

# kVA PROCESS<sup>®</sup>

## TRANSFORMERS PVT. LTD.

[www.kvatransformer.com](http://www.kvatransformer.com)



**POWER TO  
EMPOWER**

# About Us



kVA Process Transformers Pvt. Ltd. started manufacturing of transformers in the year 1999 and in a short span of time it has installed over 6500 transformers for various applications, viz. transformers for induction furnace, electric arc furnace, ladle refining furnace, rolling mill, power and distribution, Dry type, reactor, and special purpose, etc. The transformers are manufactured using optimum grade components and advanced techniques under the supervision of deft professionals.

These transformers are available in numerous technical specifications in order to meet the several needs of our precious patrons. Our offered transformers are highly acclaimed for their excellent functionality and long service life in the market. Having a deep understanding of furnace characteristics and steel plant operations, we are committed to making equipment that meets the special needs of the industry.

**kVA PROCESS** transformers are designed and tested as per National and International Standards, i.e. IS: 2026, IS: 1180, IEC 171, ASA C57 and other relevant IS and IEC rules.

Different types of transformers manufactured by us are:

- ✓ Arc / Sub Merged Arc / Refining Furnace Transformer
- ✓ Power Transformer
- ✓ Auxiliary / Distribution Transformer
- ✓ Induction furnace Transformer
- ✓ Automatic Step Voltage Transformer
- ✓ Dry Type Transformer
- ✓ Earthing / Neutral Grounding Transformer
- ✓ Solar Transformer
- ✓ APFC / Distribution LT Panel board

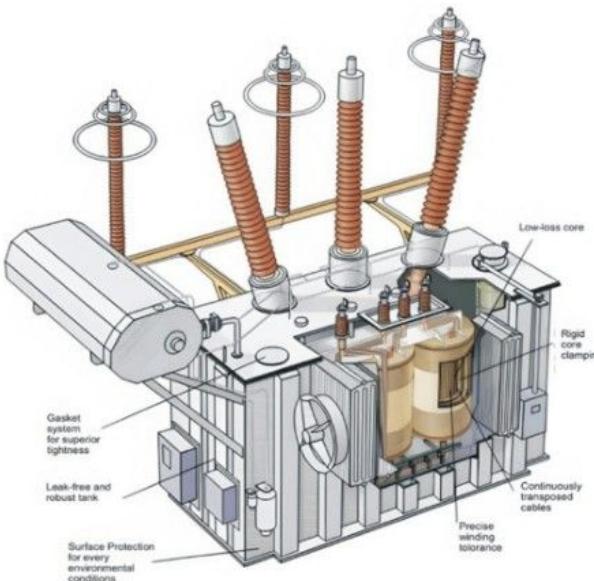
IS: 1180



**WE BELIEVE IN  
SAVING ENERGY**



# Manufacturing Process



## TRANSFORMER TECHNOLOGY AND DESIGN:

Our experience of transformer designing spanning more than a decade is our strength to satisfy customer requirement. Our team of well qualified expert engineers & technocrats has developed optimized designs, which are most reliable and affordable for recent market scenario. Our design activity confirms to the various standard like IS/IEC/BS/ANSI, NEMA. All the drawings are CAD for quick review while getting approval and thereafter, the final drawings can be submitted on a CD along with a print copy as required. All aspects of transformer design (Electrical & Mechanical) comprising Losses, % Impedance, Guaranteed Temperature Rise, Pressure & Vacuum withstand capability etc. are taken care of our design development. Further our fault detection, Analysis and their solutions are gracefully welcomed by many reputed customers with their entire satisfaction.

## 1. WINDINGS:

Transformer windings are designed to meet three fundamental requirements, viz. mechanical, thermal and electrical. They are cylindrical in shape and are assembled concentrically. Paper insulated conductors of high conductivity and soft drawn Electrolytic grade copper is used which comply with the latest Indian as well as international standards.

Windings are made with great care by well experienced skilled workers in dust free & temperature controlled environment.

Insulation between layers and turns is based upon the electrical and mechanical strength level, Interlayer cooling ducts (Axial & Radial) are provided to minimize the temperature gradient between windings and oil, and hence the hot spot temperature is kept to a minimum. This also ensures that the rate of insulation deterioration is minimized and high life expectancy is achieved.

Transpositions are made in multiple conductor windings, to ensure uniform current distributions, minimize circulating currents, decrease eddy current loss and improve the lamination factor.

Multiple conductor layer wound coils are most suitable for low voltage windings of large power transformers to mitigate high current designs requirement. For High voltage windings the disc coils with excellent mechanical strength are used to take the stresses due to voltage level. Special interleaved or shielded construction offers most uniform voltage distribution despite system transient. Specialized disc winding and inter-leaved disc windings are used having very high series capacitance giving a very good impulse voltage performance.



For better short circuit withstand ability under fault conditions, wound coils are pressed, clamped and dried in oven prior to impregnation in oil. Cooling ducts formed with rigid, high density spacers and horizontal and vertical ducts are provided to save hot spots.



## 2. CORE

The most significant material in a transformer is the core. KVA PROCESS uses high quality Cold Rolled Grain Oriented Magnetic Silicon Steel to ensure optimum losses and most efficient working of the Transformer. The type of magnetic steel is chosen according to the desired loss level. The laminations are cut geometrically to ensure optimum flow of magnetic flux and minimum air gap between the joint of two consecutive sheets. The supporting structures and clamping devices of the core contribute to the compactness of the design and also ensure low sound levels.

The core is designed with safe flux density to minimize core loss and magnetizing current. Butt-lap, miter or step-lap-miter construction is chosen based on the application and core-loss requirements.

Laminations are AISI grade H0, M3, M4 or other high permeability steel is used. Laminations are burr free fully annealed with Low Loss and very thin between 0.23 mm and 0.27 mm, varying no more than  $\pm 0.05$  mm in length for the lowest sound level and excitation currents. Each lamination is covered with a high-resistance, inorganic coating to reduce eddy currents.



Core Building in Process

Core is built with Cold Rolled Grain Oriental, low loss silicon steel lamination. Bonded core design/technique is used to eliminate hole punching and to minimize fixed losses and Magnetizing Current. Use of Hib grade & Laser scribed Laminations and Rigid clamps significantly reduce vibrations and noise level. Cooling ducts are provided in large transformers for efficient circulation of oil to keep temperature of core well within limit without affecting the flux distortion and also in the core suitable insulation paper are inserted between some laminations for the purpose of reducing eddy currents and also minimizing magnetic short circuit.



Core Assembly



Core Of Transformer

The laminations are handled with utmost care to preserve magnetic properties. The core is clamped in a rigid frame with uniform pressure to reduce mechanical effect on performance.

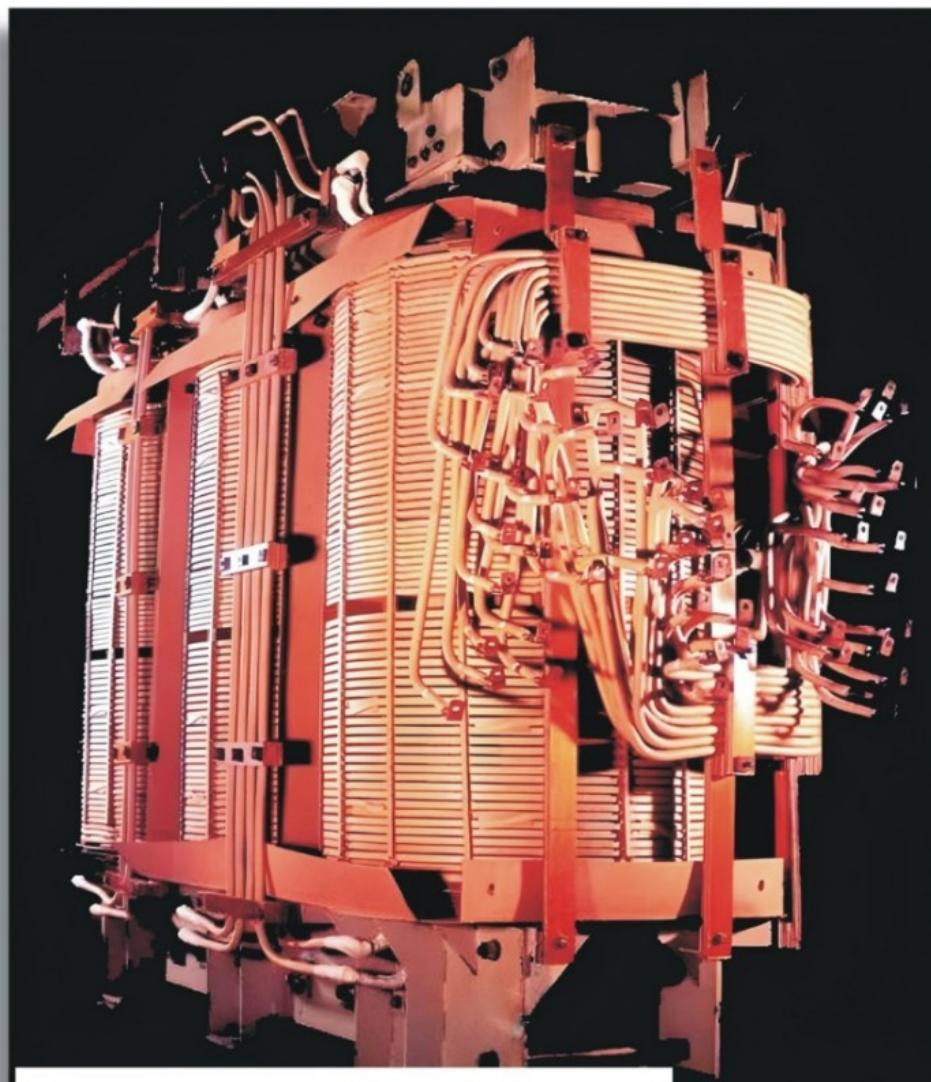
### 3. CORE & COIL ASSEMBLY:

kVA PROCESS uses high electrical grade Pre-compressed Pressboard & kraft paper, as per IS: 1576. The Insulating papers are routinely checked for high dielectric strength. Perma wood is also used in top and bottom for mechanical strength.

LV. Windings are normally placed near core over insulating cylinder and oil ducts. HV windings are assembled co-axially with respect to L.V. Spacers between coils are 'T' shaped for added firmness, Coils are assembled with best insulating materials and are adequately clamped. The winding is rigidly supported by a common spacer ring of densified wood at the top and bottom for precise alignment. Well profiled angled rings

are placed between LV & HV windings to reduce voltage stress level. The ends & tapping leads of all windings are connected by special extra flexible, insulated copper cables which are rigidly braced in position.

Coil design and quality are keys to transformer efficiency and longevity, kVA PROCESS design coils specifically for each application, We use thermally upgraded paper for longest insulation life.



Core Coil Assembly Ready For OVENING

#### 4. TANK CONSTRUCTION

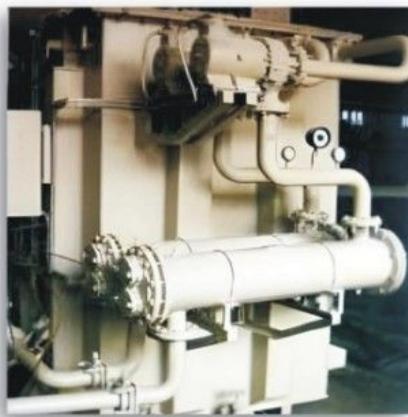
All our tanks are fabricated with high grade tested mild steel. The design of the tanks incorporated adequate wall and base thickness so as to withstand the pressure build up in the tank.

Protection of active part in transformer is very important. While achieving the optimized size of transformer to suit the site condition for installation. The main role of the tank is to protect the active part and tank is manufacture to have sufficient strengths to withstand internal & external faults that may occur during operation. Tanks are fabricated from low carbon M.S. Sheet of best quality proceeds by qualified welders. The tank is designed to withstand vacuum and pressure test as per Indian/International standards. A robust skid under base is provided, and guide bars are located inside the tank to securely fix the core and windings assembly in position, and to prevent any movement during transportation.

Each transformer tank is tested for leakage by filling them with oil and keeping them under pressure of 0.5kg/cm<sup>2</sup> or above for several hours. With this test even minute leaks are detected.



Tank Construction



Cooling System

#### 5. COOLING SYSTEM

The transformer while in service gets heated and Electrical Losses like Load Loss & No Load Loss which must be dissipated to avoid the exceeding the Temperature Rise limit specified by Customers. To achieve Temperature Rise well within limit, a suitable cooling method is adopted.

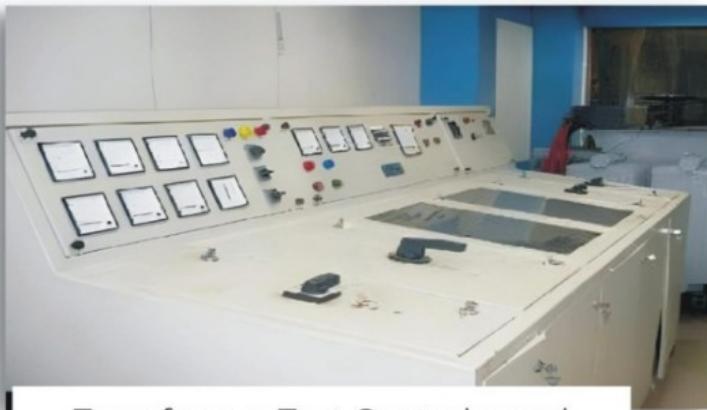
Generally, the cooling method suitable for the transformer is determined by the customer after due consideration of transformer capacity and the circumstances at the installation site. KVA PROCESS can design and manufacture transformer with various types of cooling systems according to the customer's requirement.

- |         |         |       |
|---------|---------|-------|
| 1. ONAN | 3. OFAF | 5. AN |
| 2. ONAF | 4. OFWF |       |

For ONAN Cooling, Pressed sheet steel radiators are used for cooling ensuring that greater surface area is available for high dissipation. The radiators are independently pressure tested and then mounted on the tank.

## 6. PAINTING

All fabricated steel tanks internally & externally cleared thoroughly of all scales and rust by sand blasting/shot blasting. A coat of Zinc chromate primer paint is immediately applied to all external surfaces. This anticorrosive paint has rust inhibitive properties and excellent chemical resistance. Two coats of glossy, oil and weather resisting, not fading paint of D.A. Grey, shade no. 635 of 15:5 are then applied.



Transformer Test Control panel

## 7. OIL

The insulating oil used is low viscosity with good resistance to oxidation and formation of sludge and acids. Moisture content, dielectric strength etc. is determined and certified by conduct relevant tested as per 15: 335/1993. Generally we use "TRANSOL brand, 'SAVITA' make EHV grade oil.

## 8. TESTING

Our testing lab is fully equipped with digital and computerised testing meters and accessories to conduct all routine tests as per ISS & IEC upto 25 MVA and upto 132 KV Voltage grade.

### THE LIST OF ROUTINE TESTS ARE AS FOLLOWS (THOUGH NOT LIMITED TO):

- a) Measurement of winding resistance.
- b) Measurement of voltage ratio and check of voltage vector relationship.
- c) Measurement of impedance voltage (principal tapping) and Load Loss.
- d) Measurement of No load loss and current.
- e) Measurement of insulation resistance.
- f) Dielectric Test and
- g) Test on On Load Tap Changers, where appropriate.

Exported to Ethiopia



Core & Coil Assembly of Submerged Arc Furnace Transformer

# Sub Merged Arc Furnace Transformer

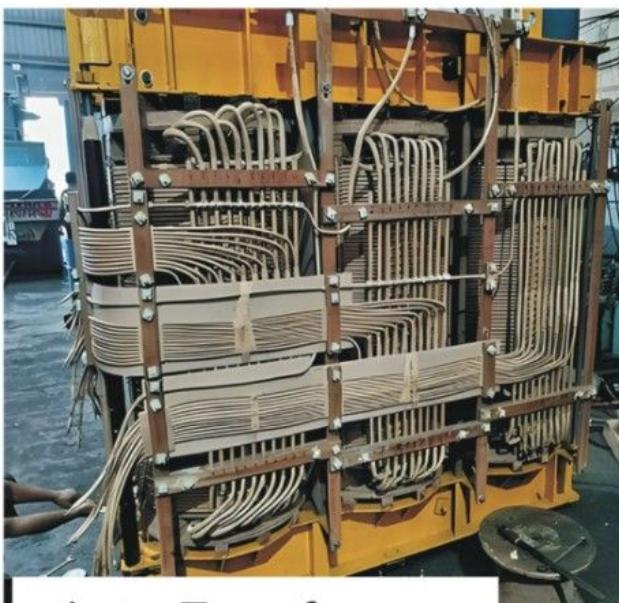
Sub Merged Arc melting furnace transformers are manufactured in 3 phase system upto 15 MVA and Bank of 3 nos, single phase, transformers for higher than 15 MVA transformers.

## A. THREE PHASE UNITS ARE AVAILABLE IN THREE WAYS:

- Tap windings are in series with main HT windings in one core frame and in one tank with OLTC.
- Tab windings are separated through auto transformer in addition to main transformer, but both the transformers are in one common tank.
- Tap windings are through an auto transformers in separate tank with OLTC and main transformer is in another tank.

## B. SINGLE PHASE UNITS ARE AVAILABLE IN THREE WAYS:

- Three single phase units having each unit, consisting of Tap windings in series with main HT windings in one core frame and in one tank with OLTC.
- Three single phase units having each unit consisting of separate Tap winding through Auto Transformer in addition to main transformer and in one tank with OLTC.Three single phase units having each unit consisting of only main transformer. The OLTC & three phase auto transformer shall be in separate tank.



Auto Transformer



Main Transformer

Exported to Bangladesh



16/18 MVA, POWER TRANSFORMER (ONAF Cooled)

# Power Transformer

A power transformer is a passive electromagnetic device that transfers energy from one circuit to another circuit by means of inductive coupling. Power transformers differ from other transformer types in that they are designed to comply with regulatory requirements for mains power interfacing, working at mains voltages and relatively high currents. The most important specification of a power transformer is its primary to secondary transformer galvanic isolation, which is usually specified in kV. This is a fundamental safety aspect in protecting humans from potentially lethal earth fault conditions.

A power transformer is used to essential equipment used to transmit energy in a specific component of the electrical or electronic circuit between the generator and the primary distribution circuits. Generally, power transformers are used in distribution networks in order to interface step down and step-up voltages.

At kVA Process Transformers, we explore an array of medium power (MV) transformers that offer high productivity and efficiency rates. At kVA Process Transformers, we understand the importance of power transformers across various power networks. Therefore, our competent panel of professionals ensures that our range of power transformers exceeds and moves beyond MV to offer a customized portfolio of fluid-filled and oil-immersed transformers. These transformers are specially designed for high-performance applications in different power distribution networks by using proven and dedicated designs for several transformer applications.



## PRODUCT DETAILS:

### Specifications:

- Capacity: Up to 50000 kVA
- No. of Phases: 03 phase
- Frequency: 50 Hz
- Voltage: 11 kv/ 22 kv/ 33 kv / 66 kv/ 132 kv
- Taps: On load / Off load as per customer requirement
- Insulations: Class A
- Vector group: As per customer requirements
- Connections: As per customer requirements
- Duty cycle: Continuous
- Winding: Copper
- Terminals: As per customer requirement



# Auxiliary / Distribution Transformer

kVA Process Transformers is a leading manufacturer of Auxiliary / Distribution Transformers of High Ratings from 3000KVA to 6000KVA using Special Technology i.e, CTC Conductors in LV Winding which stimulates robustness and avoids Hot-spot heating in the windings.

Using of such design concept is SPECIAL & practice of this guarantees long life span of the Transformer. It is costlier than traditional method but also now obsolete for us.

Having being engaged in manufacturing of Special / Furnace Transformers, our workmanship & design technology for these Transformers are more robust and sound than others.

kVA Process Transformers also manufactures Transformers custom built as per end customer's requirement. Transformers as designed as per special requirement of our customers.



## CAPACITY SPECIFICATIONS:

- ✓ Capacity: Upto 6000 kVA
- ✓ No of Phases: 3 Phase
- ✓ Frequency: 50 hz
- ✓ Voltage class: 3.3 kV, 6 kV, 11 kV, 22 kV, 33 kV and 66 kV
- ✓ Taps: ON LOAD / OFF LOAD (as per requirement)
- ✓ Insulation: Class A
- ✓ Vector group: as per customer requirement
- ✓ Connection: as per customer requirement
- ✓ Duty cycle: Continuous
- ✓ Winding: Copper/Aluminum (Alu. upto 300 kVA only)
- ✓ Terminal: as per customer requirement.

# Induction Furnace Transformer

Induction Furnace has a coil constructed from heavy copper tubing. It is designed and tuned to the inverter circuit which applies a medium frequency (generally 500 Hz or 1000 Hz) voltage to the Induction coil. The magnetic field produced by the induction coil induces eddy currents in the charge and heats it. Medium frequency is necessary to enhance the rate of heat generation.

The inverter circuit requires for its operation a D.C. Voltage which is obtained by converting available three-phase A.C. Voltage. Transformers which are used for transforming available three-phase A.C. voltage to the required voltage for the converter circuit of the Induction Furnace are referred to as Induction Furnace Transformers. Thus, they are essentially Rectifier/Converter Duty Transformers.

Depending on the rating of the rectifier transformers, the input voltage is derived from standard three-phase AC distribution voltages like 3.3 kV, 6.6 kV, 11 kV, 22 kV, 33 kV, 66 kV etc. These become the primary (or line side) voltage of the transformer. Secondary (or cell side) voltage can be between 400 to 1100V decided by the required D.C. output Voltage.



## PRODUCT DETAILS:

Induction Furnace Transformers are manufactured for four types of Pulse system:

- a) 6 Pulse b) 12 Pulse c) 18 Pulse d) 24 Pulse

The most important aspect of a furnace transformer is its ability to withstand frequent short circuit, which needs selection of proper conductor size, type of coils used and selection of current density of conductor and flux density of CRGO core for better Short Circuit Protection.

## OUR TRANSFORMERS ARE INSTALLED WITH FURNACES OF:

- Inductotherm
- Meghatherm
- Electrotherm
- Indotherm
- G.A. Danniallys

# Automatic Step Voltage Transformer

Automatic Step Voltage Transformer or On-load tap changer (OLTC) transformer, also known as On-circuit tap changer (OCTC) transformer, is a tap changer in applications where a supply interruption during a tap change is unacceptable, the transformer is often fitted with a more expensive and complex on load tap changing mechanism.

The present product range of kVA PROCESS includes ASVRs in 3.3 kV, 6 kV, 11 kV, 33 kV & 66 kV system. We also manufacturer tailor made equipment as per requirements of our customers.

## PRODUCT DETAILS:

OLTC Fitted Transformers are available in three types:

a) If the variation of input high voltage is within 15-20% of the rated voltage; the step-down transformer can be provided with ON LOAD TAP CHANGER (OLTC). The voltage sensing relay of the OLTC panel choose the suitable tap automatically resulting the regulated output voltage.

b) If the variation of input high voltage is more than 20% of the rated voltage, the OLTC is attached with a star connected high voltage auto transformer having suitable taps in addition of normal step-down transformer and placed in the same cabinet. The Voltage sensing relay of the OLTC panel chooses the suitable tap automatically and regulated HT voltage (+/-%) from the auto transformer is fed to the step-down transformer.



c) If normal step-down transformer had already been installed or if the capacity of the step-down transformer is very high (more than 2 MVA); the regulator is made in separate cabinet. This type of regulator consists of an auto transformer with OLTC. Regulated HT voltage from the regulator is fed to the step-down transformer.

This is the most modern design of high voltage regulator used to correct the variation in HV supply voltage. These are available in 4 voltage range i.e., 3.3 kV, 6 kV, 11 kV, 22 kV, 33 kV & 66 kV. This type of regulator corrects the supply voltage by means of ON LOAD TAP CHANGER SWITCH.

## RANGE:

The present product range of kVA PROCESS includes AVR in 3.3 kV, 6 kV, 11 kV, 22 kV, 33 kV & 66 kV. We also manufacturer tailor made equipments as per requirements of our customers.



# Dry Type Transformer

Dry Type Transformers are Vacuum impregnated type with class "B", "C" & "H" insulation having allowable temperature 140 to 180 degree Centigrade. The insulating materials used in Fiber Glass Cylinders and windings having NOMEKX insulation with 50:50 overlap. Nomex insulation is having high dielectric strength and is capable to withstand high temperature. The temperature withstanding capacity is generally made to comply with IEC 76/IS 2026/IS 11171.

## PRODUCT DETAILS:

### AVAILABLE IN THE FOLLOWING VERSIONS:

- Open execution type for installation in an existing panel or enclosure.
- Well ventilated enclosure with lip cut louvers and buffers for indoor installation.
- Non ventilated enclosure for outdoor installation.

### ADVANTAGES:

- Use of non-biodegradable materials makes these suitable for strict environmental conditions.
- No fire or explosion hazards because of use of non-flammable materials and absence of any liquid insulation.
- Non-requirement of oil sump makes these ideally suitable for installation near load centre thus reducing cabling costs and improving voltage regulation.

### ZERO MAINTENANCE

- Drastically reduced maintenance and clear looks due to the absence of any insulating liquid.
- A life cycle analysis would reveal the cost-effectiveness of Dry Type Transformers in long run though it requires a Higher initial cost.
- Easy handling and access to active parts for inspection.



### SUITABLE FOR INSTALLATIONS IN:

- Underground gassy mines.
- Petrochemical refineries.
- Multi-storied buildings.
- Business Blocks & supermarkets.
- Congested Metropolitan urban areas.
- Underground Railways/Metro Railway.



### RANGES

Present product range includes Transformers up to 3000 kVA, 3.3 kV, 6 kV, 11 kV & 33 kV class.



# Earthing / Neutral Grounding Transformers

When a transformer is used for the purpose of providing a neutral point for grounding purpose in a system where the neutral point of a three phase system are not available or where the transformers or generators are delta connected, that type of transformer is called Earthing or neutral grounding transformer.



The earthing transformer creates a neutral point for a network. ZN connection is usually applied. Z connection provides linear and specified zero sequence impedance. YN+d can also be applied.

## RANGE:

Voltage level: up to 33 kV



The Earthing or neutral grounding transformer may be two winding with a zig-zag connected primary and a star connected secondary or a single winding three phase auto-transformer with windings interconnected star or zig-zag. Earthing transformer is a three limbed core type transformer having two equally balanced windings on each core. One set of windings is connected in star to provide the neutral point. The other ends of this set of windings are connected to the second set of windings.

Zig-Zag type earthing transformers are designed on the base of rated normal current flows when a solid single line to ground fault is applied at transformer terminals. It is common to select the current rating of the earthing transformer equal to the full load current rating of the largest generator or transformer unit. The KVA rating of a three phase earthing transformer is the product of normal line to neutral voltage (KV) and the neutral current in amperes that the transformer is designed to carry under fault conditions for a specified time. The two most common time intervals specified for the duration of the earth fault current are 30 and 60 seconds. Unless the system conditions or protective system applied warrant it is quite adequate to specify the rating for 30 seconds only.

A grounding transformer or earthing transformer is a type of auxiliary transformer used in three-phase electric power systems to provide a ground path to either an ungrounded wye or a delta-connected system. Grounding transformers are part of an earthing system of the network.

A zigzag transformer is a special-purpose earthing transformer with a zigzag or "interconnected star" winding connection, such that each output is the vector sum of two phases offset by 120°.

# Solar Transformer



At kVA Process Transformers, we also specialize in manufacturing high-quality solar transformers that play a crucial role in solar power generation. Our solar transformers are designed to efficiently convert and distribute the electricity generated by solar panels.

## KEY FEATURES:

- Efficient Power Conversion: Our solar transformers are optimized for maximum power conversion, ensuring minimal energy losses during the transmission process.
- Enhanced Durability: We use high-grade materials and advanced manufacturing techniques to ensure that our solar transformers can withstand the demanding conditions of solar power installations.
- Customized Solutions: We offer customized solar transformers tailored to meet the specific requirements of your solar power projects, including voltage ratings, capacity, and other technical specifications.
- Compliance with Standards: Our solar transformers are designed and tested to meet international standards, ensuring safety and reliability in solar power applications.
- Reliable Performance: Our transformers undergo rigorous testing to ensure reliable and consistent performance, enabling smooth and efficient solar power generation.



# APFC / Distribution LT Panel

LT Panel Board is an electrical distribution board that receives power from generator or transformer and distributes the same to various electronic devices and distribution boards. Backed by a team of experts we are presenting our valuable clients a comprehensive range of LT Panels. Our product range is treasured for their high performance, low maintenance, reliable performance, easy to install and safety features.

kVA PROCESS brand, panels are fabricated from best quality 2 mm thick CRCA Sheet steel and are free standing, dust & vermin proof, fully compartmentalized, single, or double front, suitable for 3 phase, 415 Volts, TPN, 50 Hz, AC supply system. The protection class of the panel shall be IP:52.

Electrolytic grade, high conductivity Copper Busbar having current density of 1.6 Amp/sq.mm are Electrolytic E91E grade Aluminium Busbars having current density of 1.0 amp/sq.mm are used in our panels. The Busbars shall be properly covered with Heat shrinkable PVC sleeves and duly colour coded. Necessary FRP supports are also given for Robust construction & to withstand short circuit conditions.

All the doors, cut-outs for cable entry plates etc. shall have best quality synthetic rubber gaskets without any discontinuity to make the panel completely dust, damp & vermin proof. Necessary pre-treatment on the surface of the panel board is carried out prior to powder coating i.e., Degreasing, Derusting, Phosphating and passivation to have a count of 8-10 micron phosphate coat. This is a nine-tank hot phosphating process. The panel shall be finished with oven-baked Powder coating to shade no. RAL7032.

## PRODUCT RANGE:

- Power Control Centre
- Motor Control Centre
- Power Distribution Boards
- Automatic Power Factor Controller
- 33 kV Relay Control Panel
- Automatic Change Over Panels
- Auto-mains failure Panels
- Furnace Control Desks
- Distribution Boards
- Control Boards
- Synchronizing Control Panel
- D.G. Set Main Control Panel
- L.T. Bus Duct System



# Our Clients





ISO 9001:2015 Co.

Quality, Made in India Transformers

# kVA PROCESS TRANSFORMERS PVT. LTD.



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