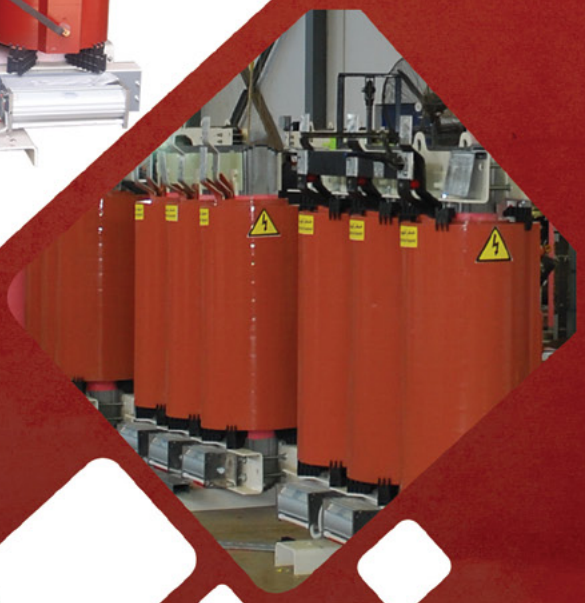
EGYTRAFO

Dry Cast Resin Transformers

Up to 3.6 MVA, 33 KV



ISO 9001:2015
ISO 14001:2015
ISO 45001:2018
ISO Certified

Table Of Contents

EGYTRAFO

EGYTRAFO Grp.

- **Vision :** Being market leader in manufacture of transformers and Nickel Cadmium batteries and its services locally and globally.
- **Mission :** Customer focus through high quality and reliable products / services with competitive price and an 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.

EGYTRAFO

Different Power Vission

Dear Group Members;

Dear Valued Customers;

First of all, I'd like to thank EGYTRAFO's Grp. staff for their Dedication and our clients whom we have been dealing with since 1979, for the success we have achieved in achieving our goals.

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

Our history started since we established our trading company ETCO in 1979 in which we were trading in electrical equipment ie Transformers, HRC fuses, lighting arrestors and Nickel Cadmium Batteries.

Our strong beliefs towards the Egyptians' Qualifications and looking forward to reviving the Egyptian market with locally produced Oil Transformers and Nickel Cadmium Batteries, EGYTRAFO Grp. was established in 1994 and 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 also established "Trafo Tech Manufacturing PLC" factory in Ethiopia in 2013 for the production and maintenance of Oil Transformers.

Our most important key factors in achieving 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.

In addition, our Oil and Cast resin transformers are "KEMA" certified. One of our main goals is to maintain a 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. Our main goal is to grow and expand our activities in order to increase its market share. We believe that our mission never ends.

Grp. Chairman
Atef A. Moniem

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 Cast Resin Dry transformers are designed, manufactured and tested according to IEC60076-11 Standards.
- EGYTRAFO produces wide range of Dry type Cast Resin transformers up to 3.6MVA, 33KV suitable for indoor and outdoor installation (inside enclosure with certain IP) 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 condition and customized solutions can be implemented on request.

-Dry type transformers is a reliable alternative for oil immersed transformer with low running costs, free maintenance, environmental friendly and suitable for operation under heavy load flactuations.

1- Dry Type Cast Resin Transformers

A- General Characteristics & Advantages:

-Fire resistance :

In locations where the fire risk associated with the use of mineral oil is unacceptable like offices, shopping complexes, apartment buildings, hospitals ...etc.

The cast coil with Epoxy resin has a self fire – extinguishing performance, to be free from fire due to electrical sparks.

-Maintenance free:

- No liquids (oil) to contaminate, breakdown, leak or explode and burn.
- The insulation material is not subjected to absorption or ageing.

-Insensitive to moisture:

No deterioration of dielectric property due to humidity (enhanced dielectric strength).

-High overloading capacity:

The cast coil with Epoxy resin has a high thermal time withstand factor therefore it can endure much higher overloads for a short time.

Also able to absorb continues overloads up to 40% using cooling fans.

-Long and stable life time:

With very low partial discharge, life time exceeds 30 years in service. It has higher mechanical and electrical strength against network transients and suitable for heavy load flactuations.

-Installation close to load centers (maximum safety):

Without fire and explosion danger it is possible to place the CRT direct vicinity of load center.

-Easy to connect and install:

Possibility of assemble on site. Easier to handle and less installation costs (neither special precautions nor tools are needed).

-Immediate switch-on:

No need for tests or special precautions before starting up.

-Easy to repair:

Minimum time for inspection & repair also on-site repair is possible.

-No special requirements for installation room:
No need for drainage areas, firewalls or use of expensive high fire point liquids.
Also no air conditioning is required.

-Environmentally safe:
In case of damage they don't pollute the groundwater nor form toxic decomposition products (No pollution effects).

-Hardly inflammable:
Due to the high quality of non-hygroscopic material.

-Low operational cost and service expenses:
Due to reducing the length of costly low voltage cabling and being maintenance free.

-High performance, reliability and high short circuit strength:
Robust structure against electro - mechanical forces during short circuits, external impacts and abnormal vibrations.

B- Field of Applications:

-With CRT advantages and features they're especially suitable for particular industrial applications like: foundries, rolling mills, steel works, textiles, food and cements.

-Due to the fact that materials are flame resistant and self-extinguishing, the cast resin transformers are particularly suitable for special applications like: hospitals, banks, sky - scrapers, commercial and residential buildings, hotels, schools, nuclear plants, ambients with high ecological contents.

-Due to high reliability of the CRT they are suitable for Gas, carbon and oil refineries and extraction, mines and offshore platforms, subways, water supply.

-Transportation means as railways underground, trams and tunnels.

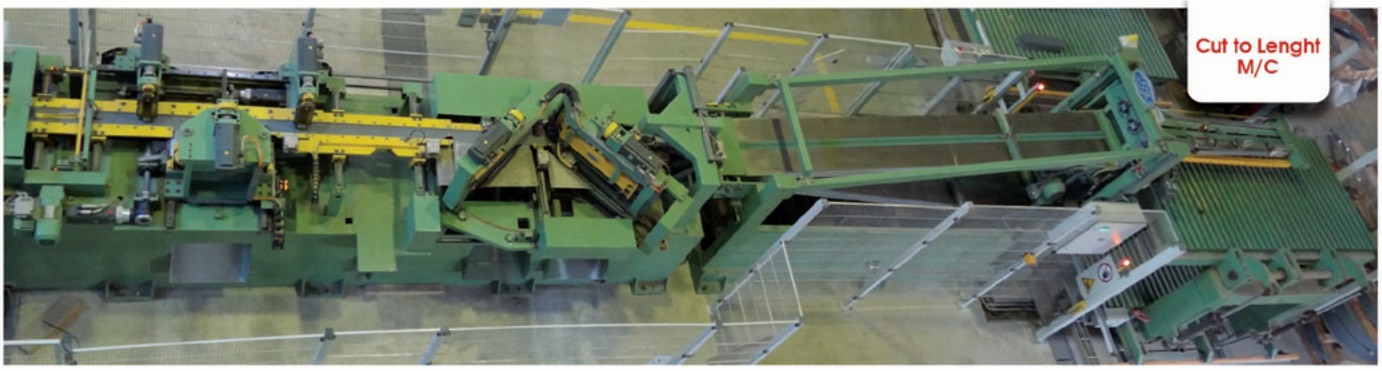
-Locations with vibrations and shocks (like ships and cranes).

2- Dry Type Cast Resin Transformer Construction

A- Main components

• Core:

Manufactured from high quality grain oriented cold rolled silicon steel laminations with high magnetic conductivity. Yokes are clamped with high quality electrostatic painted steel angles to apply uniform clamping forces across the entire core. Top and bottom angles are secured together by steel straps for each core limbs for free stress core assembly.
The core construction of overlapping ensures very low level of iron losses as well as noise.
Different over lapping techniques of laminations are used in core construction (step–lapping process).



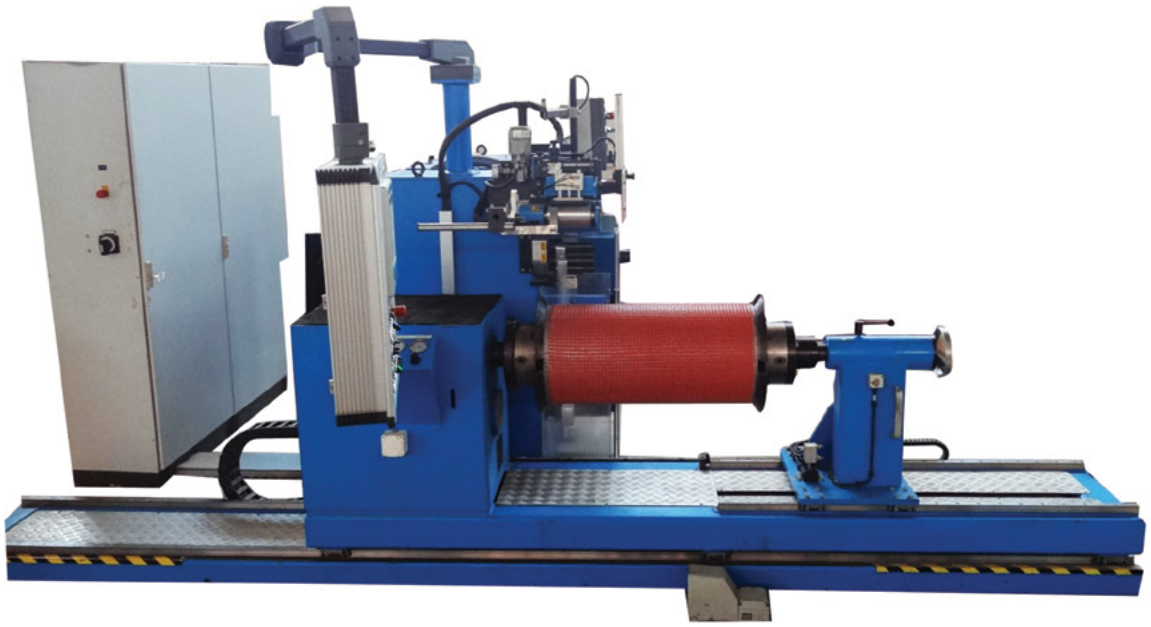
• LV windings:

High quality electrolytic aluminum / copper foils are used in LV winding. Turns are insulated from each other using class " F " pre – impregnated paper. Winding process is conducted using high-quality winding machine.
Connections of coil windings to terminal bars are done using shielded arc technique for high joint integrity and quality.
Impregnated or fully casted LV Coils can be manufactured on request.

• HV Windings:

The HV windings are produced by overlapped coils in aluminum / copper strips, connected in series, with rounded corners and insulated with polyester material films.

The alignment of the strip with the insulation and the mechanical tension of components is kept constant with the automatic computer aided equipments.



• Casting:

Coils are assembled inside casting molds. Molds are pre-heated then filled with a thoroughly mixed epoxy resin under vacuum to ensure a solid void free casting. After this Molds enter inside high temperature oven for final curing process.

Epoxy resin mixture consists of high quality hardener, resin, silica and fire retardant material to get E2 – C2 – F1 class.

• **Tapping:**
Taps are supported inside epoxy along the face of each HV coils and changed by moving bolted links between different taps.
Tap changers are normally 5 or 7 steps each step is 2.5 %.

• **Temperature control and protection**
Temperature is controlled by electronic device and PT 100 sensor. The controller is used for fan operation, alarm and trip.

• **Cooling:**
There are two types of cooling methods: AN (air natural) and AN/AF (air natural /air forced).
For AN/AF cooling fans are used for over sizing transformer capacity up to 40 %.
Fans are automatically actuated using the temperature controller device.

B - Standard and optional accessories:

Standard accessories are:
- Bi-directional rollers.
- Lifting lugs.
- Earthing terminals.
- Rating Plate.
- 1 set of 3 PT 100 Thermo-resistance (Temp. Sensors).
- Distance bushings for HV cable connection.
- Temperature relay for thermal protection and controlling fans with contacts and communication port RS485 for connection to SCADA and BMS.
- Enclosure IP 21,31,23 with standard electrostatic paint or special marine paint (C5).
- Cooling fans for AF operation up to 40% over capacity.

Optional accessories are:
- MV cable box.
- LV cable box.

3- Dry Type Transformers Technical Description

- EGYTRAFO group produces dry type transformers according to IEC 60076-11 standards from 10 KVA to 8000 KVA up to 33KV, with the following specs:
- Frequency: 50 Hz or 60Hz
- Max ambient temperature:+ 40 : 60℃
- HV/LV Insulating material: F/F („H„ class available upon request)
- Winding over temperature: start from 80℃ upto 100℃ according to customer request
- Transformers are designed and certified in conformity to Environment (E2), Climate (C2), and fire (FI) classes in which each is classified as follows:
- E2: Transformer is suitable for being installed in high-polluted environment and with presence of substantial condensation.
- C2: Transformer is suitable for being stored and used at ambient temperature upto -25℃
- FI: Self fire retardant transformer which doesn't emit toxic substances and opaque smokes.
- Transformers are designed and certified for Moderate Seismic Performance Level

In addition, EGYTRAFO produces the following special dry type transformers:

- Earthing (Zigzag) dry type transformers without or with auxiliary secondary coil
- Dual voltage dry type transformers for example dual primary 22KV & 11 KV, dual secondary 400 & 230 Volt
- MV/MV dry type transformers for example: 22/11 KV, 22/6.6 KV, 22/3.6 KV, etc.
- Rectifier dry type transformers for example: 6 pulses,12 pulses, 18 pulses
- Isolation transformers for example K4, K9, K13, K20
- Dry Transformers with ON load tap changers
- Dry type transformers inside enclosures with high IP protection (up to IP55)
- Pole mounted dry type transformer (applicable for small ratings)
- Amorphous core dry type transformers (very low no load losses)

A - Technical data tables

Standard specs according to EEDC *, Insulation level 12-28-75 KV							
power (KVA)	No load losses (watt)	Load losses at 75 °C (watt)	%Z at 75 °C	Noise level (dB)	Approximate transformer dimensions (mm)(LxWxH)	Approximate enclosure dimensions (mm) (AxBxC)	Approximate total weight(KG)
50	340	1200	4	45	1000x700x1050	1500x1100x1500	900
63	400	1400	4	48	1000x700x1050	1500x1100x1500	950
100	480	1700	4	50	1050x700x1100	1500x1100x1500	1100
160	610	2300	4	50	1150x700x1250	1800x1300x1800	1450
250	820	3100	4	53	1250x1000x1250	1800x1300x1800	1900
315	950	3600	4	54	1300x1000x1300	1900x1300x2000	2100
400	1150	4300	4	55	1400x1000x1350	1900x1300x2000	2400
500	1300	5100	4	56	1450x1000x1450	1900x1300x2000	2550
630	1500	6400	4	57	1450x1000x1500	2150x1300x2500	3000
800	1700	7700	5	58	1500x1000x1600	2150x1300x2500	3400
1000	1850	8000	5	59	1600x1000x1700	2150x1300x2500	4000
1250	2500	10500	5	61	1650x1000x1750	2150x1300x2500	4400
1500	2600	11200	6	61	1900x1250x1950	2300x1550x2600	5000
1600	2800	12300	6	61	1900x1250x1950	2300x1550x2600	5200
2000	3500	14900	6	62	2000x1250x2200	2400x1550x2800	5600
2500	4300	18300	6	65	2000x1250x2250	2400x1550x2800	6000
3150	5500	22000	7	65	2400x1500x2400	2900x2000x3000	9300
5000	8725	31500	7	65	2800x1500x2900	3500x2250x3500	12500

*these data are according to the standard of Egyptian electrical distribution company and could be changed for different technical specifications in other countries

Standard specs according to EEDC *, Insulation level 24-50-125 KV							
power (KVA)	No load losses (watt)	Load losses at 75 °C (watt)	%Z at 75 °C	Noise level (dB)	Approximate transformer dimensions (mm)(LxWxH)	Approximate enclosure dimensions (mm) (AxBxC)	Approximate total weight(KG)
50	380	1200	4	45	1100x700x1100	1700x1250x1700	950
63	460	1400	4	48	1100x700x1100	1700x1250x1700	1000
100	590	1700	4	50	1150x700x1200	1700x1250x1700	1150
160	650	2300	4	50	1250x700x1350	1950x1500x1950	1550
250	880	3300	4	53	1400x1000x1400	1950x1500x1950	2100
315	1030	4000	4	54	1400x1000x1450	2000x1500x2100	2300
400	1200	4800	4	55	1450x1000x1500	2000x1500x2100	2600
500	1500	5600	4	56	1500x1000x1550	2000x1500x2100	2750
630	1650	6800	4	57	1550x1000x1700	2250x1500x2650	3300
800	2000	8200	5	58	1600x1000x1850	2250x1500x2650	3700
1000	2200	8900	5	59	1650x1000x2050	2250x1500x2650	4200
1250	2800	11500	5	61	1700x1000x2100	2250x1500x2650	4600
1500	2800	12800	6	61	1850x1250x2150	2450x1750x2700	5200
1600	3100	14000	6	61	1850x1250x2150	2450x1750x2700	5400
2000	4000	17500	6	62	2050x1250x2300	2500x1750x2900	6000
2500	5000	20000	6	65	2100x1250x2350	2500x1750x2900	6600
3150	6300	23000	7	65	2450x1500x2450	2900x2000x3000	9900
5000	10000	31500	7	65	3000x1500x3100	3500x2250x3500	13300

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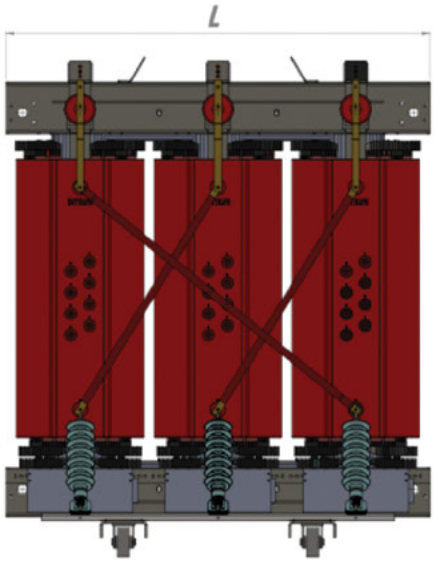
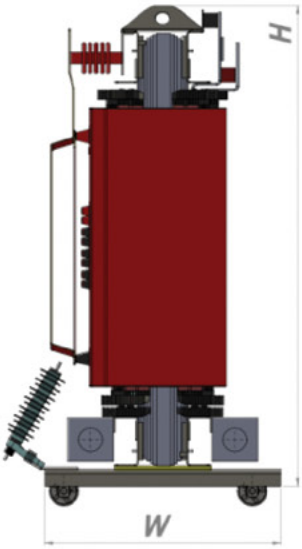
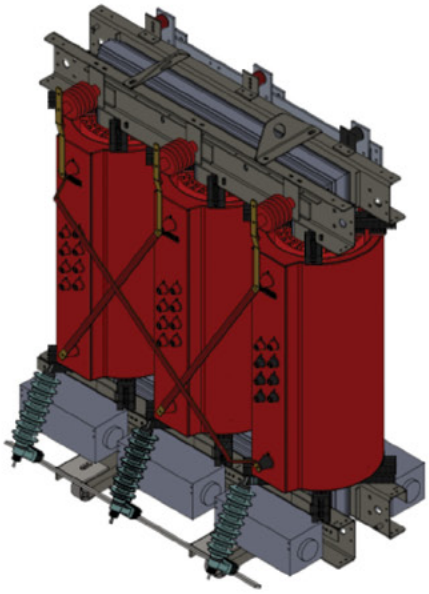
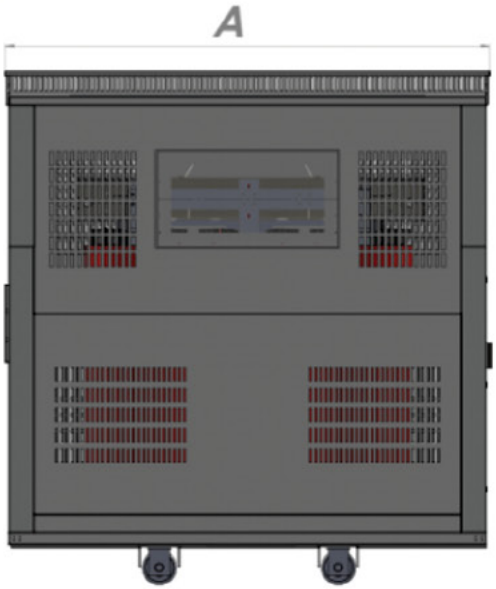
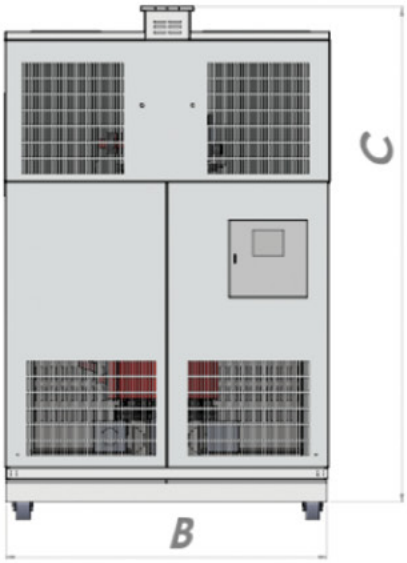
A - Technical data tables

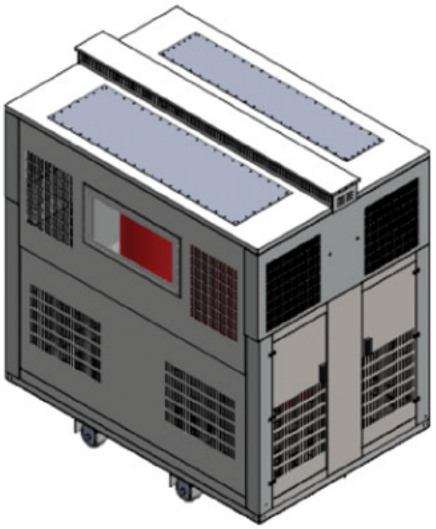




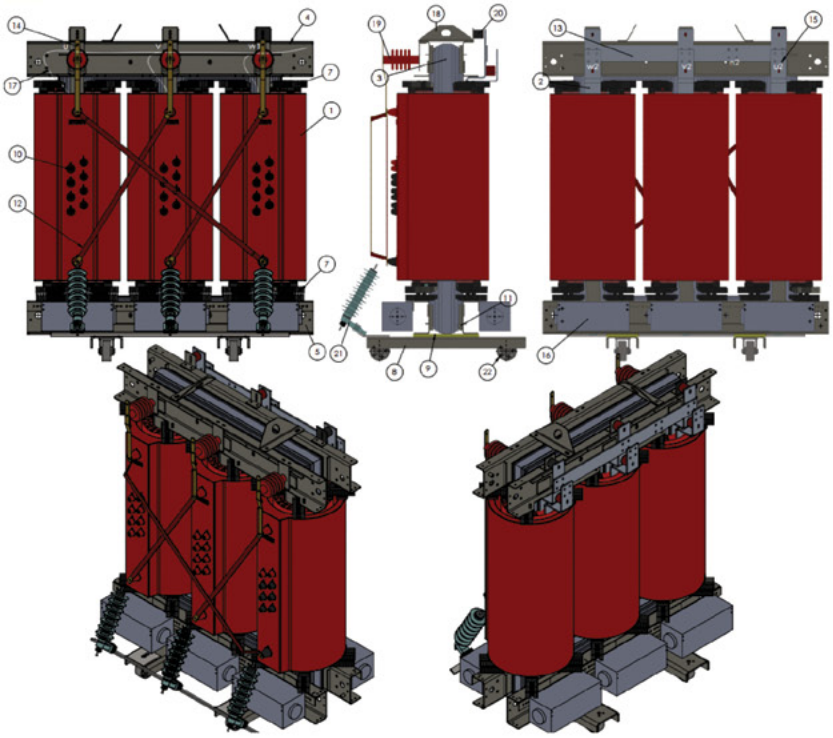




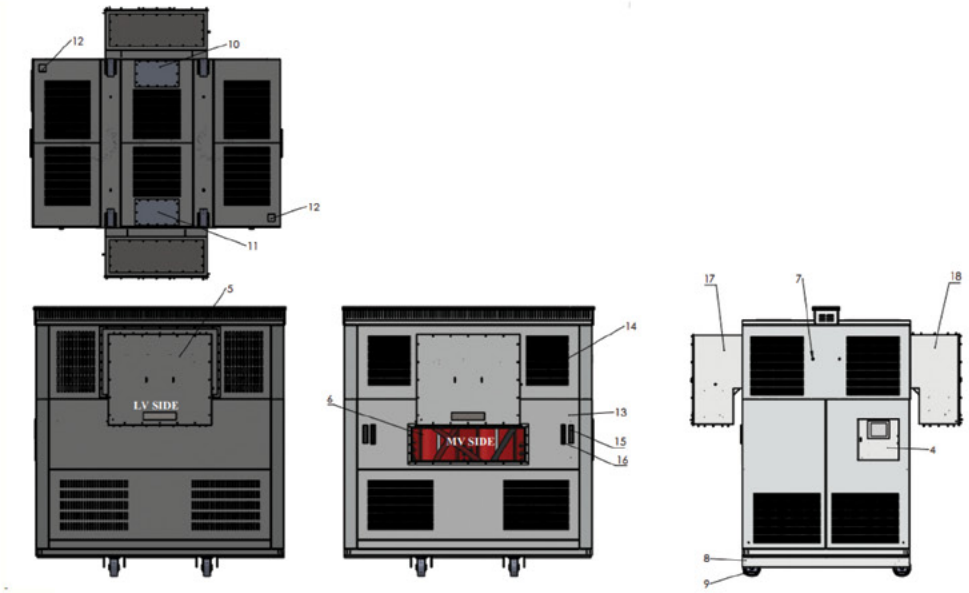




B - Detailed assembly drawings



1	HV Casted Coil
2	LV Casted Coil
3	Magnetic steel Core
4	Upper Tightening clamp
5	Lower Tightening clamp
7	Fixation Blocks with rubber pads
8	Foot Channel
9	Anti-shock rubber
10	Tap changer
11	earthing studs
12	Delta Bars of MV Side
13	Neutral Bar for Star connection of LV Side
14	connection point of MV Side U1-V1-W1
15	connection point of LV Side u2-v2-w2-n2
16	Cooling fans for AF operation
17	3 PT100 sensors
18	Lifting Lugs
19	MV Post insulator to fix MV terminations over upper clamp
20	LV Post insulator to fix LV terminations over upper clamp
21	surge arrester on MV side
22	rollers with lock



1	Removable Cover to allow crane wire to reach lifting lugs of transformer and carry both transformer and enclosure together
2	-Reomvable aluminum plate for top entry of LV Busways/Cables.
3	-Reomvable aluminum plate for top entry of MV Cables.
4	Control (marshalling) box IP 55 to install componenets of thermal protection system : temperature relay , miniature circuit breaker , terminal blocks .
5	Acrylic transparent screen to watch interior LV side
6	Acrylic transparent screen to watch interior MV side
7	Latching lugs
8	Bottom U channel
9	Bi-directional rollers
10	Reomvable aluminum plate suitable for bottom entry of LV Cables.
11	Reomvable aluminum plate suitable for bottom entry of MV Cables.
12	Bottom entry of Earthing cable (2 points on opposite corners)
13	Removable door with key lock on MV side to reach tap cahnger
14	Air Louvers
15	Lock
16	Hand
17	MV Cable Box
18	LV Cable Box

4- 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 & the relevant test reports are issued.

1- Transformer turns ratio & vector group.
2- No load losses and magnetic current (no – load current).
3- Full load losses and impedance voltage.
4- Winding DC resistance.
5- Separate source voltage withstand & test AC & Induced AC over voltage withstand test.
6- Insulation resistance test.
7- Partial Discharge test.

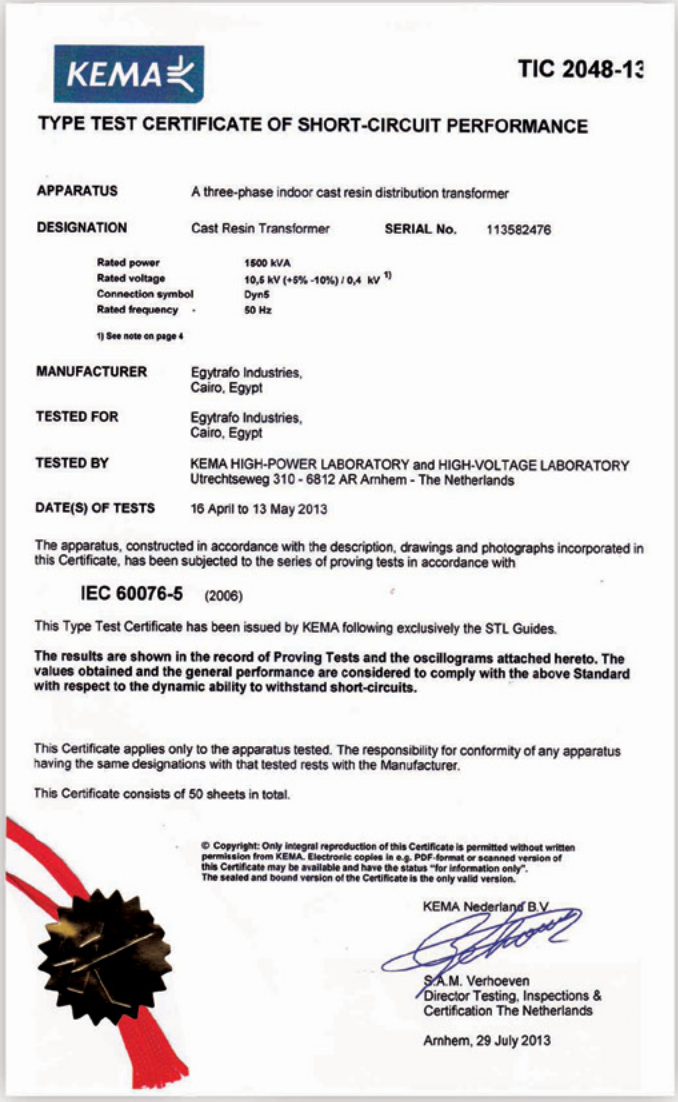
Type tests:

1- Temperature rise test.
2- Impulse test (ability to withstand lighting impulse).

Special tests:

1- Short circuit withstand test.
2- Sound level test (noise test).
3- Environmental, Climatic & Fire behavior test.

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



KEMA

TIC 2048-13

TYPE TEST CERTIFICATE OF SHORT-CIRCUIT PERFORMANCE

APPARATUS A three-phase indoor cast resin distribution transformer

DESIGNATION Cast Resin Transformer **SERIAL No.** 113582476

Rated power	1500 kVA
Rated voltage	10,5 kV (+5% -10%) / 0,4 kV 1)
Connection symbol	Dyn5
Rated frequency	50 Hz

1) See note on page 4

MANUFACTURER Egytrafo Industries, Cairo, Egypt

TESTED FOR Egytrafo Industries, Cairo, Egypt

TESTED BY KEMA HIGH-POWER LABORATORY and HIGH-VOLTAGE LABORATORY Utrechtseweg 310 - 6812 AR Arnhem - The Netherlands

DATE(S) OF TESTS 16 April to 13 May 2013

The apparatus, constructed in accordance with the description, drawings and photographs incorporated in this Certificate, has been subjected to the series of proving tests in accordance with

IEC 60076-5 (2006)

This Type Test Certificate has been issued by KEMA following exclusively the STL Guides.

The results are shown in the record of Proving Tests and the oscillograms attached hereto. The values obtained and the general performance are considered to comply with the above Standard with respect to the dynamic ability to withstand short-circuits.

This Certificate applies only to the apparatus tested. The responsibility for conformity of any apparatus having the same designations with that tested rests with the Manufacturer.

This Certificate consists of 50 sheets in total.

KEMA Nederland B.V.

S.A.M. Verhoeven
Director Testing, Inspections & Certification The Netherlands

Arnhem, 29 July 2013

5- Services and After sales services:

Our concept is to ensure safety, efficiency and prolonged life of the transformers, consequently reducing 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:
- Supervise the installation of the transformer at customer sites.
- Training customers on the operation and maintenance of transformers.
- Following up the status of the transformers under operation at customers sites.
- Providing the needed spare parts if requested.
- Providing periodic maintenance for the transformer at site.
- Performing site tests like Turns ratio and polarity , Insulation resistance
- Repairing transformers during and after warranty period at site and in our factory.
- Yearly maintenance contracts as per request.
- Engineering, design and upgrading of old transformers for replacement.

6- 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.

Eritrea - Ethiopia - Germany - Ghana - Iraq - Jordon - Kenya - KSA - Lebanon
Nigeria - Rwanda - Sudan - Syria - UAE - UK - Yemen

Branches and Agencies Abroad:
TRAFOTECH MANUFACTURING FACTORY – Mekelle – Ethiopia
GULF TEPCO Factory – El Maddinah El Monawara – KSA
Ambab Development Co. Ltd – Sudan (Distributer)

7- Quality Assurance & Achieved Certificates:

The quality assurance is systematically performed at all stages starting from the materials receive, production process up to final delivery and extended to after sales service.
All processes are 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.

Enjoy The Silence

EGYTRAFO

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