



Drawing approval subject to valid vendor registration

Ground clearance of 8000 mm shall be maintained from Plinth level during erection.

CLIENT : TRANSMISSION CORPORATION OF ANDHRA PRADESH LIMITED, VIJAYAWADA

CONTRACTOR :

PO.NO. :

PROJECT : Suitable Clamps/Connectors in the scope of the EPC contractor

LIST OF DRAWINGS FOR 400kV/4400pF CAPACITOR VOLTAGE TRANSFORMER (CCV-420)

SL.No.	DRAWING NUMBER	DESCRIPTION OF DRAWING
01	GTP REV.00	GUARANTEED TECHNICAL PARTICULARS
02	712-B-3276 REV.00	OUTLINE DIAGRAM
03	713-B-3442 REV.00	NAME PLATES
04	714-B-4134 REV.00	SECTIONAL VIEW
05	716-B-4103 REV.00	DETAILS OF SECONDARY TERMINAL BOX
06	723-B-1207 REV.00	PORCELAIN HOUSING

Note: Drawing Approval subject to valid type test reports to be checked during acceptance tests

PRPD:

Raghul

09.11.21

Chief Engineer

Planning & Power Systems

APTransco

CHKD:

Sangith

09.11.21

APPRD:

Mayank

09.11.21

ISO : -----

! CONTENTS OF THE DRAWING SHALL NOT BE MODIFIED WITHOUT PRIOR INTIMATION TO GE. REQUIRED CHANGES, IF ANY, SHALL BE HIGHLIGHTED OR MARKED AND COMMUNICATED TO GE FOR NECESSARY ACTION

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1.	GENERAL			
a)	Name of Manufacturer	GE T&D INDIA LIMITED		
b)	Manufacturer's Type designation	CCV 420		
c)	Standard applicable	IEC-61869-1&5/60358		
d)	Rated voltage Un(kV)	400 $\sqrt{3}$ kV rms		
e)	i)Number of secondaries	Three		
	ii)Voltage ratio	400000/ $\sqrt{3}$ / 110/ $\sqrt{3}$		
f)	Rated frequency(Hz)	50 Hz		
g)	Type of Installation	Outdoor Pedestal Mounting		
2.	GUARANTEED RATINGS			
a)	Winding	I	II	III
b)	Rated output of each secondary winding(VA)	50 VA	50 VA	50 VA
c)	Accuracy class	3P	3P	0.2
d)	Total simultaneous burden(VA)	100 VA for 0.2 CL @ 50Hz		
e)	Thermal burden(VA)	750 VA		
f)	Rated Voltage factor			
	i)Continuous	1.2 Un		
	ii)30 seconds	1.5 Un		
	iii)5 seconds	Not Applicable		
g)	Capacitance	APTransco		
	i)For carrier frequency coupling(pF)	4400 pF +10%,-5%		
	ii)Of high voltage capacitor C1(pF)	4426 pF +10%,-5%		
	iii)of intermediate voltage capacitor C2(pF)	92458 pF +10%,-5%		
h)	Natural frequency of coupling(kHz)	> 500 kHz		
i)	Self tuning frequency of CVT(kHz)	> 500 kHz		
j)	Band width(kHz)	40 - 500 kHz		
k)	Temperature rise over ambient Temperature at 50 Deg. C	55 Deg.C temperature rise over an ambient temperature of 50 Deg.C		

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09.11.21APPD. MAYANK
09.11.21

5645395/2022/EEMRT-ENE51


**GUARANTEED TECHNICAL PARTICULARS
FOR 400kV/4400pF C.V.T (CCV-420)**

SHEET 02 OF 04

ISO -----

REV.No 00

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l)	One minute power frequency test voltage of secondary winding(kV rms)	3 kV rms
m)	One minute power frequency test voltage of H.F terminal(kV rms)	4 kV rms (Weather proof)
n)	One minute power frequency test voltage of capacitance(kV rms)(dry)	630 kV rms
o)	1.2/50 micro second impulse withstand test voltage of capacitor(kVp)	±1425 kVp
p)	250/2500 micro second switching surge withstand test voltage of capacitor(wet)(kVp)	Chief Engineer ±1050 kVp Planning & Power Systems APTransco
q)	Corona extinction voltage	320 kV rms (min.)
r)	Max. radio interference voltage at 266 kV (frequency between 0.5 MHz to 2 MHz.)	≤ 1000 μV
s)	Rated voltage of surge arrester connected at the secondary of CVT	350 Volts across the secondary of the EMU
t)	Min. creepage distance between phase to ground(mm)	10,500 mm
u)	Seismic acceleration	0.3g horizontal
v)	System neutral earthing	Effectively earthed
3)	CONSTRUCTIONAL DETAILS	Drawing approval subject to valid vendor registration
a)	Overall Dimensions	
	i)Overall height(mm)	4432 ±100
	ii)Height upto top of terminal pad from mounting plane(mm)	4567 ±100
	iii)Diameter and length of terminal pad (mm)	Height of terminal pad 135 x 95
iv)Material of terminal pad	Aluminium Alloy	

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v)	Mounting dimensions and diameter of mounting holes	4 Nos. 20x23 Slotted holes at 450 x 450 mm. spacing.
vi)	Diameter of insulator (mm)	I.D – 135 (shed)
b)	Total weight (kg)	500 kgs. (Approx.)
c)	Quantity of oil (kgs.)	38 kgs. FOR CAPACITOR UNIT (Approx.) 40 kgs. FOR EMU (Approx.)
d)	Whether CVTs are hermetically sealed. if so, how?	Yes, By NBR/SILICON Gaskets
e)	Details of dielectric for CVD	Paper, Film, oil dielectric
f)	Standard to which oil conforms generally	IEC-60296 FOR EMU IEC-60867 FOR CAPACITOR UNIT
i)	Minimum clearance between phases recommended(mm)	6000 mm. (Min.)
j)	Minimum center to center spacing recommended(mm)	6000 mm. (Min.)
k)	Minimum distance from nearby earthed objects (mm)	5620 mm. (Min.)
l)	Tan delta value of capacitor unit	<0.002
m)	Value of stray capacitance and conductance	300 +5% Cn & 50 Micro Siemens
n)	IP Protection for Terminal Box	IP-55 AS PER IEC-60947-1:2004
o)	Insulation Class	Class "A"
n)	Standard Frequency range for Accuracy & Protection class	Measuring accuracy calss-99% to 101% Protective accuracy calss-96% to 102%
o)	HF Series Resistance	< 40 Ohms
p)	Partial discharge	<10pC @ Um, <5pC @ 1.2Um/ $\sqrt{3}$ As per IEC-61869-1&5
r)	Cantilever strength of Insulator	500 kgs (min.)

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APPD.

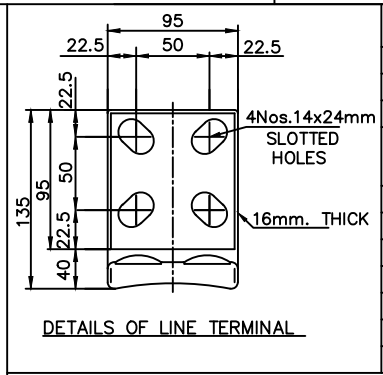
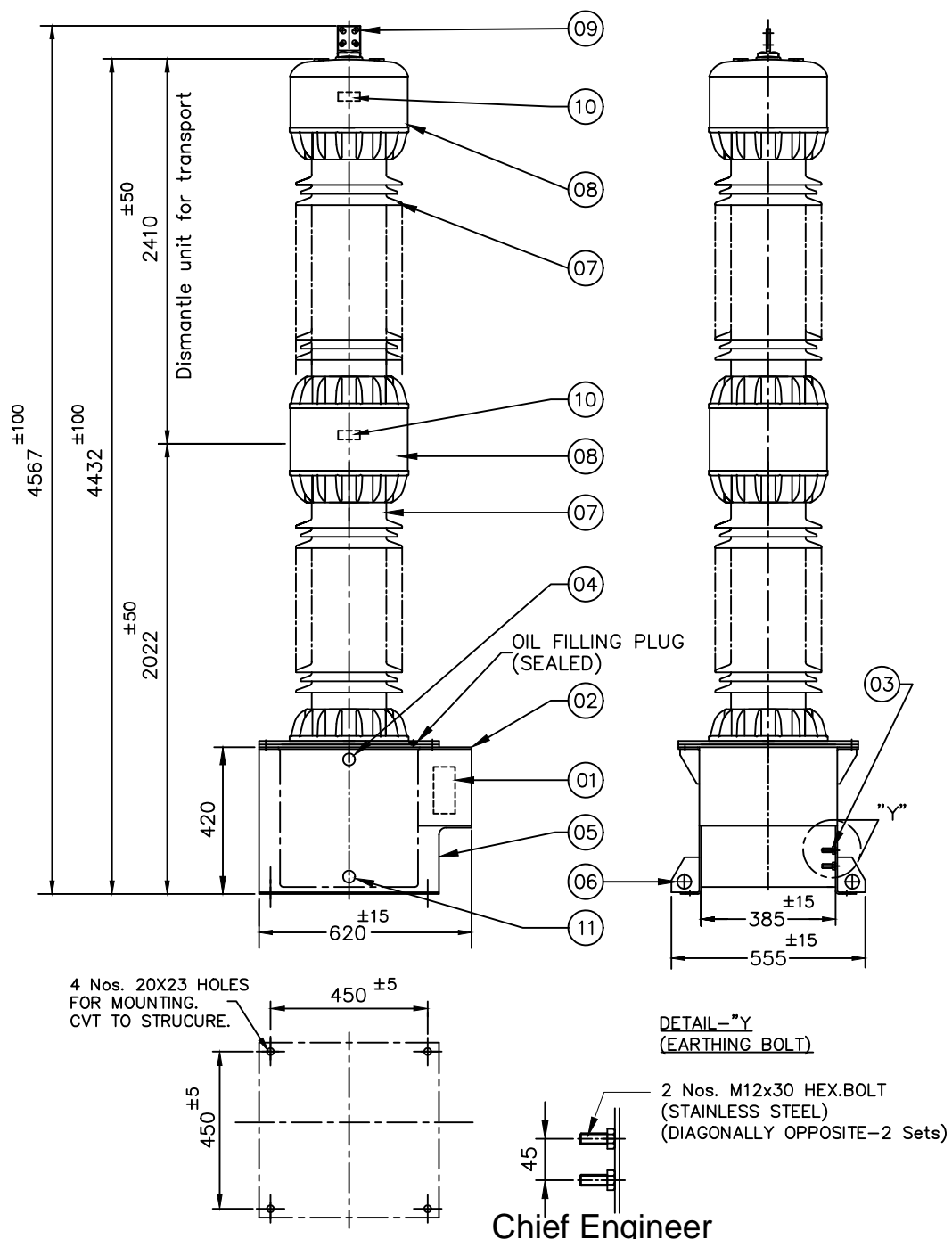
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Sl.No.	DESCRIPTION	MATERIAL	Qty.
01	CVT NAME PLATE	STAINLESS STEEL	1
02	SECONDARY TERMINAL BOX	M.S	1
03	EARTH BOLT (M12)	STAINLESS STEEL	4
04	OIL LEVEL INDICATOR (PRISMATIC TYPE)	AL. & GLASS	1
05	E.M.U TANK	M.S	1
06	LIFTING EYE (Ø40 HOLE)	M.S	4
07	PORCELAIN INSULATOR	PORCELAIN	2
08	SHIELD	ALUMINIUM	2
09	H.V. TERMINAL (PAD TYPE)	ALUMINIUM	1
10	CVT UNIT NAME PLATE	STAINLESS STEEL	2
11	OIL DRAIN PLUG	M.S & BRASS	1

NOTES :-

- NOMINAL CREEPAGE DISTANCE – 10500 mm.
- OIL QUANTITY :-
38 kgs. FOR CAPACITOR UNIT (IEC-60867) SYNTHETIC OIL
40 kgs. FOR EMU (IEC-60296) MINERAL OIL
- WEIGHT OF CVT : 500 kgs.
- WEIGHTS INDICATED ARE APPROXIMATE
- FINISH ELECTRO MAGNETIC UNIT TANK AS FOLLOWS:-
TANK SHALL BE HOT DIP GALVANISED AND
ALL EXPOSED MILD STEEL PARTS SHALL BE HOT DIP GALVANISED
- GENERAL TOLERANCE WILL BE APPLICABLE AS PER ISO 2768
WHERE TOLERANCE IS NOT INDICATED.
- MAKE OF INSULATOR : BHEL/IEC/MODERN/LILING HUAXIN
- INSULATION CLASS : 'A'

TECHNICAL DETAILS:-	
01. APPLICABLE STANDARD	IEC-61869-1&5,60358
02. RATED VOLTAGE	400 kV/√3
03. HIGHEST SYSTEM VOLTAGE	420 kV
04. H.V. TEST VOLTAGE	630 kV rms for 1 Min.
05. IMPLUSE TEST VOLTAGE	1425 kVp
06. RATED FREQUENCY	50Hz
07. "HF" CAPACITANCE	4400 pF
08. PRIMARY CAPACITANCE C1	4426 pF
09. SECONDARY CAPACITANCE C2	92458 pF
10. RIV at 266 kV	≤ 1000 μV

DRN.	NAME	DATE	ALL DIMENSIONS ARE IN mm. UNLESS OTHERWISE SPECIFIED.	SCALE : NTS.
Raghu	Raghu	09.11.21		
Sangith	Sangith	09.11.21		
APPD.	Mayank	09.11.21	OUTLINE DIAGRAM	
OF				
400 kV/4400 pF C.V.T (CCV-420)				



REF. -----

 DRG. No.
712-B-3276
 REV. No. 00

REVISION	
It.	DESCRIPTION

Chief Engineer
 Planning & Power Systems
 APTransco

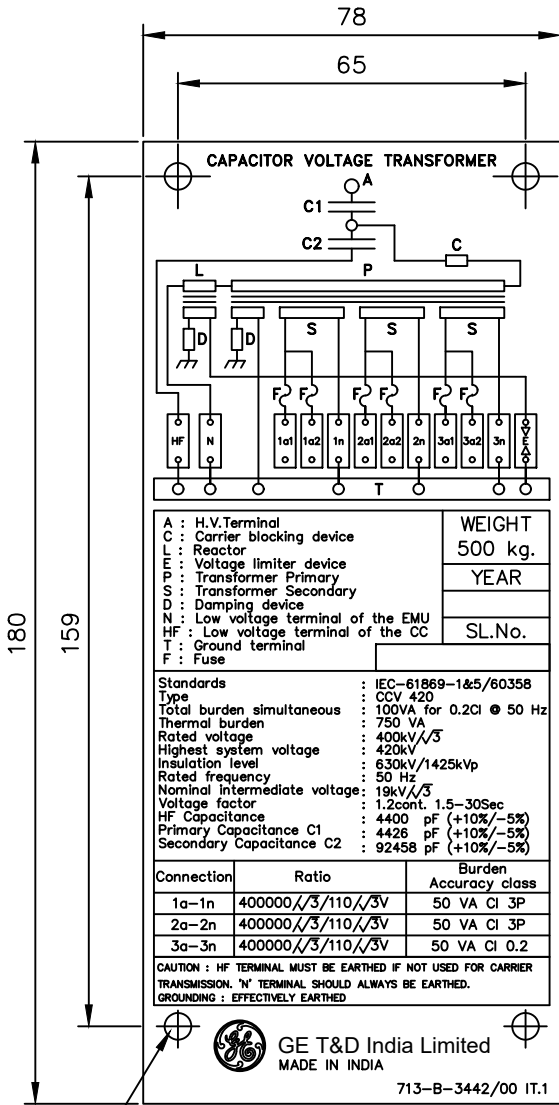
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Ground clearance of 8000 mm shall be maintained from Plinth level during erection.



A : H.V. Terminal	WEIGHT	500 kg.
C : Carrier blocking device	YEAR	
L : Reactor	SL.No.	
P : Voltage limiter device		
C : Transformer Primary		
D : Transformer Secondary		
S : Damping device		
HF : Low voltage terminal of the EMU		
N : Low voltage terminal of the CC		
T : Ground terminal		
F : Fuse		

Standards : IEC-61869-1&5/60358
Type : CCV 420
Total burden simultaneous : 100VA for 0.2CI @ 50 Hz
Thermal burden : 750 VA
Rated voltage : 400kV/√3
Highest system voltage : 420kV
Insulation level : 630kV/1425kVp
Rated frequency : 50 Hz
Nominal intermediate voltage : 19kV/√3
Voltage factor : 1.2cont. 1.5-30Sec
HF Capacitance : 4400 pF (+10%/-5%)
Primary Capacitance C1 : 4426 pF (+10%/-5%)
Secondary Capacitance C2 : 92458 pF (+10%/-5%)

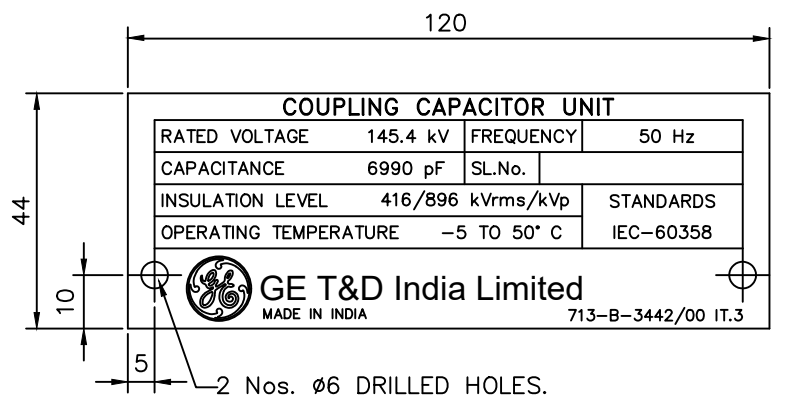
Connection	Ratio	Burden Accuracy class
1a-1n	400000/√3/110/√3V	50 VA CI 3P
2a-2n	400000/√3/110/√3V	50 VA CI 3P
3a-3n	400000/√3/110/√3V	50 VA CI 0.2

CAUTION : HF TERMINAL MUST BE EARTHED IF NOT USED FOR CARRIER TRANSMISSION. 'N' TERMINAL SHOULD ALWAYS BE EARTHED. GROUNDING : EFFECTIVELY EARTHED

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713-B-3442/00 IT.1

4 Nos. ø6 HOLES.

DETAILS OF CVT NAME PLATE (IT.No.1)

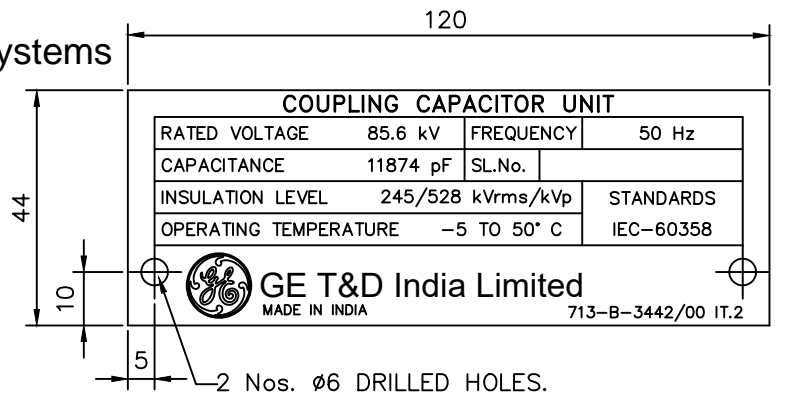


COUPLING CAPACITOR UNIT			
RATED VOLTAGE	145.4 kV	FREQUENCY	50 Hz
CAPACITANCE	6990 pF	SL.No.	
INSULATION LEVEL	416/896 kVrms/kVp	STANDARDS	
OPERATING TEMPERATURE	-5 TO 50° C	IEC-60358	

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713-B-3442/00 IT.3

2 Nos. ø6 DRILLED HOLES.

DETAILS OF CVT UNIT NAME PLATE (TOP UNIT) IT.No.3



COUPLING CAPACITOR UNIT			
RATED VOLTAGE	85.6 kV	FREQUENCY	50 Hz
CAPACITANCE	11874 pF	SL.No.	
INSULATION LEVEL	245/528 kVrms/kVp	STANDARDS	
OPERATING TEMPERATURE	-5 TO 50° C	IEC-60358	

GE T&D India Limited
MADE IN INDIA
713-B-3442/00 IT.2

2 Nos. ø6 DRILLED HOLES.

DETAILS OF CVT UNIT NAME PLATE (BOTTOM UNIT) IT.No.2

NOTES

1. WEIGHT INDICATED IN NAME PLATES ARE APPROXIMATE.
2. MATERIAL OF NAME PLATE - STAINLESS STEEL (0.5 mm.THICK) FOR OUTDOOR PROOF
3. GENERAL TOLERANCE WILL BE APPLICABLE AS PER ISO 2768 WHERE TOLERANCE IS NOT INDICATED
4. YEAR & SL. No. TO BE PRINTED AT THE TIME OF MANUFACTURE
5. FUSE RATING SUBJECT TO CHANGE DURING DETAILED ENGINEERING

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REVISION	DESCRIPTION	NAME	DATE	ALL DIMENSIONS ARE IN mm. UNLESS OTHERWISE SPECIFIED.	SCALE : NTS.
DRN.	Raghul		09.11.21	NAME PLATES FOR 400 kV/4400 pF C.V.T (CCV-420)	REF. ----
CHD.	Sangith		09.11.21		
APPD.	Mayank		09.11.21		
				GE T&D India Limited	DRG. No. 713-B-3442
					REV. No. 00

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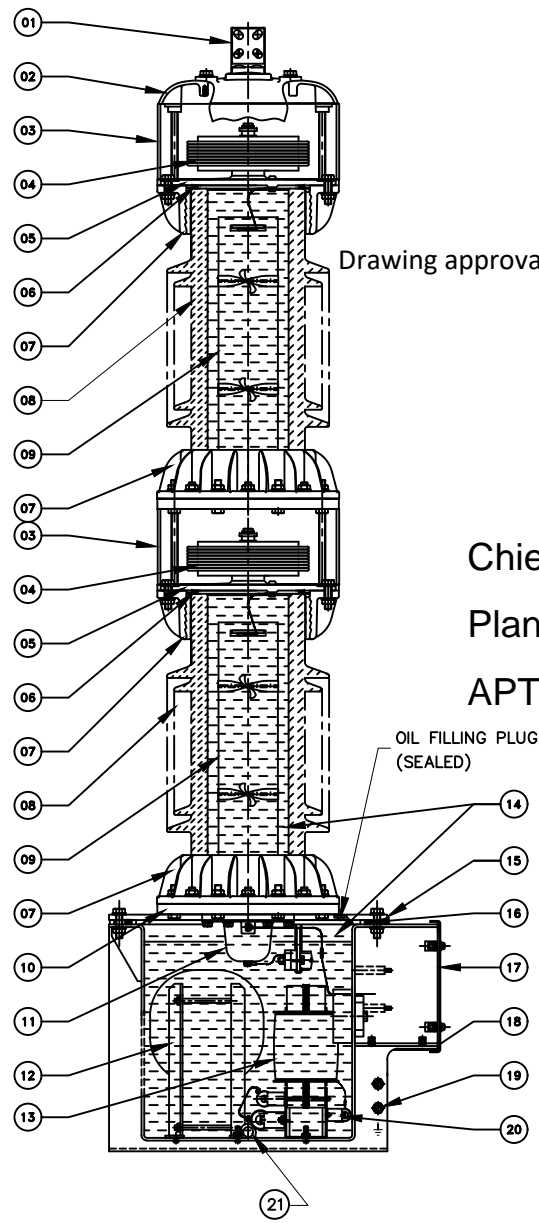
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Suitable Clamps/Connectors in the scope of the EPC contractor

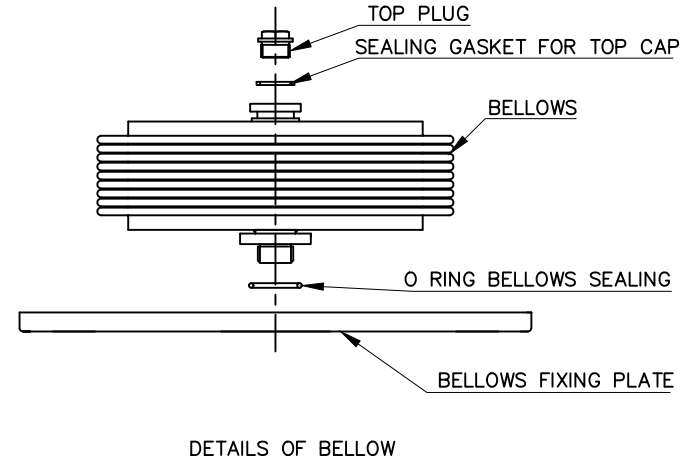
NOTE : DRAWING APPROVAL SUBJECT TO VALID TYPE TEST REPORTS, TO BE CHECKED DURING ACCEPTANCE TESTS.



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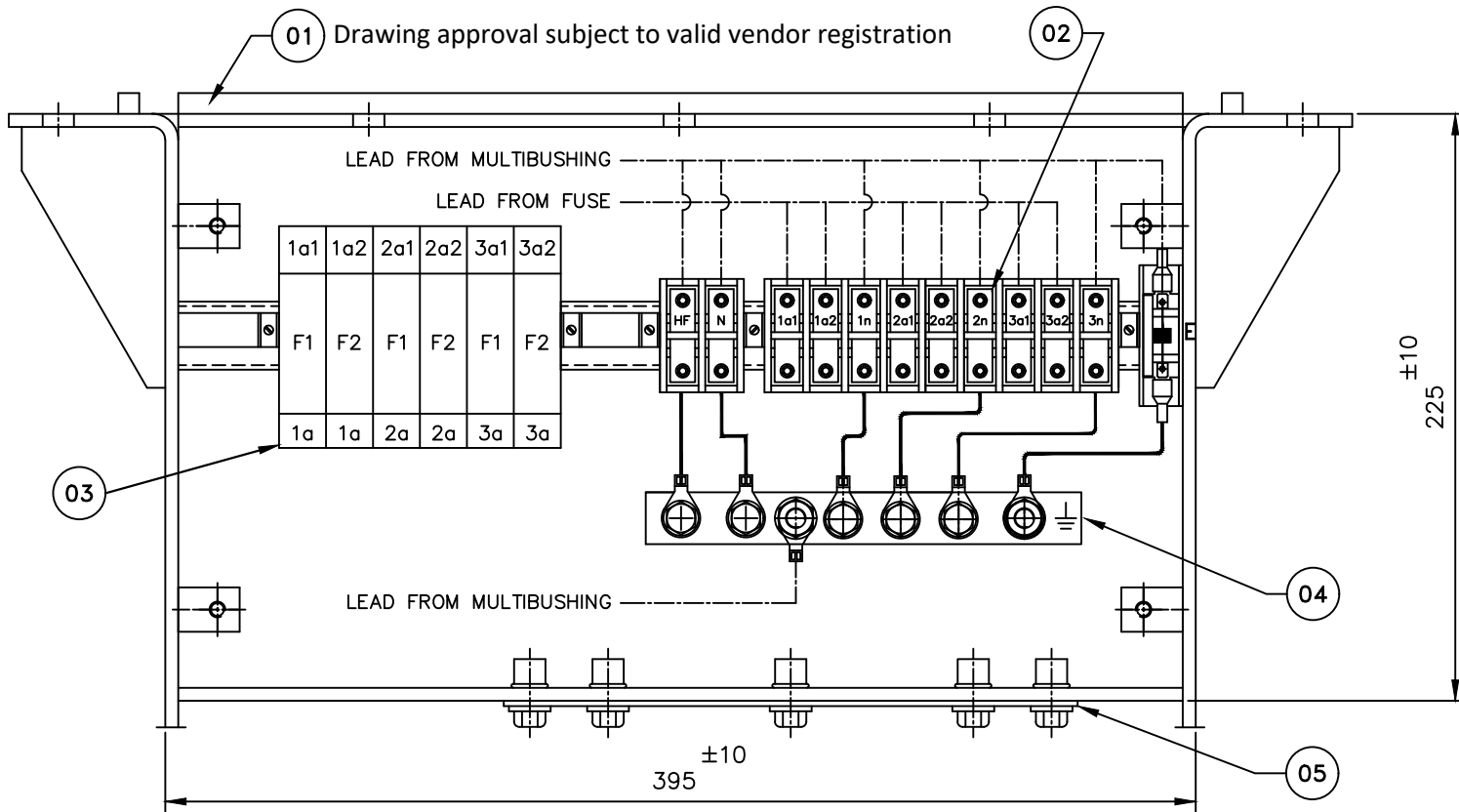
Chief Engineer
Planning & Power Systems
APTransco

Sl.No.	DESCRIPTION	7
01	H.V. TERMINAL PAD (ALUMINIUM)	564
02	H.V. TERMINAL PLATE	
03	SHIELD	
04	BELLOW	
05	BOTTOM PLATE FOR BELLOW	
06	GASKET FOR PORCELAIN TO PLATE	
07	END FLANGE	
08	PORCELAIN INSULATOR	
09	CAPACITOR STACK ASSEMBLY	
10	BOTTOM PLATE FOR STACK ASSEMBLY	
11	L.V. BUSHING	
12	TRANSFORMER ASSEMBLY	
13	REACTOR ASSEMBLY	
14	OIL	
15	TANK COVER PLATE	
16	GASKET FOR TANK	
17	SECONDARY TERMINAL BOX	
18	GASKET FOR SECONDARY TERMINAL BOX	
19	EARTH BOLT	
20	DAMPING CIRCUIT	
21	OIL DRAIN PLUG	



REVISION	DESCRIPTION
It.	

NAME	DATE	ALL DIMENSIONS ARE IN mm. UNLESS OTHERWISE SPECIFIED.	SCALE : NTS.
DRN. Raghu	09.11.21	SECTIONAL VIEW OF 400 kV/4400 pF C.V.T (CCV-420)	REF. ----
CHD. Sangith	09.11.21		
APPD. Mayank	09.11.21		
		GE T&D India Limited	
		DRG. No. 714-B-4134	
		REV. No. 00	



NOTES: -

1. F1 & F2 - 6 Amps FUSE
2. HF - LOW VOLTAGE TERMINAL OF THE CC
3. N - LOW VOLTAGE TERMINAL OF THE EMU
4. E - VOLTAGE LIMITER DEVICE
5. ENCLOSURE PROTECTION CLASS OF SECONDARY TERMINAL BOX CONFORM TO IP-55 AS PER IEC-60947-1-2004
6. 3 Nos. 3/4 Inch CABLE GLAND (UNDER SCOPE OF GE T&D SUPPLY)

Chief Engineer
Planning & Power Systems
APTransco

Sl.No.	DESCRIPTION	QTY.
01	TANK ASSEMBLY	1
02	CONNECTOR ASSEMBLY	1
03	FUSE	6
04	GROUNDING STRIP	1
05	CABLE GLAND PLATE	1

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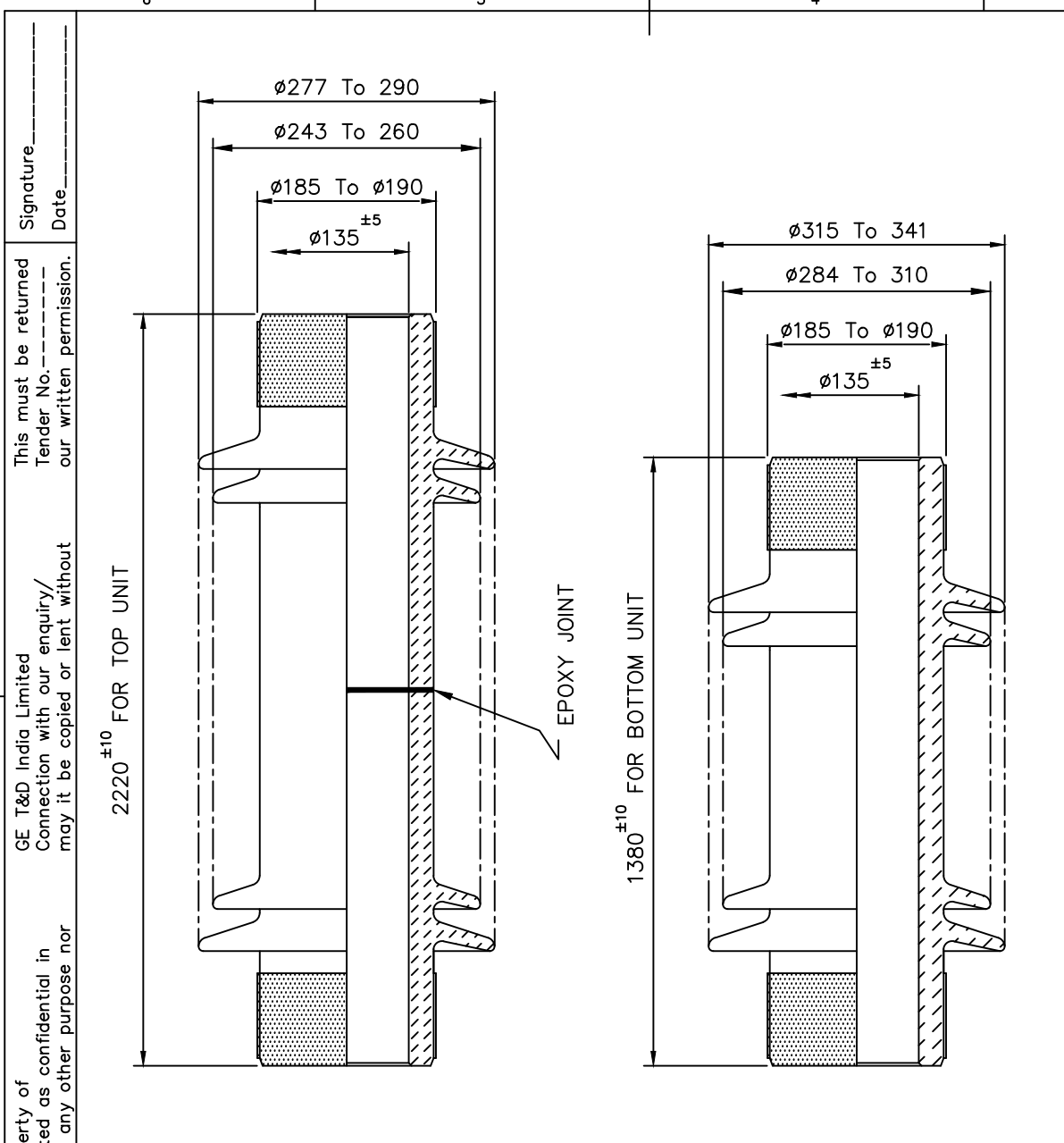
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NAME	DATE	ALL DIMENSIONS ARE IN mm. UNLESS OTHERWISE SPECIFIED.	SCALE : NTS.
DRN. Raghu	09.11.21	DETAILS OF SECONDARY TERMINAL BOX FOR 400 kV/4400 pF C.V.T (CCV-420)	REF. ----
CHD. Sangith	09.11.21		
APPD. Mayank	09.11.21		DRG. No. 716-B-4103
GE T&D India Limited			REV. No. 00

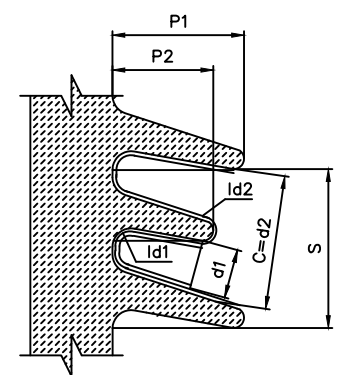
8
564
F
E
D
C
B
A



SHED PARAMETERS AS PER IEC:815-1986	SHED PARAMETERS OF OFFERED PORCELAIN	IEC REQUIREMENTS
1.DISTANCE BETWEEN SHED-C	≥ 30 mm	≥ 30 mm
2.RATIO BETWEEN SPACING AND SHED OVERHANG (S/P1)	≥ 0.8	≥ 0.8
3.RATIO BETWEEN CREEPAGE DISTANCE AND CLEARANCE $ld1/d1$	< 5	< 5
4.RATIO BETWEEN CREEPAGE DISTANCE AND CLEARANCE $ld2/d2$	< 5	< 5
5.DIFFERENCE BETWEEN TWO CONSECUTIVE SHED OVERHANGS P1-P2	≥ 15	≥ 15
6.CREEPAGE FACTOR	< 4	< 4
7.PROFILE FACTOR	> 0.7	> 0.7

NOTES:

- NOMINAL CREEPAGE DISTANCE : 10500 mm
- APPLICABLE STANDARD IEC-62155 / IEC-60815
- MAKE OF INSULATOR : BHEL/IEC/MODERN/LILING HUAXIN
- GENERAL TOLERANCE : $\pm(0.04d+1.5)$ mm. WHEN "d" IS < 300 mm.
 $\pm(0.025d+6)$ mm. WHEN "d" IS >300 mm. WHERE "d" IS THE DIMENSION IN mm.
- ONE EPOXY JOINT (Maximum)



DETAILS OF SHED PROFILE
FOR INFORMATION ONLY

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	It.		

NAME	DATE	ALL DIMENSIONS ARE IN mm. UNLESS OTHERWISE SPECIFIED.	SCALE : NTS.
DRN. Raghu	09.11.21	PORCELAIN HOUSING OF 400 kV/4400 pF C.V.T (CCV-420)	REF. ----
CHD. Sangith	09.11.21		
APPD. Mayank	09.11.21		
GE T&D India Limited			DRG. No. 723-B-1207
			REV. No. 00

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