

AMORPHOUS METAL DRY TYPE TRANSFORMER

Energy Saving, Recyclable, No pollution, Good Quality!



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Chinese Largest Amorphous Metal Dry Type Transformer Production Base

CEEG is the first enterprise to receive "China Environmental Enterprise" and "China Environmental Product", double green labeling award. For the past 20 years, CEEG seek continuously development and growth in the product range. In 2001, the first generation "three-phase five-column" Amorphous Metal Dry Type Transformer had been invented. CEEG has strong faith in the industry that the energy saving and environmental protection type transformer is the trend in industry. In 2006, CEEG built 200 acres, China largest production base, in Jiangning, China. In year 2007, CEEG has developed the second generation "three-phase three-column" Amorphous Metal Dry Type Transformer, and it had been widely use in the industry.

The company possesses the world's most advanced technology for the amorphous core cutting machine, which can process amorphous core for transformer capacity up to 2500KVA. The equipment uses PLC smart control system, it has touch screen control panel, automation control, with high accuracy on the cutting and measure. CEEG also possess the world's largest annealing furnace, with the advanced technology, it create stability on the amorphous metal and provide the best quality of the processed product.

First in the Industry: 3-phase 3-column

Three phase three columns, China patented. Hitachi Metals and CEEG have established long term strategic partners on amorphous metals. With close relationship with Hitachi metals, our products can have enhanced quality. The maximum capacity can up to 3150KVA for 10KV and 20KV type transformer.

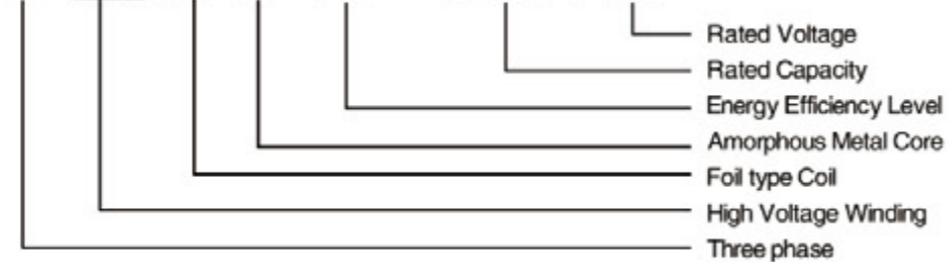


**The only Chinese made three phase three column
SCRBH15 Amorphous Metal Transformer Manufacturer**



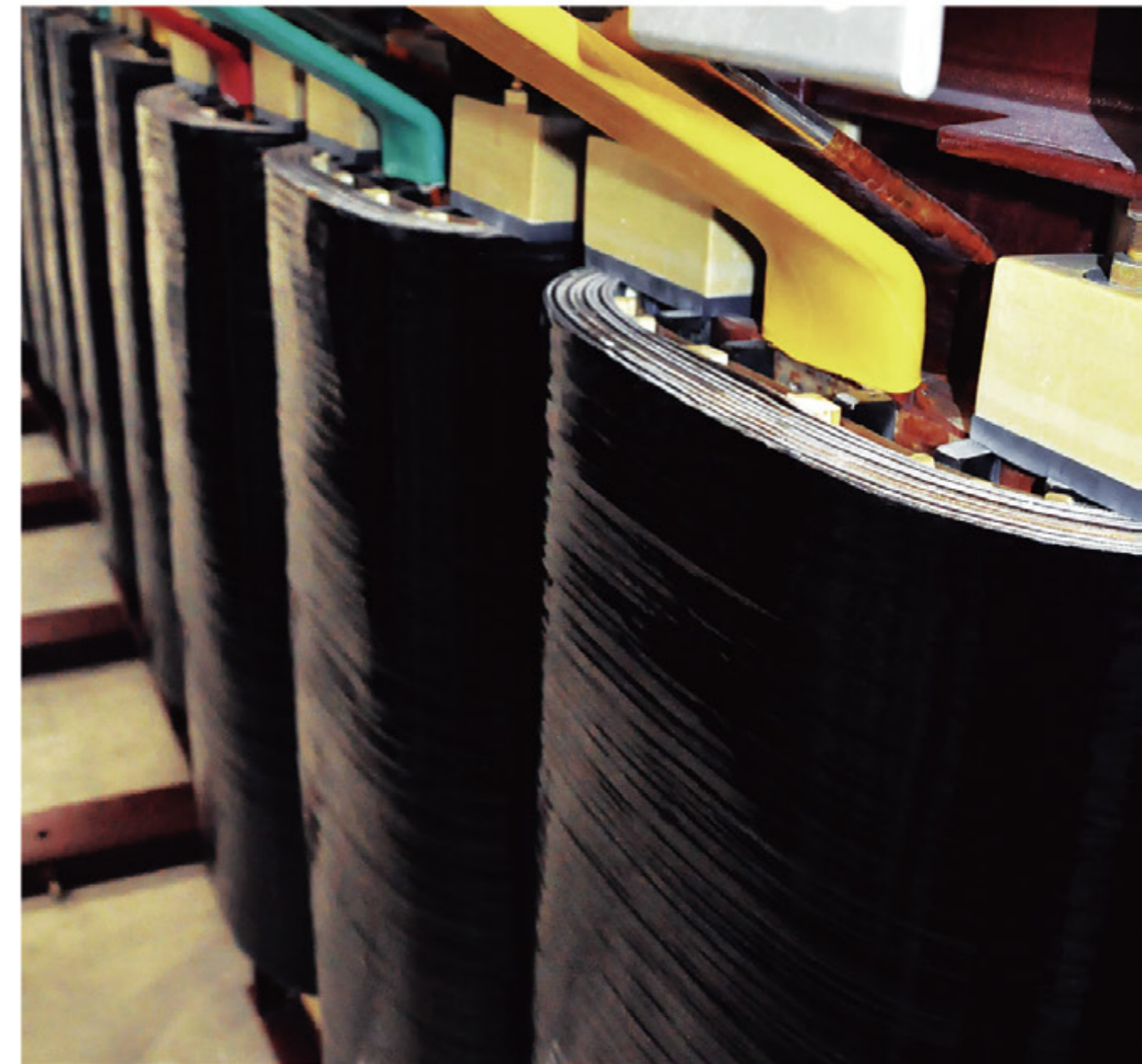
SCRBH15 AMORPHOUS METAL DRY TYPE TRANSFORMER

S C R B H 15 - 1250 / 10



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!





CEEG SCRBH15 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 Core

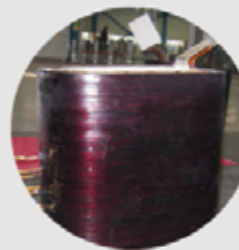
- 1) All raw material are supplied by Hitachi Metals with iron loss less than 70-80% of the standard silicon steel
- 2) Company has special treatment, procedure and manufacturer process; which has patent number as: 200810238258.6, 20082015857.5, 200820215858.X, 200820215812.8, 200820215814.7.
- 3) Core 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.



SCRBH15



Three phase three columns



Three phase five columns

CEEG Amorphous Metal Dry Type Transformer

Assembly difficulties	Less accessories needed, outer appearance clean and neat.
Weight	Lighter
Insulation and temperature rise	No external column problem, insulation design is same as regular transformer. Give Safety and reliability to you. No external column that may covers the windings, temperature rise is lower. New type of transformer has a small size and lighter structure.
Other	Transformer's primary and secondary vector group can be easily connect.
Insulation Level	Transformer insulation class H (180°C) Main insulation material is class C (220°C), which fire retardation and explosion-proof.
Reliable	Insulation level high, can overload at 120% in long period of time.
Environmental Friendly	Nomex paper is fire retardation and explosion-proof material. This will not release harmful gas when in fire. At the end of the transformer life cycle, the main material copper is recyclable. Low noise, 3-5dB under the requirement of GB.
Production Period	HV winding do not require molding, flexible design can shorten the production period.

Amorphous Metal Dry Type Transformer

Assembly difficulties	More accessories parts, body and appearance complicated.
Weight	5%-10% heavier than the three phase three column type. Side column require attention on insulation protection. Side column create difficulty on air flow.
Other	Transformer design complicated, big and heavy Primary voltage must be Delta connection, Star connection may create high harmonic.
Insulation Level	Insulation Class F (155°C)
Reliable	Cannot overload operation in long period of time. Has harmful gas during burning No recycle possible for copper during the end of transformer life cycle Noise level high.
Production Period	HV coil complicated, production period longer.

Product Qualification



Product Patent

CEEG amorphous metal dry type transformer is the industry pioneer to produce three phase three column type. As the China biggest production base of Amorphous metal dry type transformer, CEEG received many patent and has our own R&D center for continuous development and improvement of the quality of the transformers.

1. Three phase three column amorphous core dry type core processing	11. Load-lead row
2. Three phase three column amorphous core dry type core clamping structure	12. Amorphous metal transformer coil winding procedure
3. Three phase three column amorphous core dry type core supporting panel	13. Amorphous metal transformer molding
4. Three phase three column amorphous core dry type core installation technology	14. Amorphous metal transformer assembling
5. Three phase three column amorphous core dry type core drawing board	15. Rectangle winding technology
6. Three phase three column amorphous core dry type core side board	16. Pressure-mold
7. Three phase three column amorphous core dry type core fixture	17. A special type of amorphous core
8. Three phase three column amorphous core dry type core insulation	18. Amorphous core type in rectangle form
9. New type noise blocking structure	19. Special supporting frame
10. Wire tensioner	20. Special supporting frame with insulation material combination technique



We provide you the best quality and energy saving proposal of the transformer

Job reference

- | | | |
|--------------------|---------------------|--------------------|
| 珠江黄埔大桥 | 深港跨海大桥 | 镇江市供电公司 |
| 安徽省蚌埠电力实业总公司 | 六九硅业有限公司 | 天津市政工程配套办公室 |
| 中铁四局集团建筑装饰安装工程有限公司 | 中国移动通信集团湖南有限公司娄底分公司 | 中国机械对外经济技术合作总公司 |
| 中铁十局集团建筑装饰安装工程有限公司 | 中国医学科学院 | 镇江大照集团有限公司器材分公司 |
| 江苏涟水经济开发区管委会 | 陕西煤业集团黄陵建庄矿业有限公司 | 南京市高淳县供电局 |
| 安徽省黄塔桥高速公路 | 沈阳沈康高速公路法库服务区 | 甘肃甘南自治州合作市热力煤炭有限公司 |
| 石家庄日报社 | 北汽福田汽车股份有限公司 | 内蒙古第一机械制造(集团)有限公司 |
| 广东明珠集团股份有限公司 | 天津市汇和电气控制设备厂 | 涟水四通电力设备有限公司 |
| 上海一开电器成套有限公司 | 深圳创先照明科技有限公司 | 上海四立电器有限公司 |
| 重庆市华驰交通科技有限公司 | 滁州富达机械电子有限公司 | 镇江苏源电力器材有限公司 |
| 江苏镇安电力设备有限公司 | 北汽福田汽车股份有限公司 | 宜昌市能达通用电气股份合作公司 |
| 镇江恒隆电气设备有限公司 | 镇江市吉通电器设备工程有限公司 | 安徽和信科技发展有限公司 |
| 北京华威森虹电气设备有限公司 | 金华电力开关有限公司 | 浙江开关厂有限公司 |
| 北京双鹤药业股份有限公司 | 常熟市通用电器厂有限公司 | 北京华远达电气设备安装有限责任公司 |
| 吉林太阳城有限公司 | 上海一开投资集团有限公司 | 拉萨德力西电器销售有限公司 |
| 吉林市宝泰经贸有限公司 | 松原市恒瑞经贸有限公司 | 南京亿涛科贸有限公司 |
| 马鞍山市苏能电力器材有限公司 | 沈阳兴隆大家庭购物中心有限公司 | 正泰电气股份有限公司 |
| 赤峰蒙侠药业有限公司 | 金华电力开关有限公司 | ... |

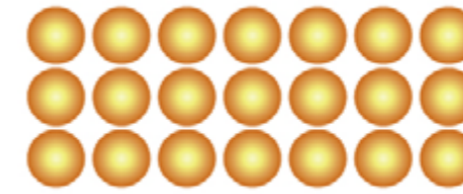
AMORPHOUS METAL COIL FEATURE

Amorphous Metal transformer introduction

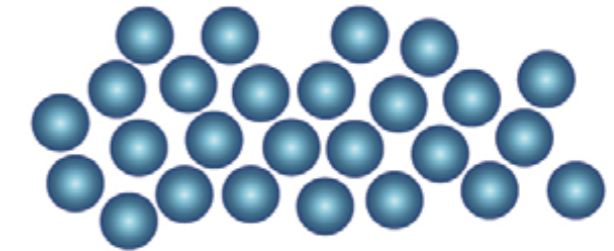
The development of the amorphous metal in 1970s, it has become widely use in 1990 for a high energy saving material for the transformer industry. Right now, over 1million sets of amorphous metal type transformer had been connected to grid all over the world. The longest proven save and reliable transformer 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 Silicone 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:

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

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.

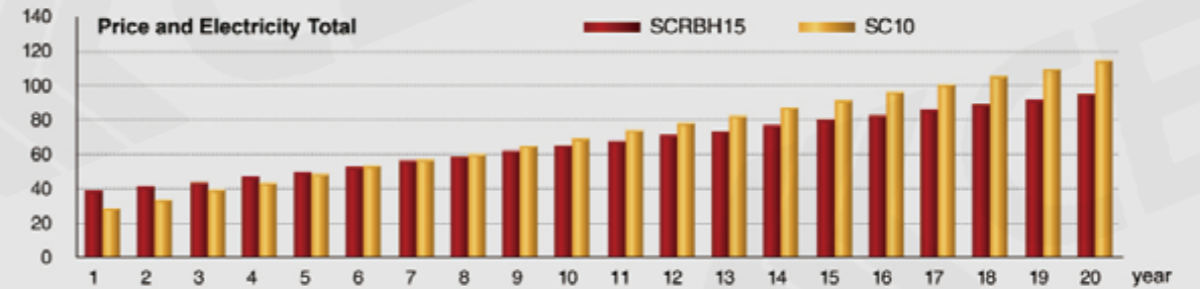
Therefore, for the future of the power transmission and distribution network, amorphous metal transformer can be a great economic effect to the society.

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	
			69.7%
800	1539	470	69.5%
1000	1791	540	69.8%
1250	2115	640	69.7%
1600	2484	750	69.8%

Comparison of SCRBH15 and SC10



TOC (Total Owning Cost) =

Transformer Price + Operating Cost

Transformer operation cost can use the equation as below:

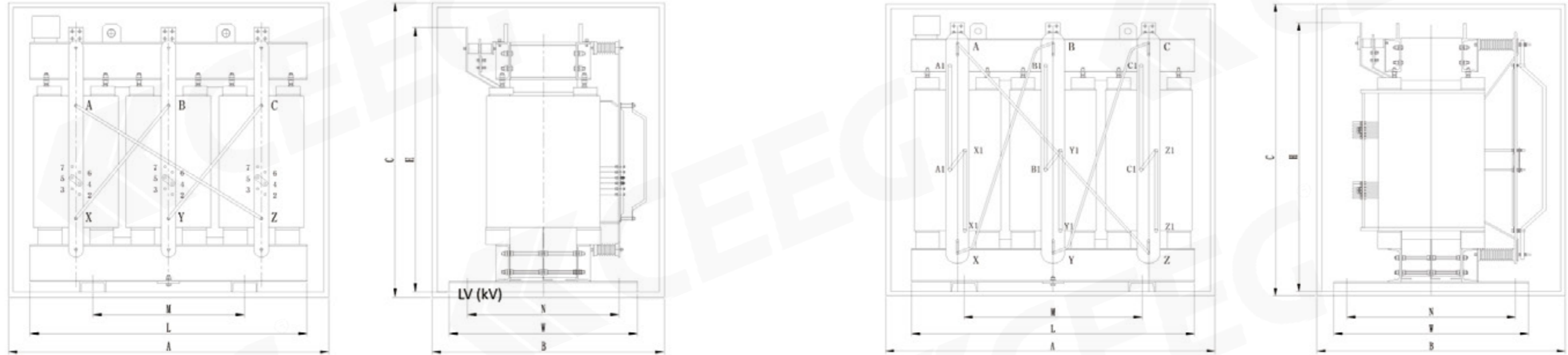
$$8600 \times (P_o + \frac{0.05 \times I_0 \times S_n}{100}) \times 1 + 2200 \times (P_k + \frac{0.05 \times U_k \times S_n}{100}) \times 1$$

For example 1 kWh electricity cost RMB1

2000KVA SCRBH15 Amorphous Metal Dry Type Transformer Power losses

Rated Capacity kVA _n	No load loss W P _o	Loading(120°C) Load loss W P _k	No load current % I _o	Impedance % U _k	No load power loss	Load power losses	Total Losses
2000	0.98	14450	0.5	6	12728	44990	57718

TECHNIQUE PARAMETER



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 (no-load current) %		LPA (AN) dB	Dimension (mm)			Insulation 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	± 2 x 2.5	0.4	Dyn11	120	1480	1570	1690	1.2	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					400	5610	5960	6400	0.7	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 (no-load current) %		LPA (AN) dB	Dimension (mm)			Insulation 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)	
315	20	± 2 x 2.5	0.4	Dyn11	390	4100	4300	4600	0.9	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					590	6880	7200	7750	0.7	58	1510 x 1270 x 1580	3500	2000 x 1700 x 1900	820 x 1070	
800					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	

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



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 (%)	Impedance voltage (%)	LPA (AN) dB	Dimension (mm)			Insulation Dimension M x N (mm)
	HV/kV	HV/Tapping Range (%)	LV/kV			100°C (B)	120°C (F)				L x W x H (IP00) (mm)	Weight (kg)	A x B x C (IP20) (mm)	
100					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	6				220	2590	2760	1.0	4	54	1100 x 860 x 1245	1400	1500 x 1350 x 1600	660 x 660
315	6.3				270	3270	3470	0.9		56	1190 x 860 x 1280	1900	1600 x 1350 x 1700	660 x 660
400	6.6	± 5	0.4	Dyn11	300	3750	3990	0.8		56	1270 x 1020 x 1350	2250	1700 x 1350 x 1700	660 x 820
500	10	± 2 x 2.5		Yyn0	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.