Surge Arresters

Functional Specification for Polymer-Housed UXL High-Strength Station-Class Surge Arresters

1. Scope:

1.1 This specification covers the electrical and mechanical characteristics of polymer-housed high-strength station-class arresters.

2. Applicable Standards:

2.1. The surge arresters shall meet the requirements of IEEE Std C62.11™-2012 standard "Standard for Metal-Oxide Surge Arresters for Alternating Current Power Circuits".

3. Construction:

3.1. Arresters shall be polymer-housed station-class. The housing should contain a minimum of 75% silicone rubber. Housings, which are primarily EPDM, EPR or other carbon-based materials, are not acceptable.

4. Cantilever Strength:

4.1. Polymer-housed station-class arresters should meet ultimate cantilever strength, in in-lbs, for the following designs:

UXLB (3-360 kV)	80,000 in-lbs
UXLC (132-360 kV)	92,000 in-lbs

5. Creepage Distance:

5.1. The arrester housing shall have minimum creepage distance per the following table:

Arrester Rating (kV, rms)	Creep UXLB (in)	Creep UXLC (in)		Arrester Rating (kV, rms)	Creep UXLB (in)	Creep UXLC (in)
3	38	-		108	215	
6	46	-		120	246	-
9	46	-		132	246	322
10	46	-		138	307	322
12	54	-		144	307	330
15	54	-		162	330	345
18	61	-		168	330	345
21	61	-		172	353	422
24	69	-		180	399	429
27	69	-		192	422	445
30	77	-		198	430	460
33	84	-		204	438	460
36	84	-		216	445	468
39	92	-		228	453	460
42	92	-		240	484	483
45	100	-		258	614	690
48	108	-		264	614	698
54	108	-		276	691	714
60	123	-		288	706	721
66	123	-		312	722	798
72	169	-		330	783	829
78	177	-		336	360	836
84	184	-		360	845	859
90	192	-				
96	200	-				

6. Terminals

6.1. Terminals shall have solderless clamp-type connections suitable to accept up to 1.15” diameter conductors.

7. Mounting Provisions:

7.1. The arrester shall be supplied with a 3-hole mounting base using an 8.75”-10” diameter bolt circle pattern. The bolt-holes should be sized for .5” diameter bolts.

8. Nameplate:

8.1. The arrester should specify the manufacturer name, catalog number, serial number, arrester rating and MCOV. It should be permanently affixed to the mounting base.

9. Protective Characteristics:

9.1. The arrester shall have discharge voltages, which do not exceed the following switching surge energy rating (two shot-thermal):

UXL - Standard Energy Handling (minimum 15 kJ/kV of MCOV)

Arrester Rating (kV, rms)	Arrester MCOV (kV rms)	TOV*		Front-of-wave Protective Level** (kV Crest)	Maximum Discharge Voltage (kV Crest)						Switching Surge Protective Level (kV Crest)			
		1 sec	10 Sec		1.5kA	3kA	5kA	10kA	20kA	40kA	125A	250A	500A***	1000A
3	2.55	3.5	3.3	7.7	6.2	6.5	6.8	7.3	7.8	8.6	5.5	5.7	5.8	6
6	5.1	6.9	6.6	15.3	12.5	13	13.5	14.6	15.6	17.2	11	11.3	11.6	12
9	7.65	10.4	9.9	22.5	18.4	19.2	20	21.5	23	25.3	16.2	16.6	17.1	17.7
10	8.4	11.4	10.8	24.7	20.2	21.1	21.9	23.6	25.2	27.8	17.8	18.3	18.8	19.5
12	10.2	13.9	13.1	30	24.5	25.6	26.6	28.7	30.6	33.8	21.7	22.2	22.8	23.6
15	12.7	17.2	16.4	37.3	30.4	31.9	33.1	35.7	38.1	42	27	27.6	28.4	29.4
18	15.3	20.8	19.7	45	36.7	38.4	39.9	43	45.9	50.6	32.4	33.2	34.2	35.4
21	17	23.1	21.9	50	40.7	42.6	44.3	47.7	51	56.2	36	36.9	38	39.3
24	19.5	26.5	25.1	57.3	46.7	48.9	50.8	54.8	58.5	64.5	41.3	42.3	43.6	45.1
27	22	29.9	28.4	64.7	52.7	55.2	57.3	61.8	66	72.7	46.6	47.8	49.2	50.9
30	24.4	33.1	31.5	71.7	58.4	61.2	63.6	68.5	73.2	80.7	51.7	53	54.5	56.4
33	27.5	37.3	35.4	80.8	65.8	68.9	71.6	77.2	82.5	90.9	58.3	59.7	61.4	63.6
36	29	39.4	37.4	85.2	69.4	72.7	75.5	81.4	87	95.9	61.5	62.9	64.8	67.1
39	31.5	42.8	40.6	92.6	75.4	79	82	88.4	94.5	105	66.8	68.4	70.4	72.9
42	34	46.2	43.8	99.9	81.4	85.2	88.6	95.4	102	113	72	73.8	76	78.6
45	36.5	49.6	47	108	87.4	91.5	95.1	103	110	121	77.4	79.2	81.6	84.4
48	39	53	50.3	115	93.4	97.7	102	110	117	129	82.6	84.6	87.1	90.2
54	42	57	54.1	124	101	106	110	118	126	139	89	91.1	93.8	97.1
60	48	65.2	61.9	141	115	121	125	135	144	159	102	105	108	111
66	53	72	68.3	156	127	133	138	149	159	176	113	115	119	123
72	57	77.4	73.5	168	137	143	149	160	171	189	121	124	128	132
78	62	84.2	79.9	183	149	156	162	174	186	205	132	135	139	144
84	68	92.3	87.7	200	163	171	178	191	204	225	144	148	152	158
90	72	97.8	92.8	212	173	181	188	202	216	238	153	157	161	167
96	76	103.2	98	224	182	191	198	214	228	252	161	165	170	176
108	84	114.1	108.3	247	201	211	219	236	252	278	178	183	188	195
120	98	133.1	126.3	288	235	246	256	275	294	324	208	213	219	227
132	106	143.9	136.6	312	254	266	276	298	318	351	225	230	237	246
138	111	150.7	143.1	326	266	279	289	312	333	367	236	241	248	257
144	115	156.2	148.2	338	276	289	300	323	345	380	244	250	257	266
162	130	176.5	167.6	382	312	326	339	365	390	430	276	282	291	301
168	131	177.9	168.9	385	314	329	342	368	393	433	278	285	293	303
172	140	190.1	180.5	412	335	351	365	393	420	463	297	304	313	324
180	144	195.6	185.6	423	345	361	375	404	432	476	305	313	322	333
192	152	206.4	195.9	447	364	381	396	427	456	503	322	330	340	352
198	160	217.3	206.2	470	383	401	417	449	480	529	339	347	358	370
204	165	224.1	212.7	485	395	414	430	463	495	546	350	358	369	382
216	174	236.3	224.3	512	417	436	453	489	522	575	369	378	389	403
228	180	244.4	232	529	431	451	469	505	540	595	382	391	402	417
240	190	258	244.9	558	455	476	495	533	570	628	403	412	425	440
258	209	283.8	269.4	614	501	524	545	587	627	691	443	454	467	484
264	212	287.9	273.3	623	508	532	552	595	636	701	449	460	474	490
276	220	298.8	283.6	647	527	552	573	618	660	727	466	478	492	509
288	230	312.3	296.5	676	551	577	599	646	690	760	488	499	514	532
312	245	332.7	315.8	720	587	614	638	688	735	810	519	532	548	567
330	267	362.6	344.2	758	618	647	672	724	774	853	547	560	577	597
336	272	369.4	350.6	820	668	699	727	783	837	922	591	605	623	645
360	289	392.5	372.5	849	692	724	753	811	867	955	613	627	646	668

* Temporary Overvoltage (TOV) with Prior Duty.
** Based on a 10 kA current impulse that results in a discharge voltage cresting in 0.5 µs.
*** 45-60 µs rise time for a 500 A peak current surge.

10. Standard Production Tests:

10.1. Every metal oxide varistor and arrester shall be 100% production tested as follows to demonstrate compliance with the manufacturers' specifications. Test report should be supplied with each arrester. Each arrester shall be marked with a unique serial number to allow tracking for at least 20 years from date of production.

10.1.1. Metal Oxide Varistor Tests

10.1.1.1. Measure Reference Voltage at specified Reference Current. This voltage level must fall within the parameters established by the manufacturer.

10.1.1.2. The discharge voltage of each MOV must be measured per IEEE Std C62.11™-2012 standard, Section 12.2, "Discharge Voltage Test".

10.1.1.3. The leakage current must be measured by a method prescribed by the manufacturer.

10.1.2. Complete Arrester Tests

10.1.2.1. The partial discharge must be measured at no less than 1.05 times MCOV.

10.1.2.2. The Watts Loss must be measured at no less than 1.05 times MCOV.

10.1.2.3. The arrester reference voltage must be verified for each arrester.

11. Quality Assurance

11.1. Any varistor or complete arrester that does not comply with the requirements of these specifications shall be rejected.