

Pre-Qualifying Criteria (PQC) for Resin Cast Bar Type CTs (PI - 240922090)

PQC Requirement	Bidder to Furnish	Vendor Compliance
<u>Technical Experience</u> : - The OEM should have manufactured and supplied similar CT's to any Central / State Govt Organization / PSU / Public Listed Company for 2 Years before the bid opening date.	Bidder to furnish Purchase Orders or Invoice(s) as proof of supply.	
<u>Past Performance</u> : - The OEM should have supplied same or similar category product for atleast 10% of bid quantity, in any one of the three financial years before the bid opening due date to any of Central/State Gov./PSU/Public listed company.	Bidder to furnish Purchase Orders or Invoice(s) as proof of quantity.	
<u>Organizational Capability</u> : - The Bidder shall have after sales service support set-up for providing product repair/ rectification, testing and commissioning support.	Bidder to furnish set-up details along with an undertaking in respect of above or vendor registration details at BHEL.	

Arvind Kumar

Dy. Manager / SWE

1002624/2022/HEP-SWE40900



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ANNEXURE-A

ANNEXURE-A TO PURCHASE INDENT NO. REV.NO. 00

BHEL | Technical Spec. of : CTs |
Bhopal |
SWE | PI no. : 240922090 | Enq. No: | PO No:
W.O. Nos. :

FOR DETAILED TECHNICAL SPECIFICATION, REFER PRODUCT STANDARD SG12917 REV.07

TABLE : 1

CLAUSE NO.	DESCRIPTION	BHEL'S REQUIREMENT		BIDDERS CONFIRMATION/COMMENTS
1.0	TECHNICAL PARAMETERS	Upto 11kV	20kV & 33kV	
1.1	System Voltage (3Phase, 50 Hz) kV	11		
1.2	Insulation level			
1.2.1	System highest voltage kV	12		
1.2.2	Power freq. withstand voltage (primary) kV Power freq. withstand voltage (secondary) kV	28 2.5		
1.2.3	Lightening Impulse withstand voltage kVp	75		
1.3	Insulation class kV/kVrms/kVp	12/ 28/75		
1.4	STC Rating / duration kA/sec	25 KA for 3 sec		
1.5	Instrument safety factor for all metering cores (The ISF shall be as low as practicable and should be less than 10. In case of multi ratio CTs, the highest ratio core shall have ISF less than 20.)			
1.6	Continuous Overloading Capacity	125%		
1.7	Neutral Earthing	SOLID		
1.8	Insulation class of CTs	B or better		
1.9	Secondary. Term. & Rating Plate on P1/P2 Side	P2 side		
1.10	Characteristics and magnetizing curves of the CTs should be positively submitted before dispatch of equipment	Compliance required		

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TABLE : 2
11kV, 3 Phase, 50 Hz.

IT. NO.	CT RATIO	SLOT/ WOUN D/ BAR/ MOTO R	ACCURACY / BURDEN		Vendor's drg.ref.	Remarks
			CORE-I	CORE-II		
001	400- 200/5-5A	BAR	VA=10, Class 5P, ALF=20 (for O/C & E/F protection).	VA=10, Class 0.2S, ISF less than 5 at lower tap (for metering).	Ref.cl.5.0 of Ann-I	
Bidders confirmation / Comments						
002	1200- 600/5-5A	BAR	VA=10, Class 5P, ALF=10 (for O/C & E/F protection).	VA=10, Class 0.2S, ISF less than 5 at lower tap (for metering).	Ref.cl.5.0 of Ann-I	
Bidders confirmation / Comments						
003	100/5-5A	BAR	VA=10, Class 5P, ALF=20 (for O/C & E/F protection).	VA=10, Class 0.2S, ISF less than 5 at lower tap (for metering).	Ref.cl.5.0 of Ann-I	
Bidders confirmation / Comments						
004	600- 300/5-5A	BAR	VA=10, Class 5P, ALF=20 (for O/C & E/F protection).	VA=10, Class 0.2S, ISF less than 5 at lower tap (for metering).	Ref.cl.5.0 of Ann-I	
Bidders confirmation / Comments						
005	1200- 600/ 0.577-1A	BAR	VA-10, Class PS,VK>40(1+ Rct)l (for differential Protection VK > 266V at Rct < 5.63 Ohms)Imag < 30 mA	VA=25,5p,ALF =15 (For REF Protection)	Ref.cl.5.0 of Ann-I	
Bidders confirmation / Comments						

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006	1800-900A/ 0.577-1A	BAR	VA-10, Class PS,VK>40(1+ Rct)l (for differential Protection VK > 266V at Rct < 5.63 Ohms)Imag < 30 mA at lower tap	VA=10,5p,ALF =20 (For REF Protection) at lower tap	Ref.cl.5.0 of Ann-I		
Bidders confirmation / Comments							
007	1800-900/5-5A	BAR	VA=10, Class 5P, ALF=20 (for back up protection).	VA=10, Class 0.2S, ISF less than 5 at lower tap (for metering).	Ref.cl.5.0 of Ann-I		
Bidders confirmation / Comments							
008	900-450/ 5-5A	BAR	VA=10, Class 5P, ALF=10 (for back up protection).	VA=10, Class 0.2S, ISF less than 5 at lower tap (for metering).	Ref.cl.5.0 of Ann-I		
Bidders confirmation / Comments							
009	900-450/ 0.577-1A	BAR	VA-10, Class PS,VK>40(1+ Rct)l (for differential Protection VK > 266V at Rct < 5.63 Ohms)Imag < 30 mA	VA=25,5p,ALF =15 (For REF Protection) at lower tap	Ref.cl.5.0 of Ann-I		
Bidders confirmation / Comments							

TABLE : 3

4.0	CLIMATIC CONDITIONS	VENDOR CONFIRMATION /COMMENTS
4.1	Ambient Air Temp. - -5°C (min) & 50°C (max.)	
4.2	Relative humidity - 10%(min) & 95%(max)	
4.3	Height above MSL - ≤ 1 00 meters (consider suitable Altitude correctio factor in Impulse withstand for height more than 1000 mtrs)	
4.4	Pollut on Severity - Heavily po luted (with coal dust & Fly ash) & Highly corrosive environment.	
4.5	Seismic Coefficient - 0.3g	
4.6	Design Ambient Temp.- 50 Deg.C	



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Annexure-I

General Technical Specification & Format for Offers 3.3kV to 33kV Indoor Resin Cast Current Transformers

GENERAL :

Resin cast CTs are used in indoor metal clad switchgears for metering and protection purposes. This product standard is intended to cover the general technical requirement common to all indoor resin cast current transformers.

GENERAL REQUIREMENT & GUIDELINES TO VENDORS:

SL. NO.	BHEL'S REQUIREMENT	BIDDERS CONFIRMATION / COMMENTS
1	OFFERS SUBMITTED IN THIS SPECIFIED FORMAT (ANNEXURE-I) ONLY SHALL BE EVALUATED. OFFERS IN ANY OTHER FORMAT MAY NOT BE CONSIDERED FOR EVALUATION. SOFT COPY OF THE FORMAT SHALL BE MADE AVAILABLE TO SUPPLIERS ON DEMAND.	
2	Offers shall be opened in single bid only. Incomplete offers in any respect will be rejected without any correspondence/clarification with/from the vendor.	
3	The specification 'Annexure-A' and indent remarks given alongwith the enquiry document will be overriding in case of difference.	
4	For all PS class CTs, suppliers to indicate estimated values of V_k & I_e (based on formula as well as calculated value from the magnetization curve) in the table-7 , as per estimated magnetization curve of the offered CTs. Actual magnetization curves are required at order stage.	
5	To have similar magnetizing characteristics, switchgear end CTs & respective motor end CTs for differential protection of motors shall be procured in pair, from any one vendor on technically clear & L1 basis.	
6	Supplier shall affix green sticker on all motor end CTs for easy identification.	
7	Mounting plate shall be rigidly fixed with CT using suitable inserts and shall be zinc plated.	
8	Clear space for fixing the mounting plate in switchgear with pneumatic tool shall be provided.	
9	10% extra secondary terminal covers shall be provided with each order.	
10	1 complete set of loose rating plates shall be provided for all CTs.	
11	Any deviation with respect to specification is to be indicated strictly in 'Annexure-D'. Deviations indicated elsewhere shall not be considered. IF NO DEVIATION IS MENTIONED IN THIS ANNEXURE THEN IT WILL BE CONSIDERED AS TOTAL COMPLIANCE TO OUR SPECIFICATION.	

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CLAU E NO.	DESCRIPTION	BIDDERS CONFIRMATION/ COMMENTS
1.0	TECHNICAL PARAMETERS - AS PER ANNEXURE-A.	
2.0	CT RATIO, ACCURACY AND BURDEN - AS PER ANNEXURE-A.	
3.0	APPLICABLE STANDARDS : IS:2705 / IEC:186 for CTs. IS:11322 / IEC:44 for Partial Discharge Test	
4.0	CLIMATIC CONDITIONS - AS PER ANNEXURE-A.	
5.0	DIMENSIONS For CT dimensions, suppliers to follow the following BHEL drgs for various ratings & type of CTs -	
5.1	All CTs with ratio 500A and above shall be SLOT TYPE only. Also refer Table-6 part-A	
	For SLOT CT (upto 11kV)	Drg.No. 35210051517 REV.06 Window size as under -
i	For CT primary above 2500A & upto 3500A	105x55 mm, OD - 250 mm max is acceptable. Remaining dimensions as per Drg.No. 35210051517 REV.06.
ii	For CT primary from 1000A upto 2500A	105x40 mm
iii	For CT primary below 1000A -	Preferably 105x40 mm only. However, in case it is not possible to meet technical parameters requirement with this slot size, suppliers may offer a slot size of 80x40 mm. Offers should clearly indicate such case(s).
5.2	All CTs below 500A ratio shall be WOUND TYPE only. For WOUND CT (upto 11kV) drg. no. 35210051516 REV.04. Also refer Table-6 part-B.	
5.3	For BAR CT (upto 11kV) drg. no. 35210052565 Rev.01. Also refer Table-6 part-C.	
5.4	For MOTOR end differential CTs drg. no. 34022240026 rev00. Also refer Table-6 part-D.	
5.5	All CTs with ratio 500A and above shall be SLOT TYPE only. For SLOT CT (20kV and 33kV) drg. no. 45226001513 Rev.01. Window size - 110x40 mm Also refer Table-6 part-E	
5.6	All CTs below 500A ratio shall be WOUND TYPE only. For WOUND CT (20kV and 33kV) drg. no. 45226001506 Rev.01. Also refer Table-6 part-F	

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<div>COPYRIGHT AND CONFIDENTIAL</div> <div>The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to interest of Co.</div>		6.0			DESIGN AND CONSTRUCTION	
		6.1			The current transformer cores shall be made of suitable grade non-ageing cold rolled grain oriented silicon steel of low hysteresis loss and permeability to ensure accuracy at both normal and over voltages of 110 percent of the rated voltage and currents of 120 percent of the normal current. There shall be no saturation under service conditions.	
		6.2			The current transformer shall be designed to withstand the indicated climatic conditions without temperature rise exceeding beyond permissible limits and CT shall be designed to withstand the thermal and mechanical stresses due to rated short circuit condition. Ambient temp. of 50°C shall be considered for design purpose.	
		6.3			The primary conductor / secondary winding layer should be insulated with polyester film tape. Transparent cover shall be provided over secondary terminal.	
		6.4			The CTs shall be completely encapsulated and terminal marking shall be properly & legibly provided without any requirement to interfere with wiring connections.	
		6.5			The resin to be used in construction shall be high grade, mixed under high vacuum and poured also in vacuum to prevent any void remaining in the casting.	
		6.6			The CTs should be cured properly so that the final product is non hygroscopic.	
		6.7			Equi-potential lug of 0.25mtr length shall be provided for slot CTs in line with respective drawings.	
		6.8			In case of wound CT's, the primary winding must be joined to primary terminals by either brazing process or bolted or clamped. Making a temporary joint is not acceptable.	
		7.0			Q.A. PLAN	
					As per BHEL's standard Q.A. plan ref. QAQC/SCR/15/052 enclosed. Suppliers to specifically confirm adherence to this Q.A. plan in their offers.	
		8.0			INSPECTION	
					CTs shall be tested & inspected at supplier's works by BHEL/BHEL's customer/BHEL's authorized representative in line with above Q.A. plan. Supplier shall give 2 weeks advance intimation.	

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QAQC/SCR/15/052, rev-00.		11.1.9	For all class PS CTs, 1 copy of estimated magnetization curves and knee point voltage & magnetizing current calculations to be filled and submitted in Table-7.		11.1.10	Schedule of deviations as per Annexure-D duly filled.		11.1.11	Dimensional details as per Table-6 part-A, B, C, D, E & F		11.2	Documents to be furnished at the time of delivery		11.2.1	2 copies of routine test certificates alongwith the consignment and 1 copy along with the dispatch document.		11.2.2	Actual magnetization curves for PS class CTs.					12.0	PERFORMANCE GUARANTEE		12.1	The supplier shall guarantee the satisfactory performance of the CTs for a period of 24 months from the date of receipt at BHEL Bhopal or 18 months from the date of commissioning, whichever is later.		12.2	For suppliers, supplying these types of CTS to BHEL for the first time, guarantee for satisfactory performance shall be 5 ½ yrs from the date of receipt at BHEL Bhopal or 5 yrs from the date of commissioning, whichever is later.		12.3	Alongwith offer, the supplier shall also submit the proof of supplying indoor CTs to BHEL for last 5 orders failing which performance guarantee will be changed to 5 years.												13.0	ACCEPTANCE CRITERIA			13.1	BHEL/BHEL's authorized representative's report for adhering to BHEL's standard QA Plan during manufacturing process.			13.2	Visual checks for crack and surface finish.			13.3	Rating plate as per specification parameters.			13.4	Dimensions as per approved drawing.			13.5	Availability of all routine test certificates.			13.6	Availability of 10% extra secondary terminal covers.			13.7	1 complete set of loose rating plates for all CTs			13.8	Packing case identification as per specification cl.10.4.	
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TABLE-5

(FORMATS TO BE FILLED BY SUPPLIERS FOR EACH ITEM)

9.0		TYPE TESTS																					
9.1		APPLICABILITY OF TYPE TESTS																					
PART A												FOR APPLICABILITY OF STC TEST CERTIFICATE											
IT. NO.	STC TEST REPORT NO.	DATE OF TEST	DETAILS OF TESTED CT					DETAILS OF OFFERED CT					REMARKS / DEVIATION										
			STC RATING / I ² t	NO. OF PRIM. TURNS / AREA SQMM	CURRENT DENSITY AMP / SQMM	DYNAMIC AMP-TURNS	STC RATING / I ² t	NO. OF PRIM. TURNS / AREA SQMM	CURRENT DENSITY AMP / SQMM	DYNAMIC AMP-TURNS													
001																							
002																							

PART B FOR IMPULSE TEST CERTIFICATE JUSTIFICATION									
IT. NO.	IMPULSE TEST REPORT NO.	DATE OF TEST	DETAILS OF TESTED CT			DETAILS OF OFFERED CT			REMARKS / DEVIATION
			IMPULSE TEST IN KV PEAK	CREEPAGE	DRG. NO.	IMPULSE TEST IN KV PEAK	CREEPAGE	DRG. NO.	
001									
002									

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TABLE-6
(FORMATS TO BE FILLED BY SUPPLIERS FOR EACH ITEM)

(TABLE-6 PART-A)
REFER SPEC.CLAUSE 5.1 FOR UPTO 12kV SLOT CTS TO DRG.NO.35210051517
REV.06 AND CONFIRM FOLLOWING (DEVIATIONS TO BE INDICATED AGAINST
RESPECTIVE ITEM)

SL. NO.	REQUIREMENT	VENDOR TO CONFIRM DIMENSION					
		It. No.	It. No.				It. No.
1.	Mounting dimension of offered CT shall be 200±1(along depth)X 140±1(along width) mm						
2.	Mounting plate dimension of offered CT shall be 230±2(along depth) X170±2(along width)mm (MAX.)						
3.	Slot/Window dimension of offered CTs shall be (as per cl.5.1)						
4.	Overall height from bottom of mounting plate shall be 292.5 mm max.						
5.	Height of center of slot to bottom of mounting plate shall be 177.5±2mm.						
6.	Width of CT shall be (as per cl.5.1)						
7.	Depth of CTs shall be 230mm max.						
8.	Mounting (plate) slot dimension shall be 12Wx18L mm.						

(TABLE-6 PART-B)
REFER SPEC.CLAUSE 5.2 FOR UPTO 12kV WOUND CTS TO DRG.NO.35210051516
REV.04 AND CONFIRM FOLLOWING (DEVIATIONS TO BE INDICATED AGAINST
RESPECTIVE ITEM)

SL. NO.	REQUIREMENT	VENDOR TO CONFIRM DIMENSION					
		It. No.	It. No.				It. No.
1.	Mounting dimension of offered CT shall be 200±1(along depth) X 140±1(along width) mm						
2.	Mounting plate dimension of offered CT shall be 230±2(along depth)X 170±2(along width) mm (MAX.)						
3.	Centre to center distance between primary terminal shall be 90±1mm (along depth) & 40±0.5mm (along width)						
4.	Height of primary terminal from bottom of mounting plate shall be 300±2mm.						
5.	M16 Primary connection bolts provided as per drg.						
6.	Width of CT shall be 205mm max.						
7.	Depth of CTs shall be 310mm max.						
8.	Mounting (plate) slot dimension shall be 12Wx18L mm.						

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(TABLE-6 PART-C)

REFER SPEC.CLAUSE 5.3 FOR UPTO 12kV BAR TYPE CTS TO DRG.NO.35210052565
REV.01 AND CONFIRM FOLLOWING (DEVIATIONS TO BE INDICATED AGAINST
RESPECTIVE ITEM)

SL. NO.	REQUIREMENT	VENDOR TO CONFIRM DIMENSION					
		It. No.	It. No.				It. No.
1.	Mounting dimension of offered CT shall be 136±1(along depth)X 118±1(along width) mm						
2.	Mounting plate dimension of offered CT shall be 156±2(along depth) X150±2(along width)mm (MAX.)						
3.	Overall height from bottom of mounting plate shall be 322mm max.						
4.	Width of CT shall be 160mm max.						
5.	Depth of CTs shall be 270mm max.						
6.	Mounting (plate) slot dimension shall be 10Wx15L mm.						

(TABLE-6 PART-D)

REFER SPEC.CLAUSE 5.4 FOR UPTO 12kV MOTOR END CTS TO DRG.NO.
34022240026 rev.00 AND CONFIRM FOLLOWING (DEVIATIONS TO BE INDICATED
AGAINST RESPECTIVE ITEM)

SL. NO.	REQUIREMENT	VENDOR TO CONFIRM DIMENSION					
		It. No.	It. No.				It. No.
1.	Mounting dimension of offered CT shall be 300±1(along depth)X 157±1(along width) mm						
2.	Mounting plate dimension of offered CT shall be min.315±2(along depth) X 180±2(along width)mm (MAX.)						
3.	Overall height from bottom of mounting plate shall be 260mm max.						
4.	Width of CT shall be 180mm max.						
5.	Depth of CTs shall be 382mm max.						
6.	Mounting (plate) slot dimension shall be dia.11 mm.						

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(TABLE-6 PART-E)

REFER SPEC.CLAUSE 5.5 FOR UPTO 33kV SLOT CTS TO DRG.NO.45226001513
REV.01 AND CONFIRM FOLLOWING (DEVIATIONS TO BE INDICATED AGAINST
RESPECTIVE ITEM)

SLNO	REQUIREMENT	VENDOR TO CONFIRM/INDICATE DIMENSION					
		It. No.	It. No.				It. No.
1.	Mounting dimension of offered CT shall be 305±1(along depth)X 170±1(along width) mm						
2.	Mounting plate dimension of offered CT shall be 340±2(along depth)X 195±2(along width)mm (MAX.)						
3.	Slot/WINDOW dimension of offered CTs shall be 110X40 sqmm.						
4.	Overall height from bottom of mounting plate shall be 550mm max.						
5.	Height of center of slot to bottom of mounting plate shall be 390±2mm.						
6.	Width of CT shall be 350mm max.						
7.	Depth of CTs shall be 320mm max.						
8.	Mounting (plate) slot dimension shall be 12Wx18L mm.						

(TABLE-6 PART-F)

REFER SPEC.CLAUSE 5.6 FOR UPTO 33kV WOUND CTS TO DRG.NO.45226001506
REV.01 AND CONFIRM FOLLOWING (DEVIATIONS TO BE INDICATED AGAINST
RESPECTIVE ITEM)

SL NO	REQUIREMENT	VENDOR TO CONFIRM/INDICATE DIMENSION					
		It. No.	It. No.				It. No.
1.	Mounting dimension of offered CT shall be 305±1(along depth) X 170±1(along width) mm						
2.	Mounting plate dimension of offered CT shall be 340±2(along depth)X 195±2(along width) mm (MAX.)						
3.	Centre to center distance between primary terminal shall be 90±1mm (along depth) & 40±0.5mm (along width)						
4.	Height of primary terminal from bottom of mounting plate shall be 360±1mm.						
5.	M16 Primary connection bolts provided as per drg.						
6.	Width of CT shall be 220mm max.						
7.	Depth of CTs shall be 275mm max.						
8.	Mounting (plate) slot dimension shall be 12Wx18L mm.						

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TABLE-7

(FORMATS TO BE FILLED BY SUPPLIERS FOR ALL PS CLASS CTs)
 REFER GENERAL REQUIREMENT NOTE-4 & SPEC.CLAUSE-11.1.9 FOR PS CLASS
 CTS AND CONFIRM FOLLOWING (DEVIATIONS TO BE INDICATED AGAINST
 RESPECTIVE ITEM)

ITEM NO.	REQUIREMENT (FORMULA)	VENDOR TO INDICATE ACTUAL VALUES OF V_k & I_e AS PER			
		V_k AS PER		I_e at $0.5V_k$ or $0.4V_k$ AS PER	
		Formula	Curve	Formula	Curve
1.					
2.					



ANNEXURE -D (SCHEDULE OF DEVIATIONS)

Item no.	Current Transformers	Deviation in		
	CT Details	Technical Parameters	Dimensional Drawing	Type Test
1.				
2.				

NOTE: IF NO DEVIATION IS MENTIONED IN THIS ANNEXURE THEN IT
 WILL BE CONSIDERED AS TOTAL COMPLIANCE TO OUR
SPECIFICATION



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			PRODUCT STANDARD SWITCHGEAR ENGINEERING DIVISION					SG12917 REV.07			
								PAGE 11 OF 12			
			QUALITY PLAN FOR INDOOR RESIN CAST CURRENT TRANSFORMERS (3.3kV TO 33kV)					QP NO. : QAQC/SCR/15/05 REV. : 00 DATE: 10.08.04 PAGE: 01 OF 02			
								REVIEWED BY APPROVE			
SL. NO.	COMPONENT & PROCESS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	FORMAT OF RECORD	AGENCY			REMARK
1	2	3	4	5	6	7	8	M	C	I	11
A. RAW MATERIALS :											
1.00	CORE	a) DIMENSION b) MAGNETISING CURRENT	C A	M T	10% 100%-M,10%-C	SUPPLIER'S SPEC.+++	T.C. T.C.	P P	V P	RR RR	
2.00	ENAMELLED COPPER WIRE	a) WIRE SIZE b) ENAMEL COATING c) ELECTRICAL PROPERTIES	C B A	M T T	10% 10% 10%	IS4800/ IS13730	T.R. T.R. T.R.		V V V	RR RR RR	
3.00	COPPER SECTION	a) DIMENSION b) ELECTRICAL PROPERTIES	C B	M T	100%-M,10%-C 100%-M,10%-C	SUPPLIER'S SPEC.+++	T.C./T.R. T.C./T.R.	P P	P P	RR RR	
4.00	RESIN HARDENER &	CHEMICAL	B	T	100%	SUPPLIER'S SPEC.+++	T.C.	P	RR	RR	
5.00	POLYESTER FILM	a) DIMENSION b) ELECTRICAL PROPERTIES	C B	M T	100%-M,10%-C 100%-M,10%-C	SUPPLIER'S SPEC.+++	T.C. T.C.	P P	RR RR	RR RR	
B: MANUFACTURING PROCESS:											
1.00	MOULDING PROCESS	a) LEVEL OF VACUUM DURING POURING b) CURING TEMPERATURE AND TIME	A A	M M	FOR EACH BATCH	SUPPLIER'S SPEC.+++	P.R. P.R.		P P	RR RR	
2.00	EPOXY CASTING	SHAPE & SURFACE FINISH	B	V	100%	SHAPE: AS PER APPROVED DRG./FINISH : DEFECT FREE	O.S.		V	RR	
LEGEND : A:CRITICAL,B:MAJOR,C:MINOR,M:MEASUREMENT,V:VISUAL,T:TEST,RR:RECORD REVIEW,P.R: PROCESS RECORD,T.C:TEST CERTIFICATE,T.R.;TEST REPORT,O.S:OBSERVATION SHEET; QA DOCUMENTATION ; M:MANUFACTURER/SUB CONTRACTOR, C: SUPPLIER,I:BHEL/INSPECTION AGENCY (P:PERFORM,W: WITNESS & V: VERIFICATION AS APPROPRIATE,CHP :CUSTOMER'S HOLD POINT;+++ SUPPLIER'S SPECIFICATION TO APPROVED BY BHEL, ***SP (SAMPLING PLAN) AS PER IS:2500,PART I,AQL : 0.65, GENERAL INSPECTION LEVEL -II,SINGLE SAMPLING PLAN (REDUCED INSPECTION)											

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							PAGE 12 OF 12					
			QUALITY PLAN FOR INDOOR RESIN CAST CURRENT TRANSFORMERS (3.3kV TO 33kV)				QP NO. : QAQC/SCR/15/052		REV. : 00		REVIEWED BY: APPROVED	
						DATE: 09.08.04		PAGE: 02 OF 02				
SL. NO.	COMPONENT & PROCESS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	FORMAT OF RECORD	AGENCY			REMARK	
1	2	3	4	5	6	7	8	M	C	I	11	
C. ROUTINE TESTS:												
1.00	FINISHED CT	a) OGA DIMENSION	B	M	AS PER	BHEL'S	O.S.	P	V			
		b) SIZE OF PRIMARY TERM.	B	T	SAMPLING	APPROVED	O.S.	P	V			
		c) SIZE OF BASE PLATE	B	T	PLAN (SP)***	DRAWING	O.S.	P	V			
2.00	ELECTRICAL TESTING	a) TERMINAL MARKINGS & POLARITY	A	T	100%-C , SP-I		T.R.	P	W	CHP		
		b) RATIO & PHASE ERROR	A	T	100%-C , SP-I		T.R.	P	W	CHP		
		c) COMPOSITE ERROR (ON PROTECTION CORE)	A	T	100%-C , SP-I		T.R.	P	W	CHP		
		d) HV TEST ON PRIMARY	A	T	100%-C , SP-I		T.R.	P	W	CHP		
		e) LV TEST ON SECONDARY	A	T	100%-C , SP-I	IS-2705 / IEC	T.R.	P	W	CHP		
		f) INTER TURN TEST	A	T	100%-C , SP-I	186	T.R.	P	W	CHP		
		g) PARTIAL DISCHARGE TEST	A	T	100%-C , SP-I		T.R.	P	W	CHP		
3.00	ADDITIONAL TESTS FOR CLASS 'PS' CORE	a) SECONDARY WDG.RESISTANCE	B	T	100%-C , SP-I		T.R.	P	W	CHP		
		b) KNEE POINT VOLTAGE AND EXCITING CURRENT	A	T	100%-C , SP-I		T.R.	P	W	CHP		
D. TYPE TESTS(AS PER BHEL'S P.O) :												
		a) SHORT TIME CURRENT	A	T			T.R.	P	W	CHP		
		b) IMPULSE	A	T			T.R.	P	W	CHP		
		c) TEMPERATURE RISE	A	T			T.R.	P	W	CHP		
LEGEND : A:CRITICAL,B:MAJOR,C:MINOR;M:MEASUREMENT,V:VISUAL,T:TEST,RR:RECORD REVIEW,P,R: PROCESS RECORD,T,C: CERTIFICATE,T.R.;TEST REPORT,O.S:OBSERVATION SHEET; QA DOCUMENTATION ; M:MANUFACTURER/SUB CONTRACTOR, C: SUPPLIER,I:BHEL/INSPECTION AGENCY (P:PERFORM,W: WITNESS & V: VERIFICATION AS APPROPRIATE,CHP :CUSTOMER'S HOLD POINT;+++ SUPPLIER'S SPECIFICATION BE APPROVED BY BHEL, ***SP (SAMPLING PLAN) AS PER IS:2500,PART I,AQL : 0.65, GENERAL INSPECTION LEVEL -II,SINGLE SAMPLE PLAN (REDUCED INSPECTION LEVEL)												

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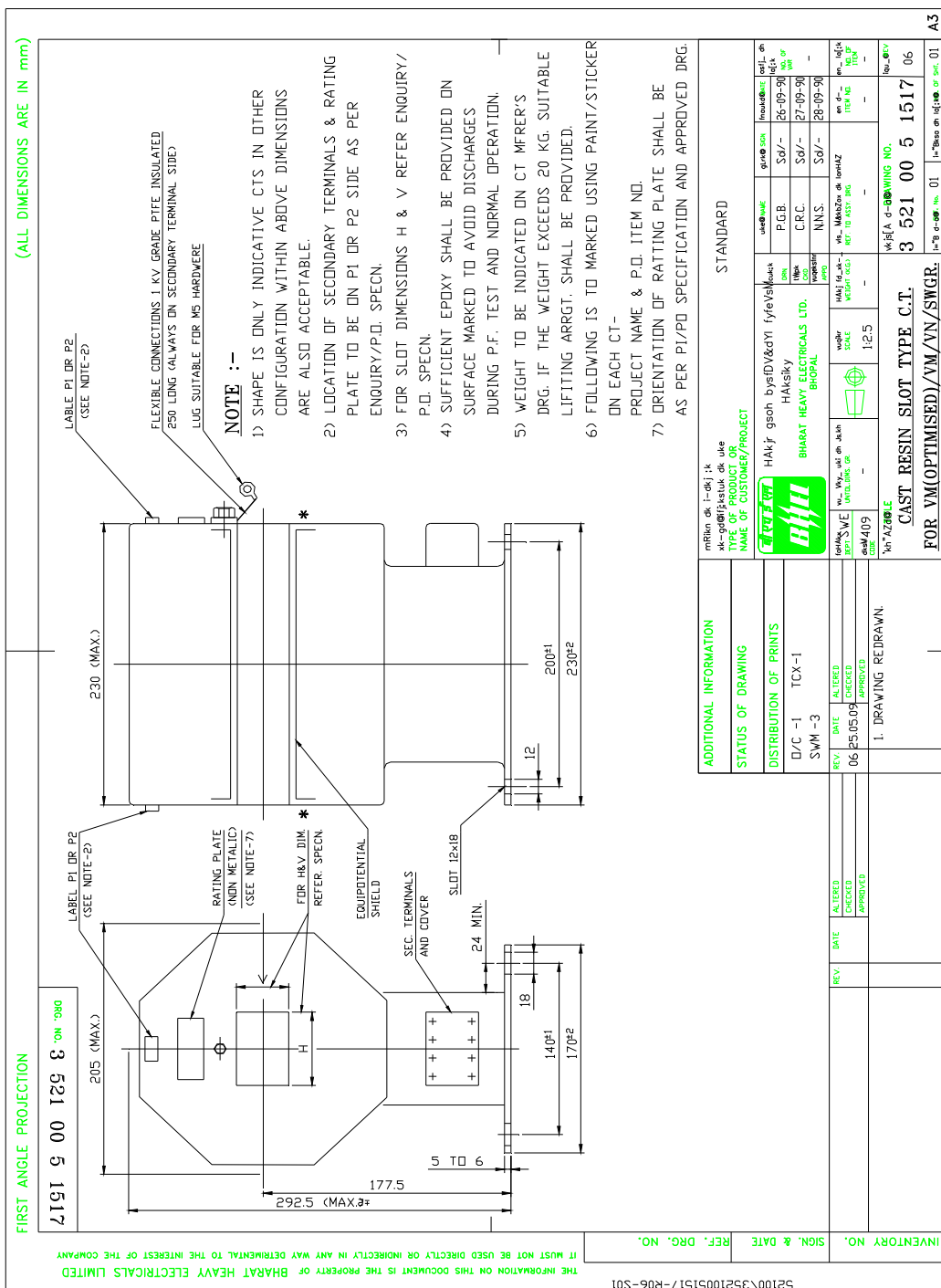


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ANNEXURE-1





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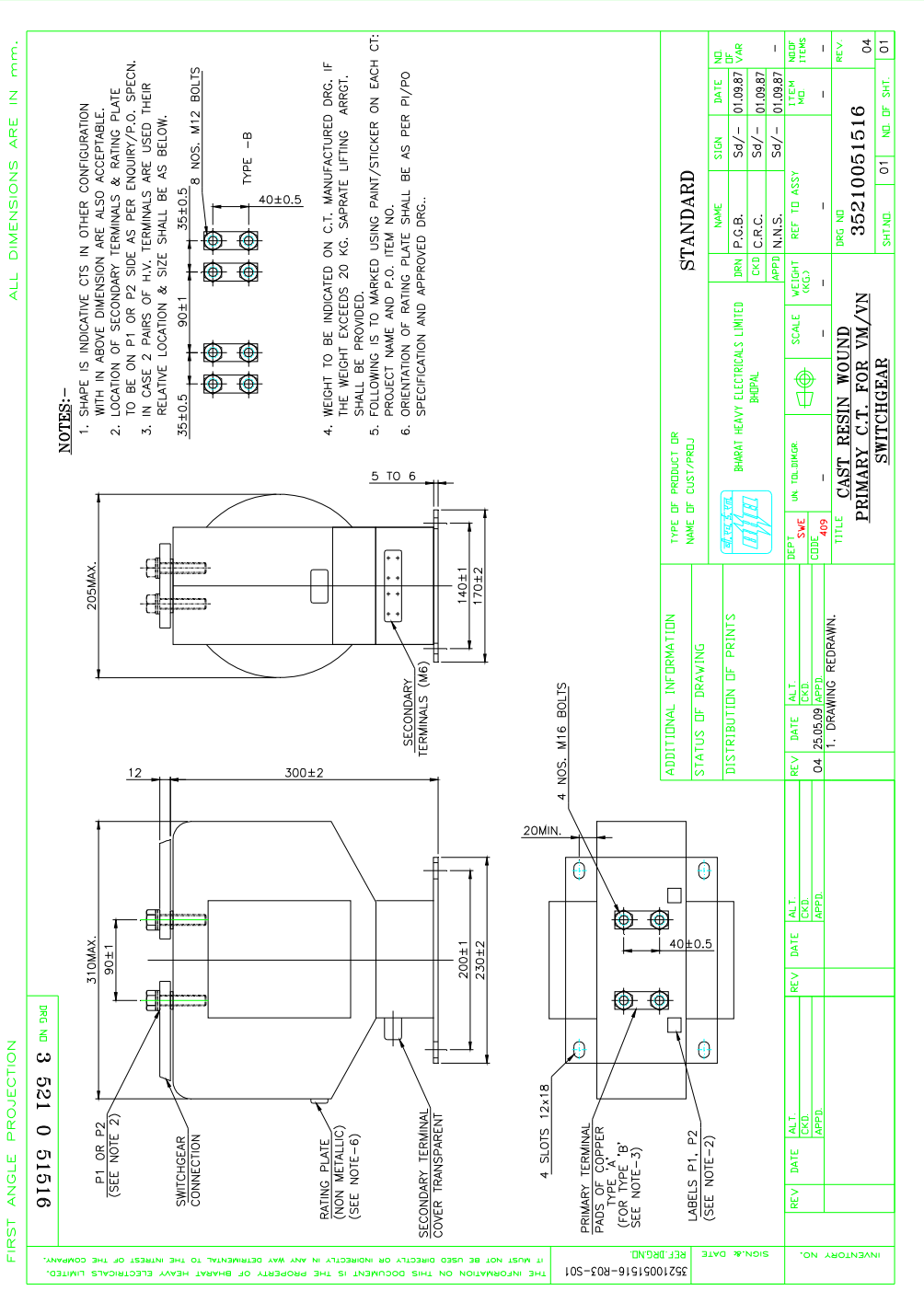
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ANNEXURE-2

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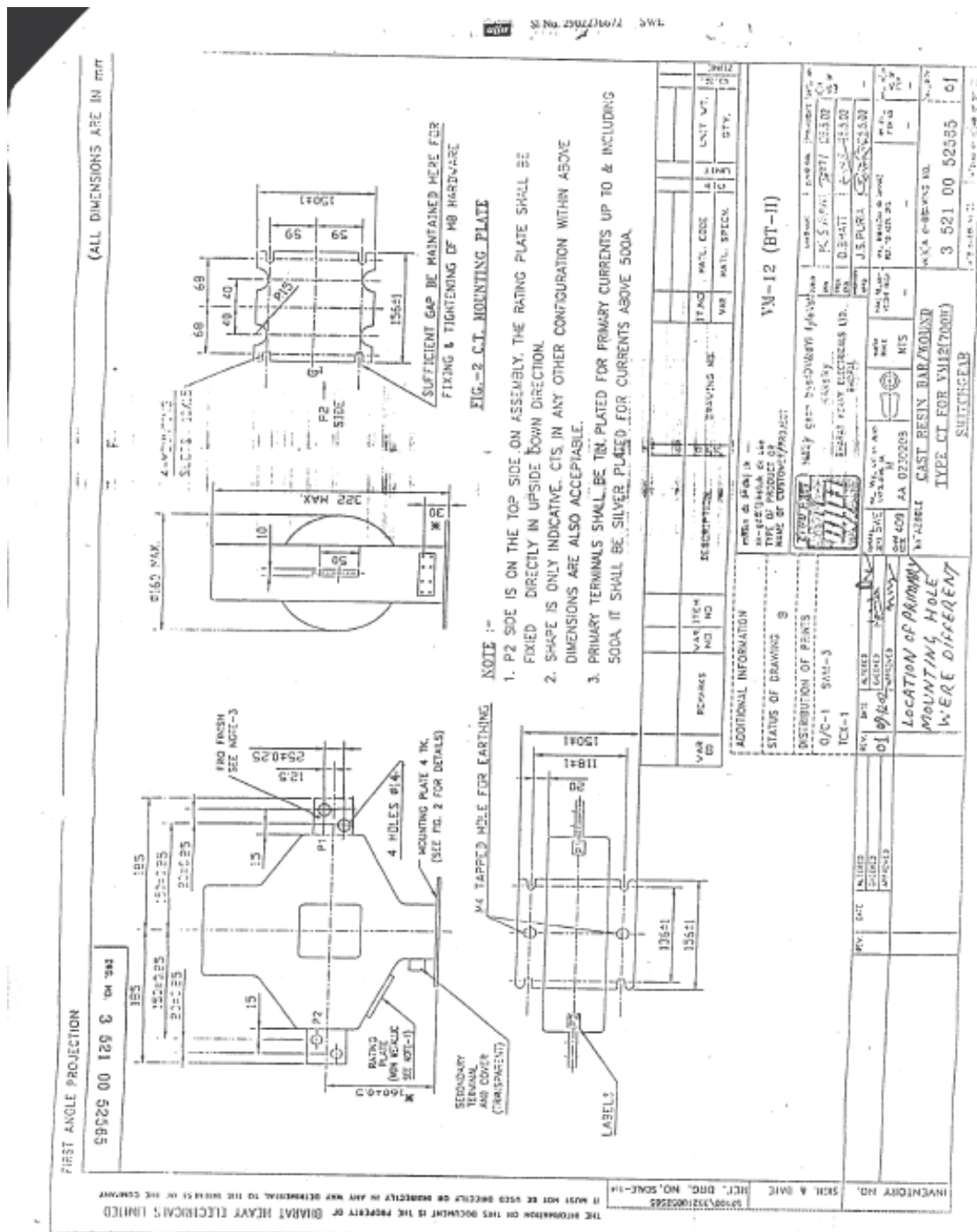
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ANNEXURE-3

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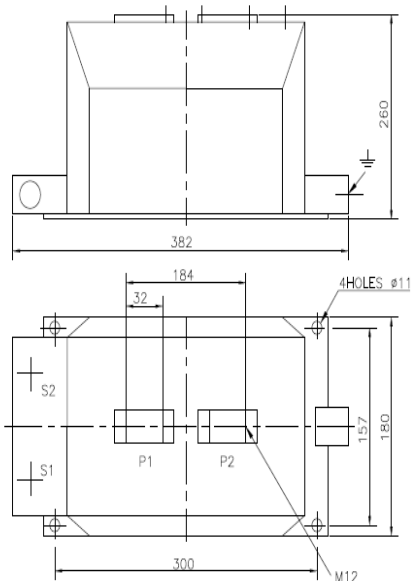
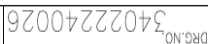
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ANNEXURE-4




FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm.)



NOTES:—

1. C.T. SHOULD CONFORM TO IS:2705.
2. C.T. TERMINALS SHALL BE OF TINNED COPPER.
3. C.T. DRAWING INDICATING DIMENSIONS AND WEIGHT AND CHARACTERISTIC CURVES SHALL BE FURNISHED ALONG WITH THE OFFER.
4. RATING PLATE AS PER IS:2705 SHALL BE PROVIDED ON EACH C.T.
5. SEPARATE TEST CERTIFICATE SHALL BE FURNISHED FOR EACH C.T. AS PER IS:2705.
6. TYPE TEST SHALL BE DONE ON ONE C.T. OF EACH TYPE.
7. C.T. MOUNTING PLATE DIMENSION SHALL PREFERABLY BE AS PER ABOVE OUTLINE.
8. TYPE TEST CERTIFICATE OF SIMILAR C.T. MANUFACTURED SHALL BE FURNISHED ALONGWITH THE OFFER.
9. C.T. SHALL BE DESPATCHED WITH SECONDARY SHORTLET BY COPPER LINK.
10. T.C. OF EACH C.T. SHOULD INCLUDE MEASURED KNEE POINT VOLTAGE AND EXCITING CURRENT.

REV. & DATE	<table><tr><th colspan="6">AUTOMATIC INFORMATION</th></tr><tr><td colspan="6">STATUS OF DRAWING</td></tr><tr><td colspan="6">MULTIPLICATION OF PRINTS</td></tr><tr><td colspan="6">OC-1 TCX(PLM)-1</td></tr><tr><td colspan="6">PLM-4</td></tr></table>												AUTOMATIC INFORMATION						STATUS OF DRAWING						MULTIPLICATION OF PRINTS						OC-1 TCX(PLM)-1						PLM-4						<table><tr><th colspan="2">TYPE OF PRODUCT</th></tr><tr><td colspan="2">EPOXY RESIN CAST CURRENT TRANSFORMER</td></tr><tr><td colspan="2">DR</td></tr><tr><td colspan="2">NAME OF CUSTOMER/PROJECT</td></tr></table>						TYPE OF PRODUCT		EPOXY RESIN CAST CURRENT TRANSFORMER		DR		NAME OF CUSTOMER/PROJECT																																		
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1002624/2022/HEP-SWE40900



PRODUCT STANDARD

SWITCHGEAR ENGINEERING DIVISION

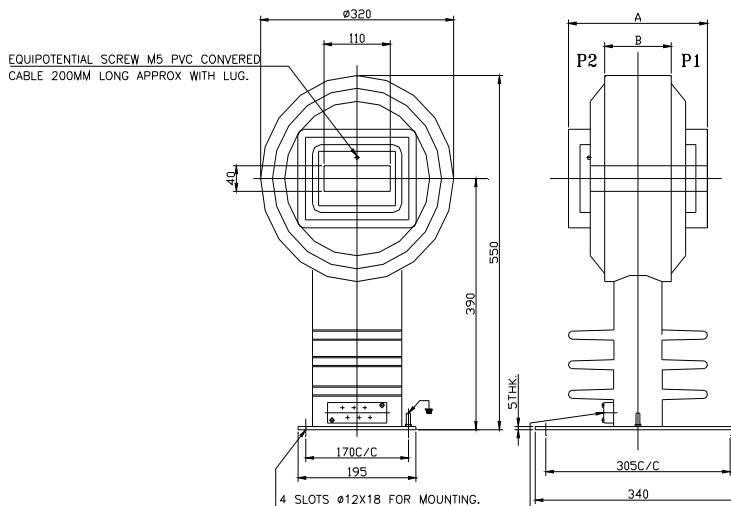
SG12917 REV.07

PAGE 1 OF 1

ANNEXURE-5

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN mm)

REV.	DATE	ALTERED	REV.	DATE	ALTERED	ADDITIONAL INFORMATION
01	18.06.09	CHECKED			CHECKED	STATUS OF DRAWING
						DISTRIBUTION □/C-1 SWM-3 OF PRINTS TCX-1



REVISION : CHANGED MOUNTING PLATE AND MOUNTING DIMENSIONS
(OUR REF. NO. : Q2710 DT. 17/01/2004.

REVISION : ADDED 'A' AND 'B' DIMENSIONS TABLE DT. 27/12/2003.
: CHANGED THE SLOT DIMENSION 110MM. PLACE OF
: 105 MM. DT. 27/12/2003.

NOTE:-



TOLERANCE WHEREVER NOT MENTIONED \pm SWM.

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IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

45226001513/R00/S01

SIGN & DATE

INVENTORY No.

				BHATAT HEAVY ELECTRICALS LIMITED BHOPAL		NAME		SIGN.		DATE		NO. OF VAR					
						DRN		S.U.SAVALE		SD/-		21.04.05					
						CHD		K.S.M.		SD/-		21.04.05					
						APPD		DIVYA		SD/-		21.04.05					
DEPT. SWE		UN. TOL. DIM. GR.				SCALE		WEIGHT (Kg)		REF. TO ASSY. DRG.				ITEM MO.		NO. OF ITEMS	
CODE 409																	
TITLE								DRAWING No.						REV.			
RESIN CAST RING TYPE								45226001513						01			
CURRENT TRANSFORMER																	
								SHEET NO. 01				NO. OF SHEETS 01					

SIZE A4

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PRODUCT STANDARD

SWITCHGEAR ENGINEERING DIVISION

SG12917 REV.07

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ANNEXURE-6

FIRST ANGLE PROJECTION				CALL DIMENSIONS ARE IN mm			
REV.	DATE	ALTERED	BY	REV.	DATE	ALTERED	BY
		CHECKED		01	11.06.09	CHECKED	DJ
DIMENSION 275 WAS 225 . (DCA 28732)				ADDITIONAL INFORMATION STATUS OF DRAWING DISTRIBUTION □/C-1 SWM-3 OF PRINTS TCX-1			
*PROVISION THIS SIDE TO BE MADE ONLY IF ABSOLUTELY NECESSARY							
NOTE:- TOLERANCE WHEREVER NOT MENTIONED $\pm 3\text{MM}$.							
DEPT. SWE CODE 409				UN. TOL.DIM.GR. M AA 0230208			
SCALE 				WEIGHT (Kg) REF. TO ASSY. DRG.			
TITLE RESIN CAST WOUND TYPE CURRENT TRANSFORMER				DRAWING No. 45226001506			
SHEET NO. 01				NO.OF SHEETS 01			

SIZE A4

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45226001506/R00/S01

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SIGN & DATE

INVENTORY No.



BHARAT HEAVY ELECTRICALS LIMITED
BHOPAL

NAME	SIGN.	DATE	NO.OF VAR
DRN S.U.SAVALE	SD/-	21.04.05	
CHD K.S.M.	SD/-	21.04.05	
APPD DIVYA	SD/-	21.04.05	

DEPT. SWE	UN. TOL.DIM.GR.	SCALE	WEIGHT (Kg)	REF. TO ASSY. DRG.	ITEM MO.	NO.OF ITEMS
CODE 409	M AA 0230208					
TITLE RESIN CAST WOUND TYPE CURRENT TRANSFORMER				DRAWING No. 45226001506		REV. 01
SHEET NO. 01		NO.OF SHEETS 01				



PRODUCT STANDARD

SWITCHGEAR ENGINEERING DIVISION

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PAGE 1 OF 2

FORMAT FOR ANNEXURE-A**ANNEXURE-A** TO PURCHASE INDENT NO. _____

REV.NO. _____

BHEL | Technical Spec. of : CTs | Sht. 01 of _____

Bhopal | _____

SWE | PI no. : _____ | Enq. No: _____ | PO No: _____

W.O. Nos. : _____

**FOR DETAILED TECHNICAL SPECIFICATION, REFER PRODUCT STANDARD SG12917
REV.07**

TABLE : 1

CLAUSe NO.	DESCRIPTION	BHEL'S REQUIREMENT		BIDDERS CONFIRMATION/COMMENTS
1.0	TECHNICAL PARAMETERS	Upto 11kV	20kV & 33kV	
1.1	System Voltage (3Phase, 50 Hz) kV	11	33	
1.2	Insulation level			
1.2.1	System highest voltage kV	12	36	
1.2.2	Power freq. withstand voltage (primary) kV	28	70	
	Power freq. withstand voltage (secondary) kV	2.5	2.5	
1.2.3	Lightening Impulse withstand voltage kVp	75	170	
1.3	Insulation class kV/kVrms/kVp	12/28 /75	36/70 /170	
1.4	STC Rating / duration kA/sec	To be indicated as per contract requirement		
1.5	Instrument safety factor for all metering cores (The ISF shall be as low as practicable and should be less than 10 for lowest. In case of multi ratio CTs, the highest ratio core shall have ISF less than 20.)			
1.6	Continuous Overloading Capacity	120%		
1.7	Neutral Earthing	NON EFFECTIVELY EARTHED		
1.8	Insulation class of CTs	B or better		
1.9	Secondary. Term. & Rating Plate on P1/P2 Side	P2 side		

TABLE : 2**11kV / 33kV, 3 Phase, 50 Hz.**

IT. NO.	CT RATIO	SLOT/ WOUND/ BAR/ MOTOR	ACCURACY / BURDEN			Vendor's drg. ref.	REMARKS/ DEVIATION
			CORE-I	CORE-II	CORE-III		
001						Ref.cl.5.0 of Ann-I	
Bidders confirmation/ Comments							
002						Ref.cl.5.0 of Ann-I	
Bidders confirmation/ Comments							

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PRODUCT STANDARD

SWITCHGEAR ENGINEERING DIVISION

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PAGE 2 OF 2

TABLE : 3

4.0	CLIMATIC CONDITIONS	VENDOR CONFIRMATION/ COMMENTS
4.1	Ambient Air Temp. - -5°C (min) & 50°C (max.)	
4.2	Relative humidity - 10%(min) & 95%(max)	
4.3	Height above MSL - ≤ 1000 meters (consider suitable Altitude correction factor in Impulse withstand for height more than 1000 mtrs)	
4.4	Pollution Severity - Heavily polluted (with coal dust & Fly ash) & Highly corrosive environment.	
4.5	Seismic Coefficient - 0.3g	
4.6	Design Ambient Temp.- 50 Deg.C	

TABLE : 4

11.0	PACKING AND SHIPPING	BHEL'S REQUIREMENT	VENDORS CONFIRMATION / COMMENTS
11.1	Identification marking on CTs	Indicate 'Project name'	

14.0 SPECIAL REQUIREMENT (if any) -

SL. NO.	REQUIREMENT	BIDDERS CONFIRMATION/ COMMENTS
14.1	ALL TYPE TEST REPORTS SHALL NOT BE MORE THAN --- -- YRS OLD. REPEAT TYPE TEST DUE TO THIS SHALL NOT ATTRACT ANY SEPARATE CHARGE.	
14.2	FOLLOWING ITEMS SHALL BE PROCURED IN PAIR, FROM ANY ONE VENDOR ON TECHNICALLY CLEAR & L1 BASIS (AS PER GENERAL REQUIREMENT NOTE-5 OF SG12917 REV.04)	

15.0 IMPORTANT NOTES

15.1	DEVIATION SHALL BE INDICATED ONLY IN ANNEXURE-D (SCHEDULE OF DEVIATIONS) . NO DEVIATION SHALL BE ACCEPTED IF WRITTEN ELSE WHERE. IF NO DEVIATION IS MENTIONED IN ANNEXURE-D THEN IT WILL BE CONSIDERED AS TOTAL COMPLIANCE TO OUR SPECIFICATION	
15.2	VENDORS TO FURNISH VALUES OF KNEE POINT VOLTAGE & MAGNITIZING CURRENT (Vk & Ie) FOR ALL PS CLASS CTS, BOTH AS PER FORMULA AND AS PER ESTIMATED MAGNITIZING CURVE, IN TABLE-7 .	
15.3	VENDORS TO ENCLOSE COPY OF SG12917 REV.07 DULY FILLED IN THE SPECIFIED FORMAT WITH EVERY ENQUIRY, FAILING WHICH THE OFFER MAY NOT BE CONSIDERED.	
15.4	ALL DRAWINGS / DOCUMENTS AS PER ANNEXURE-I CL.11.0 ENCLOSED.	YES/NO

Prepared by :
Date :

Approved by :
Date :

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