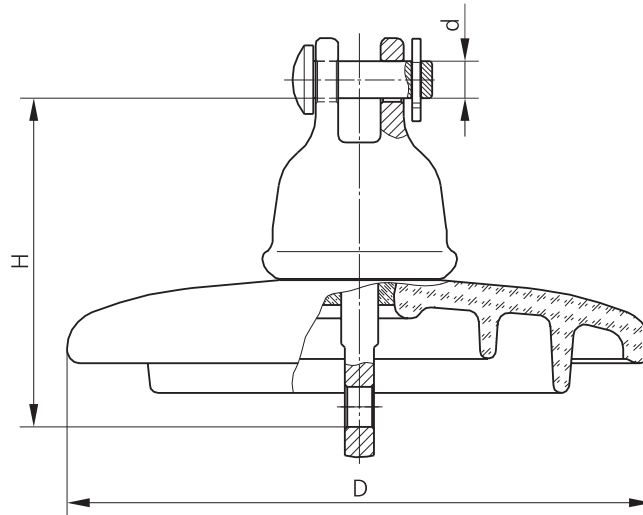


Reference designation		PS70I
Minimum mechanical failing load	kN	70
Minimum mechanical residual strength	kN	56
Diameter of the insulating part, D	mm	255
Spacing, H	mm	146
Nominal creepage distance	mm	407
Ball and socket coupling, d (IEC 60120)	mm	16A
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	72
50 Hz withstand voltage (wet)	kV	42
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	110/110
Radio interference voltage at 0.5 MHz	dB	60
	kV	20
	dB	86
	kV	30
Weight	kg	4.3

All technical requirements and testing are in accordance with IEC standards.
According to IEC 60305 insulator of PS70I type corresponds to insulator of U70BL type and can be applied instead of insulator of U70BL type.

HV glass suspension insulator of U70C type

Tongue-ball type
Standard profile

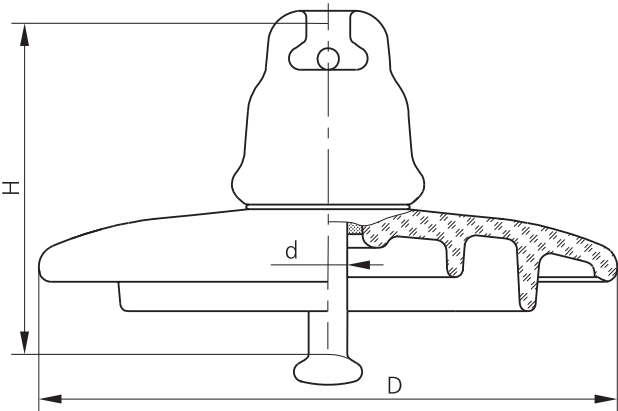


Reference designation	IEC 60305	U70C
Minimum mechanical failing load	kN	70
Minimum mechanical residual strength	kN	56
Diameter of the insulating part, D	mm	255
Spacing, H	mm	146
Nominal creepage distance	mm	320
Tongue-ball coupling, d (IEC 60120)	mm	16C
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	70
50 Hz withstand voltage (wet)	kV	40
Dry lightning impulse withstand voltage 1.2/50 +/–	kV	105/105
Radio interference voltage at 0.5 MHz	dB	60
	kV	20
	dB	86
	kV	25
Weight	kg	3.8

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of U80B type

Ball and socket type
 Standard profile

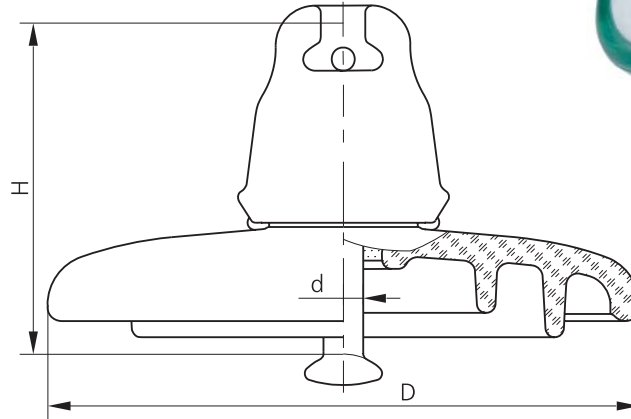


Reference designation	BS EN 60305	U80B
Minimum mechanical failing load	kN	80
Minimum mechanical residual strength	kN	56
Diameter of the insulating part, D	mm	255
Spacing, H	mm	140
Nominal creepage distance	mm	320
Ball and socket coupling, d (IEC 60120)	mm	16
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	70
50 Hz withstand voltage (wet)	kV	40
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	105/105
Radio interference voltage at 0.5 MHz	dB	60
	kV	20
	dB	86
	kV	25
Weight	kg	3.8

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulators of U100BS and U100BL type

Ball and socket type
Standard profile

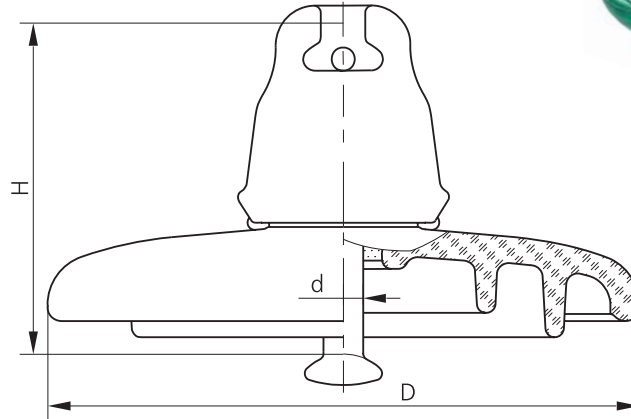


Reference designation	IEC 60305	U100BS	U100BL
Minimum mechanical failing load	kN	100	100
Minimum mechanical residual strength	kN	80	80
Diameter of the insulating part, D	mm	255	255
Spacing, H	mm	127	146
Nominal creepage distance	mm	320	320
Ball and socket coupling, d (IEC 60120)	mm	16A	16A
Puncture voltage in insulating medium	kV	130	130
50 Hz withstand voltage (dry)	kV	70	70
50 Hz withstand voltage (wet)	kV	40	40
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	100/100	100/100
Radio interference voltage at 0.5 MHz	dB	60	60
	kV	20	20
	dB	86	86
	kV	30	30
Weight	kg	3.9	3.9

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of U120B type

Ball and socket type
Standard profile

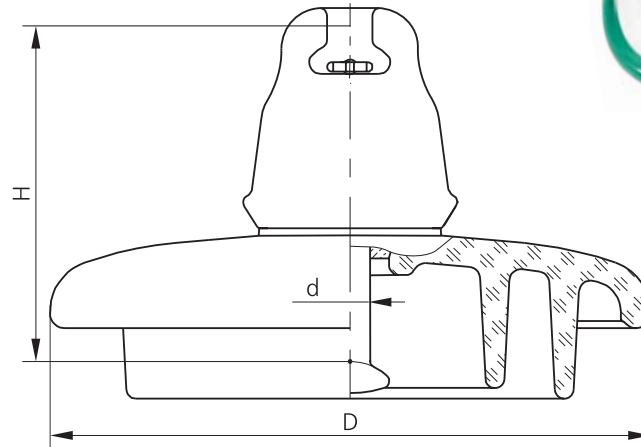


Reference designation	IEC 60305	U120B
Minimum mechanical failing load	kN	120
Minimum mechanical residual strength	kN	96
Diameter of the insulating part, D	mm	255
Spacing, H	mm	127/146
Nominal creepage distance	mm	320
Ball and socket coupling, d (IEC 60120)	mm	16A
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	70
50 Hz withstand voltage (wet)	kV	40
Dry lightning impulse withstand voltage 1.2/50 +/–	kV	100/100
Radio interference voltage at 0.5 MHz	dB	60
	kV	20
	dB	86
	kV	25
Weight	kg	3.9

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of PS120V type with extended protrusion of the rib

Ball and socket type
Standard profile

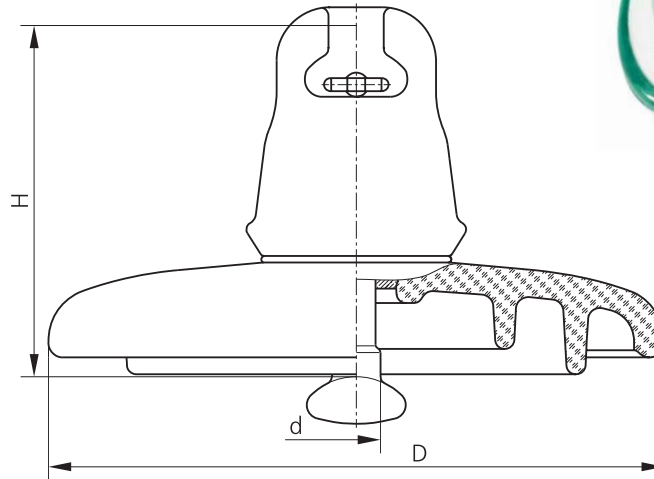


Reference designation		PS120V
Minimum mechanical failing load	kN	120
Minimum mechanical residual strength	kN	96
Diameter of the insulating part, D	mm	255
Spacing, H	mm	146
Nominal creepage distance	mm	407
Ball and socket coupling, d (IEC 60120)	mm	16A
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	72
50 Hz withstand voltage (wet)	kV	42
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	110/110
Radio interference voltage at 0.5 MHz	dB	60
	kV	20
	dB	86
	kV	30
Weight	kg	4.6

All technical requirements and testing are in accordance with IEC standards.
According to IEC 60305 insulator of PS120V type corresponds to insulator of U120B type and can be applied instead of insulator of U120B type.

HV glass suspension insulator of U125B type

Ball and socket type
Standard profile

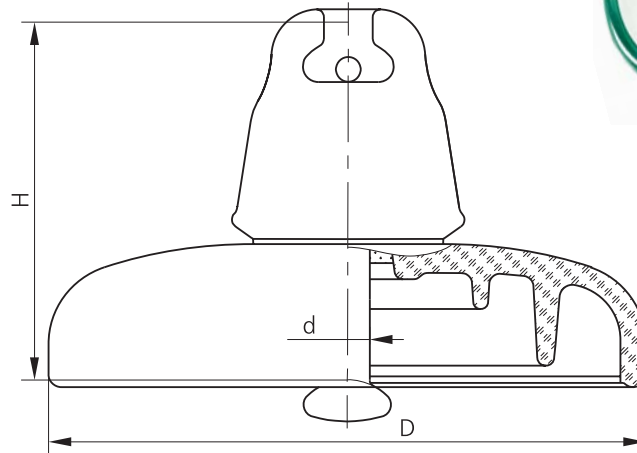


Reference designation	IEC 60305	U125B
	BS EN 60305	
Minimum mechanical failing load	kN	125
Minimum mechanical residual strength	kN	100
Diameter of the insulating part, D	mm	255
Spacing, H	mm	146
Nominal creepage distance	mm	320
Ball and socket coupling, d (IEC 60120)	mm	20
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	70
50 Hz withstand voltage (wet)	kV	40
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	100/100
Radio interference voltage at 0.5 MHz	dB	34
	kV	10
	dB	86
	kV	25
Weight	kg	4.1

All technical requirements and testing are in accordance with IEC, BS standards.

HV glass suspension insulators of U160BS and U160BL type

Ball and socket type
Standard profile



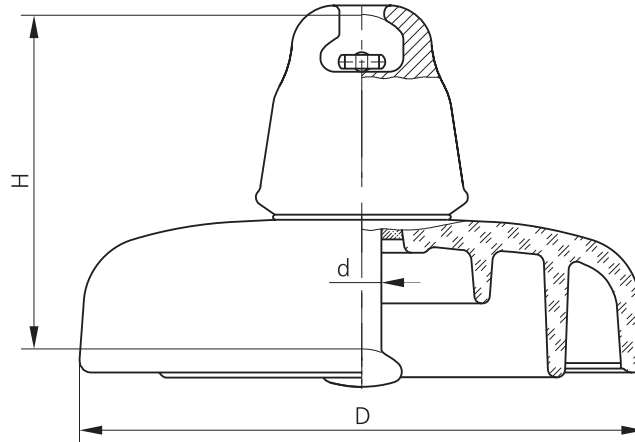
Reference designation	IEC 60305	U160BS	U160BL
Minimum mechanical failing load	kN	160	160
Minimum mechanical residual strength	kN	128	128
Diameter of the insulating part, D	mm	280	280
Spacing, H	mm	146	170
Nominal creepage distance	mm	385	385
Ball and socket coupling, d (IEC 60120)	mm	20	20
Puncture voltage in insulating medium	kV	130	130
50 Hz withstand voltage (dry)	kV	72	72
50 Hz withstand voltage (wet)	kV	45	45
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	110/110	110/110
Radio interference voltage at 0.5 MHz	dB	60	60
	kV	20	20
	dB	86	86
	kV	35	35
Weight	kg	6.13	6.13

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of PS160K type

Advantages of insulator PS160K over the existing analogue:

HV glass suspension insulator of PS160K type with the same dimensions as U160BL has larger nominal creepage distance that allows reducing the number of insulators in a string unit. Although withstand voltage (dry) is higher than U160BL.



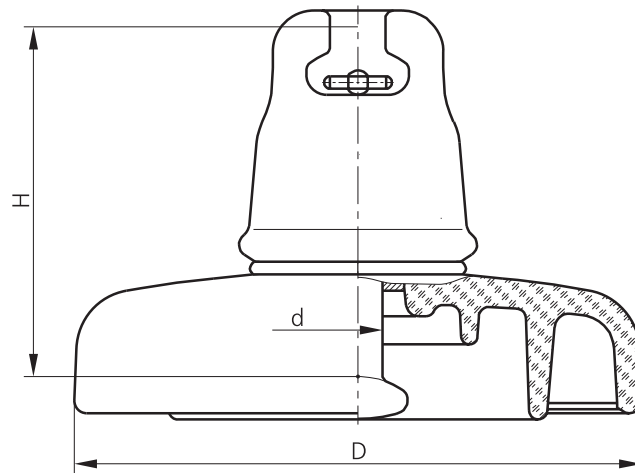
Reference designation		PS160K
Minimum mechanical failing load	kN	160
Minimum mechanical residual strength	kN	128
Diameter of the insulating part, D	mm	280
Spacing, H	mm	170
Nominal creepage distance	mm	460
Ball and socket coupling, d (IEC 60120)	mm	20
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	75
50 Hz withstand voltage (wet)	kV	45
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	115/115
Radio interference voltage at 0.5 MHz	dB	34
	kV	10
	dB	86
	kV	35
Weight	kg	7.4

All technical requirements and testing are in accordance with IEC standards.

According to IEC 60305 insulator of PS160K type corresponds to insulator of U160BL type and can be applied instead of insulator of U160BL type.

HV glass suspension insulator of U190B type

Ball and socket type
Standard profile

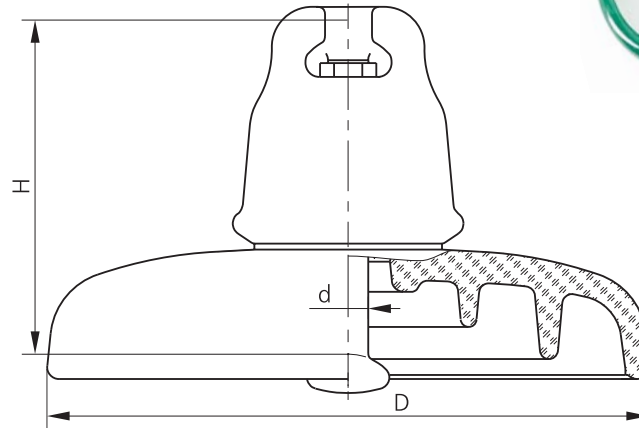


Reference designation		U190B
Minimum mechanical failing load	kN	190
Minimum mechanical residual strength	kN	152
Diameter of the insulating part, D	mm	280
Spacing, H	mm	190
Nominal creepage distance	mm	428
Ball and socket coupling, d (IEC 60120)	mm	24
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	70
50 Hz withstand voltage (wet)	kV	45
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	110/110
Radio interference voltage at 0.5 MHz	dB	60
	kV	20
	dB	86
	kV	40
Weight	kg	7.9

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of U210B type

Ball and socket type
Standard profile



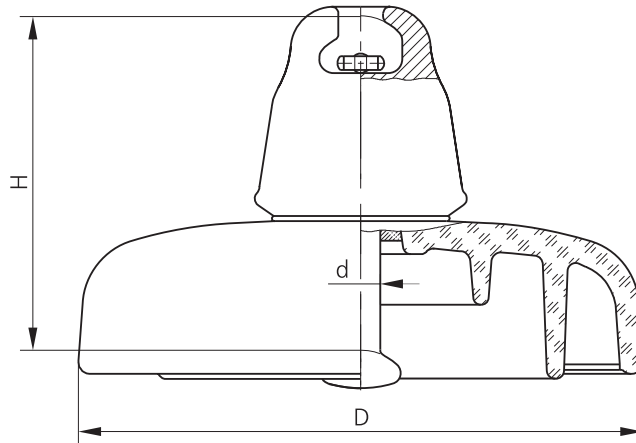
Reference designation	IEC 60305	U210B
Minimum mechanical failing load	kN	210
Minimum mechanical residual strength	kN	168
Diameter of the insulating part, D	mm	290
Spacing, H	mm	170/195
Nominal creepage distance	mm	380
Ball and socket coupling, d (IEC 60120)	mm	20
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	72
50 Hz withstand voltage (wet)	kV	45
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	110/110
Radio interference voltage at 0.5 MHz	dB	60
	kV	20
	dB	86
	kV	40
Weight	kg	7.2

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of PS210D type

Advantages of insulator PS210D over the existing analogue:

HV glass suspension insulator of PS210D type with the same dimensions U210B type has increased creepage distance, which allows reducing of number of the insulators in the string.



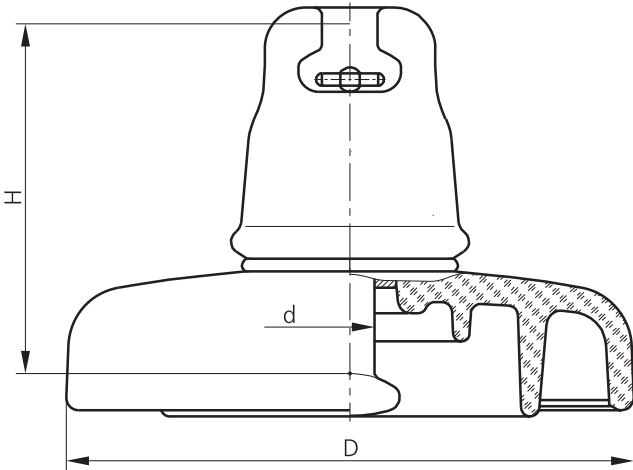
Reference designation		PS210D
Minimum mechanical failing load	kN	210
Minimum mechanical residual strength	kN	168
Diameter of the insulating part, D	mm	280
Spacing, H	mm	170
Nominal creepage distance	mm	460
Ball and socket coupling, d (IEC 60120)	mm	20
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	75
50 Hz withstand voltage (wet)	kV	45
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	115/115
Radio interference voltage at 0.5 MHz	dB	60
	kV	20
	dB	86
	kV	40
Weight	kg	8.7

All technical requirements and testing are in accordance with IEC standards.

According to IEC 60305 insulator of PS210D type corresponds to insulator of U210B type and can be applied instead of insulator of U210B type.

HV glass suspension insulator of U240B type

Ball and socket type
 Standard profile

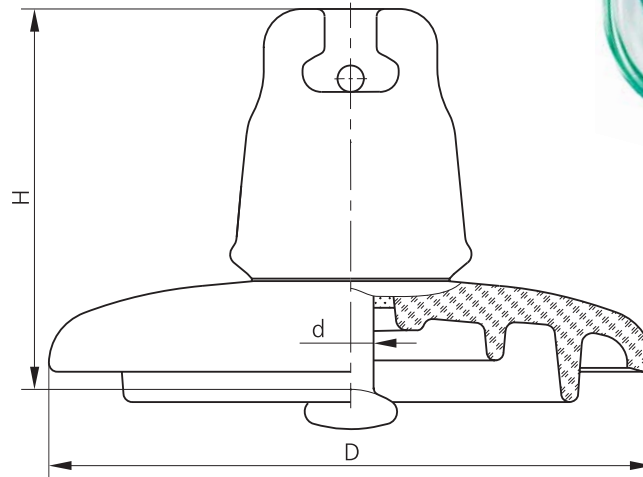


Reference designation		U240B
Minimum mechanical failing load	kN	240
Minimum mechanical residual strength	kN	192
Diameter of the insulating part, D	mm	280
Spacing, H	mm	170/192
Nominal creepage distance	mm	428
Ball and socket coupling, d (IEC 60120)	mm	24
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	70
50 Hz withstand voltage (wet)	kV	45
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	110/110
Radio interference voltage at 0.5 MHz	dB	60
	kV	20
	dB	86
	kV	40
Weight	kg	7.9

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of U300B type

Ball and socket type
Standard profile

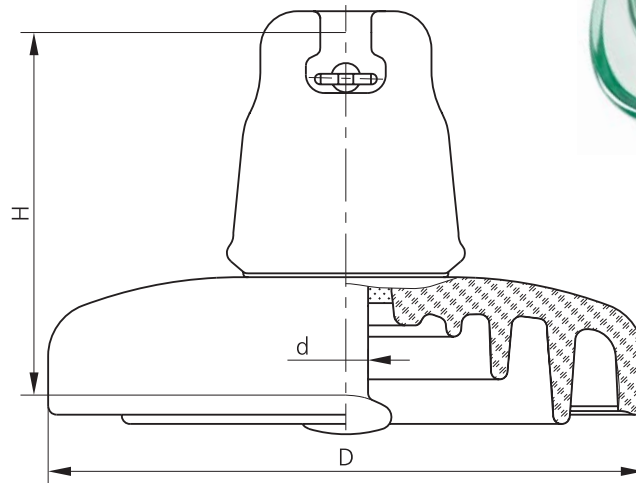


Reference designation	IEC 60305	U300B
Minimum mechanical failing load	kN	300
Minimum mechanical residual strength	kN	240
Diameter of the insulating part, D	mm	320
Spacing, H	mm	195
Nominal creepage distance	mm	390
Ball and socket coupling, d (IEC 60120)	mm	24
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	82
50 Hz withstand voltage (wet)	kV	50
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	130/130
Radio interference voltage at 0.5 MHz	dB	60
	kV	20
	dB	86
	kV	40
Weight	kg	10.0

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of PS300G type

Ball and socket type
Standard profile

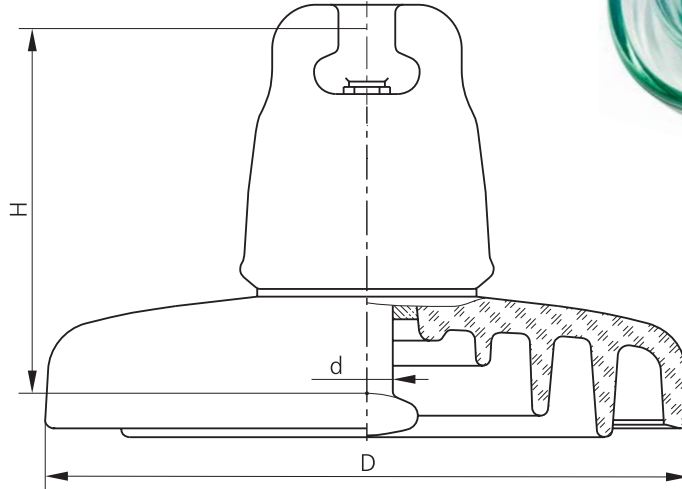


Reference designation		PS300G
Minimum mechanical failing load	kN	300
Minimum mechanical residual strength	kN	240
Diameter of the insulating part, D	mm	320
Spacing, H	mm	195
Nominal creepage distance	mm	485
Ball and socket coupling, d (IEC 60120)	mm	24
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	82
50 Hz withstand voltage (wet)	kV	50
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	130/130
Radio interference voltage at 0.5 MHz	dB	60
	kV	20
	dB	86
	kV	40
Weight	kg	11.5

All technical requirements and testing are in accordance with IEC standards.
According to IEC 60305 insulator of PS300G type corresponds to insulator of U300B type and can be applied instead of insulator of U300B type.

HV glass suspension insulator of U400B type

Ball and socket type
Standard profile

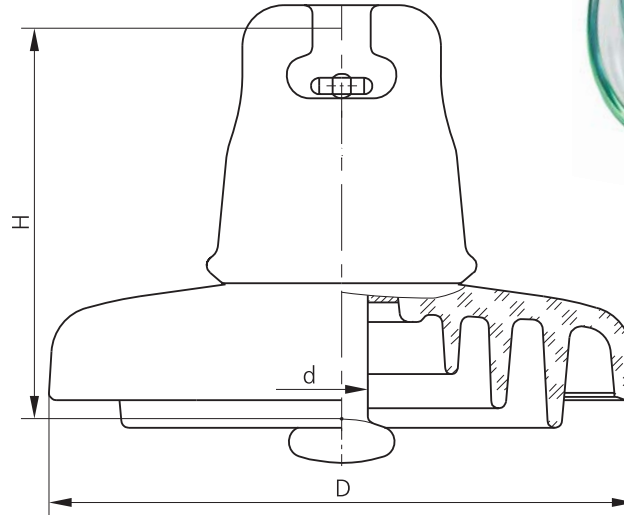


Reference designation	IEC 60305	U400B
Minimum mechanical failing load	kN	400
Minimum mechanical residual strength	kN	320
Diameter of the insulating part, D	mm	360
Spacing, H	mm	205
Nominal creepage distance	mm	550
Ball and socket coupling, d (IEC 60120)	mm	28
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	90
50 Hz withstand voltage (wet)	kV	55
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	140/140
Radio interference voltage at 0.5 MHz	dB	60
	kV	20
	dB	86
	kV	40
Weight	kg	16.2

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of U530B type

Ball and socket type
Standard profile

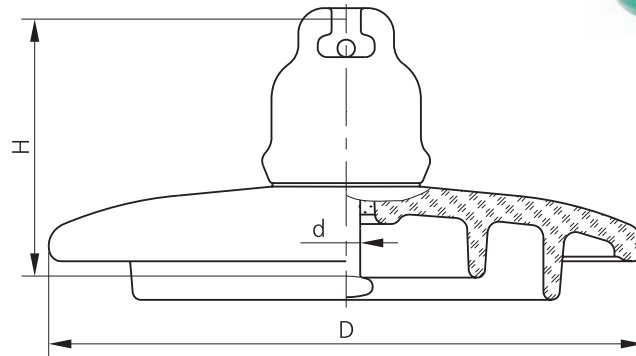


Reference designation	IEC 60305	U530B
Minimum mechanical failing load	kN	530
Minimum mechanical residual strength	kN	424
Diameter of the insulating part, D	mm	360
Spacing, H	mm	240
Nominal creepage distance	mm	600
Ball and socket coupling, d (IEC 60120)	mm	32
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	100
50 Hz withstand voltage (wet)	kV	60
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	155/155
Radio interference voltage at 0.5 MHz	dB	60
	kV	20
	dB	86
	kV	40
Weight	kg	20.5

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of U40M type

Ball and socket type
Fog type profile

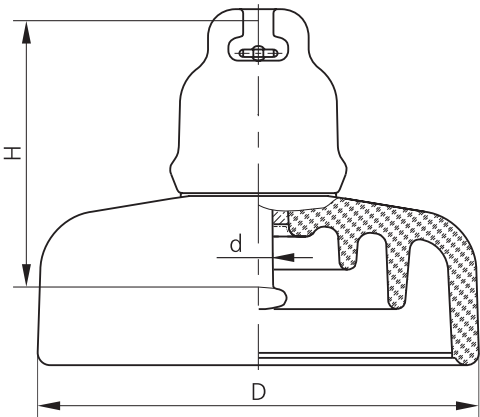


Reference designation	Non-standard	U40M	
Minimum mechanical failing load	kN	40	40
Minimum mechanical residual strength	kN	32	32
Diameter of the insulating part, D	mm	255	255
Spacing, H	mm	100	110
Nominal creepage distance	mm	320	320
Ball and socket coupling, d (IEC 60120)	mm	11	11
Puncture voltage in insulating medium	kV	110	110
50 Hz withstand voltage (dry)	kV	70	70
50 Hz withstand voltage (wet)	kV	40	40
Dry lightning impulse withstand voltage 1.2/50 +/–	kV	100/100	100/100
Radio interference voltage at 0.5 MHz	dB	60	60
	kV	20	20
	dB	86	86
	kV	25	25
Weight	kg	3.0	3.0

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of U40BP type

Ball and socket type
Fog type profile

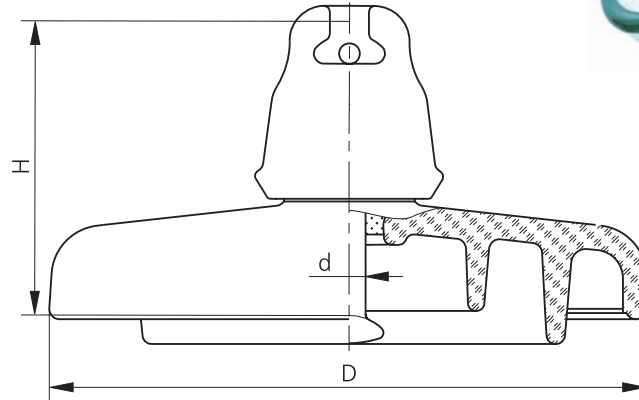


Reference designation	IEC 60305		U40BP
Minimum mechanical failing load	kN		40
Minimum mechanical residual strength	kN		32
Diameter of the insulating part, D	mm		175
Spacing, H	mm		110
Nominal creepage distance	mm		300
Ball and socket coupling, d (IEC 60120)	mm		11
Puncture voltage in insulating medium	kV		110
50 Hz withstand voltage (dry)	kV		60
50 Hz withstand voltage (wet)	kV		34
Dry lightning impulse withstand voltage 1.2/50 +/-	kV		85/85
Radio interference voltage at 0.5 MHz	dB		60
	kV		20
	dB		86
	kV		25
Weight	kg		2.5

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of U70BLP type

Ball and socket type
Fog type profile

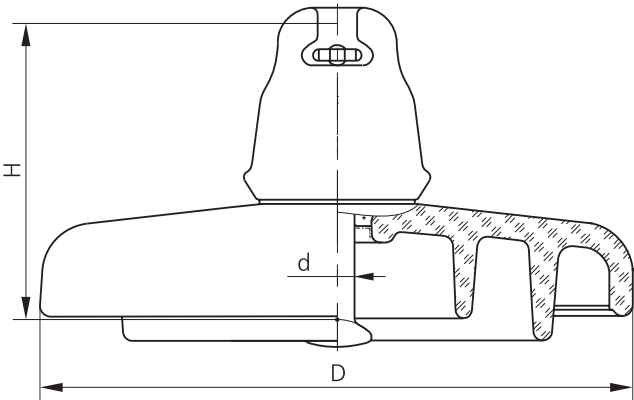


Reference designation	IEC 60305	U70BLP
Minimum mechanical failing load	kN	70
Minimum mechanical residual strength	kN	56
Diameter of the insulating part, D	mm	280
Spacing, H	mm	146
Nominal creepage distance	mm	445
Ball and socket coupling, d (IEC 60120)	mm	16A
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	82
50 Hz withstand voltage (wet)	kV	50
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	125/125
Radio interference voltage at 0.5 MHz	dB	60
	kV	20
	dB	86
	kV	30
Weight	kg	5.66

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of U100BLP type

Ball and socket type
 Fog type profile

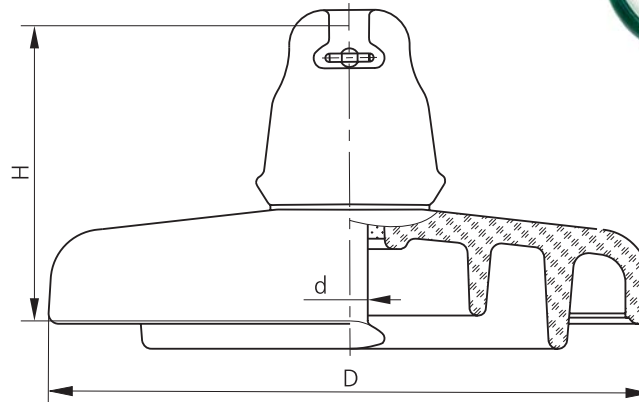


Reference designation	IEC 60305	U100BLP
Minimum mechanical failing load	kN	100
Minimum mechanical residual strength	kN	80
Diameter of the insulating part, D	mm	280
Spacing, H	mm	146
Nominal creepage distance	mm	445
Ball and socket coupling, d (IEC 60120)	mm	16A
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	82
50 Hz withstand voltage (wet)	kV	50
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	125/125
Radio interference voltage at 0.5 MHz	dB	34
	kV	10
	dB	86
	kV	30
Weight	kg	5.66

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of U120BP type

Ball and socket type
Fog type profile

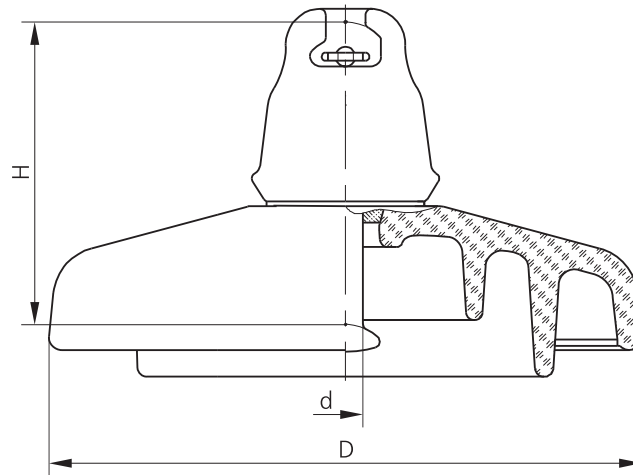


Reference designation	IEC 60305	U120BP
Minimum mechanical failing load	kN	120
Minimum mechanical residual strength	kN	96
Diameter of the insulating part, D	mm	280
Spacing, H	mm	127/146
Nominal creepage distance	mm	445
Ball and socket coupling, d (IEC 60120)	mm	16A
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	82
50 Hz withstand voltage (wet)	kV	50
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	125/125
Radio interference voltage at 0.5 MHz	dB	60
	kV	20
	dB	86
	kV	30
Weight	kg	5.66

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of PSV120D type

Ball and socket type
Fog type profile



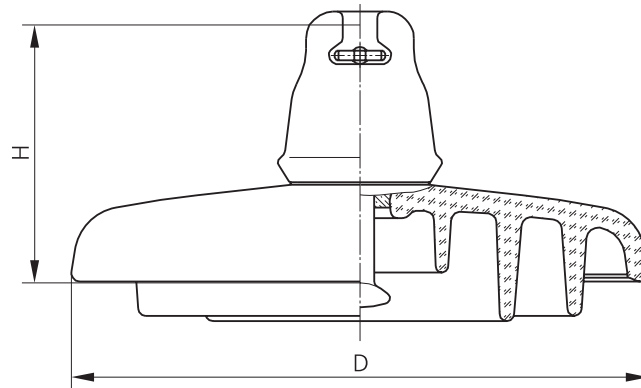
Reference designation		PSV120D	
Minimum mechanical failing load	kN	120	120
Minimum mechanical residual strength	kN	96	96
Diameter of the insulating part, D	mm	280	280
Spacing, H	mm	127	146
Nominal creepage distance	mm	468	468
Ball and socket coupling, d (IEC 60120)	mm	16	16
Puncture voltage in insulating medium	kV	130	130
50 Hz withstand voltage (dry)	kV	82	82
50 Hz withstand voltage (wet)	kV	50	50
Dry lightning impulse withstand voltage 1.2/50 +/–	kV	125/125	125/125
Radio interference voltage at 0.5 MHz	dB	60	60
	kV	20	20
	dB	86	86
	kV	30	30
Weight	kg	5.75	5.75

All technical requirements and testing are in accordance with IEC standards.

According to IEC 60305 insulator of PSV120D type corresponds to insulator of U120BP type and can be applied instead of insulator of U120BP type.

HV glass suspension insulator of U120BP1 type

Ball and socket type
Fog type profile

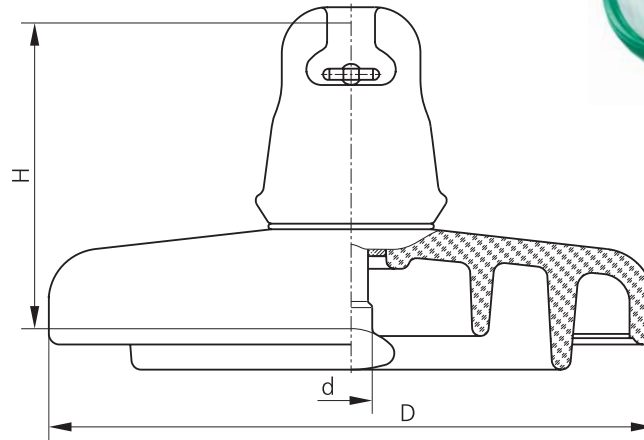


Reference designation	IEC 60305	U120BP1
Minimum mechanical failing load	kN	120
Minimum mechanical residual strength	kN	96
Diameter of the insulating part, D	mm	320
Spacing, H	mm	146
Nominal creepage distance	mm	555
Ball and socket coupling, d (IEC 60120)	mm	16
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	90
50 Hz withstand voltage (wet)	kV	55
Dry lightning impulse withstand voltage 1.2/50 +/–	kV	140/140
Radio interference voltage at 0.5 MHz	dB	34
	kV	10
	dB	86
	kV	30
Weight	kg	6.65

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of U125BP type

Ball and socket type
Fog type profile

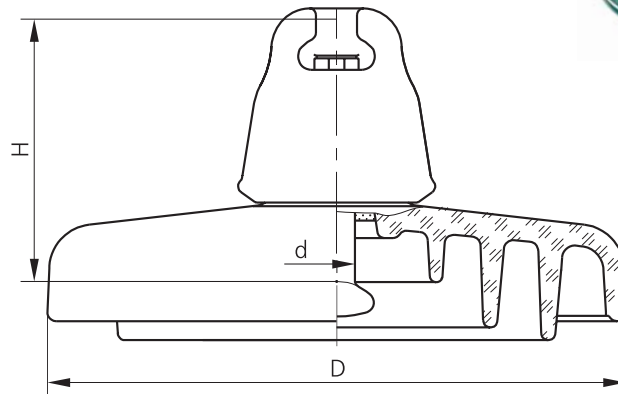


Reference designation	IEC 60305	U125BP
	BS EN 60305	
Minimum mechanical failing load	kN	125
Minimum mechanical residual strength	kN	100
Diameter of the insulating part, D	mm	280
Spacing, H	mm	146
Nominal creepage distance	mm	445
Ball and socket coupling, d (IEC 60120)	mm	20
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	82
50 Hz withstand voltage (wet)	kV	50
Dry lightning impulse withstand voltage 1.2/50 +/–	kV	125/125
Radio interference voltage at 0.5 MHz	dB	34
	kV	10
	dB	86
	kV	25
Weight	kg	5.86

All technical requirements and testing are in accordance with IEC, BS standards.

HV glass suspension insulators of U160BSP and U160BLP type

Ball and socket type
Fog type profile

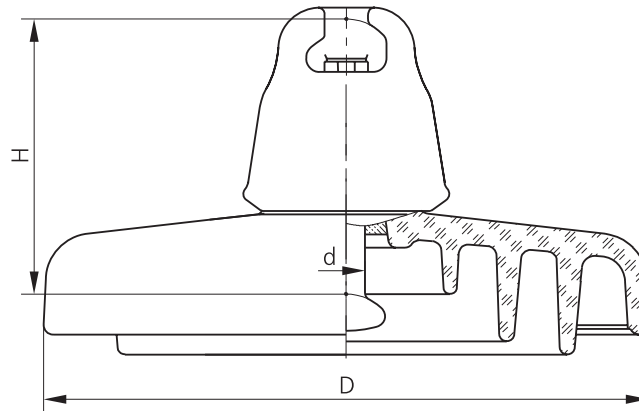


Reference designation	IEC 60305	U160BSP	U160BLP
Minimum mechanical failing load	kN	160	160
Minimum mechanical residual strength	kN	128	128
Diameter of the insulating part, D	mm	320	320
Spacing, H	mm	146	170
Nominal creepage distance	mm	545	545
Ball and socket coupling, d (IEC 60120)	mm	20	20
Puncture voltage in insulating medium	kV	130	130
50 Hz withstand voltage (dry)	kV	90	90
50 Hz withstand voltage (wet)	kV	55	55
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	140/140	140/140
Radio interference voltage at 0.5 MHz	dB	60	60
	kV	20	20
	dB	86	86
	kV	35	35
Weight	kg	8.28	8.28

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of PSV160B type with extended protrusion of the rib reduced radio interference level

Ball and socket type
Fog type profile

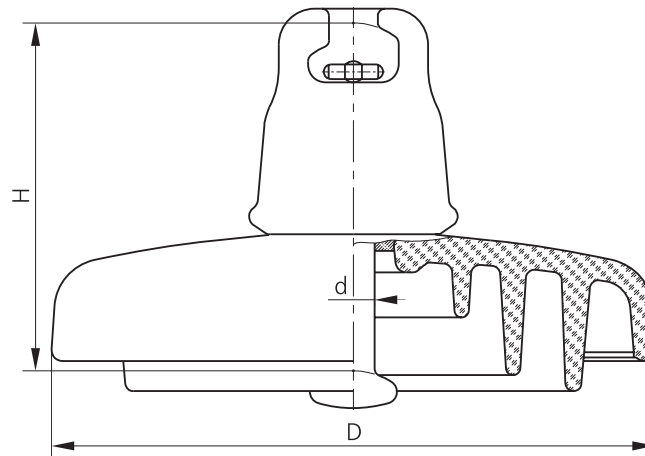


Reference designation		PSV160B	
Minimum mechanical failing load	kN	160	160
Minimum mechanical residual strength	kN	128	128
Diameter of the insulating part, D	mm	320	320
Spacing, H	mm	146	170
Nominal creepage distance	mm	545	545
Ball and socket coupling, d (IEC 60120)	mm	20	20
Puncture voltage in insulating medium	kV	130	130
50 Hz withstand voltage (dry)	kV	90	90
50 Hz withstand voltage (wet)	kV	55	55
Dry lightning impulse withstand voltage 1.2/50 +/–	kV	140/140	140/140
Radio interference voltage at 0.5 MHz	dB	60	60
	kV	25	25
	dB	86	86
	kV	40	40
Weight	kg	8.28	8.28

All technical requirements and testing are in accordance with IEC standards.

According to IEC 60305 insulator of PSV160B type corresponds to insulator of U160BP type and can be applied instead of insulator of U160BP type.

HV glass suspension insulator of U190BP type

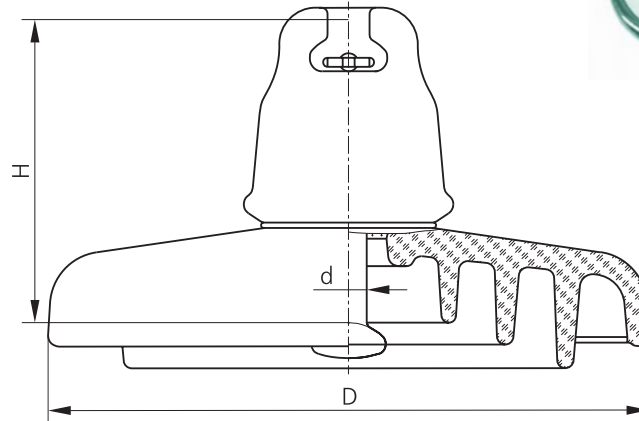


Reference designation		U190BP
Minimum mechanical failing load	kN	190
Minimum mechanical residual strength	kN	152
Diameter of the insulating part, D	mm	340
Spacing, H	mm	196
Nominal creepage distance	mm	617
Ball and socket coupling, d (IEC 60120)	mm	24
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	100
50 Hz withstand voltage (wet)	kV	60
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	150/150
Radio interference voltage at 0.5 MHz	dB	34
	kV	10
	dB	52
	kV	30
Weight	kg	10.6

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of U210BP type

Ball and socket type
Fog type profile

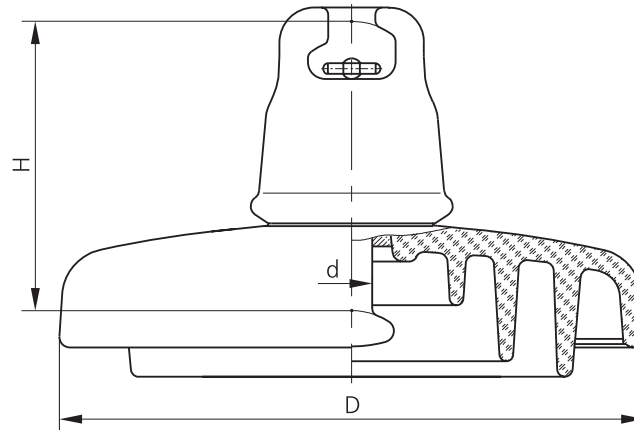


Reference designation	IEC 60305	U210BP
Minimum mechanical failing load	kN	210
Minimum mechanical residual strength	kN	168
Diameter of the insulating part, D	mm	330
Spacing, H	mm	170/195
Nominal creepage distance	mm	555
Ball and socket coupling, d (IEC 60120)	mm	20
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	90
50 Hz withstand voltage (wet)	kV	55
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	140/140
Radio interference voltage at 0.5 MHz	dB	60
	kV	20
	dB	86
	kV	35
Weight	kg	9.45

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulators of U240BSP and U240BLP type with extended protrusion of the rib

Ball and socket type
Fog type profile

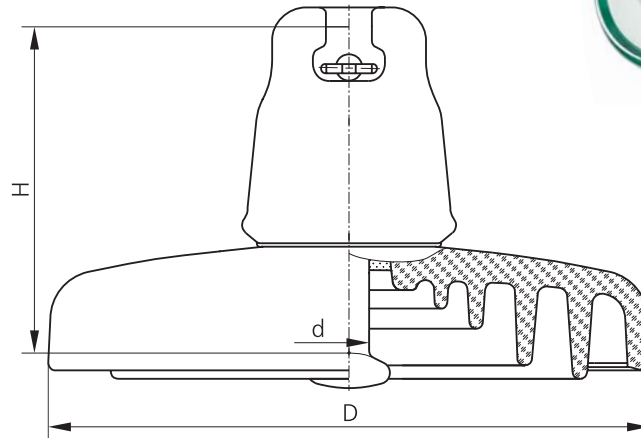


Reference designation		U240BSP	U240BLP
Minimum mechanical failing load	kN	240	240
Minimum mechanical residual strength	kN	192	192
Diameter of the insulating part, D	mm	340	340
Spacing, H	mm	170	195
Nominal creepage distance	mm	617	617
Ball and socket coupling, d (IEC 60120)	mm	24	24
Puncture voltage in insulating medium	kV	130	130
50 Hz withstand voltage (dry)	kV	100	100
50 Hz withstand voltage (wet)	kV	60	60
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	150/150	150/150
Radio interference voltage at 0.5 MHz	dB	34	34
	kV	10	10
	dB	86	86
	kV	35	35
Weight	kg	11.0	11.0

All technical requirements and testing are in accordance with IEC standards.

HV glass suspension insulator of U300BP type

Ball and socket type
Fog type profile

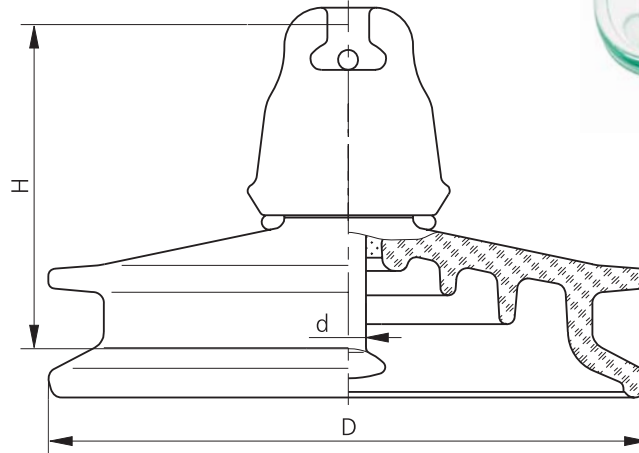


Reference designation	IEC 60305	U300BP
Minimum mechanical failing load	kN	300
Minimum mechanical residual strength	kN	240
Diameter of the insulating part, D	mm	360
Spacing, H	mm	195/196
Nominal creepage distance	mm	617
Ball and socket coupling, d (IEC 60120)	mm	24
Puncture voltage in insulating medium	kV	130
50 Hz withstand voltage (dry)	kV	100
50 Hz withstand voltage (wet)	kV	60
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	155/155
Radio interference voltage at 0.5 MHz	dB	60
	kV	20
	dB	86
	kV	40
Weight	kg	13.3

All technical requirements and testing are in accordance with IEC standards.

Two-winged HV glass suspension insulator of PSD70E type

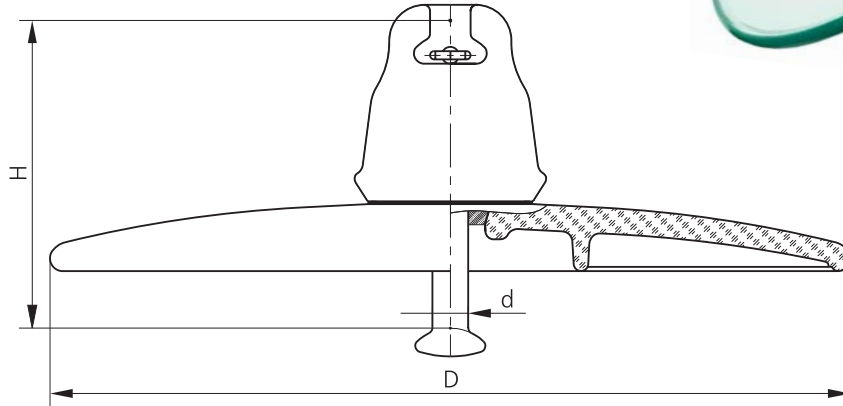
Ball and socket type
Fog type special profile



Reference designation		PSD70E	
Minimum mechanical failing load	kN	70	70
Minimum mechanical residual strength	kN	56	56
Diameter of the insulating part, D	mm	270	270
Spacing, H	mm	127	146
Nominal creepage distance	mm	411	411
Ball and socket coupling, d (IEC 60120)	mm	16A	16A
Puncture voltage in insulating medium	kV	130	130
50 Hz withstand voltage (dry)	kV	75	75
50 Hz withstand voltage (wet)	kV	45	45
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	110/110	110/110
Radio interference voltage at 0.5 MHz	dB	60	60
	kV	20	20
	dB	86	86
	kV	25	25
Weight	kg	4.6	4.6

All technical requirements and testing are in accordance with IEC standards.

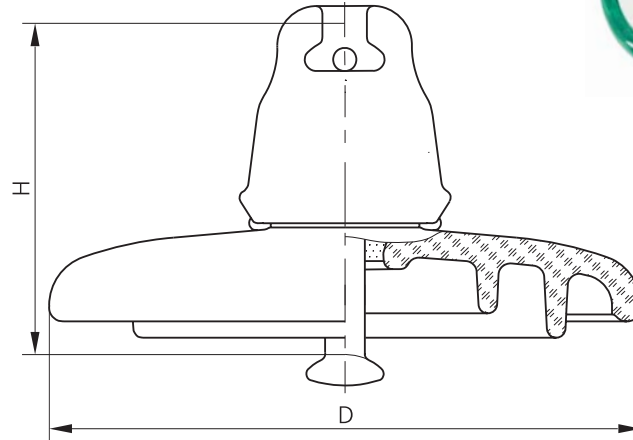
**HV glass suspension insulators
with the insulating part
of aerodynamic profile
of U120AD, U160AD, U210AD type**



Reference designation		U120AD	U120AD	U160AD	U210AD
Minimum mechanical failing load	kN	120	120	160	210
Minimum mechanical residual strength	kN	96	96	128	168
Diameter of the insulating part, D	mm	380	380	420	420
Spacing, H	mm	127/130	146	146/170	170
Nominal creepage distance	mm	365	365	400	400
Ball and socket coupling, d (IEC 60120)	mm	16A	16A	20	20
Puncture voltage in insulating medium	kV	130	130	130	130
50 Hz withstand voltage (dry)	kV	60	60	60	60
50 Hz withstand voltage (wet)	kV	50	50	50	50
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	95/95	95/95	95/95	95/95
Radio interference voltage at 0.5 MHz	dB	34	34	60	60
	kV	10	10	20	20
	dB	86	86	86	86
	kV	30	30	40	40
Weight	kg	5.2	5.2	7.43	8.28

All technical requirements and testing are in accordance with IEC standards.

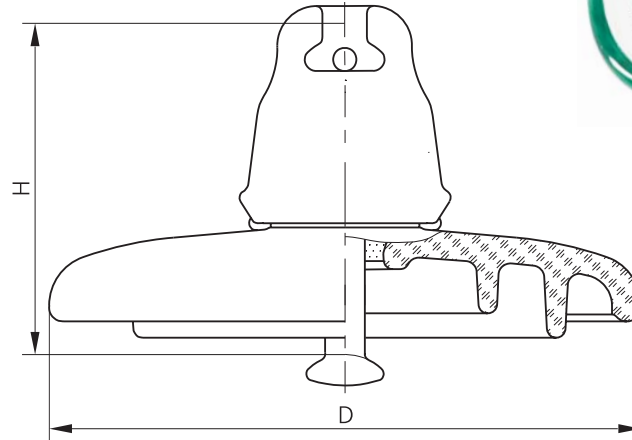
HV glass suspension insulator of 52-3 type



Reference designation	ANSI C 29.2	52-3
Minimum mechanical failing load	lbs (kN)	20.000 (100)
Minimum mechanical residual strength	lbs (kN)	13.400 (60)
Impact strength	in·lbs (N·m)	400 (45)
Diameter of the insulating part, D	in (mm)	10 (255)
Spacing, H	in (mm)	5 ³ / ₄ (146)
Nominal creepage distance	in (mm)	12 ⁵ / ₈ (320)
Ball and socket coupling	—	type B
Puncture voltage	kV	130
Flashover power frequency voltage (dry)	kV	80
Flashover power frequency voltage (wet)	kV	50
Dry lightning impulse withstand voltage 1.2/50 +/—	kV	125/130
Radio interference voltage at 1 MHz	dB	34
	kV	10
Weight	lb (kg)	8.8 (4.0)

Insulator meet ANSI C 29.1, ANSI C 29.2 requirements.

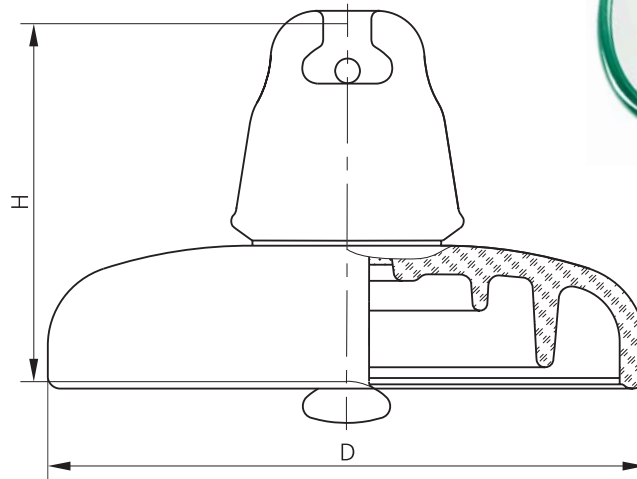
HV glass suspension insulator of 52-5 type



Reference designation	ANSI C 29.2	52-5
Minimum mechanical failing load	lbs (kN)	30.000 (136)
Minimum mechanical residual strength	lbs (kN)	18.000 (81.6)
Impact strength	in•lbs (N•m)	400 (45)
Diameter of the insulating part, D	in (mm)	10 (255)
Spacing, H	in (mm)	5 ³ / ₄ (146)
Nominal creepage distance	in (mm)	12 ⁵ / ₈ (320)
Ball and socket coupling	—	type J
Puncture voltage	kV	130
Flashover power frequency voltage (dry)	kV	80
Flashover power frequency voltage (wet)	kV	50
Dry lightning impulse withstand voltage 1.2/50 +/—	kV	125/130
Radio interference voltage at 1 MHz	dB	34
	kV	10
Weight	lb (kg)	9.2 (4.2)

Insulator meet ANSI C 29.1, ANSI C 29.2 requirements.

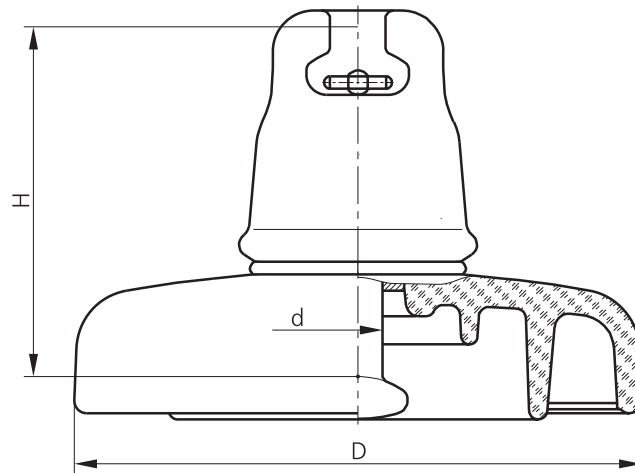
HV glass suspension insulator of 52-8 type



Reference designation	ANSI C 29.2	52-8
Minimum mechanical failing load	lbs (kN)	40.000 (180)
Minimum mechanical residual strength	lbs (kN)	24.000 (108)
Impact strength	in·lbs (N·m)	400 (45)
Diameter of the insulating part, D	in (mm)	11 (280)
Spacing, H	in (mm)	5 ³ / ₄ (146)
Nominal creepage distance	in (mm)	15 ¹ / ₆ (385)
Ball and socket coupling	—	type K
Puncture voltage	kV	130
Flashover power frequency voltage (dry)	kV	80
Flashover power frequency voltage (wet)	kV	50
Dry lightning impulse withstand voltage 1.2/50 +/—	kV	125/130
Radio interference voltage at 1 MHz	dB	34
	kV	10
Weight	lb (kg)	13.6 (6.18)

Insulator meet ANSI C 29.1, ANSI C 29.2 requirements.

HV glass suspension insulator of 52-11 type

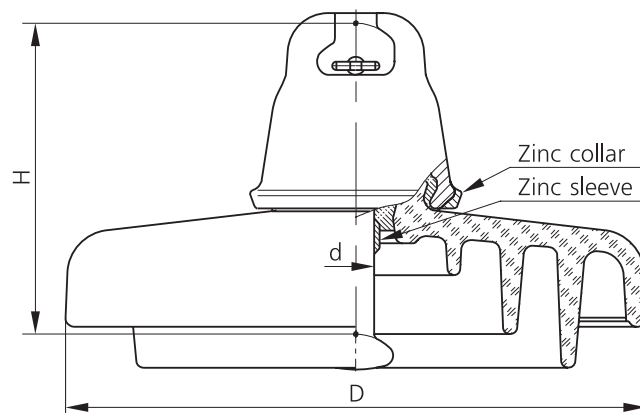


Reference designation	ANSI C 29.2	52-11
Minimum mechanical failing load	lbs (kN)	50.000 (222)
Minimum mechanical residual strength	lbs (kN)	30.000 (133)
Impact strength	in·lbs (N·m)	400 (45)
Diameter of the insulating part, D	in (mm)	11 (280)
Spacing, H	in (mm)	6 ¹ / ₈ (156)
Nominal creepage distance	in (mm)	16 ³ / ₄ (428)
Ball and socket coupling	—	type K
Puncture voltage	kV	130
Flashover power frequency voltage (dry)	kV	80
Flashover power frequency voltage (wet)	kV	50
Dry lightning impulse withstand voltage 1.2/50 +/—	kV	140/140
Radio interference voltage at 1 MHz	dB	34
	kV	10
Weight	lb (kg)	17.4 (7.9)

Insulator meet ANSI C 29.1, ANSI C 29.2 requirements.

HV glass suspension insulator of U160BLP/DC type for application on HVDC

Ball and socket type
Fog type profile



Reference designation	IEC 61325	U160BLP/DC
Minimum mechanical failing load	kN	160
Minimum mechanical residual strength	kN	128
Diameter of the insulating part, D	mm	320
Spacing, H	mm	170
Nominal creepage distance	mm	550
Ball and socket coupling, d (IEC 60120)	mm	20
DC withstand voltage (dry)	kV	150
DC withstand voltage (wet)	kV	65
DC puncture withstand voltage in SF6	kV	225
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	140/140
Weight	kg	8.58

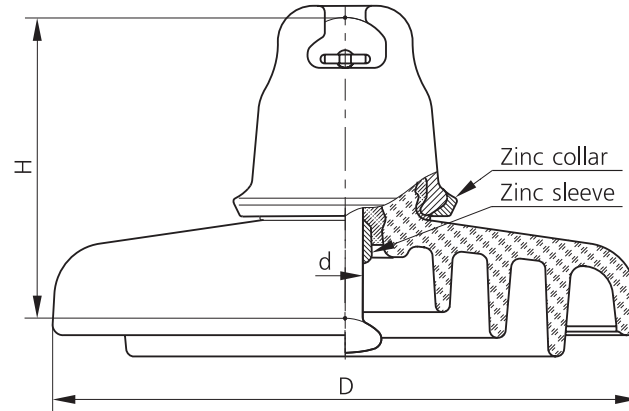
All technical requirements and testing are in accordance with IEC standards.

Special characteristics of insulators for HVDC:

- high resistance to the ionic migration within the glass part reaches a record values as a result of GIG know-how,
- pure zinc sleeve bonded to the pin,
- metallurgical bond of the zinc collar and cast iron cap reaches up to 100%.

HV glass suspension insulator of U210BP/DC type for application on HVDC

Ball and socket type
Fog type profile



Reference designation	IEC 61325	U210BP/DC
Minimum mechanical failing load	kN	210
Minimum mechanical residual strength	kN	168
Diameter of the insulating part, D	mm	330
Spacing, H	mm	170
Nominal creepage distance	mm	555
Ball and socket coupling, d (IEC 60120)	mm	20
DC withstand voltage (dry)	kV	150
DC withstand voltage (wet)	kV	65
DC puncture withstand voltage in SF6	kV	225
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	140/140
Weight	kg	9.45±0.4

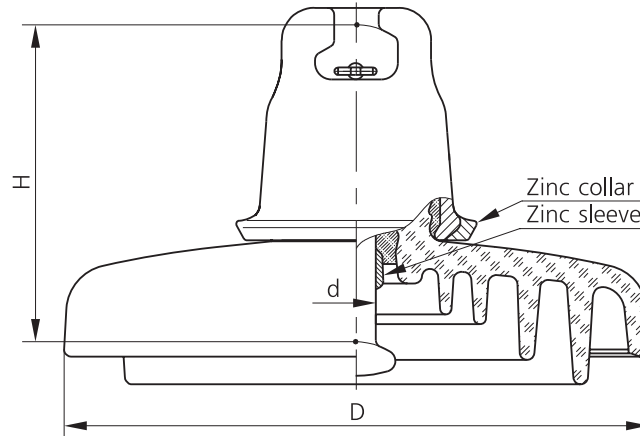
All technical requirements and testing are in accordance with IEC standards.

Special characteristics of insulators for HVDC:

- high resistance to the ionic migration within the glass part reaches a record values as a result of GIG know-how,
- pure zinc sleeve bonded to the pin,
- metallurgical bond of the zinc collar and cast iron cap reaches up to 100%.

HV glass suspension insulator of U300BP/DC type for application on HVDC

Ball and socket type
Fog type profile



Reference designation	IEC 61325	U300BP/DC
Minimum mechanical failing load	kN	300
Minimum mechanical residual strength	kN	240
Diameter of the insulating part, D	mm	360
Spacing, H	mm	195
Nominal creepage distance	mm	645
Ball and socket coupling, d (IEC 60120)	mm	24
DC withstand voltage (dry)	kV	170
DC withstand voltage (wet)	kV	75
DC puncture withstand voltage in SF6	kV	225
Dry lightning impulse withstand voltage 1.2/50 +/-	kV	155/155
Weight	kg	14.2

All technical requirements and testing are in accordance with IEC standards.

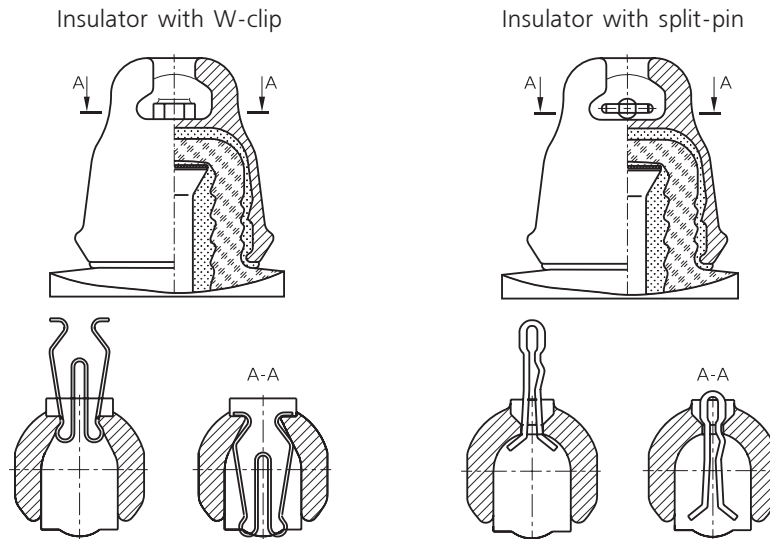
Special characteristics of insulators for HVDC:

- high resistance to the ionic migration within the glass part reaches a record values as a result of GIG know-how,
- pure zinc sleeve bonded to the pin,
- metallurgical bond of the zinc collar and cast iron cap reaches up to 100%.

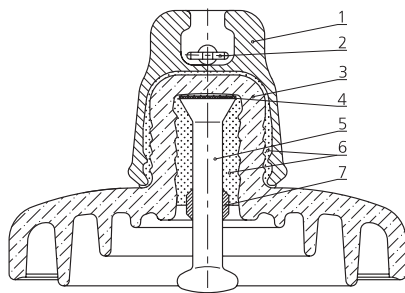
Locking devices for ball and socket couplings of suspension insulators

The plant manufactures insulators with W-clips and split-pins, which corresponds to the Russian and international standards. Split-pin provides more reliable coupling in a string, as the cross-section area of the split-pin is 2 times more than the cross-section area of the W-clip. The insertion of split-pins and bending of the legs are made at the plant.

It is necessary to note, that with such a universal coupling it is possible to make a string of insulator units with different types of locking devices.



Suspension glass insulator with zinc sleeve



The characteristics of insulators with a zinc sleeve fully correspond to those of insulators without it. The zinc sleeve, being "a sacrificial electrode", prevents for a long time from corrosion of a pin caused by DC and environmental conditions (Tropical climate).

1. Cap.
2. Locking device (split-pin).
3. Glass part.
4. Gasket.
5. Pin.
6. Binding material.
7. Zinc sleeve.



When the insulators are stored in a dry atmosphere, especially at high temperature, the cement bond loses its moisture. It may results in a slight shrinkage, in this case the clearance between the glass and the cement bond increases. In some cases the increased clearance can lead to a rotation of the pin relative to the glass by a few degrees. This rotation occurs when performing rotation manually, which is accompanied by distinctive clicking noise. This phenomenon disappears once you move the insulator into the atmosphere with normal conditions or being under load when assembling on the line. This phenomenon does not affect an insulator performance.

Mixed type string unit

It is recommended to use combined string with fog and aerodynamic types of insulators for the highest level of atmospheric pollution.

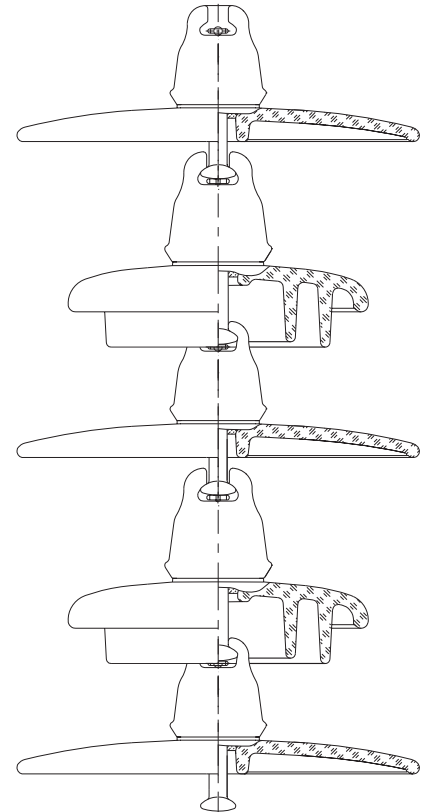
Advantages of mixed type string unit

With a uniform interchange of insulating parts of aerodynamic and fog type profiles the combination of these parts is superior to uniform string unit of fog type profile by the method of dirt-guard system.

- When blowing wind current with fine mud particles, flat disk of aerodynamic insulator does not provide turbulent air curls as above and below surface and contaminated particles do not settle.
- The surface of aerodynamic profile has better ability for self-cleaning under the rain.
- Vertical flowing contaminations are shield by aerodynamic profile thus the most of the lower insulator is left in "dry zone".
- The difference in diameters decreases possibility of flashover from overvoltage while raining.
- Protection from flashover caused by birds streamer.

Power frequency withstand voltage (wet) test of mixed type string unit

String unit of two-winged insulators and combination of insulators of aerodynamic profile and with extended protrusion of ribs were tested. Test showed the increase of discharge characteristics (wet) of mixed type string unit at 25%.



Yuzhurskiy
(ЮЗ) Insulators and Fittings
and Plant

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APPROVED
Head of Test Center of Insulators and line fittings
"Yuzhurskiy"
S.V. Movchan-ov
2016 r.

TEST REPORT № 6409-02-2016

Test object	String of line suspension disk insulators U120AD and U120AD-U120B (IEC 120B)
Standard applied	Test acc. to requirements of customer
Place	Test Center of insulators and line fittings of "Yuzhurskiy" AD, Yuzhurskiy
Date of test	Certificate of accreditation: № POCC RU.0001.22ME66 11 May 2016
Number of sheets	9

This test results and printed results this protocol without the permission of the Test center
Personal values to the sample submitted to the test

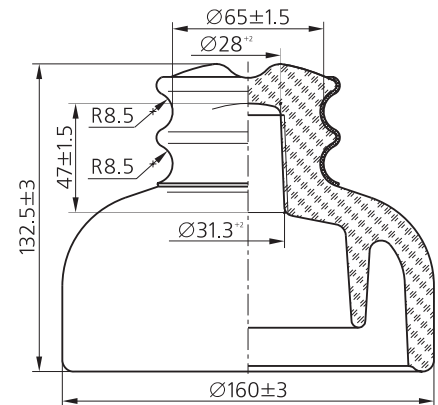
HV glass pin insulator of SHS10E type

HV glass pin insulator of SHS10E type is intended for the insulation and fastening of the conductors in the AC overhead transmission lines and switchgears of the power stations and substations with the voltage up to 10 kV and power frequency up to 100 Hz, at the temperature of air from -60°C to $+50^{\circ}\text{C}$.

Minimum voltage	Puncture voltage in insulating medium	kV	130
	50 Hz withstand voltage (dry)	kV	68
	50 Hz withstand voltage (wet)	kV	42
	Impulse withstand voltage 1.2/50 +/-	kV	105
	Impulse puncture test voltage in air	kV	200...220
Nominal creepage distance		mm	290
Minimum mechanical failing load (bending)		kN	12.5
Weight		kg	2.0

Advantages of insulator SHS10E over the existing analogues:

- visual breakdown detection,
- high thermal-shock resistance (70°C),
- residual strength after breakage due to polymer coating of insulator cap (modified ethylene polymer).



HV glass-ceramic pin insulator of SHS10I type

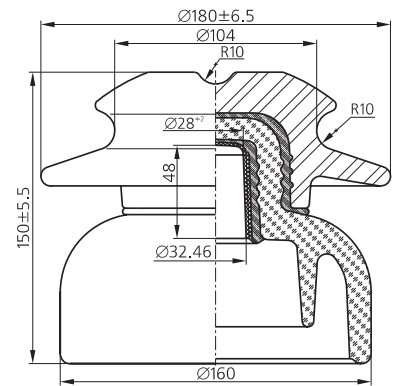
HV glass-ceramic pin insulator of SHS10I type is intended for the insulation and fastening of the conductors in the AC overhead transmission lines and switchgears of the power stations and substations with the voltage up to 10 kV and power frequency up to 100 Hz, at the temperature of air from -60°C to $+50^{\circ}\text{C}$.

Minimum voltage	Puncture voltage in insulating medium	kV	130
	50 Hz withstand voltage (dry)	kV	68
	50 Hz withstand voltage (wet)	kV	45
	Impulse withstand voltage 1.2/50 +/–	kV	115
	Impulse puncture test voltage in air	kV	220...245
Nominal creepage distance		mm	350
Minimum mechanical failing load (bending)		kN	12.5
Weight		kg	3.6

Insulator SHS10I consists of two insulating parts: tempered glass and porcelain.

Advantages of insulator SHS10I over the existing analogues:

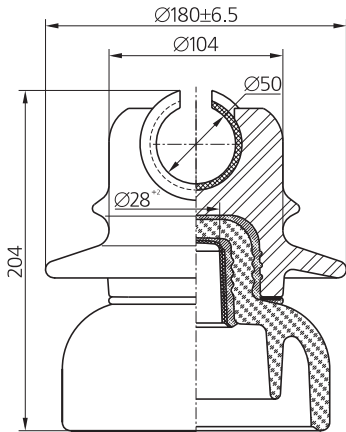
- possibility of visual detection of damage,
- high thermal-shock resistance,
- residual strength after breakage.



HV glass-ceramic pin insulator of SHS10I1 type

HV glass-ceramic pin insulator of SHS10I1 type is intended for the insulation and fastening of the conductors in the AC overhead transmission lines and switchgears of the power stations and substations with the voltage up to 10 kV and power frequency up to 100 Hz, at the temperature of air from −60°C to +50°C.

Minimum voltage	Puncture voltage in insulating medium	kV	130
	50 Hz withstand voltage (dry)	kV	68
	50 Hz withstand voltage (wet)	kV	45
	Impulse withstand voltage 1.2/50 +/−	kV	80
Nominal creepage distance		mm	350
Minimum mechanical failing load (bending)		kN	12.5
Weight		kg	3.9

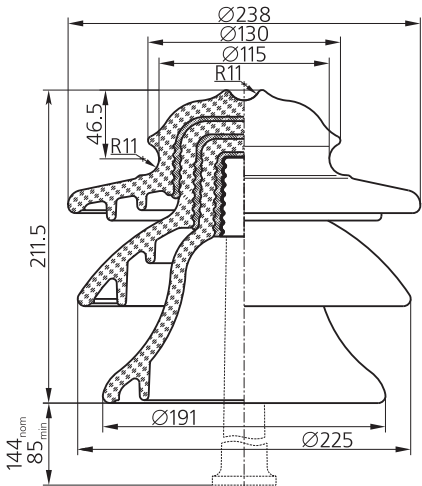


HV glass pin insulator of LS 175 type

Nominal voltage is 30 kV. Internal screwed hole is in compliance with standard BS 3288.

Minimum voltage	Puncture voltage in insulating medium	kV	130
	50 Hz withstand voltage (dry)	kV	100
	50 Hz withstand voltage (wet)	kV	70
	Impulse withstand voltage 1.2/50 +/−	kV	175
Nominal creepage distance		mm	735
Minimum mechanical failing load (bending)		kN	20
Weight		kg	5.8

Insulator meets the requirements of IEC 383-1.



Insulators with hot setting coating

The coating allows to give polymeric properties for glass insulators while maintaining the advantages of toughed glass as:

- Contamination of the insulator surface is greatly reduced due to the high hydrophobic property of the coating. Discharge characteristics are increased by 1.5 and more times under severe contamination conditions.
- It is not needed anymore to clean and wash insulating strings. Costs are greatly decreased for lines operation.
- Radio interference level is decreased either for insulators and string at all. Insulators with voltage up to 35 kV have radio interference level less than 34 dB.
- Insulators become resistant to vandalism (shooting).

Advantages of insulators with hot setting coating:

- Better hydrophobic properties. Wetting angle is more than 120 degrees.
- Ability to apply coating by cast moulding practically without loss of material that as a result decrease the cost of price.
- Ability to apply coating with thickness no less than 1 mm (average coating thickness – 2–2.5 mm) allows to predict the coating lifetime which is similar to lifetime of glass insulators and does not need to renew the coating.
- Provide resistance for glass insulators to the external mechanical effects (vandalism).



HV glass suspension insulators of U70BS and U70BL type

HV glass suspension insulators of U100BS and U100BL type

HV glass suspension insulator of U120B type

Withstand voltages of suspension insulator string with insulators of standard profile are based on the tests according to IEC 60383.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	U70BS/U100BS/U120B			U70BL/U100BL/U120B		
	Diameter 255 mm			Diameter 255 mm		
	Spacing 127 mm			Spacing 146 mm		
	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV
	dry	wet		dry	wet	
2	113	65	175	130	75	195
3	157	100	245	180	115	275
4	204	135	320	235	155	360
5	244	170	395	280	195	430
6	283	200	460	325	230	505
7	326	231	525	375	265	580
8	365	261	585	420	300	660
9	404	283	660	465	325	730
10	444	326	720	510	375	800
11	478	357	785	550	410	880
12	518	383	850	595	440	955
13	552	413	920	635	475	1025
14	587	444	985	675	510	1095
15	622	470	1050	715	540	1160
16	657	496	1115	755	570	1230
17	696	522	1180	800	600	1300
18	744	552	1240	855	635	1370
19	761	578	1310	875	665	1440
20	796	609	1365	915	700	1510
21	826	635	1425	950	730	1575
22	861	661	1490	990	760	1640
23	896	687	1550	1030	790	1710
24	926	713	1610	1065	820	1775
25	957	744	1670	1100	855	1850
26	992	765	1735	1140	880	1920
27	1022	792	1800	1175	910	1990
28	1057	813	1860	1215	935	2060
29	1092	839	1920	1255	965	2130
30	1122	861	1980	1290	990	2200

HV glass suspension insulator of PS70I type

HV glass suspension insulator of PS120V type

Withstand voltages of suspension insulator string with insulators of standard profile are based on the tests according to IEC 60383.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	Diameter 255 mm		
	Spacing 146 mm		
	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV
	dry	wet	
2	140	90	200
3	195	135	285
4	242	185	365
5	280	225	450
6	330	255	510
7	380	285	580
8	425	325	665
9	470	360	735
10	515	395	810
11	555	430	890
12	600	465	960
13	640	495	1045
14	680	525	1123
15	720	555	1200
16	760	585	1277
17	810	615	1365
18	865	650	1452
19	890	680	1529
20	930	715	1602
21	965	745	1674
22	995	780	1752
23	1035	810	1824
24	1070	840	1887
25	1105	875	1960
26	1145	905	2032
27	1180	930	2110
28	1220	960	2187
29	1265	985	2265
30	1300	1015	2342

HV glass suspension insulators of U160BS and U160BL type

HV glass suspension insulator of U210B type

Withstand voltages of suspension insulator string with insulators of standard profile are based on the tests according to IEC 60383.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	U160BS			U160BL/U210B		
	Diameter 280 mm			Diameter 280/290 mm		
	Spacing 146 mm			Spacing 170 mm		
	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV
	dry	wet		dry	wet	
2	130	75	195	140	80	215
3	180	115	275	200	120	305
4	235	155	360	250	160	385
5	280	195	430	300	200	470
6	325	230	505	350	240	560
7	375	265	580	400	280	640
8	420	300	660	450	320	720
9	465	325	730	500	350	810
10	510	375	800	545	380	900
11	550	410	880	590	420	980
12	595	440	955	635	455	1070
13	635	475	1025	675	490	1140
14	675	510	1095	720	520	1220
15	715	540	1160	760	550	1300
16	755	570	1230	810	585	1380
17	800	600	1300	850	615	1460
18	855	635	1370	895	650	1550
19	875	665	1440	930	680	1620
20	915	700	1510	970	710	1690
21	950	730	1575	1000	740	1770
22	990	760	1640	1050	775	1840
23	1030	790	1710	1090	805	1920
24	1065	820	1775	1130	835	2000
25	1100	855	1850	1170	870	2080
26	1140	880	1920	1210	900	2160
27	1175	910	1990	1250	930	2240
28	1215	935	2060	1290	960	2320
29	1255	965	2130	1330	990	2400
30	1290	990	2200	1370	1030	2480

HV glass suspension insulator of U190B type

Withstand voltages of suspension insulator string with insulators of standard profile are based on the tests according to IEC 60383.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	Diameter 280 mm		
	Spacing 190 mm		
	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV
	dry	wet	
2	150	80	220
3	210	125	315
4	280	165	410
5	320	210	510
6	370	255	600
7	415	290	670
8	480	335	750
9	540	365	840
10	590	420	930
11	645	460	1010
12	695	510	1200
13	735	540	1170
14	785	590	1250
15	830	620	1330
16	880	650	1410
17	930	685	1490
18	980	715	1580
19	1030	745	1650
20	1070	780	1720
21	1120	810	1800
22	1170	840	1870
23	1220	880	1950
24	1270	900	2030
25	1305	930	2100
26	1340	960	2190
27	1390	990	2270
28	1440	1030	2350
29	1470	1065	2430
30	1520	1090	2510

HV glass suspension insulator of U240B type

Withstand voltages of suspension insulator string with insulators of standard profile are based on the tests according to IEC 60383.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	Diameter 280 mm			Diameter 280 mm		
	Spacing 170 mm			Spacing 192 mm		
	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV
	dry	wet		dry	wet	
2	140	80	215	150	80	220
3	200	120	305	210	125	315
4	250	160	385	280	165	410
5	300	200	470	320	210	510
6	350	240	560	370	255	600
7	400	280	640	415	290	670
8	450	320	720	480	335	750
9	500	350	810	540	365	840
10	545	380	900	590	420	930
11	590	420	980	645	460	1010
12	635	455	1070	695	510	1200
13	675	490	1140	735	540	1170
14	720	520	1220	785	590	1250
15	760	550	1300	830	620	1330
16	810	585	1380	880	650	1410
17	850	615	1460	930	685	1490
18	895	650	1550	980	715	1580
19	930	680	1620	1030	745	1650
20	970	710	1690	1070	780	1720
21	1000	740	1770	1120	810	1800
22	1050	775	1840	1170	840	1870
23	1090	805	1920	1220	880	1950
24	1130	835	2000	1270	900	2030
25	1170	870	2080	1305	930	2100
26	1210	900	2160	1340	960	2190
27	1250	930	2240	1390	990	2270
28	1290	960	2320	1440	1030	2350
29	1330	990	2400	1470	1065	2430
30	1370	1030	2480	1520	1090	2510

HV glass suspension insulator of U300B type

Withstand voltages of suspension insulator string with insulators of standard profile are based on the tests according to IEC 60383.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	Diameter 320 mm		
	Spacing 195 mm		
	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV
	dry	wet	
2	155	90	230
3	220	140	340
4	290	180	430
5	350	220	530
6	405	260	620
7	465	300	700
8	515	350	790
9	570	390	880
10	620	440	970
11	675	490	1060
12	725	540	1150
13	775	580	1240
14	825	620	1330
15	870	660	1425
16	920	700	1520
17	970	740	1610
18	1020	780	1700
19	1070	820	1790
20	1110	860	1880
21	1160	900	1970
22	1210	940	2050
23	1260	980	2140
24	1310	1015	2230
25	1360	1050	2320
26	1410	1085	2410
27	1460	1120	2500
28	1510	1155	2600
29	1550	1190	2700
30	1600	1225	2800

HV glass suspension insulator of U400B type

Withstand voltages of suspension insulator string with insulators of standard profile are based on the tests according to IEC 60383.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	Diameter 360 mm		
	Spacing 205 mm		
	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV
	dry	wet	
2	155	100	230
3	220	160	340
4	290	200	430
5	350	240	530
6	405	280	620
7	465	320	700
8	515	380	790
9	570	430	880
10	620	500	970
11	675	560	1060
12	725	625	1150
13	775	670	1240
14	825	720	1330
15	870	770	1425
16	920	815	1520
17	970	865	1610
18	1020	910	1700
19	1070	960	1790
20	1110	1010	1880
21	1160	1060	1970
22	1210	1105	2050
23	1260	1155	2140
24	1310	1195	2230
25	1360	1230	2320
26	1410	1270	2410
27	1460	1310	2500
28	1510	1350	2600
29	1550	1390	2700
30	1600	1420	2800

HV glass suspension insulator of U530B type

Withstand voltages of suspension insulator string with insulators of standard profile are based on the tests according to IEC 60383.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	Diameter 360 mm		
	Spacing 240 mm		
	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV
	dry	wet	
2	160	100	240
3	230	160	340
4	300	200	440
5	360	240	540
6	420	280	640
7	480	320	740
8	530	380	835
9	590	430	935
10	640	500	1030
11	700	560	1130
12	750	625	1230
13	800	670	1330
14	850	720	1430
15	900	770	1530
16	950	815	1635
17	1000	865	1735
18	1050	910	1835
19	1100	960	1935
20	1150	1010	2040
21	1200	1060	2135
22	1250	1105	2235
23	1300	1155	2330
24	1350	1195	2430
25	1410	1230	2525
26	1460	1270	2625
27	1510	1310	2720
28	1570	1350	2815
29	1600	1390	2915
30	1650	1420	3010

HV glass suspension insulator of U70BLP type **HV glass suspension insulator of U100BLP type** **HV glass suspension insulator of U120BP type**

Withstand voltages of suspension insulator string with insulators of FOG profile (insulating part with elongated rib, FOG profile) are based on the tests according to IEC 60383.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	Diameter 280 mm		
	Spacing 146 mm		
	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV
	dry	wet	
2	140	85	210
3	195	115	295
4	240	150	380
5	290	180	465
6	335	210	530
7	380	240	600
8	425	270	680
9	465	300	760
10	510	330	840
11	550	360	920
12	585	390	1000
13	630	410	1080
14	670	430	1160
15	710	460	1240
16	750	490	1320
17	785	510	1410
18	825	530	1500
19	860	550	1580
20	895	570	1655
21	925	590	1730
22	960	610	1810
23	995	630	1885
24	1025	650	1950
25	1060	670	2025
26	1090	690	2100
27	1120	710	2180
28	1155	730	2260
29	1185	750	2340
30	1215	770	2420

HV glass suspension insulators of U160BSP and U160BLP type

Withstand voltages of suspension insulator string with insulators of FOG profile (insulating part with elongated rib, FOG profile) are based on the tests according to IEC 60383.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	U160BSP			U160BLP		
	Diameter 320 mm			Diameter 320 mm		
	Spacing 146 mm			Spacing 170 mm		
	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV
	dry	wet		dry	wet	
2	140	85	210	150	105	235
3	195	115	295	210	150	335
4	240	150	380	265	190	435
5	290	180	465	320	230	535
6	335	210	530	370	270	625
7	380	240	600	420	300	710
8	425	270	680	470	335	800
9	465	300	760	515	365	890
10	510	330	840	570	395	980
11	550	360	920	610	430	1070
12	585	390	1000	660	460	1170
13	630	410	1080	700	490	1260
14	670	430	1160	745	520	1355
15	710	460	1240	785	550	1450
16	750	490	1320	830	575	1540
17	785	510	1410	870	605	1640
18	825	530	1500	910	630	1730
19	860	550	1580	950	655	1810
20	895	570	1655	990	680	1900
21	925	590	1730	1030	700	1990
22	960	610	1810	1060	720	2080
23	995	630	1885	1090	740	2160
24	1025	650	1950	1130	755	2245
25	1060	670	2025	1170	780	2325
26	1090	690	2100	1200	800	2410
27	1120	710	2180	1250	825	2490
28	1155	730	2260	1290	850	2575
29	1185	750	2340	1330	885	2650
30	1215	770	2420	1360	910	2720

HV glass suspension insulator of U210BP type

Withstand voltages of suspension insulator string with insulators of FOG profile (insulating part with elongated rib, FOG profile) are based on the tests according to IEC 60383.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	Diameter 330 mm		
	Spacing 170 mm		
	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV
	dry	wet	
2	150	105	235
3	210	150	335
4	265	190	435
5	320	230	535
6	370	270	625
7	420	300	710
8	470	335	800
9	515	365	890
10	570	395	980
11	610	430	1070
12	660	460	1170
13	700	490	1260
14	745	520	1355
15	785	550	1450
16	830	575	1540
17	870	605	1640
18	910	630	1730
19	950	655	1810
20	990	680	1900
21	1030	700	1990
22	1060	720	2080
23	1090	740	2160
24	1130	755	2245
25	1170	780	2325
26	1200	800	2410
27	1250	825	2490
28	1290	850	2575
29	1330	885	2650
30	1360	910	2720

HV glass suspension insulator of U300BP type

Withstand voltages of suspension insulator string with insulators of FOG profile (insulating part with elongated rib, FOG profile) are based on the tests according to IEC 60383.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	Diameter 360 mm		
	Spacing 195 mm		
	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV
	dry	wet	
2	170	120	235
3	240	170	335
4	300	210	435
5	370	265	535
6	420	310	625
7	480	345	710
8	540	380	800
9	590	415	890
10	650	450	1070
11	700	490	1170
12	755	520	1260
13	800	550	1355
14	850	580	1450
15	900	610	1540
16	950	650	1640
17	1000	680	1730
18	1040	700	1810
19	1090	730	1900
20	1130	750	1990
21	1180	780	2080
22	1210	800	2160
23	1250	830	2245
24	1300	850	2325
25	1340	880	2410
26	1370	900	2490
27	1430	930	2575
28	1480	950	2650
29	1520	1000	2720
30	1550	1030	2800

Two-winged HV glass suspension insulator of PSD70E type

Withstand voltages of suspension insulator string with insulators of extreme profile (two wings insulating part) are based on the tests according to IEC 60383.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	Diameter 270 mm			Diameter 270 mm		
	Spacing 127 mm			Spacing 146 mm		
	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV
	dry	wet		dry	wet	
2	113	65	175	130	75	195
3	157	100	245	180	115	275
4	204	135	320	235	155	360
5	244	170	395	280	195	430
6	283	200	460	325	230	505
7	326	231	525	375	265	580
8	365	261	585	420	300	660
9	404	283	660	465	325	730
10	444	326	720	510	375	800
11	478	357	785	550	410	880
12	518	383	850	595	440	955
13	552	413	920	635	475	1025
14	587	444	985	675	510	1095
15	622	470	1050	715	540	1160
16	657	496	1115	755	570	1230
17	696	522	1180	800	600	1300
18	744	552	1240	855	635	1370
19	761	578	1310	875	665	1440
20	796	609	1365	915	700	1510
21	826	635	1425	950	730	1575
22	861	661	1490	990	760	1640
23	896	687	1550	1030	790	1710
24	926	713	1610	1065	820	1775
25	957	744	1670	1100	855	1850
26	992	765	1735	1140	880	1920
27	1022	792	1800	1175	910	1990
28	1057	813	1860	1215	935	2060
29	1092	839	1920	1255	965	2130
30	1122	861	1980	1290	990	2200

HV glass suspension insulator of U120AD type

Withstand voltages of suspension insulator string with insulators of OPEN type profile (insulating part of OPEN profile) are based on the tests according to IEC 60383.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	Diameter 380 mm			Diameter 380 mm		
	Spacing 127 mm			Spacing 130 mm		
	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV
	dry	wet		dry	wet	
2	95	75	160	95	75	160
3	135	110	225	135	110	225
4	175	145	290	175	145	290
5	215	180	355	215	180	355
6	255	210	420	255	210	420
7	290	245	490	290	245	490
8	330	280	555	330	280	555
9	370	310	620	370	310	620
10	410	345	685	410	345	685
11	450	380	750	450	380	750
12	490	410	815	490	410	815
13	530	445	885	530	445	885
14	570	480	950	570	480	950
15	610	515	1015	610	515	1015
16	650	545	1080	650	545	1080
17	690	580	1145	690	580	1145
18	730	615	1210	730	615	1210
19	770	645	1280	770	645	1280
20	810	680	1345	810	680	1345
21	850	715	1410	850	715	1410
22	890	750	1475	890	750	1475
23	930	780	1540	930	780	1540
24	970	815	1605	970	815	1605
25	1010	850	1675	1010	850	1675
26	1050	880	1740	1050	880	1740
27	1090	915	1805	1090	915	1805
28	1130	950	1870	1130	950	1870
29	1170	980	1935	1170	980	1935
30	1210	1015	2000	1215	1020	2010

HV glass suspension insulator of U120AD type

Withstand voltages of suspension insulator string with insulators of OPEN type profile (insulating part of OPEN profile) are based on the tests according to IEC 60383.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	Diameter 380 mm		
	Spacing 146 mm		
	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV
	dry	wet	
2	110	85	165
3	160	125	235
4	205	165	310
5	255	205	380
6	305	240	450
7	355	280	525
8	405	320	595
9	455	360	670
10	505	395	740
11	555	435	810
12	605	470	885
13	655	510	955
14	705	550	1030
15	755	590	1100
16	800	625	1175
17	850	665	1245
18	900	705	1315
19	950	745	1390
20	1000	780	1460
21	1050	820	1535
22	1100	860	1605
23	1150	895	1675
24	1200	935	1750
25	1250	975	1825
26	1290	1010	1895
27	1350	1050	1965
28	1400	1090	2035
29	1450	1125	2110
30	1495	1165	2180

HV glass suspension insulator of U160AD type

Withstand voltages of suspension insulator string with insulators of OPEN type profile (insulating part of OPEN profile) are based on the tests according to IEC 60383.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	Diameter 420 mm			Diameter 420 mm		
	Spacing 146 mm			Spacing 170 mm		
	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV
	dry	wet		dry	wet	
2	110	85	165	125	85	180
3	160	125	235	180	125	260
4	205	165	310	230	165	340
5	255	205	380	295	205	420
6	305	240	450	350	240	490
7	355	280	525	400	280	580
8	405	320	595	450	320	650
9	455	360	670	510	360	740
10	505	395	740	560	395	810
11	555	435	810	620	435	890
12	605	470	885	680	470	970
13	655	510	955	730	510	1050
14	705	550	1030	800	550	1130
15	755	590	1100	850	590	1210
16	800	625	1175	900	625	1300
17	850	665	1245	960	665	1370
18	900	705	1315	1020	705	1450
19	950	745	1390	1070	745	1530
20	1000	780	1460	1140	780	1610
21	1050	820	1535	1200	820	1690
22	1100	860	1605	1250	860	1770
23	1150	895	1675	1310	895	1850
24	1200	935	1750	1360	935	1930
25	1250	975	1825	1420	975	2010
26	1290	1010	1895	1470	1010	2090
27	1350	1050	1965	1540	1050	2170
28	1400	1090	2035	1600	1090	2250
29	1450	1125	2110	1650	1125	2330
30	1495	1165	2180	1710	1165	2410

HV glass suspension insulator of U210AD type

Withstand voltages of suspension insulator string with insulators of OPEN type profile (insulating part of OPEN profile) are based on the tests according to IEC 60383.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	Diameter 420 mm		
	Spacing 170 mm		
	Power frequency withstand voltage, kV		Standard lightning impulse withstand voltage, kV
	dry	wet	
2	125	85	180
3	180	125	260
4	230	165	340
5	295	205	420
6	350	240	490
7	400	280	580
8	450	320	650
9	510	360	740
10	560	395	810
11	620	435	890
12	680	470	970
13	730	510	1050
14	800	550	1130
15	850	590	1210
16	900	625	1300
17	960	665	1370
18	1020	705	1450
19	1070	745	1530
20	1140	780	1610
21	1200	820	1690
22	1250	860	1770
23	1310	895	1850
24	1360	935	1930
25	1420	975	2010
26	1470	1010	2090
27	1540	1050	2170
28	1600	1090	2250
29	1650	1125	2330
30	1710	1165	2410

HV glass suspension insulators of 52-3, 52-5 type

Flashover voltages of suspension insulator string with insulators of standard profile are based on the tests according to ANSI C 29.1.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	Diameter 10 in (255 mm)			
	Spacing 5 ³ / ₄ in (146 mm)			
	Power frequency flashover voltage, kV		Critical impulse flashover voltage, kV	
	dry	wet	Positive polarity (+)	Negative polarity (–)
2	145	90	220	225
3	205	130	315	320
4	270	170	410	420
5	325	215	500	510
6	380	255	595	605
7	435	295	670	695
8	485	335	760	780
9	540	375	845	860
10	590	415	930	945
11	640	455	1015	1025
12	690	490	1105	1105
13	735	525	1185	1190
14	785	565	1265	1275
15	830	600	1345	1360
16	875	635	1425	1440
17	920	670	1505	1530
18	965	705	1585	1615
19	1010	740	1665	1700
20	1050	775	1745	1785
21	1100	810	1825	1870
22	1135	845	1905	1955
23	1180	880	1985	2040
24	1220	915	2065	2125
25	1260	950	2145	2210
26	1300	985	2220	2295
27	1340	1015	2300	2380
28	1380	1045	2375	2465
29	1425	1080	2455	2550
30	1460	1110	2530	2635

Acc. to ANSI C 29.1 there are possible the tolerances in values:

- dry power frequency flashover voltage $\pm 5\%$ (average flashover value at testing on three strings will be equal or higher than 95% from the value shown in the table),
- wet power frequency flashover voltage $\pm 10\%$ (average flashover value at testing on three strings will be equal or higher than 90% from the value shown in the table),
- critical impulse flashover voltage $\pm 8\%$ (average flashover value at testing on three strings will be equal or higher than 92% from the value shown in the table).

HV glass suspension insulator of 52-8 type

Flashover voltages of suspension insulator string with insulators of standard profile are based on the tests according to ANSI C 29.1.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	Diameter 11 in (280 mm)			
	Spacing 5 ³ / ₄ in (146 mm)			
	Power frequency flashover voltage, kV		Critical impulse flashover voltage, kV	
	dry	wet	Positive polarity (+)	Negative polarity (–)
2	145	90	220	225
3	205	130	315	320
4	270	170	410	420
5	325	215	500	510
6	380	255	595	605
7	435	295	670	695
8	485	335	760	780
9	540	375	845	860
10	590	415	930	945
11	640	455	1015	1025
12	690	490	1105	1105
13	735	525	1185	1190
14	785	565	1265	1275
15	830	600	1345	1360
16	875	635	1425	1440
17	920	670	1505	1530
18	965	705	1585	1615
19	1010	740	1665	1700
20	1050	775	1745	1785
21	1100	810	1825	1870
22	1135	845	1905	1955
23	1180	880	1985	2040
24	1220	915	2065	2125
25	1260	950	2145	2210
26	1300	985	2220	2295
27	1340	1015	2300	2380
28	1380	1045	2375	2465
29	1425	1080	2455	2550
30	1460	1110	2530	2635

Acc. to ANSI C 29.1 there are possible the tolerances in values:

- dry power frequency flashover voltage $\pm 5\%$ (average flashover value at testing on three strings will be equal or higher than 95% from the value shown in the table),
- wet power frequency flashover voltage $\pm 10\%$ (average flashover value at testing on three strings will be equal or higher than 90% from the value shown in the table),
- critical impulse flashover voltage $\pm 8\%$ (average flashover value at testing on three strings will be equal or higher than 92% from the value shown in the table).

HV glass suspension insulator of 52-11 type

Flashover voltages of suspension insulator string with insulators of standard profile are based on the tests according to ANSI C 29.1.

Characteristics are given for the strings without screens and arcing horns (at application of the specified protective fittings the characteristics are defined according to the arcing distance specified in the documentation for the string).

Number of insulators in string, pcs.	Diameter 11 in (280 mm)			
	Spacing 6 ¹ / ₈ in (156 mm)			
	Power frequency flashover voltage, kV		Critical impulse flashover voltage, kV	
	dry	wet	Positive polarity (+)	Negative polarity (–)
2	145	90	220	225
3	205	130	315	320
4	270	170	410	420
5	345	225	520	530
6	400	275	615	625
7	455	315	690	715
8	510	360	765	815
9	570	405	920	925
10	640	455	1015	1025
11	690	490	1105	1105
12	735	525	1185	1190
13	785	565	1265	1275
14	830	600	1345	1360
15	875	635	1425	1440
16	920	670	1505	1530
17	965	705	1585	1615
18	1010	740	1665	1700
19	1050	775	1745	1785
20	1100	810	1825	1870
21	1135	845	1905	1955
22	1180	880	1985	2040
23	1220	915	2065	2125
24	1260	950	2145	2210
25	1300	985	2220	2295
26	1340	1015	2300	2380
27	1380	1045	2375	2465
28	1425	1080	2455	2550
29	1460	1110	2530	2635
30	1495	1140	2605	2720

Acc. to ANSI C 29.1 there are possible the tolerances in values:

- dry power frequency flashover voltage $\pm 5\%$ (average flashover value at testing on three strings will be equal or higher than 95% from the value shown in the table),
- wet power frequency flashover voltage $\pm 10\%$ (average flashover value at testing on three strings will be equal or higher than 90% from the value shown in the table),
- critical impulse flashover voltage $\pm 8\%$ (average flashover value at testing on three strings will be equal or higher than 92% from the value shown in the table).

HV glass suspension insulator of U40B type

SGS Fimko Ltd. (Finland)

Certificate of type tests No.18434
27.02.2002–19.04.2002

The product has been tested according to standards
IEC 60383-1:1993 and IEC 61211:1994



Helsinki University of Technology (Finland)

Test report No.2002hv10 1 (9)

27.02.2002–19.04.2002

Standards: IEC 60383-1 (1993) and IEC 61211 (1994)



HV glass suspension insulators of U70BS and U70BL type

High-Voltage Laboratory of KEMA (the Netherlands)

Type test certificate of complete type test No.03-1237
03.11.2003–14.11.2003

The object has been subjected to the series of proving tests
in accordance with IEC 60383-1

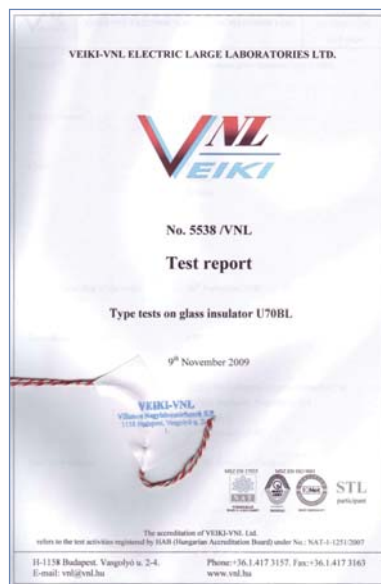


VEIKI-VNL Electric Large Laboratories Ltd. (Hungary)

Test report No.5538/VNL

09.11.2009

Type test



HV glass suspension insulator of U210B type

SGS Fimko Ltd. (Finland)

Certificate of type tests No.18432

27.02.2002–19.04.2002

The product has been tested according to standards IEC 60383-1:1993 and IEC 61211:1994

SGS Fimko Ltd.
 CERTIFICATE OF TYPE TESTS 18432
 Product: Glass suspension insulator (cap and pin type)
 Type: U210B
 Trade mark: YUAIZ
 Certificate Holder: Yuzhno-Ural'sk Insulators and Fittings Plant (YUAIZ)
 Manufacturer: Chelyabinsk Region, 457040
 Tested for: Järvenpää Oy, Helsinki, FINLAND
 The product has been tested according to standards: IEC 60383-1:1993 and IEC 61211:1994
 Date of tests: 27.2 – 19.4.2002
 Test results: This certificate is based on testing carried out by HET/VTTE. The results are shown in Test Report No.2002/13 consisting of 8 Pages + 14 Appendices.
 The product, constructed in accordance with the description, drawings and photographs incorporated in this Certificate, has been subjected to the series of proving tests in accordance with the complete type test requirements of IEC 60383-1:1993 and IEC 61211:1994.
 The results are shown in the record of proving tests and the photographs attached hereto. The values obtained and the general performance are considered to comply with the above standards and to justify the ratings assigned by the manufacturer based on these 14 Test Results.
 This Certificate and Record of Proving Tests apply only to the specific piece of product tested from the particular plant of manufacture. The responsibility for conformity of any product having the same designation with that tested rests with the manufacturer at the place of manufacture of that product.
 Date of issue: 27 May 2002
 Signature: Osmo Vartiainen, Laboratory Manager

VEIKI-VNL Electric Large Laboratories Ltd. (Hungary)

Test report No. 7935/VNL

17.05.2014–29.05.2014

Dielectric and mechanical tests

VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.
 No. 7935/VNL
 Page 1 of 19
TYPE TEST REPORT
 Test Object: Cap and pin type glass insulator
 Designation: Insulator U210B
 Manufacturer: OAO "YUAIZ"
 1, Zarevskaya St., Yuzhnouralsk
 Chelyabinsk region, 457040 Russia
 Tested for: OAO "YUAIZ"
 Date of tests: 17 until 29 May 2014
 Tested by: VEIKI-VNL Electric Large Laboratories Ltd.
 Project ID: NPL-17/2014
 Order/Contract: NPL-17/2014, 30th April 2014
 Test Specification: IEC 60383-1:1993 Clause 13, 14, 17, 19 and 20
 IEC 60060-1:2010,
 IEC 60797:1994
 Tests Performed: The test object, constructed in accordance with the description, drawing and photographs incorporated in this report has been subjected to dielectric and mechanical tests.
 Test Results: The test object fulfilled the requirements of the standard.
 This Test Report has been issued by VEIKI-VNL Ltd. in accordance with above mentioned Specifications. The Report applies only to the test object tested. The responsibility for conformity of any test object having the same designation with that tested rests with the Manufacturer.
 This Report comprises 21 sheets in total (19 numbered pages, 2 drawings).
 Only integral reproduction of this document is permitted without written permission from VEIKI-VNL Ltd.
 Budapest, 30th May, 2014
 Test engineer: Tamás Forgó
 Csaba Horváth supervised by
 Dr. László Varga managing director
 H-1158 Budapest, Vargalyás u. 3-4.
 E-mail: vnl@vnl.hu
 www.vnl.hu
 Phone: +36-1-417 3157
 Fax: +36-1-417 3163

HV glass suspension insulator of U240B type

VEIKI-VNL Electric Large Laboratories Ltd. (Hungary)

Test report No. 7936/VNL

13.05.2014–27.05.2014

Dielectric and mechanical tests

VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.
 No. 7936/VNL
 Page 1 of 19
TYPE TEST REPORT
 Test Object: Cap and pin type glass insulator
 Designation: Insulator U240B
 Manufacturer: OAO "YUAIZ"
 1, Zarevskaya St., Yuzhnouralsk
 Chelyabinsk region, 457040 Russia
 Tested for: OAO "YUAIZ"
 Date of tests: 13 until 27 May 2014
 Tested by: VEIKI-VNL Electric Large Laboratories Ltd.
 Project ID: NPL-17/2014
 Order/Contract: NPL-17/2014, 30th April 2014
 Test Specification: IEC 60383-1:1993 Clause 13, 14, 17, 19 and 20
 IEC 60060-1:2010,
 IEC 60797:1994
 Tests Performed: The test object, constructed in accordance with the description, drawing and photographs incorporated in this report has been subjected to dielectric and mechanical tests.
 Test Results: The test object fulfilled the requirements of the standard.
 This Test Report has been issued by VEIKI-VNL Ltd. in accordance with above mentioned Specifications. The Report applies only to the test object tested. The responsibility for conformity of any test object having the same designation with that tested rests with the Manufacturer.
 This Report comprises 21 sheets in total (19 numbered pages, 2 drawings).
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 Budapest, 30th May, 2014
 Test engineer: Tamás Forgó
 Csaba Horváth supervised by
 Dr. László Varga managing director
 H-1158 Budapest, Vargalyás u. 3-4.
 E-mail: vnl@vnl.hu
 www.vnl.hu
 Phone: +36-1-417 3157
 Fax: +36-1-417 3163

EGU-HV Laboratory a.s. (Czech Republic)

Test report No. 10320/A/15

03.09.2015–29.09.2015

Type test

EGU HV Laboratory a.s.
 EGU - HV Laboratory a.s., Podbuzická 257, 150 11 Praha 5, Břichovna
HIGH VOLTAGE TESTING LABORATORY
 Accredited testing laboratory No.: 1029
 Accredited by Czech Accreditation Institute, a.p.s.
TEST REPORT No.: 10320/A/15
CUSTOMER: Otkrytoe akcionernoe obshchestvo "Yuzhnouralskiy armaturno-dizayner'skiy zavod (OAO "YUAIZ", member of Global Insulator Group) Zavodskaya 1 457040 Yuzhnouralsk, Chelyabinsk region, Russia
ORDER No.: Contract No. 012/15
DATE OF TESTS: From 2015-09-03 till 2015-09-29

TEST REPORT No.: 10320/A/15
TEST OBJECT: Cap and pin glass insulator unit
TYPE SPECIFICATION: PS240A
DRAWING NO.: IS-074.00.0058
MANUFACTURER: OAO "YUAIZ", Russia
DATE OF DELIVERY: 2015-08-03
TEST STANDARDS: IEC 60383-1 Ed.4:1993, IEC 60437 Ed.2:1997
TESTS WITNESSED BY: n/a
 Test engineer: Marek Šindel
 Head of High Voltage Testing Laboratory: Jan Šlechta
 Director of EGU - HV Laboratory a.s.: Jan Šlechta, Ph.D.
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 Pages: 9
 Date: 2015-10-23

HV glass suspension insulator of U400B type

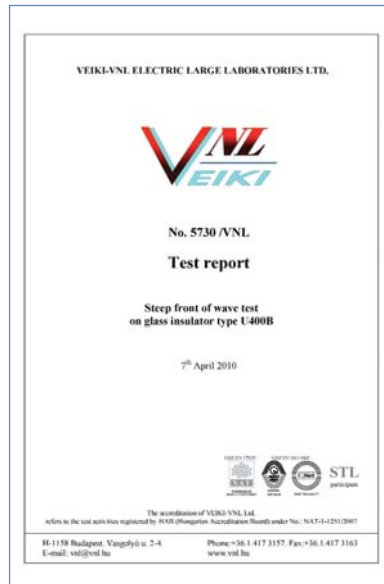
VEIKI-VNL Electric Large Laboratories Ltd. (Hungary)

Test report No. 5729/VNL
07.04.2010
Residual strength test



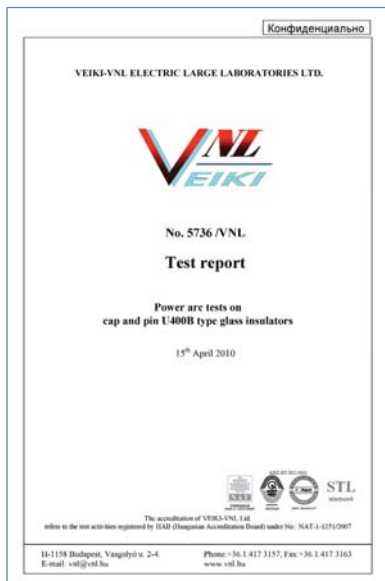
VEIKI-VNL Electric Large Laboratories Ltd. (Hungary)

Test report No. 5730/VNL
07.04.2010
Steep front of wave test



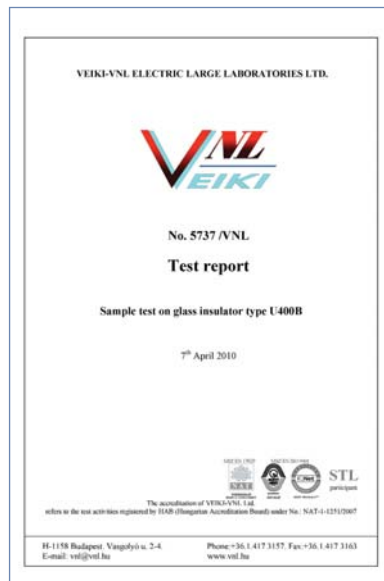
VEIKI-VNL Electric Large Laboratories Ltd. (Hungary)

Test report No. 5736/VNL
15.04.2010
Power arc tests



VEIKI-VNL Electric Large Laboratories Ltd. (Hungary)

Test report No. 5737/VNL
07.04.2010
Sample test



HV glass suspension insulator of U400B type

VEIKI-VNL Electric Large Laboratories Ltd. (Hungary)

Test report No. 5738/VNL

07.04.2010

Type test



HV glass suspension insulator of U530B type

VEIKI-VNL Electric Large Laboratories Ltd. (Hungary)

Test report No. 5745/VNL

26.04.2010

Type test



HV glass suspension insulator of U120BP type

EGU-HV Laboratory a.s. (Czech Republic)

Test report No.10320/C/15

06.09.2015–29.09.2015

Type test

EGU HV Laboratory a.s.
EGU - HV Laboratory a.s., Podbuzická 207, 190 11 Praha 9, Běchovice

HIGH VOLTAGE TESTING LABORATORY
 Accredited testing laboratory No.: 1029
 Accredited by Czech Accreditation Institute, o.p.s.

TEST REPORT No.: 10320/C/15

CUSTOMER: Otkrytoe akcionernoe obshchestvo "Yuzhnouralskiy armaturno-izolyatsionnyy zavod (OAO "YuAZ", member of Global Insulator Group) Zavodskaya 1 457040 Yuzhnouralskiy, Chelyabinsk region Russia

ORDER No.: Contract No. 012/15

DATE OF TESTS: From 2015-09-06 till 2015-09-29

Test Report No.: 10320/C/15

TEST REPORT No.: 10320/C/15

TEST OBJECT: Cap and pin glass insulator unit

TYPE SPECIFICATION: U120BP

DRAWING NO.: IS-157 C8

MANUFACTURER: OAO "YuAZ", Russia

DATE OF DELIVERY: 2015-08-03

TEST STANDARDS: IEC 60383-1 Ed.4:1993, IEC 60437 Ed.2:1997

TESTS WITNESSED BY: n/a

Test engineer: Marek Šindler

Head of High Voltage Testing Laboratory: Jan Boucha

Director of EGU - HV Laboratory a.s.: Jan Lachman, Ph.D.

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Copies: 1+1 Pages: 9 Date: 2015-10-23

HV glass suspension insulator of U160BLP type

High-Voltage Laboratory of KEMA (the Netherlands)

Test report No. 70370158.000-HVL 03-1240

11.11.2003

The requirements as specified in the standard IEC 60383-1 (1993)

VEIKI-VNL Electric Large Laboratories Ltd. (Hungary)

Test report No. 6157/VNL

29.03.2011

Type test

KEMA

TEST REPORT

Report no.: 70370158.000-HVL 03-1240

Client: J.S.C. "Yuzhnouralskiy insulators and fittings plant" 457040, Yuzhnouralskiy, Chelyabinsk region, Russia

Reference: Contract KEMA 70370158-T01-HVL 03-200304, dated 1 September 2003

Concerning: tests

Date: 11 November 2003

Place: KEMA High-Voltage Laboratory, Arnhem

Object: Insulated glass suspension insulator (cap and pin type)

Type: U160BLP (pin-hanging type)

Manufacturer: same as client

REQUIREMENTS
 The requirements as specified in the standard IEC 61383-1(1993).

TEST PROGRAMME
 The programme was specified by the client and was as follows:
 1. Type tests according to IEC 60383-1 (1993)
 1.1 Dry lightning impulse withstand voltage test on a standard short string of 5 insulators in accordance with clause 13 of the above mentioned standard
 1.2 Wet power frequency withstand voltage tests on a standard short string of 5 insulators and on a single insulator in accordance with clause 14 of the above mentioned standard
 2. Space tests (mechanical) according to client's specifications based on IEC 61383-2 (1993)
 2.1 Wet switching impulse withstand voltage test in accordance with clause 11 of the above mentioned standard

SUMMARY AND CONCLUSION
 The results obtained relate only to the work ordered and to the material tested.
 The tests were passed.

Author: P.H.W. Kappers

KEMA Nederland B.V.
 S.A.M. Verhoeven
 KEMA High-Voltage Laboratory
 Arnhem, 14 January 2004

This B-report consists of:
 13 pages
 1 appendix

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VEIKI-VNL ELECTRIC LARGE LABORATORIES LTD.

VEIKI

No. 6157/VNL

Test report

Type test on glass insulator type U160BLP

29th March 2011

The accreditation of VEIKI-VNL Ltd. refers to the test methods recognised by IAB (Hungarian Accreditation Board) under No.: NAT-4-129/2007

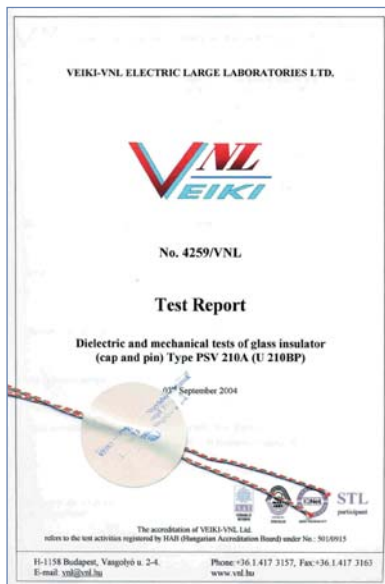
11-1158 (Budapest, Városliget u. 2-4.
 E-mail: vs@veiki.hu

Phone: +36-1-417 3157. Fax: +36-1-417 3163
 www.vnl.hu

HV glass suspension insulator of U210BP type

VEIKI-VNL Electric Large Laboratories Ltd. (Hungary)

Test report No. 4259/VNL
21.06.2004–02.07.2004
Dielectric and mechanical tests



VEIKI-VNL Electric Large Laboratories Ltd. (Hungary)

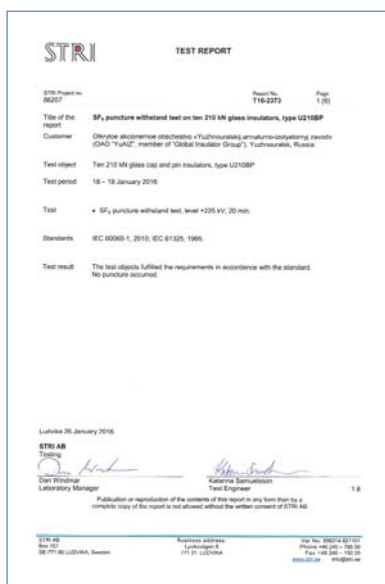
Test report No. 6158/VNL
29.03.2011
Type test



HV glass suspension insulator of U210BP type for application on HVDC

STRI AB (Sweden)

Test report No. T16-2373
18.01.2016–19.01.2016
SF₆ puncture withstand test



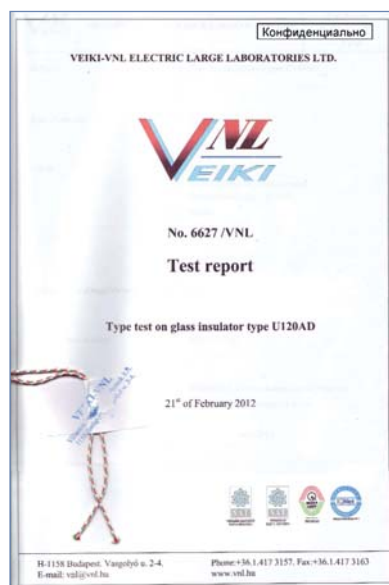
HV glass suspension insulator of U120AD type

VEIKI-VNL Electric Large Laboratories Ltd. (Hungary)

Test report No. 6627/VNL

21.02.2012

Type test



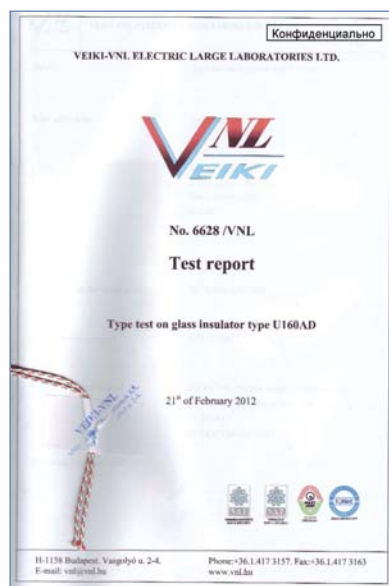
HV glass suspension insulator of U160AD type

VEIKI-VNL Electric Large Laboratories Ltd. (Hungary)

Test report No. 6628/VNL

21.02.2012

Type test



HV glass suspension insulator of 52-3 type

EGU-HV Laboratory a.s. (Czech Republic)

Test report No. 10107/H/14
11.08.2014–29.08.2014
Type test

EGU – HV Laboratory a. s.
Podskateňská 267, 190 11 Praha 9, Běchovice

High voltage testing laboratory
Accredited testing laboratory No. 1829
Accredited by Czech Accreditation Institute, s.p.a.

CUSTOMER: ORDER No.:
Odkrytý akcionářský obchod "Yuzhnouralskiy armaturno-izolyatornyy zavod"
(OAO "YuaIZ", member of Global Insulator Group)
Zavodskaya 1
Yuzhnouralskiy, Chelyabinsk region 457040
Russia

DATE OF TEST: TEST No.:
From 2014-08-11 till 2014-08-29 10107/14

TEST REPORT
No. 10107/H/14

TEST OBJECT: BALL-AND-SOCKET INSULATOR
TYPE: 52-3
MANUFACTURER: OAO YuaIZ
TEST STANDARDS: ANSI C 29.2B.2013, ANSI C29.1.2012, NEMA 107:1993

Test performed by:
Marek Šindler

Head of High voltage testing laboratory:
Jan Bolech

Director of EGU - HV Laboratory a.s.:
Jan Lachman

Copies: 2 + 1 **Pages:** 17

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In Prague 9 - Běchovice: 2014-10-27

VEIKI-VNL Electric Large Laboratories Ltd. (Hungary)

Test report No. 8134/VNL
29.09.2014
Power arc tests

VEIKI-VNL
ELECTRIC LARGE LABORATORIES Ltd. No. 8134/VNL
Page 1 of 14

TEST REPORT

Test object: Cap and pin type glass insulator
Designation: Insulator type 52-3 (130 kV)
Manufacturer: OAO "YuaIZ", member of Global Insulator Group
1, Zavodskaya str. Yuzhnouralskiy, Chelyabinsk Region 457040 - RUSSIA
Tested for: OAO "YuaIZ", member of Global Insulator Group
Date of test: 29th September, 2014
Tested by: VEIKI-VNL Ltd. - Budapest - HUNGARY
Project ID: NTL-49/2014
Order/Contract: 0360/12, 25th September, 2014
Test specifications: IEC 2400-4:2008, Sub-Clause 8.2.4
Test performed: The test object, constructed in accordance with the description, drawing and photographs incorporated in this report has been subjected to power arc tests.
Test results: The tested cap and pin type glass insulator fulfilled the prescription of the referred specification concerning to power arc tests on short strings with parameters of 6kA-0.2s.

This Test Report has been issued by VEIKI-VNL Ltd. in accordance with above mentioned specification.
The Report applies only to the test object. The responsibility for conformity of any product having the same designations with that tested rests with the Manufacturer.
This Report comprises 18 sheets in total (14 numbered pages, 1 drawing and 3 enclaves). Only integral reproduction of the document is permitted without written permission from VEIKI-VNL Ltd.
VEIKI-VNL Ltd. is an independent testing laboratory.

Budapest,
10th October, 2014

Ferenc Bakor
responsible for the test

Attila Tóth
supervised by

Dr. László Varga
managing director

H-1158 Budapest, Vagyóly u. 2-4., HUNGARY
E-mail: veiki@veiki.hu
www: veiki.hu

Phone: +36-1-417 3137
Fax: +36-1-417 3163

HV glass suspension insulator of 52-5 type

High-Voltage Laboratory of KEMA (the Netherlands)

Type test certificate of complete type test No. 08-1029
10.04.2008–24.04.2008
The object has been subjected to the series of proving tests in accordance with ANSI C 29.2

KEMA 08-1029

TYPE TEST CERTIFICATE OF COMPLETE TYPE TEST

OBJECT: Toughened glass suspension insulator
TYPE: ANSI Class 52-5
Nominal diameter 200 mm Nominal spacing 300 mm Nominal creepage distance 140 mm

MANUFACTURER: JSC Yuzhnouralskiy Insulators and Fittings Plant,
Yuzhnouralskiy, Russia
CLIENT: Global Insulator Group,
Ekaterinburg, Russia

TESTED BY: KEMA HIGH VOLTAGE LABORATORY
Arnhem, the Netherlands
DATE OF TESTS: 10 April 2008 until 24 April 2008

The object, constructed in accordance with the description, drawings and photographs incorporated in this Certificate, has been subjected to the series of proving tests in accordance with
ANSI C29.2

This Type Test Certificate has been issued by KEMA following exclusively the IEC Guidelines.
The results are shown in the record of Proving Tests and the oscillograms attached hereto. The values obtained and the general performance are considered to comply with the above Standard and to justify the ratings assigned by the manufacturer as listed on page 5.
This Certificate applies only to the object tested. The responsibility for conformity of any object having the same designations with that tested rests with the Manufacturer.
This Certificate consists of 21 pages in total.

KEMA
KEMA T&E Testing Services
Managing Director
Arnhem, 27 June 2008

VEIKI-VNL
ELECTRIC LARGE LABORATORIES Ltd. No. 8135/VNL
Page 1 of 14

TEST REPORT

Test object: Cap and pin type glass insulator
Designation: Insulator type 52-5 (130 kV)
Manufacturer: OAO "YuaIZ", member of Global Insulator Group
1, Zavodskaya str. Yuzhnouralskiy, Chelyabinsk Region 457040 - RUSSIA
Tested for: OAO "YuaIZ", member of Global Insulator Group
Date of test: 29th September, 2014
Tested by: VEIKI-VNL Ltd. - Budapest - HUNGARY
Project ID: NTL-49/2014
Order/Contract: 0360/12, 25th September, 2014
Test specifications: IEC 2400-4:2008, Sub-Clause 8.2.4
Test performed: The test object, constructed in accordance with the description, drawing and photographs incorporated in this report has been subjected to power arc tests.
Test results: The tested cap and pin type glass insulator fulfilled the prescription of the referred specification concerning to power arc tests on short strings with parameters of 6kA-0.2s.

This Test Report has been issued by VEIKI-VNL Ltd. in accordance with above mentioned specification.
The Report applies only to the test object. The responsibility for conformity of any product having the same designations with that tested rests with the Manufacturer.
This Report comprises 18 sheets in total (14 numbered pages, 1 drawing and 3 enclaves). Only integral reproduction of the document is permitted without written permission from VEIKI-VNL Ltd.
VEIKI-VNL Ltd. is an independent testing laboratory.

Budapest,
10th October, 2014

Ferenc Bakor
responsible for the test

Attila Tóth
supervised by

Dr. László Varga
managing director

H-1158 Budapest, Vagyóly u. 2-4., HUNGARY
E-mail: veiki@veiki.hu
www: veiki.hu

Phone: +36-1-417 3137
Fax: +36-1-417 3163

HV glass suspension insulator of 52-8 type

High-Voltage Laboratory of KEMA (the Netherlands)

Type test certificate of complete type test No. 07-1035
23.07.2007–14.09.2007

The object has been subjected to the series of proving tests in accordance with ANSI C 29.2

KEMA 07-1035

TYPE TEST CERTIFICATE OF COMPLETE TYPE TEST

OBJECT: Toughened glass suspension insulator

TYPE: ANSI Class 52-8

Continued VIM testing level	2000 (100) kV (50)	Normal spacing	140 mm
Normal diameter	200 mm	Normal creepage distance	285 mm

MANUFACTURER: JSC Yuzhnouralsky Insulators and Fittings Plant, Yuzhnouralsk, Russia

CLIENT: Global Insulator Group, Ekaterinburg, Russia

TESTED BY: KEMA HIGH VOLTAGE LABORATORY, Arnhem, the Netherlands

DATES OF TESTS: 23 July 2007 till 14 September 2007

The apparatus, constructed in accordance with the description, drawings and photographs incorporated in this Certificate, has been subjected to the series of proving tests in accordance with

ANSI C29.2

This Type Test Certificate has been issued by KEMA following exclusively the IEC Guides.

The results are shown in the record of Proving Tests and the oscillograms attached hereto. The values obtained and the general performance are considered to comply with the above Standard and to justify the ratings assigned by the manufacturer as listed on page 3.

This Certificate applies only to the object tested. The responsibility for conformity of any object having the same designations with that tested rests with the Manufacturer.

This Certificate consists of 22 sheets in total.

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KEMA Nederland B.V.
P.O. Box 100
KEMA T&D Testing Services
Managing Director
Arnhem, 27 September 2007

EGU-HV Laboratory a.s. (Czech Republic)

Test report No. 10107/B/14

31.05.2014–21.08.2014

Type test

EGU – HV Laboratory a. s.
Podnikatelská 267, 190 11 Praha 9, Běchovice

High voltage testing laboratory
Accredited testing laboratory No.: 1829
Accredited by Czech Accreditation Institute, s.p.a.

CUSTOMER: Okrytovací akciová společnost "Yuzhnouralskiy armaturno-izolyatornyy zavod" (OAO "YuAIZ", member of Global Insulator Group)
Zavodskaya 1
Yuzhnouralsk, Chelyabinsk region 457040
Russia

ORDER No.: Contract No. 003/14

DATE OF TEST: From 2014-05-31 till 2014-08-21

TEST No.: 10107/14

TEST REPORT
No.: 10107/B/14

TEST OBJECT: BALL-AND-SOCKET INSULATOR

TYPE: 52-8

MANUFACTURER: OAO YuAIZ

TEST STANDARDS: ANSI C 29.2B-2013, ANSI C29.1-2012, NEMA 107-1993, IEC 60383-1-1993, IEC 60797-1984

Test performed by: Marek Šindler

Head of high voltage testing laboratory: Jan Bolech

Director of EGU - HV Laboratory a.s.: Jan Lachman

Copies: 2 + 1

Pages: 22

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In Prague 9 - Běchovice: 2014-10-16

HV glass suspension insulator of 52-11 type

EGU-HV Laboratory a.s. (Czech Republic)

Test report No. 10107/A/14

26.05.2014–21.08.2014

Type test

EGU – HV Laboratory a. s.
Podnikatelská 267, 190 11 Praha 9, Běchovice

High voltage testing laboratory
Accredited testing laboratory No.: 1829
Accredited by Czech Accreditation Institute, s.p.a.

CUSTOMER: Okrytovací akciová společnost "Yuzhnouralskiy armaturno-izolyatornyy zavod" (OAO "YuAIZ", member of Global Insulator Group)
Zavodskaya 1
Yuzhnouralsk, Chelyabinsk region 457040
Russia

ORDER No.: Contract No. 003/14

DATE OF TEST: From 2014-05-26 till 2014-08-21

TEST No.: 10107/14

TEST REPORT
No.: 10107/A/14

TEST OBJECT: BALL-AND-SOCKET INSULATOR

TYPE: 52-11

MANUFACTURER: OAO YuAIZ

TEST STANDARDS: ANSI C 29.2B-2013, ANSI C29.1-2012, NEMA 107-1993, IEC 60383-1-1993, IEC 60797-1984

Test performed by: Marek Šindler

Head of high voltage testing laboratory: Jan Bolech

Director of EGU - HV Laboratory a.s.: Jan Lachman

Copies: 2 + 1

Pages: 22

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In Prague 9 - Běchovice: 2014-10-16

HV glass suspension insulator of U40B type

Helsinki University of Technology (Finland)

Test report No. 2003hv05 1 (5)

06.03.2003–28.03.2003

Standards: IEC 60383-1 (1993) and IEC 61211 (1994)

TEST REPORT No. 2003hv05 1 (5)

Requested by: ENSTO Utility Networks
P.O. Box 51
FIN-00051 PORVOO
Finland

Object: Glass suspension insulators (cap and pin type)

Designation: U40B

Manufacturer: Lohi Insulator Plant
361, Zolnaia str, LVIV, 79066 Ukraine

Tests: Type tests

Standards: IEC 60383-1 (1993) and IEC 61211 (1994)

Testing dates: 3. - 6.3, 14.3. and 28.3.2003

SUMMARY
Glass suspension insulator units U40B were subjected to type tests according to the test program on the page 2.
All the tests as required by the test specification have been carried out with the satisfactory results.
More details of the tests performed are given in the enclosed tables and graphs.

The test results shall only be the basis for:
Expiry: 03.04.2003
HELSINKI UNIVERSITY OF TECHNOLOGY
High Voltage Institute
Marja-Leena Pykälä, Researcher
Arja Hakkanen, Operations Engineer

Appendices 1 to 7, 9 pages

TEKNIILINEN KORKEAKOULU High Voltage Institute
FINLANDIA HIGHSCHOOL P.O. Box 5050, FIN-00051 HUT
HELSINKI UNIVERSITY OF TECHNOLOGY Espoo 1, Espoo, Finland
TECHNISCHE HOCHSCHULE HELSINKI Tel. +358 9 4600
UNIVERSITE DE TECHNOLOGIE D'HELSINKI Fax +358 9 461 000
Helsinki-2003

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Helsinki University of Technology (HUT).

HV glass suspension insulator of U70BL type

Helsinki University of Technology (Finland)

Test report No. 2002hv21 1 (7)

24.04.2002–17.05.2002

Standards: IEC 60383-1 (1993) and IEC 61211 (1994)

TEST REPORT No. 2002hv21 1 (7)

Requested by: ENSTO SEKKO OY
P.O. Box 51
FIN-00051 PORVOO
Finland

Object: Glass suspension insulators (cap and pin type)

Designation: U70BL

Manufacturer: Lohi Insulator Plant
361, Zolnaia str, LVIV, 79066 Ukraine

Tests: Type tests

Standards: IEC 60383-1 (1993) and IEC 61211 (1994)

Testing dates: 24.4. - 17.5. 2002

SUMMARY
Glass suspension insulator units U70BL were subjected to type tests according to the test program on the page 2.
All the tests as required by the test specification have been carried out with the satisfactory results.
More details of the tests performed are given in the enclosed tables and graphs.

The test results shall only be the basis for:
Expiry: 20.5.2002
HELSINKI UNIVERSITY OF TECHNOLOGY
High Voltage Institute
Marja-Leena Pykälä, Researcher
Arja Hakkanen, Operations Engineer

Appendices 1 to 8, 10 pages

TEKNIILINEN KORKEAKOULU High Voltage Institute
FINLANDIA HIGHSCHOOL P.O. Box 5050, FIN-00051 HUT
HELSINKI UNIVERSITY OF TECHNOLOGY Espoo 1, Espoo, Finland
TECHNISCHE HOCHSCHULE HELSINKI Tel. +358 9 4600
UNIVERSITE DE TECHNOLOGIE D'HELSINKI Fax +358 9 461 000
Helsinki-2002

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Helsinki University of Technology (HUT).

HV glass suspension insulator of U120B type

High-Voltage Laboratory of KEMA
(the Netherlands)

Test report No. 70570059-HVL 05-1328
04.07.2005–13.08.2005

The requirements as specified in the standard IEC 61211 (2004)

KEMA	
TEST REPORT	
Report no.	70570059-HVL 05-1328
Client	Lviv Insulator Company (LIC) Ltd., Ukraine
Reference	
Concerning	see
Date	2 July until 13 August 2005
Place	KEMA high-voltage Laboratory, Arnhem, the Netherlands
Object	U120B high-voltage glass suspension insulator
Type	cap and pin type
Manufacturer	Lviv Insulator Company (LIC) Ltd., Ukraine
REQUIREMENTS	
The requirements as specified in the standard IEC 61211 (2004) and as per client's specification.	
TEST PROGRAMME	
The programme was specified by the client and was as follows:	
1. Power arc test and followed by mechanical testing (see test client's instructions)	
2. Sleep break off wave test (IEC 61211 (2004))	
SUMMARY AND CONCLUSION	
The results obtained relate only to the work ordered and to the material tested. The tests were passed.	
Author: P.J. Nijzenberg	KEMA Nederland B.V. P.O. Box 4000 6500 CA Arnhem Arnhem, 4 November 2005
This report consists of: 18 pages 2 appendices	
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HV glass suspension insulator of U120BP1 type

VEIKI-VNL Electric Large Laboratories Ltd. (Hungary)

Test report No. 7736/VNL
01.11.2013–15.12.2013

Standards: IEC 60383-1:1993, IEC 60437:1997, IEC 60797:1984,
IEC 61211:2004, IEC 60467:2008, IEC 60060-1:1989

VEIKI-VNL		VEIKI-VNL	
ELECTRIC LARGE LABORATORIES Ltd.		No. 7736/VNL	
		Page 1 of 33	
TEST REPORT			
Test Object:	Cap and pin type glass insulator		
Designation:	U120BP1		
Manufacturer:	Lviv Insulator Company Ltd.		
	79000 L'viv, Ukraine		
Tested for:	Lviv Insulator Company Ltd.		
Date of test:	1 st November 2013 – 15 th December 2013		
Tested by:	VEIKI-VNL Electric Large Laboratories Ltd.		
Project ID:	NPL-41/2013/A1		
Order/Contract:	NPL-41/2013, 30 th September 2013		
Test Specification:	IEC 60383-1:1993		
	IEC 60437:1997		
	IEC 60797:1984		
	IEC 61211:2004		
	IEC 60467:2008		
	IEC 60060-1:1989		
Tests Performed:	The test object, constructed in accordance with the description, drawing and photographs incorporated in this report has been subjected to tests.		
Test Results:	The test object passed the tests.		
The Test Report has been issued by VEIKI-VNL Ltd. in accordance with above mentioned specifications.			
The Report applies only to the test object tested. The responsibility for conformity of any test object having the same designations with that tested rests with the Manufacturer.			
This Report comprises 61 sheets in total (31 numbered pages, 1 drawing, 27 enclosures).			
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VEIKI-VNL Ltd. is an independent testing laboratory accredited by the Hungarian Accreditation Board (HAT) under registration no. NAT-0-1231/2003.			
 Budapest, 24 th January, 2014 Tamas Forgó responsible for the test		 Csaba Horvath supervised by Dr. László Varga managing director	
H-1158 Budapest, Vagyolyi s. 2-4. E-mail: veiki@veiki.hu Phone: +36-1-417 3157 www.veiki.hu Fax: +36-1-417 3163			

Packet with crates



Each packet with crates includes several wooden crates placed on the pallet.

For packing manufacture the "screw-ringed" nails are used. They have ring grooves on the stem that create the additional friction force and the nails keep the nailed timber more fixedly.

The pallet packer wraps round the packet with insulators by stretchtape in a few layers to strengthen it for transport to the consumer.

Lath packet



Universal package (UP)



Sea package (SP)



Wooden crate



The pallet packer wraps round the packet with insulators by stretchtape in a few layers to strengthen it for transport to the consumer.

Package with boxes (PB)



Slatted crates

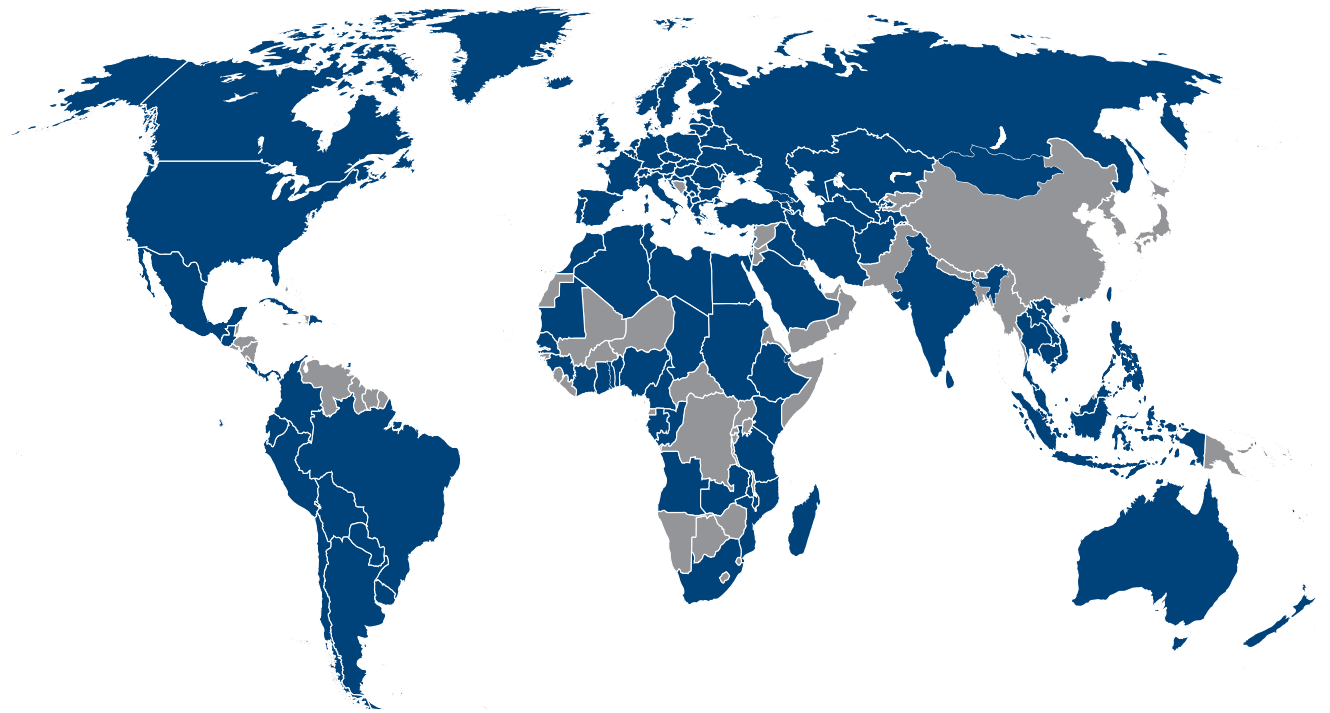


Easy to disassemble (box does not require special tools for opening; simply untwist the wires and the box opens). The design is such that during the transportation empty boxes can be laid flatwise taking up minimum space in the truck.

Wooden cylindrical crate (WCC)



The packing of insulators supplied by GIG is made of wood treated in accordance with the international standard ISPM-15. When the insulators are stored at the open storage ground, the wood may darken due to ultraviolet emission exposure or dust. The impact of these factors on the packing material does not reduce its mechanical strength.



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