

# 145 kV CAPACITOR VOLTAGE TRANSFORMER TYPE: CPB-H 145

CLIENT:  
**(AS APPLICABLE)**

NOTE: 1. DRAWING APPROVAL SUBJECT TO VALID TYPE TEST REPORTS, TO BE CHECKED DURING ACCEPTANCE TESTS  
2. FOR EPC CONTRACTS ONLY

END CUSTOMER:  
**APTRANSCO**

1. Minimum 300mm plinth shall be maintained for CT/PT/CVT/Isolators/IV/LA/Breakers in the Substation during foundation works to ensure safe live to ground clearance 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 contractor shall be instructed to supply the same in line with CT/PT/CVT/Isolator/IVT/LA/Breakers requirement and compatibility.

PROJECT:  
**(AS APPLICABLE)**

Drawing approval subject to valid vendor registration

W.O. NO.:  
**(AS APPLICABLE)**

P.O. NO.:  
**(AS APPLICABLE)**

**CHIEF ENGINEER  
PLANNING & POWER SYSTEMS  
APTRANSCO**

QTY.:  
**(AS APPLICABLE)**

SR. NO.	REFERENCE OF STD DRGS/ DOCUMENTS	REV.	DESCRIPTION
1.	1HYT903320-067	A	GENERAL ARRANGEMENT- 31mm/kV
2.	1HYT903320-069	A	RATING PLATE- 31mm/kV
3.	1HYT903320-070	A	SECONDARY TERMINAL BOX
4.	1HYT903320-071	A	SECTIONAL VIEW
5.	1HYT903320-073	A	INSULATOR DRAWING- 31mm/kV

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Ⓐ New drg. prepared.

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Prepared: SR	Checked: SNP	Approved: SN
Without Sep. PL.: <input type="checkbox"/>	Same PL. Same No.: <input type="checkbox"/>	Sep. PL. Other No.: <input type="checkbox"/>
Derived by:	Supersedes:	Supersedes by:
A   2022-07-07		

**LIST OF DOCUMENTS FOR  
CPB-H 145  
TYPE CVT**

Scale  
NTS  
T.Sh.  
1

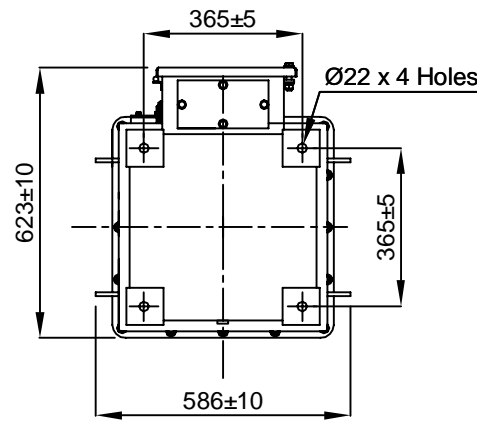
**ABB** HITACHI ENERGY INDIA LIMITED  
(FORMERLY KNOWN AS APPSIL)

**1HYT903320-066**

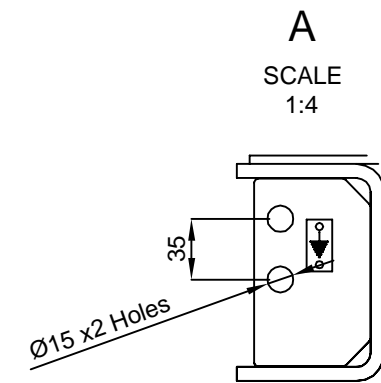
Sheets  
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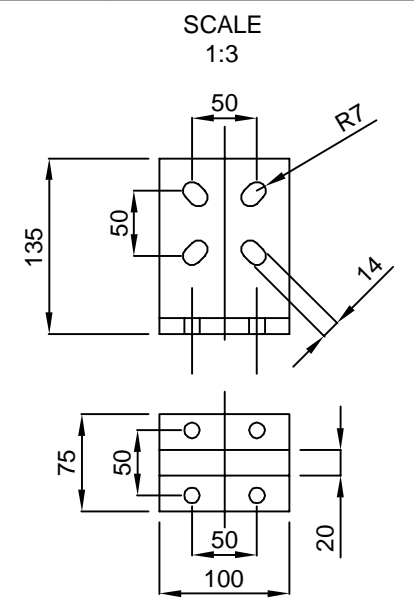
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BOTTOM VIEW

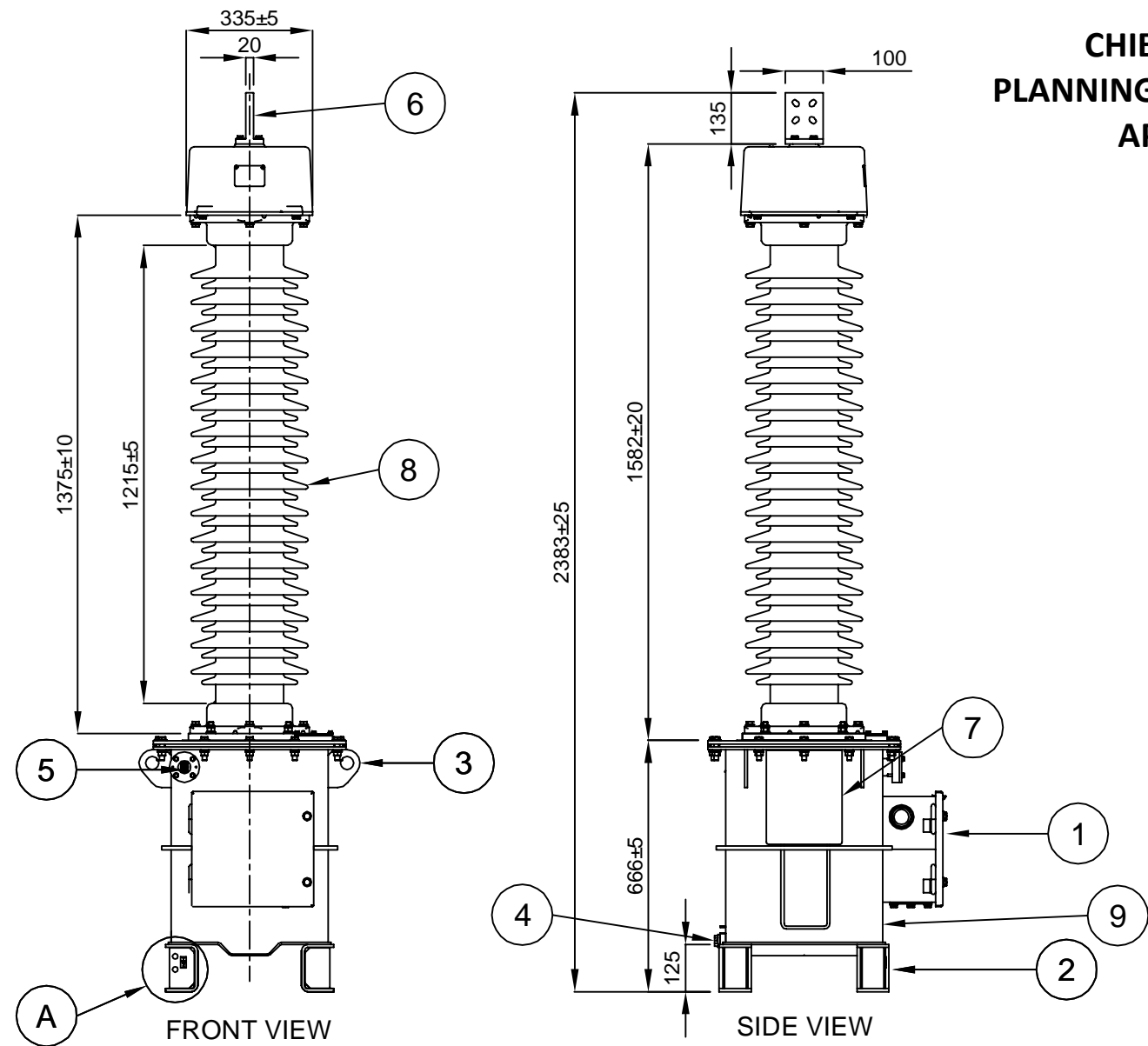


Earthing Terminal Detail



Primary Terminal Detail

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FRONT VIEW

SIDE VIEW

Sr.No.	DESCRIPTION	MATERIAL	QTY.
9	EMU TANK	MS HOT DIP GALVANISED	1
8	INSULATOR	PORCELAIN	1
7	RATING PLATE	ALUMINUM	1
6	PRIMARY TERMINAL	ALUMINUM	1
5	OIL LEVEL INDICATOR	TOUGHENED GLASS	1
4	OIL DRAIN PLUG	MS HOT DIP GALVANISED	1
3	LIFTING LUG	MS HOT DIP GALVANISED	4
2	MOUNTING PAD	MS HOT DIP GALVANISED	4
1	SECONDARY TERMIALANL BOX	MS HOT DIP GALVANISED	1

Notes:-

- All exposed ferrous parts including tank are hot dip galvanized.
- Connect the HF Terminal to Earth when carrier coupling device is not used.
- Nominal Creepage Distance is 4495 mm (31 mm/kV)
- All Dimensions are in mm. General Tolerance as per ISO:2768-C.
- CVD bellow material: Stainless Steel
- Two nos. earthing provisions provided on mounting pad diagonally.
- Porcelain insulators without any joint.

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Revision Details:  
Ⓜ New drawing prepared.

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Revision		145 kV Capacitor Voltage Transformer Type: CPB-H 145	General Arrangement Drawing	DRAWN: SS	CHECKED: PDS	APPRD.: SN	file: - 3320-067	TOTAL SH. 1
A	2022-07-07			HITACHI ENERGY INDIA LIMITED (FORMERLY KNOWN AS APPSIL)			1HYT903320-067	Sh. NO. 1

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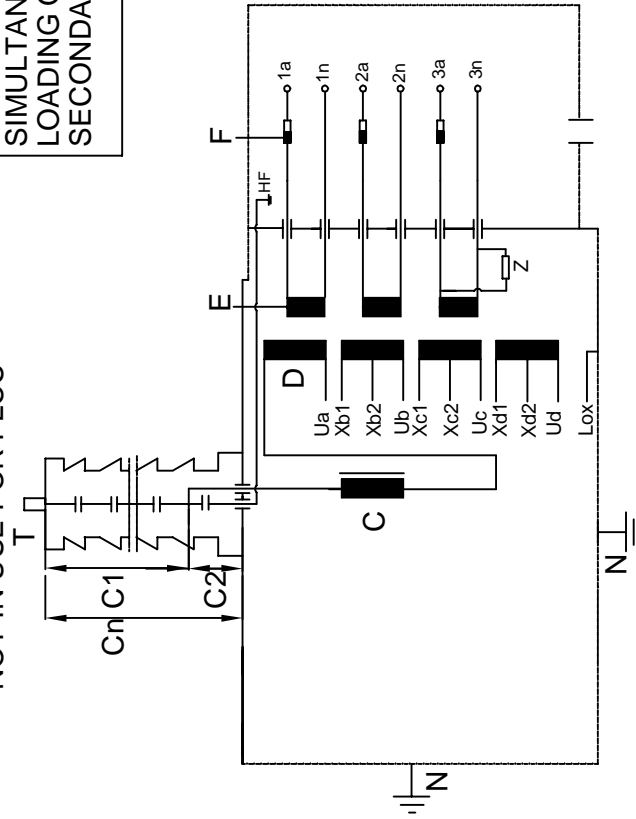
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200±1

<b>ABB</b>		Hitachi Energy India Ltd		Made in India	
1Ph. Capacitor voltage transformer	145	Type	CPB-H 145	Serial No.	xxxxxx
Highest system volt.kV	145/275/650	Rated voltage	kV	132/√3	4495
Rated Insulation level kV	50	Total creepage minimum	mm	78	
Rated frequency Hz	IEC: 61869-5	Weight of oil	kg	400	
Standard	5328	Equ.Cap.(Cn)For PLCC	pF	4400 <sup>+10%</sup> <sub>-5%</sub>	
H.V.(PRI) Cap: C1	25252	Nominal Intermediate volt	kV	23/√3	
Int. V(SEC) Cap: C2	-5 to +50 °C	Date of mfg.		MM/YYYY	
Temperature category °C	750 VA	Suitable for hot line washing		YES	
Total thermal burden VA	'A'	G.A. drg. No.		1HYT903320-067	
Class of Insulation					

Rated sec. voltage (V)	110/√3	Terminal markings	1a - 1n	Rated burden (VA)	50	Accuracy class	3P
	110/√3		2a - 2n		50		3P
	110/√3		3a - 3n		50		0.2
SIMULTANEOUS LOADING OF SECONDARIES							
					50		0.2
					100		3P

EARTH HF TERMINAL WHEN NOT IN USE FOR PLCC



- T - H.V. Terminal
- C - Compensating reactor
- D - Primary Winding
- E - Secondary Winding
- F - FUSE
- HF- H.F. Terminal(PLCC)
- N - Earthing
- Z - F.R. Circuit
- Ud-Xd } Compensating windings
- Uc-Xc }
- Ub-Xb }
- Ua-Lead connecting C,D.
- Lox-Earth Terminal

END CUSTOMER: APTRANSCO  
 HEIL WORKS ORDER NO : (AS APPLICABLE)  
 CLIENT WORK ORDER NO: (AS APPLICABLE)

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- Minimum 300mm plinth shall be maintained for CT/PT/CVT/Isolators/IV/LA/Breakers in the Substation during foundation works to ensure safe live to ground clearance as per IE rules.
- Since the supply of terminal connectors is not in the scope of manufacturer as mentioned in the drawings. The EPC contractor shall be instructed to supply the same in line with CT/PT/CVT/Isolator/IVT/LA/Breakers requirement and compatibility.

1	Rating and Diagram Plate	1	ALUMINUM	Sh. 2mm thk.
QTY	DESCRIPTION	P	MATERIAL /CODE NO	WT LOWER DRG NO.
DRAWN: SR		CHECKED: SNP		APPRD.: SN
file :3320-069		TOTAL SH. 1		
<b>ABB</b> HITACHI ENERGY INDIA LIMITED (FORMERLY KNOWN AS APPSIL)		1HYT903320-069		
		Sh. NO. 1		

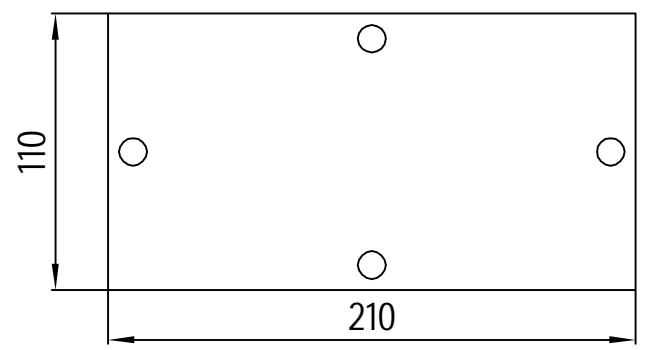
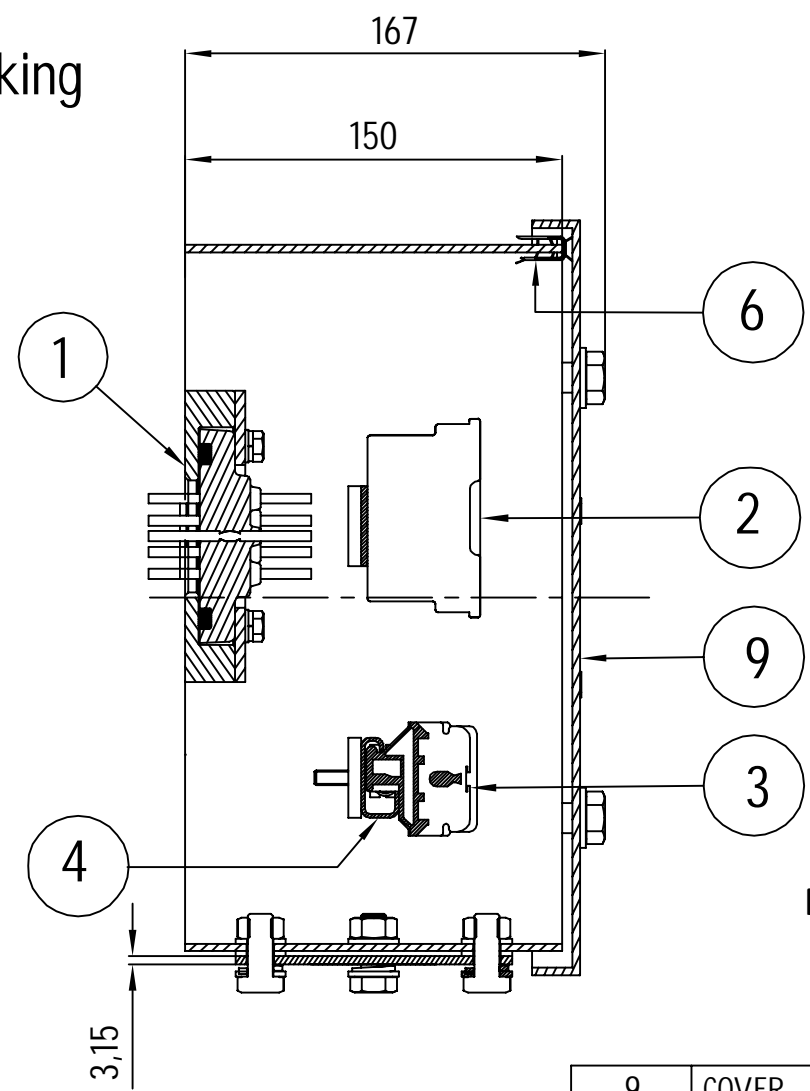
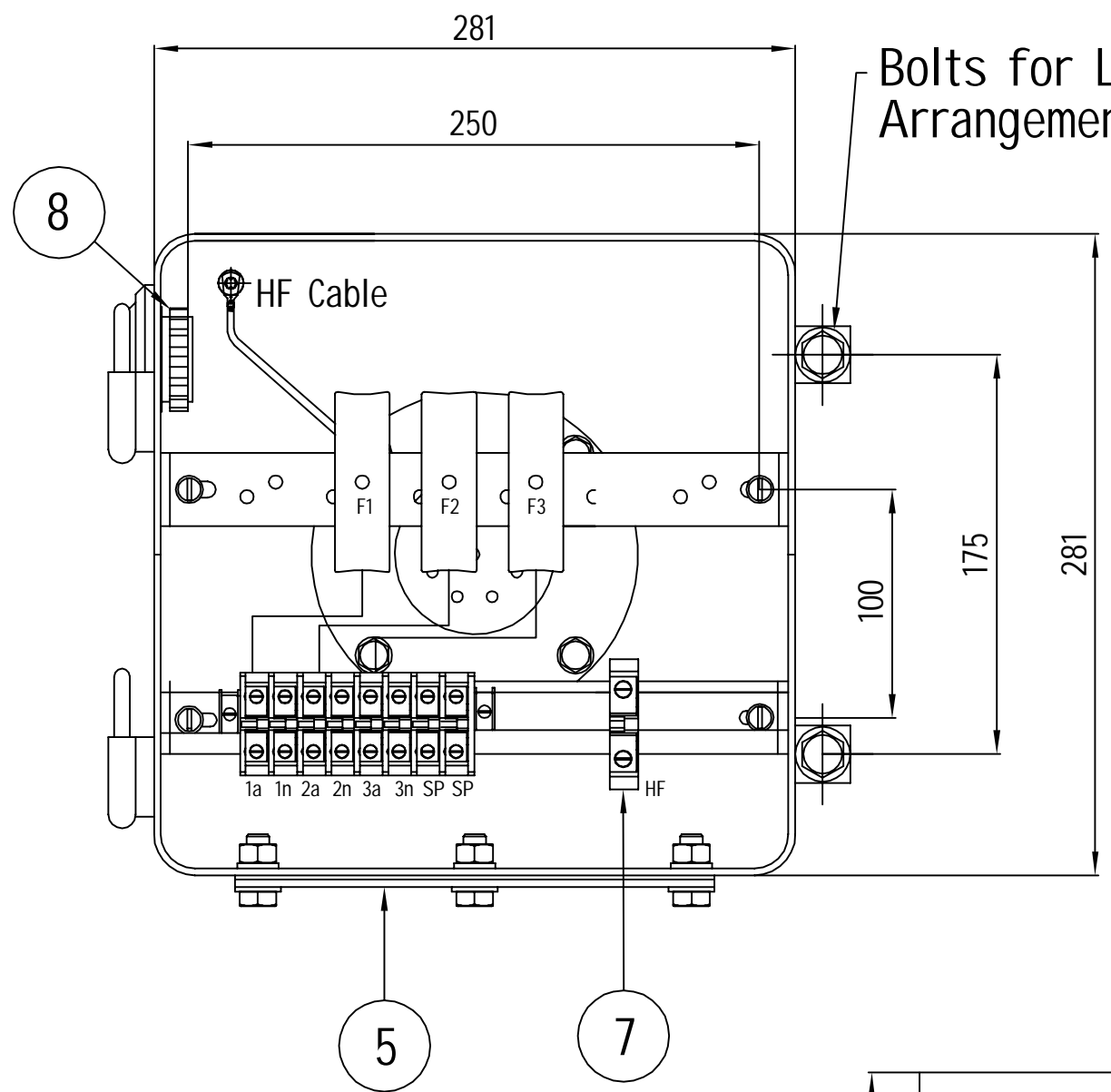
**Rating Plate:**  
 1HYP000428P3

**Rating & Diagram Plate for**  
 145kV Capacitor Voltage Transformer

Revision	
A	2022-07-07

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5. REMOVABLE UNDRILLED CABLE GLAND PLATE

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9	COVER
8	BREATHER
7	HF TERMINAL CONNECTION - OAT 25
6	EPDM GASKET
5	REMOVABLE UNDRILLED CABLE GLAND PLATE
4	TERMINAL MOUNTING CHANNEL
3	TERMINALS ELMEX MAKE CAT M4
2	HRC. FUSES (16AMP)
1	SECONDARY WINDING TERMINALS & HF BUSHING
Sr. No.	Item Description

NOTES:  
1) DEGREE OF PROTECTION IP-55.  
2) ALL FERROUS PARTS ARE HOT DIP GALVANIZED.  
3) STEEL SHEET 3.15mm THICK HOT ROLLED.  
4) ALL DIMENSIONS ARE IN mm.

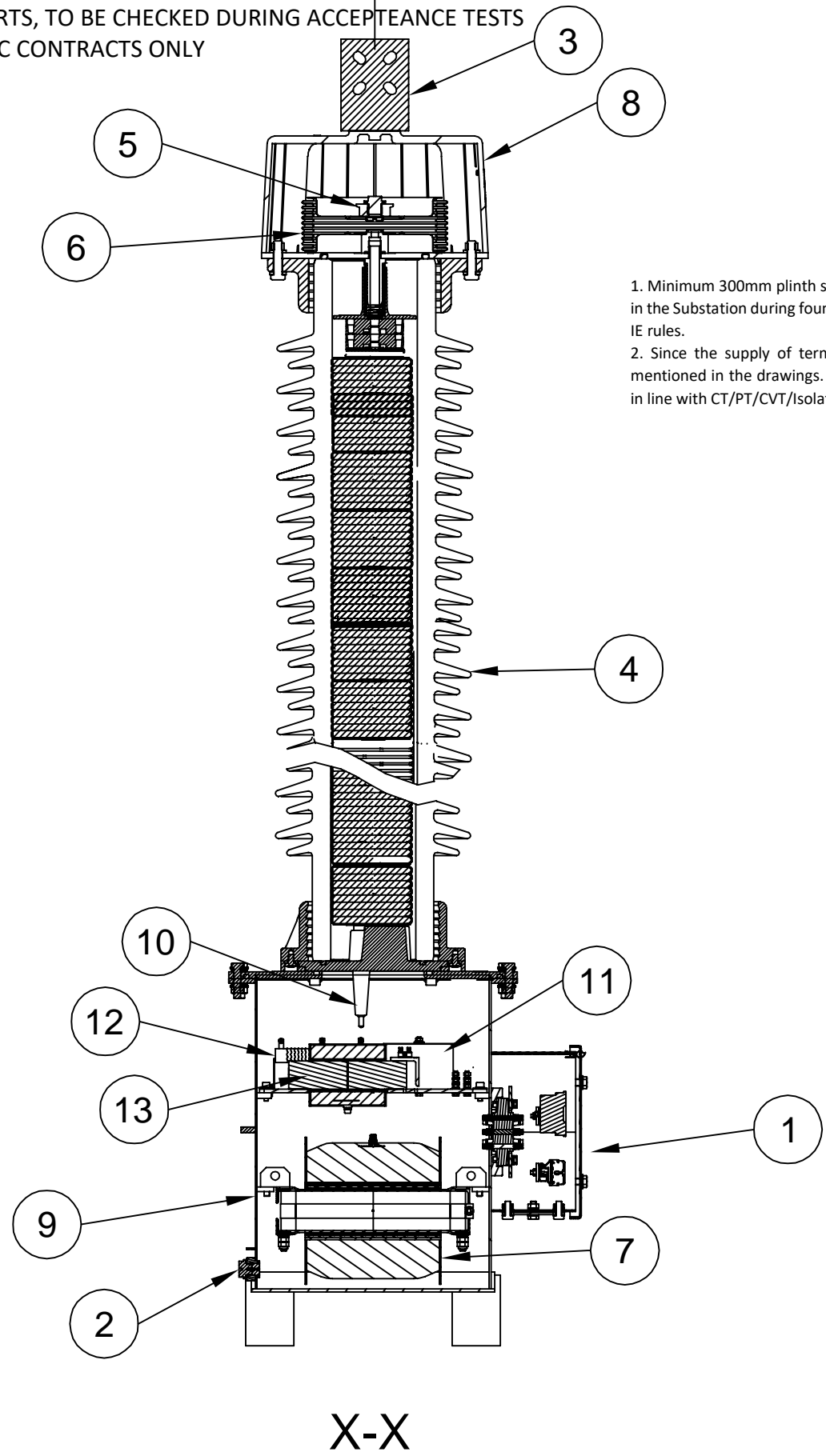
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Revision Details:  
A New drg. prepared.

Revision		145 KV Capacitor Voltage Transformer Type: CPB-H 145	SECONDARY TERMINAL BOX	DRAWN: SR	CHECKED: SNP	APPRD.: SN	file: 3320-070	TOTAL SH. 1
A	2022-07-07			HITACHI ENERGY INDIA LIMITED (FORMERLY KNOWN AS APPSIL)			1HYT903320-070	Sh. NO. 1

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Notes:

1. All exposed ferrous parts including tank are hot dip galvanized.
2. Connect the HF Terminal to Earth when carrier coupling device is not used.
3. All Dimensions are in mm. General Tolerance as per ISO:2768-C.
4. Porcelain insulators without any joint.
5. CVD bellow material: Stainless Steel

1. Minimum 300mm plinth shall be maintained for CT/PT/CVT/Isolators/IV/LA/Breakers in the Substation during foundation works to ensure safe live to ground clearance as per IE rules.
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13	Compensating reactor	1
12	Damping resistor.	1
11	Damping reactor	1
10	Mono Bushing	1
9	EMU tank	1
8	Top cover	1
7	Intermediate Voltage transformer	1
6	Bellow	1
5	Oil Filling Plug (Not to be Opened as hermetically sealed)	1
4	Insulator	1
3	Primary Terminal	1
2	Oil Drain Plug	1
1	Secondary Terminal Box	1
Sr. No.	Description	Quantity

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Revision Details:  
A New drg. prepared.

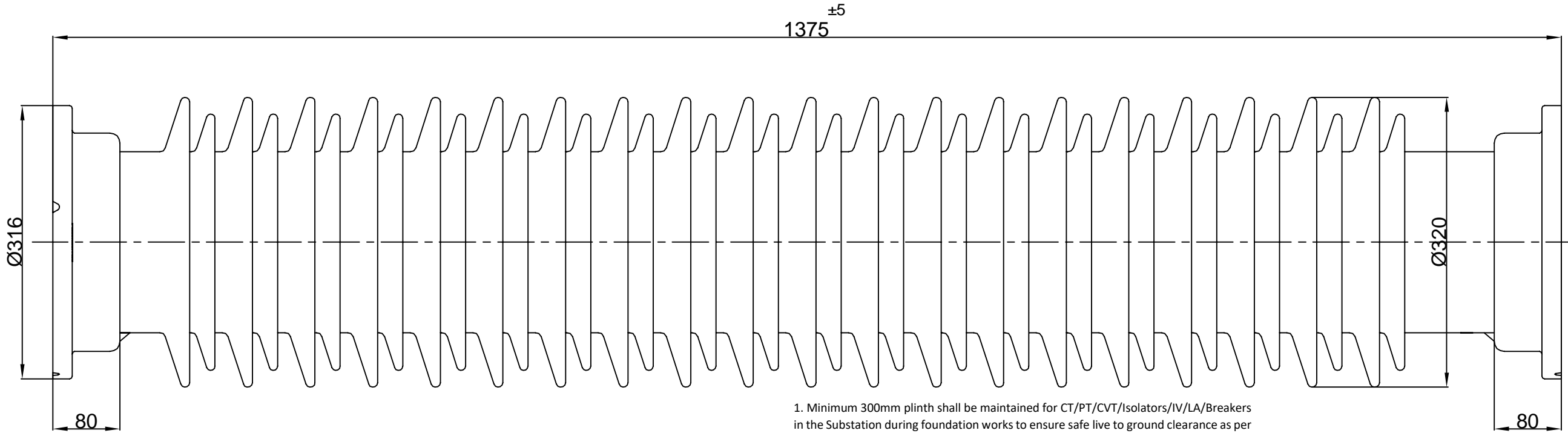
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Revision		145 KV Capacitor Voltage Transformer Type: CPB-H 145	SECTIONAL VIEW	DRAWN: SR	CHECKED: SNP	APPRD.: SN	file: 3320-071	TOTAL SH. 1
A	2022-07-07			HITACHI ENERGY INDIA LIMITED (FORMERLY KNOWN AS APPSIL)			1HYT903320-071	Sh. NO. 1

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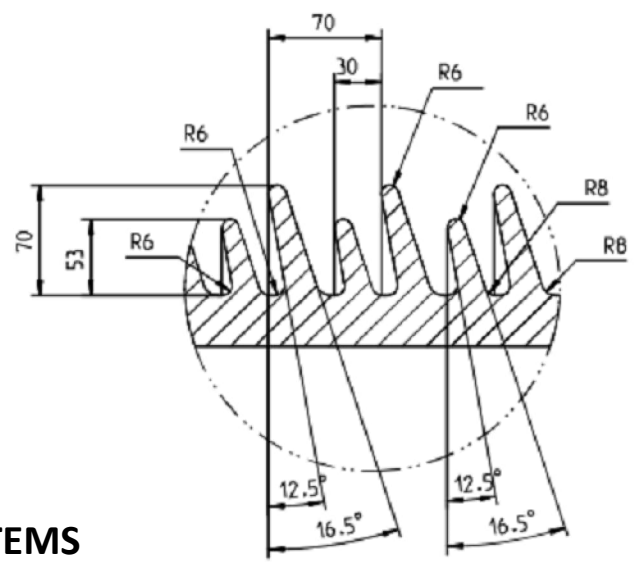
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- A) CEMENT COMPOUND SHOULD NOT STICK ON INSULATOR END OUTER CHAMFER AS WELL AS SEALING SURFACE
  - B) THE OUTER SURFACE OF FLANGES SHALL BE WITH COLOURLESS ANODIZING OF 5 µm THICKNESS MIN. THE ANODIZING SHALL NOT BE DONE ON SURFACE MARKED WITH CHAIN DOTTED LINE (i.e., ALONG SEALING SURFACE)
  - C) PLEASE REFER SH.2 FOR SHED PROFILE AND ITS DETAIL
  - D) THE TOTAL CREEPAGE DISTANCE SHALL BE 4495 mm MIN.
  - E) CANTILEVER STRENGTH: 600Kg
- Ref Standard IEC 62155/IS 5621



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16 long and 16 short sheds

Revision Details:  
⊗ New drawing prepared.  
  
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Revision		145 kV Capacitor Voltage Transformer Type: CPB-H 145	INSULATOR DRAWING (31 mm/kV)	DRAWN: SR	CHECKED: PDS	APPRD.: SN	file: - 3320-073	TOTAL SH. 1
A	2022-07-07			HITACHI ENERGY INDIA LIMITED (FORMERLY KNOWN AS APPSIL)			1HYT903320-073	Sh. NO. 1

NOTE: 1. DRAWING APPROVAL SUBJECT TO VALID TEST REPORTS, TO BE CHECKED DURING ACCEPTANCE TESTS

6096794/2022/EMRT-ENE51

## GUARANTEED TECHNICAL PARTICULARS

### FOR 132kV CAPACITOR VOLTAGE TRANSFORMERS

#### 2. FOR EPC CONTRACTS ONLY

1	Name of the Manufacturer	Hitachi Energy India Limited
2	Type Designation	CPB-H 145
3	Type of CVT	Outdoor, Oil filled, hermetically sealed
4	Rated Primary Voltage (kV)	132/√3
5	Highest Service Voltage (kV)	145
6	Rated Voltage factor	1.2 Continuous & 1.5 for 30 Sec.
7	Rated Frequency (Hz)	50
8	Number of Phases	Single
9	Power frequency voltage withstand for 1 minute (kV rms)	275
10	Lightning Impulse voltage withstand for 1.2/50 μs (kV peak)	650
11	Switching Impulse voltage withstand for 250/2500 μs (kV peak)	NA
12	Power frequencies voltage withstand of secondary winding	3 kV for 1 Minute
13	Power frequencies voltage withstand of H.F. Terminal	4 kV for 1 Min. (for Enclosed Type)
14	Equivalent series resistance over entire carrier frequency range (Ohm)	<40
15	Standard Applicable	IEC: 61869-5
16	Temperature rise over ambient temperature at 50 °C	According to IEC: 61869-5 /IEC:186 / IS:3156
17	Radio interference voltage at 1 MHz at 1.1Um/√3 (μV)	<1000
18	Whether CVTs are suitable for Carrier Communication, Carrier Teleprinting services, Metering, Relaying, Protection, Synchronizing and Interlocking purposes?	Yes
19	Capacitance values (pF)	<b>4400 (+10% -5%)</b>
20	Natural frequency of coupling / Self Tuning frequency (kHz)	≥ 500
21	Band width (kHz)	40 to 500
22	Values of stray capacitance and stray conductance in the carrier frequency range of 40 to 500 kHz	300 + 0.05C <sub>n</sub> (pF) and 50 μS (As per IEC:60358)
23	Capacitance Temp coefficient (% per kelvin)	0.07 %
24	Rated intermediate voltage of CVT (kV)	23/√3
25	Rated primary voltage of EMU (kV)	23/√3
26	Tan Delta value of CVT	<0.005
27	Type of Insulator	Porcelain
28	Mounting details (mm)	365x365
29	Overall height (mm)	2383±25
30	Standard range of frequencies for which accuracy are valid	As per IEC 61869-5 (96% to 102% for protection) (99 % to 101% for metering)
31	Nominal creepage distance (mm/kV)	31
32	Total Weight (kg)	400 approx.
33	Quantity of oil (kg)	78 approx.
34	Surface finish of all ferrous parts	Mild Steel – Hot Dip Galvanized
35	Provision made for accepting the change in oil volume?	Metal Bellows
36	Type & Material of terminal pad	Flat type, Aluminum
37	Partial Discharge (pC)	<10 at Um, <5 at 1.2 Um/√ 3
38	EMU oil	Mineral oil (As per IEC:60296)
39	CVD oil	Synthetic oil (As per IEC:60867)
40	Seismic acceleration	0.36g
41	Type of insulation	A

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**6096794/2022/EEMRT-ENE51** **GUARANTEED TECHNICAL PARTICULARS**  
**FOR 132kV CAPACITOR VOLTAGE TRANSFORMERS**

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**Winding Details**

Sr.No.	Parameter	Wdg I	Wdg II	Wdg III
1	Rated Secondary Voltage (v)	110/ $\sqrt{3}$	110/ $\sqrt{3}$	110/ $\sqrt{3}$
2	Accuracy Class	<b>3P</b>	<b>3P</b>	<b>0.2</b>
3	Rated BurdenS	<b>50 VA</b>	<b>50 VA</b>	<b>50 VA</b>
4	Simultaneous Burden	50 VA for 0.2 & 100 for 3P		
5	Rated Thermal Burden	750 VA		

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