

Specification for Station Class Hollow Core Silicone Housed Surge Arresters

1.0 Scope

1.1 This specification covers hollow core silicone housed gapless MOV surge arresters. The arresters shall be station class in accordance with the latest edition of ANSI/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 shall provide certification that the supplier has at least 15 years experience in manufacturing gapless polymer housed surge arresters and has an installed base of at least 200,000 of this type 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 shall 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 ANSI/IEEE C62.11.

2.2.1.4 Certification of an ISO 9002 registered quality program.

2.2.2 All of the documentation shall be supplied in English.

3.0 Standards

- 1 ANSI/IEEE C62.11 (Latest Revision)
- 2 Performance Requirements

4.0 General

4.1.1 The allowed housing materials shall be silicone rubber.

4.1.2 Each arrester shall be supplied with line and ground terminal connectors suitable for clamping conductors from .25 to .81 inches in diameter.

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4.1.3 Nameplate data shall include the following information:

- a. Arrester Classification
- b. Manufacturer's Name or Trademark
- c. Manufacturer's Type and identification number
- d. Duty-cycle voltage rating of the arrester
- e. MCOV rating of the arrester
- f. Serial Number

4.1.4 The arrester shall have a minimum pressure relief rating of 65,000 amperes when tested per section 8.16 of IEEE Std C62.11-2005.

4.2 Dimensions and Weight

4.2.1 Leakage distance - The minimum leakage distance of the arrester(s) shall be in accordance with the following table.

4.2.2 Height - The total height of the arrester shall not exceed the values in the table below.

4.2.3 Weight – The weight of the arrester shall not exceed the values in the following table.

Duty Cycle Rating	Maximum Continuous Operating Voltage (MCOV)	Overall Height	Minimum Leakage Distance	Mounting Clearance Spacing on Center		Net Weight	Ring Diameter
				Phase to Phase (In-line)	Phase to Ground		
kVrms	kVms	Inches	Inches	Inches	Inches	Pounds	Inches
54	42	38.1	83	17	21	104	
60	48	38.1	83	19	23	107	
72	57	38.1	83	23	28	112	
90	70	44.4	113	28	34	125	
90	74	44.4	113	30	36	130	
96	76	44.4	113	30	37	128	
108	84	52.1	142	34	41	141	
108	88	52.1	142	35	42	144	
120	98	52.1	142	39	47	149	
132	106	58.8	171	42	51	167	
144	115	58.8	171	46	55	172	
168	131	76.9	196	52	63	231	
172	140	76.9	196	63	82	257	25
180	144	76.9	196	65	84	257	25
192	152	83.2	225	68	88	262	25
228	180	90.9	254	79	101	291	25
258	209	105.3	313	108	150	349	39
264	212	105.3	313	109	151	351	39
276	220	105.3	313	102	134	330	39
312	245	129.7	367	112	146	406	39
396	318	151.8	455	161	222	539	80
420	335	158.5	484	168	230	564	80
444	353	165.2	514	165	218	532	60

4.3 Electrical

4.3.1 Discharge (Residual) 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 shall be less than or equal to the values in the table below in kV:

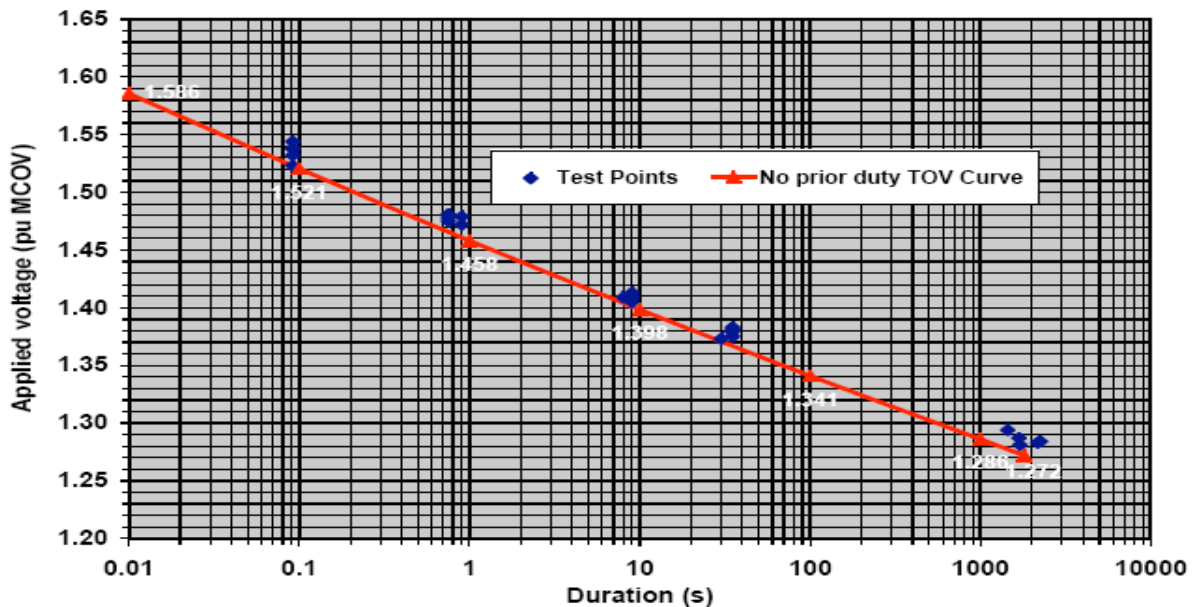
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Duty Cycle Rating kVrms	Maximum Continuous Operating Voltage (MCOV) kVrms	Maximum 0.5 μ s Discharge Voltage kV ⁽¹⁾	Maximum Switching Surge Protective Level at Classifying Current Levels kV ⁽²⁾	Maximum Discharge Voltage Using an 8/20 Current Wave - kV					
				1.5kA	3kA	5kA	10kA	20kA	40kA
54	42	133	94	103	108	113	121	131	146
60	48	152	107	118	124	129	138	150	166
72	57	181	127	140	147	153	164	178	198
90	70	222	156	172	181	188	201	218	243
90	74	235	165	182	191	199	213	231	256
96	76	241	170	187	196	205	218	237	263
108	84	266	187	207	217	226	241	262	291
108	88	279	196	217	227	237	253	274	308
120	98	311	228	241	253	264	282	305	340
132	106	336	247	261	274	285	305	330	367
144	115	365	268	283	297	310	330	358	399
168	131	416	305	323	338	353	376	408	454
172	140	444	326	345	362	377	402	436	485
180	144	457	335	355	372	388	414	449	499
192	152	482	354	374	393	409	437	473	527
228	180	571	419	443	465	485	517	561	624
258	209	663	519	515	540	563	601	651	724
264	212	673	526	522	548	571	609	660	735
276	220	698	546	542	568	592	632	685	762
312	245	777	608	603	633	660	704	763	849
396	318	1009	790	783	821	856	914	991	1102
420	335	1063	832	825	865	902	963	1043	1161
444	353	1120	876	869	912	950	1014	1100	1223

- (1) Maximum discharge voltage for an impulse current wave which produces a voltage cresting in 0.5 μ s. Discharge currents are 10kA for 42 – 353kV MCOV. This can be used for coordination where front-of wave sparkover formerly was used.
(2) Discharge voltages are based on a 500A surge of 45 μ s time to crest through 88kV MCOV and a 1000A surge of 45 s to crest through 180kV MCOV and 2000A through 245kV MCOV.

4.3.2 Temporary Overvoltage Capability - To provide long reliable service life the surge arrester shall have TOV capability (with no prior duty) not less than the durations in the following figure:

Silicone Housed Station Class Arrester TOV Curve



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5.0 Routine and Quality Assurance Testing

5.1 MOV block requirements

5.1.1 Routine (100%) tests:

5.1.1.1 Discharge voltage 10kA - Each MOV block shall be subjected to a 10 kA discharge with a veshape of 8/20 and the resulting discharge voltage shall be measured with an accuracy of 1.5percent. 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 shall receive multiple high energy square wave impulses. The magnitude of the discharge current shall be maintained such that the resulting total energy per test is greater than 210 +/- 10 percent joules per cubic centimeter of block material.

5.1.2 Quality assurance tests:

The following tests shall be performed on samples of MOV blocks taken from each manufacturing batch of blocks.

5.1.2.1 Square-wave energy test - Sample blocks shall be 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 shall exceed 210 J/cc block material.

5.1.2.2 High Current Test 100kA - Sample blocks shall be subjected to two 100-kA discharges with permissible wave shape 4-6/10-15. After a minimum one-hour cooling period, blocks shall have a maximum increase in 10-kA discharge voltage of less than 3%.

5.1.2.3 AC Tests – Sample blocks shall be energized to ≥ 30 mApk, following which the current shall be reduced to 17 mApk (Iref) and the reference voltage measured (Vrefpk). The voltage shall then be reduced to MCOV and the watts loss and capacitive current are measured. The measured watts loss shall not exceed ≤ 0.065 Watts per kV of 10kA discharge voltage for the block under test. The capacitive current shall be in the range 1.41 ± 0.10 mA.

5.1.2.4 Accelerated aging test - A sample of blocks from each batch shall be subjected to an accelerated aging test in which the blocks shall be energized at \geq MCOV at 135° C for 160 hours. At the conclusion of the test, the curve of watts loss vs. time shall exhibit a negative slope. The final/minimum watts loss shall not exceed 1.08 and the final/initial watts loss shall not exceed 1.00.

5.2 Arrester requirements:

The following tests shall be performed on 100% of assembled arrester units.

5.2.1 Starting (Reference) Voltage - The voltage necessary to produce 11.0 mA peak resistive current shall be measured and shall not be less than the minimum value designated by the manufacturer for the arrester unit.

5.2.2 Partial Discharge – The partial discharge shall be measured at 1.05 times MCOV and shall not exceed 10 pC.

5.2.3 Power Frequency Test – Each arrester unit shall be energized at 1.20 times MCOV for a minimum of 1 second during which time the watts loss shall be measured. The watts loss shall not exceed the maximum value designated by the manufacturer for the arrester unit.

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5.2.4 Seal Test – Each arrester unit shall be subjected to a seal test using a helium mass spectrometer technique to verify that the seal leak rate is not greater than 1×10^{-7} cm³/s with a one atmosphere pressure differential between inside and outside of the unit under test.

5.3 Documentation – Upon request the manufacturer shall supply certification that all of the above tests have been performed and that all requirements were met. It shall not be necessary to provided actual test values.

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