

CUSTOMER :

PROJECT NAME :

PROJECT No. :

KP REF. No. :

Technical Specification

Oil Immersed Distribution Transformers (AMORPHOUS CORE TYPE)

0	2016/12/26	For Approval	S.H.LEE	M.U.KIM	W.C.JUNG
Rev. No	Date	Revision & Description	Drawn	Checked	Approved



CONTENTS

1. Scope and Service Conditions	
1.1 Scope	1
1.2 Service conditions	
2. Scope and Service Conditions	2
3. Kind and Ratings	
3.1 Kinds	3
3.2 Rating	
4. Applications	4
4.1 Applied structure	
5. Tap changer	5
6. Kind and Ratings	
6.1 Kinds	
6.2 Rating	6
6.3	
6.4	
7. Tests	
7.1 Type tests	7
7.2 Routine tests	

1. Scope and Service conditions

1.1 Scope

This Specification cover the oil- immersed pole mounted single phase Distribution transformers for outdoor installation.

1.2 Service conditions

The transformers will be installed at indoor or outdoors. The transformers shall be suitable for continuous operation at the below site conditions :

- (a) Maximum altitude : 1000m (ASL)
- (b) Maximum ambient air temperature : +40°C
- (c) Minimum ambient air temperature : - 20°C

2. Normative references

The transformers covered by this specification will be manufactured and tested in accordance with following international standards unless otherwise specified.

But mechanical constructions and some material will confirm to manufacturer's standard practice.

- (a) [IEEE std C57.12.00 / IEEE std C57.12.20](#)

3. Kind and Ratings

3.1 Kinds

Rated power of transformer will be determined according to the table 1 of this specification.

Table 1 - Kind of transformers

Rated voltage ratio	Rated power(kVA)	Remark
	OA(oil self cooled)	
22900Grdy/13200- - 240/120	5	
	10	
	15	
	25	
	37.5	
	50	
	75	
	100	

3.2 Rating

3.2.1 Rated power

Normal rated power specified in Table 1 will be the continuous rating under the service conditions.

3.2.2 Rated frequency

Rated frequency will be **60Hz**.

3.2.3 Polarity

Polarity will be **subtractive**

Normal rated power specified in Table 1 will be the continuous rating under the service conditions.

4. Applications

4.1 Type

4.1.1 Rated power

The transformers will be overhead type for outdoor installation.

Transformers will be provided with off circuit tap voltage changer.

4.1.2 Cooling

Cooling system of rated power shall be of natural circulation of oil and air (OA).

4.1.3 2 Core

The material of core will be made by **amorphous metal**. Core assembly securely clamped.

4.1.4 Windings

The HV and LV windings will be constructed from the best drawn **copper coil** with high conductivity. All turns of windings will be adequately supported to prevent movement. The windings will be designed to meet the three fundamental requirements : mechanical, Thermal and electrical.

Adequate cooling ducts shall be provided to ensure that temperature rise is within the permissible limits at normal operating conditions.

4.1.5 Tank

The transformer will not leak of oil. Tank will be fabricated of excellent quality mild steel. The tank will be designed so that the completed

transformer can be lifted and transported without deformation or oil leakage. The tank will withstand pressures developed during normal and abnormal operation of the transformer without permanent deformation.

4.1.6 Cooling

Cooling surface will have enough capacity for heat radiation and mechanical strength.

4.1.7 Tank finish

Prior to the painting of the tank, cover and tank will be sand blasted or short blasted. External surfaces will be immediately after pretreatment with a powdered painting. Total thickness will be at least **60um**. The color of the paint shall be Munsell No. **N7**

4.1.8 Bushing

HV and LV bushing will be porcelain type bushing.

4.1.9 Fittings and protection devices

The following fittings accessories will be provided.

- (a) Earthing terminals
- (b) Pressure relief valve
- (c) Lifting lugs
- (d) Support lugs
- (e) Rated name plate
- (f) External tap voltage changer

5. Tap changer

The HV windings will be provided with no load (off- circuit) tap changer having 5 tapping positions. The tapping voltage of positions refer to Table 2.

Table 2 - Tapping voltage

Tap position	Tap voltage (V)	Remark
1	F 13860	
2	F 13530	
3 (Rated)	R 13200	
4	12870	
5	12540	

6. Applied Characteristics

6.1 Characteristics

The characteristics will comply with Table 3 of this specification.

Table 3 - Characteristics

Item No.	Rated Power (kVA)	No Load Loss (W)	Load Loss (W)	Short circuit impedance (%)
TR- A01	5	8	75	2.0 ± 0.2 at 85°C
TR- A02	10	12	120	2.0 ± 0.2 at 85°C
TR- A03	15	15	195	2.0 ± 0.2 at 85°C
TR- A04	25	18	290	2.0 ± 0.2 at 85°C
TR- A05	37.5	30	360	2.0 ± 0.2 at 85°C
TR- A06	50	32	500	2.0 ± 0.2 at 85°C
TR- A07	75	45	650	2.0 ± 0.2 at 85°C
TR- A08	100	50	850	2.0 ± 0.2 at 85°C

* Reference temperature : **85°C**

* Tolerance : **IEEE std C57.12.00**

6.2 Temperature rise

The transformers will be capable of carrying their full normal rated current continuously under the worst temperature conditions. Temperature rise of top oil will not exceed **65°C** as measured by thermometer temperature rise of winding will not exceed **65°C** as measured by resistance

6.3 Insulation

The insulation of bushings and windings will be suitable as to meet the requirements of the appropriate insulation class as specified in Table 4 of this specification.

Table 4 - Insulation level of transformers

Rated voltage (V)	Lightning impulse Withstand voltage (kV peak)	Power frequency Withstand voltage (kV rms)	Induced Withstand voltage (V rms)
7620/ 13200GrdY	125	-	2E
240/ 120	30	10	2E

6.4 Insulation oil

The transformer will be supplied with being filled with mineral insulation oil. The characteristics of insulation oil will meet the **KSC 2301(Class1, No.2)**. The oil will not be contaminated by poly chlorinated Bi- phenyls (PCBs).

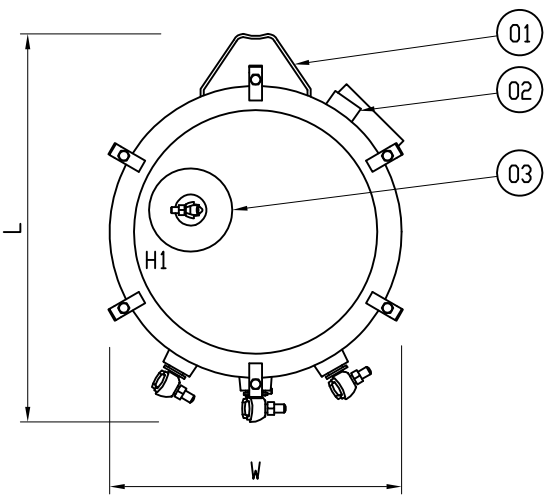
7. Tests

7.1 Characteristics

- (a) Temperature rise test
- (b) Lightning impulse test

7.2 Routine tests

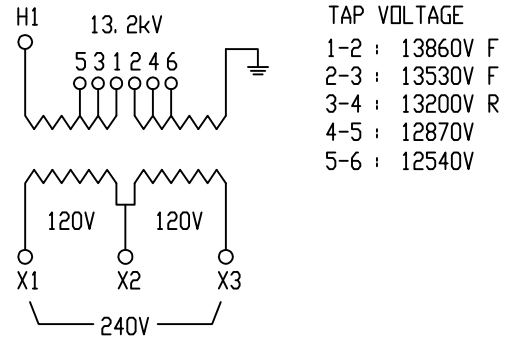
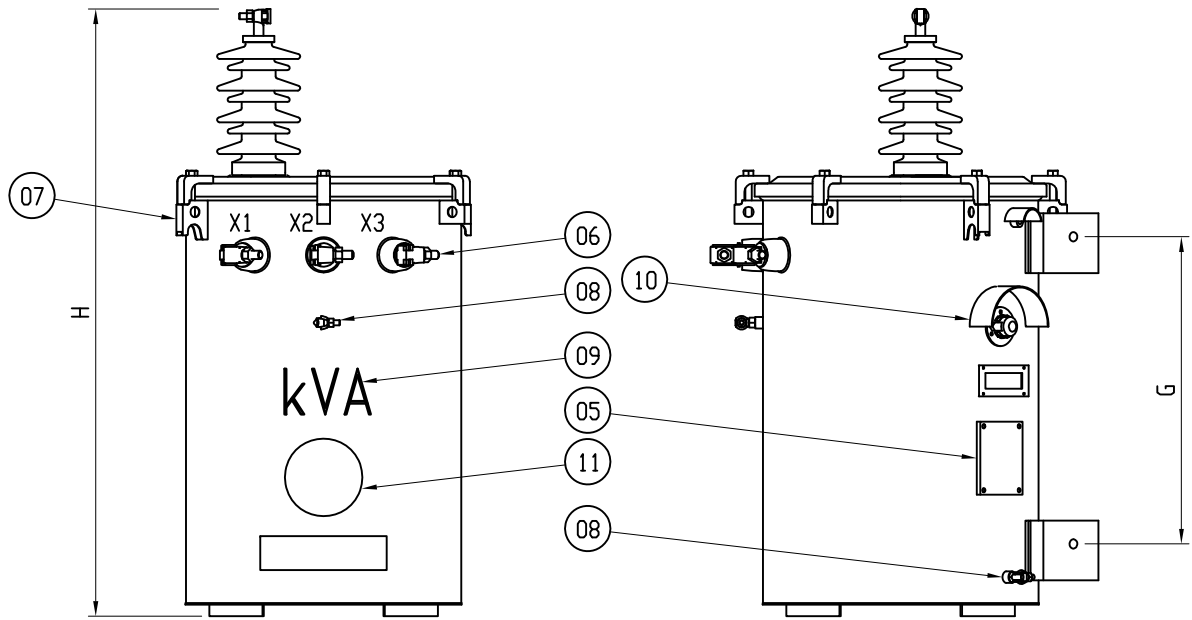
- (a) Visual inspection
- (b) Measurement of voltage ratio and check of phase displacement
- (c) Measurement of short- circuit impedance and load loss
- (d) Measurement of no- load loss and current
- (e) Induced over voltage withstand test
- (f) Separate source voltage withstand test



* CORE MATERIAL: AMORPHOUS METAL

kVA	VOLTAGE	W	L	H	G	OIL	WEIGHT
5	22900/13200V 240/120V	410	550	980	286	35	140
10		440	580	1050	286	45	180
15		470	620	1070	286	60	205
25		490	640	1110	286	65	250
37.5		540	690	1180	286	90	340
50		550	700	1170	286	85	360
75		610	760	1230	591	125	485

No.	DESCRIPTION
11	ELECTRIC COOPERATIVE MARK
10	TAP CHANGER
09	kVA MARK
08	GROUNDING TERMINAL
07	LIFTING LUGS
06	LV BUSHING
05	RATING PLATE
04	-
03	PRESSURE RELIEF VALVE
02	HV BUSHING
01	HANGER



* DIMENSION TOLERANCE: ±5%

APP		APP	
CHK		CHK	
DSN		DSN	

DSN	CHK	APP	PROJ.	-	TITLE: OUTLINE FOR TRANSFORMER			
S. H LEE	M. U KIM	W. C JUNG	UNIT	mm	1φ, 60Hz, 22900Grdy/13200V-240/120V			
'16. Oct. 19			SCALE	N/S	PROJECT NO.			
			SIZE	A4	CAD. NO.	-	SHEET /	
					REF. NO.			
					DWG. NO.	E16B25-0050-0U010	REV.	0

0 1 2 3 4 5 6

A

B

C

D

E

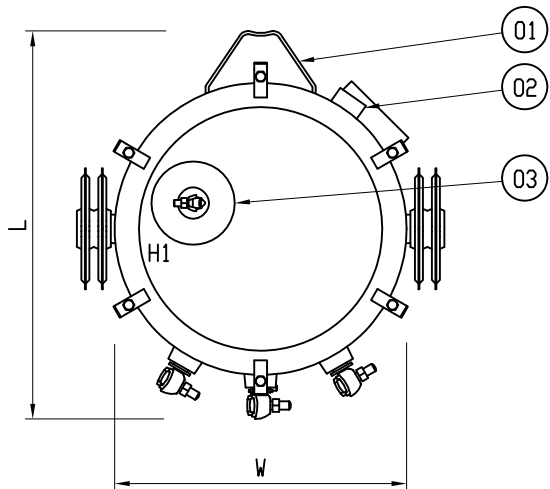
A

B

C

D

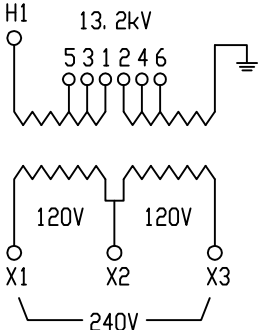
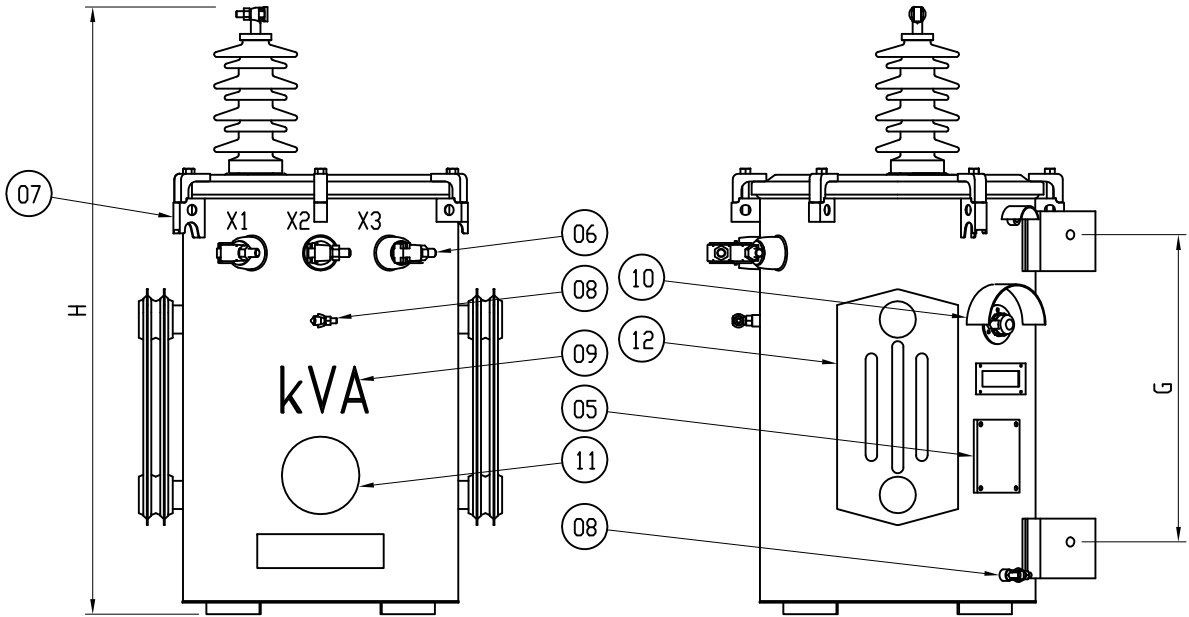
E



* CORE MATERIAL: AMORPHOUS METAL

kVA	VOLTAGE	W	L	H	G	DIL	WEIGHT	
100	22900/13200V 240/120V	650	780	1220	591	120	565	

No.	DESCRIPTION
12	RADIATOR
11	ELECTRIC COOPERATIVE MARK
10	TAP CHANGER
09	kVA MARK
08	GROUNDING TERMINAL
07	LIFTING LUGS
06	LV BUSHING
05	RATING PLATE
04	-
03	PRESSURE RELIEF VALVE
02	HV BUSHING
01	HANGER



TAP VOLTAGE
 1-2 : 13860V F
 2-3 : 13530V F
 3-4 : 13200V R
 4-5 : 12870V
 5-6 : 12540V

* DIMENSION TOLERANCE: ±5%

APP		APP	
CHK		CHK	
DSN		DSN	

DSN	CHK	APP	PROJ.	-	TITLE: OUTLINE FOR TRANSFORMER			
S. H LEE	M. U KIM	W. C JUNG	UNIT	mm	1∅, 60Hz, 22900Grdy/13200V-240/120V			
'16. Oct. 19			SCALE	N/S	PROJECT NO.			
			SIZE	A4	CAD. NO.	-	SHEET /	
					REF. NO.			
					DWG. NO.	E16B25-0050-0U011	REV.	0