

**MAKPOWER**  
**TRANS-SYSTEMS PVT. LTD.**

**TRANSFORMERS**  
**BEST ASSISTING MELTING**



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



# ABOUT COMPANY

Makpower Trans-Systems Private Limited is an ISO Certified, leading manufacturer of Sub Merged Arc Melting Duty Transformers, Electric Arc Furnace Transformers with/without Series Reactors, Ladle Refining Furnace Duty Transformers, Induction Furnace Duty Transformers, Converter & Rectifier Duty Transformers, Power & Auxiliary Transformers & Special Duty Transformers, MCCPCC-PDB, VFD & various LT Control Panels and accessories.

Presently, we are manufacturing all types of Transformers for Voltage Class upto 66KV & power Rating upto 60MVA. We believe in continuous development of our Infrastructure, we will commence manufacturing of Transformers in 132KV Class. We are registered with Bureau of Indian Standards and have been granted BIS Certification on our Manufactured Transformers covering the entire Ratings i.e, upto 2500KVA 33KV Class Energy Efficiency Level- III, built in accordance with IS/1180 (Part-1) with latest Amendment No. IV and our CM/L No. is 5100135171

IS: 1180



(PART-1)  
CM/L No. 5100135171  
MFR. OF TRANSFORMER



**WE BELIVE IN  
SAVING ENERGY**







# SINGUR TRANSFORMER MANUFACTURING PLANT

Makpower Trans-Systems Private Limited's is having best in class infrastructure & manufacturing facilities (25000 Sq. Ft.) with 60MT (30x2) EOT Crane Facility, 5MT separate EOT Crane Bay, Dust Free Winding Shop, Vacuum Drying Plant, Oil Storage Tanks, Transformer Testing Area with Air Conditioned Testing Room, Complete Testing Facility to test Transformers upto 60MVA Capacity etc. including all Updated Machineries.

## INFRASTRUCTURE



60MT (30MTX2) EOT CRANE BAY'S



SEPARATE DUST FREE WINDING SHOP



COMPLETE TRANSFORMER TESTING FACILITY



60 MT MOTORISED TROLLEY BETWEEN  
MANUFACTURING BAY'S



# MANUFACTURING PROCESS

A Transformer is a static piece of apparatus used for transferring power from one circuit to another without change in frequency. It can raise or lower the voltage with a corresponding decrease or increase in current.

The basic principle of a transformer is Faraday's Law of Electromagnetic induction, which states that whenever the flux linked with a coil changes an e.m.f is induced, the

transformer consists of a laminated iron core (Cold Rolled Grain Oriented Core Lamination) about which are wound two or more sets of windings, voltage is applied to one set of windings, called the primary, which builds up a magnetic flux through the iron. This flux generates a counter e.m.f. in the secondary which limits the current down from the supply. Makpower transformers are designed and tested as per national & international standards i.e. IS : 2026, IS : 1180, IEC 76, BSI 171, ASA C57 and other relevant IS & IE rules.



## 1. WINDING

Electrolytic grade high conductivity Copper / Aluminium duly insulated with paper / nomex/ glass is used accordingly to application & technical specification of Transformers. For better Short Circuit ability under fault conditions, wound coils are passes, 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. Arc Furnace Transformers are wound over fiberglass cylinders for better mechanical and insulation strength of windings.







## 2. CORE CONSTRUCTION

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

Laminations are burr free and very thin between 0.23mm and 0.30mm, varying no more than +0.05mm in length for the lowest sound level and excitation currents. Each

lamination is covered with a high-resistance, inorganic coating to reduce eddy currents. The laminations are handled with minimum bending to preserve the low loss properties. The core is clamped in a rigid frame with uniform pressure to reduce mechanical effect on performance.



## 3. CORE & COIL ASSEMBLY

Makpower uses high electrical grade Kraft Paper & Press Board, as per IS: 1576. The Insulating papers are checked for high dielectric strength, good ageing properties and moisture retardation. Permali wood is also used in top and bottom for mechanical strength. We use off circuit tap switches for general Transformers, externally operated ON LOAD TAP CHANGER of CTR/OLG make for special transformers and furnace applications, whereas EASUN-MR make, INTANK type OLTC are used in Sub Merged Arc Melting Furnace Transformers, as per customer's technical specification.



## 4. TANK

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

Welding is carried out in accordance with strict standards using jigs and fixtures to ensure dimension accuracy. Double weld are provided where oil tightness is required. All oil tight weld are tested to ensure no leakages occurs. Flat

gasket of neoprene bonded cork sheets are used for joints and auxiliary fitments. 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. For ONAF Cooling, Fans are mounted vertically near the radiators for their optimum use. For OFWF Cooling, Heat Exchangers, oil pumps, oil flow meter, pressure meters, differential pressure gauge is used to suit the losses of transformers at 150% loading condition. Each transformers tank is tested for leakage by filling them with oil and keeping them under pressure of 0.5 KG/Cm<sup>2</sup> or above for several hours. With this test even minute leaks are detected.



## 5. PAINTING/FINISHING

All fabricated steel tanks internally & externally cleaned thoroughly of all scales & 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 & weather resisting, not fading paint of dark grey, Shade RAL 7032(pebble grey) of ISS are then applied.





## 6. OIL

The insulating oil used is of 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 testes as per IS-335/ 1993. Generally we use 'transOL' make EHV grade Oil.

## 7. TESTING

Our testing Lab is fully equipped with 300KV High Voltage Test Set, Double Frequency Test Set (Upto 60 MVA, 66 KV), CT's & PT's to check Losses & Impedence, 3 phase Variac for Power supply, 3 phase Resistance meter, 3 phase Ratio meter in addition to other normal testing instruments. The list of routine test as per Clause No. 16.1.2 (Part I) of IS : 2026 of 1977 is as follows:



- a) Measurement of winding resistance
- b) Measurement of voltage ratio and check of voltage vector relationship.
- c) Measurement of impedance voltage (principle tapings) 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.

Impulse Test has been conducted on few of our transformers successfully from Central Power Research Institute, Bangalore. Short Circuit test has also been conducted on few transformers at CPRI Bangalore.



**7.5MVA 33KV SAF DUTY TRANSFORMER WITH EMR OLTC  
OF VIRAJ PROFILES PVT. LTD., MAHARASHTRA**



# SUB-MERGED ARC MELTING FURNACE DUTY TRANSFORMERS

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.
- Tap 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.





**3MVA 33KV EAF DUTY TRANSFORMER WITH OLTC  
OF ROMCO ALUMINATES PVT.LTD., ROURKELA**



# ELECTRIC ARC FURNACE TRANSFORMERS

**MAKPOWER** manufactures transformers for all furnace applications. A robust design guarantees mechanical & electrical strength for steel furnace operation and temperature control for continuous high loads in ferro-alloy operation. Arc furnaces are used in steel industry for smelting scrap iron and for refining steel.



## Other application areas are:

- Smelting glass and ceramics
- Manufacturing or refining many other materials, eg, ferrochromium, ferromanganese, different abrasive materials (oxides and nitrides), semiconducting base materials, nanopowders etc. Electric Arc Furnaces (EAF) can be either of AC or DC arc furnaces. The power ratings of these transformers are 500KVA to 22MVA.

Makpower Arc Furnace Transformers can be with On Load Tap Changer (In-tank or external) type or Motorised Off Circuit Tap Changer. Secondary side Open Delta is there & Primary can be in both Configuration i.e, Y/D (Star/Delta) as per voltage suitability.





**2.5MVA 33KV EAF TRANSFORMER WITH INBUILT SERIES REACTOR  
OF N F FORGINGS PRIVATE LIMITED, WEST BENGAL**





# ELECTRIC ARC FURNACE TRANSFORMER WITH SERIES REACTOR (INBUILT/EXTERNAL)

Makpower has the in-house knowledge and technical know how to develop & manufacture Series Reactors for Arc Furnace Duty. Series Reactors can be of 2 types i.e, Inbuilt (In same Tank) or External (separate unit). It is connected in parallel & used for reactance tapping. We have successfully manufactured, delivered & commissioned both the types (Inbuilt & external).

For efficient working of arc furnace, the electrode current should be low and the arc should be longer. To stabilize the arc, the series reactor is installed on primary side of the arc furnace transformer. These are normally in iron cored construction with both cooling options, i.e, ONAN & OFWF depending upon the size and requirements.



**TRANSFORMER**



**EXTERNAL SERIES REACTOR**



**ACTIVE PART OF  
TRANSFORMER AND REACTOR**





**UPTO 24MVA  
33KV CLASS**

# LADLE REFINING FURNACE DUTY TRANSFORMERS

Ladle furnaces (LF) are AC furnaces. The application is less demanding for the transformer than smelting, because the arc is rather stable. The arcing occurs between the electrodes and the molten steel.

**MAKPOWER** Arc Furnace Transformers deliver very high currents over a wide range of voltages. EAF/LRF Transformers are designed to perform excellently under high thermal, mechanical and dielectric stress.

**MAKPOWER** EAF/LRF Transformers are meticulously designed to provide:

- Excellent strength to withstand frequent short circuits on the secondary side.
- Robustness in the Design & workmanship.
- Protect the transformer from overheating due to high thermal stress through various cooling options to ensure long life.



**4MVA 33KV LRF TRANSFORMER  
OF DTPL, GUJARAT**





# POWER TRANSFORMERS WITH/WITHOUT OLTC

UPTO 60MVA  
66KV CLASS

**MAKPOWER** manufactures both on load & off circuit tap switch type power transformer. These Transformers are generally used in receiving substation for feeding residential, commercial & bulk consumers

If the secondary voltage of the Transformer is a high voltage, it is called as Power Transformer. Our Manufacturing Facilities and In-house testing setup along with our world class infrastructure, enables us to manufacture Transformers upto 60MVA 66KV Voltage Class. We manufacture Power Transformers with Low Energy Losses & designing along with construction is robust.



**WE ARE BUILDING & MANUFACTURING A 60MVA 33/11KV PTR  
FOR ONE OF WEST BENGAL'S BIGGEST STEEL PLANT LOCATED IN DURGAPUR**







**10MVA 11KV 24PULSE INDUCTION FURNACE DUTY  
TRANSFORMER OF REAL ISPAT, RAIPUR**



# INDUCTION MELTING FURNACE DUTY TRANSFORMER

UPTO 22MVA  
33KV CLASS

Induction Furnace has 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 required voltage for 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, input voltage is derived from standard three phase AC distribution voltages like 433 V, 3.3 kV, 6.6 kV, 11 kV, 22 kV, 33 kV etc. These become the primary (or line side) voltage of the transformer. Secondary (or cell side) voltage can be between 400 to 1250 V decided by the required D.C. output Voltage.

**MAKPOWER** manufacture these Transformers in four configurations, having different vector groups:

- 6 Pulse
- 12 Pulse
- 18 Pulse
- 24 Pulse



# RECTIFIER/CONVERTER DUTY TRANSFORMER

UPTO 22MVA  
33KV CLASS

**MAKPOWER** offers converter transformers. These are designed for one or more output windings connected to the rectifier loads. Drives duty or converter Transformer are multi pulse, multi winding rectifier Transformers for Motor Drives applications. The number of secondary winding feeds a power cell containing 3 phase bridge rectifier. These transformers are supplied to meet the requirement of LV and MV drives and specifically designed to mitigate the effects of harmonics generated by drives. These Transformers are used for Rolling Mill Duty purpose in Steel Plants.



**5.5MVA 33000/433-433V 12PULSE  
CONVERTER DUTY TRANSFORMER  
OF SHAKAMBHARI GROUP, W.B**



**ACTIVE PART OF 4.5MVA 33000/433V  
ROLLING MILL DUTY TRANSFORMER  
OF SIGMA GROUP, KANPUR, U.P**





**UPTO 3150KVA  
11KV CLASS**

# DRY TYPE TRANSFORMER

**MAKPOWER** manufactures Dry Type Transformers ranging from 25 kVA to 3150 kVA of voltage class up to 11 kV. These transformers are fitted in enclosures suitable for indoor installation (IP21, 23) as well as for outdoor installation (IP 45).

**MAKPOWER** in association with EI Dupont USA manufactures Dry Type Transformers with certified insulation materials & system meeting the international standards for quality of design, manufacturing and performance as per IEC 60076-20.

The vacuum pressure impregnation technology adopted is superior to conventional oil filled & Cast Coil transformers as explained below.

Sr. No.	Parameters	VPI
1	Conductor Insulation	Nomex
2	Thermal Rating	Class C, F, H
3	Process	Conventional Winding with nomex insulation
4	Impregnation	Vacuum Pressure
5	Coil Strength	Excellent
6	Over Loading	Yes, due to Ventilation
7	Repair	Possible
8	Safety	No Toxic Gases
9	Partial Discharge	No
10	Pilferage	No
11	Maintenance	No
12	Short Circuit Strength	Excellent

These transformers are as per IS 11171/SAN 180 and IEC 60076-20. The winding temperature indicator is provided & operated by RTD placed in the winding. The terminations can be bushings/cable box suitable for cable sealing. The tap changing is usually affected by means of links or off circuit switch provided with handle on enclosure.

## APPLICATIONS:

- Underground Substations
- Chemical Plants
- Solar & Wind Power
- High-rise Buildings
- Safety Hazard Locations



# AUTOMATIC STEP-VOLTAGE REGULATOR

The Automatic Step Voltage Regulator (ASVR) are available in three types:

- 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.
- 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 choose the suitable tap automatically and regulated HT voltage (+/-%) from the auto transformer is fed to the step-down transformer.
- If normal step-down transformer had already been installed or if the capacity of the step-down transformer is very high (more than 2MVA); 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.

**THE PRESENT PRODUCT RANGE OF MAKPOWER INCLUDES ASVRS IN 6 KV, 11 KV & 33 KV SYSTEM AND UPTO 10000 KVA. WE ALSO MANUFACTURE TAILOR MADE EQUIPMENTS AS PER REQUIREMENTS OF OUR CUSTOMERS.**



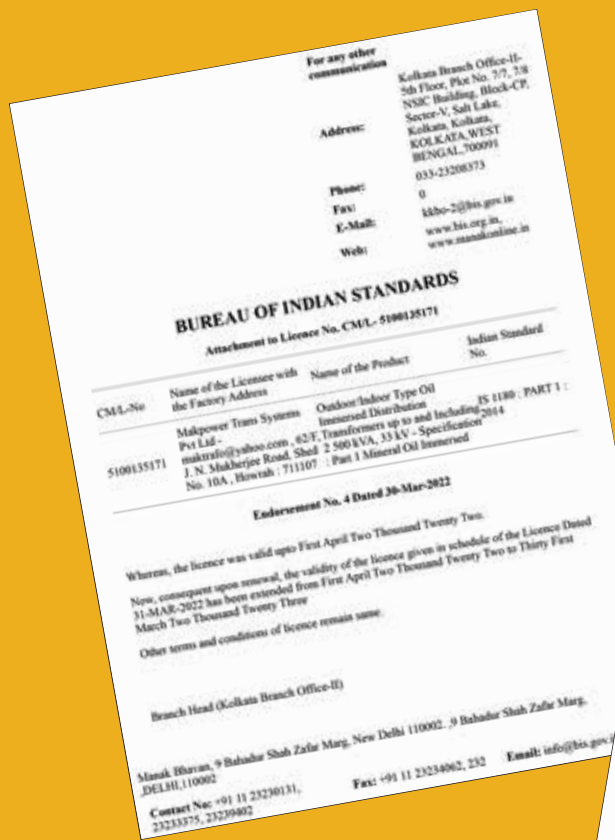




# ENERGY EFFICIENT DISTRIBUTION TRANSFORMERS

**MAKPOWER** is one of the few leaders in the Industry having BIS Certification for manufacturing of Distribution Transformers upto 2500KVA 33KV Energy Efficiency Level III as per latest amendment i.e, No. IV to IS:1180.

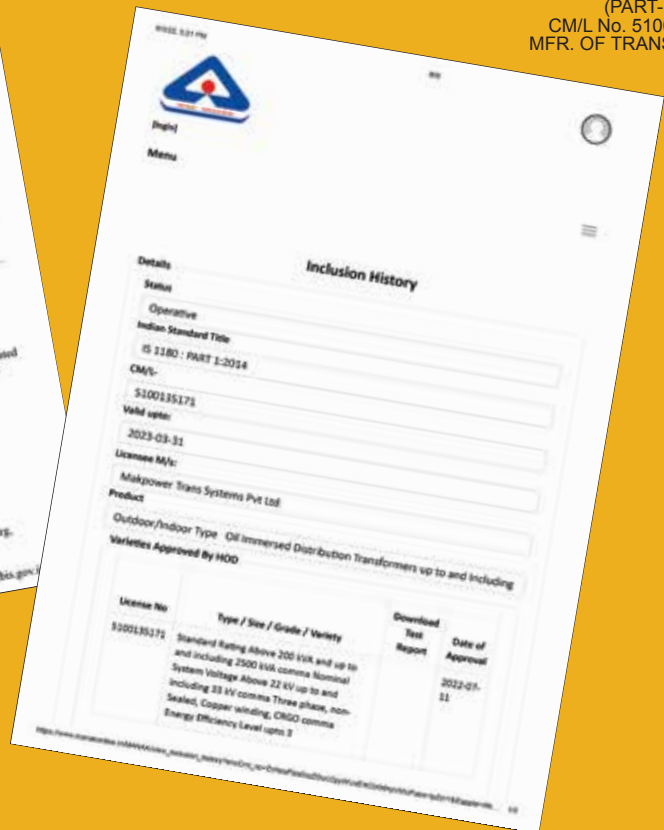
Sr. No.	Description	
1	Capacity	25KVA to 6000 KVA
2	Rated Voltage (Primary)	3.3KV/6KV/6.6KV/11KV/22KV/33KV
3	Type	Indoor or Outdoor
4	Vector Group	Dyn-11 (or any other group as per requirement)
5	Frequency	50Hz.
6	Tappings	±5%, ±7.5%, ±10% ( or any other Tapping as per requirement)
7	Temperature Rise	As per IS 2026 / IS 1180
8	Cooling	Naturally oil cooled (ONAN)
9	Winding Material	Copper/Aluminium
10	Grade of Oil	EHV Grade, as per IS: 335
11	Standard	IS: 1180 & IS: 2026



IS: 1180



(PART-1)  
CML No. 5100135171  
MFR. OF TRANSFORMER





# AUXILIARY COPPER WOUND TRANSFORMERS

UPTO 6MVA  
33KV CLASS

**MAKPOWER** is a leading manufacturer of Auxiliary 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.

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





## LV CONTROL PANELS:

Makpower make 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 pretreatment on the surface of the panel board is carried out prior to power 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
- 33KV 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



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