I. Basic Structure of Transformer

II. Introduction to Main Equipment for Production of Transformer

III. Basic Processes for Production of Transformer
I. Basic Structure of Transformer

220kV three-phase three-winding natural oil circulation
Air-cooled oil-immersed power transformer
I. Basic Structure of Transformer

1. Structure of Iron Core

Types of iron core:
- Shell type iron core and core type iron core
  Generally, core type iron core is placed vertically, the cross section of iron core is graded cylindrical, core column is surrounded by coil.
- Structural features of common core type iron core:
  Three-phase three-column laminated iron core and three-phase three-column side yoke type laminated iron core (five-column iron core).
I. Basic Structure of Transformer

Three-phase five-column laminated iron core
I. Basic Structure of Transformer

2. Winding Structure

Windings installed on transformer body

Winding is the electric circuit part of transformer and all the windings are concentric.

Type of winding: Generally, winding is divided into laminated winding and cross-over winding.
I. Basic Structure of Transformer

Materials of winding
The wire material of transformer winding can be divided into copper wire and aluminum wire.

Insulating materials of winding
The common insulating materials of winding mainly include insulation paper, insulation paper tube, end insulation, turn insulation, layer insulation, electrostatic screen, cushion block, angle ring and insulation end ring, etc.

Drying of winding
The drying treatment of winding is to absorb the moisture inside the insulating material. In this way, the insulating property of insulating material can be strengthened and the size shrinkage of insulating material can be stable, too.
I. Basic Structure of Transformer

3. Lead Wire Structure

Lead wire is used to input external electric energy into transformer and output the transmissive electric energy out of transformer. Generally, it’s divided into three types:

a. Outgoing wires connecting winding terminal with bushing;

b. Connection wires between windings of various phases;

c. Tapping wires connecting winding tap with tap changer.

110kV HV lead wire
I. Basic Structure of Transformer

4. Tank Structure

Tank is the outer shell of transformer body and it has the functions of accommodating transformer body, filled transformer oil and cooling.

Two points aspects of transformer leakage: one is welding seam leakage and the other is seal leakage.

Three kinds of structural styles of transformer tank: barreled (conventional) type tank, bell type tank and completely sealed tank.

The completely sealed tank means that the tank is installed after the final assembly of transformer body is completely finished; its top and bottom tank edges are welded together to form a whole, thus realizing the seal of tank.
II. Main Equipments for Production of Transformer

- Silicon steel sheet cutting burrs are controlled below 0.02mm
- High cutting accuracy, with longitudinal and transverse stepping cutting functions; the accuracy of feeding device is \( \pm 0.2 \text{mm} \) and positioning accuracy of cutting angle is \( \pm 0.005 \text{ degree} \).
II. Introduction to Main Equipment for Production of Transformer

150t iron core roll-over table
II. Introduction to Main Equipment for Production of Transformer

20t horizontal winding machine

- Winding coils with diameter of $\Phi 800 \sim \Phi 2800$
- Load bearing: 20t
- Equipped with advanced axial and transverse clamping devices and pneumatic wire tension device
II. Introduction to Main Equipment for Production of Transformer

15t vertical winding machine

- Firm coil winding and convenient operation
- Reducing umbrella-type coils, convenient for standing
- Convenient for winding large-scale HV coils
- Reducing operators’ labor intensity for winding coils
II. Introduction to Main Equipment for Production of Transformer

- Kerosene oil gas phase drying oven
- Air cushion vehicle
II. Introduction to Main Equipment for Production of Transformer

- Vacuum oil filter
- 60t mounting rack
- 320t Assembly workshop
III. Basic Processes for Production of Transformer
III. Basic Processes for Production of Transformer

- Cutting silicon steel sheet
- Iron core piling up, binding and standing
- Transformer body installation and stacking upper iron yokes
- Making winding insulation
- Constant voltage of coil
- Vacuum drying of coil
- Coil installation
- Coil winding
- Lead pre-arrangement
- Lead assembly of transformer body
- Gas phase drying for transformer body
- Installation of oil tank, transformer active part, tank cover pre-sealing elements and accessories
- Tidying and compaction of transformer active part
- (To be continued)
- (Continued)
- Vacuum oiling for tank
- Transformer test
- Leakage test for main body
- Dismounting, packaging and transportation
- (To be continued)
Thank you!