

Manufacturing Quality Plan - Capacitive Voltage Transformers up to 420kV

Manufacturer's Logo		Manufacturer Name and Address		Customer Details		Item :	QP No.:							
				Bihar State power transmission company Ltd.		CAPACITIVE VOLTAGE TRANSFORMER Upto 420kV	Rev. No. :							
							Date :							
Sl. No	Components / Operations	Characteristics checked	Type/ Method of check	Extent of check	Reference document & acceptance norms	Format of Record	Scope of inspection			Remarks				
							P	R	W					
2	ROUTINE TESTS ON EMU	c) Partial Discharge Test	Electrical	100%	prestress voltage @ 80% of PF Voltage (1 min). Test voltage at $U_m \& 1.2 U_m/\sqrt{3}$ corresponding values of PD should be $< 10 \text{ pC} \& < 5 \text{ pC}$	Routine Test Certificate (RTC)	O	O/C	C	CIP on the 10% of the offered lot (As the selected samples are already tested by Equipment Manufacturer before offering for inspection. the retesting shall be done at 80% of power frequency voltage as per IEC 60044 - 5)				
		d) Capacitance & loss Angle measurement after HV test at rated voltage	Electrical		Rated Voltage Variation of $\tan\delta < 0.001$ (max) Variation of capacitance value not more than 1 capacitor element		O	O/C	C					
		e) Power Frequency withstand Test on NHF terminal	Electrical		IEC 60044-5		O	O/C	C					
3	ROUTINE TESTS ON COMPLETE CVT	a) P.F. Test on Primary windings of EMU *	Electrical	100%	IEC 60044-5	Routine Test Certificate (RTC)	O	O/C	C					
		b) P.F. Test on secondary windings of EMU between LV - LV - E *	Electrical		IEC 60044-5		O	O/C	C					
D	PACKING & DISPATCH	a) Measurement of ratio & Phase angle errors verification of terminal marking & polarity	Electrical	100%	IEC 60044-5	Routine Test Certificate (RTC)	O	O/C	C					
		a) Verification of Completeness of all stages as appearing in MOP & finishing	Physical	100%		Packing Instructions	-	O	-					
		b) Check for packing	Physical	As required		No record	-	O	-					
Legends														
P - Perform		S - Supplier												
R - Review		O - Organisation												
W - Witness		C - Customer												
Prepared By:- Quality					Testing					Verified By:- Research & Development				

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A RAW MATERIAL INSPECTION										
1	Synthetic Oil	a) Appearance b) Coloration c) I poxydo equivalent d) Ethyl Vaniline e) water content f) Tan delta	Chemical Chemical Chemical Chemical Chemical Chemical	One sample/batch One sample/batch One sample/batch One sample/batch One sample/batch One sample/batch	Siemens Spec.	Component Mfr's TC Component Mfr's TC Component Mfr's TC Component Mfr's TC Component Mfr's TC Component Mfr's TC	S S S S S S	O O O O O O	- - - - - -	
2	Aluminium Foil	a) Visual b) Purity c) Thickness d) Tensile strength e) Elongation	Physical Chemical Physical Mechanical Mechanical	One sample/batch One sample/batch One sample/batch One sample/batch One sample/batch	Siemens Specs	Component Mfr's TC Component Mfr's TC Component Mfr's TC Component Mfr's TC Component Mfr's TC	S S S S S	O O O O O	- - - - -	
3	Capacitor Paper	a) Visual b) Thickness c) Density d) Ash content e) pH value f) Chloride content g) Dielectric strength	Physical Physical Chemical Chemical Chemical Chemical Electrical	One sample/batch One sample/batch One sample/batch One sample/batch One sample/batch One sample/batch One sample/batch	Siemens Specs	Component Mfr's TC Component Mfr's TC Component Mfr's TC Component Mfr's TC Component Mfr's TC Component Mfr's TC Component Mfr's TC	S S S S S S S	O O O O O O O	- - - - - - -	
4	Bellow	a) Visual b) Chemical analysis c) Leak test	Physical Chemical Mechanical	One sample/batch One sample/batch 100%	Siemens drawing	Component Mfr's TC Component Mfr's TC Component Mfr's TC	S S S	O O O	- - -	
5	Porcelain Insulators	a) Visual b) Dimensions & creepage c) Temperature cycle test	Physical Physical Thermal	100% Two samples/lot One sample/lot	Siemens Drawing & IEC 62155	Component Mfr's TC Component Mfr's TC Component Mfr's TC	S S S	O O O	- - -	

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							P	R	W	
		d) Electrical test	Electrical	100%		Component Mfr's TC	S	0	-	
6	Aluminium castings	a) Dimension	Physical	As per sampling plan	Siemens CQP & Drg	Component Mfr's TC	S	0	-	
		b) chemical analysis	Chemical	One sample/batch		Component Mfr's TC	S	0	-	
		c) mechanical analysis	Mechanical	One sample/batch		Component Mfr's TC	S	0	-	
		d) Air leak test (If specified by Siemens Drg)	Mechanical	100%		Component Mfr's TC	S	0	-	
7	Tap carrier bushing	a) Dimension	Mechanical	As per sampling plan	Siemens CQP & Drg	Component Mfr's TC	S	0	-	
		b) High voltage test 50kV for 1 min	Electrical	100%		Component Mfr's TC	S	0	-	
		c) Partial discharge free at 25 kv	Electrical	100%		Component Mfr's TC	S	0	-	
		d) Air leak test	Mechanical	100%		Component Mfr's TC	S	0	-	
8	Mineral oil	a) Appearance	Physical	one sample / Batch	Siemens Specification	Component Mfr's TC	S	0	-	
		b) Colour	Visual			Component Mfr's TC	S	0	-	
		c) Density	Chemical			Component Mfr's TC	S	0	-	
		d) Flash point	Chemical			Component Mfr's TC	S	0	-	
		e) Breakdown voltage	Electrical			Component Mfr's TC	S	0	-	
		f) Dissipation factor	Chemical			Component Mfr's TC	S	0	-	
9	IVT	a) Ratio	Electrical	100%	Siemens II / Specifications	Component Mfr's TC	S	0	-	
		b) Resistance	Electrical	100%		Component Mfr's TC	S	0	-	
10	Reactor	a) Gap setting	Electrical	as per sampling plan	Siemens II / Specifications	Component Mfr's TC	S	0	-	
11	Multi lead bushing	a) Dimensions	Physical	As per sampling plan	Siemens CQP & Drg	Component Mfr's TC	S	0	-	
		b) High voltage test at 5 kV	Electrical	100%		Component Mfr's TC	S	0	-	
		c) Air leak test	Mechanical	100%		Component Mfr's TC	S	0	-	
12	O rings & Gaskets	a) Dimensions	Physical	One sample/batch	Siemens specification	Component Mfr's CR	S	0	-	CR-compliance report

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		b) Density	Mechanical	One sample/batch		Component Mr's CR	S	O	-	
		c) Tensile strength	Mechanical	One sample/batch		Component Mr's CR	S	O	-	
		d) Shore hardness	Mechanical	One sample/batch		Component Mr's CR	S	O	-	
		e) Elongation	Mechanical	One sample/batch		Component Mr's CR	S	O	-	
B	<u>INPROCESS INSPECTION</u>									
1	Capacitor Winding	a) DC HV test b) Element length	Electrical Physical	100% one sample / batch	Siemens specs Siemens specs	Siemens Record Siemens Record	O	-	-	
2	Capacitor assembly	a) Visual b) Capacitance measurement	Visual Electrical	Random	Siemens II	Control Card	O	-	-	
3	Treated synthetic oil for capacitor divider	a) BDV [min] b) Tan Delta at 90°C (max)	Electrical Electrical	One sample / lot One sample / lot	IEC-296-1986C1 -2 / 50kV IEC-296-1986C1 -2 / 0.005	Siemens Record Siemens Record	O	-	-	
4	Oven cycle & oil filling for capacitor divider	a) Temperature of Oven charge b) Vacuum c) Sealing Test	Physical Physical Physical	Per cycle Per cycle Per cycle	ET HP IN AW MI G WI 01 CVT - OV	Siemens Record Siemens Record Siemens Record	O	-	-	
5	Treated mineral oil for EMU	a) BDV	Electrical	One sample / lot	IEC-296-1986C1 -2 / 50kV	Expt. Mr's Log Book	O	-	-	
6	Oven cycle & oil filling for EMU	a) Temperature of Oven charge b) Vacuum	Physical Physical	Per cycle Per cycle	ET HP IN AW MI G WI 01 BB - OV	Siemens Record Siemens Record	O	-	-	
C	<u>FINAL ACCEPTANCE & TESTING</u>									
1	ROUTINE TEST ON CAPACITOR VOLTAGE DIVIDER	a) Capacitance & Loss Angle measurement before voltage tests at rated voltage b) Power Frequency withstand test for one minute "	Electrical Electrical		IEC 60044-5 IEC 60044-5		O	O/C	C	