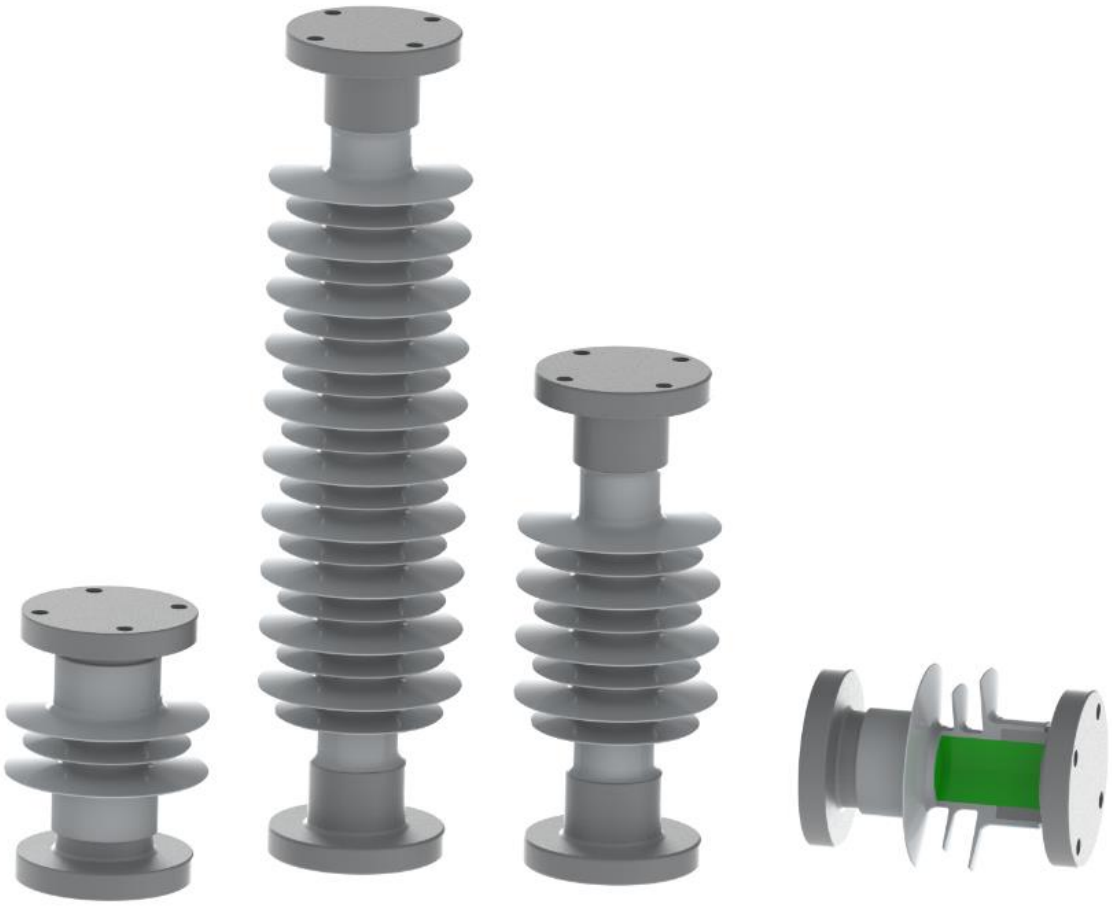
SHEMAR

Composite Insulators Catalogue

Substation Post

69kV to 500kV



Leading Innovation in Composite Insulation Technology

SHEMAR Composite Substation Post 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 substations, 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 substation 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.

Fig. Integrated injection machine

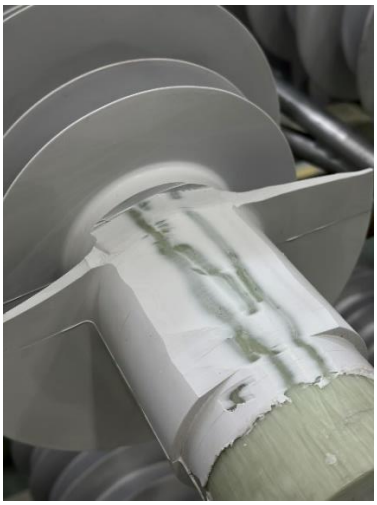


Fig. Excellent bonding performance

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 substation 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 enclose 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.

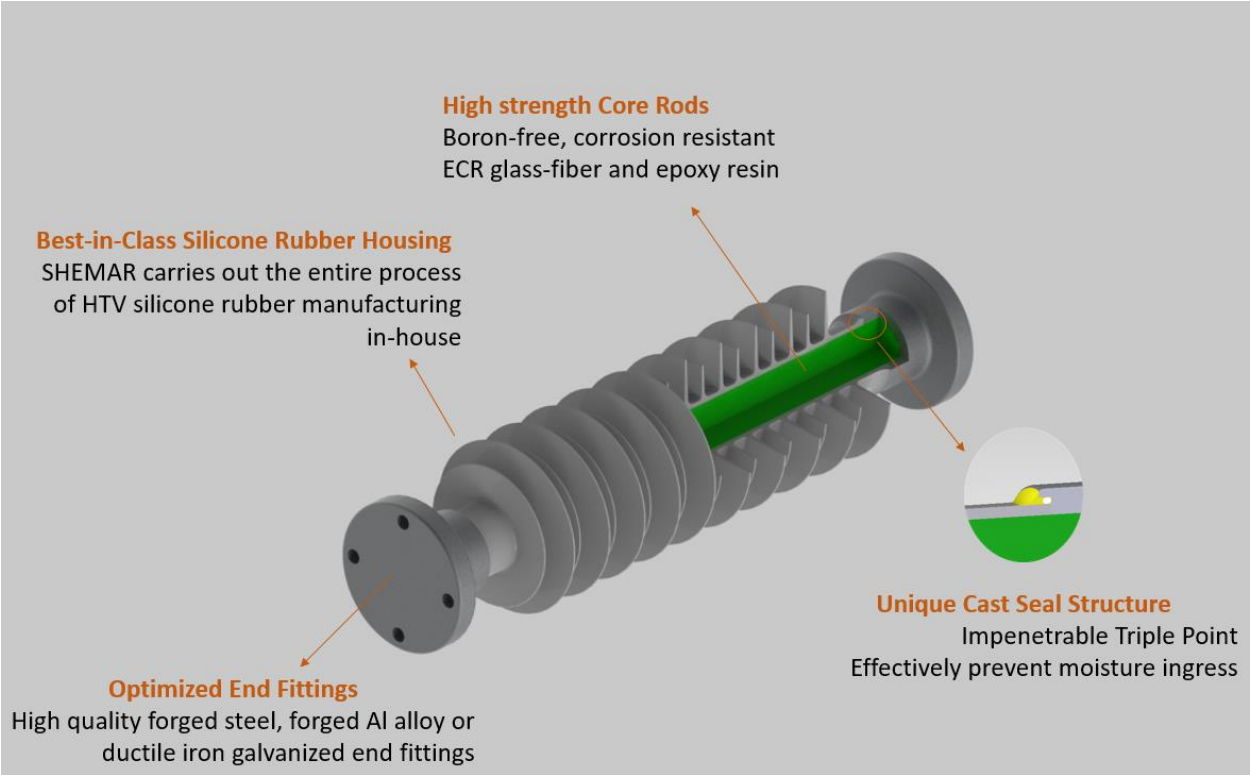
Designed to Endure Severe Environments

SHEMAR's composite substation 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 substation 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 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.

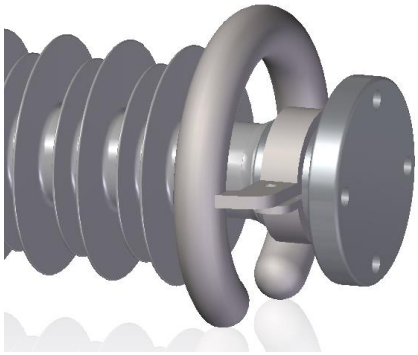


Fig. Corona ring installment

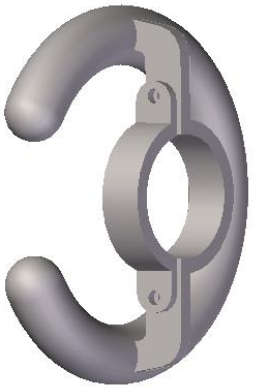


Fig. Standard corona ring

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 substation post insulator and work instructions for each production line. Every substation post insulator goes through rigorous process verification, internal testing and third party testing. All of our composite substation post insulators meet ANSI C29.19 and IEC 62231, and we carry out routine and sample tests on each batch of insulators to ensure a reliable manufacturing process.

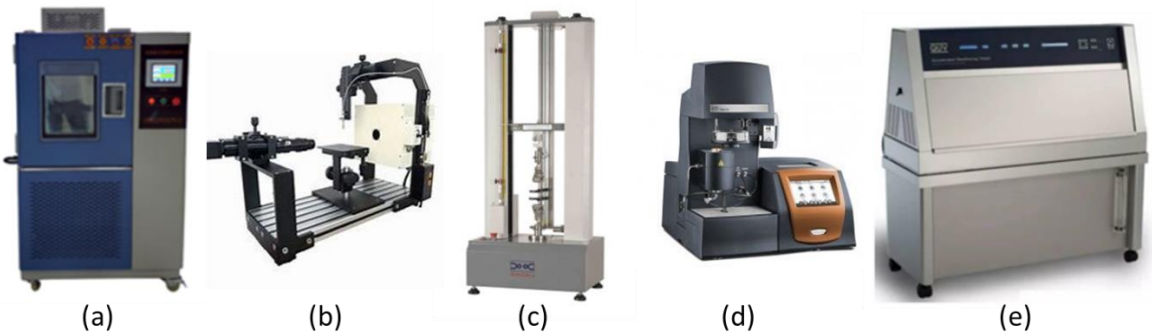
Additionally, SHEMAR's composite insulators also comply with the following tests:

- 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
- 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

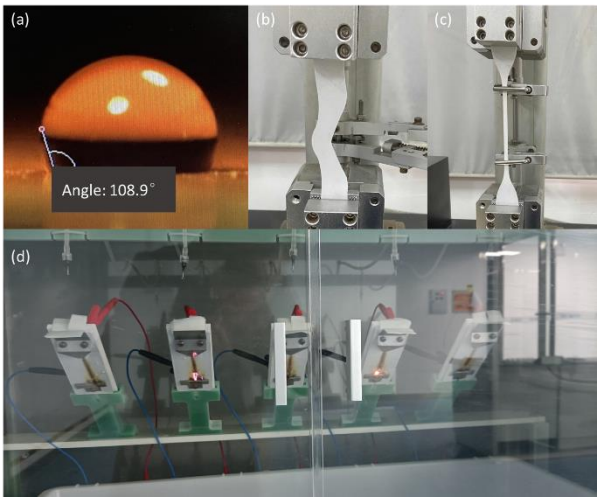
SHEMAR is dedicated to advancing key technologies, enhancing technical support, and

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.



Devices: (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.



Testing: (a) Static contact angle (b) Tearing strength test (c) Tensile strength test(d) Tracking and erosion resistance test

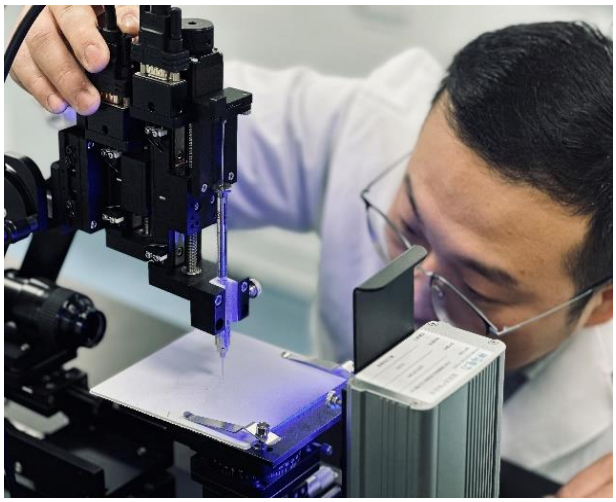


Fig. Static contact angle test

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, including 402 in China and 79 in other countries.

Advantages and Reasons for Choosing SHEMAR Substation 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 Substation 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 substations 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.

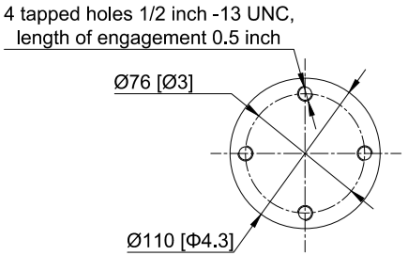
SHEMAR Catalogue Number Definition

S	S	069	B5	B5	030	A3	0
S=SHEMAR	S= Substation Post Insulators	Voltage	B3= 3" Bolt circle B5 = 5" Bolt circle B7 = 7" Bolt circle		030=30.0" Height	A3=2.5" Alternating shed A5=3.5" Alternating shed	0= No Corona Ring 1=With Corona Ring

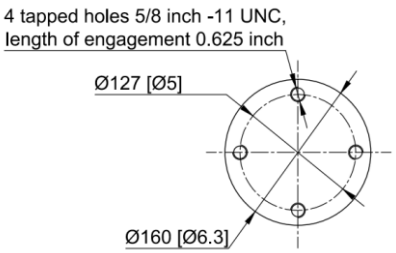
Station Post Insulators

End Fittings

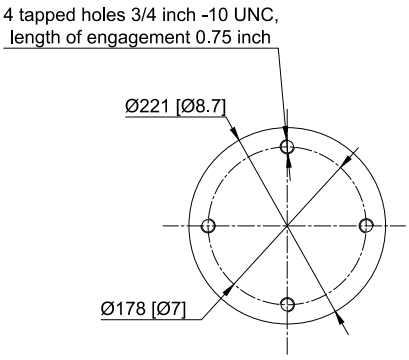
All end fittings of Substation Post Insulators are attached using a crimping process to achieve the required tensile strength. The standard end fittings are available with bolt circle mounting holes with either through or tapped holes. These bases are compatible with the ceramic Substation Post Insulator standard.



3" Bolt circle



5" Bolt circle

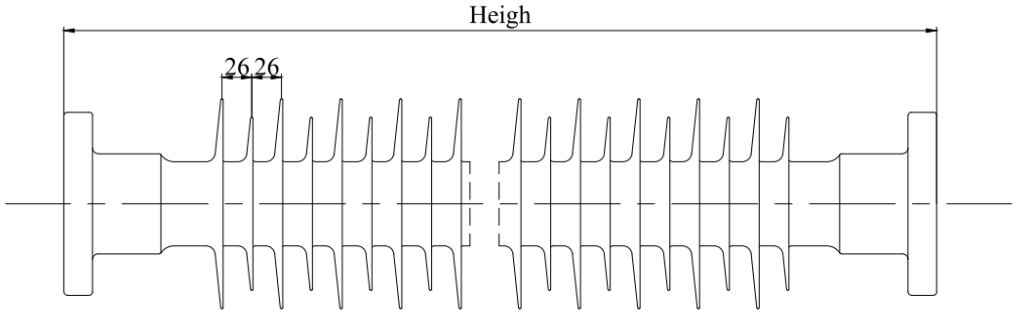


7" Bolt circle

Corona Rings

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

Substation Post Insulators



TECHNICAL DATA

TECHNICAL DATA——Station Post Insulators

TR	Catalog No.	Voltage	Height		Bolt Circle		Leakage		Cantilever		Tensile		Compression		Torsion		Max. RIV	Critical Impulse Flashover, Positive	Lower Frequency Wet Withstand	BIL and Impulse Withstand	Weight	
					Top	Base			SCL		STL		Strength		Strength							
		kV	inch	mm	inch	inch	In	mm	lbs	kN	lbs	kN	lbs	kN	in-lbs	kN.m	μv/kV	kV	kV	kV	lbs	kg
202	SS015B3B3008A30	15	8	190.5	3	3	11	267	8318	37.0	27200	121	75086	334	31000	3.5	50/5	105	30	95	26	12
205	SS015B3B3010A30	15	10	254.0	3	3	16	405	6295	28.0	27200	121	84978	378	31000	3.5	50/10	125	40	110	26	12
208	SS015B3B3014A30	15	14	355.6	3	3	26	669	5845	26.0	27200	121	75086	334	31000	3.5	100/15	165	60	150	33	15
210	SS046B3B3018A30	46	18	457.2	3	3	35	892	5395	24.0	27200	121	75086	334	31000	3.5	100/22	225	80	200	31	14
214	SS046B3B3022A30	46	22	558.8	3	3	53	1338	3597	16.0	27200	121	75086	334	31000	3.5	200/30	280	100	250	35	16
216	SS069B3B3030A30	46	30	762.0	3	3	88	2230	4496	20.0	27200	121	75086	334	31000	3.5	200/44	390	145	350	40	18
222	SS015B5B5010A30	15	10	254.0	5	5	16	405	6295	28.0	27200	121	75086	334	31000	3.5	50/5	105	30	95	26	12
225	SS015B5B5012A30	15	12	304.8	5	5	18	446	6587	29.3	27200	121	75086	334	31000	3.5	50/10	125	45	110	29	13
227	SS046B5B5015A30	46	15	381.0	5	5	26	669	5283	23.5	27200	121	73063	325	31000	3.5	100/15	170	60	150	29	13
231	SS046B3B3020A30	46	20	508.0	3	3	44	1115	5171	23.0	27200	121	71714	319	31000	3.5	100/22	225	80	200	33	15
267	SS046B3B3024A30		24	609.6	5	5	61	1561	4271	19.0	27200	121	71714	319	31000	3.5	200/30	280	100	250	35	16
278	SS069B5B5030A30	69	30	762.0	5	5	88	2230	4496	20.0	27200	121	60000	267	31000	3.5	200/44	390	145	350	44	20
286	SS115B5B5045A30	115	45	1143.0	5	5	149	3791	1933	8.6	27200	121	30000	133	31000	3.5	200/73	610	230	550	55	25
287									2967	13.2												
288	SS138B5B5054A30	138	54	1371.6	5	5	184	4683	1619	7.2	27200	121	20000	89	31000	3.5	200/88	710	275	650	62	28
289									2473	11.0												
291	SS161B5B5062A30	161	62	1574.8	5	5	219	5575	1394	6.2	27200	121	15000	67	31000	3.5	500/103	810	315	750	68	31
295									2158	9.6												
304	SS230B5B5080A31	230	80	2032.0	5	5	290	7359	1079	4.8	27200	121	10000	44	31000	3.5	500/146	1010	385	900	79	36
308									1664	7.4												
312	SS345B5B5092A31	345	92	2336.8	5	5	334	8474	922	4.1	27200	121	8500	38	31000	3.5	500/146	1210	455	1050	88	40
316									1439	6.4												
278	SS069B5B5030A50	69	30	762.0	5	5	88	2230	10116	45.0	27200	121	90000	400	75000	8.5	200/44	390	145	350	55	25
286	SS115B5B5045A50	115	45	1143.0	5	5	149	3791	4384	19.5	27200	121	85000	378	75000	8.5	200/73	610	230	550	73	33
287									6744	30.0												
288	SS138B5B5054A50	138	54	1371.6	5	5	184	4683	3889	17.3	27200	121	75000	334	75000	8.5	200/88	710	275	650	81	37
289									6002	26.7												
291	SS161B5B5062A50	161	62	1574.8	5	5	219	5575	3372	15.0	27200	121	55000	245	75000	8.5	500/103	810	315	750	90	41
295									5171	23.0												
304	SS230B5B5080A51	230	80	2032.0	5	5	290	7359	2608	11.6	27200	121	35000	156	75000	8.5	500/146	1010	385	900	110	50
308									4002	17.8												
312	SS345B5B5092A51	345	92	2336.8	5	5	334	8474	2248	10.0	27200	121	25000	111	75000	8.5	500/146	1210	455	1050	123	56
316									3485	15.5												
362	SS345B7B7092A51	345	92	2336.8	7	7	334	8474	3485	15.5	27200	121	25000	111	75000	8.5	500/146	1210	455	1050	123	56
324	SS345B5B5106A51	345	106	2692.4	5	5	395	10035	3012	13.4	27200	121	20000	89	75000	8.5	1000/220	1410	525	1300	139	63
367	SS345B5B7106A51	345	106	2692.4	5	7	395	10035	1956	8.7	27200	121	20000	89	75000	8.5	1000/220	1410	525	1300	139	63
369									3012	13.4												
330	SS500B5B5122A51	500	122	3098.8	5	5	457	11596	2608	11.6	27200	121	15000	67	75000	8.5	1000/220	1610	590	1470	154	70
371	SS500B5B7122A51	500	122	3098.8	5	7	457	11596	1686	7.5	27200	121	15000	67	75000	8.5	1000/220	1610	590	1470	154	70
373									2608	11.6												

Notes:

1）For other ratings or customized insulator designs, please contact your local SHEMAR Sales Representative