

**SUBJECT:** Technical Specifications for 5 kA, Normal-Duty  
Distribution 4.5 kV and 5 kV VariSTAR® MOV Disks

**Technical Data**  
**TD-231**

**APPLICATION**

The VariSTAR MOV (Metal Oxide Varistor) disks described in this Technical Data sheet are for use as active elements in IEC 5 kA and ANSI Normal-Duty Distribution Class Surge Arresters, when applied in an appropriately designed arrester.

**Polymer Housed Arrester Designs:**

Use the glass collared AV5NG series VariSTAR disks, when applying disks to a polymer housed arrester, where the dielectric strength of the material in direct contact with the disks exceeds the dielectric strength of air.

**Porcelain Housed Arrester Designs:**

Option 1.

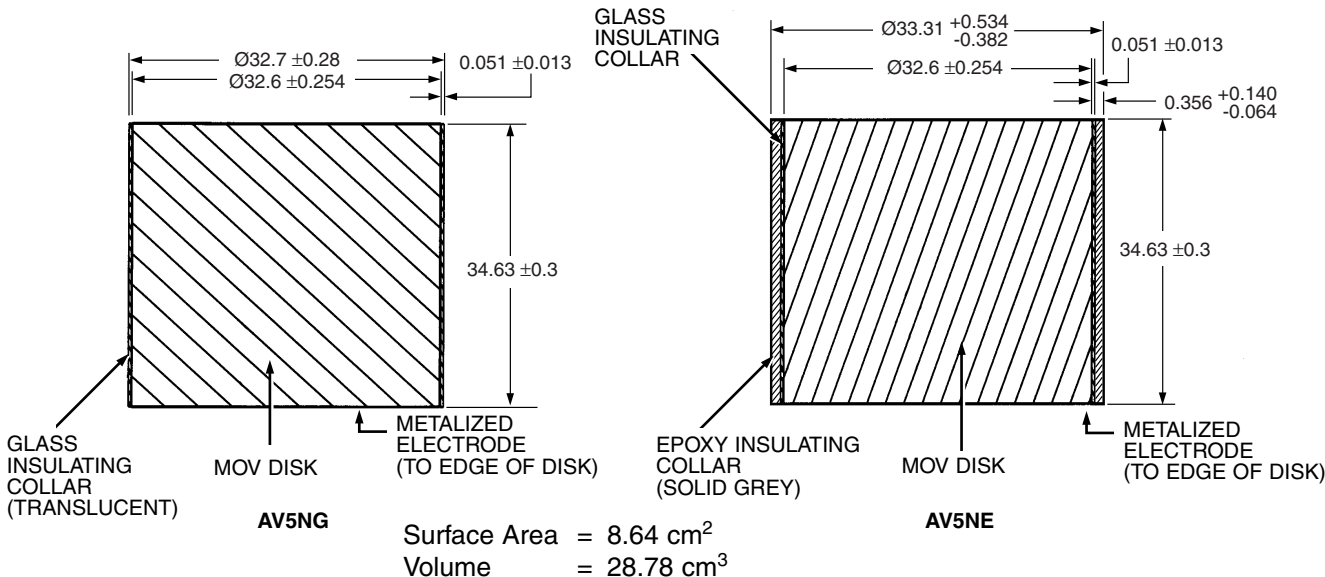
Use the glass collared AV5NG series VariSTAR disk together with an Epoxy Film Tape, as described in technical data sheet TD-241, when applying disks in a porcelain housed arrester, where the material in direct contact with the VariSTAR disks is equal to the dielectric strength of air.

Option 2.

Use the epoxy collared AV5NE series VariSTAR disks, when applying disks in a porcelain housed arrester, where the dielectric strength of the material in direct contact with the disks is equal to the dielectric strength of air.

Electrical properties for AV5NG and AV5NE series VariSTAR disks are otherwise identical.

**Catalog Number reference:**  
**AV5 = Disk Size**  
**N = Normal-Duty, 5 kA**  
**G/E = Glass or Epoxy Collar**  
**PA/PB = Rating Designation**



**Figure 1**  
**Dimensions AV5NG VariSTAR Disk and AV5NE VariSTAR Disk in mm**

**Table 1  
Suggested Usage & Class Ratings**

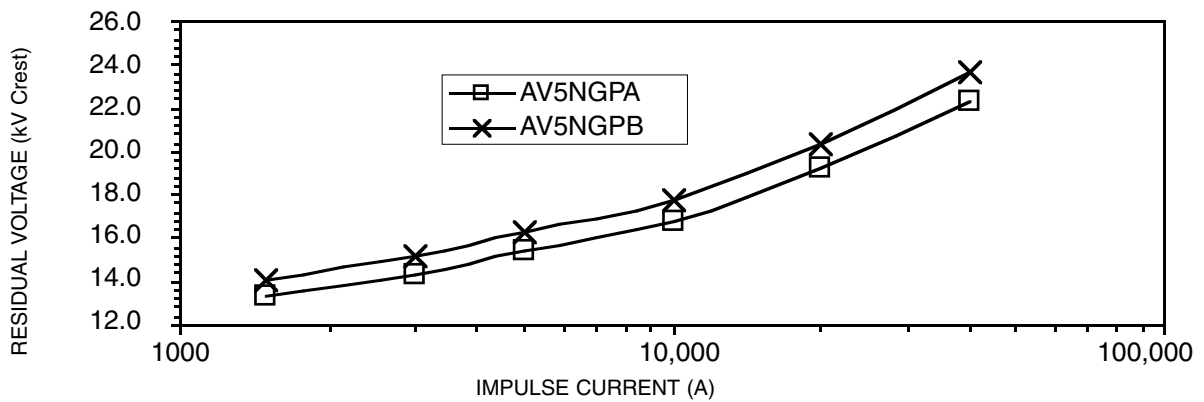
Catalog Number	Suggested $U_r$ (Rating)	Suggested $U_c$ (MCOV)	IEC LD Current Withstand	ANSI LCLD Class	IEC High Current ANSI HCSD	$I_{ref}$
AV5NEPA	4.5 kV	3.94 kV	150 A 2000 $\mu$ s	75 A 2000 $\mu$ s	65 kA	3 mA
AV5NGPA						
AV5NEPB	5.0 kV	4.26 kV	150 A 2000 $\mu$ s	75 A 2000 $\mu$ s	65 kA	3 mA
AV5NGPB						

**Table 2  
Maximum Residual Voltages**

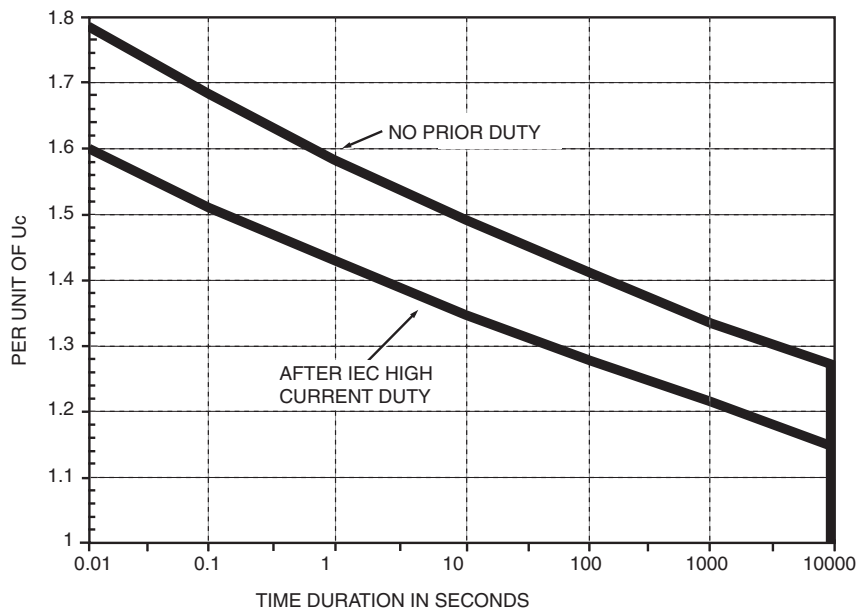
Catalog Number	Rating (kV)	MCOV (kV rms)	0.5 $\mu$ sec (ANSI) kV @ 5 kA	1.0 $\mu$ sec (IEC) kV @ 5 kA	8/20 $\mu$ s Wave Forms					
					kV pk @ 1.5 kA	kV pk @ 3 kA	kV pk @ 5 kA	kV pk @ 10 kA	kV pk @ 20 kA	kV pk @ 40 kA
AV5NEPA	4.50	3.94	16.0	15.9	13.1	14.1	15.1	16.5	18.9	21.9
AV5NGPA										
AV5NEPB	5.00	4.26	17.3	17.1	14.1	15.2	16.3	17.8	20.4	23.6
AV5NGPB										

NOTE: Values other than  $V_{5\text{ kA}}$  are typical values.

**Residual Voltage vs. Impulse Current**

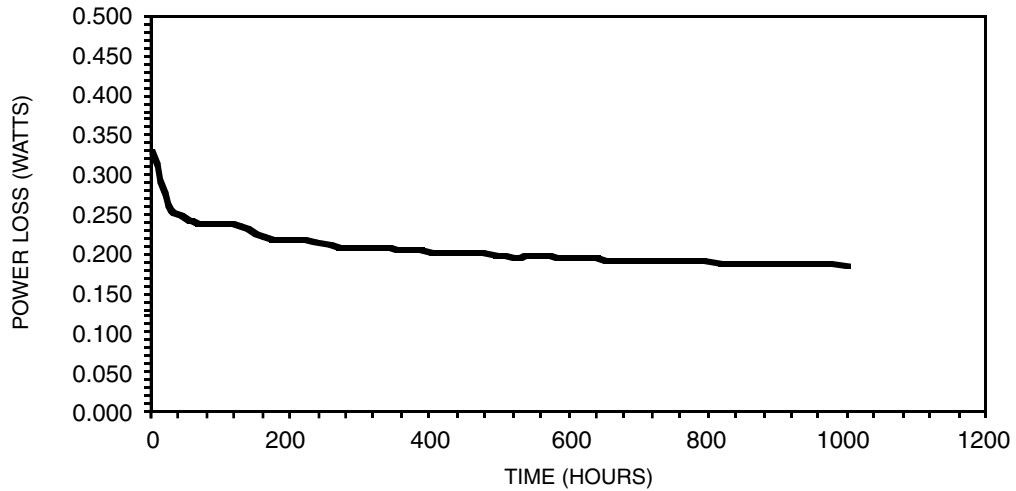


**Figure 2  
Maximum Residual Voltage vs. Impulse Current**



**Figure 3  
Temporary Overvoltage Capability, 60°C**

NOTE: The TOV capability will depend on the design and thermal capability of the arrester. The above TOV curve represents a typical Cooper Power Systems design.



**Figure 4**  
Aging curve for AV5NG and AV5NE VariSTAR disks

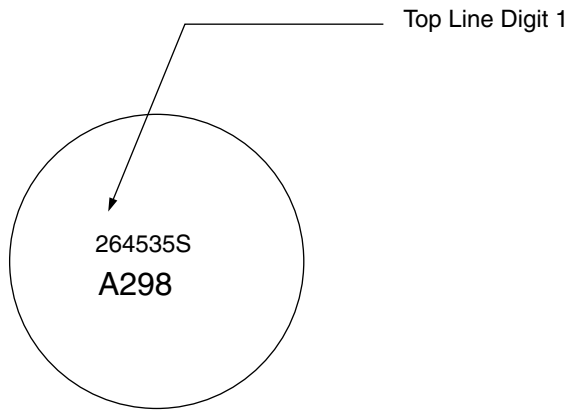
Aging factors based on the IEC and ANSI 1000 hour power loss tests are guaranteed to be less than or equal to 1. The 1000 hour test is performed at 115°C, which is equivalent to 110 years with the operating temperature at 40°C and operating voltages less than or equal to COV. See Figure 4.

### FACTORY ROUTINE TESTS PERFORMED ON EACH DISK

- Physical Inspection
- Residual Voltage Measurement (referenced to 5 kA, 8/20 μs)
- $V_{1mA/cm^2}$  (DC voltage at 8.6 mA)
- Power Loss @ 0.551 of  $V_{1mA/cm^2}$  Voltage

**Table 3**  
Guaranteed Characteristics based on 100% Testing

Catalog Number	Min. $V_{1mA/cm^2}$ (kV DC)	Max. $V_{5kA}$ (kV)
AV5NEPA	7.50	15.1
AV5NGPA		
AV5NEPB	8.12	16.3
AV5NGPB		



**Top Line:**

- Digit 1 ..... Factory No. (May be numeral or letter designation)
- Digit 2 ..... Last Digit of Year of Manufacture
- Digits 3, 4, 5, 6 ..... Factory Lot Number
- Digit 7 ..... Factory Use Only

**Second Line:**

- Digit 1 ..... Rating Code (See Table 4 below)
- Digit 2 ..... Factory Use Only
- Digits 3 (& 4) ..... Disk Sub-category per Table 5

**Figure 5**  
**Disk Identification System**

**Table 4**  
**Disk Category**

Rating Code	Catalog Number	Min. V <sub>1mA/cm<sup>2</sup></sub> (kV DC)	Max. V <sub>5kA</sub> (kV)	Power Loss Test		Min. V <sub>ref</sub> @ I <sub>ref</sub> of 3 mA (kV)
				Test Voltage kV rms	Watts @ 20° C	
A	AV5NEPA	7.50	15.1	4.14	0.245	5.21
	AV5NGPA					
B	AV5NEPB	8.12	16.3	4.47	0.260	5.64
	AV5NGPB					

**Table 5**  
**Disk Sub-category**

Second Line Digits 3 (& 4)	Minimum V <sub>5kA</sub> (kV)	Maximum V <sub>5kA</sub> (kV)
20	11.91	12.00
21	12.01	12.10
22	12.11	12.20
23	12.21	12.30
24	12.31	12.40
25	12.41	12.50
26	12.51	12.60
27	12.61	12.70
28	12.71	12.80
29	12.81	12.90
30	12.91	13.00
31	13.01	13.10
32	13.11	13.20
33	13.21	13.30
34	13.31	13.40
35	13.41	13.50
36	13.51	13.60
37	13.61	13.70
38	13.71	13.80
39	13.81	13.90
40	13.91	14.00
41	14.01	14.10
42	14.11	14.20
43	14.21	14.30
44	14.31	14.40
45	14.41	14.50
46	14.51	14.60
47	14.61	14.70
48	14.71	14.80
49	14.81	14.90
50	14.91	15.00
51	15.01	15.10
52	15.11	15.20
53	15.21	15.30
54	15.31	15.40
55	15.41	15.50
56	15.51	15.60
57	15.61	15.70
58	15.71	15.80
59	15.81	15.90
60	15.91	16.00
61	16.01	16.10
62	16.11	16.20
63	16.21	16.30
64	16.31	16.40

Note: For individual disk reference only. Not for ordering.

## STORAGE AND HANDLING

The VariSTAR MOV disks are packaged on wooden pallets and secured for ocean container shipment. The pallet/boxes shall be stored indoors until the purchaser's acceptance test. Once opened, the disks shall be stored in a dry and clean environment to avoid moisture or other contaminants to collect on the disk surface. The MOV disk should not be handled with bare hands. A latex or other non-fibrous glove should be used to prevent contaminants from compromising the collar of the disk.

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