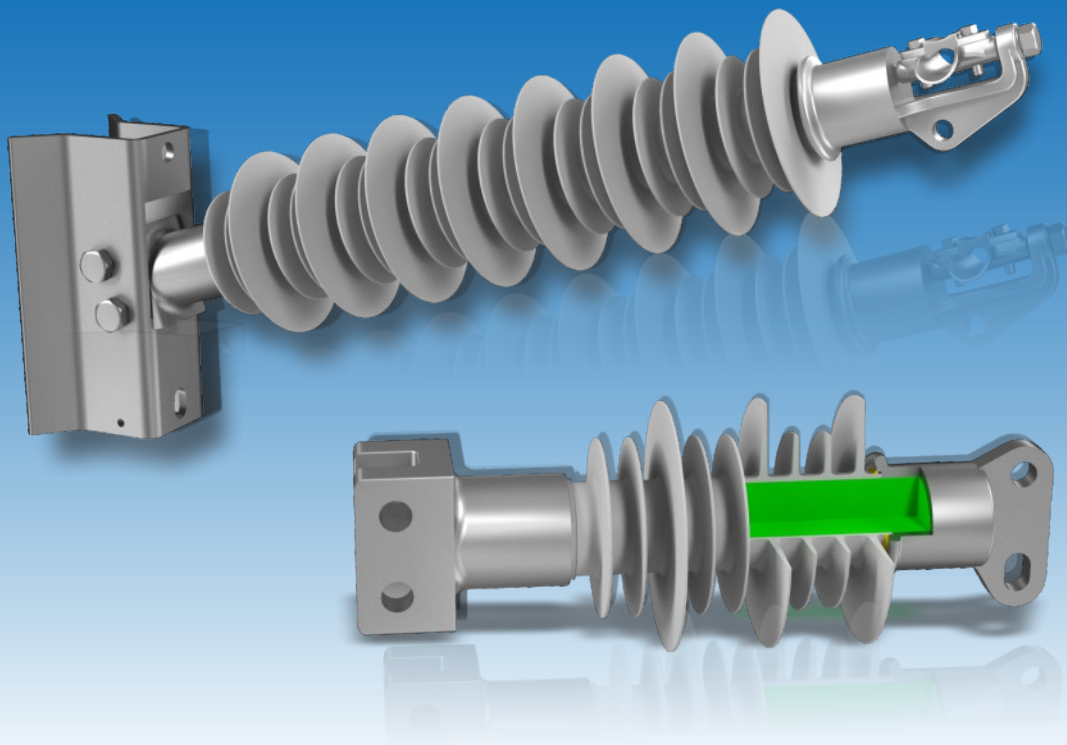


SHEMAR

Line Post Insulators Catalogue

69kV to 345kV



Leading Innovation in Composite Insulation Technology

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SHEMAR Composite Insulators

Delivering Superior Ageing Resistance and Longevity in Reliability Performance

SHEMAR composite insulators embody the latest innovations in composite insulation technology combining world leading material science development, cutting edge design technology, state-of-the-art manufacturing and rigorously monitored quality control.

We understand the crucial impact that insulators can have on the long-term performance of transmission lines, which is why at SHEMAR we have prioritized creating composite insulator products and solutions that offer unparalleled, reliability, ageing resistance and exceptional performance.

Design Features and Manufacturing

One Piece Insulator without Joints

SHEMAR's composite transmission line post insulators are designed with advanced one-piece housing technology that eliminates internal interfaces, providing superior bonding performance and protection against erosion damage. The housing is directly vulcanized to the core, resulting in a single, seamless HTV silicone rubber housing (sheath and sheds) that is impenetrable to moisture ingress and provides ultimate defense against environmental factors.

During manufacturing a single-shot injection molding process is used, which applies high pressure and temperature to ensure a robust, one-piece housing that is chemically bonded to the core rod. This one-piece housing design features only one internal interface, i.e. the boundary interface between the housing and the FRP core rod, which significantly reduces sensitivity to tangential electrical field stress that can cause erosion damage.



Integrated injection machine



Excellent bonding performance

Excellent Bonding between Core and Housing

SHEMAR's injection molding manufacturing process also creates an unmatched quality of chemically bonded interface between the rod and housing, as well as the end fitting and housing, which eliminates the risk of internal tracking along the longitudinal interface of the composite insulator. The bond between the silicone rubber housing and fiberglass rod is also mechanically stronger than the intrinsic tear strength of the silicone rubber, ensuring an incredibly durable and reliable insulator.

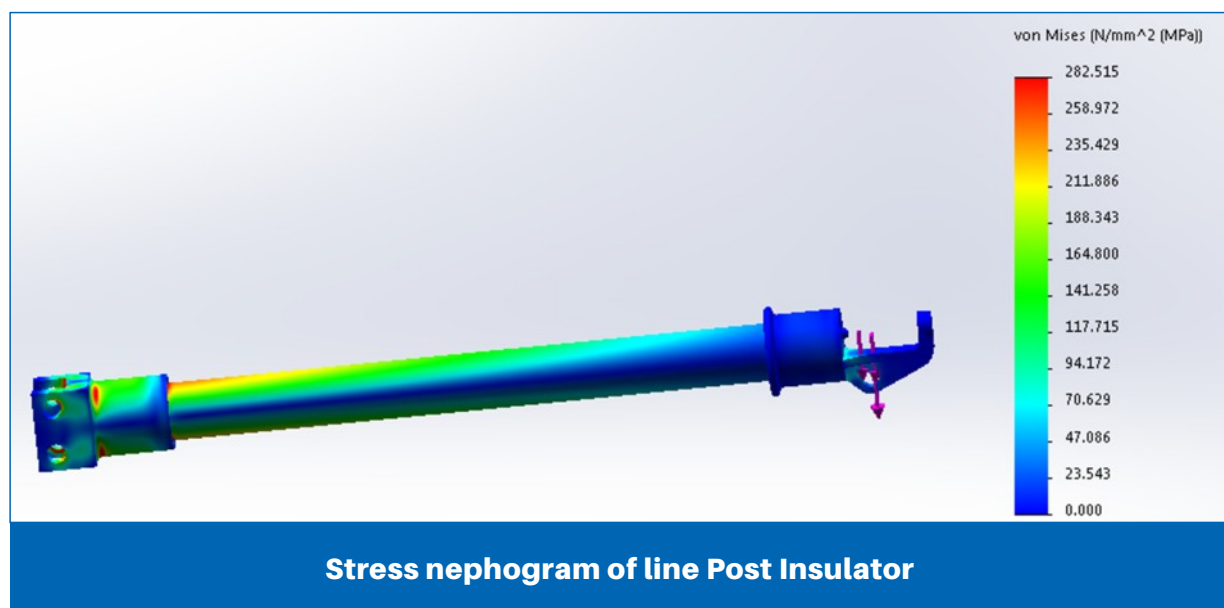
Impenetrable Triple Point

SHEMAR's composite transmission line post insulators feature an innovative and unique impenetrable cast sealing system to prevent water and contamination from entering the insulator at its triple point. This is achieved by using a HTV silicone rubber O-ring and overlapping part of the metal end fittings with an RTV rubber layer to ensure total enclosure and protection of the sensitive triple junction zone (where metal end fitting/core rod/silicone housing meet).

Maximized Mechanical Integrity

To ensure uniform stress distribution and maximum mechanical integrity of the finished insulator a circumferential, multi-step crimping system is used for the attachment of metal end fittings to the FRP core. Each crimping process is monitored for acoustic emission, crimp pressure and travel distance of compression dies as control parameters.

In addition, we also conduct mechanical simulations based on the actual crimping process, material parameters and product design, in order to confirm that there are no performance risks by checking the stress nephogram of each component. This process along with corresponding laboratory tests ensures a safe installation and operation of insulators during their service.

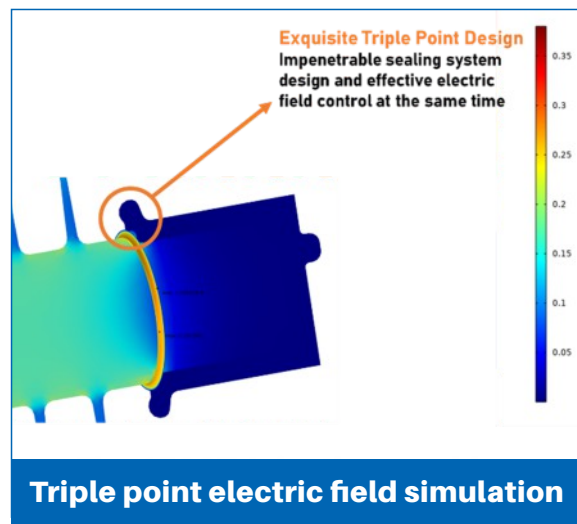
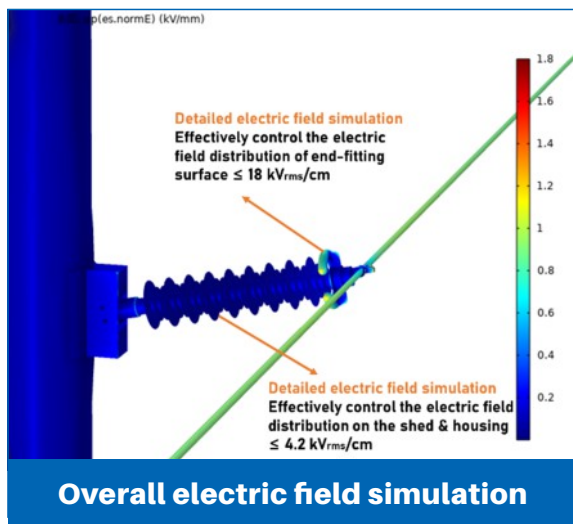


Optimal Electric Field Grading - No Water Droplet Corona

At SHEMAR, our composite insulators are carefully engineered to eliminate RIV and corona (under both dry and wet conditions). Rather than taking a one-size-fits-all approach, we design our corona rings in accordance with the actual requirements and use of the individual user. To achieve this, our application engineers utilize state-of-the-art 3D modeling and FEA simulations to determine the optimal size and placement of corona rings based on the specific structure design and overall assembly configuration.

It is ensured that the maximum electric field criteria of ≤ 4.2 kVrms/cm on silicone rubber housing recommended by EPRI/STRI* is maintained on all of our designs and thus the phenomenon of water droplet induced corona (WDIC) and corresponding risk of material erosion is avoided. Lowering of electric field stress is also aided by the shape of the silicone rubber housing at the overmolded connection zone which works to decrease the electric field strength at the inner triple point and on the silicone surface itself.

Furthermore, all of our corona rings are designed with an open (c-section) style, making them easy to install and replace.



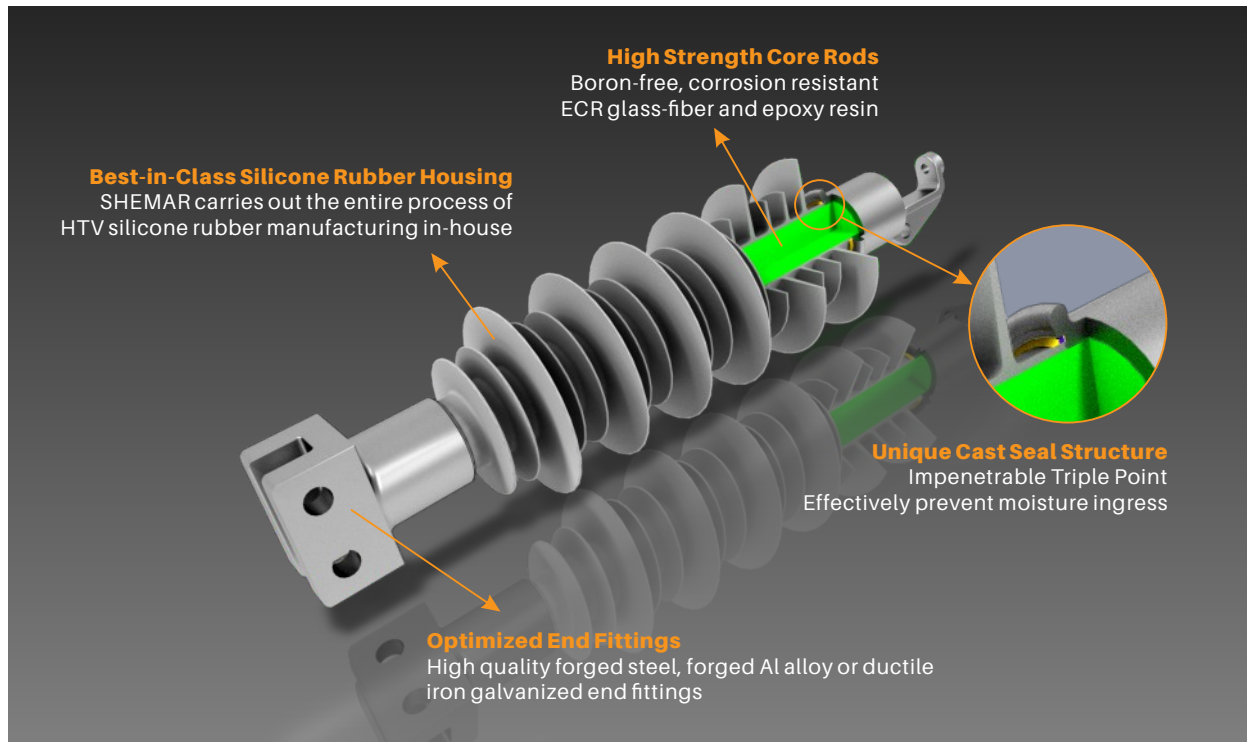
Designed to Endure Severe Environments

SHEMAR's composite transmission line post insulators are created to endure even the most severe service conditions, such as coastal salt fog, dust and industrial contamination without impairment in performance.

Superior hydrophobicity retention and short hydrophobicity transfer and recovery times prevents the formation of conductive layer and the excellent tracking and erosion performance of the housing provides an additional defense mechanism.

The insulator housing features alternating weather-shed profiles with both standard and high leakage distance designs, along with optimized shed spacing (S), overhang (P) and creepage factor (CF) parameters, to ensure maximum effectiveness, self-cleaning performance and resistance to contamination, ice and leakage currents in various environmental applications. All of our housing shed profile designs adhere to the recommendations given in IEC 60815-3 and have a minimum 3mm sheath thickness.

Materials and Components



Best-in-Class Silicone Rubber Housing

The special HTV silicone rubber formulation used in SHEMAR's composite insulator housings has been scientifically engineered as a result of extensive R&D in order to overcome the various environmental, electrical and physical degradation mechanisms and deliver the best-in-class ageing resistance and long-term reliable performance.

SHEMAR carries out the entire process of HTV silicone rubber manufacturing in-house from raw material sourcing to mixing with special additives and fillers which achieves the best UV, tracking and erosion, weather ability and contamination resistance performance. SHEMAR HTV silicone rubber formulation has a long-term track record of successfully performing in some of the most extreme and demanding service conditions without degradation.

Fracture-Proof Core Rods

The fiberglass core rods for SHEMAR's composite transmission line post insulators are manufactured with boron-free, corrosion resistant ECR glass-fiber and epoxy resin. By using this E-CR boron-free formulation of fiberglass, the core rods have exceptional electrical integrity, and they are extremely resistant to hydrolysis and stress corrosion attack, which eliminates the risk of brittle fracture. Additionally, the core rods can withstand a 96-hour nitric acid resistance test as specified in IEC 62039. SHEMAR manufactures all of its fiberglass core rods in-house using a high-quality pultrusion process.

Standardized End Fittings

SHEMAR uses industry standard forged steel or ductile iron galvanized end fittings. All end fittings are subjected to rigorously incoming quality control inspections.



Corona ring installment

Corona Rings

Standard corona rings are made from high grade aluminum alloy. Rings made of galvanized steel are also available in case of arc current withstand requirements.



Standard corona ring

Testing and Quality

Compliant with National and International Standards

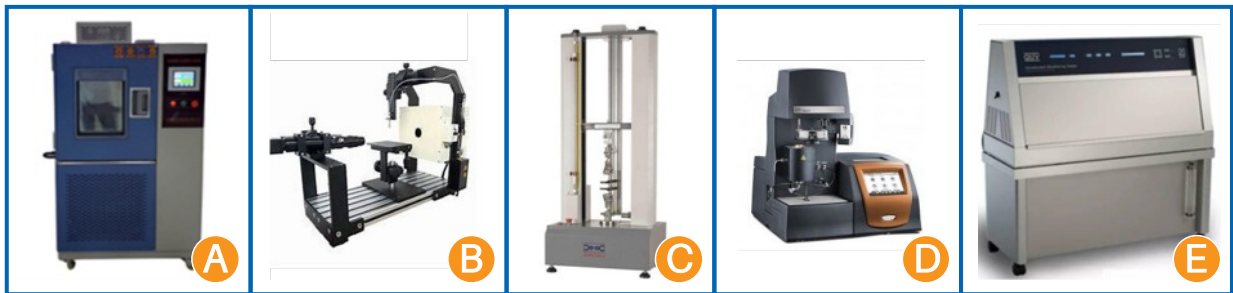
SHEMAR takes pride in being a truly global composite insulator enterprise. We have customized quality control plans for each type of transmission line post insulator and work instructions for each production line. Every transmission line post insulator goes through rigorous process verification, internal testing and third party testing. All of our composite transmission line insulators meet ANSI C29.17 and IEC 61952, and we carry out routine and sample tests on each batch of insulators to ensure a reliable manufacturing process.

Additionally, SHEMAR's composite insulators also comply with the following tests:

- 5000 Hour Multi Stress Test as specified in IEC 62730
- Accelerated Weathering Test (1000 h UV test) as specified in IEC 61109
- Tracking and Erosion Test (Class 1A 4,5) as specified in IEC 60587
- Resistance to Weathering and UV (5000 h UV test) as per ISO 4892-3
- Resistance to Hydrolysis and Acid Attack on FRP Core as specified in IEC 62039
- Tracking Wheel Test as specified in CSA C411.4
- Resistance to Corona Cutting as per SHEMAR propriety test method
- Resistance to Acid Rain as per SHEMAR propriety test method
- Corona Ring Power Arc Withstand Test (20kA-0.25s, 5 shots) as per IEC 61467

Continuous R&D and Improvement

SHEMAR is dedicated to advancing key technologies, enhancing technical support, and ensuring the success of key projects. We are also focused on improving our independent innovation capabilities and core competitiveness in the rapidly evolving energy industry. This commitment has resulted in significant advancements in technical innovation, exceptional performance, and influential demonstration initiatives. These achievements have also earned recognition from the National Energy Administration. As evidence of our success, the National Energy Administration granted SHEMAR approval to establish the "National Energy Power Insulation Composite Material Key Laboratory" on August 24, 2014.



(A) High low temperature humid-heat test box.

(B) Optical Contact Angle Measuring Device.

(C) Tensile Tester.

(D) Thermal Gravimetric Analyzer.

(E) Ultraviolet aging test chamber.

Currently, SHEMAR possesses robust and extensive in-house self-testing facilities that continually undergo refinement and enhancement. The company has established a comprehensive collection of material testing laboratories, structural mechanics testing laboratories, and electrical performance testing laboratories. These facilities are fully equipped to conduct physical and chemical property experiments on raw materials and samples, as well as structural mechanics and high-voltage electrical experiments on semi-finished and finished products. These resources enable SHEMAR to meet the research and development demands of high-quality external insulation products.

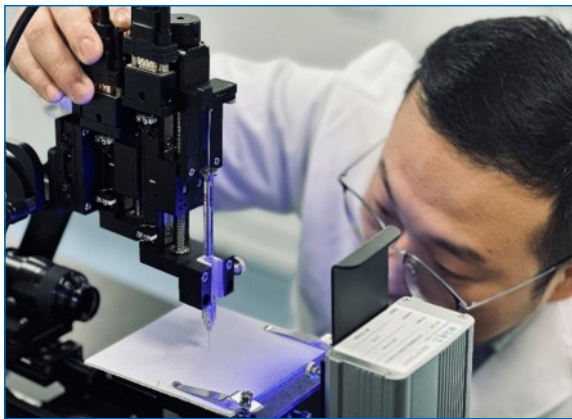


(A) Static contact angle

(B) Tearing strength test

(C) Tensile strength test

(D) Tracking and erosion resistance test



Static contact angle test

Our R&D team currently comprises 155 members, including 7 senior experts with doctorate degrees, 12 foreign technical experts, and 49 individuals with master's degrees. The team's research and development center is fortified by an interdisciplinary and cross-functional approach. With our team's continual expansion, more researchers from both domestic and international backgrounds are choosing to join SHEMAR's R&D efforts, contributing to the advancement of the green energy industry.

As of December 31, 2022, SHEMAR holds a total of **481** patents internationally.



Advantages and Reasons for Choosing SHEMAR Transmission Line Post Insulators

- Innovative and reliable design methods and advanced manufacturing technology
- Best-in-class composite materials and high quality components
- Rigorous production quality control plan and strict testing of products
- Fast delivery cycle and rapid after-sales service
- Eliminates or reduces maintenance, more economical life cycle cost

How to Select the Right Transmission Line Post Insulator

Customized solutions

At SHEMAR, we can offer customized solutions tailored to our customers' specific requirements. We take into consideration the actual working conditions, such as the size of the support pole, connection method, required working load, and pollution level, as well as any unique applications that need to be addressed. By doing so, we guarantee that our products will meet 100% of our customers' needs

Standard catalogue products

To simplify the promotion of transmission grid projects and to facilitate quick selection by our customers, we have developed a range of standardized catalog products to choose from. These products offer shorter delivery cycles and increased flexibility for future replacements. For ease of reference, our detailed standardized selection library is provided below.

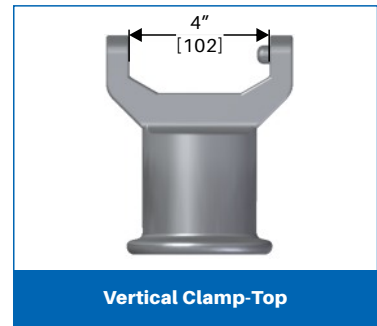
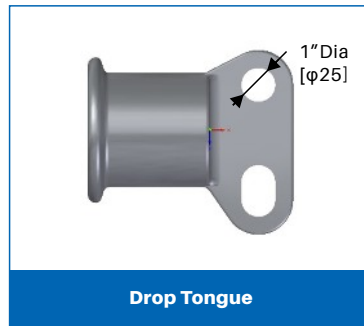
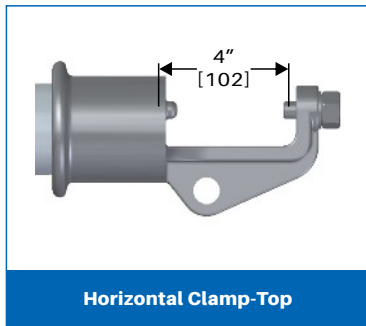
SHEMAR Catalog Number Definition

S	D	F	G10	0076	A1	O
S=SHEMAR	D= Distribution Line Post T= Transmission Line Post	F= F-Neck V= Vertical Clamp-Top H= Horizontal Clamp-Top U= Universal Clamp D= Drop Tongue	G10=3/4" no gain base G11=3/4" with gain base G20=7/8" no gain base G21=7/8" with gain base G30= Gain base G40= Flat base GBC= Bolt circle	0076=7.6"Dry Arc Distance 0111=11.1" Dry Arc Distance	A1=1.57" Alternating shed A2=1.77" Alternating shed A3=2.5" Alternating shed A4=3.0" Alternating shed A5=3.5" Alternating shed U3=2.5" Uniform shed U4=3.0" Uniform shed U5=3.5" Uniform shed	O= No Corona Ring 1=With Corona Ring

Transmission Line Post Insulators

LINE END FITTING

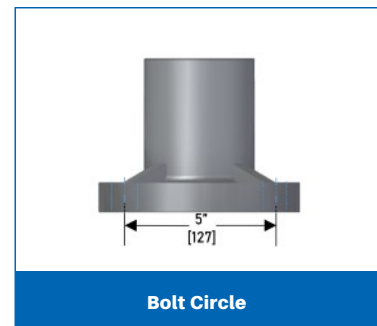
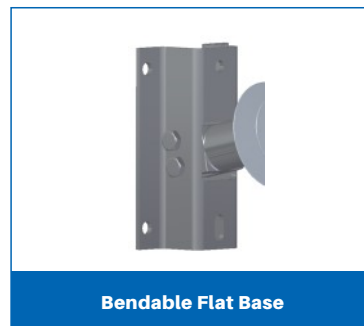
The line end fitting of Transmission Line Post Insulators are available in three different configurations: Horizontal Clamp-Top, Drop Tongue and Vertical Clamp-top.



BASE END FITTING

The base end fitting of Transmission Line Post Insulators are available in three different configurations: Bendable Gain Base, Bendable Flat Base and Bolt circle.

*For other special bases, please contact local SHEMAR Sales Representative.

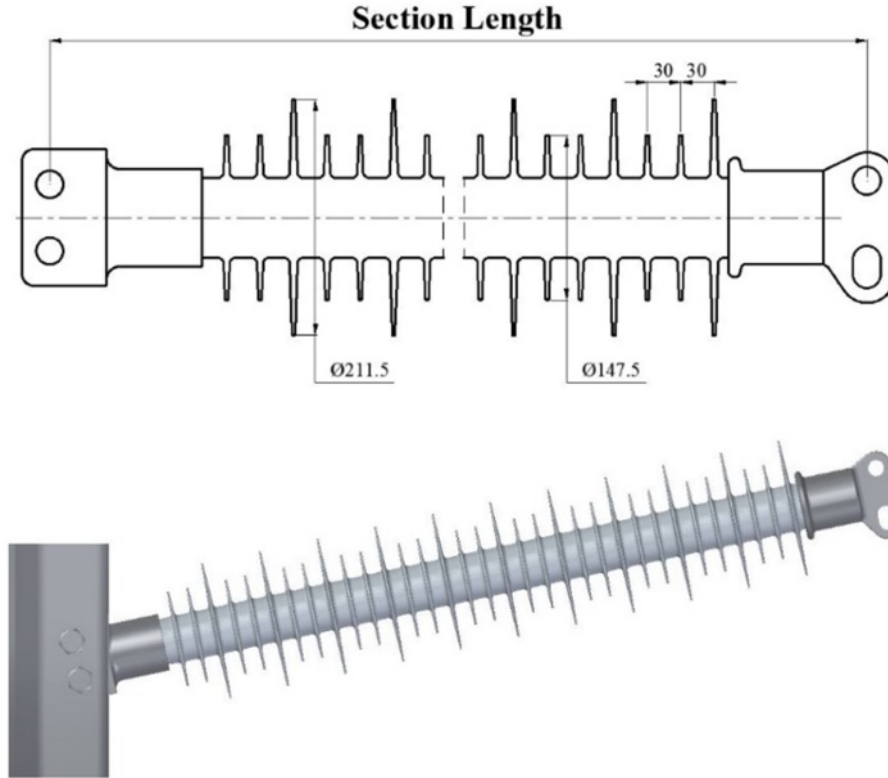


CORONA RINGS

SHEMAR's corona rings for transmission line post insulator are available in standard sizes of 11", 12". Corona ring application recommendations are provided based on the specific application. For more information, please consult your local SHEMAR Sales Representative.

Transmission Line Post - Drop Tongue

2.5" (63.5 mm) Rod Diameter



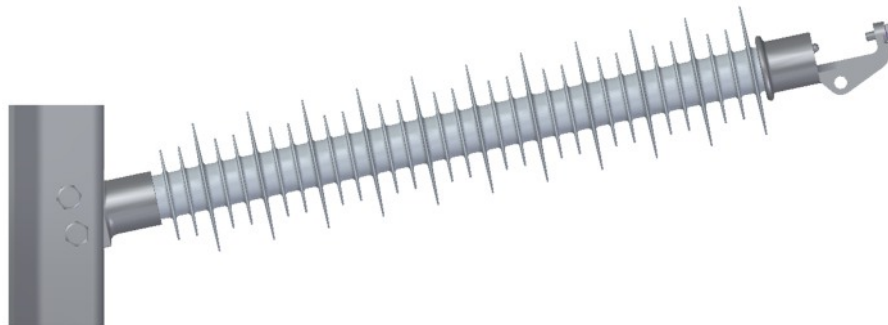
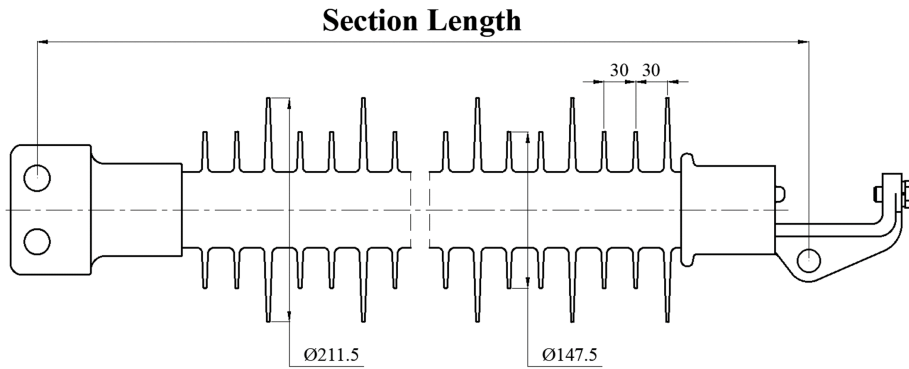
TECHNICAL DATA																		
Line Voltage					Catalog No.	SCL		Section Length(L)		Dry Arc		Leakage		Electrical Flashover(kV)				
kV						lbs	kN	In	mm	In	mm	In	mm	60HZ		CIFO		
69	115	138	161	230	345									Dry	Wet	Pos	Neg	
						STDG300200A30	7498	33.3	28.2	717	20.0	509	59.4	1510	197	179	325	412
						STDG300240A30	6563	29.2	32.2	819	23.8	605	74.0	1880	237	215	386	472
						STDG300310A30	5378	23.9	39.3	999	30.9	785	102.8	2612	303	275	488	573
						STDG300360A30	4756	21.1	44.5	1130	36.4	925	118.1	3000	363	341	593	702
						STDG300410A30	4232	18.8	50.0	1270	41.4	1051	141.7	3600	411	371	660	739
						STDG300470A30	3806	16.9	55.6	1412	47.3	1202	160.6	4080	487	432	767	845
						STDG300530A30	3434	15.3	61.6	1565	52.8	1341	184.4	4683	521	466	839	908
						STDG300560A30	3293	14.6	64.2	1632	55.7	1416	197.6	5018	553	493	891	959
						STDG300630A30	2966	13.2	71.3	1812	62.8	1596	225.7	5733	619	548	1001	1066
						STDG300670A31	2671	11.9	79.2	2012	66.9	1699	242.8	6167	651	576	1060	1118
						STDG300760A31	2407	10.7	87.9	2232	76.0	1931	282.8	7184	727	644	1197	1246
						STDG300870A31	2156	9.6	98.1	2492	86.8	2205	324.5	8242	818	723	1358	1396
						STDG300980A31	1924	8.6	109.9	2792	98.0	2490	357.2	9073	912	806	1526	1553

Notes:

- 1) SCL = Specified Cantilever Load
- 2) Mounting Angle=12 deg.
- 3) STL (Specified Tensile Load) = 15,000 lbs [66.7 kN]
- 4) For other ratings or customized insulator designs, please contact your local SHEMAR Sales Representative.

Transmission Line Post - Horizontal Clamp-Top

2.5" (63.5 mm) Rod Diameter



TECHNICAL DATA

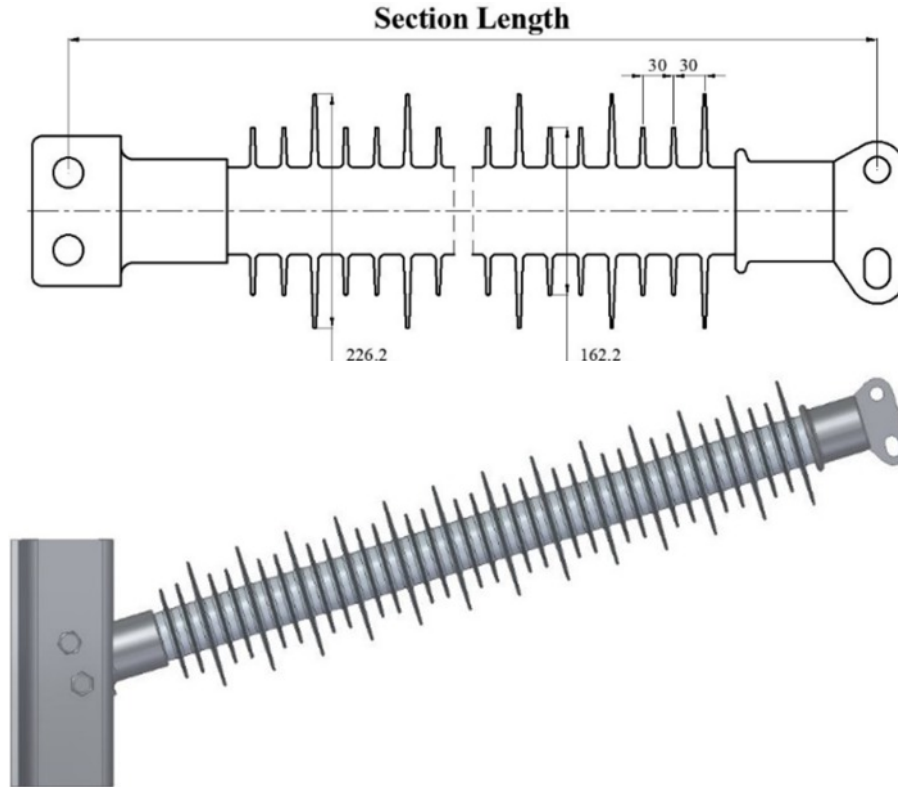
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kV							lbs	kN	In	mm	In	mm	In	mm	60HZ		CIFO	
69	115	138	161	230	345										Dry	Wet	Pos	Neg
						STHG300200A30	5000	22.2	28.1	713	20.0	509	59.4	1510	197	179	325	412
						STHG300240A30	5000	22.2	32.1	815	23.8	605	74.0	1880	237	215	386	472
						STHG300310A30	5000	22.2	39.2	996	30.9	785	102.8	2612	303	275	488	573
						STHG300360A30	4771	21.2	44.3	1126	36.4	925	118.1	3000	363	341	593	702
						STHG300410A30	4243	18.9	49.8	1266	41.4	1051	141.7	3600	411	371	660	739
						STHG300470A30	3815	17.0	55.4	1408	47.3	1202	160.6	4080	487	432	767	845
						STHG300530A30	3442	15.3	61.5	1561	52.8	1341	184.4	4683	521	466	839	908
						STHG300560A30	3300	14.7	64.1	1628	55.7	1416	197.6	5018	553	493	891	959
						STHG300630A30	2971	13.2	71.2	1808	62.8	1596	225.7	5733	619	548	1001	1066
						STHG300670A31	2675	11.9	79.1	2008	66.9	1699	242.8	6167	651	576	1060	1118
						STHG300760A31	2411	10.7	87.7	2228	76.0	1931	282.8	7184	727	644	1197	1246
						STHG300870A31	2159	9.6	98.0	2488	86.8	2205	324.5	8242	818	723	1358	1396
						STHG300980A31	1927	8.6	109.8	2788	98.0	2490	357.2	9073	912	806	1526	1553

Notes:

- 1) SCL = Specified Cantilever Load
- 2) Mounting Angle=12 deg.
- 3) STL (Specified Tensile Load) = 5,000 lbs [22.2 kN]
- 4) For other ratings or customized insulator designs, please contact your local SHEMAR Sales Representative.

Transmission Line Post - Drop Tongue

3.0" (76.2 mm) Rod Diameter



TECHNICAL DATA

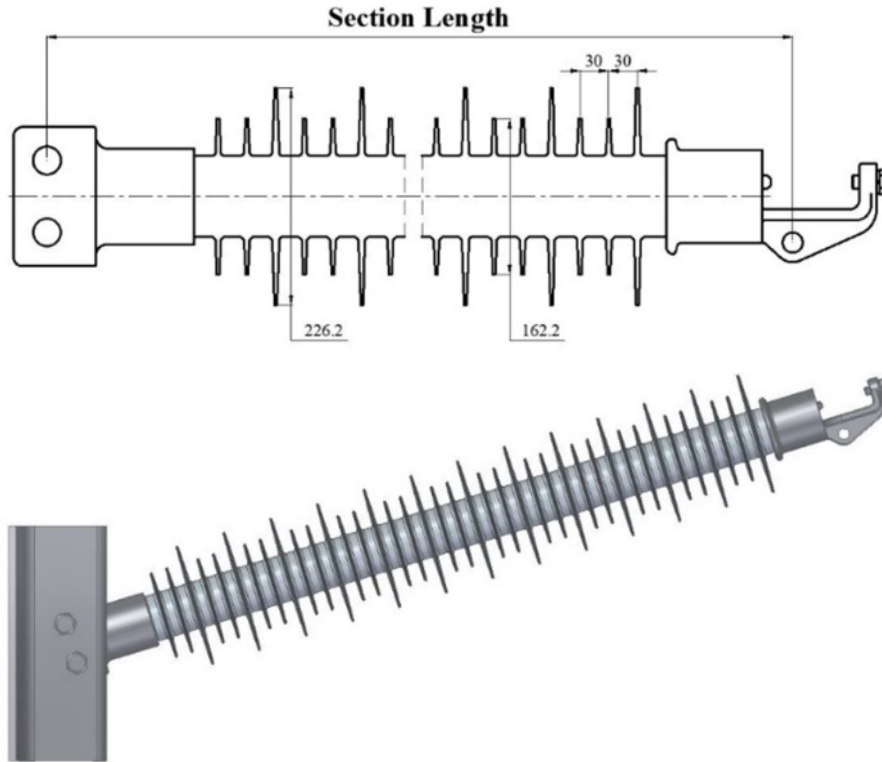
Line Voltage						Catalog No.	SCL		Section Length(L)		Dry Arc		Leakage		Electrical Flashover(kV)			
kV							lbs	kN	In	mm	In	mm	In	mm	60HZ		CIFO	
69	115	138	161	230	345										Dry	Wet	Pos	Neg
						STDG300300A40	8888	39.5	39.0	990	30	29.6	102.4	2600	299	266	473	561
						STDG300330A40	8087	35.9	42.8	1088	33	33.3	116.9	2970	333	298	534	619
						STDG300370A40	7412	32.9	46.7	1187	37	37.0	129.9	3300	335	310	574	652
						STDG300410A40	6825	30.3	50.7	1289	41	40.8	143.0	3632	367	338	631	705
						STDG300450A40	6343	28.2	54.6	1387	45	44.9	157.6	4003	439	395	721	794
						STDG300490A40	5822	25.9	59.5	1511	49	49.3	175.6	4460	484	435	801	866
						STDG300520A40	5579	24.8	62.1	1577	52	52.2	186.7	4741	510	459	847	909
						STDG300560A40	5300	23.6	65.3	1660	56	55.6	200.7	5097	536	482	893	953
						STDG300590A40	5010	22.3	69.1	1756	59	59.3	215.2	5467	566	508	946	1004
						STDG300670A40	4507	20.0	76.8	1952	67	66.6	246.5	6260	635	575	1064	1116
						STDG300760A41	3897	17.3	88.8	2257	79	76.4	288.8	7335	713	642	1207	1245
						STDG300870A41	3467	15.4	99.9	2537	90	87.2	332.1	8436	803	721	1368	1396
						STDG300980A41	3124	13.9	110.8	2816	100	97.6	375.5	9537	890	798	1524	1541
						STDG301070A41	2865	12.7	120.8	3070	111	106.9	407.0	10339	968	867	1663	1670

Notes:

- 1) SCL = Specified Cantilever Load
- 2) Mounting Angle = 17 deg.
- 3) STL (Specified Tensile Load) = 20,000 lbs (88.9 kN)
- 4) For other ratings or customized insulator designs, please contact your local SHEMAR Sales Representative

Transmission Line Post - Horizontal Clamp-Top

3.0" (76.2 mm) Rod Diameter



TECHNICAL DATA

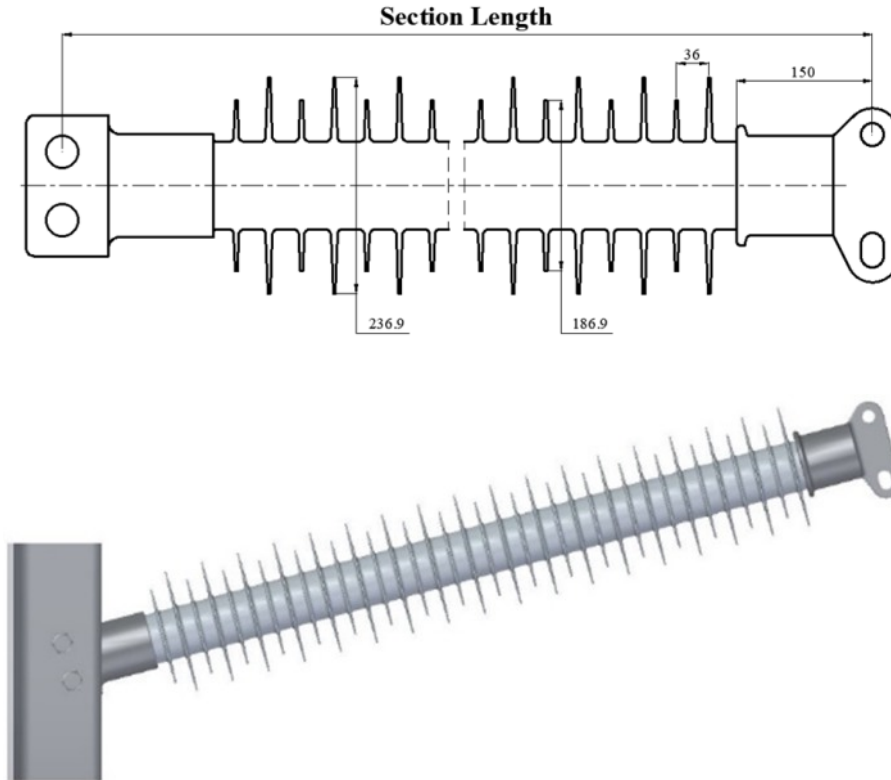
Line Voltage						Catalog No.	SCL		Section Length(L)		Dry Arc		Leakage		Electrical Flashover(kV)			
kV							lbs	kN	In		mm		In	mm	60HZ		CIFO	
69	115	138	161	230	345				mm	mm	mm	mm			Dry	Wet	Pos	Neg
						STHG300300A40	5000	22.2	38.7	984	29.6	752	102.4	2600	299	266	473	561
						STHG300330A40	5000	22.2	42.6	1082	33.3	847	116.9	2970	333	298	534	619
						STHG300370A40	5000	22.2	46.5	1181	37.0	940	129.9	3300	335	310	574	652
						STHG300410A40	5000	22.2	50.5	1283	40.8	1037	143.0	3632	367	338	631	705
						STHG300450A40	5000	22.2	54.4	1381	44.9	1140	157.6	4003	439	395	721	794
						STHG300490A40	5000	22.2	59.3	1505	49.3	1251	175.6	4460	484	435	801	866
						STHG300520A40	5000	22.2	61.9	1571	52.2	1326	186.7	4741	510	459	847	909
						STHG300560A40	5000	22.2	65.1	1654	55.6	1413	200.7	5097	536	482	893	953
						STHG300590A40	5000	22.2	68.9	1750	59.3	1505	215.2	5467	566	508	946	1004
						STHG300670A40	4519	20.1	76.6	1946	66.6	1692	246.5	6260	635	575	1064	1116
						STHG300760A41	3907	17.4	88.6	2251	76.4	1941	288.8	7335	713	642	1207	1245
						STHG300870A41	3475	15.4	99.6	2531	87.2	2215	332.1	8436	803	721	1368	1396
						STHG300980A41	3130	13.9	110.6	2810	97.6	2479	375.5	9537	890	798	1524	1541
						STHG301070A41	2870	12.8	120.6	3064	106.9	2715	407.0	10339	968	867	1663	1670

Notes:

- 1) SCL = Specified Cantilever Load
- 2) Mounting Angle=17 deg.
- 3) STL (Specified Tensile Load) = 5,000 lbs [22.2 kN]
- 4) For other ratings or customized insulator designs, please contact your local SHEMAR Sales Representative

Transmission Line Post - Drop Tongue

3.5" (88.9 mm) Rod Diameter

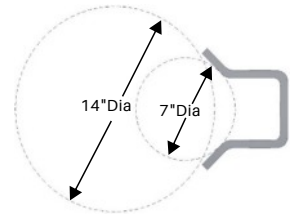
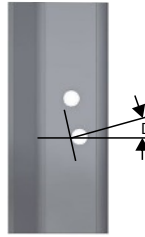
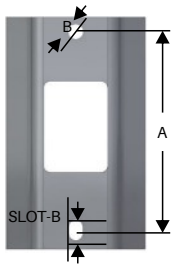


TECHNICAL DATA																		
Line Voltage					Catalog No.	SCL		Section Length(L)		Dry Arc		Leakage		Electrical Flashover(kV)				
kV						lbs	kN	In	mm	In	mm	In	mm	60HZ		CIFO		
69	115	138	161	230	345									Dry	Wet	Pos	Neg	
						STDG300390A50	10361	46.1	49.5	1258	39.0	990	135.9	3452	389	353	633	713
						STDG300450A50	9284	41.3	55.3	1404	44.8	1137	157.5	4000	420	378	685	762
						STDG300460A50	9033	40.2	56.8	1443	45.7	1161	165.9	4215	437	393	749	833
						STDG300520A50	8061	35.8	63.7	1617	52.1	1324	183.1	4650	503	451	833	890
						STDG300570A50	7556	33.6	67.9	1725	57.0	1448	202.2	5135	543	486	904	955
						STDG300660A50	6657	29.6	77.1	1958	66.0	1677	236.5	6006	618	549	1036	1083
						STDG300780A51	5760	25.6	89.1	2263	77.8	1977	285.4	7250	720	640	1220	1260
						STDG300890A51	5126	22.8	100.1	2543	88.9	2259	326.4	8291	817	714	1393	1430
						STDG301000A51	4619	20.5	111.1	2822	100.0	2539	370.9	9421	911	789	1563	1598
						STDG301110A51	4225	18.8	121.5	3085	110.8	2814	418.7	10634	986	844	1700	1737

Notes:

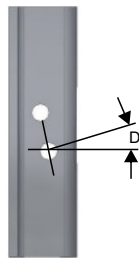
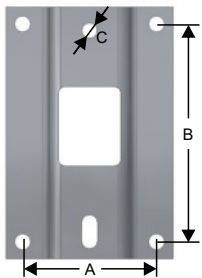
- 1) SCL = Specified Cantilever Load
- 2) Mounting Angle=15 deg.
- 3) STL (Specified Tensile Load) = 25,000 lbs [111.2 kN]
- 4) For other ratings or customized insulator designs, please contact your local SHEMAR Sales Representative

Transmission Line Post - Gain Base & Flat Base



Bendable Gain Base Common Dimensions

Rod Diameter Inches[mm]	A, Bolt Hole Spacing Inches	B, Nominal Bolt Size Inches	D, Degree
2.5"[63.5]	12	7/8	12
2.5"[63.5]	12	3/4	12
3"[76.2]	14	7/8	17
3"[76.2]	14	1	17
3.5"[88.9]	14	1	15



Bendable Flat Base Common Dimensions

Rod Diameter Inches[mm]	A, Bolt Hole Spacing Inches	B, Bolt Hole Spacing Inches	C, Nominal Bolt Size Inches	D, Degree
2.5"[63.5]	8	10	3/4	12
	8	10	7/8	12
	8	10	7/8	12
	8	13	7/8	12
3"[76.2]	9	13	1	17
	9	13	7/8	17
	9	14	7/8	17
3.5"[88.9]	10	15	1	15
	10	15	7/8	15
	10	15	3/4	15

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