

AMORPHOUS METAL DRY TYPE TRANSFORMER

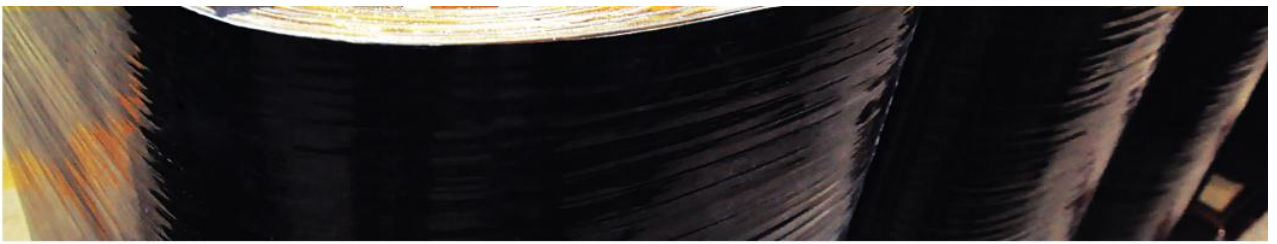
Energy Saving, Recyclable, No pollution, Good Quality!



SCR BH15

SCB BH15



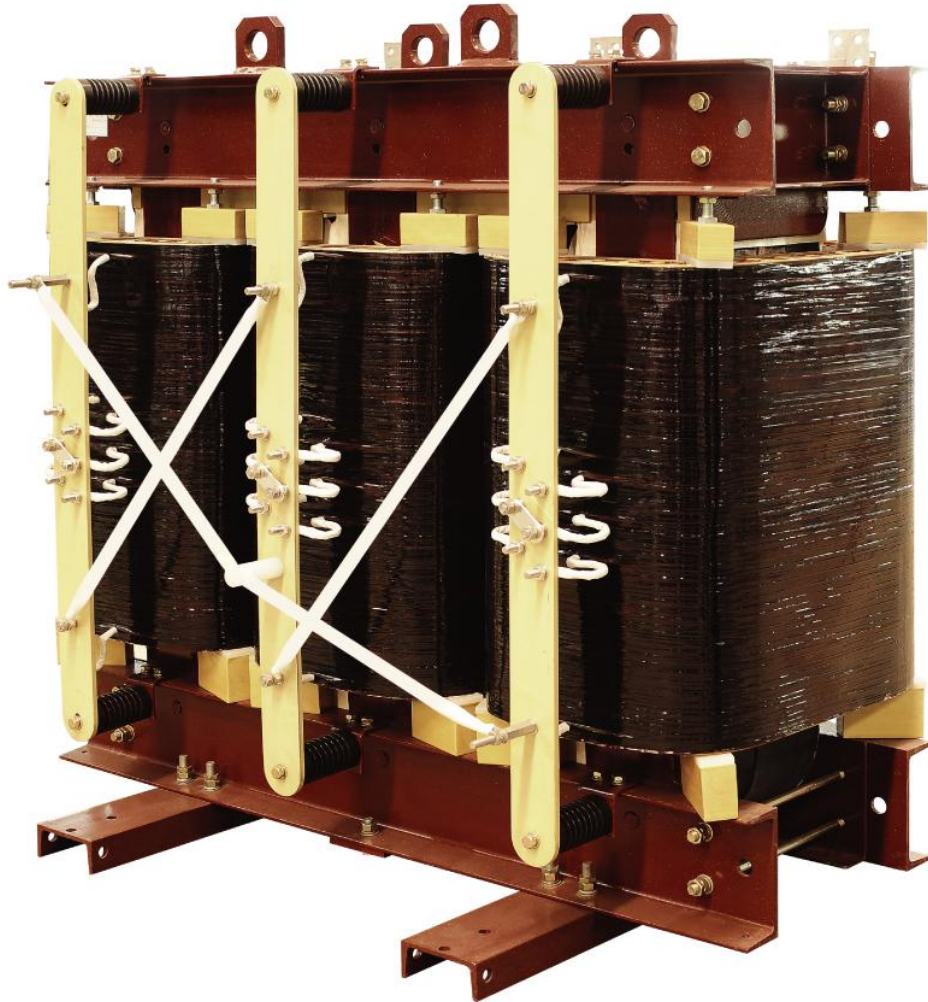


Stable, Energy Saving, Low no-load loss, Better quality!

Can reduce 70% no load loss, so that can reduce the total cost

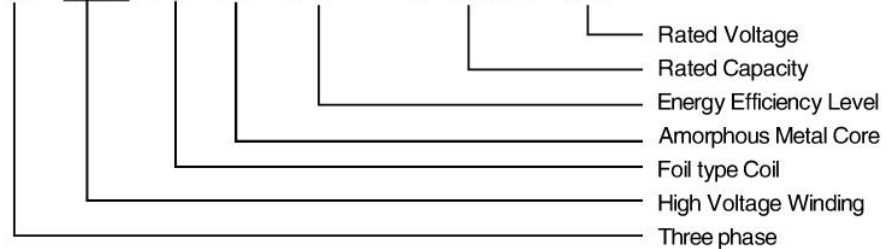
Strong technical backup and long life expectancy of the transformer!





SCRBH15 AMORPHOUS METAL DRY TYPE TRANSFORMER

SCRBH15 - 1250 / 10





Amorphous Core

- 1) All raw material are supplied by Hitachi Metals with iron loss less than 70-80% of the standard silicon steel
- 2) Company has special treatment, procedure and manufacturer process; which has patent number as: 200810238258.6, 20082015857.5, 200820215858.X, 200820215812.8, 200820215814.7.
- 3) Core structure is clean and strong, which do not influenced by the movement created during transportation.
- 4) The three column structure has capability to withstand high level harmonics, and vector group can be in Dyn11, Yyn0.



Low Voltage Winding features

LV uses high quality imported copper foil and class H insulation foil to apply on polyester-imide. In between each layer, it uses Nomex paper. Windings are insulated by vacuum pressure impregnation (VPI) systems, which make it into concrete form. Both ends of the winding drum have applied resin to seal the ends.

- 1) For better withstand of short circuit capability
- 2) For better thermo shock resistance and enhance the life expectancy of the transformer
- 3) Winding has high capability to resists moisture, dust and salt.



High voltage winding features

HV winding uses several layer coil type with vertical airway structure. It wraps Nomex paper on to copper for insulation. In between each layer, it uses Nomex paper for insulate. Vacuum, pressure, impregnation (VPI) system has applied on the coil to make the structure concrete. Both ends are sealed by resin.

- 1) Multi-layer design can enhance the inrush capability.
- 2) Enhance short circuit capability
- 3) High insulation level on the insulation material with good airway throughout the coil design, increase the capability of thermo shock. That way the transformer life expectancy is longer.
- 4) Winding has high capability to resists moisture, dust and salt.



CEEG SCR BH15 Amorphous Metal Dry Type Transformer Feature

Safety

1. Product accept the NOMEX Paper Insulation System with high level of inflaming retarding, anti-explosion, and fire rating,
2. Professional technology, excellent performance in mechanical strength and short-circuit resistance and long serve time.

Reliable

1. H-class heat-resisting temperature: 180°C, C-class level for the major insulating material (220°C) with efficient overload capacity
2. low partial discharge, high level of insulation with long serve time;
3. NBC protection, no crack display.

Environmental Friendly

Product uses Nomex Paper as the main insulation material, which create fire retardation, high insulation level, low partial discharge, long service life. Transformer Insulation class H, main material insulation class C, it increases the overloading capacity. Low noise level and the copper can be recycling after the life cycle of the transformer. Transformer has high capability to resists moisture, dust and salt.

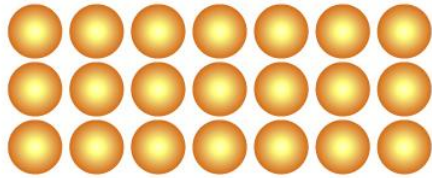
AMORPHOUS METAL COIL FEATURE

Amorphous Metal transformer introduction

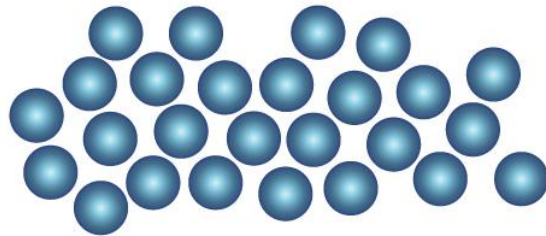
The development of the amorphous metal in 1970s, it has become widely use in 1990 for a high energy saving material for the transformer industry. Right now, over 1million sets of amorphous metal type transformer had been connected to grid all over the world. The longest proven save and reliable transformer had been running for more than 30 years, and it still perform satisfactory in the power industry. The energy saving is huge and it shall be the new era products in the power industry.

Amorphous Metal replacing silicone steel

Amorphous metal is a metallic material with a disordered atomic-scale structure.

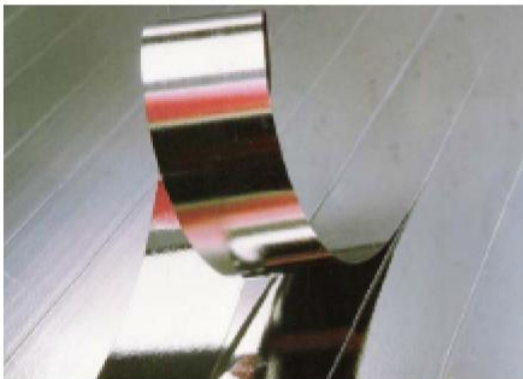


Crystalline Silicon Steel



Non-crystalline amorphous metal

Amorphous metal is non-crystalline; the alloys of boron, silicon, phosphorus, and other glass formers with magnetic metals (iron, cobalt, nickel) are magnetic, with low coercivity and high electrical resistance. The high resistance leads to low losses by eddy currents when subjected to alternating magnetic fields, a property useful for e.g. transformer magnetic cores.



- Protect The Magnetic Ability Compare To Silicone Steel Is 1/3 → Hysteresis loss
- Thickness Is Silicone Steel' s 1/10 → Eddy current loss
- High Resistivity Is Silicone Steel' s 3 Times → Eddy current loss

Amorphous Metal and Silicone Steel comparison

Type	Description	Material	
		Amorphous Metal 2605SA1	Silicon steel
Magnetic Ability	Iron loss W13/50Hz(25°C) Saturation magnetic flux density(25°C) Curie temperature	0.2W/kg 1.56T 415°C	0.63W/kg 2.0T 745°C
Physical Ability	Density Lamination factor Hardness Hv Resistivity	7.18g/cm ³ >85% 860 130 μ Ω .cm	7.65g/cm ³ >94% 180 45 μ Ω .cm
Dimension	Width Thickness	142,170,213mm 0.025mm	950mm 0.3mm
Others	Annealing	Magnetic field /380°C ~ 400°C	750°C ~ 850°C

Amorphous metal is the low loss material. Core loss compare to the normal silicone steel transformer has at least 20-30% lower. The transformer has the advantage of temperature rise low, operating noise low, small in size.

Although the investment of the transformer is higher than the regular silicone steel transformer, the saving of the no load loss can save client's electricity bills; which can be retain back in 3 to 5 years, based on the assumption of 60% loading rate.

TOTAL OWNING COST

Picture 1, The no load loss in Amorphous Metal transformer efficiency level at 15, which is 70% lower than the regular transformer efficiency level at 10. This is huge different on the energy saving.

Below is the calculation comparison for a 15 level and 10 level of the same 1250KVA type transformer, running for a 10 year, total owning cost:

$$B = C * Th * Ty * (Po + Pk * \beta^2)$$

B: Total owning and operation cost

C: Electricity price

Th: Total running hour in a year

Ty: Total running years, take 10 as an example

No load loss

Load loss

Loading, for example 0.6, that is 60% loading

Based on the calculation above, a 15-graded 1250KVA Amorphous Metal Transformer run 10 years will cost 383092 kWh electricity, a 10-graded regular transformer run 10 years will cost total 514226kWh. That is Amorphous metal transformer saved 131134 kWh electricity in 10 years.

Based on the market selling price of the regular transformer and amorphous metal transformer, the extra investment on amorphous metal transformer cost can be retain in as short as 3-5 years. For a normal life expectancy of transformer is 30 years, there will be total 393402kWh amorphous metal transformer can saved in total.

Therefore, for the future of the power transmission and distribution network, amorphous metal transformer can be a great economic effect to the society.

Amorphous Metal dry type transformer investment and energy saving analysis:

Amorphous metals Transformer's disposable investment is 30% more than ordinary dry type one, about ¥ 110,000, cost of energy saving is up to ¥ 25,800(about 50% than the ordinary one);

Rated Capacity (kVA)	No load loss (W)		Remark
	10-graded Dry type transformer	Amorphous Metal Transformer	
800	1539	470	69.7%
1000	1791	540	69.5%
1250	2115	640	69.8%
1600	2484	750	69.7%

Comparison of SCRBH15 and SC10



TOC (Total Owning Cost) =

Transformer Price + Operating Cost

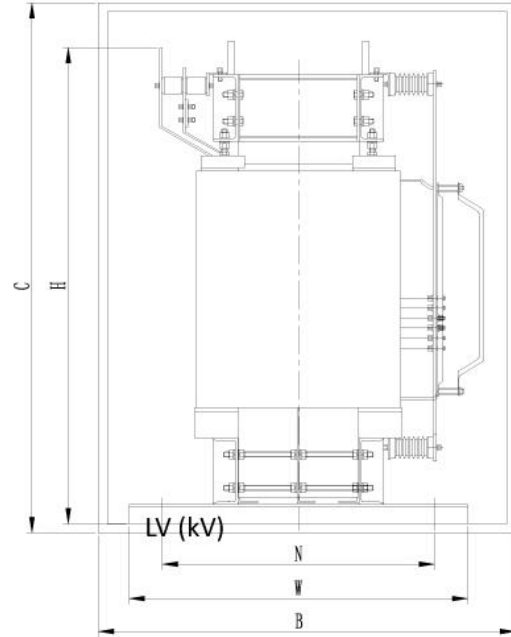
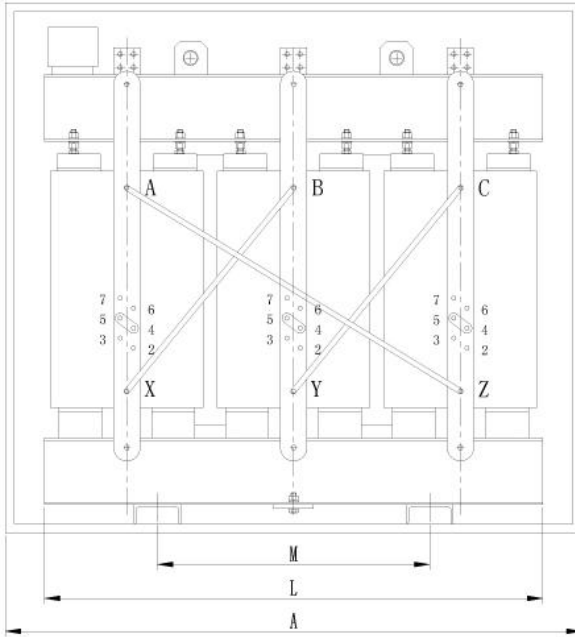
Transformer operation cost can use the equation as below:

For example 1 kWh electricity cost RMB1

$$8600 \times \left(P_o + \frac{0.05 \times I_o \times S_n}{100} \right) \times 1 + 2200 \times \left(P_k + \frac{0.05 \times U_k \times S_n}{100} \right) \times 1$$

2000KVA SCRBH15 Amorphous Metal Dry Type Transformer Power losses

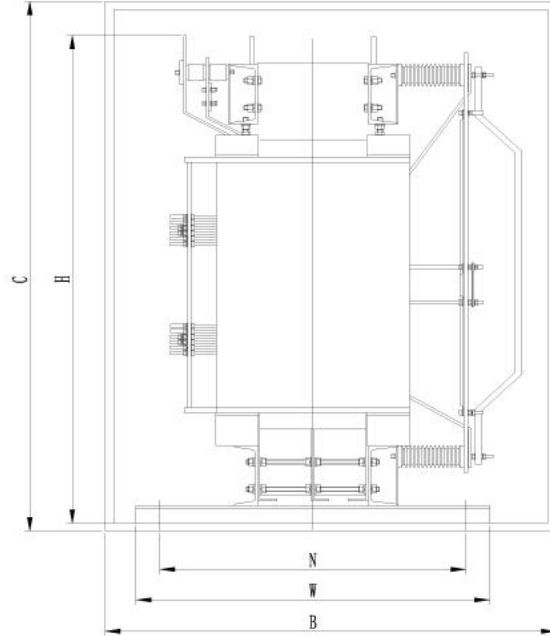
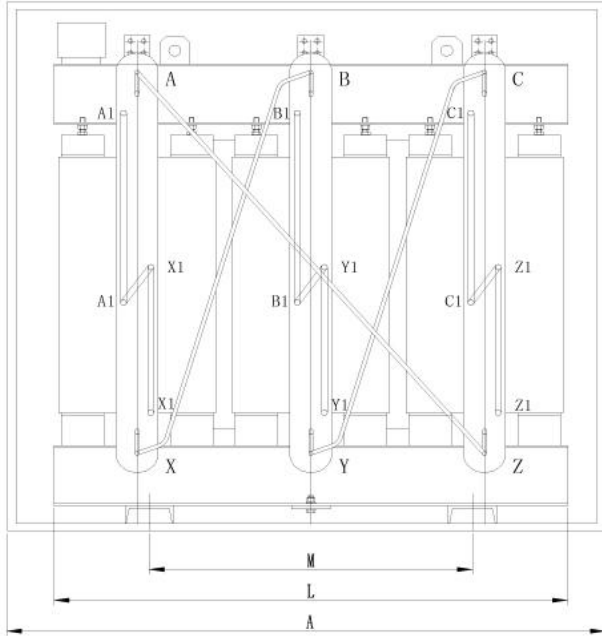
Rated Capacity kVASn	No load lossW Po	Loading(120°C) Load loss WPk	No load current% Io	Impedance% Uk	No load power loss	Load power losses	Total Losses
2000	0.98	14450	0.5	6	12728	44990	57718



100kVA-20000kVA three type three column dry type amorphous metal distribution transformer

Rated Capacity (kVA)	Voltage ratio			Vector Group	No load loss (W)	Load loss (W)			No load current (%)	Short circuit impedance (%)	LPA (dB)	Dimension (mm)			Installation Dimension M x N (mm)		
	HV (kV)	HV Tapping Range (%)	LV (kV)			100°C (B)	120°C (F)	145°C (H)				L x W x H (IP00)(mm)	Weight (kg)	A x B x C (IP20) (mm)			
100	6	±5	0.4	Dyn11	120	1480	1570	1690	1.2	4	52	1050 x 860 x 900	1050	1500 x 1300 x 1200	660 x 660		
160					160	2000	2130	2280	1.1		53	1100 x 860 x 1000	1300	1500 x 1300 x 1300	660 x 660		
200					190	2370	2530	2710	1.0		54	1100 x 860 x 1260	1300	1500 x 1300 x 1600	660 x 660		
250					220	2590	2760	2960	1.0		54	1150 x 860 x 1295	1500	1500 x 1350 x 1600	660 x 660		
315					270	3270	3470	3730	0.9		56	1240 x 860 x 1330	2000	1600 x 1350 x 1700	660 x 660		
400					300	3750	3990	4280	0.8		56	1320 x 1020 x 1400	2350	1700 x 1350 x 1700	660 x 820		
500					350	4590	4880	5230	0.8		57	1300 x 1020 x 1435	2750	1700 x 1350 x 1700	660 x 820		
630					410	5530	5880	6290	0.7		57	1400 x 1020 x 1585	3500	1800 x 1400 x 1900	820 x 820		
630				11	±2 x 2.5	Yyn0	400	5610	5960	6400	0.7	6	57	1400 x 1020 x 1425	3000	1800 x 1400 x 1800	820 x 820
800							470	6550	6960	7460	0.7		58	1490 x 1020 x 1600	3700	1900 x 1450 x 1900	820 x 820
1000							540	7650	8130	8760	0.6		58	1610 x 1270 x 1675	4300	2000 x 1500 x 2000	820 x 1070
1250							640	9100	9690	10370	0.6		59	1590 x 1270 x 1870	5500	2000 x 1600 x 2150	820 x 1070
1600							750	11050	11730	12580	0.6		59	1740 x 1270 x 1910	6500	2200 x 1650 x 2200	1070 x 1070
2000							980	13600	14450	15560	0.5		61	1710 x 1270 x 1990	7800	2200 x 1700 x 2300	1070 x 1070
2500							1200	16150	17170	18450	0.5		62	1750 x 1270 x 2050	8700	2300 x 1800 x 2400	1070 x 1070

Above are only for reference, all transformer shall be based on the actual production design.



Second Generation Amorphous Metal inter-change voltage 20(10)kV transformer

Rated Voltage (kVA)	Voltage ratio			Vector Group	No load loss (W)	Load loss (W)			No load current (%)	Stray loss (%)	LPA (AN) dB	Dimension (mm)			Installation Dimension M x N (mm)		
	HV (KV)	HV Tapping Range (%)	LV (KV)			(W)	100°C (B)	120°C (F)				145°C (H)	L x W x H (IP00) (mm)	Weight (kg)		A x B x C (IP20) (mm)	
315	20	± 5	0.4	Dyn11	390	4100	4300	4600	0.9	6	57	1550 x 1020 x 1270	2250	1900 x 1600 x 1600	820 x 820		
400					440	4900	5100	5460	0.8		57	1550 x 1020 x 1270	2700	2000 x 1650 x 1700	820 x 820		
500					500	5800	6100	6500	0.8		58	1460 x 1270 x 1440	2950	2000 x 1650 x 1800	820 x 1070		
630					22	± 2 x 2.5	590	6880	7200		7750	0.7	58	1510 x 1270 x 1580	3500	2000 x 1700 x 1900	820 x 1070
800					24		670	8230	8700		9300	0.7	60	1590 x 1270 x 1625	3900	2100 x 1750 x 1900	820 x 1070
1000					770		9720	10300	11000		0.6	60	1700 x 1270 x 1800	4850	2200 x 1750 x 2100	1070 x 1070	
1250					910		11500	12150	13000		0.6	61	1700 x 1270 x 1850	5750	2400 x 1850 x 2200	1070 x 1070	

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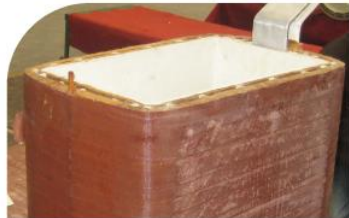
Cast Resin amorphous metal core type transformer SCBH15

Feature



Multi-layer winding coil

Amorphous metal core type transformer can also use cast resin type technology for its insulation, which create low partial discharge, strong concrete structure of the resin and 100% relative humidity ability which give transformer can withstand in bad operating environment.



Lengthways air flue foil style low-voltage coil

Low-voltage coil adopted high quality foil and rolled with the automatic foil machine, Argon arc welding with high-accuracy standard; Presoak DMD in the interlamination as insulation material, Use presoak glass for insulation both outside and inside, sealed with epoxy resin, followed by solidify in the curing oven, in order to reached the target of high level of humidity resistance.

100kVA – 2500kVA three phase three column dry type resin cast amorphous metal transformer

Rated Voltage (kVA)	Voltage ratio			Vector Group	No load loss (W)	Load loss (W)		No load current (%)	Stray loss (%)	LPA (AN) dB	Dimension (mm)			Insulation Dimension M x N (mm)				
	HV (kV)	HV Tapping Range (%)	LV (kV)			(W)	100°C (B)				120°C (F)	L x W x H (IP00) (mm)	Weight (kg)		A x B x C (IP20) (mm)			
100	6	± 5	0.4	Dyn11	120	1480	1570	1.2		52	1000 x 860 x 850	950	1500 x 1300 x 1200	660 x 660				
160					160	2000	2130	1.1		53	1050 x 860 x 950	1200	1500 x 1300 x 1300	660 x 660				
200					190	2370	2530	1.0		54	1050 x 860 x 1210	1200	1500 x 1300 x 1600	660 x 660				
250					220	2590	2760	1.0	4	54	1100 x 860 x 1245	1400	1500 x 1350 x 1600	660 x 660				
315					6.3	± 2 x 2.5	0.4	Yyn0	270	3270	3470	0.9		56	1190 x 860 x 1280	1900	1600 x 1350 x 1700	660 x 660
400					6.6				300	3750	3990	0.8		56	1270 x 1020 x 1350	2250	1700 x 1350 x 1700	660 x 820
500					10				350	4590	4880	0.8		57	1250 x 1020 x 1400	2650	1700 x 1350 x 1700	660 x 820
630					10.5				410	5530	5880	0.7		57	1350 x 1020 x 1535	3400	1800 x 1400 x 1900	820 x 820
630					11				400	5610	5960	0.7		57	1350 x 1020 x 1375	2900	1800 x 1400 x 1800	820 x 820
800									470	6550	6960	0.7		58	1450 x 1020 x 1550	3600	1900 x 1450 x 1900	820 x 820
1000									540	7650	8130	0.6	6	58	1560 x 1270 x 1625	4200	2000 x 1500 x 2000	820 x 1070
1250									640	9100	9690	0.6		59	1540 x 1270 x 1820	5400	2000 x 1600 x 2150	820 x 1070
1600									750	11050	11730	0.6		59	1700 x 1270 x 1860	6400	2200 x 1650 x 2200	1070 x 1070
2000									980	13600	14450	0.5		61	1650 x 1270 x 1950	7700	2200 x 1700 x 2300	1070 x 1070
2500									1200	16150	17170	0.5		62	1700 x 1270 x 2000	8600	2300 x 1800 x 2400	1070 x 1070

Above are only for reference, all transformer shall be based on the actual production design.