



CATALOG **011**

Polymer Suspension Insulators 69kV to 765kV



NGK Locke Polymer Insulators, Inc.
Virginia Beach, Virginia, U.S.A.

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**Quality System
ISO 9001 Certified**



Certificate Number FM36580

NGK-Locke Polymer Insulators, Inc. is ISO 9001 certified by the British Standards Institutes, BSI. BSI is accredited by NACCA, RAB, and RvC.



DESIGN FEATURES

Polymer suspension insulators of NGK-Locke Polymer Insulators, Inc. (NLPI) are **one-piece** products **up to 20 feet with no joints** on the housing (sheath) or at the weathershed interfaces. Housing is directly vulcanized to the core during compression molding process, providing superior bonding performance. Also, pressure controlled uniform crimping providing superior long-term mechanical performance.

HOUSING TO CORE -- Housing and core are **chemically bonded** and the interface strength between housing and core is higher than the tearing strength of housing itself.

SHED PROFILE -- On the basis of contamination level, we can propose best-fit shed profile. (See page 6). Shed profile complies with IEC Pub. 60815 "Guide for the selection of insulators in respect of polluted conditions."

END FITTING TO CORE -- Crimping process is **multi-step, uniform circumferential compression, controlled pressure** for each step, minimizing stress concentration.

ACOUSTIC EMISSION (AE) DETECTION -- During crimping of end fittings on the core, all the products are checked for possible damage of core by AE detection.

HOUSING AND END FITTING INTERFACE (SEALING) -- **Double "O" Ring** integral to the housing provides positive contact with the end fittings and RTV (Room Temperature Vulcanized) **Sealant** prevents the ingress of moisture (**Water-tight Sealing Structure**).

MATERIAL

WEATHERSHEDS (SHED) & HOUSING (SHEATH) -- Weathersheds and housing are the same material (**100% silicone rubber**) before adding fillers. The best mixture of base polymer, fillers, and additive agents achieves excellent contamination, weatherability, anti-tracking, and anti-erosion performance.

CORE -- High quality pultruded FRP (Fiberglass Reinforced Plastic) rod is used. The rod is made with good alignment and distribution of fibers within **Epoxy** resin.

END FITTINGS -- High grade forged steel or ductile iron is used. And all ferrous parts, other than stainless steel, are galvanized in accordance with ASTM A153. Cotter key is made from stainless steel.

GRADING RINGS -- High grade aluminum alloy is used.

DEFINITION OF RATING

SPECIFIED MECHANICAL LOAD (SML) -- The SML is a load specified by the manufacturer that has to be verified during a mechanical load test. It forms the basis for selection of an insulator.

ROUTINE TEST LOAD (RTL) -- The RTL is a rating equal to 50% of the SML.

STANDARD MATERIAL TEST

Polymer suspension insulators of NGK-Locke Polymer Insulators, Inc., pass all the requirements of prototype test and design test specified in **ANSI C29.11** and **ANSI C29.12** and also comply with the following tests.

ULTRA-VIOLET TEST -- Samples 4.3"x3.0"x0.08" are subjected to ASTM G53 "Standard Practice for Operation Light- and Water- Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials." After checking appearance, including SEM observation, weight loss, receding contact angle, we confirm that the sample passed this test (12,000 hrs) without cracks and blisters.

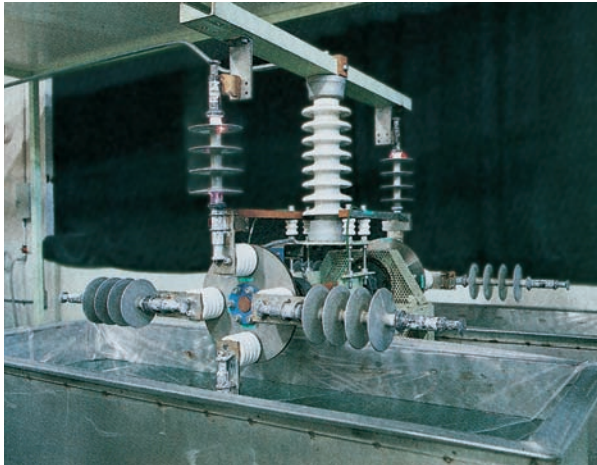
TRACKING AND EROSION (AGING) -- Our polymer insulators pass tracking and erosion test (5,000 hours) specified in IEC Pub. 61109 Annex C. Annex C is cyclic test to simulate natural climate such as rain, fog, ultra-violet, and voltage.

Also our polymer insulators pass tracking and wheel test (30,000 cycles) specified in CEA LWIWG-01 and CSA C411.4.

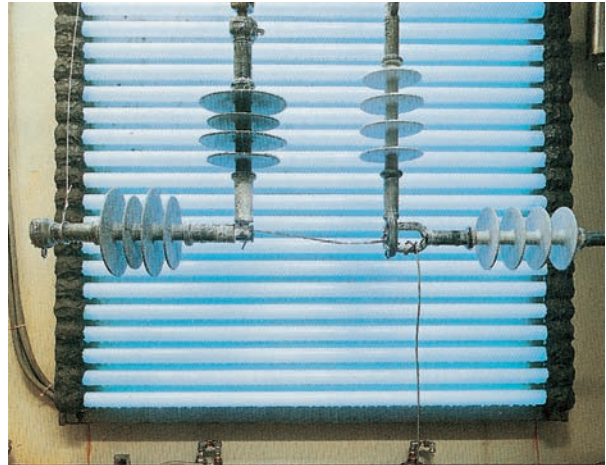
NON FLAMMABILITY -- Samples 5"x0.5"x0.12" are subjected to IEC Pub. 60707 flammability test. The samples meet the criteria FV0. Also this test is specified in IEC Pub. 61109.

POWER ARC -- Polymer insulators withstand 150kA-cycles power arc under applied tension load of 3000 lbs without failure. (Complies with clause 8.2.5 of IEEE 1024)

HIGH PRESSURE WASHING -- Polymer insulators are designed to withstand high pressure water washing at 550psi nozzle pressure, nozzle diameter 1/4", and the distance of 10' from the nozzle to polymer insulators.



Tracking Wheel Test

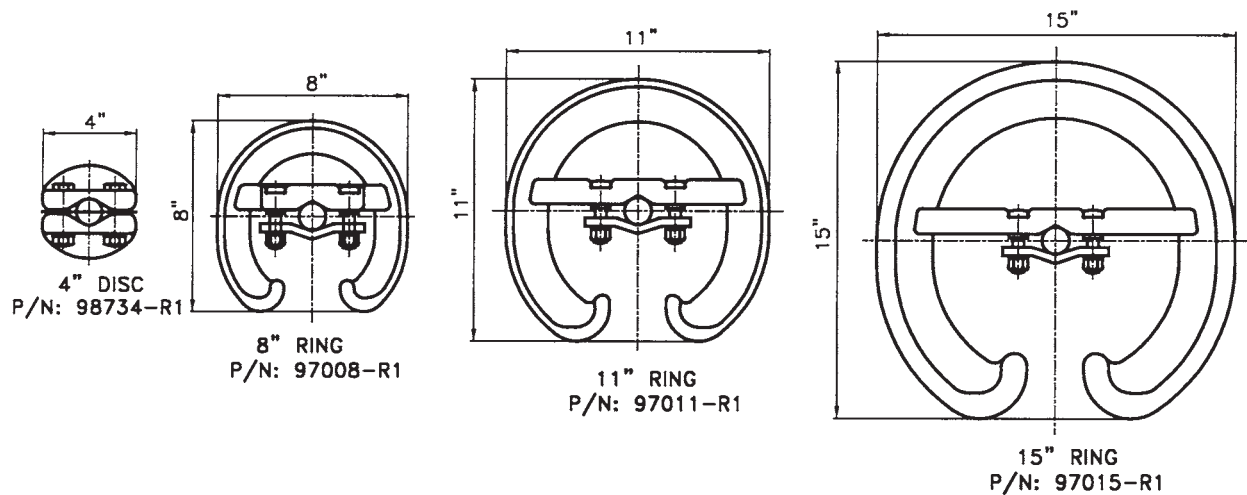


Aging test under UV conditions

GRADING RINGS

Grading discs and/or rings are applied to NLPI polymer insulators for higher operating voltages to reduce electrical stress concentration on and within the insulator and to reduce radio and/or television interference. General recommendations of grading ring application are as follows.

System Voltage		138 kV and below	161 kV	230 kV	345 kV	500 kV
NLPI Grading Rings (Discs) Application	Top (tower side)	None	None	None	ø4" disc	ø8" Ring*
	Bottom (line side)	None	ø4" disc	ø8" Ring*	ø11" Ring	ø15" Ring
NLPI Insulator Cat# Suffix		--	-04	-08	-41	-85



Grading discs are factory-installed. Field installation is required for grading rings. The clamp part of the NLPI grading ring is designed to ensure correct position mounting only.

* : In case of "SL" and "SE" sheds, need larger diameter of grading ring such as ø9.5" or ø11". For other combinations of corona ring application please check with factory.

ADJUSTMENTS WITH GRADING RING

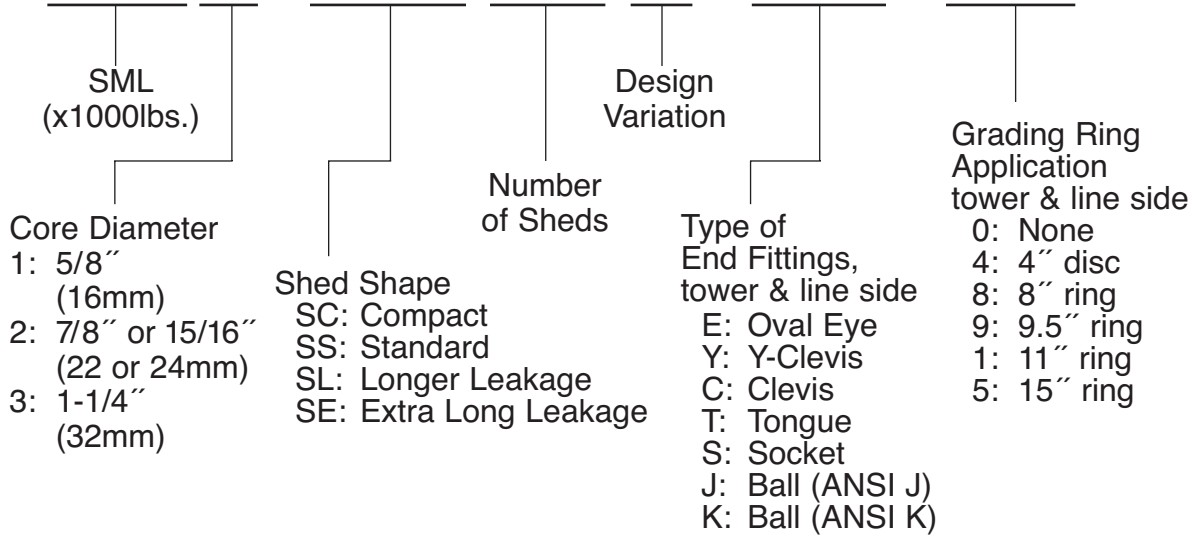
The electrical and physical values shown in the following pages are for the insulators without grading rings or discs. The following table is required if grading rings or discs are used for system voltages of 161 kV and above.

System Voltage		161 kV	230 kV	345 kV	500 kV
Adjustment of tabular values for 25k, 30k, 50k and 80k SML insulators	Arcing Distance, inch (mm)	-0.8 (-20)	-2.0 (-50)	-2.8 (-70)	-5.5 (-140)
	Low Frequency F/O Dry, kV	-5	-15	-25	-50
	Low Frequency F/O Wet, kV	-5	-15	-20	-45
	Critical Impulse F/O pos., kV	-10	-30	-45	-85
	Critical Impulse F/O neg., kV	-15	-30	-45	-90
	Net Weight, lb (kg)	+1 (+0.45)	+3.1 (+1.4)	+5.4 (+2.5)	+14.3 (+6.5)

The above adjusted electrical values are just for guidance because of non-linearity of electrical characteristics.

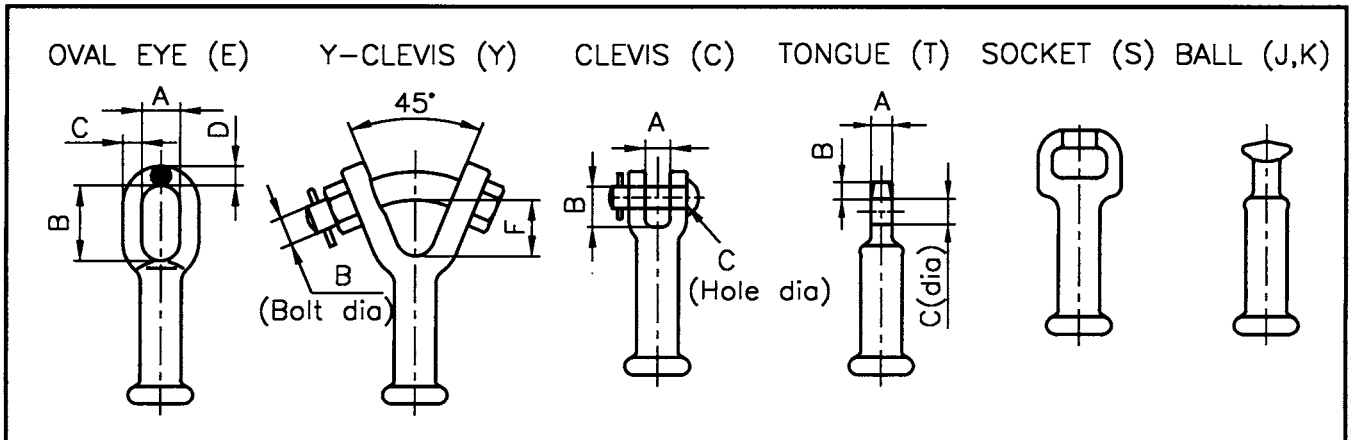
CATALOG NUMBER SYSTEM

251-SS310-SJ-08



CONFIGURATION OF END FITTINGS

Dimension Unit: inch (mm)



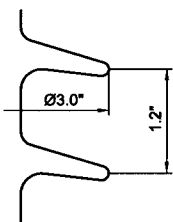
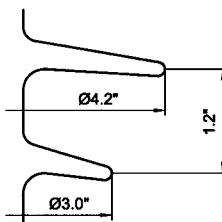
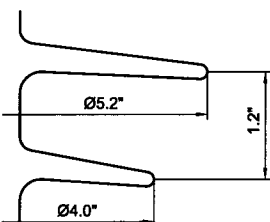
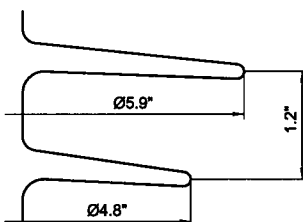
SML LBS(kN)	Oval Eye				Y-Clevis		Clevis			Tongue			Socket/Ball	
	A	B	C	D	F min	B	A	B min	C	A	B	C	Type	ANSI Class
25,000 (111)	1.02 (26)	2.0 (51)	0.63 (16)	0.63 (16)	1.54 (39)	0.75 (19)	0.75 (19)	0.98 (25)	0.69 (17.5)	0.53 (13.5)	0.52 (13.3)	0.69 (17.5)	J	52-5
30,000 (133)	1.02 (26)	2.0 (51)	0.87 (22)	0.87 (22)	1.57 (40)	0.875 (22)	0.75 (19)	0.98 (25)	0.69 (17.5)	0.53 (13.5)	0.52 (13.3)	0.69 (17.5)	J	52-5
50,000 (222)	1.02 (26)	2.0 (51)	0.87 (22)	0.87 (22)	1.57 (40)	0.875 (22)	1.06 (27)	1.26 (32)	0.94 (24)	0.90 (22.8)	0.59 (14.9)	0.94 (24)	K	52-11
80,000 (356)	1.14 (29)	2.9 (74)	0.98 (25)	1.38 (35)	—	—	—	—	—	—	—	—	—	—

HOW TO SELECT CATALOG NUMBER

Our catalog number is self-explanatory. Please follow the following general guidance to determine a catalog number.

No.	Procedures	Example (equivalent to ANSI 52-5, 7 bells)	
1	To select mechanical rating, SML	If rating is 25kip, 251 (refer to page 5)	251-S-__0-__-__
2	To select Shed Profile on the basis of leakage distance. See the following "Shed profile" for details.	If medium contamination area, shed profile is SS (refer to shed profile in this page)	251- SS __0-__-__
3	To select Number of Sheds on the basis of section length	If section length is 40 ¹ / ₄ " (=5 ³ / ₄ " x7), number of sheds is 25 (refer to page 7~16)	251-SS 250 -__-__
4	To select configuration of End Fitting	If socket & ball, -SJ (refer to page 5)	251-SS250- SJ -__
5	To select Grading Ring application on the basis of system voltage	If system voltage is 230kV, ring application is -08 (refer to page 4)	251-SS250-SJ- 08

SHED PROFILE

<p>"SC" SHED COMPACT TYPE FOR LIGHT CONTAMINATION AREA</p> 	<p>"SS" SHED STANDARD TYPE FOR MEDIUM CONTAMINATION AREA</p> 
<p>"SL" SHED LONGER LEAKAGE TYPE FOR HEAVY CONTAMINATION AREA</p> 	<p>"SE" SHED EXTRA LONG LEAKAGE TYPE FOR VERY HEAVY CONTAMINATION AREA</p> 



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