ARRESTERS

I. GENERAL:

The substation surge arrester requirements shall be specified and purchased with the substation structure purchases for the substation bus applications and with the transformer purchases for the transformer applications. Metal oxide varistor (MOV) type surge arresters shall be used for all arrester applications. Station class arresters shall be used in all applications except feeder take-off points, where intermediate type arresters shall be used.

JEA has standardized on polymer housings for surge arresters. The polymer housings provide an added safety factor not available with the porcelain housings. Generally, there are no structural strength requirements from the surge arrester. There may be locations where porcelain surge arresters are still in use. The Substation Engineering group shall be contacted to review the suitability of replacing with a polymer arrester.

II. INSTALLATION:

The surge arresters shall be connected directly to the substation bus with standard size cable used in that substation construction application. Standard 4-hole cable connectors shall be used to connect the cable to a 4-hole terminal pad at the top of the arrester. The arresters shall be solidly grounded with standard 7#5 copperweld ground conductor or 4/0 Cu. conductor which are connected to the substation ground grid system

Arresters are typically placed at the entrance point of all transmission lines, exit points of all feeders, and at the high voltage and low voltage sides of the substation transformers. The arresters are sized to provide the maximum voltage surge protection for the substation bus and equipment and still operate below the MCOV (maximum continuous operating voltage) of the arrester. Station class arresters are chosen for their high energy discharge capability to provide safe arrester operation within the substation environment.

III. APPLICATION NOTES:

1. 1/22/04: Polymer arresters are the standard and silicone is preferred over EPDM.

2. 4/19/04 (e-mail): On applications where we use double conductors to connect to the transformer, manufacturers were in agreement that there is no significant change in protection if you use a connector that only connects one conductor to the arrester.

3. 4/24/04: For transformer applications it is best to run a flyover and then tap down to the arresters. This will prevent large mechanical loads while only slightly decreasing protection.

4. 2/28/08: For incoming transmission lines and outgoing feeder lines it is acceptable to change out a single arrester at a time when one unit fails as long as the technology is the same. For example, if an arrester on one phase of a feeder fails, and it was a MOV then you can replace it with another MOV arrester and nothing more needs to be done. It is not a concern if the new unit is from a different manufacturer. If the non-failed units are silicon carbide then all three units should be replaced. For transformers we take a more conservative approach and whenever any unit fails all three should be replaced and all three should be from the same manufacturer.

TECHNICAL SPECIFICATIONS
SUBSTATIONSURGE ARRESTERS

1. GENERAL

1.1. All arresters covered by this specification shall be MOV (gapless metal oxide varistor) and shall conform to the latest edition of ANSI/IEEE Standard C62.11 for Metal-Oxide Surge Arresters and IEEE 62.22 application guide. Manufacturers shall have ISO9001 certification.

1.2. Arresters shall be of a single unit design. Grading rings shall be provided as recommended by the manufacturer.

1.3. The arrester housing shall be a flame resistant grey polymer with UV and anti-tracking inhibitors added for long-life.

1.4. Arresters shall also be mechanically strong enough to handle wind loads of 120 mph.

1.5. All arresters shall be designed to operate in an average ambient temperature of up to 104°F. They shall have a rated ultimate cantilever moment of 20,000 in-lbs and unless otherwise noted shall be suitable for vertical mounting.

1.6. All arresters shall have permanent marking (name plate) to indicate manufacturer's name, arrester type, duty cycle rating, MCOV, pressure relief current rating, catalog number, and the year of manufacture.

1.7. All arresters shall be station class with a minimum withstand fault current capability of 80kA. They shall have a minimum single shot energy discharge rating of 4.6kj/kV MCOV.

1.8. Arresters shall be equipped with a tin-platted 4-hole NEMA pad line terminal on the high side that will accommodate aluminum or copper conductor diameter sizes from .25 inches to 1.15 inches. The base of each arrester shall be equipped with a factory installed casting which provides a 10 inch diameter bolt circle and allows for .5" diameter bolts.

1.9. All arresters shall be suitable packaged to prevent damage during shipping and storage.

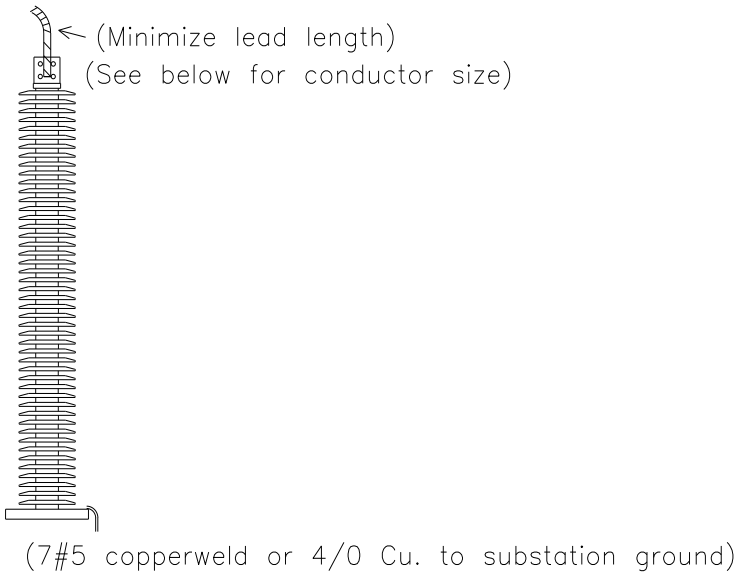
2. CHARACTERISTICS

All arresters must conform to the minimum requirements outlined below:

JEA ITEM ID ARRST	VOLTAGE RATING (kV)	NOMINAL SYSTEM VOLTAGE (kV)	MCOV (kV)	MINIMUM CREEPAGE DISTANCE INCHES	MAXIMUM SWITCHING SURGE (@500amps) (kV CREST)	MAXIMUM 0.5 µSEC DIS. VOLTAGE (kV CREST) *	MAX. DISCHARGE VOLTAGE (kV CREST USING A 8X20 µsec CURRENT WAVE	
							10 kA	20 kA
003	3	4	2.55	10	6.2	8.8	7.9	8.8
011	10	13.2	8.4	16	20.4	28.0	25.7	28.3
017	21	26.4	17	33	41.3	56.3	51.8	57.0
018	21	26.4	17	33	41.3	56.3	51.8	57.0
042	54	69	42	64	104.0	144.4	131.3	145.3
043	54	69	42	64	104.0	144.4	131.3	145.3
089	108	138	84	117	208.0	288.9	262.6	290.7
145	180	240	144	191	354.0	476.0	438.0	482

*Must use a 10kA impulse current wave which produces a voltage wave cresting in 0.5 µSEC.

3. **INSTALLATION / RESPONSIBILITIES:** Unless otherwise noted arresters shall be installed at the entrance point of all transmission lines, exit points of all feeders, and at the high and low voltage sides of substation power transformers. For substation bus applications, arresters shall be provided by the substation packager. For transformer applications they shall be provided by the transformer manufacturer. Stands shall be provided as necessary to limit the tap length. Install as shown below.



SYSTEM VOLTAGE	MIN. COND. SIZE		SYSTEM VOLTAGE	MIN. COND. SIZE
26 kV	1/0		138 kV	400 KCM
69 kV	4/0		230 kV	795 KCM

4. **APPROVED MANUFACTURER'S AND PRODUCT:**

4.1. ARRST003: 4.16KV CLASS; 3KV DUTY CYCLE; 2.55KV MCOV:
CPS UHAA003002A0845A11; GE 9L11XPA003S; OB 314003-3001;

4.2. ARRST011: 13.2KV CLASS; 10KV DUTY CYCLE; 8.4KV MCOV:
CPS UHAA010008A1045A11; GE 9L11XPA010S; OB 314009-3001;

4.3. ARRST017: 26.4KV CLASS; 21KV DUTY CYCLE; 17KV MCOV
ABB Q021SA017A; CPS UHAA021017A1845A11; GE 9L11XPA021S; OB 314017-3001;

4.4. ARRST018: UNDERHUNG 26.4KV CLASS; 21KV DUTY CYCLE; 17KV MCOV
OB 315017-3001; CPS UHAA02117A1845C11;

4.5. ARRST042: 69KV CLASS; 54KV DUTY CYCLE; 42KV MCOV
ABB Q054SA042AUH; OB EVP004210-3001; CPS UHAA054042A3045A11 ; GE 9L11XPA054S;

4.6. ARRST043: UNDERHUNG 69KV CLASS; 54KV DUTY CYCLE; 42KV MCOV
ABB Q054SA042AUH; OB EVP204210-3001; CPS UHAA054042A3045C11 ;

4.7. ARRST089: 138KV CLASS; 108KV DUTY CYCLE; 84KV MCOV:
ABB Q108SA084A; CPS UHAA108084A6045A11; GE 9L11XPA108S; OB EVP008410-3001;

4.8. ARRST145: 230KV CLASS; 180KV DUTY CYCLE; 144KV MCOV:
ABB Q180SA144B; CPS USAA180144A8645A11; OB 314144-3001;