

TEST REPORT

Padmount Transformer

3 Phase 1000kVA 13800x4160D - 480y V

P.O. No. : DS21-211

Jul. 2023

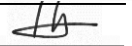


Tested by : Kang, Min-Jae



date : 2023-07-24

Checked by : Ha, Jae-gyeong



date : 2023-07-24

Approved by : Kim, Seung-Hwan



date : 2023-07-24

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1. Rating

1. Phase	:	3 Ø	2. Capacity	:	1,000 kVA
3. Rated frequency	:	60 Hz	4. Vector Group	:	Dyn1
5. Cooling method	:	ONAN	6. Core type	:	Wound
7. Rated voltage	(High voltage / Low voltage)	:	13800 x 4160 / 480	V	
8. Rated current	(High voltage / Low voltage)	:	41.8 x 138.8 / 1202.8	A	
9. Insulation level	(High voltage / Low voltage)	:	95 / 30	kV(BIL)	
10. Oil volume	:	440 GAL	11. Total weight	:	11800 lbs
12. Serial No.	:	OP1000-2326			
13. Date of manufacture	:	Jul. 2023			
14. Standard	:	IEEE C57.12.00			

2. Measurement of voltage ratio

DUAL Switch POS. 2

Tolerance : ± 0.5%

Tap Voltage				Rated ratio	Measured value						Results
HV		LV			H1 phase		H2 phase		H3 phase		
No.	Voltage	No.	Voltage		Ratio	Error(%)	Ratio	Error(%)	Ratio	Error(%)	
A	14400	-	480	51.962	51.730	-0.45	51.735	-0.44	51.730	-0.45	<i>Good</i>
B	13800	-	480	49.796	50.005	0.42	50.005	0.42	50.005	0.42	
C	13200	-	480	47.631	47.484	-0.31	47.484	-0.31	47.478	-0.32	
D	12470	-	480	44.997	44.916	-0.18	44.922	-0.17	44.914	-0.18	
E	12000	-	480	43.301	43.202	-0.23	43.208	-0.22	43.196	-0.24	

DUAL Switch POS. 1

Tap Voltage				Rated ratio	Measured value						Results
HV		LV			H1 phase		H2 phase		H3 phase		
No.	Voltage	No.	Voltage		Ratio	Error(%)	Ratio	Error(%)	Ratio	Error(%)	
-	4160	-	480	15.011	14.960	-0.34	14.960	-0.34	14.959	-0.35	<i>Good</i>

3. Check of phase relationship

Dyn1

Good

4. Measurement of winding resistance

DUAL Switch POS. 2

Ambient temperature : 28 °C

Tap No.	Tap Voltage	Measured value(Ω)					
		H1-H2		H2-H3		H3-H1	
		at 28°C	at 55°C	at 28°C	at 55°C	at 28°C	at 55°C
A	14400	0.792250	0.876798	0.790050	0.874364	0.790050	0.874364
B	13800	0.760200	0.841328	0.758300	0.839225	0.758050	0.838949
C	13200	0.726650	0.804198	0.724750	0.802095	0.724500	0.801818
D	12470	0.689800	0.763415	0.688000	0.761423	0.687650	0.761036
E	12000	0.662050	0.732704	0.660400	0.730877	0.659950	0.730379

DUAL Switch POS. 1

Ambient temperature : 28 °C

Tap No.	Tap Voltage	Measured value(Ω)					
		H1-H2		H2-H3		H3-H1	
		at 28°C	at 55°C	at 28°C	at 55°C	at 28°C	at 55°C
-	4160	0.077155	0.085389	0.077005	0.085223	0.077025	0.085245

Tap No.	Tap Voltage	Measured value(Ω)					
		x1-x2		x2-x3		x3-x1	
		at 28°C	at 55°C	at 28°C	at 55°C	at 28°C	at 55°C
-	480	0.00063785	0.00070592	0.00062890	0.00069602	0.00064710	0.00071616

5. Insulation Resistance Measurement1) Winding insulation resistance measurement - 2500V, 1000G Ω Meter.HV Winding to LV Winding : 16500 M Ω HV Winding to Earth : 17900 M Ω LV Winding to Earth : 17100 M Ω 2) Core & Clamp insulation resistance measurement - 1000V, 1G Ω Meter.Core- Earth : >1000 M Ω Clamp- Earth : >1000 M Ω Core- Clamp : >1000 M Ω **6. Measurement of no-load loss and current**

Test frequency 60 Hz, Ambient temperature : 28 °C

LV side connection at rated voltage 480 V, Tap No: C

Items	Guaranteed value	Measurement value	Results
No-load loss (W)	-	1425	Good
No-load current (%)	-	0.23	

7. Load losses and impedance voltage

Reference temperature : 55 °C at. 13800-480V

Items	Tap No.	Voltage	Guaranteed	Measurement	Results
Load loss (W)	A	14,400	-	4989	<i>Good</i>
	B	13,800	-	5023	
	E	12,000	-	5339	

Reference temperature : 85 °C

Items	Tap No.	Voltage	Guaranteed	Measurement	Results
% Impedance (%)	A	14,400	-	5.80	<i>Good</i>
	B	13,800	5.75±7.5%	5.77	
	E	12,000	-	5.77	

Reference temperature : 55 °C at. 4800-480V

Items	Tap No.	Voltage	Guaranteed	Measurement	Results
Load loss (W)	C	4,160	-	5985	<i>Good</i>

Reference temperature : 85 °C

Items	Tap No.	Voltage	Guaranteed	Measurement	Results
% Impedance (%)	C	4,160	-	6.76	<i>Good</i>

8. Efficiency & Voltage regulation

Reference temperature : 55 °C at. 13800-480V

Items	Guaranteed value	Measurement value	Results
Efficiency (at 100% load)	-	99.36 %	<i>Good</i>
Efficiency (at 50% load)	99.43 %	99.47 %	
Voltage regulation at power factor 1.0	-	0.70 %	

Reference temperature : 55 °C at. 4800-480V

Items	Guaranteed value	Measurement value	Results
Efficiency (at 100% load)	-	99.26 %	<i>Good</i>
Efficiency (at 50% load)	-	99.42 %	
Voltage regulation at power factor 1.0	-	0.85 %	

9. Temperature rise test

(Type test)

Items	Guaranteed value	Measurement value	Results
Insulation oil	65 °C	59.7 °C	<i>Good</i>
H.V. windings	65 °C	59.8 °C	
L.V. windings	65 °C	57.7 °C	

10. Applied voltage test

Items	Test voltage(kV)	Duration(sec.)	Results
HV side	34	60	<i>Withstood</i>
LV side	10	60	

11. Induced voltage test

Supply	Test voltage(kV)	Duration(sec.)	Frequency(Hz)	Results
LV	0.96	40	180	<i>Withstood</i>

12. Lightning impulse test

	Test voltage(kV)	Test sequence	Results
HV Line	95	FW-FW	<i>Withstood</i>
HV Neutral	-	-	
LV Line	-	-	
LV Neutral	-	-	

13. Insulation power factor test

Reference temperature : 20 °C

Items	Test voltage (kV)	Measurement value	Results
H-G	10	0.68	<i>Good</i>
H-L	10	0.23	
L-G	3	0.74	

14. Oil leakage test

Test result : Passed

One transformer tank with other fittings and radiator were over pressured to normal pressure plus 0.50 kgf/cm² for 12 hours.

After this test, the completed transformer with accessories proved no leaks.

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HC Transformer & Switchgear

WINDING 13800 x 4160 DELTA VOLTS
 480 Y/277 VOLTS

PADMOUNTED TRANSFORMER
 65 °C AVG. RISE 1000kVA ONAN

THREE PHASE 60 HERTZ SERIAL NO. 0P1000-2345

OIL IMMERSSED TRANSFORMER MFG. DATE 07.2023

IMPEDANCE 5.77 % AT 1000 kVA

FULL WAVE IMPULSE TEST LEVEL : HV 95 kV, LV 30 kV

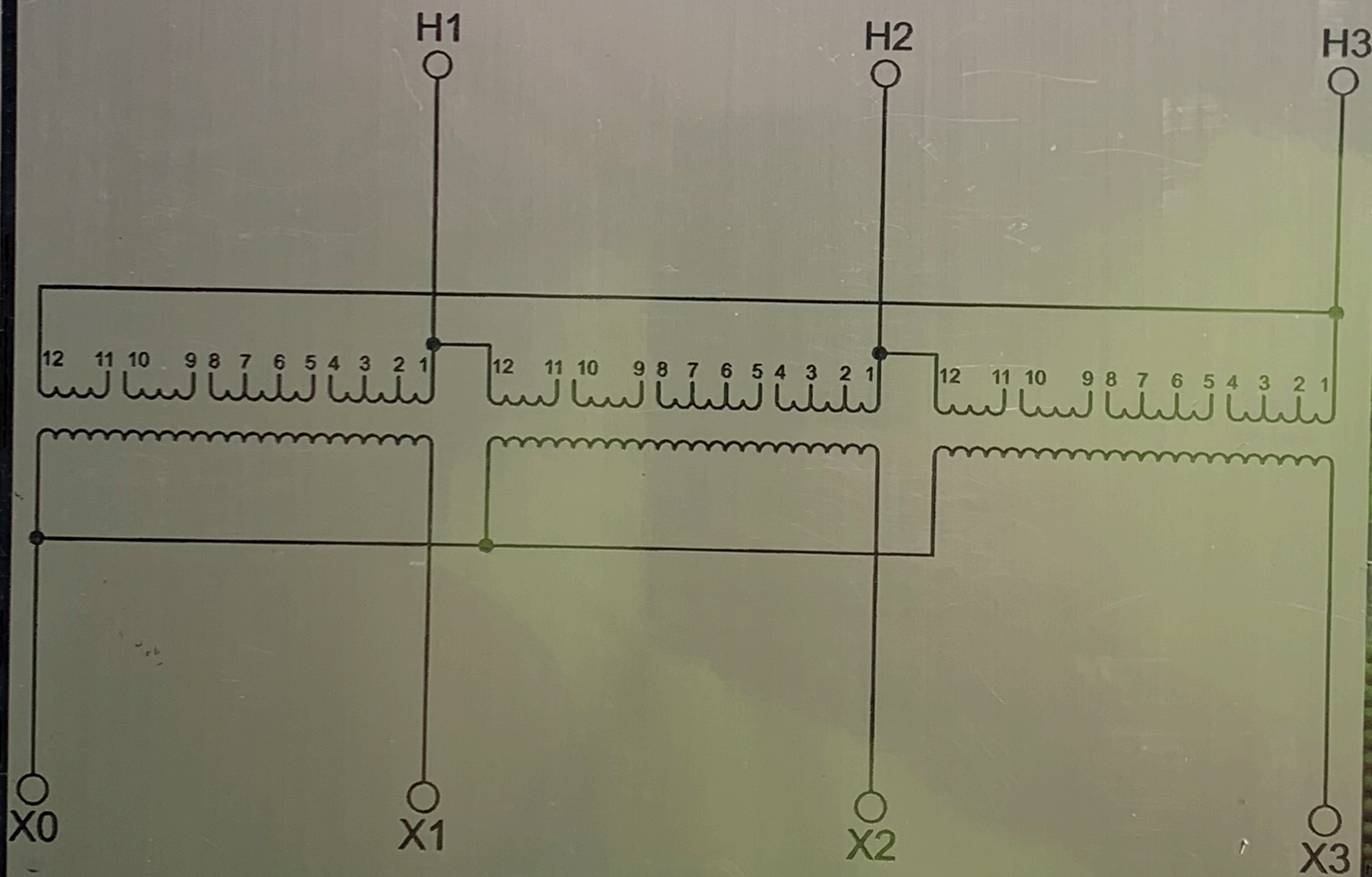
APPROXIMATE WEIGHT IN LBS :

CORE AND COIL	<u>5,580</u>	TANK AND FITTINGS	<u>3,025</u>	OIL	<u>3,195</u>	TOTAL	<u>11,800</u>
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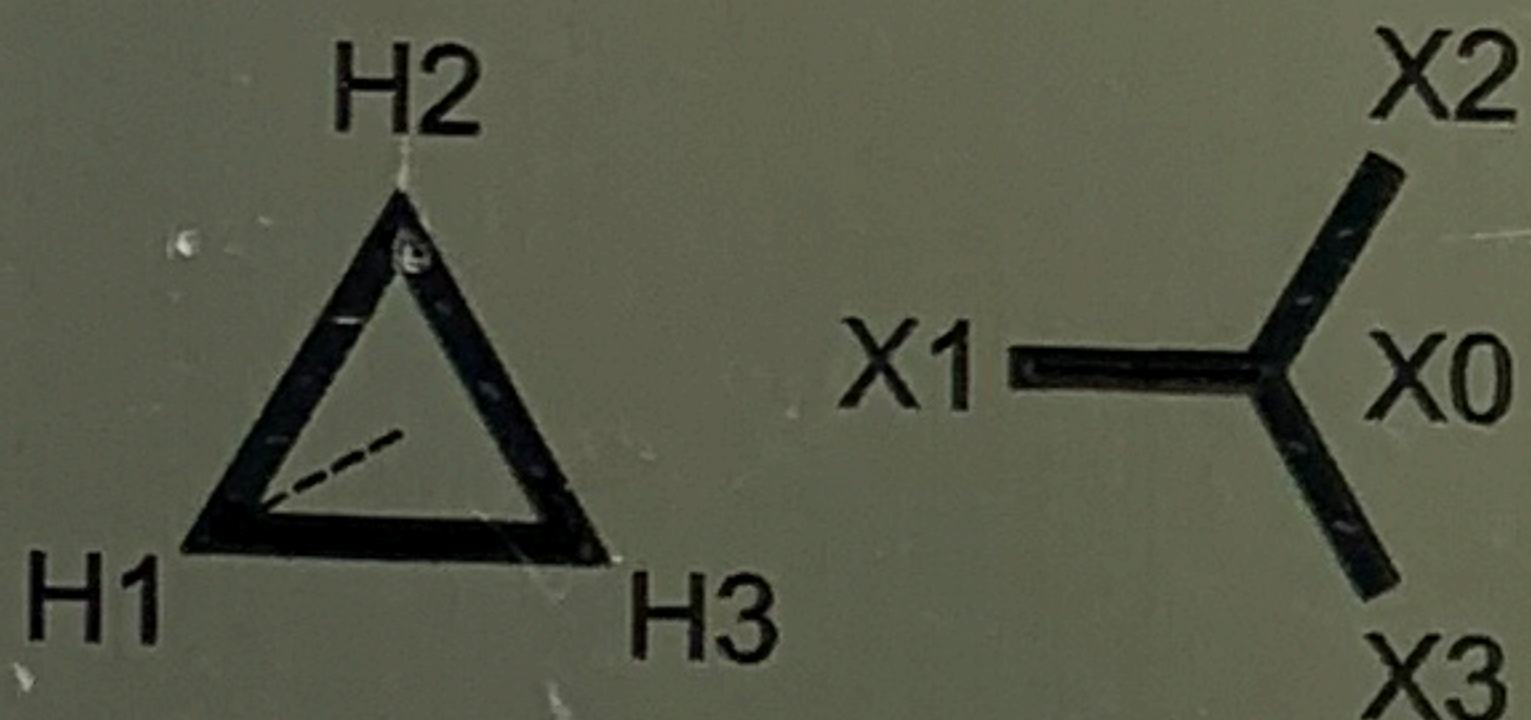
GALLONS OF INSULATION OIL :

TANK	<u>425</u>	RADIATOR	<u>15</u>	TOTAL	<u>440</u>
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DO NOT ATTEMPT TO HANDLE, INSTALL, USE OR SERVICE THIS TRANSFORMER BEFORE READING INSTRUCTION BOOK. TO DO SO MAY LEAD TO BODILY INJURY OR PROPERTY DAMAGE OR BOTH



PHASOR DIAGAM :



WINDING	VOLTS	AMPS AT 1000kVA	TAP CHANGER		DUAL SWITCH	
			POS.	CONNECT	POS.	CONNECT
HV1 DELTA	14400	40.1	A	4-5	2	8-9 10-11
	13800	41.8	B	5-3		
	13200	43.7	C	3-6		
	12470	46.3	D	6-2		
	12000	48.1	E	2-7		
HV2 DELTA	4160	138.8	D	6-2	1	1-9-11 8-10-12
LV WYE	480	1202.8				

*NOTE
 .1TAP CHANGER ON 13800V ONLY

TRANSFORMER IS ONAN.
 CONDUCTOR MATERIAL - HV WINDING AL, LV WINDING AL.
 TRANSFORMER WILL BE FILLED WITH TYPE II MINERAL OIL CONTAINING LESS THAN 2 PPM PCB.
 UNTANKING WEIGHT (HEAVIEST PIECE) 5,580 LBS.
 THE 25 °C LIQUID LEVEL IS 10 INCHES BELOW TOP OF HIGHEST MANHOLE FLANGE.
 LIQUID LEVEL CHANGES 0.4 INCHES FOR EACH 10 °C CHANGE IN AVERAGE LIQUID TEMPERATURE.
 THIS TRANSFORMER TANK IS DESIGNED TO WITHSTAND COMPLETE VACUUM AND AN INTERNAL PRESSURE OF 7 PSI.
 THE TRANSFORMER MUST NOT BE ENERGIZED FROM ANY VOLTAGE SOURCE WHEN DE-ENERGIZED TAP CHANGERS ARE OPERATED.
 THE TRANSFORMER IS DESIGNED FOR OPERATION BETWEEN PRESSURE LIMITS OF 10 PSI POSITIVE AND 8 PSI NEGATIVE.
 THE LV WINDING NEUTRAL MUST BE PERMANENTLY GROUNDED EITHER DIRECTLY OR THROUGH A LOW IMPEDANCE.



LISTED
 E497471

2016 DOE COMPLIANT
 MANUFACTURED BY IEN HANCHANG, SOUTH KOREA

UNIT 79

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ANES
NY



UNIT 79

NOTICE
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DUAL
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SWITCH

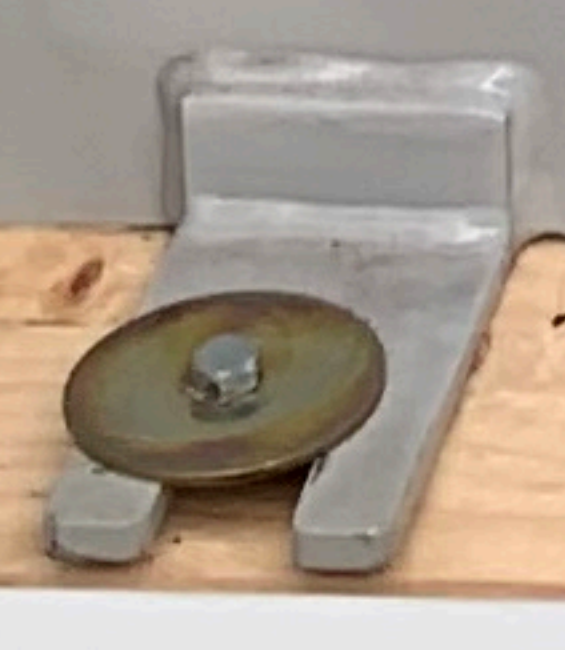
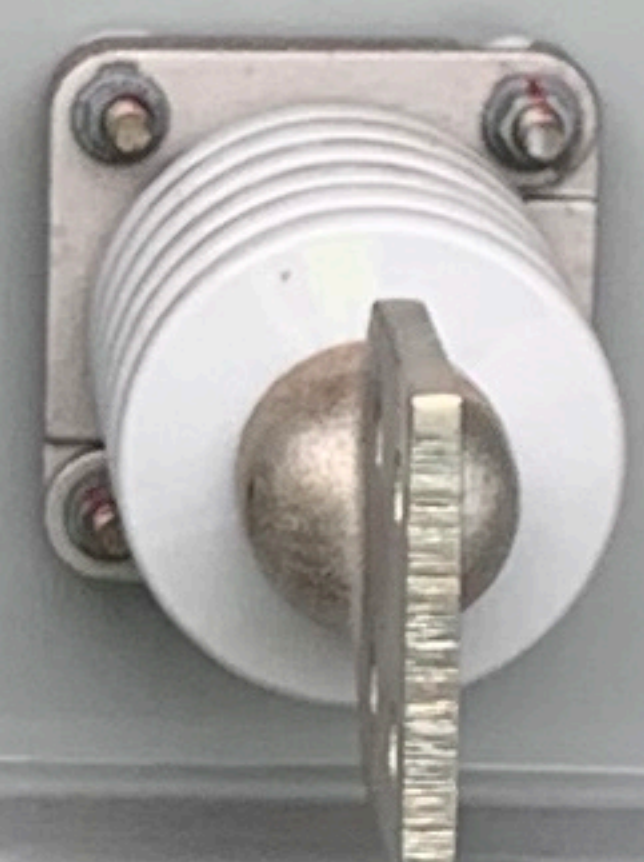
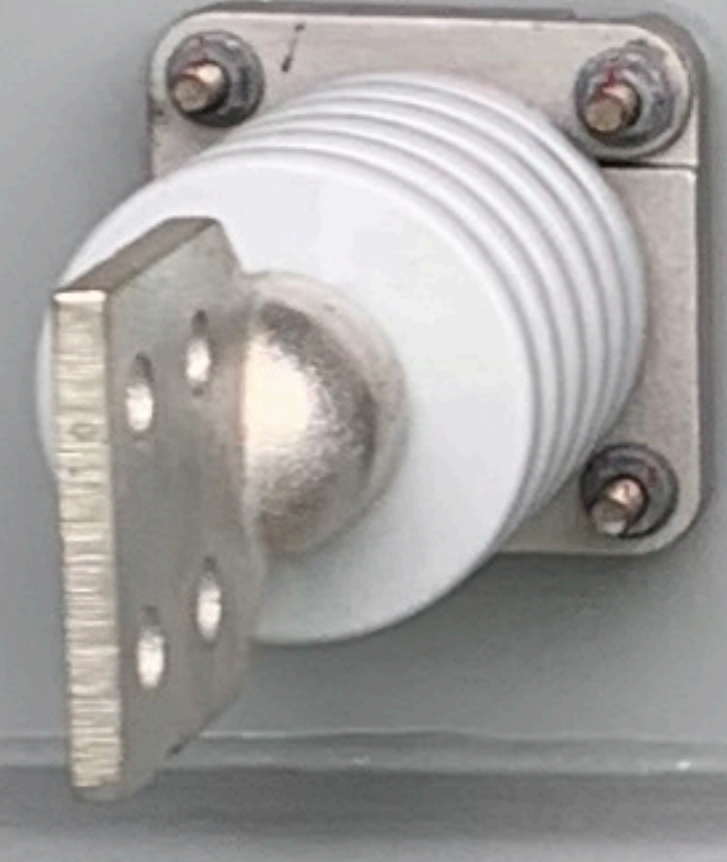
TAP
CHANGER



H1

H2

H3





X0

X1

X2

X3

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