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Drawing approval subject to valid vendor registration

**FOR EPC CONTRACTS ONLY**  
 LIST OF DRAWINGS AND DOCUMENTS FOR 145 KV, 4400 pF Capacitive Voltage Transformer (25 mm/ kV)

| SR NO. | DESCRIPTION OF DRAWINGS            | DRAWING NO.                | REVISION | DATE       |
|--------|------------------------------------|----------------------------|----------|------------|
| 01     | General Arrangement Drawing        | (4)G71AIN-NA202-Z2283-100  | --       | 22.12.2022 |
| 02     | Rating Plate Drawing               | (4)G71AIN-NA202-N2283-100  | --       | 22.12.2022 |
| 03     | Secondary Box GA Drawing           | (4)G71AIN-NA202-W2283-100  | --       | 22.12.2022 |
| 04     | Cross Sectional View for CVT       | (4)G71AIN-NA202-E2283-100  | --       | 22.12.2022 |
| 05     | Cross Sectional View for Insulator | (4)G71AIN-NA202-L2283-100  | --       | 22.12.2022 |
| 06     | Guaranteed Technical Particulars   | 145 KV CVT/ GTP/ APTRANSCO | --       | 22.12.2022 |
| 07     | Type Test reports List             | 145 KV CVT/ TTR/ APTRANSCO | --       | 22.12.2022 |

NOTE : DRAWING APPROVAL SUBJECT TO VALID TYPE TEST REPORTS, TO BE CHECKED DURING ACCEPTANCE TESTS.

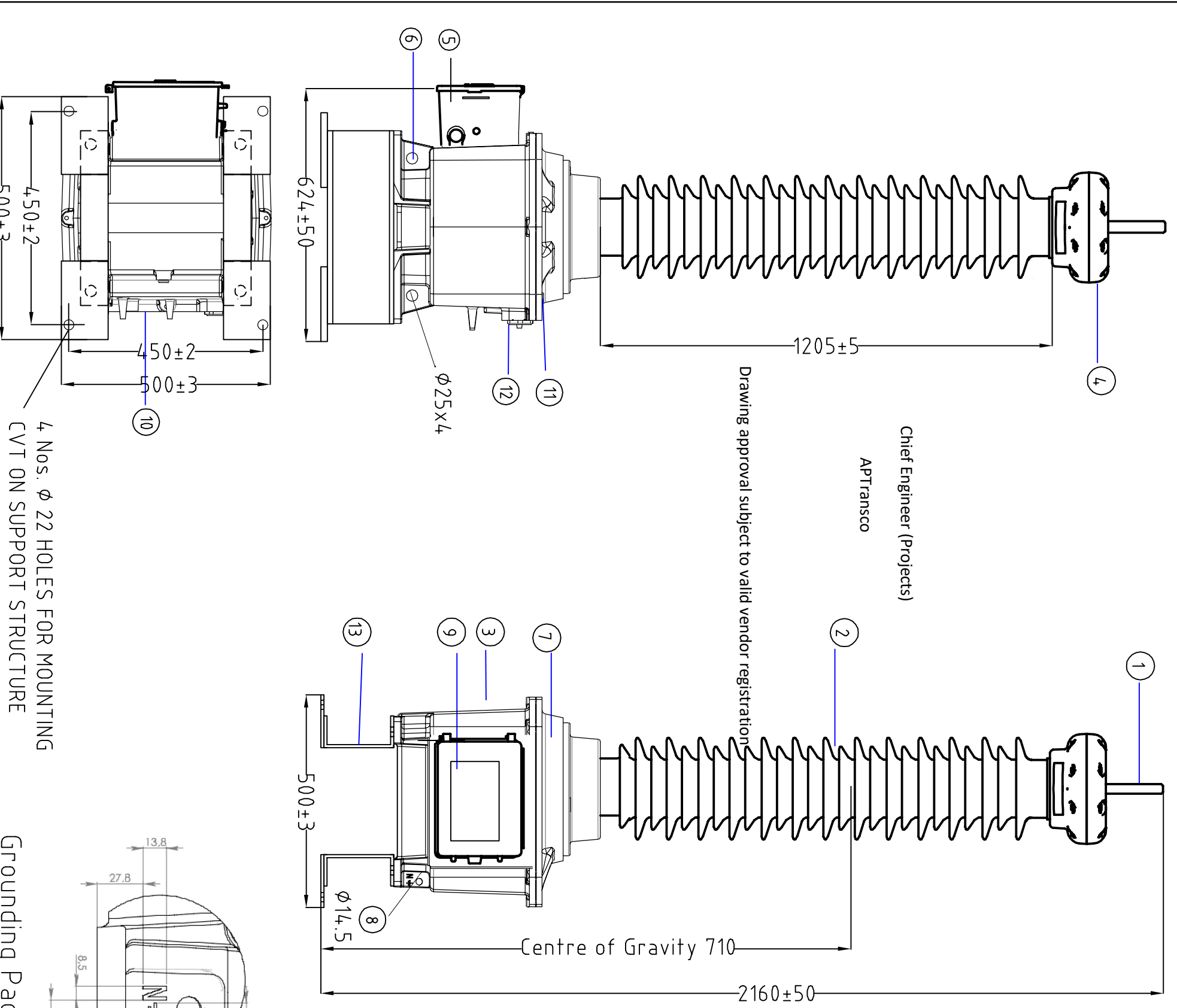
Chief Engineer (Projects)  
 APTransco

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|      |          |  |                         |  |               |  |                          |
|------|----------|--|-------------------------|--|---------------|--|--------------------------|
| Date | 22.12.22 | Customer: Transmission Corporation of Andhra Pradesh Limited | Siemens Ltd.            | Desor : 145 KV Outdoor, Oil Cooled hermetically sealed Capacitive Voltage Transformer. | S O No. : --  | Quantity : --                            | NOT TO SCALE             |
| Prep | LB       | Project: --  | AURANGABAD              | Details : List of Drawing and Documents  | Item No. : -- |  | All dimensions are in mm |
| Okd. | AR       | LOA No. : --   |                         |  |               | Drawing No. :- (4)G71AIN-NA202-R2283-100 |                          |
| Date | Prep     | Okd.   | Original/Replaced By :- |  |               |  |                          |

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4 Nos.  $\phi$  22 HOLES FOR MOUNTING  
CVT ON SUPPORT STRUCTURE

Grounding Pad Details

| NOS. | DESCRIPTION                       | MATERIAL        | QTY |
|------|-----------------------------------|-----------------|-----|
| ①    | H. V. TERMINAL ( $\phi$ 30 x 100) | ALUMINUM ALLOY  | 01  |
| ②    | INSULATOR                         | PORCELAIN       | 01  |
| ③    | BASE BOX                          | ALUMINUM ALLOY  | 01  |
| ④    | TOP COVER                         | ALUMINUM ALLOY  | 01  |
| ⑤    | TERMINAL BOX                      | ALUMINUM ALLOY  | 01  |
| ⑥    | LIFTING EYE                       | ALUMINUM ALLOY  | 04  |
| ⑦    | TANK COVER                        | ALUMINUM ALLOY  | 01  |
| ⑧    | ARRANGEMENT FOR GROUND PAD        | ALUMINUM ALLOY  | 01  |
| ⑨    | RATING PLATE                      | ALUMINUM ALLOY  | 01  |
| ⑩    | MV TAP GROUNDING SWITCH           | ALUMINUM ALLOY  | 01  |
| ⑪    | OIL SAMPLING PLUG                 | SS              | 01  |
| ⑫    | OIL LEVEL INDICATOR               | ALUMINIUM+GLASS | 01  |
| ⑬    | BASE FRAME                        | MS+HDG          | 02  |

**TECHNICAL DETAILS:**

APPLICABLE STANDARD : IEC 61869-5 & IEC 60358

RATED VOLTAGE : 132 kV/sqrt3

HIGHEST SYSTEM VOLTAGE : 145 kV

H.V. TEST VOLTAGE : 275 kV rms for 1 min

IMPULSE TEST VOLTAGE : 650 kVP

RATED FREQUENCY : 50 Hz

'HF' CAPACITANCE : 4400 pF (+10%, -5%)

PRIMARY CAPACITANCE C1 : 4771.8 pF (+10%, -5%)

SECONDARY CAPACITANCE C2 : 46286.6 pF (+10%, -5%)

TOTAL OUTPUT SIMULTANEOUS : 50 VA / 0.2 & 150 VA / 3P

**NOTES**

- TOTAL CREEPAGE DISTANCE : 3625 mm
- OIL QUANTITY : 33 kg
- WEIGHT OF CVT: 24.1 kg
- WEIGHTS INDICATED ARE APPROXIMATED.
- GENERAL TOLERANCE AS PER IS: 2102 WILL BE APPLICABLE WHERE TOLERANCE IS NOT INDICATED.
- PORCELAIN MAKE: IEC/ MODERN/ CJI/ ABI.

|             |          |       |   |
|-------------|----------|-------|---|
| Description | Date     | Prep. | Customer: Transmission Corporation of Andhra Pradesh Limited.                           |
|             | 22.12.22 | LB    | Contractor: --  |
|             |          | AR    | Project: --   |
|             |          |       | LOA No.: --   |
|             |          |       | Original/Replaced By: --  |
|             |          |       | Siemens Ltd.  |
|             |          |       | AURANGABAD  |
|             |          |       | Descr : 145 KV, Outdoor, Oil Cooled hermetically sealed Capacitive Voltage Transformer. |
|             |          |       | Details : General Arrangement Drawing   |

|  |               |                          |
|--|---------------|--------------------------|
| S.O.No. : --                             | Quantity : -- | NOT TO SCALE             |
| Item No. : --                            |               | All dimensions are in mm |
| Drawing No. :- (4)G71AIN-NA202-Z2283-100 |               | SH 1                     |
|  |               | SH 1                     |

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### CAPACITOR VOLTAGE TRANSFORMER

Made in India.

RATING AND SCHEMATIC PLATE

**Customer :** Transmission Corporation of Andhra Pradesh Limited.

**Project:** --

**Contractor:** --

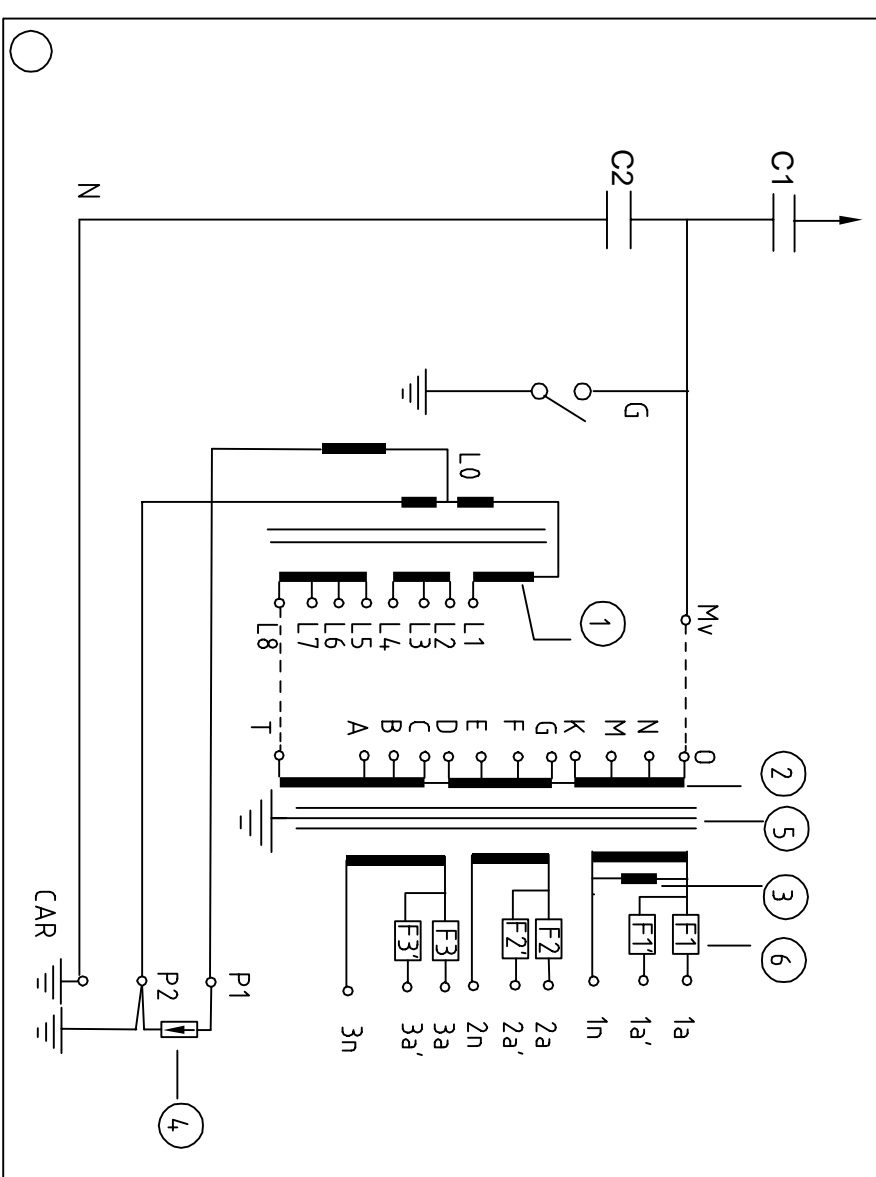
**LOA No.:** --

Type **TCVT 145** Insulation level **275 KV/ 650 KV<sub>p</sub>** Standard **IEC 61869-5** Capacitance **4400 pF (+10%, -5%)** Total Weight **241 kg** S.O. No. **--**

Highest System Voltage **145 KV** Voltage Factor **1.2 Continuous 1.5 - 30 Sec** Frequency **50 Hz** Simultaneous Burden **50 VA / 0.2 & 150 VA / 3P** Oil Weight **33 kg** Sr. No. **Year**

#### TO HV POWER CIRCUIT(H)

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|                |                   |                |                |                |
|----------------|-------------------|----------------|----------------|----------------|
|                | H-N               | 1a - 1n        | 2a - 2n        | 3a - 3n        |
| VOLTAGE (V)    | $132000/\sqrt{3}$ | $110/\sqrt{3}$ | $110/\sqrt{3}$ | $110/\sqrt{3}$ |
| VA BURDEN      | ---               | 50             | 50             | 50             |
| ACCURACY CLASS | ---               | 3P             | 3P             | 0.2            |

**Notes 1.**

- Series Reactor
- Intermediate Transformer
- Filter
- Protective gap
- Faraday Shield
- Fuse

**Caution :**

- Short circuit the Capacitor units when erecting or dismantling the CVT and remove the short circuit before pre-test or commissioning.
- Under no condition should the Load / Burden values mentioned on the Rating Plate be exceeded.
- When terminal N is not used for HF transmission It must be connected to Earth, when Supplied N is connected to Earth.

**Notes 2.**

- Connection between L1--L8 & A,D--0 are made in factory as required.
- Suitable for Hot line Washing.

**RATING PLATE DETAILS :**

MATERIAL : ALUMINIUM ALLOY  
 SIZE : 250 x 150 x 1 mm THICK.  
 COLOUR : LETTERS PRINTED IN BLACK OVER ALUMINIUM NATURAL BACKGROUND.

NOTE : SERIAL NO. IS ENGRAVED ON RATING PLATE.

NOTE : DRAWING APPROVAL SUBJECT TO VALID TYPE TEST REPORTS, TO BE CHECKED DURING ACCEPTANCE TESTS.

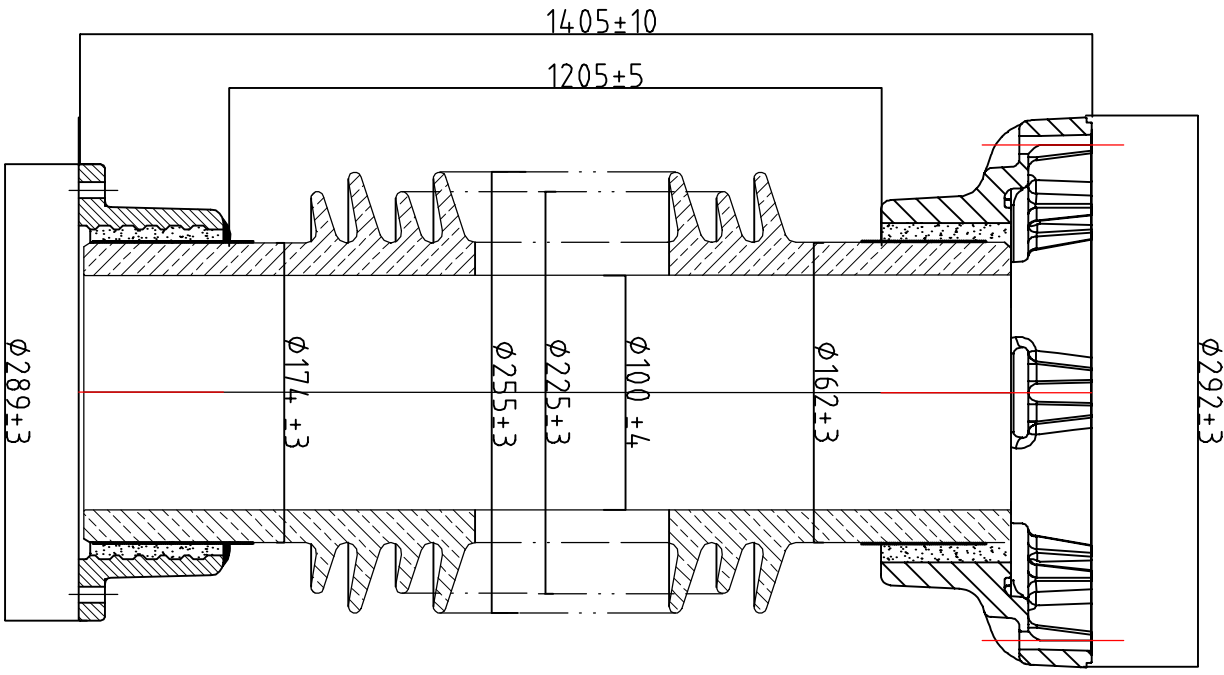
Chief Engineer (Projects)

APTranSCO

|   |              |   |  |               |  |  |
|---|--------------|---|--|---------------|--|--|
| Customer: Transmission Corporation of Andhra Pradesh Limited. | Siemens Ltd. | Desor : 145 KV, Outdoor, Oil Cooled hermetically sealed Capacitive Voltage Transformer. |  | S.O.No. : --  | NOT TO SCALE                             |  |
| Project: --   | AURANGABAD   | Details : Rating Plate Drawing.   |  | Item No. : -- | All dimensions are in mm                 |  |
| LOA No.: --   |              |   |  | Quantity : -- | Drawing No. :- (4)G71AIN-NA202-N2283-100 |  |
| Original/Replaced By: --                                      |              |   |  |               | SH 1                                     |  |
| Date: 22.12.22  |              |   |  |               | SH 1                                     |  |
| Prep. LB  |              |   |  |               |  |  |
| Ckd. AR   |              |   |  |               |  |  |
| Date Prep Norm.   |              |   |  |               |  |  |

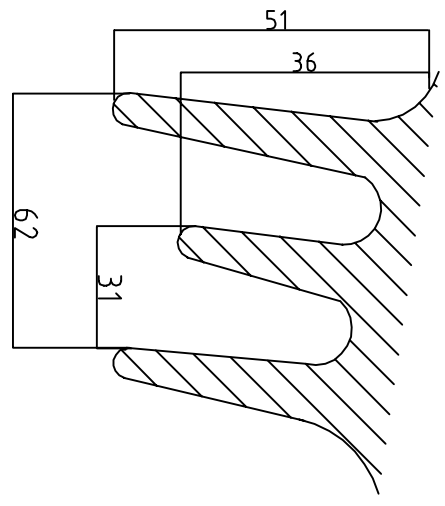






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NOTE : DRAWING APPROVAL SUBJECT TO VALID TYPE TEST REPORTS, TO BE CHECKED DURING ACCEPTANCE TESTS.



DETAILS OF SHED PROFILE


NOTES

1. Total Creepage Distance: 3625 mm (min)
2. Applicable Standard: IS-5621/IEC62155.
3. Material of insulator: Porcelain
4. Make of Porcelain: IEC/Modern/CJ/ABI.
5. General tolerance:  $\pm 3\%$  or 1.5 mm
6. One minute Power frequency withstand Voltage: 275 kV(rms)
7. 12/50 Micro Sec. Impulse withstand Voltage : 650 kVP
8. Cantilever Strength : 350 kg
9. Colour : Brown
10. All Dimensions are in mm unless otherwise specified.

Chief Engineer (Projects)

APTranSCO

|   |  |  |  |
|---|--|--|--|
| Date: 22/12/22  |  | Customer: Transmission Corporation of Andhra Pradesh Limited |  |
| Prep: LB  |  | Contractor: --   |  |
| Ckd: AR   |  | Project: --  |  |
| Name: --  |  | LOA No.: --  |  |
| Original/Replaced By: --  |  | AURANGABAD   |  |
| Date: 22/12/22  |  | Customer: Transmission Corporation of Andhra Pradesh Limited |  |
| Prep: LB  |  | Contractor: --   |  |
| Ckd: AR   |  | Project: --  |  |
| Name: --  |  | LOA No.: --  |  |
| Original/Replaced By: --  |  | AURANGABAD   |  |
| Descr: 145 KV Outdoor, Oil Filled Capacitive Voltage Transformer. |  | S.O. No. : --  |  |
| Details: Cross Sectional View of Porcelain Insulator.             |  | Item No. : --  |  |
|   |  | Quantity : --  |  |
|   |  | All dimensions are in mm                                     |  |
|   |  | Drawing No. : (4)G71AIN-NA202-1283-100                       |  |
|   |  | SH 1   |  |
|   |  | SH 1   |  |


|   |                   |                   |   |
|---|-------------------|-------------------|---|
| DOCUMENT : GTP_145 kV 4400 pF CVT   |                   | Page<br>1/2       |  |
| Customer: Transmission Corporation of Andhra Pradesh Limited.<br>Contractor: --<br>Project:--<br>LOA No: -- |                   | Rev.00            |   |
| DOC. NO : 145 kV CVT/ GTP/ APTRANSCO  | Prepared By<br>LB | Approved By<br>AR | Date<br>22.12.2022  |

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**DATA SHEET FOR 145 kV CAPACITOR VOLTAGE TRANSFORMER**

|     |   |  |
|-----|---|--|
| 1.  | Name and Address of Manufacture   | Siemens Limited, India.<br>E-76, MIDC Waluj, Aurangabad.   |
| 2.  | Manufacturer's type designation   | TCVT 145   |
| 3.  | Type of mounting  | Pedestal mounting  |
| 4.  | Type of Insulation used   | Mixed Dielectric (Paper, Oil)  |
| 5.  | Standards Applicable  | IEC 61869-5  |
| 6.  | Rated Primary Voltage Ur  | 132 kV/ $\sqrt{3}$ rms   |
| 7.  | Rated Secondary Voltage (rms)   | WINDING I : 110 V/ $\sqrt{3}$<br>WINDING II : 110 V/ $\sqrt{3}$<br>WINDING III : 110 V/ $\sqrt{3}$ |
| 8.  | Number of Secondary   | 3  |
| 9.  | Rated frequency   | 50 Hz  |
| 10. | Rated output of each secondary winding  | WINDING I: 50 VA<br>WINDING II: 50 VA<br>WINDING III: 50 VA  |
| 11. | Total Simultaneous Burden   | 50 VA/ 0.2 & 150 VA/ 3P  |
| 12. | Rated total thermal Burden  | 300 VA   |
| 13. | Highest System Voltage  | 145 kV rms (line to line)  |
| 14. | Rated voltage factor and corresponding rated time   |  |
|     | i) Continuous   | 1.2  |
|     | ii) 30 seconds  | 1.5  |
| 15. | Accuracy class of each secondary winding  | WINDING I: 3P<br>WINDING II: 3P<br>WINDING III: 0.2  |
| 16. | Capacitance   | 4400 pF (+10%, -5%)  |
| 17. | Carrier frequency coupling (pF)   | 4400 pF (+10%, -5%)  |
| 18. | Natural frequency of coupling   | More than 600 kHz  |
| 19. | Self tuning frequency of CVT  | More than 600 kHz  |
| 20. | Band width (kHz)  | 40 kHz to 500 kHz  |
| 21. | One minute Power frequency test Voltage of secondary winding ( kV rms)                        | 3 kV rms   |
| 22. | One minute Power frequency test Voltage of H.F. terminal                                      | 4 kV rms   |
| 23. | One minute Power frequency test Voltage of Capacitor (kV rms) (Dry & wet)                     | 275 kV rms   |
| 24. | 1.2 / 50 micro second impulse withstand test Voltage of capacitor (kV <sub>p</sub> )          | 650 kV peak<br>Chief Engineer (Projects)   |
| 25. | 250/ 2500 micro switching surge withstand Voltage of capacitor (Dry & wet )(kV <sub>p</sub> ) | Not Applicable<br>APTransco  |
| 26. | Corona extinction Voltage   | 92 kV rms  |
| 27. | Corona inception Voltage  | 119.7 kV   |
| 28. | Max. Radio interference voltage at 1.1 Ur/ root 3 at 1.0 MHz                                  | 500 micro Volts  |
| 29. | Total Weight  | 241 kg   |
| 30. | Quantity of Oil   | 33 kg  |

7257774/2023/EEMRT-ENE51  
CHECKED DURING ACCEPTANCE TESTS.

|   |                    |                   |   |
|---|--------------------|-------------------|---|
| DOCUMENT : GTP_145 kV 4400 pF CVT   |                    | Page<br>2/2       |  |
| Customer: Transmission Corporation of Andhra Pradesh Limited.<br>Contractor: --<br>Project:--<br>LOA No: -- |                    | Rev.00            |   |
| DOC. NO : 145 kV CVT/ GTP/ APTRANSCO  | Prepared By<br>RRD | Approved By<br>AR | Date<br>09.11.2019  |

|     |   |   |
|-----|---|---|
| 31. | Overall Height in mm  | 2160 ± 50                                       |
| 32. | Whether CVTs are hermetically sealed, and how                   | Yes - 'O' rings and stainless-steel bellow used |
| 33. | No. of terminals in terminal box                                | 12  |
| 34. | Material of Primary and Secondary winding of IVT                | Copper  |
| 35. | Material of Tank  | Aluminum  |
| 36. | Type of Insulator   | Porcelain ((4)G71AIN-NA202-L2283-100)           |
| 37. | Compliance to technical specification w.r.t.                    |   |
|     | i. Bushing insulator  | Yes   |
|     | ii. Control Cabinet   | Not included in Siemens scope of supply         |
|     | iii. Terminal Connector   | Not included in Siemens scope of supply         |
| 38. | Overall GA drawing of CVT enclosed                              | Yes, Drawing No: (4) G71AIN-NA202-Z2283-100.    |
| 39. | Total Minimum Creepage Distance                                 | 3625 mm (25 mm/ kV)                             |
| 40. | Temperature rise of winding by resistance                       | Max 13 deg.                                     |
| 41. | Partial discharge level at rated voltage for Capacitor divider. | As per IEC.                                     |
| 42. | Seismic acceleration (Horizontal & Vertical)                    | 0.3 g horizontal & 0.5 g Vertical.              |
| 43. | Hardware exposed to atmosphere (Bolts, Nuts & Washer)           | All Exposed hardware is of SS A2 grade.         |

1. Tan Delta of CVT shall be less than 0.5 %.
  2. Partial Discharge shall be less than 5 PC @ 1.2 Um/√3 and shall be less than 10 PC @ Um.
  3. Range of frequency for valid accuracy : 96 % to 102 % for Protection, 99 % to 101 % for Metering.
- 1) Minimum 300mm plinth shall be maintained for CT/PT/CVT/Isolators in the substation during foundation works to ensure safe live to ground clearances as per IE rules.
- 2) Since the supply of terminal connectors is not in the scope of manufacturer as mentioned in the drawings, the EPC contractors shall be instructed to supply the same in line with CT/PT/CVT/Isolators requirement and compatibility.

Chief Engineer (Projects)

APTransco

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