

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

LIST OF DRAWINGS AND DOCUMENTS FOR 145 kV, 4400 pF Capacitive Voltage Transformer (31 mm/ kV)

SR NO.	DESCRIPTION OF DRAWINGS	DRAWING NO.	REVISION	DATE
01	General Arrangement Drawing	(4)G71AIN-NA202-Z2283-400	--	22.12.2022
02	Rating Plate Drawing	(4)G71AIN-NA202-N2283-400	--	22.12.2022
03	Secondary Box GA Drawing	(4)G71AIN-NA202-W2283-400	--	22.12.2022
04	Cross Sectional View for CVT	(4)G71AIN-NA202-E2283-400	--	22.12.2022
05	Cross Sectional View for Insulator	(4)G71AIN-NA202-L2283-400	--	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

Chief Engineer (Projects)

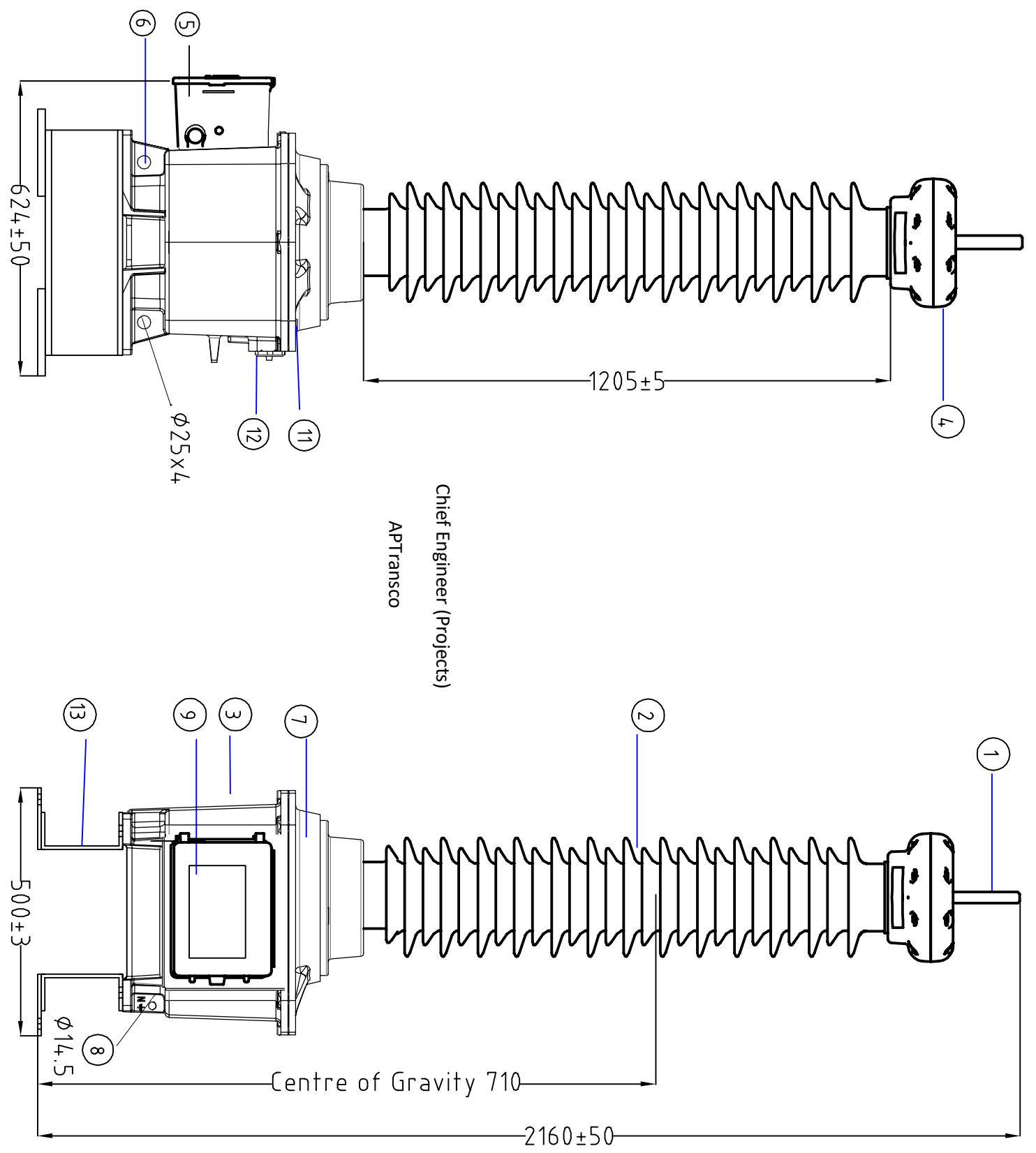
APTRANSCO

Drawing approval subject to valid vendor registration

7257784/2023/EEMRT-ENE51

Date	22.12.22	Customer: Transmission Corporation of Andhra Pradesh Limited	Date	22.12.22	Original/Replaced By :-
Prep	LB	Project :-	Prep	LB	
Okd	AR	LOA No. :-	Okd	AR	
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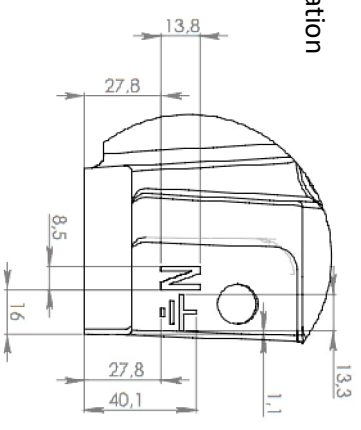


Chief Engineer (Projects)
APTransco

Drawing approval subject to valid vendor registration

4 Nos. ϕ 22 HOLES FOR MOUNTING
CVT ON SUPPORT STRUCTURE

Grounding Pad Details



NOS.	DESCRIPTION	MATERIAL	QTY
①	H. V. TERMINAL (ϕ 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 : 4495 mm (31 mm/ kV)
- OIL QUANTITY : 33 kg
- WEIGHT OF CVT: 241 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.	Date		Prep.	Contractor: --	
Date		22.12.22	LB	Project: --	Date		Prep.	Contractor: --	
Prep Norm.		AR	AR	LOA No.: --	Prep Norm.		AR	Original/Replaced By: --	
Original/Replaced By: --		Original/Replaced By: --		Original/Replaced By: --		Original/Replaced By: --		Original/Replaced By: --	

S.O.No. : --		NOT TO SCALE	
Item No. : --		All dimensions are in mm	
Drawing No. :-(4)G71AIN-NA202-Z2283-400		SH 1	
Quantity : --		SH 1	



CAPACITOR VOLTAGE TRANSFORMER

Made in India.

RATING AND SCHEMATIC PLATE

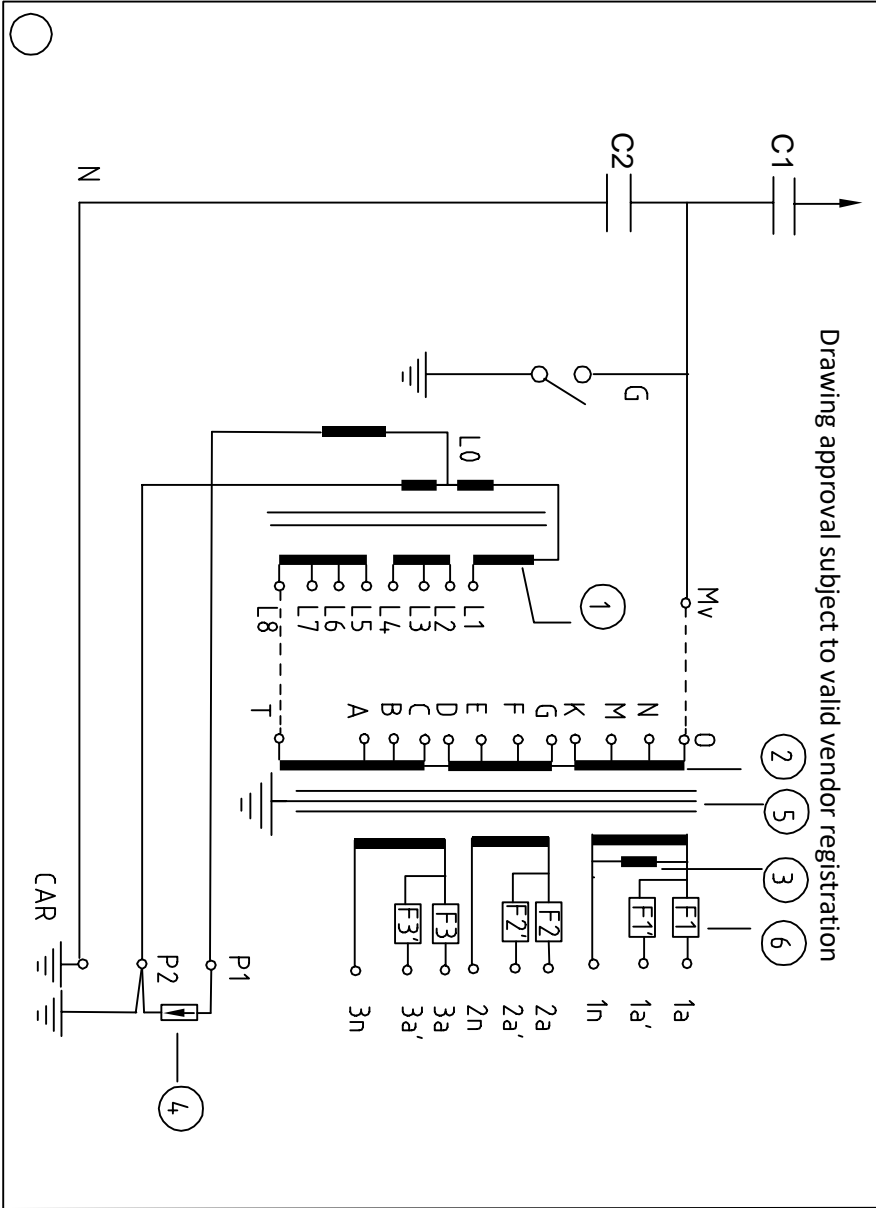
Customer : Transmission Corporation of Andhra Pradesh Limited.
Contractor: --

Project: --
LOA No.: --

Type [TCVT 145] **Insulation level** [275 KV/ 650 KV_p] **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)



	H-N	1a - 1n	2a - 2n	3a - 3n
VOLTAGE (V)	132000/√3	110/√3	110/√3	110/√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.

- H : HV Terminal
 N : HF Terminal
 C1 : Primary Capacitance
 C2 : Secondary Capacitance
 G : MV tap grounding switch
 Mv: Intermediate Voltage tap

- 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.

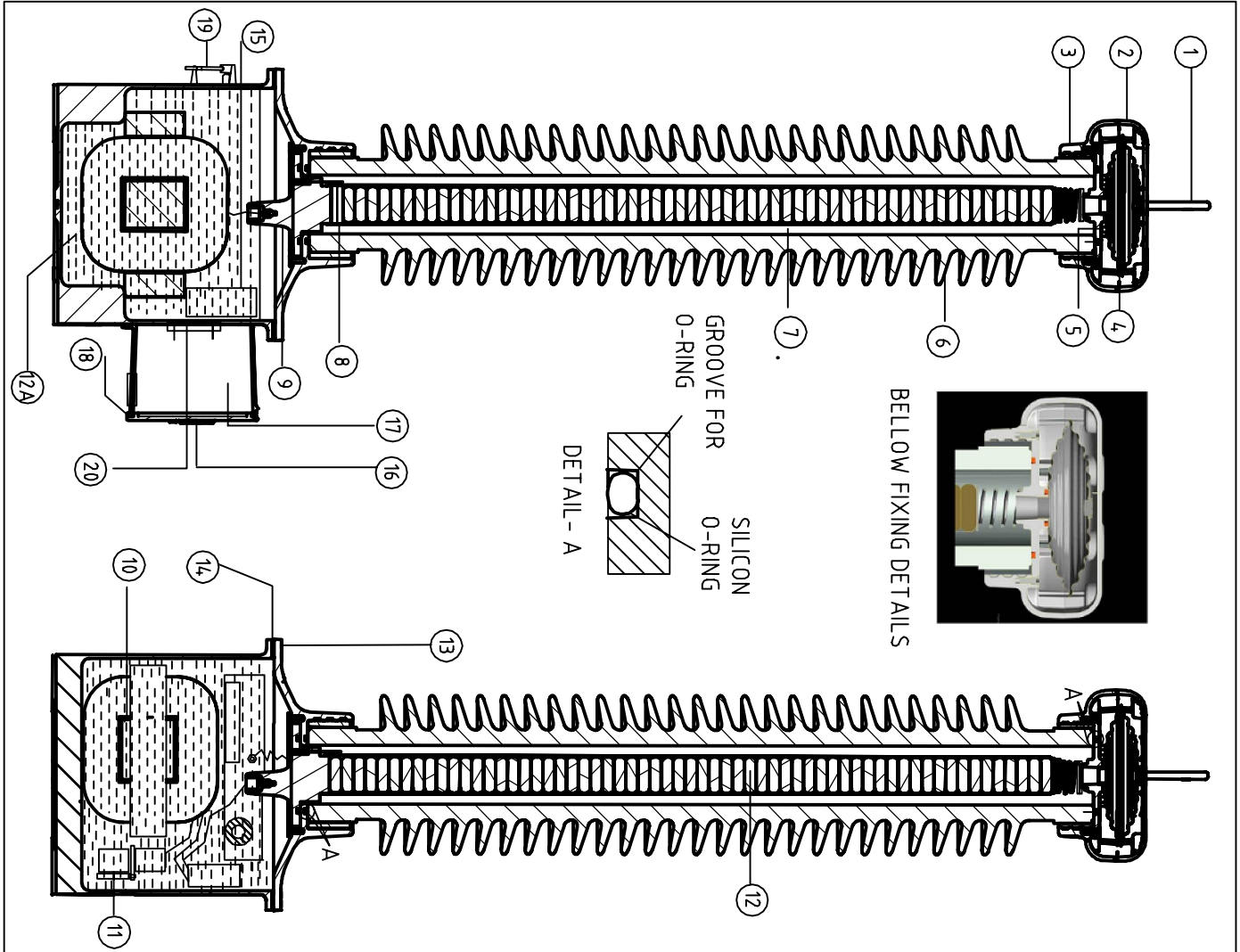
NOTE : DRAWING APPROVAL SUBJECT TO VALID TYPE TEST REPORTS, TO BE CHECKED DURING ACCEPTANCE TESTS.

- 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.
- 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

Date	22.12.22	Customer:	Transmission Corporation of Andhra Pradesh Limited.	Siemens Ltd.	Descr :	145 KV, Outdoor, Oil Cooled hermetically sealed Capacitive Voltage Transformer.	S.O.No. : --	NOT TO SCALE
Prep.	LB	Contractor:	--	AURANGABAD	Voltage Transformer.		Item No. : --	All dimensions are in mm
Ckd.	AR	Project:	--		Details : Rating Plate Drawing.		Quantity : --	
Date		LOA No.:	--				Drawing No. : (4)G71AIN-NA202-N2283-400	
Prep		Original/Replaced By:						SH 1
Norm.								1 SH

257784/2023/EEMRT-ENE51



NOS.	DESCRIPTION	MATERIAL	QTY
1	H.V. TERMINAL ROD (Ø 30 X 100)	ALUMINIUM ALLOY	01
2	TOP CAP	ALUMINIUM ALLOY	01
3	UPPER FLANGE	ALUMINIUM ALLOY	01
4	BELLOW	STAINLESS STEEL	01
5	GASKET FOR PORCELAIN TO PLATE	SILICON	01
6	PORCELAIN INSULATOR	PORCELAIN	01
7	CAPACITOR STACK ASSEMBLY	-	01
8	BOTTOM PLATE FOR STACK ASSEMBLY	ALUMINIUM ALLOY	01
9	L.V. BUSHING	EPOXY	01
10	TRANSFORMER ASSEMBLY	-	01
11	REACTOR ASSEMBLY	-	01
12/12A	OIL (NON PCB BASED)	SYNTHETIC OIL/ MINERAL OIL	10 / 23 kg
13	TANK COVER PLATE	ALUMINIUM ALLOY	01
14	GASKET FOR TANK	NBR	01
15	HARMONIC SUPPRESSION FILTER	-	01
16	RATING PLATE	ALUMINIUM ALLOY	01
17	SECONDARY TERMINAL BOX	ALUMINIUM ALLOY	01
18	GASKET FOR SECONDARY TERMINAL BOX	EPDM	01
19	SWITCH HANDLE	ALUMINIUM ALLOY	01
20	SEALING FOR OIL TO AIR SEAL PLATE	SILICON	01

NOTE :
 1. HERMETICALLY SEALED ARRANGEMENT IS ACHIEVED BY USING SS BELLOW FOR VOLUMETRIC COMPENSATION.
 2. SILICON O-RING & EPDM GASKET USED AT ALL JOINTS (DETAILS SHOWN IN ABOVE TABLE) ENSURES COMPLETE SEALING OF CVT.

Chief Engineer (Projects)

APTTransco

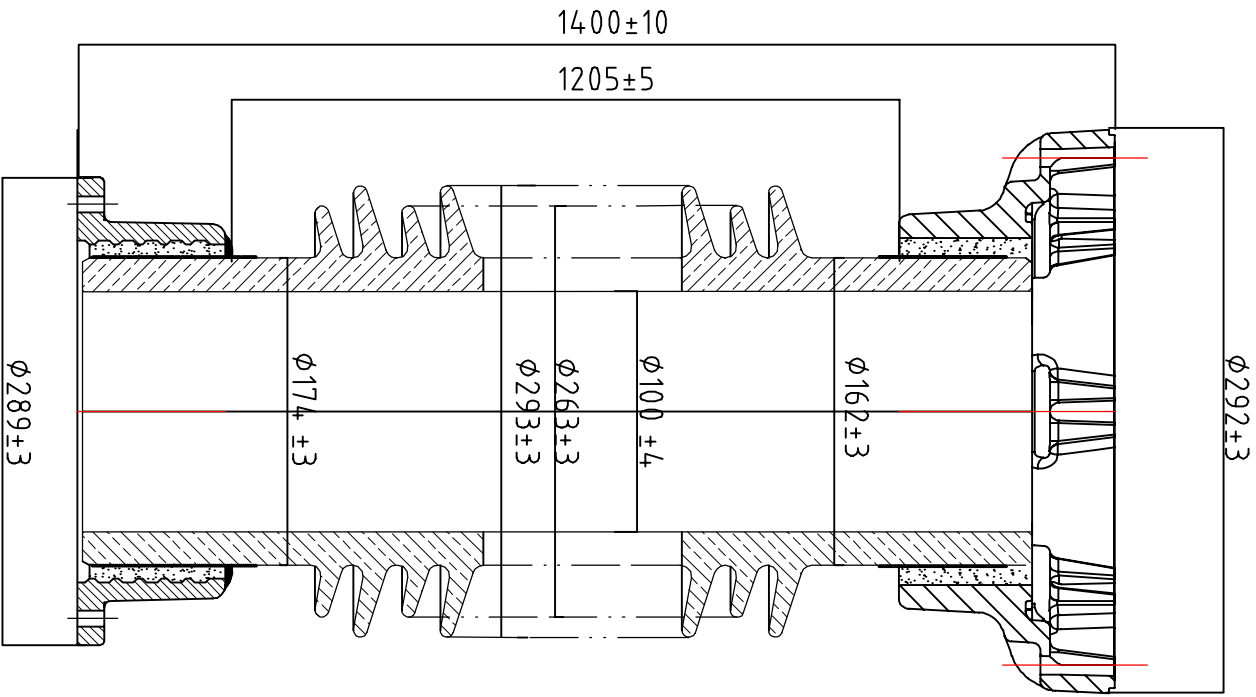
Rev	Description	Date	Prep.	Norm.	Original/Replaced By:-
G					
G1					
G2					
G3					
G4					
G5					
G6					
G7					

Date	22-12-22
Customer	Transmission Corporation of Andhra Pradesh Limited.
Contractor	--
Project	--
LOAN No.	--

Date	22-12-22
Customer	Transmission Corporation of Andhra Pradesh Limited.
Contractor	--
Project	--
LOAN No.	--

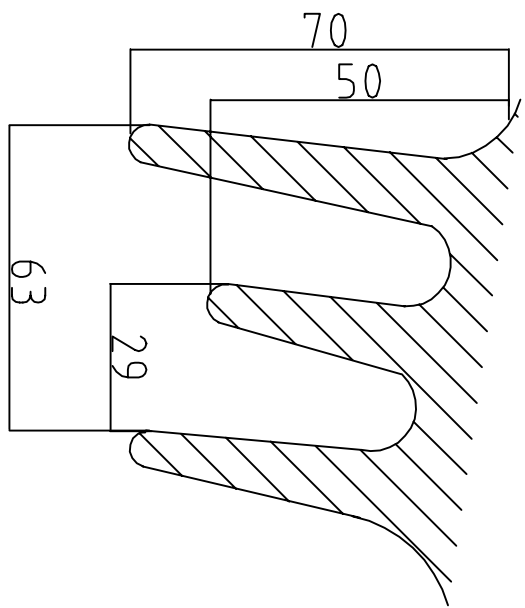
Descr	145 KV, Outdoor, Oil Cooled hermetically sealed Capacitive Voltage Transformer.
Details	Cross Sectional View of CVT
S.O. No.	--
Item No.	--
Quantity	--
Drawing No.	(4)G71AIN-NA202-E2283-400
NOT TO SCALE	All dimensions are in mm
SH	1
SH	1

Drawing approval subject to valid vendor registration



Chief Engineer (Projects)

APTranSCO




DETAILS OF SHED PROFILE

NOTES


1. Total Creepage Distance: 4495 mm (min)
2. Applicable Standard: IS-5621/ IEC62155.
3. Material of insulator: Porcelain
4. Make of Porcelain: IEC/Modern/CJI/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.

Date: 22.12.22		Customer: Transmission Corporation of Andhra Pradesh Limited		S.O. No.: --		NOT TO SCALE	
Prep: LB		Contractor: --		Item No.: --		All dimensions are in mm	
Ckd: AR		Project: --		Drawing No.: (4)G71AIN-NA202-12283-400		SH 1	
Nmn: --		LOA No.: --		Quantity: --		SH 1	
Original/Replaced By: --		AURANGABAD		Details: Cross Sectional View of Porcelain Insulator.		SH 1	

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

DATA SHEET FOR 145 kV CAPACITOR VOLTAGE TRANSFORMER

1.	Name and Address of Manufacture	Siemens Limited, India. 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 / IS 3156 (1992)
6.	Rated Primary Voltage Ur	132 kV/ $\sqrt{3}$ rms
7.	Rated Secondary Voltage (rms)	WINDING I : 110 V/ $\sqrt{3}$ WINDING II : 110 V/ $\sqrt{3}$ 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 WINDING II: 50 VA 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 WINDING II: 3P 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 Chief Engineer (Projects)
24.	1.2 / 50 micro second impulse withstand test Voltage of capacitor (kV _p)	650 kV peak APTransco
25.	250/ 2500 micro switching surge withstand Voltage of capacitor (Dry & wet)(kV _p)	Not Applicable
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

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

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-L2283-400)
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-Z2283-400.
39.	Total Minimum Creepage Distance	4495 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

FOR EPC CONTRACTS ONLY