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A CHINT COMPANY



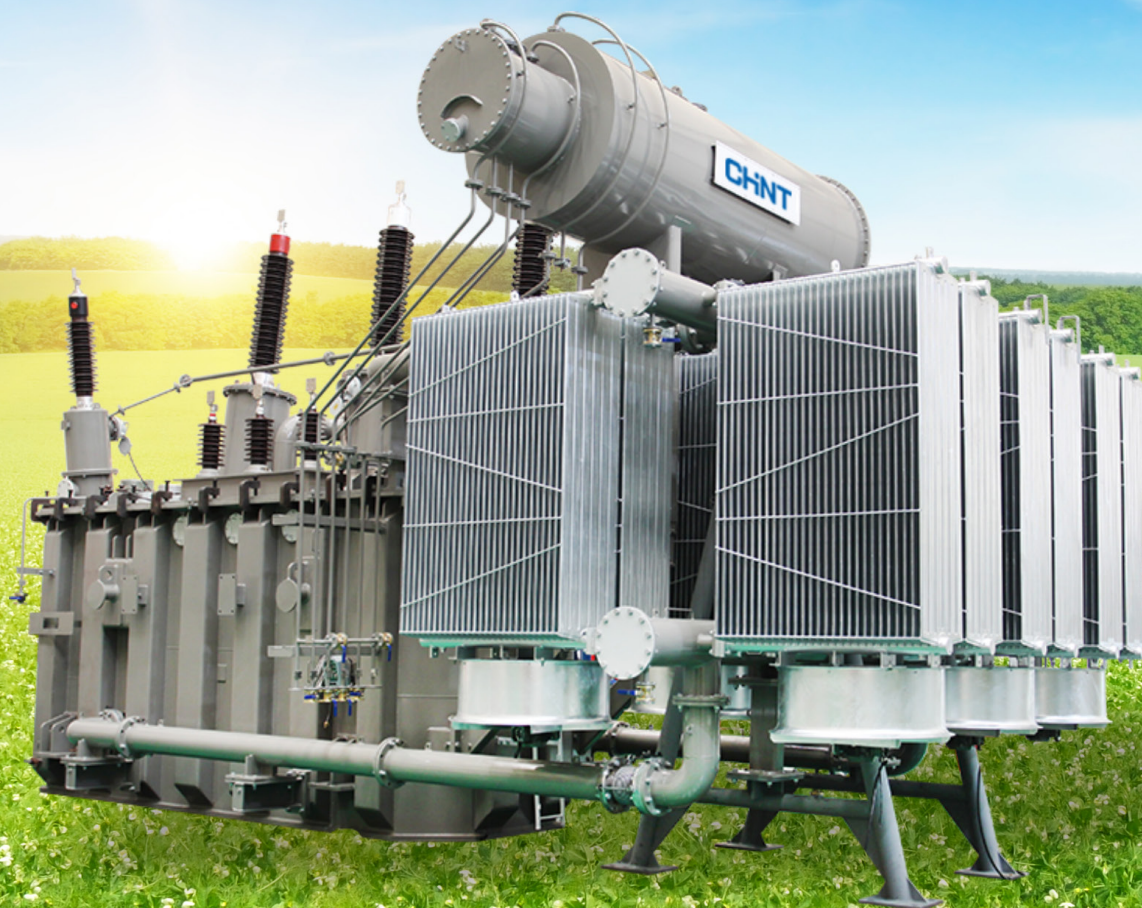
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2022.07

# CHNT

Empower the World



## Transformer Immersed in Natural Ester Insulating Oil

Power T&D Solution Provider With EPC Service



# ABOUT CHINT



## CHINT A leading global provider of smart energy solutions

CHINT was established 38 years ago in 1984 and built from the capital of approximately 8,000 US dollars. With our rapid development these years, CHINT has become the world's leading intelligent energy solutions provider for the whole industrial chain with the most complete product ranges. In 2021, our annual sales revenue exceeded 16.1 billion dollars and total assets of more than 16.2 billion.

Over two decades of global expansion, our business network covers more than 140 countries and regions worldwide in business industries of low-voltage electric, power transmission and distribution, smart technology, energy instruments and meters, green energy, solar and more. CHINT has more than 40,000 employees worldwide, creating more than 200,000 jobs in the industrial chains.

As the market localization progresses steadily, CHINT Global further establishes its supply chain through business integration and industrial upgrade. Optimizing the service system and project financing, providing innovatively integrated technical services for the global energy market, and a flexible working business model, energy, intelligent manufacturing and digital technology, CHINT has adopted "One Cloud & Two Nets" as the business strategy, takes "CHINT Cloud" as the carrier of intelligent technology and data application, and takes the lead in building the energy Internet of things (EIoT) and industrial Internet of things platforms (IIoT).

Focusing on the energy system of supply, storage, transmission, distribution and consumption, CHINT has core businesses of clean energy, energy distribution, big data and energy value-added services. Furthermore, CHINT's pillar businesses include photovoltaic equipment, energy storage, power transmission & distribution, low-voltage apparatuses, intelligent terminals, software development and control automation. By developing into a platform-based enterprise, CHINT provides a package of energy solutions for public institutions, industrial & commercial users and end-users, by building a regional smart energy operation ecosphere.

## Main Businesses



Clean Energy



Low-voltage  
Apparatus



Power Transmission and  
Distribution



Instrumentation  
and Apparatus



Smart Home



Intelligent  
Building



Intelligent  
Manufacturing



Industry  
Automation



Smart Heating



Smart Water



Home Electrical  
Apparatus



Energy Efficiency  
Management

# ABOUT CHINT ELECTRIC

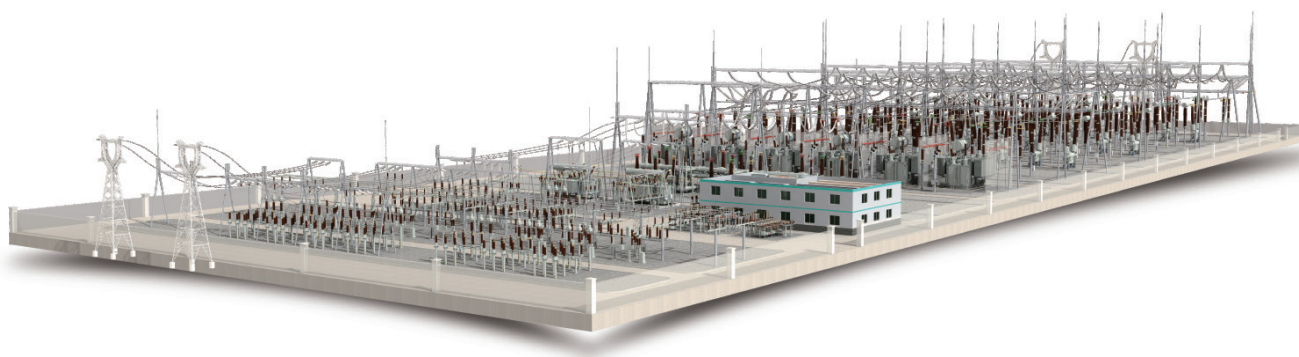
CHINT Electric Co., Ltd is a subsidiary of CHINT Group Corporation. With the wide range of transmission and distribution products, as well as the systematic and professional solution, CHINT Electric has supplied products and EPC services to customers over 140 countries across different industrial sectors, including power utility, renewable energy, oil and gas, metallurgy, railway and so on. Now CHINT Electric Co., Ltd has become one of the main players for Power T&D equipment and EPC services in the world.

## Product Line

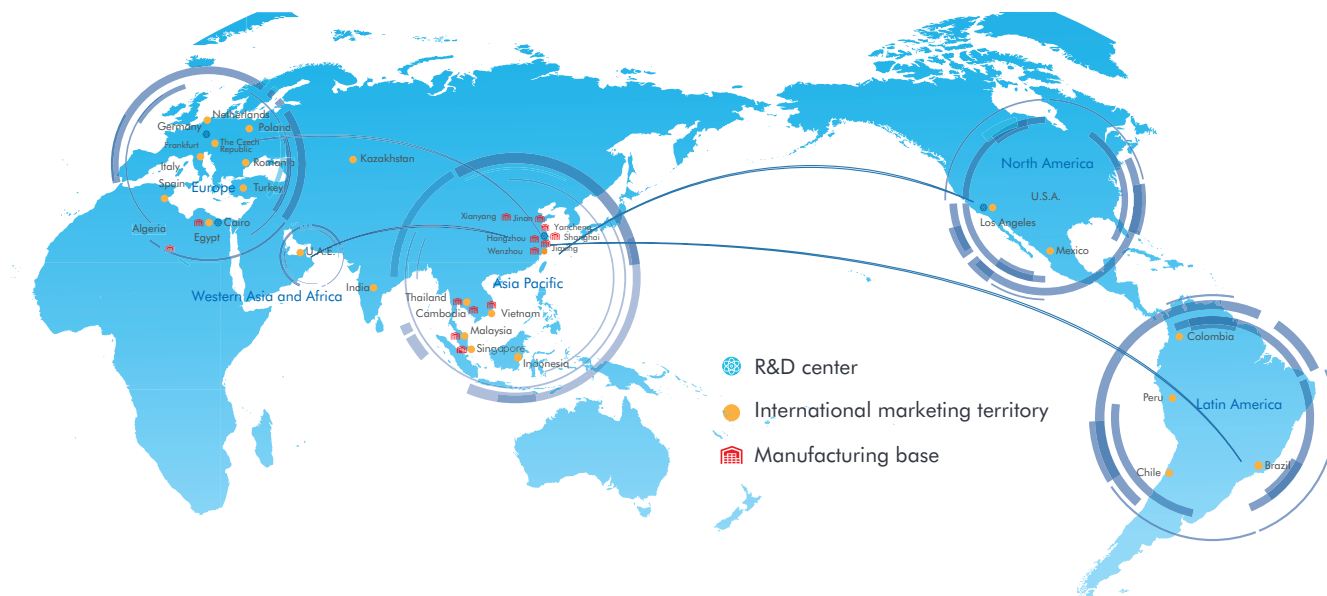
The product series is designed solely for the electrical systems with maximum voltage 750kV, covering around 2000 kinds of products within 150 series.

## Product Range

- Power Transformer (Up to 750kV)
- SVG Transformer (Up to 35kV)
- Dry-type Transformer (Up to 35kV)
- Reactor (Up to 252kV)
- GIS (Up to 252kV)
- Circuit Breaker and Disconnecter (Up to 252kV)
- MV & LV Switchgear Panels
- Surge Arrester and Insulator (Up to 1000kV)
- Current Transformer and Potential Transformer (Up to 500kV)
- Vacuum Circuit Breaker (Up to 12-40.5kV)
- Distribution Automation System
- Cable (Up to 36kV)
- Capacitor (Up to 110kV)



# GLOBAL FOOTPRINT



**4** National R&D Centers: North America, Europe, Asia Pacific, North Africa

**6** International Marketing Territories: Asia Pacific, Western Asia and Africa, Europe, Latin America, North America, China

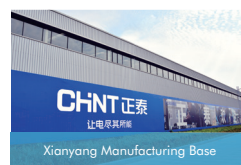
**14** Manufacturing Bases: China (Wenzhou, Hangzhou, Shanghai, Jiaxing, Xianyang, Jinan, Yancheng), Thailand, Singapore, Vietnam, Malaysia, Egypt, Algeria and Cambodia

**20+** International Logistics Centers

**2300+** Sales Companies

## GLOBAL CAPACITY LAYOUT

The industrial manufacturing bases are mainly located in Wenzhou, Hangzhou, Shanghai, Jiaxing, Xianyang and Yancheng. Additionally, CHINT has set up factories in Thailand, Singapore, Vietnam, Malaysia, Egypt, Cambodia etc.





# R&D, QUALITY, SALES, LOGISTICS

## Main Advantages

### Global R&D System

CHINT has established national R&D centers in North America, Europe, Asia Pacific, North Africa and other areas. We have explored the mode of Industry-University Research Institute Collaboration and Integration together with the universities and research institutions worldwide so as to integrate the global innovation resources and promote corporate R&D innovation and talent cultivation.



24 research institutes



The average annual R&D investment accounts for 4-12% of the revenue



Over 6000 patents in total

## Global Certification

The products have passed the standards and specifications in various regions around the world and obtained numerous international certifications



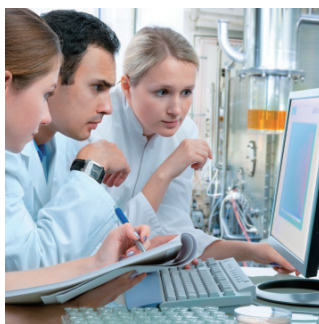
## Honors

- No. 1 in China's Top 100 Private Enterprises with Social Responsibility in 2021
- No. 92 in 2021 China's Top 500 Private Enterprises
- No. 244 in 2021 Top 500 Chinese Enterprises
- The intelligent manufacturing factory of low-voltage electrical appliances was selected as the national 2021 Intelligent Manufacturing Demonstration Factory



### Integrated Vertical R&D

By gathering the global industry elites to Provide safe and stable energy-saving green and advanced electric products.



### Great Quality System

Ensuring flaw-free and trouble-free products, the multi-dimensional and multilevel control is conducted through procurement, inspection, quality control and certification.



### One-stop Services

CHINT's concept is that it is not difficult to fulfill a high-quality logistics distribution at one time, while it is difficult to stay as accurate and prompt as the first-time. High-efficiency and high-precision accuracy are our requirement.



### 48-Hour Response

Providing end-to-end one-stop services for customers with complains, business consulting and technical support by solving problems immediately and including any possible problems in advance.

5%

At least 5% of revenue is invested in research and development





## Advantage of Natural Ester Insulating Oil Transformer

- High security and strong fire resistance. Natural ester insulating oil is a kind of level K high ignition point oil, it can be also called less-flammable oil, its ignition point is higher than 350°C, and much higher than mineral insulating oil (lower than 160 °C). Compared to mineral insulating oil, natural ester insulating oil is more difficult to be ignited, besides, one of its character is self-extinguishing after being ignited in some way, and this character can effectively help to prevent the transformer from fire accident caused by over-loading, short circuit, etc.
- Environmentally friendly and low carbon emissions. Among all insulating oil products, natural ester insulating oils have the best environmental properties. Its environmental characteristics can be divided into three aspects.
  - a) High biodegradation degree and no harmful residue in nature. Natural ester insulating oils have a biodegradability of more than 97% in 28 days, while biodegradability of mineral insulating oil is generally less than 30%.
  - b) Harmless to organisms, no acute oral toxicity, no harm to aquatic animals.
  - c) Recyclable, independent of fossil raw materials, low carbon emissions. The raw material of natural ester insulating oil is derived from natural plants which can be repeatable planted, and its production does not depend on fossil resources. It is currently the only recyclable insulating oil.
- Extend the lifetime of insulating paper. The natural ester insulating oil has higher molecular polarity than mineral oil and is more hydrophilic than mineral insulating oil, so it can absorb more moisture contained in the insulating paper and reduce the water content in the insulating paper. Besides, the natural ester can induce a transesterification reaction occurred on the surface of the insulating paper to form a protective film, which protects the insulating paper from moisture and prolongs the lifetime of the insulating paper.
- High level of heat resistance. Natural ester insulating oil is a kind of level B heat resistance insulating medium, it can operating continuously under the circumstance of 130°C for a long time, much high than mineral insulating oil, which is a level A heating resistance material.
- Excellent water resistance. Compared to mineral insulating oil, natural ester insulating oil has higher saturated water content, under the circumstances of same absolute water content between natural ester oil and mineral oil, natural ester insulating oil has a lower relative water content. This character indicates that it is difficult to form free water in the insulating oil, and it is difficult to form a small bridge effect of breakdown. The breakdown voltage is higher than mineral insulating oil.
- Reasonable electric field distribution. Due to its large molecular polarity, natural ester insulating oil has a high dielectric constant of 3.1 to 3.2, which is close to insulating paper (3.9 to 4.6) and higher than mineral insulating oil (2.2). Since the multilayer dielectric is subjected to the power frequency electric field, its field strength distribution is inversely proportional to its dielectric constant. The dielectric constant of the natural ester is very close to the value of insulating paper. It has a more uniform the electric field distribution.





### CHINT Electric Partial Natural Ester Oil-immersed transformers Reference

Customer Name	Product Type	Amount	Test Time	Notes
Democratic Republic of the Congo	10MVA/110kV	1	2017-10	Prototype
Australia MSP lithium mine, stage one	40MVA/132kV	1	2018-01	KEMA Run for more than three year
The Republic of Ecuador	8.5MVA/13.8kV	2	2019-04	
Australia Power Grid Corporation	12MVA/33kV	1	2019-05	
Afghanistan Project	16MVA/220kV	1	2019-08	KEMA Pass KEMA type test certification
Australia TAILISON	60MVA/132kV	2	2019-09	
Australia MSP lithium mine, stage two	40MVA/132kV	1	2019-05	
Shanghai Qidi Zhidian Gang, China	12.5MVA/35kV	1	2019-09	
CHINT Prototype	40MVA/35kV	1	2019-12	Certified by Wuhan High Voltage Electrical Research Institute
Guiyang Power Supply Bureau Project of China Southern Power Grid	40MVA/110kV	1	2022-05	Through the appraisal to reach the international advanced level
Slovenia, Europe	6MVA/33kV	1	On-going	
Colombia Project	6MVA/34.5kV	1	2019-11	
G2 120MVA/132kV Substation , UK	5MVA/33kV	20	2020-05	
Southern Power Grid of China	0.5MVA/10kV	1	2022-01	

### Parameters of typical products

#### 12MVA, 33kV Transformer Immersed in Natural Ester Insulating Oil

Type	SWZ-12000/33		
Capacity	12MVA	Standard	AS/IEC
Voltage ratio	33/11kV	Connection	Dyn11
Cooling Method	KNAN	Oil Type	MIDEL En1204
No-load Loss	9.87kW	On-load Loss	65.85kW
Temperature Raising of Top Oil	49.5K	Temperature Raising of Winding	56.8/58.3K

#### 40MVA, 132kV Transformer Immersed in Natural Ester Insulating Oil

Type	SWFZ-40000/132		
Certification	KEMA	Test Report No.	3016-18
Capacity	40MVA	Standard	AS/IEC
Voltage ratio	132/23.33kV	Connection	YNd11
Cooling Method	KNAN/KNAF	Oil Type	Cargill FR3
No-load Loss	25.13 kW	On-load Loss	146.7 kW
Temperature Raising of Top Oil under KNAN	34K	Temperature Raising of Winding under KNAN	37.2/39.2K
Temperature Raising of Top Oil under KNAF	32.4K	Temperature Raising of Winding under KNAF	37.4/41.2K

#### 16MVA, 220kV Transformer Immersed in Natural Ester Insulating Oil

Type	SWZ-12000/33		
Certification	KEMA	Test Report No.	Passed
Capacity	16MVA	Standard	IEC
Voltage ratio	220/20/10kV	Connection	YNyn0+d11
Cooling Method	KNAN/KNAF	Oil Type	Cargill FR3
No-load Loss	17.25 kW	On-load Loss	93.47 kW
Temperature Raising of Top Oil under KNAN	35.2K	Temperature Raising of Winding under KNAN	48.2/41.5K
Temperature Raising of Top Oil under KNAF	32.8K	Temperature Raising of Winding under KNAF	48.5/38.6K

#### 40MVA, 110kV Transformer Immersed in Natural Ester Insulation oil

Type	SWFZ20-40000/110-NX2		
Third party certification authority	National Transformer Quality Inspection and Testing	Report No.	CTQC/B-22.0167
Capacity	40MVA	Standard	IEC/GB
Voltage ratio	110/10.5kV	Connection Group	Ynd11
Cooling Method	KNAN/KNAF	Transformer Oil	Ds3
No-load Loss	20.52kW	Load Loss	136.87kW
Temperature Rise of Top Oil Under KNAN	34.5 K	Temperature Rise of Winding Under KNAN	41.9 K





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