

**Manufacturing Quality Plan - Capacitive Voltage Transformers up to 420kV**

		Manufacturer Name and Address		Customer Details		Item :	QP No: IT/QA/MQP/CVT-31			
				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	
<b>A RAW MATERIAL INSPECTION</b>										
1	<b>Synthetic Oil</b>	a) Appearance b) Coloration c) Epoxyde 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	<b>Aluminium Foil</b>	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	<b>Capacitor Paper</b>	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	<b>Bellow</b>	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	<b>Porcelain Insulators</b>	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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		SIEMENS LIMITED, ET HP Instrument Transformers, E-76, WALUJ MIDC, AURANGABAD - 431136. Maharashtra		Bihar State power transmission company Ltd.		CAPACITIVE VOLTAGE TRANSFORMER Upto 420kV	Rev. No. : Date :			
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		d) Electrical test	Electrical	100%		Component Mfr's TC	S	O	-	
6	Aluminium castings	a) Dimension	Physical	As per sampling plan	Siemens CQP & Drg	Component Mfr's TC	S	O	-	
		b) chemical analysis	Chemical	One sample/batch		Component Mfr's TC	S	O	-	
		c) mechanical analysis	Mechanical	One sample/batch		Component Mfr's TC	S	O	-	
		d) Air leak test (If specified by Siemens Drg)	Mechanical	100%		Component Mfr's TC	S	O	-	
7	Tap carrier bushing	a) Dimension	Mechanical	As per sampling plan	Siemens CQP & Drg	Component Mfr's TC	S	O	-	
		b) High voltage test 50kV for 1 min	Electrical	100%		Component Mfr's TC	S	O	-	
		c) Partial discharge free at 25 kv	Electrical	100%		Component Mfr's TC	S	O	-	
		d) Air leak test	Mechanical	100%		Component Mfr's TC	S	O	-	
8	Mineral oil	a) Appearance	Physical	one sample / Batch	Siemens Specification	Component Mfr's TC	S	O	-	
		b) Colour	Visual			Component Mfr's TC	S	O	-	
		c) Density	Chemical			Component Mfr's TC	S	O	-	
		d) Flash point	Chemical			Component Mfr's TC	S	O	-	
		e) Breakdown voltage	Electrical			Component Mfr's TC	S	O	-	
		f) Dissipation factor	Chemical			Component Mfr's TC	S	O	-	
9	IVT	a) Ratio	Electrical	100%	Siemens TI / Specifications	Component Mfr's TC	S	O	-	
		b) Resistance	Electrical	100%		Component Mfr's TC	S	O	-	
10	Reactor	a) Gap setting	Electrical	as per sampling plan	Siemens TI / Specifications	Component Mfr's TC	S	O	-	
11	Multi lead bushing	a) Dimensions	Physical	As per sampling plan	Siemens CQP & Drg	Component Mfr's TC	S	O	-	
		b) High voltage test at 5 kV	Electrical	100%		Component Mfr's TC	S	O	-	
		c) Air leak test	Mechanical	100%		Component Mfr's TC	S	O	-	
12	O rings & Gaskets	a) Dimensions	Physical	One sample/batch	Siemens specification	Component Mfr's CR	S	O	-	CR-compliance report



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		b) Density	Mechanical	One sample/batch		Component Mfr's CR	S	O	-	
		c) Tensile strength	Mechanical	One sample/batch		Component Mfr's CR	S	O	-	
		d) Shore hardness	Mechanical	One sample/batch		Component Mfr's CR	S	O	-	
		e) Elongation	Mechanical	One sample/batch		Component Mfr's CR	S	O	-	
<b>B</b>	<b><u>INPROCESS INSPECTION</u></b>									
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 TI	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-296-1986CL-2 / 60kV IEC-296-1986CL-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 MFG WI 01 CVT - OV	Siemens Record Siemens Record Siemens Record	O	-	-	
5	Treated mineral oil for EMU	a) BDV	Electrical	One sample / lot	IEC-296-1986CL-2 / 60kV	Eqpt. Mfr'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 MFG WI 01 BB - OV	Siemens Record Siemens Record	O	-	-	
<b>C</b>	<b><u>FINAL ACCEPTANCE &amp; TESTING</u></b>									
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	

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		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	
2	ROUTINE TESTS ON EMU	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	
3	ROUTINE TESTS ON COMPLETE CVT	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	
D	PACKING & DISPATCH	a) Verification of Completeness of all stages as appearing in MQP & finishing	Physical	100%		Packing Instructions	-	O	-	
		b) Check for packing	Physical	As required		No record	-	O	-	
<b>Legends</b> P Perform R Review W Witness S - Supplier O - Organisation C- Customer										
Prepared By:- Quality Testing					Verified By:- Research & Development					