Kashmir Power Distribution Corporation Ltd.

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TECHNICAL SPECIFICATIONS

FOR

33 KV CURRENT TRANSFORMER

Prepared by	Checked by	Checked by	Checked by	Approved by
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Specification No. CE/P&P/SPEC/2022/ 33kKVCurrent Transformer/011		**Date of Issue:** 12/08/2022		**Revision: 0**

This is a Tender Specification for procurement of 33 KV CURRENT TRANSFORMER subject to the modification by the Purchaser as per actual field requirement. Supplier to submit the Guaranteed Technical Particulars (GTP) and Drawings, after the award of the Contract, for approval of the Purchaser.

CLIMATIC AND ISOCERAUNIC CONDITIONS (CIC)

1.	The climatic and Isoceraunic conditions at the site of work are approximately given as under:	
	Description	Kashmir
i)	Max. temp of air in shade	30.6^0C
ii)	Min. temp of air in shade	-20^0C
iii)	Max. temp of air in sun	45^0C
iv)	Height above sea level (App.)	1600 Mtrs.
v)	Max. relative humidity	90%
vi)	Min. relative humidity	15%
vii)	Average no. of thunder storm days per year	54
viii)	Average rainfall	80 cm
ix)	Wind Zone	WZ – 3
x)	Average number of rainy days per year	106
xi)	Seismic Zone	SZ – 5
xii)	Area of installation	Heavy Snow Zone

2. **Communication and Transport:**

The nearest railway station is Jammu on the broad gauge line and is connected to the Divisional Stores by a metal road. The equipment is required to pass en-route through various tunnels on NH-44 (Nandni, Nashri and Jawahar Tunnel). The weights and maximum dimension of the packages suitable for transportation through tunnel route are as follows:-

1.	Length	=	7.0 m
2.	Width	=	3.0 m
3.	Height	=	4.55 m
4.	Weight	=	40 metric Ton

The supplier shall get the permissible weight and dimensions confirmed from the Highway Authorities before proceeding with the manufacture of the equipment. It willbe the responsibility of the supplier to ensure timely and proper delivery of the equipment on door delivery basis, at Srinagar, through road transport. The supplier shallalso ensure that the weights and dimension of the packages which are suitable to be carried by road transport up to Srinagar.

3.	**Additional conditions**	
I	Permitted Noise Level	45dB
Ii	Induced Electromagnetic disturbance	1.6kV
Iii	Pollution class/ creepage distance	III/25mm/kV
Iv	Isoceraunic Level (days/year)	50
V	Condensation	Occasional

TECHNICAL SPECIFICATION FOR 33KV CURRENT TRANSFORMERS

1. SCOPE:

i) This specification covers supply, design, manufacture, assembly, testing at manufacturer's works, packing and delivery of outdoor current transformers for protection and metering services in 33 kV Sub-stations.

ii) It is not the intent to specify completely herein all details of the design and construction of equipment. However, the equipment shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation up to the Bidder's guarantee in a manner acceptable to the Purchaser, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment, is not in accordance therewith.

iii) The equipment offered shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification or not.

2. STANDARDS:

Unless otherwise specified elsewhere in this specification, the rating, performance and testing of the current transformers and accessories shall conform to the latest revisions, of all relevant standards listed in Annexure-II

3. PRINCIPAL TECHNICAL PARAMETERS:

The Current transformers in this specification shall meet the technical requirements listed in Annexure III

4.0 GENERAL TECHNICAL REQUIREMENTS:

i) The insulation of the current transformers shall be so designed that the internal insulation shall have higher electrical withstand capability than the external insulation. The designed dielectrics withstand values of external and internal insulations shall be clearly brought out in the GTP (Guaranteed Technical particulars).The dielectric withstand values specified in this specification are meant for fully assembled current transformer.

ii) The C.T. shall be of dead tank type design and shall be so constructed that it can be easily transported to site within the allowable transport limitation, even in horizontal position, if the transport limitation so demands. The C.T. shall be hermetically sealed and shall be subject to the approval of the Purchaser.

iii) The C.T. secondary terminals shall be brought out in a weatherproof terminal box. The terminal box shall be provided with removable gland plate and glands. The cable glands shall be suitable for 1100 volts grade PVC insulated, PVC sheathed multi core stranded 6 sq.mm copper conductor cable. This terminal box shall be dust and vermin proof. The dimensions of the terminal box and its opening shall be adequate to enable easy access and working space with the use of normal tools.

iv) Polarity shall be invariably marked in each primary and secondary terminal. Facility shall be provided for short circuiting and grounding of the CT secondary terminals inside the terminal box.

v) . The CT' shall be provided with a rating plate with dimensions and marking as per I S-2705. The markings s hall be punched and not painted. The serial number and code of the Bidder shall also be punched on the tank to identify the unit in case of loss or damage to the rating plate.

vi). The Current Transformer shall be vacuum filled with oil after processing and t hereafter hermitically sealed to eliminate breathing and to prevent air and moisture entering into the tank. Oil filling and / or oil sampling cocks, if provided to facilitate factory processing should be permanently sealed before dispatching the CT.

vii). The casting of base collar etc. shall be die-cast and tested before assembly to detect cracks and voids if any.

viii). The instrument security factor of metering core shall be low enough, but not greater than 5.This shall be demonstrated on all the ratios of metering core in accordance with the procedure specified in IEC-185 or IS-2705

4.1. PORCELAIN HOUSING:

The porcelain housing shall be of a single piece construction without any joint or coupling. The housing shall be made of homogeneous, vitreous porcelain of high mechanical and dielectric strength. Glazing of porcelain shall be of uniform brown or dark brown colour with a smooth surface arranged to shed away rain water or condensed water particles (fog). The profile of porcelain shall be aerodynamic type as per IEC 815.The creepage distance for the porcelain housing shall be at least 25 mm per KV. The vertical clearance of porcelain housing shall be at least 450mm.

4.2. METAL TANKS:

The C T will be Dead Tank type .The tank shall be fabricated of MS Sheet of minimum 3.15 mm for side walls and 5mm for top and Bottom. The tank will be finished with minimum two coats of Zinc rich epoxy Paint externally. The inner surface shall be painted with oil resistance white enamel paint

All ferrous parts exposed to atmosphere shall be hot dipped Galvanised.

The bottom of the tank shall be adequately accessible for periodical maintenance of open surface.

4.3. INSULATING OIL:

Insulating oil required for first filling of the current transformer shall be covered in Bidder's scope of supply. The oil shall meet the requirements of latest edition of IS- 335.

4.4. PREVENTION OF OIL LEAKAGES & ENTRY OF MOISTURE:

i.) As specified elsewhere in this specification, the current transformer shall be guaranteed for a trouble free and maintenance - free performance for a period as specified. Therefore, the Bidder shall ensure that the sealing of current transformer is properly

achieved. In this connection the arrangement provided by the Bidder at various locations including the following ones shall be described, supported by sectional drawings.

ii.) Locations of emergence of primary and secondary terminals.

iii.) Interface between porcelain housing and metal tanks

iv.) Cover of the secondary terminal box

v) Nuts and bolts or screws used for fixation of the interfacing porcelain bushings for taking out terminals s hall be provided on flanges cemented to the bushings and not on the porcelain.

vi). For gasket joints, wherever used Nitrite Butyl Rubber Gaskets shall be used.

v i i) . The gasket shall be fitted in properly machined groove with adequate Space for accommodating the gasket under compression.

4.5 OIL LEVEL INDICATORS:

i.. For compensation of variation in volume of the oil due to temperature variation, nitrogen cushion or Stainless Steel bellows shall be used. Rubber diaphragms shall not be permitted for this purpose.

ii. Current transformer provided with nitrogen cushion for Compensation of oil volume variation shall be provided with prismatic type oil sight window at suitable location so that the oil level is clearly visible with naked eye to an observer standing at ground level. If metal bellow is used for the above purpose, a ground glass window shall be provided to monitor the position of metal bellow.

4.6 EARTHING:

Two earthing terminals shall be provided on the metallic tank of size 16mm dia and 30 mm length each with one plain washer and one nut for connection to the earth mat of the station

4.7. LIFTING AND MOUNTING ARRANGEMENT

i. Current transformers shall be provided with suitable lifting arrangement, to lift the entire unit. The lifting arrangement (lifting eye) shall be positioned in such a way as to avoid any damage to the porcelain housing, primary terminals or the tanks during the process of lifting for installation / transport. The general arrangement drawing shall show clearly the lifting arrangements provided such as lifting eye, lug, guides etc.

ii. The C T shall be of Pedestal mounting type suitable for outdoor installation on Steel /cement concrete structures. All the clamps, bolts, nuts and washers etc required for mounting the C T on the structure shall be supplied along and shall be galvanized. The bidder shall supply all the terminal connectors etc required for connection to the CT.

4.8. NAME PLATE:

The current transformer shall be provided with non -corrosive, legible name plates, with the information specified in relevant standards, duly engraved / punched on it.

4.9. PRIMARY WINDING:

i) Primary winding shall be bar type or wound type made out of high conductive copper. Conductors used for the primary winding shall be rigid or housed in rigid metallic shell. Unavoidable joints in the primary winding shall be welded type. The details of such welded joints shall be indicated in the drawings. For primary winding, current densities shall not exceed the limit 1.65 A/Sq.mm. for normal current.

ii) The design density for short circuit current as well as conductivity of the metal used for primary winding shall meet the relevant requirement of IS-2705. The Bidder shall furnish detailed calculations for selection of winding cross sections.

iii) The cross section area of primary winding, cross section area of secondary winding, number of primary turns, number of secondary turns, current density etc. shall be mentioned by the Bidder.

iv) The primary winding shall be designed for extended primary current at 120% of rated primary current.

4.10. SECONDARY WINDING:

Suitably insulated copper wire of electrolytic grade shall be used for secondary windings. For multi-ratio design, the multi-ratio shall be achieved by reconnection of the secondary windings.

The excitation current of the CT shall be as low as possible. The Bidder shall furnish, the magnetizing curves for all the cores.

4.11. PRIMARY TERMINALS:

Each primary terminal shall be bimetallic suitable for ACSR wolf/panther.

4.12. SECONDARY TERMINALS:

i) Secondary terminal studs shall be provided with at least 3 nuts and adequate plain and spring washer for fixing the leads. The studs, nuts and washer shall be made of brass duly nickel-plated. The minimum outside diameter of stud shall be 6 mm. The length of at least 15 mm shall be available on the studs for inserting the leads. Horizontal spacing between Centre's of adjacent studs shall be at least 1.5 times the outer dia. of the nuts.

ii) Current transformer characteristic shall be such as to provide satisfactory performance for burdens ranging from 25 % to 100% of rated burden over a range of 5 % to120% of rated current in case of metering CTs and up to accuracy limit factor / knee point voltage in case of protection CTs.

iii) Expansion chamber at the top of porcelain insulator should be suitable for expansion of oil.

iv). Following accessories /fittings shall, but not restricted to be supplied along with the Current Transformers.

i) Pressure release device

ii) Oil Level Indicator

iii) Lifting lugs

5. TESTS

All Type and routine tests shall be carried out as per relevant IS and or IEC

6. DOCUMENTATION:

i) . All drawings shall conform to international standards organization (ISO) ' A' series of drawing sheet / Indian Standards specification IS-656. All drawings shall be in ink and suitable for microfilming. All dimensions and data shall be in System International Units.

ii) The manufacturing of the equipment's shall be strictly in accordance with the approved drawings and no deviation shall be permitted without the written approval of the Purchaser. All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawing shall be at the Bidder's risk.

iii) Nicely printed and bound volumes of operation, maintenance and erection manuals in English language per current transformer of each voltage rating shall be submitted by the Bidder for distribution, prior to the dispatch of the equipment. The manual shall contain all the drawings and information required for erection, operation and maintenance of the current transformer. The manual shall also contain a set of all the approved drawings, type test reports etc.

iv). Approval of drawings / work by Purchaser shall not relieve the Bidder of his responsibility and liability for ensuring correctness and correct interpretation of the drawings for meeting the requirement of the latest revision of applicable standards, rules and codes of practices. The equipment shall conform in all respects to high standards of engineering, design, workmanship and latest revisions of relevant standards and Purchaser shall have the power to reject any work or materials which, in his judgment, is not in full accordance therewith.

iv) Soft copies (Auto CAD & PDF Versions) of all the drawings shall be submitted by the successful bidder.

7. CHALLENGE CLAUSE:

The Purchaser reserves the right to have the material, received after inspection by the authorized inspecting officer, again tested for any parameter(s) from approved/NABL accredited testing house/in house technique of the purchaser. The results if found deviating/unacceptable or in non-compliance with the approved GTP'S, the lot shall be rejected and bidder shall arrange to replace the rejected lot within thirty (30) days of such detection at his cost including to & fro transportation.

8. SCHEDULES

The Bidder shall fill in the following schedules

1. Guaranteed technical particulars of the Current transformers.

ANNEXURE-I

List of type tests (Current transformer)

Sr.No.	Particulars
1)	Short time current tests.
2)	Temperature rise test.
3)	Lightning impulse test for service in electrically exposed installation.
4)	High voltage power frequency wet withstand voltage test
5)	Determination of error or other characteristics secondary to the requirements of the appropriate designation or accuracy class.

ANNEXURE-II

CURRENT TRANSFORMERS

LIST OF STANDARDS

S.No	Standard No.	Title
1)	IS-2165	Insulation co-ordination of highest voltages for equipment's.
2)	IS-2705(I-IV)/1992	Current Transformers
3)	IS-2099	High voltage porcelain bushing.
4)	IS-3347	Dimensions of porcelain transformer bushing.
5)	IS-2071	Method of high voltage testing.
6)	IS-335	Insulation oil for transformers and switchgears.
7)	IS-2147	Degree of protection provided by enclosures for low voltages, switchgear and control.
8)	IEC-185	Current transformers.
9)	IEC-270	Partial discharge measurement.
10)	IEC-44(4)	Instrument transformer measurement of PDs.
11)	IEC-171	Insulation co-ordination.
12)	IEC-60	High voltage test techniques.
13)	IEC-8263	Method of RIV tests on high voltage insulators.
14)		Indian Electricity Rules, 1956.

ANNEXURE-III

PRINCIPAL TECHNICAL PARAMETERS OF CURRENT TRANSFORMERS

(Protection cum Metering)

1	Nominal System Voltage	33KV
2	Highest System Voltage	36KV
3	Rated Frequency	50Hz
4	No. of Phases	3
5	Method of Earthing System To be Connected.	Solidly Earthed
6	One Minute Power Frequency Withstand Voltage.	70KV rms
7	Lightening Impulse Withstand Voltage.	170KVP
8	System Fault Level	25KA for 3sec
TECHNICAL PARAMETERS:		
1	Type	Single phase, dead tank /Polycrete Dry type, Outdoor, oil filled hermetically sealed
2	Type of mounting	Pedestal type
3	Rated Primary Current	400-200/5-5 A (3 core-2 ratio)
4	Rated Continuous Thermal Primary Current	120% of Rated Current

5	Power frequency over voltage withstand requirement for Secondary winding (kVrms)	As per clause 9.4 and 9.5 of IS 2705(Part-I)		
6	Rated Short time Withstand Current KAP (i) Duration For Primary Current of 150Amp and above. (ii) Duration For Primary Current of below 150 Amp .	3 sec 1 sec		
7	Rated Dynamic Withstand Current	62.5 KA rms		
8	Maximum Temperature Rise	As per IEC- 185 / IS 2705		
9	Minimum Creepage Distance of Housing	900mm (min)		
10	One Minute Power Frequency Withstand Voltage Between Secondary Terminals And Earth.	3 kv		
11	R_{CT}	≤ 0.2ohms/100 turns		
12	Knee Voltage at Max Temp.	250 V.		
13	Terminal Connecters.	Bi-metallic suitable for ACSR Wolf/Panther.		
14	Details Of Secondary Core: Current Ratio Accuracy Class Burden (VA) Instrument Security Factor Accuracy Limit Factor	Metering 5A 0.5 30 ≤5 -	Protection 5A 5P10 30 - ≥10	Differential 5A PS - - -

The Bidder should submit Magnetization Curve of all cores of CT's.

Important Note: -

(i) PS: As per IS 2705 part-4(for protection).
(ii) Rct: Resistance of secondary winding of CT
(iii) P - Protection (Main / back up)
(iv) M - Metering.
(V) Instrument security factor < 5

To be furnished by the bidders)

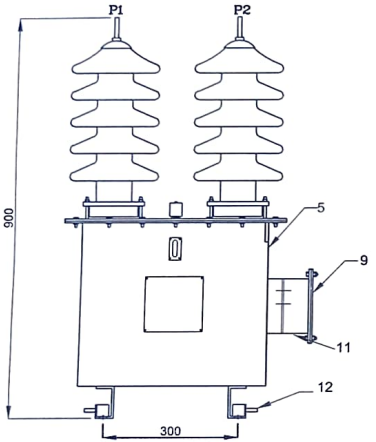
Guaranteed Technical Particulars For CURRENT TRANSFORMERS

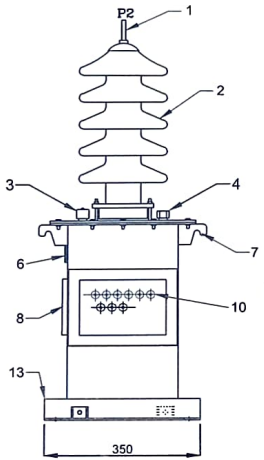
SYSTEM PARAMETERS		
S No.	**PARTICULARS**	
1	Nominal System Voltage	
2	Highest System Voltage	
3	Rated Frequency	
4	No. of Phases	
5	Method of Earthing System To be Connected.	
6	One Minute Power Frequency Withstand Voltage.	
7	Lightening Impulse Withstand Voltage.	
8	System Fault Level	
TECHNICAL PARAMETERS:		
1	Type	
2	Type of mounting	
3	Rated Primary Current	
4	Rated Continous Thermal Primary Current	
5	Power frequency over voltage withstand requirement for Secondary winding (kVrms)	

6	Rated Short time Withstand Current KAP (iii) Duration For Primary Current of 150Amp and above. (iv) Duration For Primary Current of below 150Amp .	
7	Rated Dynamic Withstand Current	
8	Maximum Temperature Rise	
9	Minimum Creepage Distance of Housing	
10	One Minute Power Frequency Withstand Voltage Between Secondary Terminals And Earth.	
11	R_{CT}	
12	Knee Voltage at Max Temp.	
13	Terminal Connecters.	
14	Details Of Secondary Core: Current Ratio Accuracy Class Burden (VA) Instrument Security Factor Accuracy Limit Factor	

Signature of the tenderer: _____
Name: _____
Designation: _____

NOTE :- 1. PHASE TO EARTH DISTANCE :- 380mm (Min.)
2. CREEPAGE DISTANCE OF H.T. BUSHING :- 900mm (Min.)

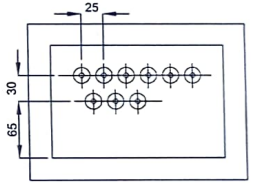




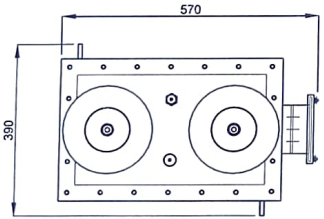
BILL OF MATERIAL

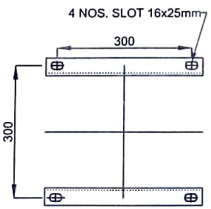
S.No.	ITEM	MATE. / SPEC.	QTY.
1.	PRIMARY TERMINALS	M-20 TINNED COPPER	2Nos.
2.	H.T. BUSHING	PORCELAIN 8603 TYPE JAIPUR GLASS / CJI / GENESIS	2Nos.
3.	PRESSURE RELIEF VALVE (SPRING TYPE)	BRASS/M.S.	1No.
4.	OIL FILLING CAP	M.S.	1No.
5.	MAIN TANK WITH TOP/BOTTOM COVER (5 mm) AND SIDE WALLS (3.15 mm)	5mm/3.15mm M.S.	1No.
6.	OIL LEVLE INDICATOR	ALUMINIUM & GLASS	1No.
7.	LIFTING LUGS	M.S.	2Nos.
8.	RATING PLATE	AL. ANODISED	1No.
9.	SECONDARY TERMINAL BOX	M.S. WITH SEALING ARRANGEMENT	1Nos.
10.	SECONDARY TERMINALS	M-6, NICKLED BRASS	AS REQ.
11.	L.T. GLAND HOLE	1"	1No.
12.	EARHTING TERMINALS	M.S., 16 x 30mm	2Nos.
13.	MOUNTING CHANNEL	M.S. (75 x 40 mm)	2Nos.

Note: Primary conductor:- 160 Sqmm - 3 Turns
Secondary conductor:- For Met. wdg. - 18SWGx2/16SWG - 120/240 Turns.
For Prot. wdg. -16SWG - 120/240 Turns.
For PS wdg. - 16SWGx2 - 120/240 Turns.



SECONDARY TERMINAL BOX





MOUNTING DETAILS

Note:
1. All dimensions are in mm unless otherwise specified.
2. Tolerance ±5%
3. In case of any discrepancy, please report to CE, P&P Wing KPDCL.
4. Tender drawings subject to modification by the owner as per field requirement. Contractor to submit his drawings after the award of contract for approval of the owner

P&P Wing, Kashmir Power Distribution Corporation Ltd.		Name	Signature	Date
	Drawn	Er. Gh. Qadir (AEE)		16/6/2022
	CHECKED	Er. Manzoor (EE)		20/06
	CHECKED	Er. Muzaffar (SE)		27/06
	APPROVED	Er. Bashir (CE)		12/8
TITLE: 33 kV O/D, O/C, D/B CURRENT TRANSFORMER.			Scale	NTS
			Rev	00
Drawing no	CE/P&P/Dwg./33KV CT/ 002		Sheet	1 of 2
Date of issue	12-08-2022			

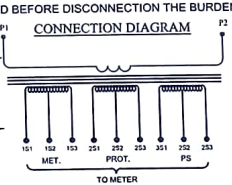
33 kV CURRENT TRANSFORMER

SR. No.	A1121/1E3-	RATED PRI. CURRENT	400-200 A
STANDARD	IS 2705	ALF	10
RATIO	400-200/5-5-5 A	ACC. CLASS	0.5 / 5P / PS
B.I.L.	36 / 70 / 170 kVp	NO. OF CORE	THREE
BURDEN	30 / 30 / - VA	VK (PS CORE)	> 250 V at 400 A
FREQUENCY	50 Hz.	STC	25 KA / 3.0 SEC.
NOM. SYS. VOLTAGE	33 kV	RATED DY. CURRENT	62.5 KA
HIGHEST SYS. VOLTAGE	36 kV	Rct (PS CORE) at 75°C	< 0.2 Ω / 100 Turns
TYPE	O/D, O/C, D/B	PURPOSE	MET / PROT / PS
MIN. CPG.	> 900 mm	QUANTITY OF OIL	35 Ltr. ± 5
EXCITING CURRENT	< 100 mA at VK	TOTAL WEIGHT	90 Kg. ± 5
YEAR OF MFG.		RATED THER. CURRENT	120 % RATED PRI.
CLASS OF INSULATION	A		

CAUTION: SECONDARY TERMINAL MUST BE SHORTED BEFORE DISCONNECTION THE BURDEN

DRAWING NO.	G-A1121/1E3-01 N-A1121/1E3-01
NO OF TURNS IN PRIMARY WDG.	3
NO OF TURNS IN SECONDARY WDG.	120-240

CONNECTION DIAGRAM



CORE	TERMINAL	RATIO	RATED VA	ACC. CL	KVP/ExAMOS	Rct at 75°C
I	1S1-1S2	200/5 A	30	0.5	-	-
	1S1-1S3	400/5 A	30	0.5	-	-
II	2S1-2S2	200/5 A	30	5P	-	-
	2S1-2S3	400/5 A	30	5P	-	-
III	3S1-3S2	200/5 A	-	PS	-	-
	3S1-3S3	400/5 A	-	PS	> 250 V <100 mA at VK	< 0.2 Ω / 100 Turns

CLIENT PROJECT

P.O. NO.

Note:
1. All dimensions are in mm unless otherwise specified.
2. Tolerance ±5%
3. In case of any discrepancy, please report to CE, P&P Wing KPDCL.
4. Tender drawings subject to modification by the owner as per field requirement. Contractor to submit his drawings after the award of contract for approval of the owner

P&P Wing, Kashmir Power Distribution Corporation Ltd.

	Name	Signature	Date
Drawn	Er. Gh. Qadir (AEE)		16/6/2022
CHECKED	Er. Manzoor (EE)		20/06
CHECKED	Er. Muzafar (SE)		27/06
APPROVED	Er. Bashir (CE)		12/9

TITLE: RATING AND CIRCUIT DIAGRAM PLATE OF 33 kV CURRENT TRANSFORMER		Scale	NTS
		Rev	00
Drawing no	CE/P&P/Dwg./ 33kV CT/001	Sheet	2 of 2
Date of issue	12-09-2022		