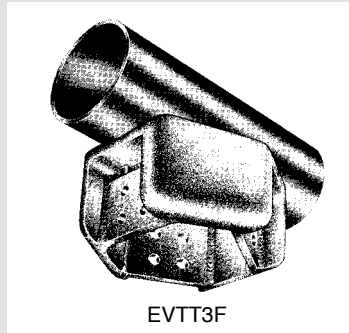


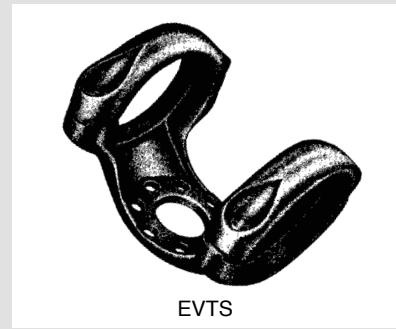
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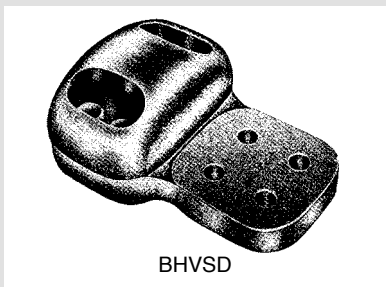
WLI-90



EVTT3F



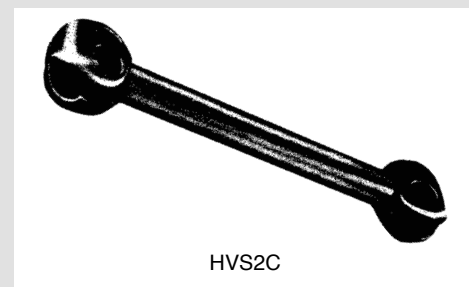
EVTS



BHVSD



HVTEB



HVS2C

ALPHABETICAL INDEX

Type	Page	Type	Page	Type	Page
21	32	EVT3F-D	17	HVSTT	18
22	31	EVTBCC	29	HVT2S	55
AFGS	73	EVTCTF	28	HVTBCC	29
BHVSD	57	EVTEB	67	HVTEB	67
BHVSF	56	EVTGS	69	HVTTF	27
CCL-EHV	6	EVTS	37	HVTTT	25
CCLS-EHV	7	EVTT2F	36	HVWETT	21
EVBCF	45	EVTT3F	35	HVWTEB	68
EV BETSH	54	EVTTF	27	UVS4C	78
EVDCH	41	EVTTT	25	W2CF-EHV	12
EVDCS	39	EVVBS	46	WCF-EHV	11
EVEDST	63	EVWETT	21	WCI	22
EVEDST-90	65	EVWTEB	68	WEPE	71
EVEF-D	84	EVWTF	34	WLI-45-EHV	20
EVETF	15	EVWTGSR	74	WLI-90-EHV	20
EVETS	49	HV2CF	5	WSTFE-EHV	8
EVHS	82	HVBETS	54	WST2F-EHV	10
EVIS	53	HVCF-EHV	4	WSTFX-EHV	9
EVKES	48	HVCGS	70	WTH-EHV	43
EVKET	14	HVCS	38	WTTFR	33
EVLCF	4	HVDCH	41	WUR-EHV	44
EVPC	81	HVDCS	39	WURE-EHV	42
EVS2C	75	HVEDST	63		
EVS2CT	79	HVEDST-90	65	Die-Reference Charts:	
EVS3C	77	HVETF	15	CC-4872	85
EVSF2	59	HVETS	49	C-13282	86
EVSF3	60	HVHS-90D	83		
EVSF3B	61	HVPC	81	Installation Charts:	
EVSF4	62	HVRTE	13	DC-6536	90
EVSP	72	HVRTS	47	DC-6750	88
EVSTF	3	HVS2C	75	DC-6788	91
EVST2F	24	HVS2CT	79	DC-6790	92
EVST3F	23	HVSCCS	51	DC-9295	87
EVSTT	18	HVSEES	52	DC-11852	89
EVT2F-D	17	HVSF	58	DC-11853	88
EVT2S	55	HVSTF	3		

EXTRA HIGH VOLTAGE SUBSTATION CONNECTORS

We have been actively engaged in the design, development and production of substation power connectors for Extra High Voltage (EHV) applications since 1957. The experience gained through research and development in designing substation connectors for use at low voltage levels helped in planning ahead for the EHV era.

The use of Extra High Voltage has evolved as an economic necessity rather than a glamorous alternate. With large generating stations being located at fuel availability points in remote areas, plus the requirement for utility interconnections, the need is increasing to transfer larger and larger blocks of power over greater distances.

Extra High Voltage was and is necessary; however, existing designs of equipment and connectors had to be altered to handle the higher voltages. EHV connectors must operate free of corona and maintain the mechanical strength and current transfer capabilities required of other power connectors.

As an established leader in the Extra High Voltage substation connector market, we were one of the 345 KV connector pioneers and the first manufacturer to supply connectors for 500 and 765 KV substations. And, a major percentage of the EHV connectors in service today were designed and supplied by us. Our continuing efforts have aided the electrical industry in the development of design standards and performance criteria for these connectors.

Our goals coincide with those of the electric utility industry...to provide an ever improving product at the lowest possible price.

Nature of Corona and RIV

Corona is the primary element which must be considered and controlled when designing connectors for Extra High Voltage applications. Corona is a result of a condition where the electrostatic flux density in the air exceeds a critical value near an adjacent metal surface. Air and other vapors in this area become ionized and serve as a conductor of electricity. When the voltage is increased, a brush discharge takes place, until the whole thickness of the dielectric layer is broken down and disruptive discharges (sparks) jump from electrode to electrode. Corona involves power loss, radio noise and can have an injurious effect on fibrous insulation. Sharp edges, bubbles, nonhomogeneous insulation, etc., aggravate this condition.

Positive corona can be seen as a plume and is the principal source of radio influence voltage (RIV). Negative corona is seen as a glow and has no significant radio influence. EHV connectors must be free of audible and visible corona at the rated line voltage plus ten percent. At these voltage levels the RIV level should not exceed 200 microvolts.

Design Criteria

The design of Extra High Voltage connectors and fittings must meet critical field gradient configurations in conjunction with the mechanical and/or electrical load carrying requirements. Failure to meet this prerequisite can result in unacceptable visible or audible corona.

We control corona on substation connectors by providing recessed hardware, generous mass and radii, high quality surface finish, and shielding rings. Any or all of these designs could be used in any given application requirement.

All Extra High Voltage components are manufactured within our facilities, utilizing proven production techniques. These procedures plus final assembly, inspection and packaging, are geared to preserve quality and acceptable connector performance.

As a result of our design efforts, testing and experience, EHV connectors and connector assemblies are free of audible and visible brush type corona at voltages ten percent above rated system operating voltages.

Years of experience in the EHV substation connector field has indicated it is most advantageous to the purchaser to obtain all EHV substation connectors for a single station from one manufacturer. This not only provides design and manufacturing integrity through all the connectors, it also provides unit responsibility. This single source minimizes the amount of effort on the part of the customer and should any questions arise during construction or subsequent operation, experienced factory personnel are available to assist in resolving questions concerning our connectors.

Various standards, test and experience in the EHV field indicates there are minimum conductor sizes which should be considered in the design of 345 KV and 500 KV substations. Tubing smaller than 1 1/2" IPS or cable less than 1.76 inch diameter should be bundled for 345 KV application. Conductors smaller than 2 1/2" IPS or 2.50 inch cable diameter should be bundled for 500 KV application.

Based on extensive laboratory testing and many years of experience, we can recommend the most efficient connector and conductor system to meet your requirements.

EHV SUBSTATION CONNECTORS- Continued

Radio Influence Voltage (R.I.V.) and Corona Testing

Corona observations are made in a darkened laboratory using binoculars. A voltage is impressed upon test specimens to cause sufficiently violent corona discharge to identify areas of high electrical stress. Corona observations are made and recorded as the impressed voltage is decreased in small increments. Observers also monitor the absence or presence of audible corona.

All of our basic designs have been tested for satisfactory corona free performance and have consistently performed above the minimum acceptable limits currently specified by every utility and consultant with whom we have worked. Without exception, all material which we propose to furnish is capable of corona free performance within normal R.I.V. limits at specified voltages.

Conclusion

We have frequently been called upon to custom design for special applications at various voltages. Many customers have found that our catalog listing is only a small segment of the vast collection of connectors and fittings which we have produced for utilities across the country. We have the production capability for producing to customer specifications and the design knowledge and experience to make sound recommendations for connector application.

Our capabilities have been proven by the outstanding field performance record enjoyed to date and we are justifiably proud of this record. We sincerely appreciate your interest in our Extra High Voltage connectors and will welcome the opportunity to provide further information in any area in which questions may arise.