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TECHNICAL SPECIFICATIONS

FOR

33 KV CT/PT COMBINED UNITS

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Specification No. CE/P&P/SPEC/2022/33KV CTPT COMBINED UNITS/013		**Date of Issue:** 12/08/2022		**Revision: 0**

This is a Tender Specification for procurement of 33 KV CT PT COMBINED UNIT 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 will be 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 shall also 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	1.6k V
iii	Pollution class/ creepage distance	III/25mm/kV
iv	Isoceraunic Level (days/year)	50
v	Condensation	Occasional

Technical specifications for 33KV CTPT combined units

1. SCOPE:

This specification covers design, engineering, manufacture, assembly, stage testing, inspection, testing, supply and delivery of 33KV CT PT Combined Metering unit Sets of class of accuracy **0.2 for 33 KV Metering Unit** as per the particulars given in the schedule attached.

2. STANDARD:

Except where modified by this specification, the component parts of the equipment shall comply with the following IS available (the latest versions).

Current Transformers	IS 2705
Potential Transformers	IS 3156
HV Porcelain Bushing	IS 2099
Oil	IS 335
Galvanization	IS 2633
Primary Terminals	IS:10601
Winding Wires	IS:4800
Dimensions of bushings	IS:3347

3. TYPE FOR 33 KV:

The metering transformer equipment should be of pole mounting type for outdoor use. They are to be used in 33 kV Three Phase with solidly earthed neutral and suitable for 3 Phase 4 Wire 50 cycles network. The equipment is required for operation of HT Trivector Meters and should be oil cooled.

The CTPT sets shall have the following ratings.

i. Rated Voltage: 33 KV

ii. Highest system voltage: 36 KV

iii. Insulation level: 36 KV

iv. Standard Impulse withstand voltage: 170 KV peak

v. One minute power frequency withstand Voltage

Primary :	70 KV
Secondary :	3 KV

vi. Short time thermal current and its duration

a. 9 KA for 1 sec for CT ratio below 50/5 A

b. 13.1 KA for 1 sec for CT ratio for > 50/5 A (including 50/5A)

vii. Class of Accuracy: 0.2 (Negative (-ve) errors will not be acceptable.)

viii. Rated burden per Phase

a. For CTs: 5 VA up to 50/5 A & 10 VA for => 50/5 A

b. For PTs: 50 VA

ix. Frequency: 50 HZ

x. Maximum attainable winding temperature=80^{o}C

xi. Minimum Phase to Phase distance=430mm

xii. Shortest distance between metal part &earth=380mm
xiii. Creepage distance of HV bushing= 900mm (Min)
xiv. Thickness of MS Tank Min 5mm for top cover & 3.15 mm bottom & all other side.
xv. Entire tank shall be hot dip galvanized.
xvi. Bi-metallic terminal connector with a nut, plane washer, spring washer & check nut suitable for aluminum conductor required for different rating of metering units. Six nos to be provided with each metering units.

4. DESIGN:

a. The equipment shall be designed to ensure satisfactory operation under all conditions of service to facilitate easy inspection, cleaning and repairs.

b. The design shall incorporate every reasonable precaution and provisions for safety of all those concerned in the operation and maintenance of the equipment. A pressure relief valve shall be invariably provided to the CT PT set. It shall be provided at the top cover of the tank.

c. All outdoor apparatus shall be so designed that water cannot stay at any point and enter the CT/PT set. The top cover of the tank, secondary terminal cover, inspection chamber cover plate should be suitably bent at the edges ***(at least 25mm bent)*** so that the gaskets are not exposed to moisture.

d. All connections and terminals shall be of sufficient size for carrying the specified currents continuously without undue heating.

e. All bolts, nuts, washers in contact with non-ferrous parts shall be of brass.

f. All ferrous parts including bolts & nuts liable to corrosion, forming integral part of the equipment shall be smoothly and continuously hot dip galvanized.

g. The secondary terminal box, inspection cover and oil gauge shall be arranged with MU.

h. The core shall be high grade non-ageing electrical silicon laminated steel or of better grade of low hysteric loss and high permeability to ensure high accuracy, at both normal and over current/voltage.

i. All windings shall be of insulated high grade Electrolytic copper wire and the manufacturing of the units shall be done in completely closed and air-conditioned room otherwise fibre glass insulation sleeves are to be provided for primary winding. Details of winding and core shall be furnished by the manufacturer.

j. The CTPT set should have Three CTs and Three PTs with star/star connection.

5. SEALING:

Sealing bolts for sealing at 4 points on the secondary terminal box (both inner & outer), inspection cover, the top cover of the tank shall be provided. This may be made by providing a hole on tail of corner bolts of adequate size to pass the sealing wire 13 SWG or above.

6. FLUCTUATION IN VOLTAGE AND FREQUENCY:

For continuous operation, entire equipment shall be subjected to variation of voltage up to + 20% and – 30%, frequency of ± 5%.

7 INSTRUMENT TRANSFORMERS:

a) The voltage and current transformers shall have normal continuous rating as per the schedule of requirement.

b) Thevoltagetransformershallbesodesignedthattheincreasedmagnetizingcurrents due to any persisting over voltage, does not produce injurious over heating. Phase barriers shall be provided.

c) The peak value of the rated dynamic current shall not be less than 2.5 times the rated short time thermal current unless stated otherwise. (4.62 of ISS: 2705/Part-I of 1992, latest version).

d) Modified polyester enamel copper wire is to be used for winding and it shall conform to IS-4800/Part-V (latest version).

e) The terminals of the instrument transformer shall be clearly marked by distinctive letters as

stated in Annex "C" of ISS: 3156/Part.I/1992 (latest version) for voltage transformer and Annex "C" of IS-2705/Part.I/1992 (latest version) for current transformers.

f) The winding shall be neatly laid and anchored.

g) The metering set tank and other metal parts shall be galvanized both inside & outside as per latest IS applicable.

8. INCOMING SIDE:

TERMINALS:

Brass rods 12mm dia for Primary and 6 mm dia for secondary.

Bushing for outgoing side of CT/PT set :

The porcelain portion of HT bushings shall be of standard make and conform to IS 2099/1996.

The dimensions of the bushings shall conform to I S - 33 4 7 /Part.III/19. The minimum phase-to-phase clearance shall be as per IS.

The tests as per IS-2099/1962 shall be conducted on the transformer bushings as detailed below:

a) Dry flash over voltage.

b) Wet flashover voltage.

c) Dry 1 Min. withstand volt.

d) Impulse withstand voltage (1.2/50 Micro Seconds –ve wave)

e) Manufacturer's test certification may be furnished for every lot of offer.

The bushing stems shall be provided with suitable bimetallic connectors so as to connect the jumper without disturbing the bushing stem.

f) The bushrod stem length should be atleast 40mm and 3 nuts with 2 flat washers of brass material should be provided with each bush rod.

9. STEEL TANK:

The oil filled container incorporating the voltage transformers and current transformers should be fitted with incoming and outgoing primary terminals and secondary terminal box. dghThe secondary terminal box shall be arranged on sides. The general arrangement drawing with 3 bushing on the incoming side and 3 bushings on the outgoing side shall be submitted by the manufacturer.

The tank shall be built with a plate of 5 mm thick top and 3.15 mm sides and bottom end with all fittings and shall be capable of withstanding without leakage or distortion at the standard test pressure. All joints of the tank and fittings shall be hot oil tight and no leakage should occur during service. Both side of the joint should have continuous welding.

a) It shall be provided with an oil gauge. The oil gauge glass shall be fixed to the side of the raised wall of the inspection box.

b) The tank shall be provided with necessary lifting lugs. Tank including top cover shall be hot deep Galvanized.

c) The secondary terminal box cover, tank cover and inspection cover and other vertical joints where gaskets are used shall be suitably bent at least 25 mm bent with necessary sealing arrangement with sealing bolts at all corners and bolts should be at least 10 mm diameter GI bolts spaced maximum 70 mm apart. This is to safeguard against seepage of water into tank in case of damaged gasket.

d) The 6 mm gaskets shall be dovetailed without joints to prevent moisture entry. In case of dovetailed joint, they shall not be more than two. The gaskets shall be of good quality Neoprene or superior quality rubberized gasket.

e) EARTHING: Two earthing terminals shall be adequate size protected against corrosion and metallically clean and identified by means of the sign marked in a legible and indelible manner on or adjacent to the terminals.

1. All bolts should be provided with 2 flat washers and a spring washer with a nut.
2. Conservator should not be provided for these CTPT sets.

3. The Secondary terminal box incoming hole should be 32 mm diameter and at a suitable height from bottom. The secondary terminals size should be 6 mm diameter, 25 mm stem length, 2 flat washers with 3 nuts of brass material should be provided. The terminals should be provided at least 70 mm height from incoming hole and clearances shall be as per IS to avoid shorting terminals due to secondary wires pipe.
4. Secondary chamber shall have double door (inner & outer) with suitable arrangement for sealing of both the doors. The inner door shall be of transparent Polycarbonate so that secondary terminal connections can be viewed without breaking the inner door seals.
5. The following details of equipment shall be engraved on tank with at least 10 mm letters.
    1. Make
    2. Ratio
    3. Class of accuracy
    4. Serial No:
    5. Month & year of manufacturing
    6. Property of Employer.

18 months guarantee embossed plate shall be welded opposite side of name plate.

10. MOUNTING ARRANGEMENT:

The under base of all CTPT sets shall be provided with two 75x40mm GI channels and foundation dimensions shall be suitable placing with tank base uniform for all sets with only ±2 mm tolerance, to avoid modification of structure / plinth, whenever CTPT set is replaced

11. OIL: The insulation oil used in the tank shall comply with the requirements specified in latest relevant IS: 335/93.

12. GUARANTEED TECHNICAL PARTICULARS:

The Technical Particulars as specified in IS shall be guaranteed. Every tenderer should furnish the particulars required and guarantee the values so furnished for the supplies.

13. TESTS:

TYPE TESTS: The equipment offered shall be fully type tested from recognized standard govt. national laboratory. The manufacturers shall also furnish type test certificates for bushings and oil. **The type test certificates shall be not older than (07) years.**

TYPE TESTS FOR CTs:

a) Verification of terminal marking and polarity
b) Short time current Test.
c) Temperature rise test.
d) Lightning Impulse test
e) High Voltage Power frequency wet withstand voltage test.
f) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class.

TYPE TESTS FOR PTs:

a) Verification of terminal marking and polarity.
b) High voltage Power frequency wet withstand voltage test.
c) Power frequency dry withstand tests on Primary winding. Power frequency dry withstand test on

Secondary winding.

d) Determination of errors according to the requirements of the appropriate accuracy class.
e) Temperature rise test.
f) Impulse Voltage test.
g) Lightning Impulse test

TYPE TESTS FOR TRANSFORMER BUSHINGS:

i) Dry flash over voltage.
ii) Wet flash over voltage.
iii) Dry 1 Minute withstand voltage.
iv) Impulse withstand voltage (1.2/50 Micro Seconds –ve wave)

ACCEPTANCE AND ROUTINE TESTS:

The following shall be conducted as per IS: 3156 (Latest version).

i) Verification of Terminal marking and polarity.
ii) Power frequency/ dry withstand tests on primary windings.
iii) Power frequency dry withstand tests on secondary windings.
iv) Determination of errors according to the requirements of the appropriate accuracy class.
v) Temperature rise test**.**
vi) Air pressure test on empty tank of M U opened for verification test (One for every lot offered for pre-dispatch inspection)
vii) All acceptance and routine tests as stipulated in the relevant standards shall be carried out by the manufacturer in presence of Employer representatives.

14. DRAWINGS AND LEAFLETS (along with tender):

Two sets of drawings showing clearly the general arrangements, sectional views, fitting details, electrical connections**,** *foundation details, overall dimensions* and design features of each component part should accompany the tender. The supplier has to submit clear & detailed drawings with description how he will arrange the double door system in secondary chamber with sealing. Technical leaflets giving the operating instructions should also be furnished. Literature and drawings are to be sent along with each equipment while dispatching, after approval.

15. DEVIATIONS:

The deviations between these CTPT sets and NABL approved Standard Lab (CPRI, ERDA, etc.,) type tested CTPT set along with detailed reasons for deviations if any shall be submitted along with tender.

16. TOLERANCES:

Unless otherwise specified herein the test value of the transformers supplied should be within the tolerance permitted in the IS on the guarantee values.

17. SEALING OF CTPT SETS AFTER TESTING AND INDIVIDUAL TEST REPORTS:

After witnessing testing on sample quantity and physical inspection of all offered CTPT sets, the purchaser's representative will provide numbered plastic seal bits to two opposite corners of tank, Secondary Chamber and inspection cover of all offered CTPT sets, for delivery of correct inspected materials only. The manufacturer has to provide test report duly mentioning all test results, seal bit numbers and name &address of Employer representative after inspection is over. The seal bit numbers shall also be mentioned in the test reports signed by Employer representative submitted for delivery instructions.

18. INSPECTION AND TESTING OF TRANSFORMER OIL:

To ascertain the quality of transformer oil the manufacturer's test report should be submitted at the time of inspection .Arrangements should also be made for testing the transformer oil, after taking out the samples from the manufactured CTPT sets and tested in the presence of Employer representative (or) if desired, in an independent laboratory manufactured CTPT sets and tested in the presence of Employer representative (or) if desired, in an independent laboratory.

19. DEPARTURE FROM SPECIFICATION:

If the tenderer wishes to depart from this specification in any respect, he shall draw the attention to such points of departure explaining fully the reasons therefore. Unless this is done the requirements of this specification will be deemed to have been accepted in every respect.

20. NAME PLATE:

The Purchase order No. and Date of purchase order, the words **"PROPERTY OF KPDCL"**. The name plate shall be non-detachable type & fixed with rivets, not with bolts & nuts. The name plate should bear year & month of manufacture & other data as per IS. Space should be provided to punch the date of installation by user group.

21. WARRANTY:

The manufacturer will warrant for the satisfactory functioning of the material / equipment as per specification for a minimum period of 18 months from the date of dispatch of the material / equipment in good condition indicating GP covering date upto ----------

22. The tenderer shall indicate the source of all materials. He shall also indicate thename of the manufacturer and make of conductor, Transformer oil Electrical Steel Laminations, Construction Steel etc.

23. FITTINGS:

The following standard fittings shall be provided.

a) Rating and terminal marking plates non detachable -1no.
b) Earthing terminals with bolt, nuts & washers for connecting earth wire - 2Nos.
c) Lifting lugs -4Nos.for main tank and 2Nos. for top cover.
d) Pressure relief valve. – 1 no.
e) Bimetallic terminal connectors on the HV bushings – 6 Nos.
f) HV bushings Outdoor – 6 Nos.
g) Secondary terminals bushings – 10 Nos
h) Base channels 75 x 40 mm.
i) 18 months guarantee embossed plate welded to tank opposite side of name plate.
j) Tank and over all dimensions.
k) Weight content of a) core b) windings c) tank & fittings d) weight/qty. of oil e) over all weight.

24. 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.

GUARANTEED TECHNICAL PARTICUALRS

(TO BE FURNISHED BY SUPPLIER)

VOLTAGE TRANSFORMERS:		
1.	Maker's name and address	
2.	Manufacturer's Type & Designation	
3	Nature of service	
4	Type of Cooling	
5	Rated system Voltage	
6.	Highest system voltage	
7.	Ratio of the rated primary voltage to the corresponding rated secondary voltage.	
8.	System voltage expressed in symbolic notion.	
9.	Rated burden in volt-amperes per phase.	
10.	Rate frequency :Cycles per second.	
11	Class designation :i.e. Accuracy	
12	Limits of error:a)Ratio Error. b)Phase difference in minutes.	
13	Rated Voltage Factor & Time	
14.	Maximum temperature rise.	
15.	Max. voltage that can be withstood by the primary For one minute: kv.	
16.	Insulation strength.	
17.	One-minute power frequency dry withstand test voltage on secondary winding.	
18	Winding wire on Primary a. Diameter in mm b. Type/grade of material	
19.	Winding wire on secondary a. Diameter in mm b. Type/grade of material	
20.	Inter layer insulation.	
21.	Core material grade and details	

CURRENT TRANSFORMERS		
1.	Maker's name.	
2.	Type	
3.	Ratio of the rated primary current to the corresponding rated secondary current.	
4.	Rated burden in volt-amperes.	
5.	Rated frequency :Cycles per second.	
6.	Class designation :i.e. Accuracy	
7.	Overcurrent factor and time	
8.	Limits of error: a)Ratio Error. b)Phase difference in minutes.	
10.	Maximum temperature rise.	
11.	Continuous percentage overload.	
12	Impulse withstand test voltage KV (Peak)	
15.	Short circuit current and duration.	
16	Rated current dynamic(Peak value)	
17	Whether overvoltage protection for open circuit of secondary moulded if Provided details to be furnished	
18	Inter layer insulation	
19	Resistance per Phase at 75 deg C in Ohms	
20	Turns on a. Primary b. Secondary	
21	Core material grade and details	
22	Winding wire Primary Diameter in mm Type/grade of material	
23	Winding wire Secondary Diameter in mm Type/grade of material	

III. **Details of Cable Boxes & Bushings:**

IV. **OIL:**

1. Grade of oil
2. Quantity of oil for first filling a)Litres
   b)Kgs

V. **TANK:**

1. Dimension and thickness.
2. Standard pressure that can be withstood.

VI. **GENERAL:**

1. The design shall incorporate every reasonable precaution and provisions for safety of all those concerned in the operation and maintenance of the equipment.
2. All outdoor apparatus shall be so designed that water cannot collect at any point.
3. On outdoor equipment, all bolts, nuts, washers in contact with non-ferrous parts shall be of phosphor bronze.
4. The oil gauge glass shall be fixed appropriately.