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Drawing approval subject to valid vendor registration

**FOR EPC CONTRACTS ONLY**

**LIST OF DRAWINGS AND DOCUMENTS FOR 420 KV, 4400 pF Capacitive Voltage Transformer (25 mm/ kV)**

SR NO.	DESCRIPTION OF DRAWINGS	DRAWING NO.	REVISION	DATE
01	General Arrangement Drawing (2 Pages)	(4)G71AIN-NA204-Z2283-300	--	22.12.2022
02	Rating Plate Drawing	(4)G71AIN-NA204-N2283-300	--	22.12.2022
03	Secondary Box GA Drawing	(4)G71AIN-NA204-W2283-300	--	22.12.2022
04	Cross Sectional View for CVT	(4)G71AIN-NA204-E2283-300	--	22.12.2022
05	Cross Sectional View for Insulator	(4)G71AIN-NA204-L2283-300	--	22.12.2022
06	Guaranteed Technical Particulars	420 kv CVT/ GTP/ APTRANSCO	--	22.12.2022
07	Type Test reports List	420 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

7257824/2023/EEMRT-ENE51

Date		22.12.22	Customer: Transmission Corporation of Andhra Pradesh Limited.		Siemens Ltd.		Descr : 420 KV, Outdoor, Oil Cooled hermetically sealed Capacitive Voltage Transformer.		S.O.No. : --		NOT TO SCALE	
Prep.		LB	Project: --		AURANGABAD		Details : List of Drawing and Documents		Item No. : --		All dimensions are in mm	
Ckd.		AR	LOA No. : --						Drawing No. :- (4)G71AIN-NA204-R2283-300		SH 1	
Date			Original/Replaced By :-								SH 1	
Prep												
Norm.												
Description												





### CAPACITOR VOLTAGE TRANSFORMER

Made in India.

### RATING AND SCHEMATIC PLATE

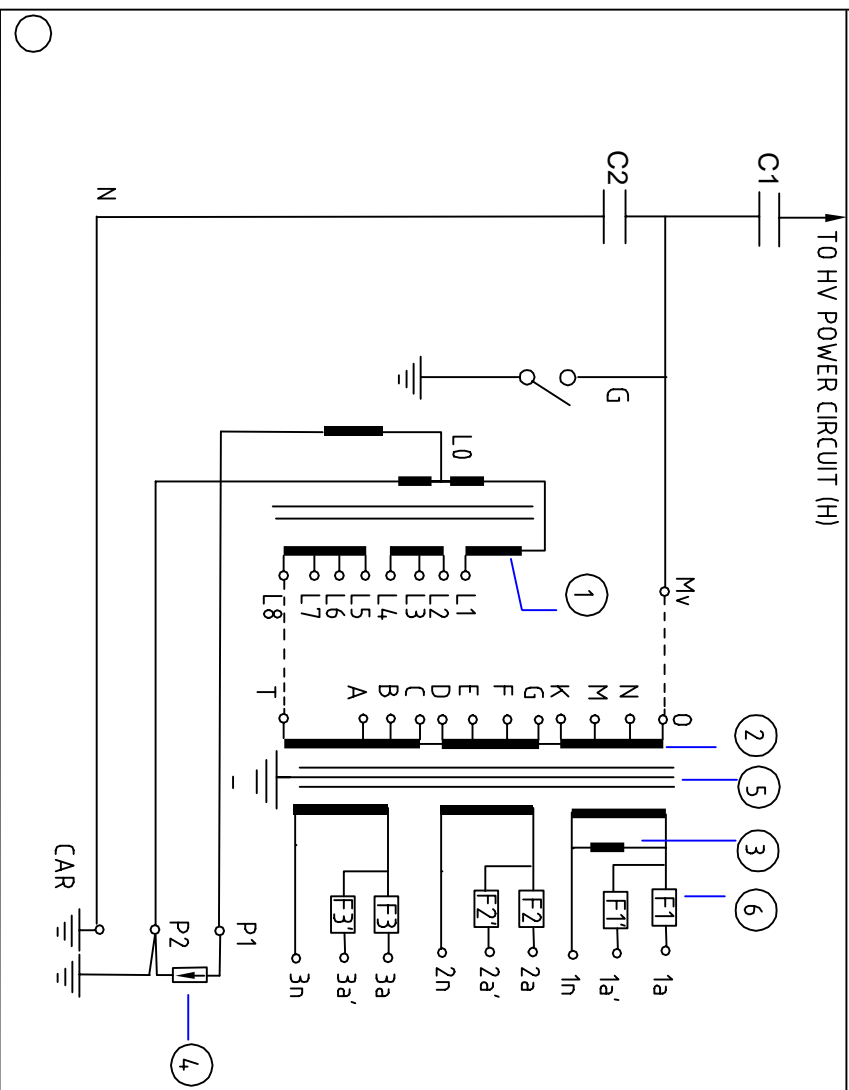
Customer : --  
Contractor : --

Project : --  
LOA No.: --

Type **TCVT 420** Insulation level **630 kV/ 1425 kV<sub>p</sub>** Standard **IEC 61869-5** Capacitance **4400 pF (+10%, -5%)** Total Weight **550 kg** Total Oil Weight **52 kg** Sr. No.  Year

Highest System Voltage **420 kV** Voltage Factor **1.2 Continuous/ 1.5 - 30 Sec** Frequency **50 Hz** Simultaneous Burden **100 VA / 0.2 & 150 VA/ 3P** Rated Thermal Burden **300 VA** Insulation Class **Class A** SO. No.

Primary Capacitance (C1) **4468 pF (+10%, -5%)** Secondary Capacitance (C2) **130129 pF (+10%, -5%)**



	H - N	1a-1n	2a-2n	3a-3n
VOLTS	400000/√3	110/√3	110/√3	110/√3
VA BURDEN	---	50	50	50
ACCURACY CLASS	---	3P & 0.5	3P & 0.5	0.2

- Notes 1:
- Series Reactor
  - Intermediate Transformer
  - Filter
  - Protective gap
  - Faraday Shield
  - Fuses-10A HRC
- H : HV Terminal  
N : HF Terminal  
C1 : Primary Capacitance  
C2 : Secondary Capacitance  
Mv : Intermediate Voltage tap  
G : MV tap grounding switch

- 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.

**SIEMENS ENERGY**  
Capacitor Voltage Transformer Stack Details

CUSTOMER : TRANSMISSION CORPORATION OF ANDHRA PRADESH LIMITED.  
SO No:  Line Item:  Sr.No:  Year:   
Highest System Voltage **420 kV** Stack Description:  Capacitance: **4400 (+10%, -5%) pF**

30  
100

Chief Engineer (Projects)  
APTransco

**RATING PLATE DETAILS**  
MATERIAL - ALUMINUM ALLOY  
SIZE - 250 X 150 X 1 mm  
COLOUR - LETTERS PRINTED IN BLACK OVER ALUMINUM NATURAL BACKGROUND.

Note : Serial No. is engraved on rating plate.

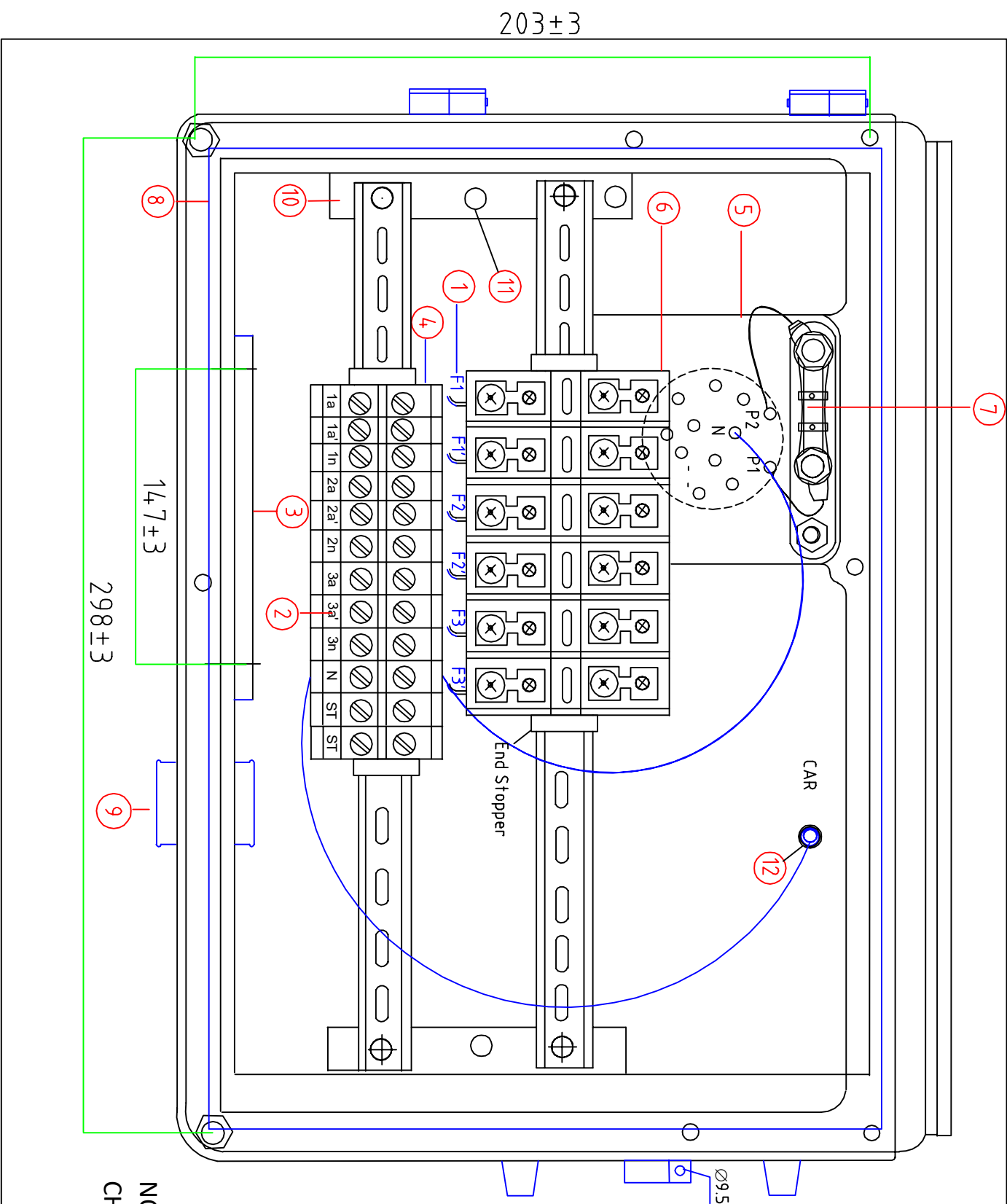
Date	22.12.22	Customer:	Transmission Corporation of Andhra Pradesh Limited.
Prep	LB	Contractor:	--
CKd.	AR	Project:	--
Norm.		LOA No.:	--
Prep		Original/Replaced By:	--

Siemens Ltd.	Descr : 420 kV, 4400 pF Outdoor, Oil filled Capacitive Voltage Transformer.
AURANGABAD	Details : Rating Plate Drawing.

S.O.No. : --	Quantity : --	NOT TO SCALE
Item No. : --		All dimensions are in mm
Drawing No. : (4)G71AIN-NA204-N2283-300		SH 1
		SH 1

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NOS.	DESCRIPTION
1	TERMINALS - CONNECTED TO 1a, 2a, 3a, 1a', 2a' & 3a' (Not shown for clarity)
2	IDENTIFICATION STRIP
3	GLAND PLATE (122 X 147)
4	TERMINAL BLOCK (STUD TYPE, NON DISCONNECTING TYPE)
5	OIL TO AIR SEAL PLATE
6	FUSES, 10 A, HRC TYPE, MAKE SIEMENS
7	SURGE PROTECTOR
8	GASKET
9	RUBBER GORMET
10	ALUMINUM TERMINAL CHANNEL HOLDER
11	EARTHING ARRANGEMENT
12	HF TERMINAL SCREW 'M10'

NOTES :

1. DOOR REMOVED FOR CLARITY.
2. TERMINAL BOX SHALL CONFIRM AS PER IP55.
3. 20 % SPARE TERMINALS SHALL BE PROVIDED.

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

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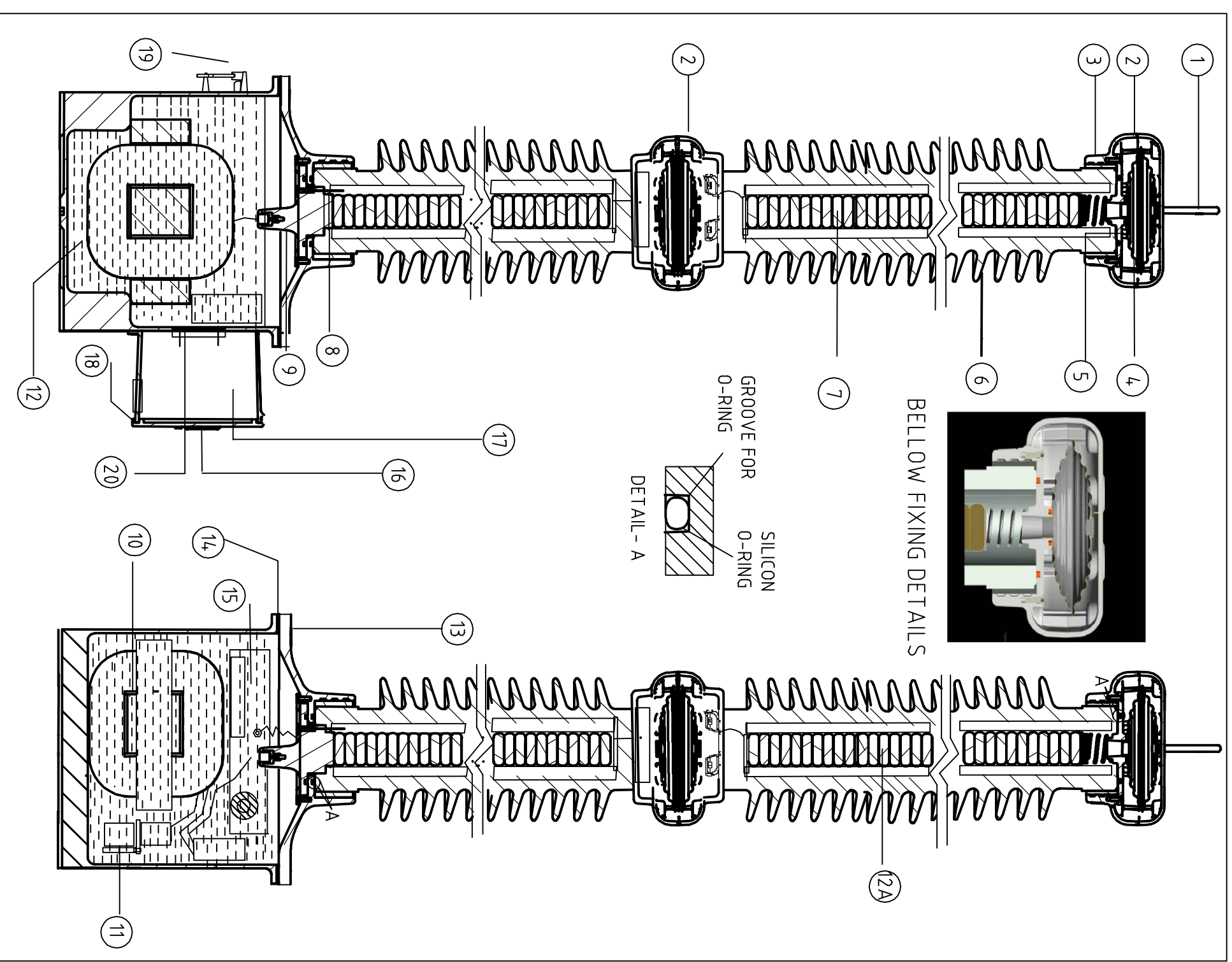
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Prep	LB	Contractor:	--
CKd.	A.R	Project:	--
Date		LOA No.:	--
Prep		Original/Replaced By:	

Siemens Ltd.  
AURANGABAD

Descr : 420 KV, 4400 pF Outdoor, Oil filled Capacitive Voltage Transformer.  
Details : Secondary Box GA Drawing.

S.O.No. :-	Item No. :-	Quantity :-	NOT TO SCALE
			All dimensions are in mm
Drawing No. :- (4)G71AIN-NA204-W2283-300	SH	1	SH

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NOS.	DESCRIPTION	MATERIAL	QTY
1	H.V. TERMINAL ROD (Ø 30X100mm)	ALUMINUM ALLOY	01
2	TOP CAP	ALUMINUM ALLOY	01
3	UPPER FLANGE	ALUMINUM ALLOY	01
4	BELLOW	STAINLESS STEEL	02
5	GASKET FOR PORCELAIN TO PLATE	SILICON	02
6	PORCELAIN INSULATOR	PORCELAIN	02
7	CAPACITOR STACK ASSEMBLY	-	02
8	BOTTOM PLATE FOR STACK ASSEMBLY	ALUMINUM ALLOY	01
9	LOW VOLTAGE BUSHING	EPOXY	01
10	TRANSFORMER ASSEMBLY	-	01
11	REACTOR ASSEMBLY	-	01
12A/12	OIL (NON PCB BASED)	SYNTHETIC OIL/MINERAL OIL	-
13	TANK COVER PLATE	ALUMINUM ALLOY	01
14	GASKET FOR TANK	NBR	01
15	HARMONIC SUPPRESSION FILTER	-	01
16	RATING PLATE	ALUMINUM ALLOY	01
17	SECONDARY TERMINAL BOX	ALUMINUM ALLOY	01
18	GASKET FOR SECONDARY TERMINAL BOX	EPDM	01
19	SWITCH HANDLE	ALUMINUM ALLOY	01
20	SEALING FOR OIL TO AIR SEAL PLATE	SILICON	01

NOTE:  
 1. SS BELLOW ARE USED VOLUMETRIC COMPENSATION.  
 2. SILICON O-RING & EPDM GASKETS USED AT ALL JOINTS (DETAILS SHOWN IN ABOVE TABLE ENSURES COMPLETE HERMETICAL SEALING OF CVT).

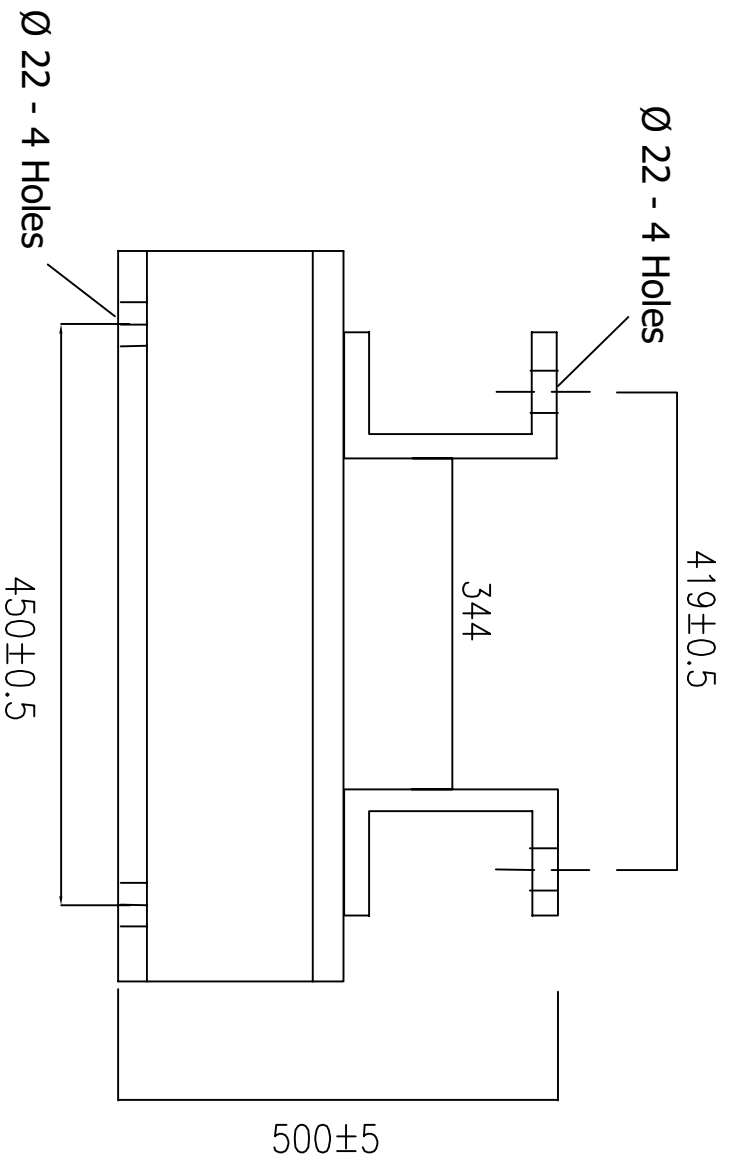
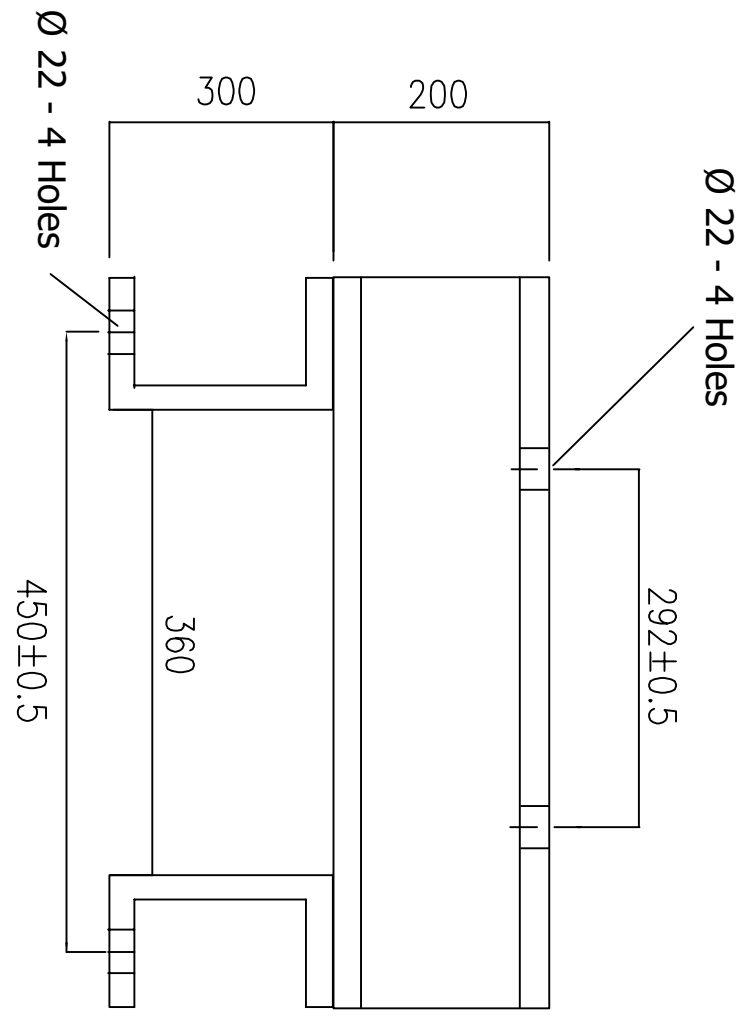
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7257824/2023/EEMRT-ENE51

Customer: Transmission Corporation of Andhra Pradesh Limited.	Date: 22.12.22	Prep: LB	Contractor: --
Project: --	Prep: AR	Project: --	Contractor: --
LOA No.: --	Original/Replaced By: --	Original/Replaced By: --	Original/Replaced By: --
Siemens Ltd. AURANGABAD	Descr: 420 KV, 4400 pF Outdoor, Oil filled Capacitive Voltage Transformer.	S.O.No.: --	Item No.: --
Details: Cross Sectional View of Capacitive Voltage Transformer.	Quantity: --	NOT TO SCALE	
	Drawing No.: (4)G71AIN-NA204-E2283-300	All dimensions are in mm	
		SH 1	SH 1

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**SPECIFICATION :**

**MATERIAL :**

MS Channel (HDG- 86 Micron)- 2 Nos  
 300 x 90 mm (Standard) with 540 mm Length.  
 Thickness of Channel is 7.8 mm

MS Channel (HDG- 86 Micron)- 2 Nos  
 200 x 75 mm (Standard) with 540 mm Length.  
 Thickness of Channel is 6.2 mm

Total weight of Stool: 63.3 kg

M/S Channels are welded together at the Joints.  
 Minimum thickness of welding shall be 5 mm.

Chief Engineer (Projects)

APTransco

**Hardware:**

**STRUCTURE TO ADAPTOR**  
 HDG HEX BOLT M20 X 60 Long- 4 PCS  
 HDG WASHER M20- 8 PCS  
 M16 HEX NUT- 4 PCS

**ADAPTOR TO CVT**  
 HDG HEX BOLT M20 X 60 Long- 4 PCS  
 HDG WASHER M20- 8 PCS  
 M20 HEX NUT- 4 PCS

Hole to Hole Mounting Dimension on Top: 292 x 419  
 (4 Holes of 22 mm diameter)

Hole to Hole Mounting Dimension at Bottom: 450 x 450  
 (4 Holes with 22 mm diameter)

Date	22.12.22
Prep	LB
CKd.	AR
Prep	Norm.

Customer: Transmission Corporation of Andhra Pradesh Limited  
 Contractor: -  
 Project: --  
 LOA No.: --  
 Original/Replaced By: .

Siemens Ltd.  
 AURANGABAD

Descr : 420 kV, 4400 µF Outdoor, Oil filled  
 Capacitive Voltage Transformer.  
 Details : General Arrangement Drawing  
 (Height Matching stool)

S.O.No. : --  
 Item No. : --

Quantity: --

Drawing No. :- (4)G71AIN-NA204-Z2283-300-1

NOT TO SCALE

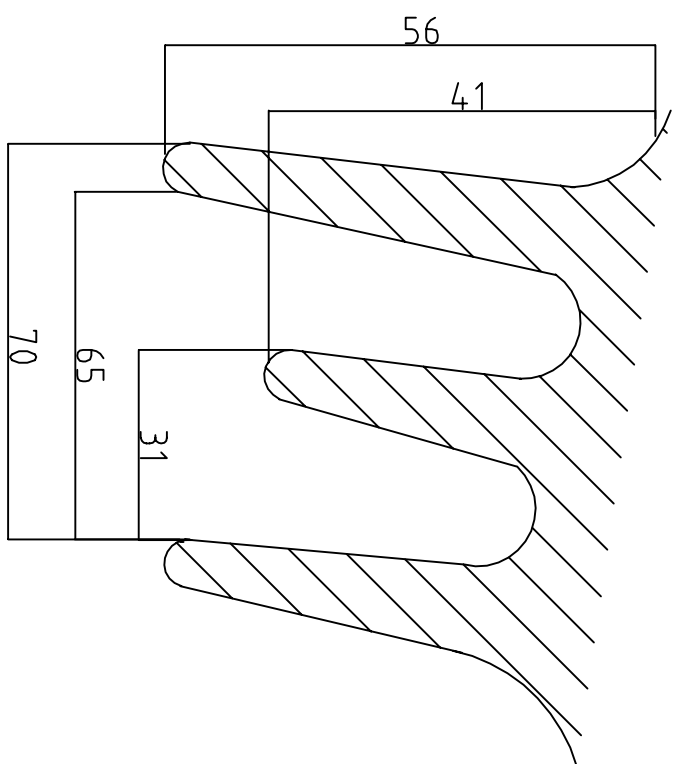
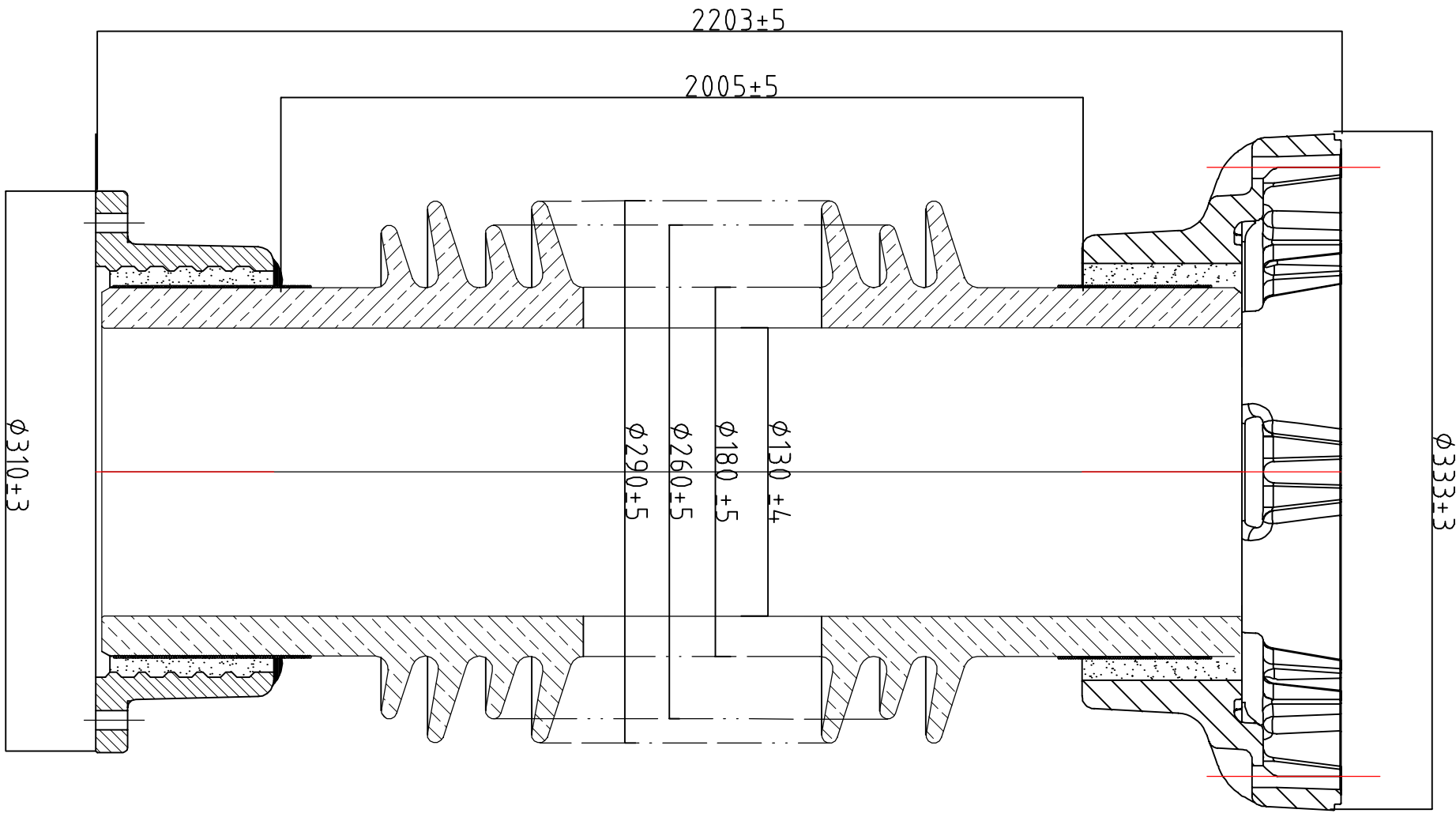
All dimensions are in mm

SH 2  
 SH 2



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HO/ESD-Coord/9E 03-90  
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DETAILS OF SHED PROFILE


NOTES

1. Combined Creepage distance: 10500 mm (25 mm/kV) (min)
2. Applicable Standard: IS-5621/IEC62155.
3. Material of Insulator: Porcelain
4. Make of Porcelain: IEC/Modern/CJI/ABI.
5. General tolerance: ± 3% or 1.5 mm
6. One minute Power frequency withstand Voltage: 420 kV(rms)
7. 1.2/50 micro seconds Impulse withstand Voltage : 950 kVP
8. Cantilever Strength : 500 kg
9. Color : Brown
10. All Dimensions are in mm unless otherwise specified.
11. Single epoxy joint allowed for lower unit.

LOWER INSULATOR DRAWING FOR 420 kV, 4400 PF CVT.

Date		22.12.22		Customer: Transmission Corporation of Andhra Pradesh Limited.	
Prep.		LB		Contractor: --	
Ckd.		A.R		Project: --	
Date				LOA No.: --	
Prep. Norm.				Original / Replaced By: --	
Date				Siemens Ltd.	
Prep.				AURANGABAD	
Ckd.				Descr : 420 kV, Outdoor, Oil filled Capacitive Voltage Transformer.	
Date				Details: Cross Sectional View For Porcelain Insulator.	
Prep. Norm.				S.O.No. : --	
Date				Item No. : --	
Prep.				Quantity : --	
Ckd.				Drawing.No.: (4)G71AIN-NA204-L2283-300-1	
Date				NOT TO SCALE	
Prep. Norm.				All dimensions are in mm	
Date				SH 2	
Prep.				SH 2	

CHECKED DURING ACCEPTANCE TESTS.

DOCUMENT: GTP_420 kV 4400 pF CVT		Page 1/2	
Customer: Transmission Corporation of Andhra Pradesh Limited. Contractor: -- Project: -- LOA No: --                      Drawing approval subject to valid vendor registration		Rev.00	
DOC. NO.: 420 kV CVT/GTP/ APTRANSCO	Prepared By LB	Approved By AR	Date 22.12.2022

**Guaranteed Technical Particulars of 420 kV, 4400 pF Capacitive Voltage Transformer:**

1.	Name and Address of Manufacture	Siemens Limited India. E-76, MIDC Waluj, Aurangabad.		
2.	Manufacturer's type designation	TCVT 420		
3.	Standards Applicable	IEC 61869-5		
4.	Rated Primary Voltage Ur	400 kV/ $\sqrt{3}$ rms		
5.	Rated Secondary Voltage	110 V/ $\sqrt{3}$ rms		
6.	Number of Secondaries	Three		
7.	Rated frequency	50 Hz		
8.	Installation	Outdoor		
9.	Rated output of each secondary winding	50/50/50 VA		
10.	Total Simultaneous burden/ Accuracy	100 VA/ 0.2 & 150 VA/ 3P		
11.	Rated total thermal burden	300 VA		
12.	Highest System Voltage	420 kV rms (line to line)		
13.	Rated voltage factor and corresponding rated time			
	i) Continuous	1.2 Un		
	ii) 30 seconds	1.5 Un		
14.	Accuracy class of each secondary winding	Winding-I	Winding -II	Winding -III
	Rated output VA	50 VA	50 VA	50 VA
	Accuracy class	3P & 0.5	3P & 0.5	0.2
	Ratio Error	$\pm 0.5\%$	$\pm 0.5\%$	$\pm 0.2\%$
	Phase Error	$\pm 20$ MIN	$\pm 20$ MIN	$\pm 10$ MIN
15.	Capacitance a) High Voltage Capacitance b) Intermediate Voltage Capacitance c) Carrier frequency coupling (pF)	4468 pF (+10%, - 5%) 130129 pF (+10%, -5%) 4400 pF (+10%, -5%)		
16.	Natural frequency of coupling	> 500 kHz		
17.	Self tuning frequency of CVT	> 500 kHz		
18.	Self-Resonant Frequency	> 500 kHz		
19.	Range of Frequency for Valid Accuracy	96 % to 102 % for Protection 99% to 101% for Metering		


Siemens Ltd. India

Chief Engineer (Projects)

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7257824/2023/EMRT-ENF51

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

DOCUMENT: GTP_420 kV 4400 pF CVT		Page 2/2	
Customer: Transmission Corporation of Andhra Pradesh Limited. Contractor: -- Project: -- LOA No: --		Rev.00	
<b>FOR EPC CONTRACTS ONLY</b>			
DOC. NO.: 420 kV CVT/GTP/ APTRANSCO	Prepared By LB	Approved By AR	Date 22.12.2022

20.	Range of power line carrier frequency (kHz)	40 kHz to 500 kHz	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 IEC 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.
21.	Temperature raise over Ambient at 50 °C	< 55 °C	
22.	One-minute power frequency test Voltage of secondary winding (kV rms)	3 kV rms	
23.	One-minute power frequency test Voltage of H.F. terminal	4 kV rms	
24.	Seismic Acceleration	0.3 g	
25.	Partial Discharge	< 10 pC	
26.	Equivalent Series resistance over the entire carrier frequency range	< 40 Ω	
27.	Stray capacitance & Stray conductance of the LV terminal Over entire Carrier freq. range	Within Limits as per IEC 6189-5	
28.	One-minute power frequency test Voltage of Capacitor (kV rms) (Dry & wet)	630 kV rms	
29.	1.2 / 50 micro second impulse withstand test Voltage of Capacitor (kVp)	1425 kV peak	
30.	250 /2500 micro switching surge withstand Voltage of Capacitor (kVp)	1050 kV peak	
31.	Corona Extinction Voltage	320 kV rms	
32.	Max. Radio interference voltage at 1.1 Ur/√3 at 1.0 MHz	< 1000 micro Volts	
33.	Total Weight (Approx.)	550 kg	
34.	Characteristics of Oil	Mineral & Synthetic	
35.	Quantity of Oil	52 kg	
36.	System Earthing	Solid Grounded	
37.	Whether CVTs are hermetically sealed	Yes	
38.	Total Minimum Creepage Distance	10500 mm	
39.	Transportation Whether Vertical/Horizontal	Vertical	
40.	Storage Vertical/horizontal	Vertical	
41.	Type of Bellow	Expansion	

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.

Chief Engineer (Projects)