Specification for Station Class Polymer Housed Surge Arresters

1.0 Scope

1.1 This specification covers station class polymer 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 must provide certification that the supplier has at least 15 years experience in manufacturing gapless polymer housed surge arresters and must have an installed base of at least 200,000 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 ANSI/IEEE C62.11.
- 2.2.1.4 Certification of an ISO 9002 registered quality program.
- 2.2.1.5 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 Standards

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

4.0 General

4.1.1 The allowed housing materials will be either an alloy of EPDM rubber and low molecular weight silicone oil or silicone rubber.

4.1.2 The interface between the polymer housing must be filled with a silicone dielectric compound. Also, a housing that is bonded to the internal elements is permitted.

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

4.1.4 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

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

4.1.6 The arrester will have a minimum pressure relief rating of 80,000 amperes when tested per section 8.16 of IEEE Std C62.11-2005.

4.2 Dimensions and Weight

4.2.1 Leakage distance - The arrester shall meet or exceed the leakage distances in the following table.

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

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

Duty Cycle Rating	Maximum Continuous Operating Voltage (MCOV)	Overall Height	Leakage Distance	Mounting Clearance Spacing on Center		Net Weight
				Phase to Phase (In-line)	Phase to Ground	
kV	kV	Inches	Inches	Inches	Inches	Pounds
3	2.55	10.2	23	12.3	7.7	20.3
6	5.1	10.2	23	12.3	7.7	20.8
9	7.65	10.2	23	12.3	7.7	21.3
10	8.4	10.2	23	12.3	7.7	21.6
12	10.2	12.8	31	12.3	7.7	25.2
15	12.7	12.8	31	12.3	7.7	25.8
18	15.3	12.8	31	12.3	7.7	26.3
21	17.0	18.2	46	12.3	7.7	33.6
24	19.5	18.2	46	12.3	8.0	34.2
27	22.0	18.2	46	12.3	8.8	34.7
30	24.4	18.2	46	12.3	9.6	35.2
36	29.0	18.2	46	13.8	11.0	36.5
39	31.5	23.5	62	14.6	11.8	43.5
45	36.5	23.5	62	16.3	13.5	44.4
48	39	23.5	62	17.0	14.2	45.2
54	42	28.8	78	18.6	15.8	52.6
60	48	28.8	78	20.6	17.8	53.6
72	57	34	92	23.4	20.6	76.7
90	70	44.6	124	27.0	24.5	77.0
96	76	44.6	124	30.5	28.0	80.0
108	84	55.3	156	44.5	36.5	98.9
108	88	55.3	156	44.5	36.5	98.9
120	98	55.3	156	49.0	41.0	101.0
132	106	55.3	156	53.0	45.0	105.0
144	115	65.8	186	56.0	48.0	120.1
168	131	84.4	234	74.0	60.0	152.0
172	140	84.4	234	77.0	63.0	152.0
180	144	84.4	234	78.0	64.0	152.0
192	152	84.4	234	84.0	70.0	152.0
228	180	112.2	312	94.0	80.0	201.0

NOTE: Because Hubbell has a policy of continuous product improvement, we reserve the right to change design and specifications without notice.

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 will be less than or equal to the values in the table below in kV:

Duty Cycle Rating kV	Maximum Continuous Operating Voltage kV	Maximum 0.5μsec Discharge Voltage kV (1)	Maximum Switching Surge Protective Level kV (2)	Maximum Discharge Voltage Using an 8/20 Current Wave – kV					
				1.5kA	3kA	5kA	10kA	20kA	40kA
3	2.55	8.4	6.0	6.4	6.7	7.1	7.6	8.4	9.6
6	5.1	16.7	11.9	12.8	13.5	14.1	15.2	16.8	19.1
9	7.65	25.0	17.8	19.2	20.2	21.1	22.7	25.1	28.3
10	8.4	27.8	19.8	21.4	22.5	23.5	25.3	28.0	31.8
12	10.2	33.3	23.7	25.6	26.9	28.1	30.3	33.5	38.1
15	12.7	41.7	29.7	32.0	33.7	35.2	37.9	42.0	47.6
18	15.3	50.1	35.6	38.4	40.4	42.3	45.5	50.4	57.2
21	17.0	56.3	40.1	43.2	45.5	47.6	51.2	56.7	64.4
24	19.5	63.9	45.5	49.1	51.6	54.0	58.1	64.3	73.0
27	22.0	72.9	51.9	56.0	58.9	61.6	66.3	73.4	83.3
30	24.4	80.4	57.2	61.7	64.9	67.9	73.1	80.9	91.9
36	29.0	95.9	68.3	73.6	77.4	81.0	87.2	96.5	109.6
39	31.5	104.2	74.2	80.0	84.1	88.0	94.7	104.8	119.0
45	36.5	120.9	86.1	92.8	97.6	102.1	109.9	121.7	138.1
48	39	128.7	91.6	98.8	103.9	108.7	117.0	129.5	147.1
54	42	144.4	102.8	110.9	116.6	122.0	131.3	145.3	165.0
60	48	163.5	116.4	125.5	132.0	138.0	148.6	164.5	186.8
72	57	191.8	136.6	147.3	154.9	162.0	174.4	193.1	219.2
90	70	241.8	172.1	185.6	195.2	204.2	219.8	243.3	276.3
96	76	257.4	183.2	197.6	207.8	217.4	234.0	259.0	294.1
108	84	288.9	205.6	221.8	233.2	244.0	262.6	290.7	330.1
108	88	288.9	205.6	221.8	233.2	244.0	262.6	290.7	330.1
120	98	326.9	241.3	251.0	263.9	276.1	297.2	329.0	373.6
132	106	352	252	270	284	298	317	353	404
144	115	386.1	285.0	296.5	311.7	326.1	351.0	388.6	441.2
168	131	445	330	343	363	380	409	446	503
172	140	455	338	351	372	389	419	457	516
180	144	476	354	367	389	407	438	478	539
192	152	508	377	391	415	434	467	509	575
228	180	604	448	465	493	516	556	607	684

(1) Maximum discharge voltage for a 10kA impulse current wave which produces a voltage wave cresting in 0.5μs. This can be used for coordination where front-of-wave sparkover was formerly used.

(2) Based on a 500A surge of 45μs time to crest through 88kv MCOV, and 1000A surge of 45μs time to crest for a 98kv MCOV and higher ratings.

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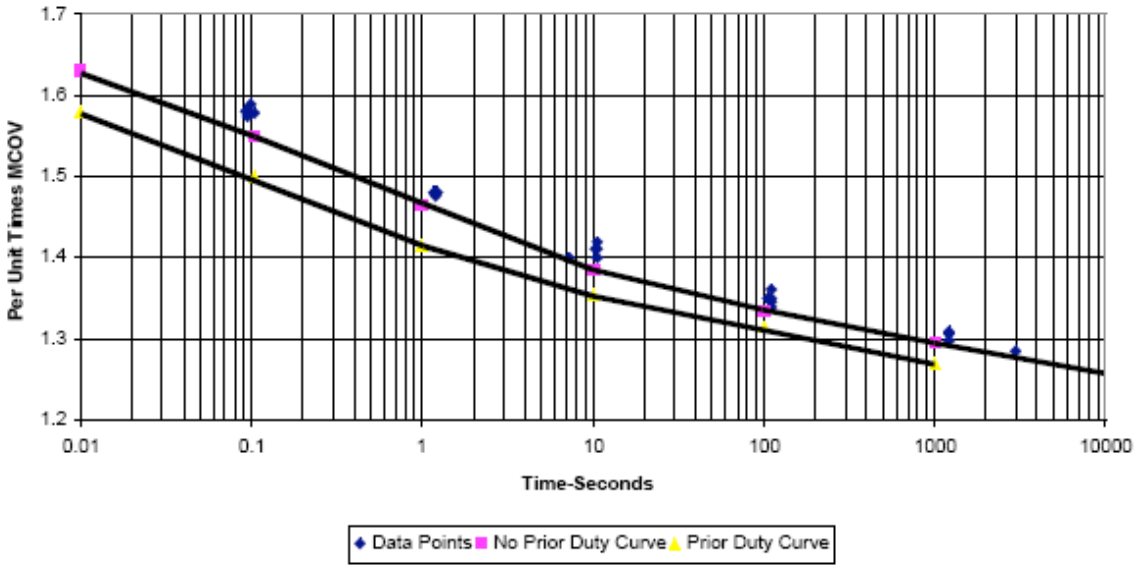
4.3.2 Temporary Overvoltage Capability - To provide long reliable service life the surge arrester must have TOV capability (with no prior duty) not less than the durations in the table below:

Polymer Station Class TOV Curve per IEEE C62.11 Standard



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 1.0 percent. 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 multiple high energy square wave impulses. The magnitude of the discharge current is maintained such that the resulting energy per test is greater than 193 +/- 10 percent 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 193 J/cc block material.

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

5.1.2.3 AC Tests - After the disc is energized to ≥ 30 mApk, the current is reduced to 11 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 ≤ 0.050 Watts per kV of 10kA discharge for the block under test. The capacitive current must be 0.87 ± 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 Starting (Reference) Voltage - The voltage necessary to produce 11.0 mA peak resistive current must be measured.

5.2.2 Partial Discharge – The partial discharge must be measured and must be less than 10 pC with an applied voltage of 1.05 times MCOV or greater.

5.2.3 Power Frequency Test – Energize arrester for minimum of 1 second withstand at 1.20 times MCOV.

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