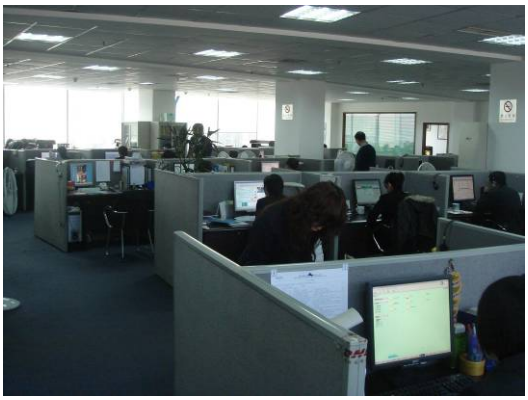
KEE HING CHEUNG KEE CO., LTD.
DLFTZ CHANG HING KEE
INT'L INDUSTRY & TRADE CO., LTD.

OIL IMMERSED TRANSFORMER

CONTENT

OIL IMMERSED POWER TRANSFORMER

Design



- We developed a whole set of designing method and calculation programs about short-circuit dynamic stability on the basis of thorough theoretical research and tests on short-circuit of large transformers.
- With the calculation of main insulation and winding insulation by computer, designers can exactly calculate the voltage distribution along windings under the impulse performed. On basis of the accurate field calculation, we can ensure the whole insulation reliable.
- Transformer loss is lowered by means of leakage field analysis, tank shield, tie plate and the narrowest lamination grooved. Stray loss is reduced by means of improving active part structure. Eddy loss is also reduced by optimizing wire transpositions.
- In accordance with calculation of oil-flow distribution, reasonable oil-flow distribution is achieved in active part, directed oil guide rings and proper channels are used inside winding to reduce average temperature rise and hot spot temperature rise of the windings, the transformer's service life will last long.
- We take many measures to reduce the noise level, including selecting suitable flux density and self-vibration frequency of the core, choosing high-quality core material and multiple step-lap stacking type, adopting active part structure with high short-circuit withstanding ability, improving connection between active part and tank, using noise shielding tank with accessories of low noise level, etc.

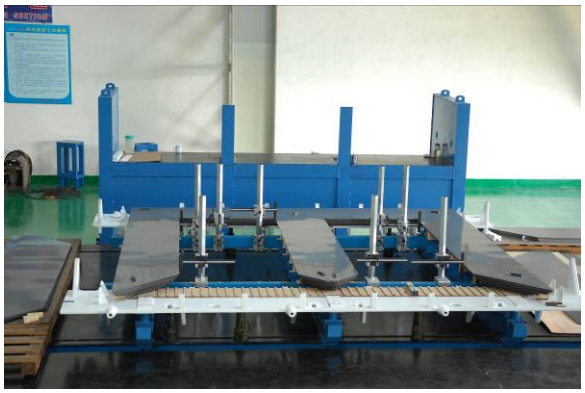
Advanced technology

- We introduce advanced technology as know-how. The whole process of the transformer manufacture is carried out in the dust-free workshops. Each link is performed strictly according to the quality operation regulations and manufacturing technology regulations. Advanced technology results in high-quality transformer and guarantees to manufacture fine products.

Step-lap cover cutting machine with automatic stacking functions

Steel slitting machine

- Laminations are cut to length on cut-to-length line with step-lap cut and automatic stacking functions to high dimensional accuracy. This can not only reduce noise, but also improve flux and magnetic performance to reduce no-load loss.



- The degree of tightness is of the most importance to windings. We use vertical winding machine with tension controlling device to get compulsory radial force during rolling winding, this can ensure tightness and designing size of winding

Horizontal winding equipment

Vertical winding machine

- After the active part of large transformer is assembled in the dust-free, purified workshop. It is dried in the fully automatic vapor phase drying plant.
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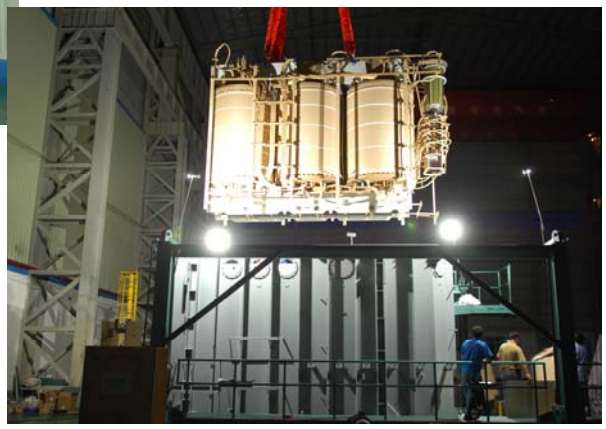
Coal oil vapour phase drying equipment



Assembling

Manufacturing

- Winding Machine
  Start stably
  None step operation on speed adjustment
  Bigger rotating power
  Adjustable fasten stress
  Guarantee radial size of the windings

- Core Machine
  Unique oil directed duct to ensure mostly optimized cooling effect
  Durable material used as oil duct
  Anti-aging
  Crack free
  Higher insulation class
  Universally oil directed
  Less friction

The transformer in the manufacturing process, uses the advanced processing technology and the reliable quality control, selects the advanced equipment simultaneously to guarantee the product manufacture the quality, guaranteed the product technology superiority perfectly manifests.

- Flat tank with fin radiator, inside and outside welded. The advanced oil leakage detection equipment in addition to the double sided welding ensures no leakages.
  Magnetic shunt on the tank reducing stray losses and avoid hot spots on the tank walls, the large –scale numerical controlled cutting machine, plank-cutting machine, hydraulic bending machine, automatic welding machine, rich argon mixed gas welding equipments are used to feed and bend. But welding is adopted for the oil tank parts of power transformer product. The corrugated oil tank production line of German GEORG Company is used to produce the corrugated oil tank of distribution.
- Use 6-step per lapping sequence and 45 degree miter joints.
- Core diameter step each 1 mm.

200T Traveling Crane

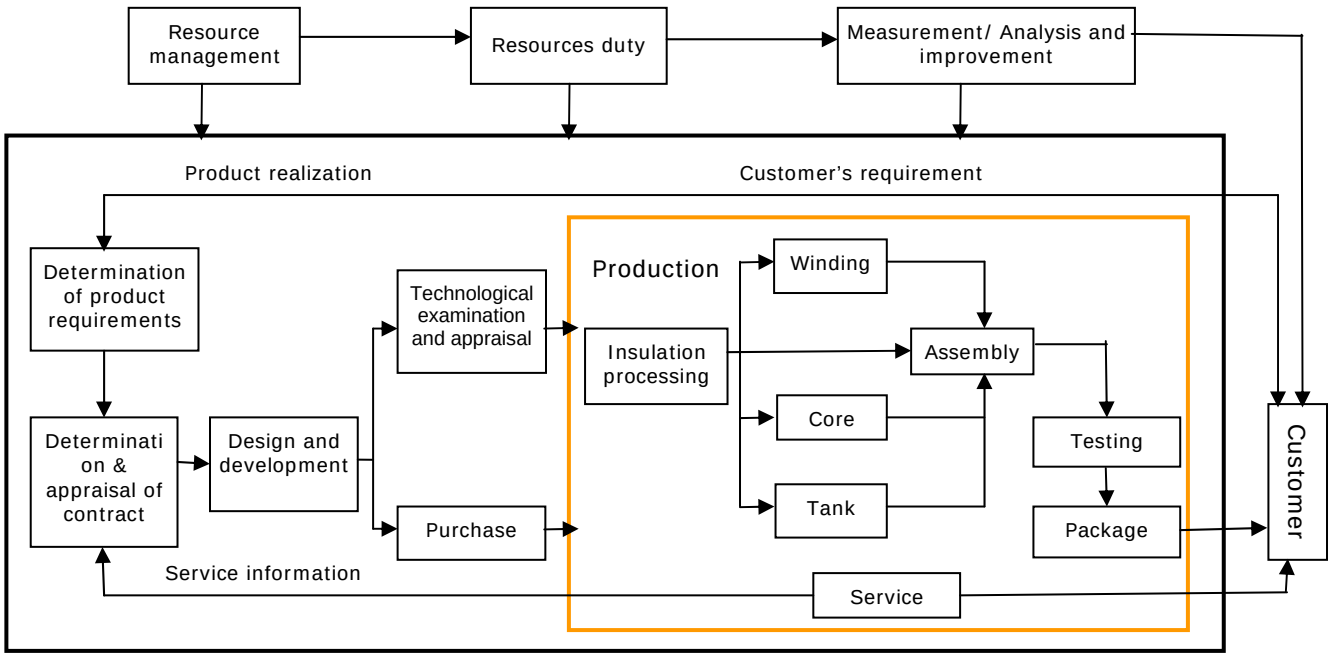
Assemble lifting platform

Assemble workshop

Quality

Reliable quality is not only the base to obtain customers, but the key to our existence and development. We always take the quality as life of the enterprise, place great emphasis on staff's quality awareness and quality management at every link. And we devote ourselves to improve the interior quality management system.

Quality Management System



Quality Control System

- Preliminary examination
  All raw materials and purchased parts will not enter the inventory list before stringent examination.
  All accessories including gas-relay, pressure-relief device, winding thermometer valves, radiators, bushings etc, will go through stringent examinations.
- Procedure Inspection
  24 inspection cards for each manufacturing step.
  42 DPMO measuring points.
  Integrated quality checking by 7 departments.
  2 control steps on insulation drying.

Methods for improvement

- Clear, measurable quality targets
- Measurement, analysis, control and continuous improvement.
- Prevent overlooked defects, and maintain reliability.

- Provide results that can be counted upon.
- Decide best technical method.
- Improve quality and show quality status with quantitative information.
- We could use 6-sigma as the measurement method on 42 measuring points during the whole manufacturing procedure from the raw material examination to final dispatch of transformers to achieve target quality.

Test

We have advanced imported test equipment to ensure testing, with those equipment, we are to do routine and specialized testing, depending on customer requirements, and according to GB/IEC and international standard.

Transformer under testing

Test room 250 kV apply Voltage and 1800kV impulse voltage generating equipment

The Measurement System of Impulse Voltage Generator with Standard Lighting Wave

110kV POWER TRANSFORMER

Brief introduction to products:

110kV Power Transformer is manufactured on the basis of domestic and overseas advanced technology. It has the following features: low noises, low losses, low partial discharge, high mechanical and electrical strength, fully sealed and so on.

Due to these features, it can save a lot of operation costs and improve the economic effectiveness and safety of power network.

High reliability

- Insulating strength
- Short circuit strength
- Temperature rise

Lowest cost for whole life span

The products have relatively low losses through the optimized design of the transformer and detailed analysis of leakage magnetic field and of the losses distribution. The maintenance cost of customers has been decreased by adoption of end user-oriented design and by taking transformer operation environment, application convenience and practical demands in operation design of end user-oriented into consideration.

User-oriented design

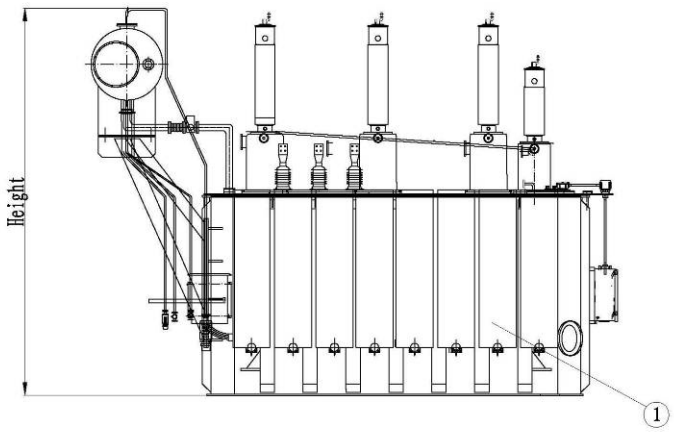
Based on the design, through three-dimension method to simulate feeders, operation field, terminal boxes arrangement and in full consideration of operating convenience and free of maintenance etc, the operation cost has dropped.

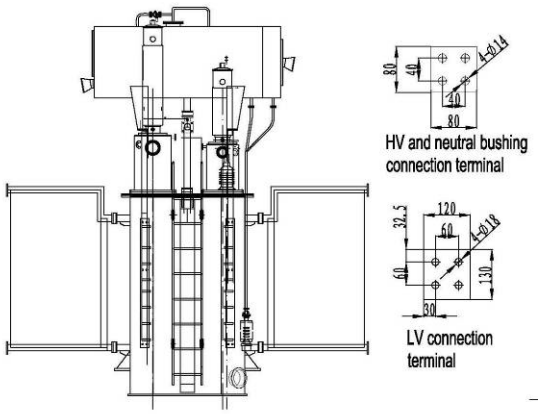
- Iron core is made of permeability silicon steel sheet, thus reduces the none-bad loss. Since the yoke clamping strength has been improved, thus the noise of transformer is reduced.
- Coil: Supported by the cardboard cylinder, the supporting points are added to the inner coils so as to increase the mechanical strength. The improvement of transposition method and the use of combined conductors reduce on-load loss effectively.
- Body and Insulation: The crucial parts of insulation are made of pulp so as to ensure the reasonable distribution of electric field strength. All leading wires are connected with cold-pressed adapters to control the partial discharge efficiently. In order to guarantee tightness and reliability, the body is dried and pressed, by means more pressing points. The leading wires are arranged properly and fixed firmly by systematic calculation of electric field, thus improves the product's short-circuit ability.
- Oil tank: The steel plate oil tank is nice in looking. The control box is fixed on the transformer body, so it's unnecessary to make another foundation for it.
- Accessories; All valves are made of high-quality alloy steel and the oil pipe of radiator is made of square seamless steel.

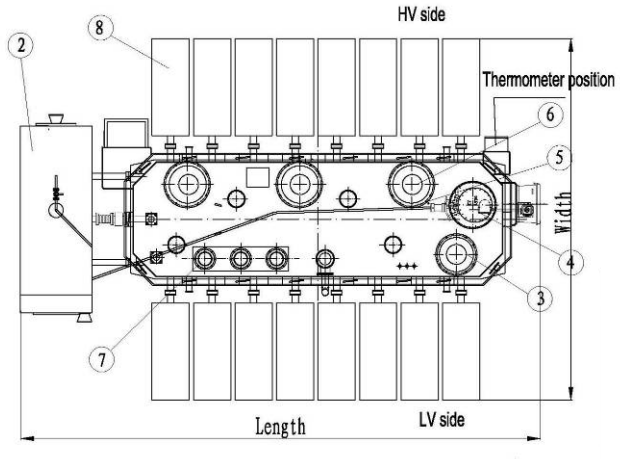
Power transformer with OLTC

Rated capacity (KVA)	Voltage Combination		Vector group	No load Losses KW	No load Current %	On load Losses KW	Impedance Voltage (%)
	HV	LV					
10000	110; 121 ±8x1.25%	6.3, 6.6, 10.5, 11	YNd11	11	0.8	50.2	10.5
12500				12.8	0.75	59.5	
16000				15.5	0.7	73	
20000				18	0.65	88.5	
25000				21.5	0.6	105	
31500				25.5	0.55	126	
40000				30.5	0.5	150	
50000				36	0.45	184	
63000				43	0.4	221	

Structure feature
110kV three-phase power transformer with OLTC

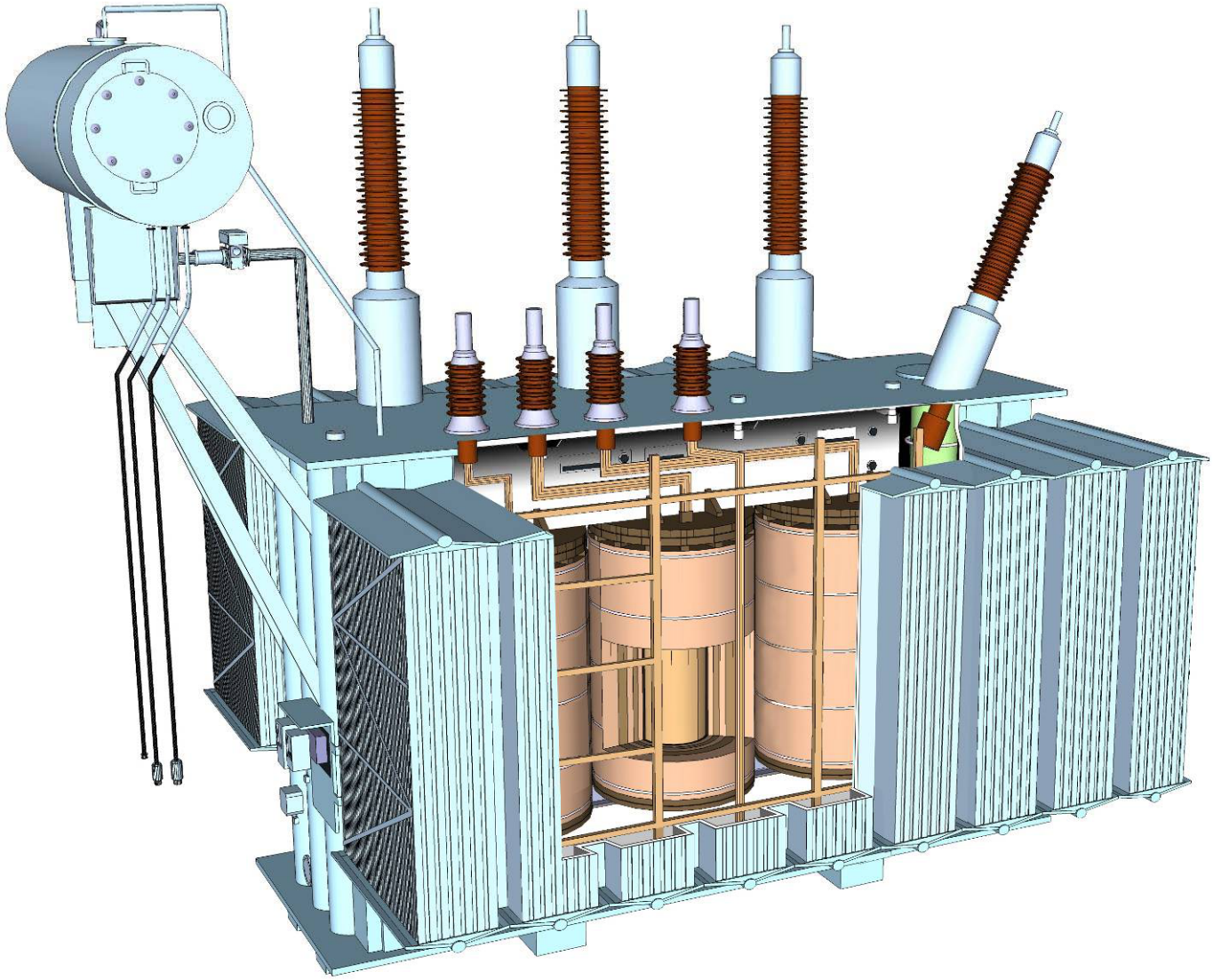






1. Transformer body
2. Oil conservator
3. HV neutral bushing
4. OLTC
5. Connection pipe
6. HV bushing
7. LV bushing
8. Plate radiator

Outline Drawing



35 kV POWER TRANSFORMER

SZ9-2000 ～ 12500/35 Three-phase oil-immersed load voltage-regulating power transformers

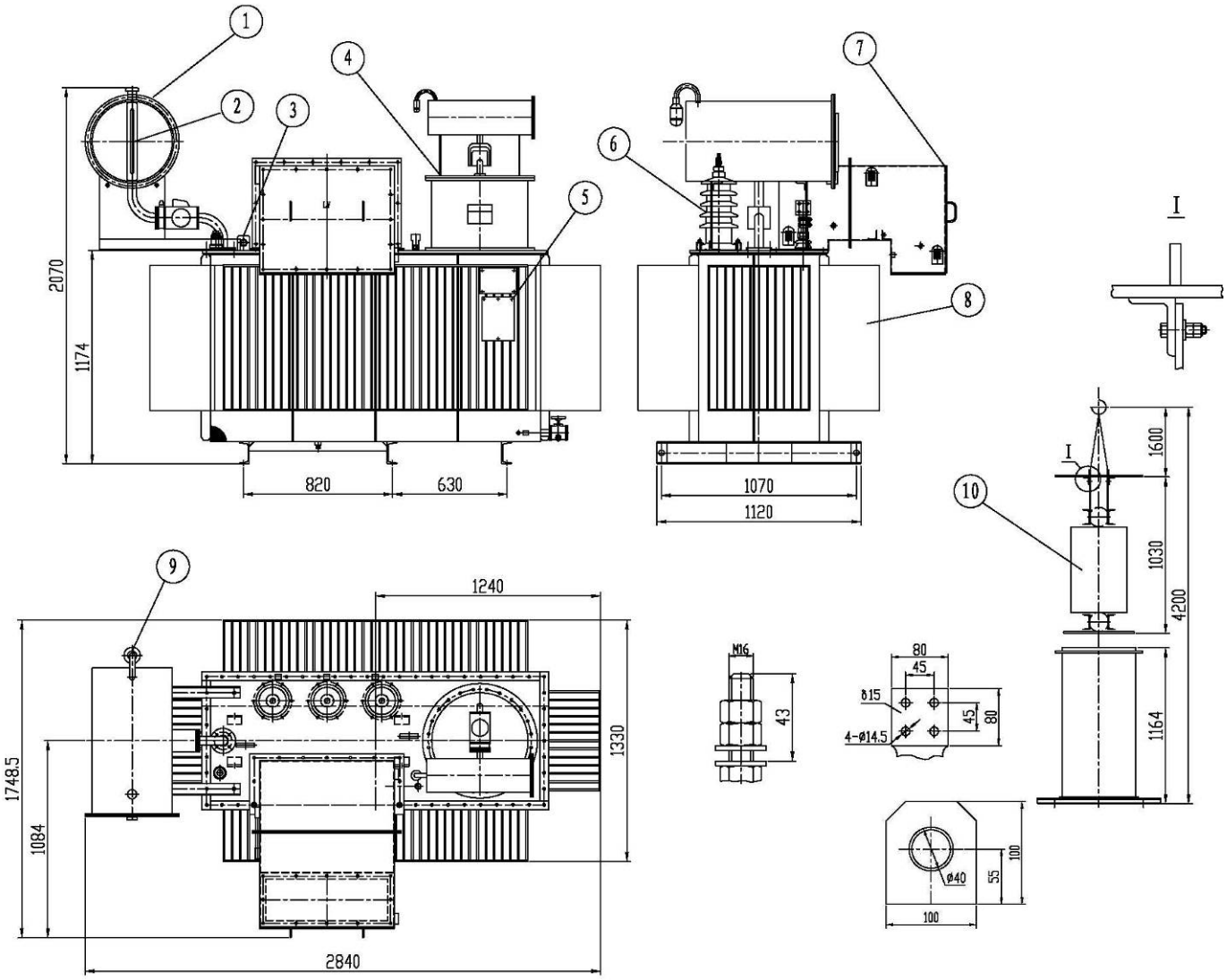
This product conforms to the Requirements of IEC Standards with a series of significant innovations adopted in terms of material, technology, and structure.

It features with high efficiency and low consumption. It can save a lot of power operating costs and the social benefits are very significant, it is a nationality- promoted new product and one of the products warmly welcomed by customers.

Distribution transformer with OLTC

Rated capacity (KVA)	Voltage Combination			Vector group	No load Losses KW	load Losses KW	No load Current %	Impedance Voltage (%)
	HV(kV)	Tapping (%)	LV(kV)					
2000	35	±3x2.5	10.5 6.3	Yd11	2.9	20.0	1.0	6.5
2500					3.3	22.0	1.0	
3150	35				4.0	26.0	0.9	7.0
4000					4.9	30.5	0.9	
5000					5.8	35.0	0.85	
6300					7.0	39.0	0.85	7.5
8000	38.5			YNd11	8.9	44.0	0.75	
10000					10.5	51.0	0.75	
12500					12.6	60.5	0.7	8.0

Structure feature
35kV three-phase distribution transformer with OLTC



1.Oil conservator 2.Oil indicator 3.Gas relay 4.OLTC 5.Name plate 6.bushing
7.LV bushing cover 8.oil box body 9. Moisture absorber 10.Core assembly

Special voltage and capacity can be designed according to customer's requirement.

10 kV POWER TRANSFORMER

S13, S11 3D Triangle Energy-saving Environment-friendly Distribution Transformer with Rolled Iron Core

As a breakthrough of the traditional flat structure, the 3D Triangle Energy-saving Environment-friendly Distribution Transformer with Rolled Iron Core adopts the 3-phase symmetric 3D structure with entirely symmetric 3-phase iron core magnet circuit, so as to greatly reduce magnet resistance, exciting current and no-load loss as a high-performance energy-saving transformer made of traditional materials but with lower running noise and more compactness. Its great effects on energy saving, consumption reduction, materials saving and environmental protection are superior to that of any other types of transformers.

Feature:

- 3-dimensional wound core composed of 3 uniform parts is of stable structure, enhanced mechanical strength and great short current withstand ability.
- It highly utilizes the magnet-inductivity of cold-rolled silicon steel sheet and lowers the no-load current and no-load loss tremendously through annealing. Its no-load current and no-load loss are 80% and 25% lower respectively than other products of the same kind.
- Core is wound tightly with excellent cold-rolled silicon steel sheets, which shows more advantages in tightness than that of laminated core, ensures the absence of an air gap and decreases 7-10 db of noise after the annealing and painting processes. In addition, the windings enveloping the core effectively reduce magnetostriction, the main source of hum found in standard vertically laminated transformers.
- The direction of the magnetic flux of the entire core is the same as the rolling direction of the steel. A high flux density and no-scrap processing, therefore, can be allowed with great material saving as a result. Besides, Coil windings are made up of fresh-new oxygen-free copper wires that are wound directly around the core, which has simplified the processing, realized less raw materials and load loss, smaller and lighter structure.
- The corrugated structure of the oil tank leads to elegant outer appearance, compact volume, and small dimension.

S13-M-RL-100-1600/10 solid triangle rolling iron core transformer

Rated capacity	(KVA)	100	125	160	250	400	500	800	1000	1250	1600
Voltage combination kV	high voltage	10±5%			10±2x2.5%						
	low voltage	0.4									
No load loss	W	100	170	200	240	410	490	700	830	980	1180
On load loss	W	870	1800	2200	2600	4300	5100	7500	10300	12000	14500
No load current	%	0.25	0.20	0.19	0.18	0.16	0.15	0.14	0.13	0.12	0.11
Short circuit impedance	%	4	4	4	4	4	4	4.5	4.5	4.5	4.5
Body weight	Kg	235	460	530	605	860	1220	1685	1950	2245	2630
Total weight	Kg	395	755	865	995	1305	1875	2550	2985	3480	4160

S11-M-RL-100-1600/10 solid triangle rolling iron core transformer

Rated capacity	(KVA)	100	160	205	250	400	500	800	1000	1250	1600
Voltage combination kV	high voltage	10±5%			10±2x2.5%						
	low voltage	0.4									
No load loss	W	200	280	340	400	570	680	980	1150	1360	1640
On load loss	W	1500	2200	2600	3050	4300	5100	7500	10300	12000	14500
No load current	%	0.26	0.25	0.25	0.23	0.21	0.21	0.19	0.18	0.17	0.16
Short circuit impedance	%	4	4	4	4	4	4	4.5	4.5	4.5	4.5
Body weight	Kg	311	424	488	572	818	960	1424	1660	1802	2247
Total weight	Kg	556	754	879	1101	1464	1803	2417	2955	3135	3528

S11-M, S11 series Oil-immersed totally enclosed distribution transformer

S11-M and S11 series Oil-immersed totally enclosed distribution transformer is a new type of product in accord with the IEC standard designed. The product is characterized by compact structure, beautiful outline, small size, low noise in temperature rise, and strong overload ability. Its no-load loss decreases by more than 30% compared with S9 series product, and its no-load current decreases to 45%-80%, thus becoming one of the most energy-saving products in the series of production in the company at present.

Features:

- By adopting the corrugated oil tank with a totally enclosed structure, the cabinet can prevent the transformer oil from coming into contact with the air and water content, thus decreasing the aging of oil, and prolonging the lifespan of the transformer. The elastic distortion of the corrugated piece can be used to adjust the change of transformer oil in size since it expands when heated and contracts when cooled.

- The product is an outdoor installation without conservator and with a high dustproof. In the normal operation period there is no need to change the transformer oil, and therefore it can actually be free from maintenance to ensure the safe operation and reliability of the power network.

- The transformer is equipped with pressure release protection. When something is wrong with the transformer so as to produce too high a pressure, the pressure release valve can release the pressure safely to prevent the worsening of the accident.

- The product enclosing pattern: there are the cabinet edge welding and the bolt tightening for the users to choose from.

S11-M series 10kV oil-immersed totally-enclosed distribution transformer

Model	Rated Voltage			Vector group	No-load Losses W	On-load Losses W	No-+load Current %	Impedance Voltage (%)
	HV	Tap	LV					
S11-M-100/10	6 6.3 10] 10.5 11	+5% Or +2%x 2.5%	0.4	Yyn0 Or Dyn11	200	1500	1.5	4 4.5
S11-M-125/10					240	1800	1.5	
S11-M-160/10					270	2200	1.3	
S11-M-250/10					400	3050	1.2	
S11-M-400/10					570	4300	1.0	
S11-M-500/10					680	5150	1.0	
S11-M-800/10					980	7500	0.8	
S11-M-1000/10					1150	10300	0.7	
S11-M-1250/10					1360	12000	0.6	
S11-M-1600/10					1640	14500	0.6	

Structure feature: