



OIL

Immersed Transformers

25 – 15000 KVA

Up to 33 KV



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Egytrafo

- **Vision** : Being a market leader for "distribution transformers" and its services locally and globally
- **Mission** : Customer focus through high quality and reliable products / services with competitive price and on time delivery.
- **Objective** : Maintain continual improvement in our business and manufacturing procedures with persistent staff development taking in to consideration operational health and safety in all stages.



Different Power Vision



Dear Group Members;

Dear Valued Customers;

First of all, I would like to thank Egytrafo staff for their dedication and our clients whom we have been dealing with for more than 37 years, for the success that we have reached in achieving our goals.

Looking back on the previous years and remember every moment of hard work, deadlines met, challenges and competitions, those were significant stimulants that enhanced our emerging experience since we started.

Our history began since we established our trading company ETCO in 1979 in which we were trading electrical equipments i.e. transformers, HRC fuses, lighting arrestors and Nickel Cadmium Batteries.

Our strong believe towards the Egyptians' qualifications and looking forward to revive the Egyptian market with locally produced Oil transformers and Nickel Cadmium Batteries, Egytrafo Grp. was established in 1994 which became a leading manufacturer for both products.

The success that Egytrafo Grp. proved to all its customers as well as perceiving exactly the market requirements encouraged us to step forward towards our dream in 2007 where we launched Dry type Cast resin transformers in the Egyptian market.

In addition, we have as well established a new factory in Ethiopia in 2013 called "Trafo Tech manufacturing PLC" for the production and maintenance of Oil and Dry transformers.

Our most important key factors of reaching this success are our product's quality and the team's dedication to compete locally and globally. Therefore, our quality assurance team ensures the compliance of the latest IEC and ISO standards for our products to be internationally accepted.

Besides, our Oil and Cast resin transformers are "KEMA" certified. One of our main objectives is to maintain continuous quality improvement and staff development along with safety regulation.

Clients trust, experience, high quality and success are our main driving factors that we depend on in making our future business.

Last but not least Egytrafo's Grp. main aim is to grow and expand our activities in order to increase its market share. We do believe that our mission never ends.

Grp. Chairman

Introduction

- Transformers are considered long – life capital goods. Therefore, our aim to produce high quality transformers (high efficiency, reliability and low maintenance) using latest manufacturing technology to satisfy customer specific needs.
 - All transformers are designed, manufactured and tested according to IEC60076 Standard.
 - EGYTRAFO produces wide range of oil transformers from 25 KVA up to 15000 KVA, up to 33 KV suitable for indoor and outdoor installation and ambient temperatures up to 45°C.
 - Transformers are designed to deliver maximum continuous power without exceeding temperature rise limit and withstand overloading according to IEC – 60354.
- Other operating conditions and customized solutions can be implemented on request .

1- Oil immersed transformer:-

A-Main components

A-1- Active parts:-

- Core:

Is manufactured from high quality grain oriented cold rolled silicon steel laminations with high magnetic conductivity. Yokes are clamped with steel channels. Top and bottom channels are secured together by rods for free stress core assembly. The core construction of overlapping ensures very low level of iron losses as well as noise.



- Windings:

• L.V. windings:

For transformer with rating up to 200 KVA, flat copper wire according to DIN 2/6433 ,IEC–27-60317 and NFC 31011 is used. The flat wire is cold drawn annealed electrolytic copper or aluminum with round edges, and insulated with multi - layers electro paper class (A) insulation, other classes can be used on request.

The winding is multi-layers helical type.

For transformers with rating higher than 200 up to 3000KVA, Copper foils are used to obtain multi-layers cylindrical winding which are characterize with highest stability during short circuit stresses.

The axial forces which are developed by short circuit are avoided with this system of winding.

Axial contraction forces also have no effect in the foil conductors.

The low voltage terminals consist mainly of massive bars which are press welded to the conductor of the foil.

• HV windings:

They are manufactured from circular or rectangular electrolytic copper or aluminum wire insulated with high quality special varnish. Flat wire copper or aluminum insulated with paper can also be used.

HV winding are cross over or disc type windings. with interlayer cooling ducts to ensure low temperature.

L.V windings are inside and the HV windings are outside to obtain a favorable electric field.

In order to withstand short Circuits , windings are effectively braced against one to the other and the core by support rings, blocks and strips which guarantee a good circulation of the oil, a uniform gradient temperature and a good mechanical resistance.

Core with windings are dried well to extract humidity before assembly in the tank.

- Tapping switch:

The HV windings are provided with tappings which are normally + %2.5 and %5 they are placed in the middle of the winding to minimize axial short circuit forces, guarantee magnetic symmetry and connected to an off circuit tap changer. The tap changer is actuated by a handle situated on the top of the cover of the transformer.

Tap changers are normally 5 or 7 steps (any number of steps are also available)

A-2 - Tank :

Welded steel structure in which active part assembly is located under oil . It consists of rigid bottom with oil drain plug and sides, reinforced on outside by steel stiffeners.

After welding, leakage test and painting the cover is bolted to the tank and provided with holes and lifting lugs. Earthing terminals are placed on both sides of the tank.

Egytrafo produces two types of tanks :-

1 - Tank with conservator :-

(where the expansion of oil due to pressure or temperature increase is taken up by the conservator)

i- Corrugated fin wall tank :

The most common type used for distribution transformers which made of corrugated sheet steel forming an adequately strong structure.

ii- Radiators coolers (plain wall with radiators) tank:

Provided with radiators for cooling the oil. Each radiator consists of a number of fins assembled to two headers that are welded to the tank.

Both type of tanks (corrugated fin wall / individual fins and the assembled radiators) are tested for pressure leakage 0.3 Kg/cm².

2 – Tank without conservator (Hermetic type)

Made of cooling fins (corrugated tank) or radiator coolers depending on its rating.

The expansion of oil due to temperature or pressure increase is absorbed by elasticity of cooling fins or inert gas cushion.

To ensure the tightness of the tank welding is tested with ultra violet rays.

Oil leakage test is conducted on every transformer to ensure oil tightness after assembly.



Hermetic type

A-3- Oil:

Tank is filled with high quality grade mineral oil as per IEC 296 and it's PCP's free.

Oil filling process is applied under vacuum to avoid any bubble which might cause voltage interruptions.

Oil is used for both cooling and electrical insulation between internal life parts.

A-4 -cooling:

There are two types of cooling methods: ONAN - ONAF

A-5- Bushings:

HV and LV bushings are made of brown glazed porcelain suitable for rated voltage and current, indoor outdoor installations. The (oil seal) between the insulator and tank is a synthetic Rubber gasket. and HV bushings are provided with arcing horn made of mild steel.

B-Standard and optional fittings “Protection and Control Equipment”

B-1 Standard Fittings:

1. Oil conservator with oil level indicator.
2. Rating and diagram plate.
3. Drain valve.
4. Dial thermometer.
5. Off circuit tap changer
6. Earth terminals.
7. Lifting Lugs.
8. Dehydrating breather (SILICA – GEL TYPE).
9. Rollers.

B-2 Optional Fittings:

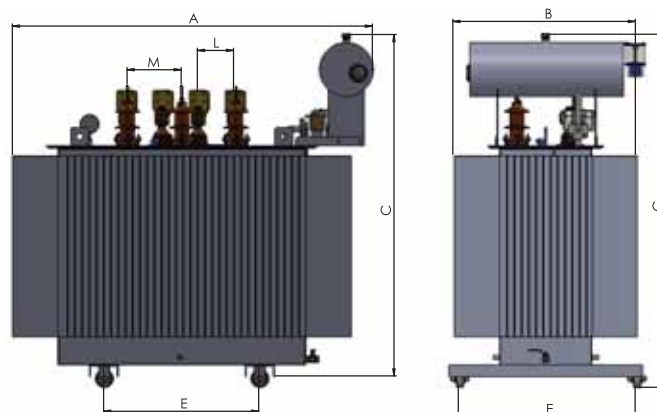
1. Double float buchholz relay.
2. Mercury thermometer.
3. Contact thermometer.
4. Pressure relief valve.
5. HV cable end box and LV cable end box
6. DGPT instrument for Hermetic type.
7. Marshaling box.
8. Winding temperature controller.



C-Technical data tables

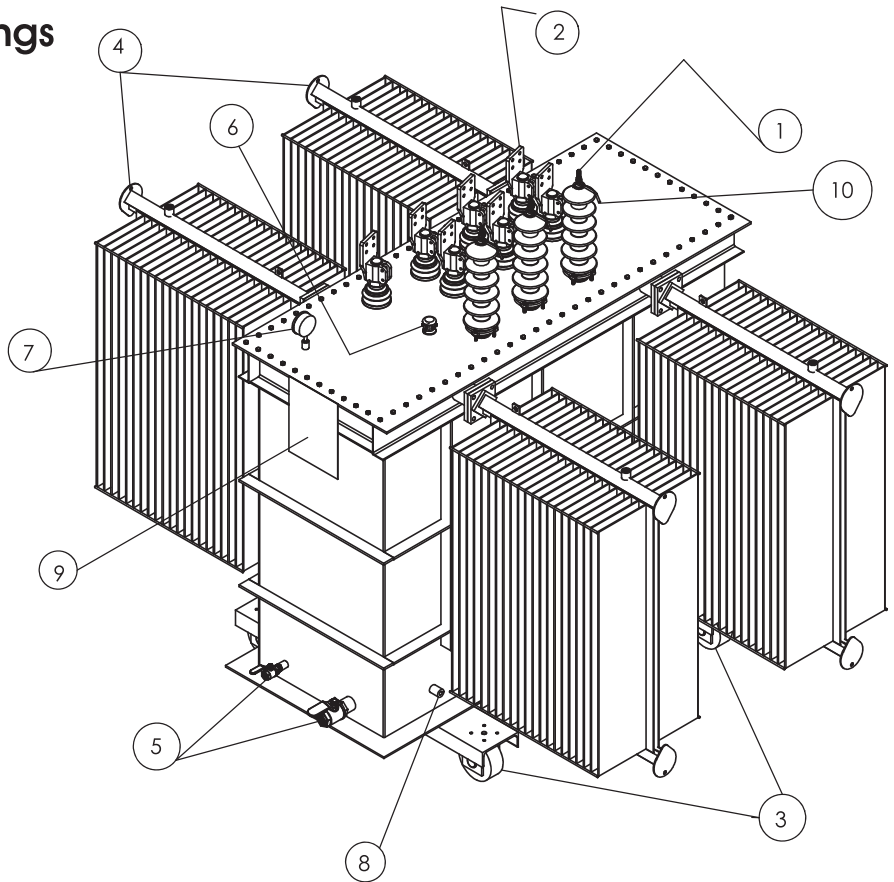
Oil Immersed Transformer												
(Low losses)												
Connection Group: Dyn 11						Ambient Temperature: 45°C						
Temperature Rise in oil: 45°C						Temperature Rise in windings: 55°C						
Rated Voltage: 11000 / 400 - 231 Volt												
Rated Power	KVA	50	63	100	160	200	300	500	800	1000	1500	2000
No Load loss	W	168	200	272	384	456	576	700	1015	1222	1785	2736
Load Loss	W	875	1100	1505	2170	2520	3815	5460	7700	9450	13860	15750
Total Loss	W	1043	1300	1777	2554	2976	4391	6160	8715	10672	15645	18486
Impedance voltage at rated current at 95°C												
	%	4	4	4	4	4	4	4	5	5	6	7
Overall Dimensions												
Length (A)	mm	850	860	980	1070	1140	1280	1587	1830	1930	2110	2260
Breadth (B)	mm	560	560	600	550	570	690	790	870	980	1120	1150
Height (C)	mm	1145	1175	1250	1375	1420	1630	1945	1960	2050	2100	2120
Distance between Rollers												
(E)	mm	450	480	490	544	590	620	750	780	800	870	940
Dimension between H.V												
Bushing (M)	mm	210	210	210	220	250	250	320	320	320	320	360
Dimension between L.V												
Bushing (L)	mm	90	90	90	100	120	150	180	180	180	180	200
Oil weight	Kg	130	145	180	216	274	315	426	627	655	793	932
Total weight	Kg	423	456	595	795	970	1236	1673	2650	2850	3700	4190
Rated Voltage: 22000 / 400 - 231 Volt												
Rated Power	KVA	50	63	100	160	200	300	500	800	1000	1500	2000
No Load Loss	W	168	200	272	384	456	576	700	1015	1222	1785	2736
Load Loss	W	875	1100	1505	2170	2520	3815	5460	7700	9450	13860	15750
Total Loss	W	1043	1300	1777	2554	2976	4391	6160	8715	10672	15645	18486
Impedance voltage at rated current at 95°C												
	%	4	4	4	4	4	4	4	5	5	6	7
Overall Dimension												
Length (A)	mm	955	860	1010	1140	1150	1290	1600	1830	2000	2110	2260
Breadth (B)	mm	585	560	610	570	580	690	805	870	980	1120	1150
Height (C)	mm	1205	1175	1270	1440	1450	1650	1950	2075	2100	2100	2160
Distance between Rollers												
(E)	mm	470	480	490	580	600	630	690	780	840	870	940
Dimension between H.V												
Bushing (M)	mm	250	250	250	250	270	270	320	320	320	320	360
Dimension between L.V												
Bushing (L)	mm	90	90	90	90	120	150	180	180	180	180	200
Oil weight	Kg	147	150	194	280	285	331	440	660	736	793	960
Total weight	Kg	445	460	617	843	990	1280	1708	2700	2980	3750	4290

N.B : Data and characteristics are not binding and can be change without notice

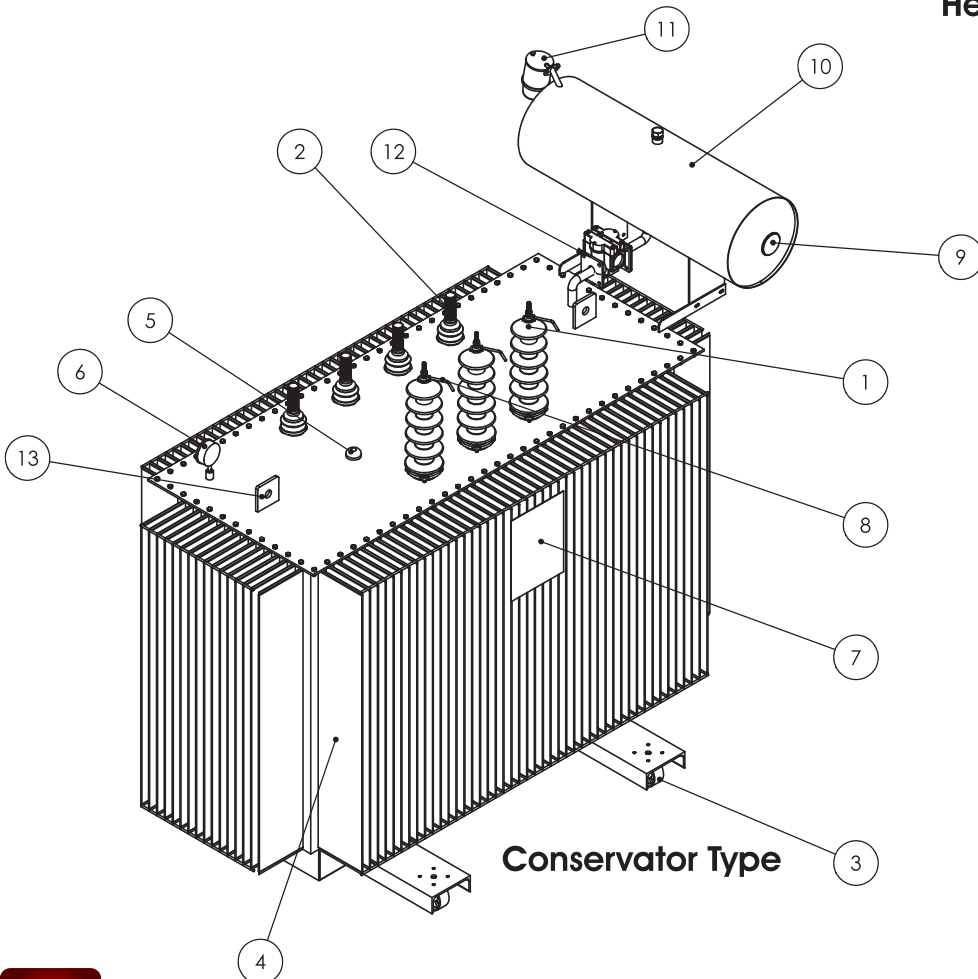


D-Detailed assembly drawings

- 1 H.V BUSHINGS
- 2 L.V BUSHINGS
- 3 WHEEL
- 4 RADIATOR UNIT
- 5 OIL DRAINING VALVE
- 6 TAP CHANGER
- 7 THERMOMETER POCKET
- 8 EARTHING TERMINAL
- 9 NAME PLATE
- 10 ARCING HORN



Hermetic / Radiators Type



- 1 H.V BUSHINGS
- 2 L.V BUSHINGS
- 3 WHEEL
- 4 CORRUGATED WALL
- 5 TAP CHANGER
- 6 THERMOMETR POCKET
- 7 NAME PLATE
- 8 ARCING HORN
- 9 OIL INDICATOR
- 10 CONSERVATOR
- 11 DEHYDRATING BREATHER
- 12 BUCHOLZ RELAY
- 13 CRANE LIFT RING

Conservator Type

2-Types of Oil immersed transformer:

A- Standard distribution transformers:

Ratings from 25KVA to 3500KVA with vector group Dyn 11.

- Pole mounted transformers
- Ground pad transformers
- Step - up transformers
- Step - down transformers

B – Special Design Transformers:

High rating up to 15000KVA , 33KV

- Various number of taps for instance 21.....,5,7,9,12.....etc.
- Dual voltage transformers for both primary and secondary side.
- Testing transformers according to customer ratings and data.
- Isolating transformers according to customer ratings and data.
- Any connection group can be fulfilled on request.

Egytafo can design new solutions for Oil & Gas, Utilities and Industrial sectors according to their existing networks and requirements.



C – Earthing / Zigzag transformer.:

Is a special – purpose transformer with a zigzag or "interconnected star" winding connection , such that each output is the vector sum of two phases offset by 120° . Its applications are for the creation of a missing neutral connection from an ungrounded 3 – phase system to permit the grounding of that neutral to an earth reference point and also harmonic mitigation , as it can suppress triplet (3rd , 9 th ,15 th ,21 st , etc) harmonic currents , to supply 3 – phase power as an autotransformer (serving as the primary and secondary with no isolated circuits) , and to supply non standard phase shift 3 – phase power . fig (1)

The earthing transformer can be provided with auxiliary coils for delivery of power. fig (2)

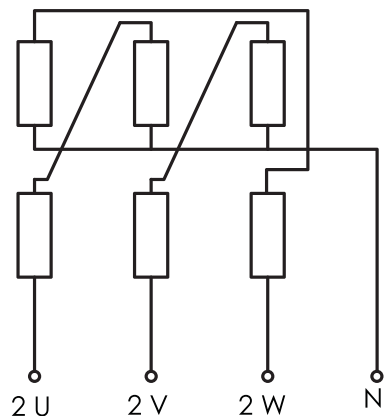


fig. (1)

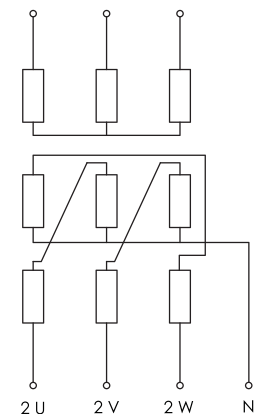


fig. (2)

Petroleum applications Dual primary voltage

D – Auto-Transformers:

Auto Transformers with (manual / automatic) tap – changing equipment are inserted as voltage regulators , so that customers at the far end of the of the line receive the same average voltage as those closer to the source The variable ratio of the Auto Transformer compensates for the voltage drop along the line. Our ranges are up to 600 A, 22 KV and more than 5 taping positions on request.

Auto Transformers applications:

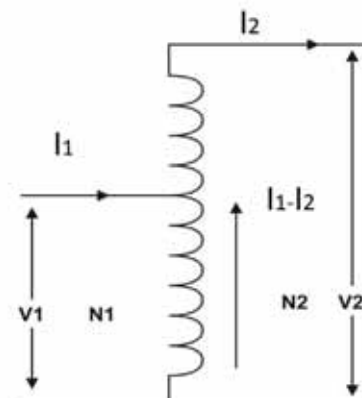
- They are used as a safely starting machines such as induction motors and synchronous motors
- They are used as boosters to give a small boost to distribution cable for compensating the voltage drop
- They can be used as variac.

Auto Transformers advantages:

- Increased KVA rating for a given size and mass .
- Less amount of copper is required.
- Due to smaller size , cost is less compared to a two – winding transformer .
- The resistance and reactance are less compared to a two – winding transformer and hence it has superior voltage regulation.
- Volt – ampere rating is more compared to a two – winding transformer.
- It is possible to get smooth and continuous variation of voltage.

Technical data tables

Ambient temp =45 C	Max oil temp .rise = 45 C		Max winding temp .rise = 55 C		
Rated power (KVA)	433	650	866	1083	1299
Primary (KV)	9.75	9.75	9.75	9.75	9.75
Secondary (kv)	11	11	11	11	11
Load current (AMP)	200	300	400	500	600
Tap Changer	+3*250V	+3*250	+3*250	+3*250	+3*250
Connection	Yy0	Yy0	Yy0	Yy0	Yy0



Step-up Auto Transformer

3-Electrical tests

Routine tests:

All transformer are tested according to IEC 60076 standards before shipment The following routine tests are performed on each unit manufactured in our testing Laboratories and the relevant test report are issued .

- 1- Transformer turns ratio and vector group.
- 2- No load losses and magnetic current (no – load current)
- 3- Full load losses and impedance voltage.
- 4- Winding DC resistance.
- 5- Insulation test.
 - Separate source voltage withstand test AC.
 - Induced HV AC over voltage withstand test.
- 6- Insulation resistance test (no limitation for the values given).

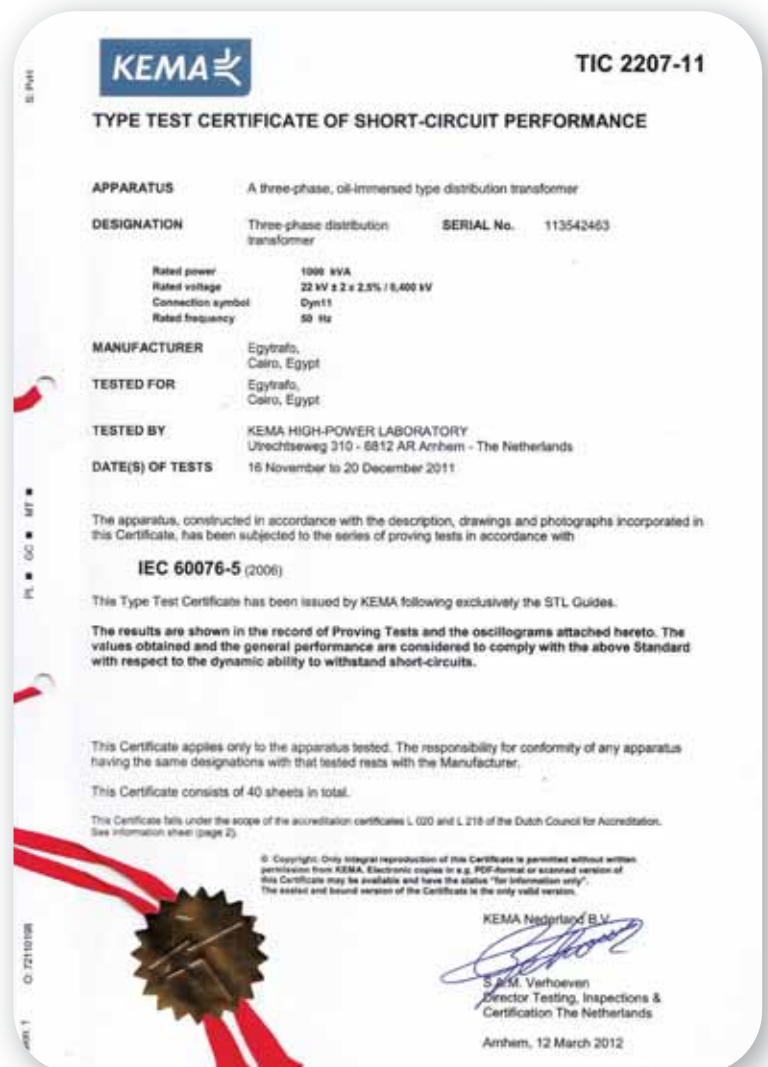
Type tests:

- 1- Temperature rise test.
- 2- Impulse test (ability to with stand lightning impulse).

Special tests:

- 1- Short circuit withstand test.
- 2- Sound level test (noise test).
- 3- Over leakage test performed for six hours under adequate over pressure.

Egytrafo transformers are type tested and KEMA certified for short circuit withstand test. Per request, type tests and special tests are conducted on customer expenses



4-Services and after sales service

Our concept is to ensure safety, efficiency and prolonged life of the transformers, consequently reduces operational risks.

Egytrafo can provide a comprehensive service and maintenance portfolio to support their customers including transformers produced by others.

The following service items can be provided:

1. Supervise the installation of the transformer at customer sites.
2. Training customers on the operation and maintenance of transformers.
3. Following up the status of the transformers under operation at customers sites.
4. Providing the needed spare parts if requested.
5. Providing periodic maintenance for the transformer at site :-
 - a) Oil investigation and purification.
 - b) Upgrading the transformer dielectric.
 - c) Maintenance of the transformer protection system.
 - d) Replacement of defected transformer bushings.
 - e) Changing oil at site.
 - f) Performing all site tests :-
 - * Turns ratio and polarity.
 - * Insulation resistance (Megger test).
 - * Measuring of (DC) resistance.
 - * Measuring of oil dielectric strength.
6. Repairing transformers during and after warranty period at site and in our factory.
7. Yearly maintenance contracts as per request.
- 8 Engineering , design and upgrading of old transformers for replacement.

5- Export

We have already exported our transformers to several countries throughout the world.

In line with our vision and strategy to cover more areas in the world, the trend is to enhance our potential for corporate expansion by building more production units/ agencies in different market centers.

• Branches and Agencies Abroad :

TERAFOTECH MANUFACTURING FACTORY – Mekelle – Ethiopia
GULF TEPCO Factory – El Maddinah El Monawara – KSA
Ambab Development Co. Ltd – Sudan (Distributor)
Dar El Hedaya – Iraq (Agent)
Syrian Co. For Trading – STCO – Syria (Agent)



6-Quality Assurance & Achieved Certificates :

The quality assurance is systematically performed at all levels starting from the materials receipt production process up to final delivery and extended to after sales service.

All processes are continuously monitored and analyzed. Actions are taken for any discrepancy for continual improvements and deliver error free products on time.

EGYTRAFO has achieved three management system certifications as follows:-

1. ISO 9001 : 2008 : Quality management system (design , development , manufacturing and sales)
2. ISO 14001 : 2004 : Environmental management system.
3. OHSAS 18001 : 2007 : Occupational Health and Safety management system.





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