



BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

MANUFACTURING QUALITY PLAN -- upto 400 kV CVT

		Vendor Code	Item	M.Q.P. No. 015	Rev 00
			Upto 400 kV CVT	Date :02.01.2016	Valid From : 15.01.2016
					Valid Upto : Till Revision
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MANUFACTURING QUALITY PLAN (MQP)

PRODUCT : upto 400 kV CVT

CUSTOMER : BIHAR STATE POWER TRANSMISSION COMPANY LIMITED



BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

MANUFACTURING QUALITY PLAN -- upto 400 kV CVT

				Vendor Code	Item	M.Q.P. No. 015		Rev 00
					Upto 400 kV CVT	Date : 02.01.2016		Valid From : 15.01.2016
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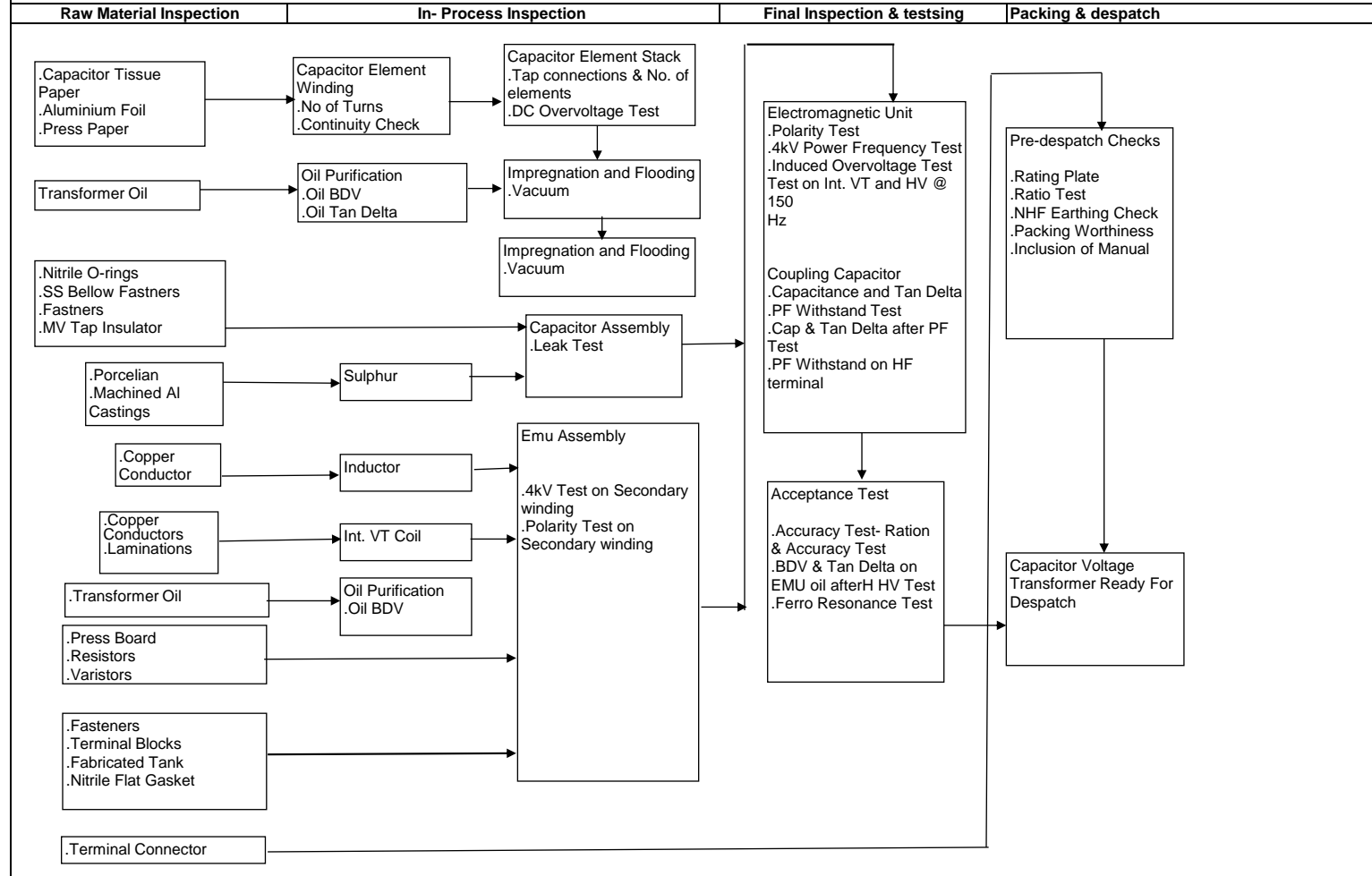
BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

MANUFACTURING QUALITY PLAN -- upto 400 kV CVT

Crompton Greaves Ltd.,	Vendor Code	Item :	M.Q.P. No. 015	Rev 00
Switchgear Complex, A-3, MIDC, Ambad, Nashik - 422 010.		Upto 400 kV CVT	Date : 02.01.2016	Valid From : 15.01.2016
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PROCESS FLOW MAP OF CVT





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NOTES						
Sl. No.	Description					
1	The MQP should read in conjunction with BSPTCL specification and shall deem to include additional tests, if any, required as per the contract.					
2	BSPTCL specifications shall include provisions of letter of Award, BSPTCL approved drawings / technical data sheet / BOM / test schedule / test procedure applicable to the specific contract.					
3	In case of any contradiction between the manufacturer's plant standards, this MQP and BSPTCL specifications following precedence shall be followed:					
a	BSPTCL specifications.					
b	This manufacturing Quality Plan.					
c	Manufacturer's plant standards.					
4	It is responsibility of the manufacture to ensure that this document is readily available at their works, as well as, at the works of their sub vendors in order to avoid any delay, at the time of inspection.					
5	The manufacturer shall ensure that their, as well as their sub vendors control, metering & testing instruments are duly calibrated and should have calibration certificates traceable to Indian / International standards. Calibration records should be available during inspection by BSPTCL. Key testing instruments will be calibrated only by NABL accredited / International laboratories.					
6	In case of any tests carried out at third party lab, such lab / facility should be NABL accredited / accepted by BSPTCL.					
7	Witnessing of Acceptance test by BSPTCL shall be on 10% of the number of samples for acceptance test. The contractor or Equipment Manufacturer will inform in advance the serial numbers					
8	EM should submit their annual Quality Audit report to BSPTCL of the manufacturers of Insulators.					
9	The manufacturer shall maintain the proper co-relation of test certificates from raw material stage to finished product stage and records should be available during inspection by BSPTCL.					
10	Manufacturer shall show the approval of BSPTCL engineering for all contract specific type tests, including specific type tests if any as per the BSPTCL specifications at the time of final inspection.					
11	All packing cases should be marked with BSPTCL LOA details, name of project, item description and CIP / MICC number (by which material has been cleared for despatch).					
12	One copy of the test report, CIP / MICC shall also be sent along with consignment.					
13	Inspection of spare items ordered by BSPTCL shall also be governed by the provisions of this MQP. Items if not governed under MQP shall be offered for inspection as per BSPTCL specifications / Relevant-Indian / International specifications.					
14	Any material rejected during BSPTCL inspection shall be disposed off with the approval of BSPTCL. For destructive disposal BSPTCL may depute it's representative for witnessing. In case the material is to be returned to sub-vendor, all such items shall be indelibly marked (to prevent mixing) at the works of the manufacturer and offered to BSPTCL inspector for verification of marking.					
15	The manufacturer shall align their Quality System and that of their sub-vendors to the requirements of latest ISO 9000 Quality standards in a time bound manner.					



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Code 1 : Indicates place where testing is planned to be performed i.e Inspection location.		Code 4 : Review of Test Reports/Certificates		
		W	By Manufacturer during raw material / bought out component inspection	
A	At Equipment Manufacturer's works	X	By Contractor during product/process inspection	
B	At Component Manufacturer's works	Y	By BSPTCL during product/process inspection	
C	At Authorised Distributer's place	Z	By Contractor and/or BSPTCL during product/process inspection	
D	At Independent Lab			
E	At Turn Key Contractor's location			
F	Not specified			
Code 2 : Indicates who has to perform the tests i.e. Testing Agency.		Code 5 : Whether specific approval of sub-vendor / component make is envisaged?		
J	The Equipment Manufacturer	E	Envisaged	
K	The Component Manufacturer	N	Not Envisaged	
L	The Third Party			
M	The Turnkey Contractor			
Code 3 : Indicates who shall witness the tests i.e. Witnessing Agency.		Code 6 : Whether test records required to be submitted after Final Inspection for issuance of CIP / MICC.		
P	Component Manufacturer itself	Y	Yes	
Q	Component Manufacturer and Equipment Manufacturer	N	No	
R	Component Manufacturer, Equipment Manufacturer and Contractor			
S	Equipment Manufacturer itself			
T	Equipment Manufacturer and Contractor			
U	Equipment Manufacturer, Contractor and BSPTCL			
V	Third Party itself			



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S.N	Components / Operations & Description of Test	Type of Check	Quantam of Check / Sampling with basis	Reference Document for Testing	Acceptance Norms	Format of Record	Applicable Codes						Remarks
							1	2	3	4	5	6	
A)	Raw Material Inspection												
A1	<u>CAPACITOR TISSUE PAPER</u>												
	15 micron												
	a) Visual check	Visual	One sample per lot	EM Specn	EM Specn	EM Record : QR-05	A	J	S	W	E	N	Review of CMTC/EMTC during BSPTCL final inspection
	b) Thickness	Mechanical	One sample per lot	EM Specn	EM Specn	CMTC EM Record : QR-05	B	K	P	W		N	
	c) Width(as per order)	Mechanical	One sample per lot	EM Specn	EM Specn	EM Record : QR-05	A	J	S	W		N	
	d) Ash content	Chemical	One sample per lot Once a year	EM Specn	EM Specn	CMTC	B	K	P	W		N	
	e) Ph value of Aqueous extract.	Chemical	One sample per lot Once a year	EM Specn	EM Specn	CMTC	B	K	P	W		N	
	f) Conductivity of Aqueous extract (Max)	Electrical	One sample per lot Once a year	EM Specn	EM Specn	CMTC	B	K	P	W		N	
	g) Dielectric Strength of dry capacitor paper	Electrical	One sample (set of 10) Once a year	EM Specn	EM Specn	CMTC	B	K	P	W		N	



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							1	2	3	4	5	6	
A2	ALUMINUM FOIL												
	a) Visual Check	Visual	100%	EM Specn	EM Specn	EM Record : QR-06	A	J	S	W	E	N	Review of CMTC/EMTC during BSPTCL final inspection
	b) Thickness	Mechanical	One sample per lot	EM Specn	EM Specn	CMTC EM Record : QR-06	B	K	P	W		N	
	c) Width (as per order)	Mechanical	One sample per lot	EM Specn	EM Specn	EM Record : QR-06	A	J	S	W		N	
	d) Composition	Chemical	One sample per lot	EM Specn	EM Specn	CMTC	B	K	P	W		N	
	e) Elongation	Mechanical	One sample per lot	EM Specn	EM Specn	CMTC	B	K	P	W		N	
f) Tensile strength	Mechanical	One sample per lot	EM Specn	EM Specn	CMTC	B	K	P	W		N		
A3	ALUMINIUM CASTINGS (Biannual check at Third party lab for chemical composition in sample selected at EM works)										E		Review of CMTC/EMTC during BSPTCL final inspection
	a) Dimensions	Mechanical	100%	EM Specn	EM drg	CMTC	B	K	P	W		N	
	b) Finish	Visual	100%	EM Specn	EM drg	CMTC	B	K	P	W		N	



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							1	2	3	4	5	6	
A4 A5	c) Composition (LM 9 or LM 25)	Chemical	One sample per lot	EM Specn	EM Specn	CMTC	B	K	P	W		N	Review of CMTC/EMTC during BSPTCL final inspection
	d) Hardness Test	Mechanical	One sample per lot	EM Specn EM drg	EM Specn	CMTC	B	K	P	W		N	
	e) Leak testing (Wherever applicable)	Pneumatic	100%	2.5 kg/cm sq in water	Casting should not leak.	CMTC	B	K	P	W		N	
	<u>PORTLAND CEMENT</u> a) Compressive Strength	Mechanical	One sample per batch	EM Specn	200 Kg/sq.cm (Min.) after 48hrs	EMTC	A	J	S	W	N	N	
	<u>STAINLESS ST. BELLOW</u> a) Visual & Dimension	Visual	100%	EM Drg. EM Specn.	EM Drg. EM Specn.	CMTC	B	K	P	W	E	N	
	b) Leak Test	Pneumatic	100%	EM Specn.	EM Specn.	CMTC	B	K	P	W		N	
	c) Chemical Composition	Chemical	One Sample per lot	EM Specn	EM Specn	CMTC	B	K	P	W		N	
d) Duty Cycle Test	Mechanical	One Sample per design	EM Specn.	EM Specn.	CMTC	B	K	P	W		N		



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							1	2	3	4	5	6	
A6	e) Sealing Surface Finish	Visual	One sample per lot	EM Specn.	EM Specn.	CMTC	B	K	P	W		N	Review of CMTC/EMTC during BSPTCL final inspection
	f) Rupturing & Springing test	Mechanical	One sample per lot of 20	EM Specn	EM Specn	CMTC	B	K	P	W		N	
	<u>PORCELAIN HOUSING</u>												
	a) Dimensions	Mechanical	100%	EM approved vendor drg	EM approved vendor drg	CMTC	B	K	P	W		N	
	b) Visual Inspection (Surface defects)	Visual	100%	IS :5621	IS :5621	CMTC	B	K	P	W		N	
	c) Electrical routine tests	Electrical	100%	IS :5621 35 KV (min.)	IS :5621 35 KV (min.)	CMTC	B	K	P	W		N	
	d) Porosity test	Mechanical	One sample per lot	IS :5621	IS :5621	CMTC	B	K	P	W		N	
	e) Temperature Cycle Test	Electrical	One Sample per lot	IS : 5621	IS : 5621	CMTC	B	K	P	W		N	
	f) Creepage distance , Parallelity	Mechanical	One Sample per lot	EM Drg	EM Drg	CMTC	B	K	P	W		N	
g) Finish of Sealing	Mechanical	100%	EM drg.	EM drg.	CMTC	B	K	P	W		N		



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							1	2	3	4	5	6			
A12	a) Dimensions	Physical	100%	EM drg.	EM drg.	CMTC	B	K	P	W	E	N			
	b) Leak Test	Pneumatic	100%	EM Drg	Tank should not leak.	CMTC	B	K	P	W		N			
	c) Test fo HDG (As per contract) c-1) Coating thickness of HDG/Paint	Chemical	One Sample per lot	EM Drg	EM Drg	CMTC	B	K	P	W		N			
	<u>O RINGS/ GASKETS</u>										E				
	a) Finish	Visual			EM Specn	EM Specn	CMTC	B	K	P	W			N	
	b) Shore Hardness	Mechanical			EM Specn	EM Specn	CMTC	B	K	P	W			N	Review of CMTC/EMTC during BSPTCL final inspection
	c) Dimensions	Mechanical			EM Specn	EM Specn	CMTC	B	K	P	W			N	
	d) Heat Ageing Test	Thermal			EM Specn	EM Specn	CMTC	B	K	P	W			N	
e) Compression Set	Mechanical			EM Specn	EM Specn	CMTC	B	K	P	W		N			



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							1	2	3	4	5	6	
	f) Elongation	Mechanical		EM Specn	EM Specn	CMTC	B	K	P	W		N	Review of CMTC/EMTC during BSPTCL final inspection
	g) Tensile Strength	Mechanical		EM Specn	EM Specn	CMTC	B	K	P	W		N	
A13	Transformer oil											E	
a	Appearance	Visual	One sample per lot	EM Spec. / IEC60296	EM Specn/ IS:335 IEC60296	CMTC	B	K	P	W		N	
b	Density at 20°C (g/cc) (Max.)	Physical	One sample per lot	EM Specn/ IS:335 IEC60296	EM Specn / IS:335 IEC60296	CMTC	B	K	P	W		N	
c	Viscosity CST at 27°C, at 40°C and at -15°C	Physical	One sample per lot	EM Specn/ IS:335 IEC60296	EM Specn/ IS:335 IEC60296	CMTC	B	K	P	W		N	
d	Interfacial tension at 27°C (Min.)	Physical	One sample per lot	EM Specn/ IS:335 IEC60296	EM Specn/ IS:335 IEC60296	CMTC	B	K	P	W		N	
e	Flash Point (Min.)	Chemical	One sample per lot	EM Specn/ IS:335 IEC60296	EM Specn/ IS:335 IEC60296	CMTC	B	K	P	W		N	
f	Pour Point (Max.)	Physical	One sample per lot	EM Spec. /IS:335 IEC60296	EM Specn/ IS:335 IEC60296	CMTC	B	K	P	W		N	
g	Neutralization Value (Max.)		One sample per lot	EM Spec. No./ IS:335 IEC60296	EM Specn/ IS:335 IEC60296	CMTC	B	K	P	W		N	
h	Corrosive Sulphur	Chemical	One sample per lot	EM Specn/ IS:335 IEC60296	EM Specn/ IS:335 IEC60296	CMTC	B	K	P	W		N	
i	Electric Strength (Min.) BDV	Electrical	One sample per lot	EM Spec. /IS:335 IEC60296	EM Spec. / IS:335 IEC60296	CMTC	B	K	P	W		N	



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							1	2	3	4	5	6	
j	i) Dielectric Dissipation Factor at 100°C	Electrical	One sample per batch	EM Spec. No.S1-MS 003 IS:335 IEC60296	EM Spec. No.S1-MS 003 IS:335 IEC60296	CMTC	B	K	P	W		N	
	ii) Change in tan delta at 100°C after 2 hrs.			EM Spec. No.S1-MS 003 IS:335 IEC60296	EM Spec. No.S1-MS 003 IS:335 IEC60296	CMTC	B	K	P	W		N	
k	Specific Resistance			EM SpecnS1-MS 003 / IEC 60296	EM SpecnS1-MS 003 / IEC 60296	CMTC	B	K	P	W		N	
l	Oil Characteristics after oxidation Stability test (164 hrs. at 100°C)	Chemical		EM SpecnS1-MS 003 / IEC 60296	EM SpecnS1-MS 003 / IEC 60296	CMTC	B	K	P	W		N	
	i) Neutralisation												
	ii) Total sludge												
	ii) Tan delta at 90°C Max.												
	iv) IFT N/M Min.												
m	Oil Characteristics after accelerated Ageing			EM Specn/ IEC 60296	EM Specn / IEC 60296	CMTC	B	K	P	W		N	
	i) Tan Delta at 90°C	Electrical											
	ii) Neutralisation Value												
	iii) Sludge content	Physical											
	iv) Specific Resistance at 27°C	Electrical											
	iv) Specific Resistance at 90°C	Electrical											
n	Presence of Oxidation Inhibitor	Physical		EM Specn / IEC 60296	EM Specn / IEC 60296	CMTC	B	K	P	W		N	
o	Water Content of Untreated & Unfiltered Oil	Chemical		EM Specn / IEC 60296	EM Specn / IEC 60296	CMTC	B	K	P	W		N	
A14	Synthetic Oil a) Moisture content	Physical	1 sample/Lot	N A	≤ 100 ppm	CMTC	B	K	P	W	E	N	



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							1	2	3	4	5	6	
A15	b) Tandelta	Electrical	1 sample/Lot	N A	≤ 0.004	CMTC	B	K	P	W		N	
	<u>COPPER CONDUCTOR</u>												
	a) Dimensions	Physical	10% of bobbin / supply lot	EM Specn. / IS : 13730 - 34	EM Specn. / IS : 13730 - 34	CMTC	B	K	P	W	E	N	
	b) Elongation	Physical	One sample per lot	EM Specn. / IS : 13730 - 34	EM Specn. / IS : 13730 - 34	CMTC	B	K	P	W		N	
	c) Visual Check	Visual	10% of bobbin / supply lot	EM Specn. / IS : 13730 - 34	EM Specn. / IS : 13730 - 34	CMTC	B	K	P	W		N	
	d) Resistance	Electrical	10% of bobbin / supply lot	EM Specn. / IS : 13730 - 34	EM Specn. / IS : 13730 - 34	CMTC	B	K	P	W		N	
	e) Enamel Covering Flexibility & Adhesion of Enamel	Physical	One sample per lot	EM Specn. / IS : 13730 - 34	EM Specn. / IS : 13730 - 34	CMTC	B	K	P	W		N	
	1) Mandrel winding , jerk & peel off test	Physical	One sample per lot	EM Specn. / IS : 13730	EM Specn. / IS : 13730	CMTC	B	K	P	W		N	
2) Cut through test	Physical	One sample per lot	EM Specn. /	No breakdown in two minutes	CMTC	B	K	P	W		N		



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							1	2	3	4	5	6	
	3) Springback	Physical	One sample per lot	IS : 13730 - 34 EM Specn. / IS : 13730 - 34	IS : 13730 - 34 EM Specn. / IS : 13730 - 34	CMTC	B	K	P	W		N	
	4) Heat shock test	Thermal	One sample per lot	IS : 13730 - 34 EM Specn. / IS : 13730 - 34	Free from cracks after keeping for 30 minutes at 175-180 deg C	CMTC	B	K	P	W		N	
	5) Break down voltage	Electrical	One sample per lot	IS : 13730 - 34 EM Specn. / IS : 13730 - 34	EM Specn. / IS : 13730 - 34	CMTC	B	K	P	W		N	
	6) Solvent Test	Chemical	One sample per lot	IS : 13730 - 34 EM Specn. / IS : 13730 - 34	EM Specn. / IS : 13730 - 34	CMTC	B	K	P	W		N	
	7) Continuity of covering	Electrical	One sample per lot	IS : 13730 - 34 EM Specn. / IS : 13730 - 34	EM Specn. / IS : 13730 - 34	CMTC	B	K	P	W		N	
A16	<u>PRESS BOARD AND PRESS PAPER</u>											E	
	Density ,Thick. , Tensile	Physical	One sample	IS 8570/ IS 1576	IS 8570/ IS 1576	CMTC	B	K	P	W		N	



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							1	2	3	4	5	6		
A17	Test , Oil absorption & braekdown Voltage	Electrical	per lot											
	<u>TERMINAL CONNECTOR</u> (If applicable as per contract)													
	a) Dimensions	Physical	IS 5561/ nearest whole number to 1% of the batch offered per type	IS 5561 / Aprpd. drawing	IS 5561 / Aprpd. drawing	CMTC	B	K	P	W				N
	b)Tensile test	Physical	IS 5561/ nearest whole number to 1% of the batch offered per type	IS 5561 / Aprpd. drawing	IS 5561 / Aprpd. drawing	CMTC	B	K	P	W				N
	c) Resistance Test	Electrical	IS 5561/ nearest whole number to 1% of the batch offered per type	IS 5561 / Aprpd. drawing	IS 5561 / Aprpd. drawing	CMTC	B	K	P	W				N



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							1	2	3	4	5	6	
	d) Composition	Chemical	One sample per lot per type	IS 5561 / IS 617	IS 5561 / IS 617	CMTC	B	K	P	W		N	
	e) Verification of type test approval from BSPTCL Engg		One sample per type	IS 5561 / Approved drg	IS 5561 / Approved drg	CMTC	B	K	P	W		N	
	f) Galvanisation test for hardwares	Physical	IS 5561/ nearest whole number to 1% of the batch offered per type	IS 5561 / Approved drg IS 2629/IS2633	IS 5561 / Approved drg IS 2629/IS2633	CMTC	B	K	P	W		N	
	i) Mass of coating	Physical	IS 1367	IS 1367	IS 1367 / Min 300 gm/sq m (43 microns) Average 375 gm/sq.m (54 microns)	CMTC	B	K	P	W		N	
	ii) Uniformity of Zinc coating	Physical	IS 1367	IS 1367 / IS 2633	IS 1367 / IS 2633	CMTC	B	K	P	W		N	
	iii) Adhesion	Physical	IS 1367	IS 1367 / IS 2633	IS 1367 / IS 2633	CMTC	B	K	P	W		N	
	iv) Verification of make	Visual	IS 1367	EM Specification	EM Specification	CMTC	B	K	P	W		N	



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S.N	Components / Operations & Description of Test	Type of Check	Quantam of Check / Sampling with basis	Reference Document for Testing	Acceptance Norms	Format of Record	Applicable Codes						Remarks	
							1	2	3	4	5	6		
	a) Insulation resistance (1 min DC test)	Electrical	One sample per lot	IS 4007	IS 4007	CMTC	B	K	P	W	E	N		
	b) HV Test betwn. Terminals	Electrical	One sample per lot	IS 4008	IEC 60947-7-2	CMTC	B	K	P	W		N		
	c) Plating Thickness		One sample per lot	IS 4009	IEC 60947-7-3	CMTC	B	K	P	W		N		
	d) Mech. Strength		One sample per lot	IS 4010	IEC 60947-7-4	CMTC	B	K	P	W		N		
A19	<u>FASTENERS</u>													
	a) Dimensions ,visual & verification of make	Visual Physical		EM SPECS	EM SPECS		B	K	P	W	E	N		
A20	<u>MARSHALLING BOX</u>													
	(If applicable as per order)					CMTC	B	K	P	W	E	N		Review of CMTC/EMTC during BSPTCL final inspection
	a) Dimensions	Physical	100%	Approved drg	Approved drg	CMTC	B	K	P	W/Z		N		
	b) High Voltage test	Electrical	100%	Approved drg (2 kV for1minute)	Approved drg (2 kV for1minute)	CMTC	B	K	P	W/Z		N		
	c) Insulation resistance (before & after HV test)	Electrical	100%	Approved drawing	IR value 20 Mega Ohm (min)	CMTC	B	K	P	W/Z		N		



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							1	2	3	4	5	6	
	d) Functional test	Electrical	100%	Approved drawing	Approved drawing	CMTC	B	K	P	W/Z		N	
	e) Approved make & rating of CMTC's	Physical	100%	Approved drawing	Approved drawing	CMTC	B	K	P	W/Z		N	
	f) Degree of protection	Physical	One sample per design	IS 13947	IS 13947	CMTC	B	K	P	W/Z		N	
	g) Painting thickness	Physical	100%	Approved drg	(80 MICRON MIN)	CMTC	B	K	P	W/Z		N	
B)	<u>SECTION : INPROCESS INSPECTION</u>												
B1	Capacitor Element Winding [Climatic Control on Capacitor Wdg Room Class 10000 Less than 5 microns per cubic Meter)]												
	a) No of turns	Physical	One sample per lot	EM Electrical Specifications	EM Electrical Specifications	EM Test record	A	J	S	W		N	
	b) Continuity check (By capacitance meter)	Electrical	100%	EM Electrical Specifications	EM Electrical Specifications	EM Test record	A	J	S	W		N	
B2	Capacitor Element												

Review of CMTC/EMTC during BSPTCL final inspection



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							1	2	3	4	5	6	
	Stacking												
	a) Tap Connection & No. of Elements	Physical	100%	EM Electrical Specifications	EM Electrical Specifications	EM Test record	A	J	S	W		N	
	b) D.C.over voltage test (1.8 kv./ Element)	Electrical	100%	EM Electrical Specifications	EM Electrical Specifications	EM Test record	A	J	S	W		N	
B3	Inductor												
	a) No of turns	Mechanical	100%	EM Electrical Specifications	Specifications	EM Test record	A	J	S	W		N	
B4	Int. VT Coil												
	a) Turns Ratio	Electrical	100%	EM Electrical Specifications	EM Electrical Specifications	EM Test record	A	J	S	W		N	
B5	EMU Assembly												
	a) 4 KV Test on secondary wdg.	Electrical	100%	EM Electrical Specifications	EM Electrical Specifications	EM Test record	A	J	S	W		N	
	b) Polarity Test on sec wdg.	Electrical	100%	EM Electrical Specifications	EM Electrical Specifications	EM Test record	A	J	S	W		N	



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							1	2	3	4	5	6	
B6	Impregnation and flooding												
	a) Temperature of stack	Physical	Hourly Readings	EM Plant Std WI-P- 088	EM Plant Std WI-P- 088	EM Test record	A	J	S	W		N	Review of CMTC/EMTC during BSPTCL final inspection
	b) Vacuum	Physical	Hourly Readings	EM Plant Std WI-P- 088	EM Plant Std WI-P- 088	EM Test record	A	J	S	W		N	
	c) Oil Test - BDV	Electrical	One Sample per batch	IS 335/IEC 60296	60 kV minm.	EM Test record	A	J	S	W		N	
- Tan Delta	Electrical	One Sample per batch	IS 335/IEC 60296	0.002 Max	EM Test record	A	J	S	W		N		
B7	Capacitor Stack Ratio Setting												
a) Capacitance Ratio	Electrical	100%	EM Electrical Specifications	EM Electrical Specifications	EM Test record	A	J	S	W		N	Review of CMTC/EMTC during BSPTCL final inspection	
B8	Capacitor Assembly												
a) Leak test	Mechanical	100%	EM Specifications	In oven at 70+0/-10deg C with CVT having 1.1 kg/cm sq	EM Test record	A	J	S	W		N		



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							1	2	3	4	5	6	
C C1	FINAL INSPECTION ROUTINE TESTS(EMU)# 1) Verification of Terminal marking & Polarity	Physical	100% 100% (PG)	Approved Drg. IS : 3156 / IEC60044-5	pressure for 8 hrs Approved Drg. IS : 3156 / IEC60044-5	EM test record	A	J	T/U	W/Z		Y	C.I.P
	2) 4 KV 1 minute Power frequency Test between LV-LV , LV -E on EMU	Electrical	100% 100% (PG)	Approved Data Sheet / IS:3156 IEC60044-5	Approved Data Sheet / IS:3156 IEC60044-5	EM test record	A	J	T/U	W/Z		Y	C.I.P
	3)Induced over voltage test on Int.VT and HV choke of EMU (150 Hz)	Electrical	100% 100% (PG)	Approved Data Sheet / IS:3156 IEC60044-5	Approved Data Sheet / IS:3156 IEC60044-5	EM test record	A	J	T/U	W/Z		Y	C.I.P
	Capacitor Assembly : 1) Capacitance & Tan Delta measurement before one minute Power Frequency & One / root 3 test at 10kV	Electrical	100% 100% (PG)	IS:9348/ IEC 358 IEC60044-5 /Approved Data Sheet /	Tan delta 0.005 max ,change in tan delta 0.001 max	EM test record	A	J	T/U	W/Z		Y	C.I.P
C2	2) Power Frequency withstandTest.	Electrical	100% 100% (PG)	IS :9348/ IEC 358 IEC60044-5 /Approved Data Sheet /change in tan delta		EM test record	A	J	T/U	W/Z		Y	C.I.P
	3) Capacitance & Tan Delta measurement after one minute Power Frequency	Electrical	100% 100% (PG)	IS :9348/IEC 358 IEC60044-5 /Approved Data	Change in tan delta after HV test 0.0003 max, change	EM test record	A	J	T/U	W/Z		Y	C.I.P



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							1	2	3	4	5	6	
C3	test at 0.9, 1.0 & 1.1 times Un /root 3				in tan delta with voltages 0.001 max, Change in capacitance after HV test shall be less than the change due to failure of one element.								
	4) Power Frequency with stand Test on HF terminal 4KV/1MIN	Electrical	100% 100% (PG)	IS : 9348/ IEC 358(4 kV /1 min) IEC60044-5	IS : 9348/ IEC 358(4 kV /1 min) IEC60044-5	EM test record	A	J	T/U	W/Z		Y	C.I.P
	5) Sealing Test	Electrical	100% 100% (PG)	EM Specs in oven 70+ 0/-10 deg C /1.1kg /sq cm for 8 hours.	There should be no leakage.	EM test record	A	J	T/U	W/Z		Y	C.I.P
	6) Partial Discharge Test	Electrical	100% 100% (PG)	IEC 358 / IEC60044-5 After 1 min Hv test Partial discharge measurement at Um & 1.2 Um/root 3	PD should be less than 10 PC & 5PC respectively.	EM test record	A	J	T/U	W/Z		Y	C.I.P
	(CVT)# 1) Accuracy Test - ratio and phase angle error.	Electrical	100% 100% (PG)	IS 3156 / IEC60044-5 Approved Data Sheet	IS 3156 / IEC60044-5 Approved Data Sheet	EMTC	A	J	T/U	W/Z		Y	C.I.P



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							1	2	3	4	5	6		
D)	2) BDV & Tan delta on EMU oil after HV Test	Electrical	One sample per lot	IS 1866	IS 1866	EMTC	A	J	T/U	W/Z		Y	C.I.P	
	3) Ferro resonance test	Electrical	100% As per 60444-5 100% (PG)	IEC60044-5	IEC60044-5	EMTC	A	J	T/U	W/Z		Y	C.I.P	
	<u>PACKING & DESPATCH :</u>													
	1) Verification of Completeness of stage as appearing on MQP	Physical	100%	Approved Data Sheet	Approved Data Sheet	EM Test record	A	J	S	W			N	
	2) Check for Finish	Physical	100%	Approved Data Sheet	Approved Data Sheet	EM Test record	A	J	S	W			N	
3) Check for packing	Physical	100%	Approved Data	Approved Data	EM Test record	A	J	S	W			N		
4) CIP/MICC along with test reports	Physical	100%	Approved Data	Approved Data	EM Test record	A	J	S	W			N		

Samples for witnessing : 100%



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1	Acmi industries Ltd	Aluminium Castings	D-8,Phase-IV,I.D.A.,Jeedimetla,Hyd-55			
2	Swastika Castal Ltd	Aluminium Castings	535,Vemardi road,Kanderi,Dist. Vadodara.			
3	Malti industries	Aluminium Castings	Plot No 100/101,Industrial Estate,Palus.			
4	Walshekar Metals & Engineers	Aluminium Castings	K-58,MIDC, WALUJ,AURANGABAD-431 136.			
5	Bhastrik Mechanical Labs Pvt Ltd	Stainless Steel Bellows	1stMain Road Nehru Ngr,Perungudi,Chennai-96.			
6	Flexatherm Expanlow Pvt Ltd	Stainless Steel Bellows	354,G.I.D.C. Makarpura , Baroda - 10.			
7	IEC Ltd	Porcelain Housing	1-8,New ind Area ,PB, No.1,Mandideep,MP.			
8	BHEL	Porcelain Housing	Science Inst., Post,Malleshwaram,Bangalore - 12			
9	Modern Insulators Ltd	Porcelain Housing	PB no 23, ABU Road-307026 , Rajasthan .			
10	Aditya Birla	Porcelain Housing	Halol , INDIA.			
11	WS insulators Ltd	Porcelain Housing	108,Poonamallee Road, Porur, Chennai-116			
12	Liling Pukou Insulator	Porcelain Housing	Pokou Ind. Zone, Liling City, Hunan Province.			
13	Liling Huaxin Porcelain Insulator	Porcelain Housing	Pokou Ind. Zone, Liling City, Hunan Province.			
14	Associated Engineering Co	Aluminium Alloy Tank	W-192 M.I.D.C. Ambad. Nasik-422010.			
15	Sudal Industries	Aluminium Pipes	A/5, M.I.D.C. Ambad, Nasik - 422010. M.S.			
16	Scorpion Industrial Polymers Pvt. Ltd.	O Rings & Gaskets	30,3rd Cross Road,Sri Venkateswara Colony, Nehru Nagar, Chennai			
16	Blaze Enterprises	O Rings & Gaskets	J - 42 , M.I.D.C. Ambad Nasik - 422010. M.S.			
17	Raj Petro Specialities Pvt. Ltd.	Transformer Oil	Madhuban Dam Road, Rakoli Silvasa			
18	Savita Oil Teahnologies Ltd.	Transformer Oil	17A Thane-Belapur Road,Vashi, Navi Mumbai.			
19	Arkema France	Synthetic Oil	Fue Henri Moissan B.P. 63, F-69493, Pierre Benitre Cedex, France			
20	Gujarat Cables & Enamel pvt Ltd	Super Enamelled Copper Wire	Dadra Nagar Haveli.			
21	Vidarbha Winding Wires Pvt Ltd	Super Enamelled Copper Wire	C-40/A ,MIDC.Hingna Road, Nagpur - 28			
22	Do All Engineers pvt Ltd	Torroidal Cores	W - 108(A), M.I.D.C.Ambad,Nasik 422010			
23	Sinewave Electronics Pvt Ltd	Torroidal Cores	47, Udyog vihar, Chorahara, Rewa, M.P.			
24	Amod Stampings Pvt Ltd	Torroidal Cores	Samiala.Podra road,TAL & Dist - Vadodara.			
25	Klemmen Engineering	Terminal Connectors	B-12,Mogappair Ind Estate (E) Chennai -7.			
26	Exalt Engineers	Terminal Connectors	B - 31, Nand Bhuvan Ind. Estate, Mahakali Caves Road. Andheri , MUMBAI.			
27	Prathoma Switchgear Pvt Ltd	Marshelling Box	C-28,M.I.D.C.,ABMAD.,Nashik : 422 010			
28	General Electric	Marshelling Box	H2/17, MIDC , Ambad, Nasik			
29	VKR industries	Epoxy Monoblocks	F- 138/1, MIDC, Ambad, Nasik			
30	Salasar Copper	Super Enamelled Copper	Survey No.: 142/2, Near Madhuban Dam, Village Karad, Rakholi, Silvasa-396240			
31	Raman Boards	Press Board and paper				
32	Elmex	Terminal blocks				
33	Kundan	Fasteners				
34	SPO Germany	Capacitor Tissue paper				
35	Amcor AG, Switzerland	Aluminium foil				