Specification for:

Heavy Duty Class Polymer Housed Distribution Arresters

1.0 Scope

1.1 This specification covers Heavy Duty polymer housed gapless metal oxide varistor (MOV) distribution surge arresters. The arresters shall be HD distribution class in accordance with the latest edition of IEEE Standard C62.11.

If a conflict exists between the above referenced standard and this specification, this specification shall prevail.

2.0 General Requirements

2.1 Guarantee

2.1.1 Bidder must provide certification that the supplier has at least 30 years of experience in manufacturing gapless polymer housed surge arresters and must have an installed base of at least 30,000,000 of these arresters in service.

2.1.2 Bidders that cannot comply with section 2.1.1 will not be considered.

2.2 Information with bid

2.2.1 The bid documentation supplied will include as a minimum the following information:

2.2.1.1 Outline drawings of the arrester including the external mounting hardware

2.2.1.2 Discharge voltage levels

2.2.1.3 Design test reports in accordance with the latest revision of IEEE C62.11

2.2.1.4 ISO 9001 quality certification

2.2.1.5 ISO 14001 environmental certification

2.2.1.6 Certification of the amount of total internal air volume in the arrester

2.2.2 All of the documentation will be supplied in English.

3.0 Applicable Standards

3.1 - IEEE C62.11 (Latest Revision)

4.0 Product Characteristics and Requirements

4.1 The arrester shall be gapless.

4.2 The allowed housing materials will be a blend of silicone and EPDM rubber, or silicone rubber.

4.3 The interface between the polymer housing must be filled with a silicone dielectric compound. A housing that is bonded to the internal elements is also permitted.

4.4 Each arrester will be supplied with line and ground terminal connectors suitable for clamping conductors from No. 6 AWG solid to No. 2 AWG stranded.

4.5 The line and ground terminals of the arrester will be 3/8-16 threads. All external metal parts (excluding the mounting bracket and associated hardware) will be stainless steel. However, it is permitted that the nuts on the line and ground end may be brass.

4.6 A ground lead disconnector will be installed on the arrester.

4.6.1 The ground lead disconnector must operate for currents as low as 1 Ampere RMS, in addition to the requirements in IEEE C62.11.

4.6.2 The ground lead disconnector must comply with all US Department of Transportation (DOT) shipping regulations without the need for an external restraining mechanism during shipment.

4.7 Nameplate data shall include the following information:

a. Arrester Classification
b. Manufacturer's name or trademark
c. Manufacturer's product type and identification number
d. Duty-cycle voltage rating of the arrester
e. MCOV rating of the arrester
f. Month and year of manufacture
g. Pressure relief capability

4.8 To ensure a low failure rate from moisture ingress the arrester will have less than 5% of the total internal volume as air space.

4.9 The arrester will have a minimum fault current withstand capability of 20 kA when tested per section 8.18 of IEEE Standard C62.11-2012.

4.10 Dimensions and Clearances

4.10.1 Leakage distance - The arrester shall meet or exceed the leakage distances in Table 1

4.10.2 Height - The height of the arrester shall be provided

4.10.3 Strike Distance – The minimum strike distance shall be provided

4.10.4 Clearances – The recommended phase-to-phase and phase-to-ground clearances shall be provided

Table 1: Heavy Duty Surge Arrester Characteristics

Rated Voltage	Maximum Continuous Operating Voltage	Arrester Only Height	Minimum Leakage Distance	Minimum Strike Distance with Bracket	Recommended Clearances	
					Phase-Phase	Phase-Ground
kV	kV	in	in	in	in	in
3	2.55	3.0	8.5	5.6	5.0	3.0
6	5.1	3.8	11.3	6.3	5.4	3.4
9	7.65	4.9	14.4	7.5	6.0	4.0
10	8.4	4.9	14.4	7.5	6.2	4.2
12	10.2	5.5	17.0	8.3	7.5	5.5
15	12.7	7.8	25.2	10.6	8.5	6.5
18	15.3	7.8	25.2	10.6	9.5	7.5
21	17	8.6	28.1	11.5	10.0	8.0
24	19.5	11.5	36.5	14.2	12.0	10.0
27	22	12.6	39.6	15.2	13.0	11.0
30	24.4	13.1	42.5	15.7	14.0	12.0
36	29	15.5	50.4	18.0	16.5	14.5

4.11 Electrical

4.11.1 Discharge Voltages: Arresters shall be assembled with the correct number of MOV blocks to obtain proper characteristics for a given MCOV. The sum of the discharge voltages of discs assembled in an arrester and the voltage drop of springs and other internal parts will be less than or equal to the values in Table 2.

Table 2: Heavy Duty Surge Arrester Discharge Voltages

Rated Voltage	Maximum Continuous Operating Voltage	Discharge Voltage (kV)							
		Front of Wave	8/20 Impulse Wave						Switching Surge
kV	kV	10 kA	1.5 kA	3 kA	5 kA	10 kA	20 kA	40 kA	0.5 kA
3	2.55	11.5	8	8.6	9.1	9.9	11.2	13.3	7.3
6	5.1	22.4	16	17.1	18.2	19.8	22.5	26.5	14.7
9	7.65	32.7	23.5	25.1	26.6	29	32.9	38.8	21.5
10	8.4	35.5	25.6	27.4	29	31.6	35.9	42.3	23.4
12	10.2	42.1	30.4	32.6	34.5	37.6	42.7	50.3	27.8
15	12.7	53.8	38.7	41.4	43.8	47.8	54.3	64	34.5
18	15.3	63.1	45.6	48.8	51.7	56.4	64.1	75.5	41.7
21	17	71	51.4	55	58.2	63.5	72.1	85	47
24	19.5	85.5	61.6	66	69.9	76.2	86.6	102	56.4
27	22	95.9	69.2	74	78.4	85.5	97.1	114.5	63.3
30	24.4	105.2	76	81.4	86.2	94	106.8	125.9	69.6
36	29	126.3	91.3	97.8	103.5	112.9	128.3	151.2	83.5
42	34	142	102.7	110	116.5	127	144.3	170.1	137.7

4.11.2 Temporary Overvoltage (TOV) Capability - To provide long reliable service life the surge arrester must have TOV capability (with no prior duty) not less than the durations in the chart below.

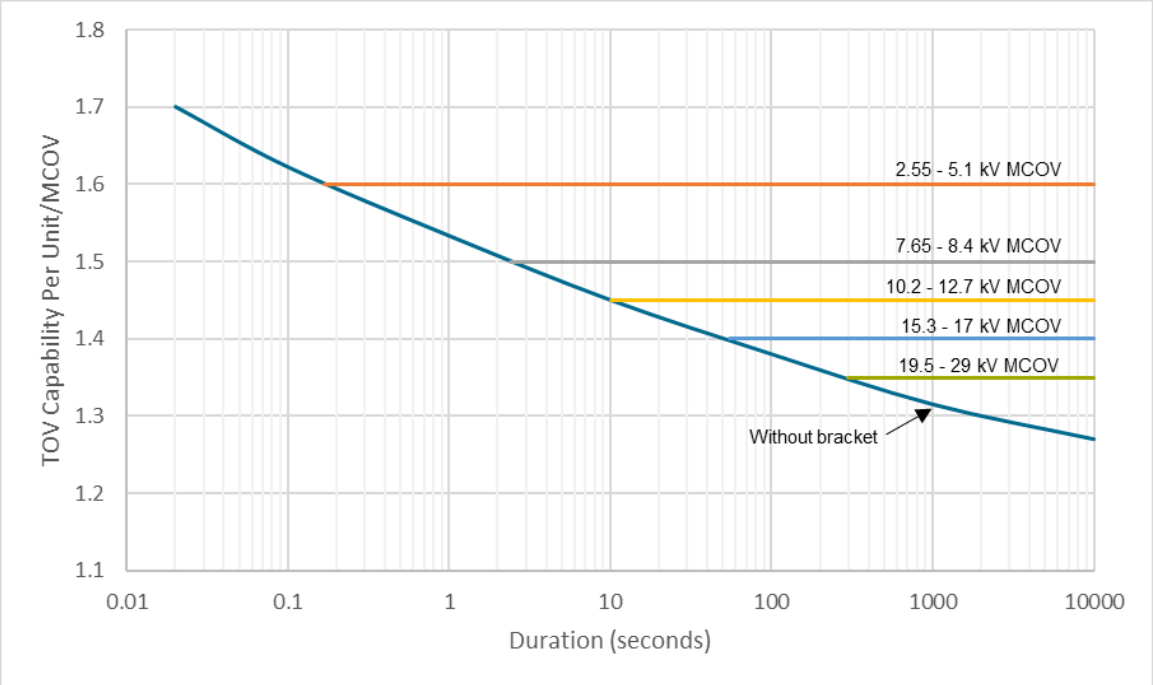

Figure 1: TOV Capability (with and without capacitive ground lead disconnector bracket)

5.0 Routine and Quality Assurance Testing

5.1 MOV block requirements

5.1.1 Routine (100%) tests:

5.1.1.1 Discharge Voltage (10 kA) - Each MOV block is subjected to a 10 kA discharge with a wave shape of 8/20 and the resulting discharge voltage measured with an accuracy of 1.5%. This measured value must be stamped on the disc and used as the basic reference value in assembling multiple blocks into complete arresters.

5.1.1.2 Rated Energy Test - Each block will receive a single 8/20 high current impulse. The magnitude of the discharge current is maintained such that the resulting energy per discharge is greater than 268 +/- 10% joules per cubic centimeter of block material.

5.1.2 Quality assurance tests:

5.1.2.1 Square-wave energy test - Sample blocks are subjected to a two shot series of high energy discharges which are increased in magnitude on successive series until the block fails. This indicates the ultimate energy capability by the magnitude of the energy absorbed on the last shot prior to failure. The minimum energy of the block will exceed 268 J/cc block material.

5.1.2.2 High Current Test (100 kA) - Sample blocks will be subjected to a single 100 kA discharge with permissible wave shape 4-6/10-15. If the block sustains damage during the discharge, it's watts loss and 10 kA discharge voltage are measured. The maximum watts loss must be ≤ 0.020 Watts per kV of MCOVpk for the block under test.

5.1.2.3 AC Tests - After the disc is energized to ≥ 20 mApk, the current is reduced to 4 mApk (Iref) and the reference voltage measured (Vrefpk). Then the voltage is reduced to MCOV where the watts loss and capacitive current are measured. Maximum watts loss must be ≤ 0.020 Watts per kV of MCOVpk for the block under test. The capacitive current must be 0.37 ± 0.10 mA.

5.1.2.4 Accelerated aging test - A sample of blocks from each batch will be subjected to accelerated aging test. The blocks are energized at ≥ MCOV at 135° C for 160 hours. At the conclusion of the test, the curve of watts loss vs. time has a negative slope, and the final/minimum watts loss must be ≤ 1.08 and the final/initial watts loss must be < 1.00. This test is equivalent to over 100 years at an operating temperature of 40° C.

5.2 Arrester requirements: The following tests are to be done on 100% of the arresters. Certification that all arresters were tested must be supplied. It is not necessary that data be available for each individual arrester.

5.2.1 Reference Voltage - The voltage necessary to produce 4 mA peak resistive current must be measured.

5.2.2 Partial Discharge – PD must be measured and must be less than 10 pC with an applied voltage of 1.05 times MCOV.

5.2.3 Power Frequency Test – Energize arrester for minimum of 1 second withstand at 1.25 times MCOV.

5.3 Documentation – Upon request the manufacturer will supply certification that all the above tests are performed.

For product inquiries, please contact your local sales representative or customer service representative.