

# ELECTRICAL EQUIPMENT JOINT STOCK COMPANY



*Powered by quality*

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## I/ INTRODUCTION

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Electrical Equipment Joint Stock Company (known as THIBIDI) was established in 1980, specializing in manufacturing and supplying various kinds of transformers, belonging to Electrical Equipment Corporation under Ministry of Industry. Its headquarters is located in the Bien Hoa Industrial Zone No. 1, Road No. 09, An Binh ward, Bien Hoa City, Dong Nai province, Viet Nam.

THIBIDI is the biggest manufacturer of distribution transformers in Vietnam and is well-known because of its best quality and services. With managerial expertise, team of experienced engineers and skilled workers, THIBIDI has been continuously improving its products and services to satisfy customers' demand and to integrate Vietnam transformers into SoutheastAsian area as well as the global market.

## II/ PRODUCT

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Transformers of THIBIDI are designed to approach international standards. Our product are tested according to IEC - 60076 standards or customers' requirements.

THIBIDI transformers have been certified "Power-saving product" in accordance with TCVN: 8525:2010 by the Ministry of Trade.

1 ► Specifications of standard transformers:

- Capacity: + from 30kVA to 10000kVA for three-phase transformers.  
+ from 10kVA to 167kVA for single-phase transformers.

- Voltage: up to 35kV. Type: Hermetically sealed type and opened type (with conservator and dehydration breather), indoor and outdoor use.

The transformers have good ability to withstand short-circuit. Transformer windings are designed to withstand impulse voltages caused of lightning.



*Three-phase  
Oil-Immersed Transformers*



*Three phases transformer  
with cable box*



*Single phase  
Oil-Immersed Transformer*

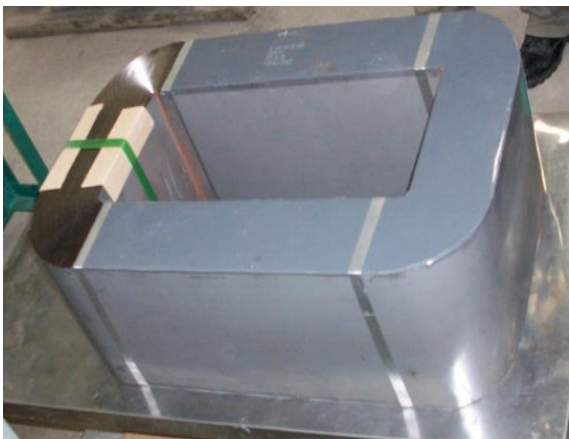
2/ ► Cast resin transformers are products of the cooperation between General Electric (GE) – USA and THIBIDI. GE supplies designs, windings and accessories. Capacity from 250kVA to 4000kVA, with high voltage up to 35kV. Windings are made of epoxy with the following characteristics.

- Non-flammable, self-fire-extinguishing and free from fire of electrical sparks.
- High electrical and mechanical strength and firm structure against force of short circuit, external impacts and abnormal vibrations.



*Cast resin Transformer*

3/ ► THIBIDI has been transferred the Amorphous Alloy cores manufacturing technology from Hitachi Metals company. Amorphous Alloy core is magnetic alloy which has thickness equal to 1/10 of common silicon steel, high permeability and very low loss. Distribution transformers using Amorphous Alloy core have no-load loss equal to 1/3 or 1/4 of transformers using common silicon steel. Amorphous Alloy cores have low temperature, and reduce CO<sub>2</sub> emission.



*Amorphous alloy Core*



*Transformers using Amorphous alloy cores*

## PRODUCT

4/ ► THIBIDI is has cooperated with Cooper Power System (CPS)-USA to manufacture three-phase Pad-mounted transformers. Capacity from 250kVA to 2500kVA, with voltage up to 35kV. These transformers are already integrated the switching and protection system.



*Three phase Pad-mounted Transformer*

5 ► Kiosk – type package transformer substation has capacity up to 2500kVA and high voltage 22 kV. Kiosk - type Package transformer Substation includes substation enclosure containing the distribution transformers, medium-voltage (MV) switchgear, low-voltage (LV) switchboard, measurement system, cables and accessories of Schneider, Siemens, General Electric (GE),... to ensure the safe energy supply. Advantages with already made designs, THIBIDI brings customers the following benefits:

- \* Safety for operators and general public.
- \* Improving the reliability of electric power quality.
- \* Prefabricated, easy and quick for installation.
- \* Protecting transformer outstandingly, ensuring the lifetime of equipments.
- \* Saving the installation space.
- \* Needing to be a little bit of infrastructure item, low installation cost.
- \* Increasing the aesthetics for site area.



*Kiosk - type Package transformer*



*Low-voltage switchboard*

### **III/ TRANSFORMERS MANUFACTURING TECHNOLOGY**

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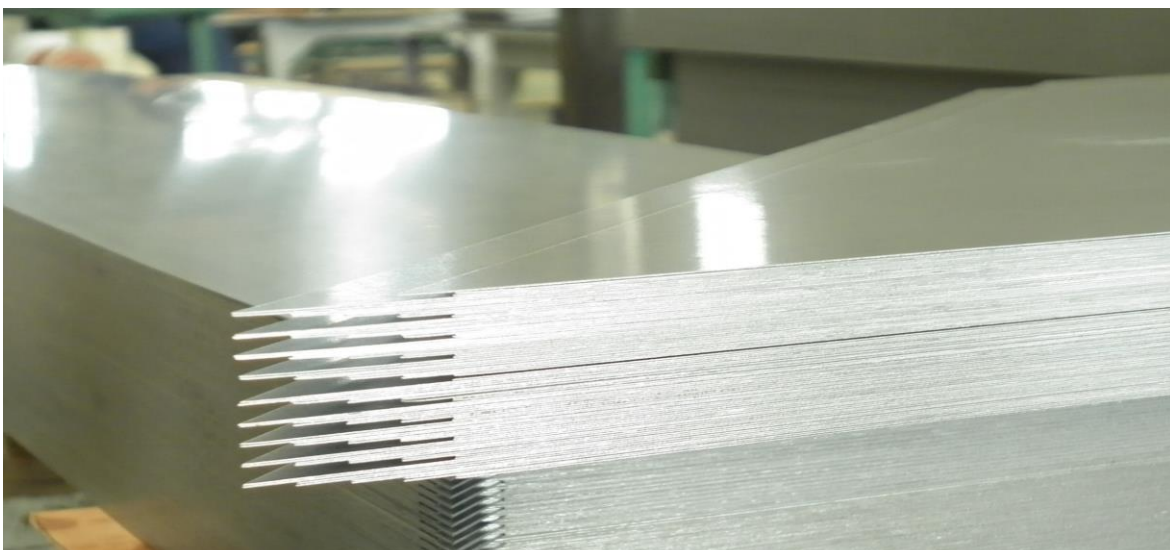
#### **1/ The cores**

##### **\* Stacking-type Core:**

- Cores are made of cold-rolled, grain-oriented magnetic steel sheets of the highest quality. The sheets are cut accurately and stably by an automatic cut-to-length machine, driven by computer. The cutting angle is  $45^{\circ}$ . Sheets are staggered on legs and yokes by step-lap technology. These factors reduce the values of no-load losses and no-load currents as well as of the noise and increase the mechanical solidity.



*Cut-to-length machine*



*Step – lap Joints*

# TRANSFORMERS MANUFACTURING TECHNOLOGY

## \* Wound Core:

Cores of single-phase transformers and small three-phase transformers are produced with wound core technology. They are automatically cut and wound by automatic machine. The core with their step-lap joints are annealed to form shapes and reduce no-load losses.



*Automatic core cutting machine*



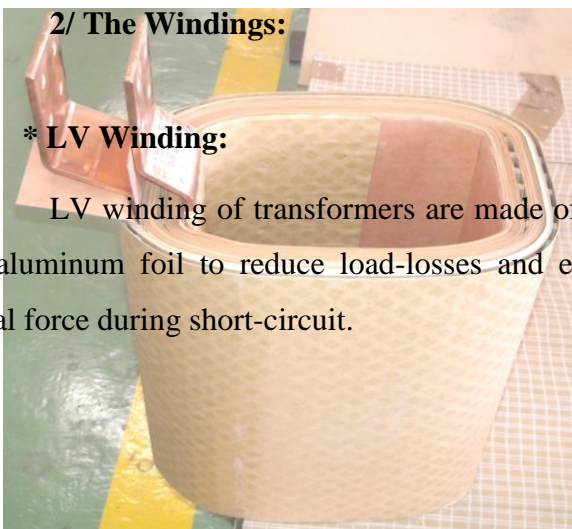
*Annealing furnace*



## 2/ The Windings:

### \* LV Winding:

LV winding of transformers are made of copper or aluminum foil to reduce load-losses and eliminate axial force during short-circuit.



*Foil winding machine*



**\* HV Winding:**

HV windings are of multi-layer type. HV windings are designed to uniform impulse voltages causes of lightning. A special type of epoxy diamond dotted paper with high mechanical, temperature, and electric strength is used as insulation between layers. Resin on paper surface will be melt when dried so that enameled copper wires on layers will be stuck together. Consequently, the HV winding have good ability to withstand vibration and axial forces during short-circuit.



*HV winding machine*

**3/ The Tanks :**

The tanks are made of corrugated steel fins and have ability, **is manufactured by the modern technology.** to stretch to suit oil volume expansion during operation. Tanks are tested of tightness by means of UV lamp and special fluid. Tanks and covers are ball-blasted and electrostatic painted with polyester powder paint. This is resistant to atmospheric aging, UV light, giving an excellent and durable protection against corrosion caused of hot moisture, brine vapour and acids. The tank can be hot-dip galvanized or zinc-rich cold galvanized according to customer's requirement.



*Laser cutting machine*



*CNC Bending machine*

## TRANSFORMERS MANUFACTURING TECHNOLOGY

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*Fin wall making machine*



*Ball-blasting machine*



*Powder coating line*



*Workshop for single phase Transformers*

## **PRODUCT AND TECHNOLOGY**

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### **4/ Core and Coil Assembly:**

#### **a/ Internal part assembly :**

This process is carried out in production line and tested after each step. First, the core is carried to the mounting station, and then the HV and LV coils are mounted and centered. After that, the upper yoke is stacked and the core-coil clamping devices are fixed.

The HV terminal are insulated with special crimping paper tubes. The HV terminal positions are fixed by pressboard panel. The LV terminal are fixed to LV bushings by bolts.



*Active part assembly*

#### **b/ Drying and Oil Filling:**



*Drying oven*

- All internal parts of a transformer are dried in special furnaces. The oil has no PCB toxic and is tested in accordance with IEC standard, treated by vacuum filters, then filled into transformers in vacuum environment.

- In addition to insulating mineral fluid, THIBIDI also provides Envirottemp FR3 fluid which is formulated from edible vegetable oils, is friendly to the environment and has high flash point. The use of Envirottemp FR3 fluid helps eliminate the risk of fires and explosion to create the safety for residential areas. Envirottemp FR3 fluid can be used for all transformers on customers request.



*Vacuum oil Filling oven*

## IV/ TESTING AND QUALITY ASSURANCE

In order to ensure product quality and satisfy customers' demands, THIBIDI has invested a state-of-the-art test room with modern instrument. This test room (code: **VILAS 054**) meets **TCVN ISO/IEC 17025:2005** standard and has been approved by General Department of Standard and Measurement of Vietnam.

All transformers are tested according to **IEC-60076** standard at this test room. Normally we do two kinds of testing: routine test and type test. Routine test is carried out on each transformer.



The routine test consists of:

- \* Ratio test.
- \* Polarity and phase relation (Vector group) test.
- \* Resistance Measurement of all windings.
- \* No load loss and no load current test.
- \* Impedance voltage and load loss test.
- \* Insulation resistances test.
- \* Power frequency voltage withstand test.

Type test is carried out on a transformer which is representative of other transformers.

The type test consists of:

- \* Temperature rise test.
- \* Lightning impulse test.
- \* Short-circuit test.
- \* Sound level test.

Besides THIBIDI's laboratory will test transformer according to other standards on customers' request.





## V/ ACCESSORIES



*HV Bushing*



*Oil level indicator*



*High voltage PLUG-IN BUSHING*



*Tap changer*



*Oil thermometer*



*Radiator valve*



*Buchholz relay*

Accessories such as oil level indicator, dehydration breather, and Buchholz relay... are attached on transformers. Number of accessories attached on a transformer depends on its capacity as well as its protection requirement during operation.

## VI/ AFTER-SALES SERVICES

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THIBIDI not only has been continuously improving its products but also has professional staffs in maintenance and warranty services, who always ready to serve customers whenever they need. Beside that, we have repaired services of transformers which have capacity up to 10000kVA and voltage up to 35kV. We also have consultative service for customer in operation and maintenance of transformer.

With objective toward to satisfy customers' requirement, we would like to commit continuously to improve the product quality, reduce the cost, as well as always listen to customers' feedback for our better products and better services.



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