EGYTRAFO

Nickel Cadmium Batteries

Up to 800 AH

ISO 9001 OHSAS 18001 ISO 14001
РУССКИЙ РЕГИСТР
RUSSIAN REGISTER

Mission

Being market leader in manufacturing of transformers and Nickel Cadmium batteries and its services locally and globally.

EGYTRAFO

Objective

Maintain continual improvement in our business and manufacturing procedures with persistent staff development taking into consideration operational health and safety in all stages.

Vision

Customer focus through high quality and reliable products / services with competitive price and on time delivery.

PROUDLY MADE IN EGYPT مصر

E-4100-E-02-20

EGYTRAFO

Different Power Vission

Dear Group Members;
Dear Valued Customers;

First of all, I would like to thank EGYTRAFO's Group staff for their dedication and our clients whom we have been dealing with since 1979, for their trust and success that we have achieved, 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 began.

Our history started since we established our trading company ETCO in 1979 in which we were trading in electrical equipment as Transformers, HRC fuses, lighiting arrestors and Nickel Cadmium Batteries. Due to our strong beliefs towards the Egyptians' qualifications and the importance of locally produced products. EGYTRAFO Group was established in 1994 which became a leading manufacturer of Oil Transformers up to 15 MVA, 33KV and Nickel Cadmium Batteries up to 800 Ah

The success that EGYTRAFO Group 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 the first local Dry Type Cast Resin transformers factory in the Egyptian market that produce ratings up to 3.6 MVA,33 KV

In 2013, we have also established "TrafoTech manufacturing PLC" factory in Ethiopia for the production and maintenance of Oil Transformers.

As we always believe in meeting the market requirements, EGYTRAFO Group launched the first Off Load Auto Transformer in the Egyptian electrical network in 2013 due to the EDC complain of the voltage reduction in some locations in the network. Later on, in 2019, EGYTRAFO Group has improved its product by adding some features and now the product is an Automated Auto Transformer, providing an On Load Tap Changer that can be manually, remote and automatically operated.

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. 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 Group's main goal is to grow and expand our activities in order to increase its market share. We do believe that our mission never ends.

Grp. Chairman
Atef A. Moniem

Introduction

Nickel Cadmium batteries are the most reliable battery systems available in the market today. Their unique features enable them to be used in wide range of applications and different environments; therefore the nickel cadmium battery has become an obvious first choice for users looking for a reliable, long life and low maintenance system.

Retaining all the advantages arising since nearly 100 years of development of pocket plate technology topping-up with water is the only major maintenance requirement.

„Egytrafo Grp.„ Produces battery cells that fulfill all the requirements of IEC 60623.

Industry

Offshore oil & gas

Airports

Hospital

Utilities

Signaling

1- Nickel Cadmium Batteries:

Why Ni-CD Batteries?

- Advantages

1.1Complete Reliability:
The battery does not suffer from the sudden death failure associated with the lead acid battery.

1.2 Long Cycle Life:
The battery has a long cycle life even when the charge / discharge cycle involves 100% depth of discharge.

1.3 Exceptionally Long Lifetime:
A lifetime in excess of twenty years is achieved by the battery in many applications, and at elevated temperatures it has a lifetime unthinkable for other widely available battery technologies.

1.4 Low Maintenance:
With its generous electrolyte reserve, the battery reduces the need for topping-up with water, and can be left in remote sites for long periods without any maintenance.

1.5 Wide Operating Temperature Range:
The battery has an electrolyte which allows it to have a normal operating temperature of from -20 °C to + 50 °C (4 °F to + 122 °F), and accept extreme temperatures, ranging from as low as -50 °C (-58 °F) to up to + 70 °C (+158 °F).

1.6 Fast Recharge :
The battery can be recharged at currents which allow very fast recharge times to be achieved

1.7 Resistance to Mechanical Abuse :
The battery is designed to have the mechanical strength required to withstand all the harsh treatment associated with transportation over difficult terrain.

1.8 High Resistance to Electrical Abuse:
The battery will survive abuse which would destroy a lead acid battery, for example overcharging, deep discharging, and high ripple currents.

1.9 Simple Installation :
The battery can be used with a wide range of stationary and mobile application as it produces no corrosive vapors, uses corrosion-free polypropylene containers and has a simple bolted connector assembly system.

1.10 Extended Storage :
When stored in the empty and discharged state under the recommended conditions, the battery can be stored for many years.

1.11 Environmentally Safe :
Environmentally safe: More than 99% of NI-CD Battery can be recycled.

1.12 Low Life-Cycle Cost :
When all the factors of lifetime, low maintenance requirements, simple installation and storage and resistance to abuse are taken into account, the Egytrafo battery becomes the most cost effective solution for many professional applications.

2- Nickel Cadmium Batteries Types and Application:

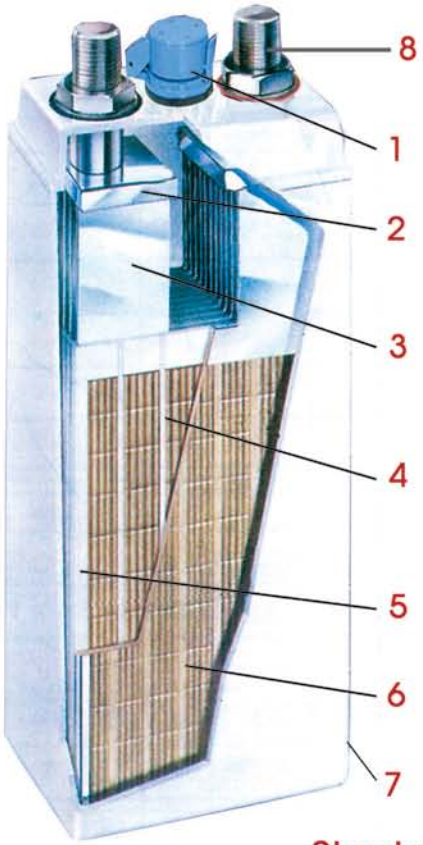
In order to provide an optimum solution for wide range of battery applications which exist , the battery is constructed in three performance ranges

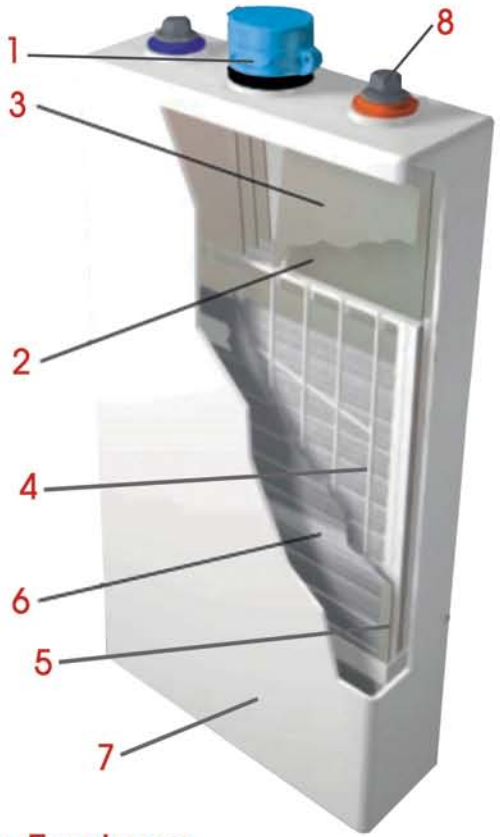
Egytrafo Battery Types	**L** TYPE (Low Discharge Current)	**M** TYPE (Medium Discharge Current)	**H** TYPE (High Discharge Current)
Characteristics	Low discharge current for long period (more than 5 hrs discharged)	Current discharge from 30 min to 3 hrs or mixed	Very thin plates & high current over short period <30 min starting
Use of battery	Power back up, bulk energy storage.	Power back up applications	Power backup applications
Application	Engine starting - Switchgear - UPS - Process control - Data & information systems - Emergency lighting - Security & fire alarm systems - Switching & transmission systems - Signaling		
Railways: intercity & urban transport	●	●	●
Stationary	●	●	●
Utilities: electricity , gas,water production distribution	●	●	●
Oil and gas: offshore & onshore petrochemical refineries	●	●	●
industry: chemical, mining , steel metal works	●	●	●
Buildings: public ,private	●	●	●
Medical: hospitals & X-ray equipment	●	●	●
Telecom: radio, satellite, cable, repeater stations, cellular base stations	●	●	
Railroad: substations & signaling	●	●	●
Airports	●	●	●
Military: all applications	●	●	●

3- Nickel Cadmium Batteries Construction:

Detailed Assembly Drawings:-

1	**Flame Arresting Vent:** Material Polypropylene
2	**Plate tab:** Spot welded to the plate side frames, to the upper edge of the pocket plate & to the plate group bus
3	**Plate Group Bus:** Connects the plate tabs with the terminal post plate tabs & terminal posts are projection welded to the plate group bus.
4	**Separating Grids:** Separate the plates & insulate the plate frames from each other. The grids allow free circulation of electrolyte between the plates
5	**Plate Frame:** Seals the plate pockets & serves as a current collector.
6	**Plate:** Horizontal pockets of double-perforated steel strip
7	**Cell Container:** Material Translucent polypropylene
8	**Terminal Seal:** The poles of the cell are connected (positive - negative)





Single Cell Construction Features

1- Pocket Plate:
- Positive plate: Nickel Hydroxide.
- Negative plate: Cadmium Hydroxide.
- Plates are welded to bus bar using spot welding method

2- Cell Container:
Polypropylene Container

3- Electrolyte:
- Consists of ptassium hydroxide, lithium, hydroxide and distilled water.
- Density (g/cm^3): High (1.2) & Low (1.17 - 1.19)

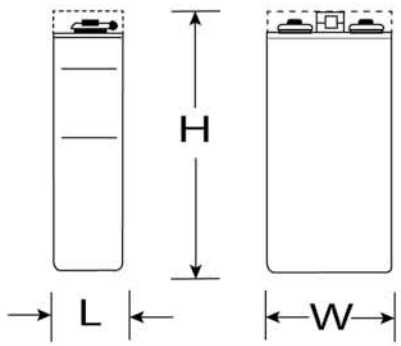
4- Vents:
Flame arresting vent to prevent external sparks so go through inside the cell.

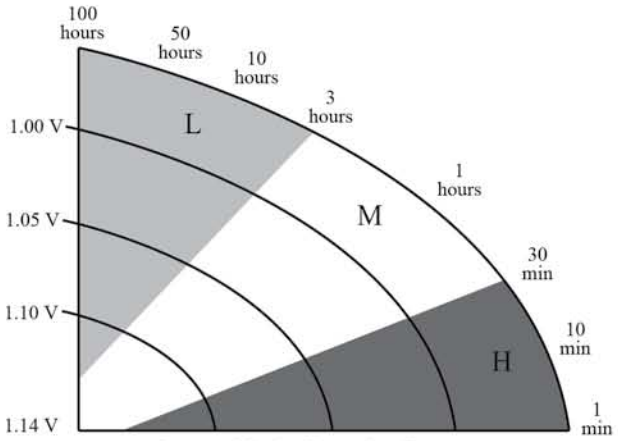
4- Nickel Cadmium Batteries Technical Description:

Technical Data Table & Specifications:-

Cell Type	Discharge				Charge			Dimensions				
	5 hrs capacity (Ah)	Nominal Voltage (V)	Rated Current (A)	End Voltage (V)	Charge Voltage (V)	Standard Charge Current(A)	Standard Charge Time (h)	App.Weight With Electrolyte (Kg)	Quantity of Electrolyte (L)	Length L (mm)	Width W (mm)	Overall Height H(mm)
KPL 70p	70	1.2	14	1.0	1.35 / 1.80	14	10	6.0	1.5	66	140	405
KPL 80p	80	1.2	16	1.0		16	10	6.64	2.5	68	192	358
KPL 100p	100	1.2	20	1.0		20	10	6.64	2.5	68	192	358
KPL 120p	120	1.2	24	1.0		24	10	7.23	2.5	68	192	358
KPL 160p	160	1.2	32	1.0		32	10	9.56	3.2	93	192	358
KPL 200p	200	1.2	40	1.0		40	10	10.2	3.4	93	192	358
KPL 250p	250	1.2	50	1.0		50	10	12.1	3.8	93	192	414
KPL 270p	270	1.2	54	1.0		54	10	12.1	3.4	93	192	414
KPL 300p	300	1.2	60	1.0		60	10	15.5	3.8	122	192	414
KPM 100p	100	1.2	20	1.0	1.35 / 1.80	20	10	6.5	2.1	75	140	405
KPM 160p	160	1.2	32	1.0		32	10	10.3	2.3	93	192	358
KPM 200P	200	1.2	40	1.0		40	10	12.3	2.7	93	192	414
KPM 250p	250	1.2	50	1.0		50	10	12.8	3.8	93	192	414
KPM 300p	300	1.2	60	1.0		60	10	16.7	3.8	122	192	414
KPM 400p	400	1.2	80	1.0		80	10	19.0	5.0	154	197	365
KPM 500p	500	1.2	100	1.0		100	10	23.1	6.25	190	197	365
KPM 600p	600	1.2	125	1.0		125	10	29.9	5.7	190	197	365

Other capacities more than 600 AH are available on request





General Selection of cell range

5- Operating Features:

5.1 Capacity :

The battery capacity is rated in ampere-hours (Ah) and is the quantity of electricity at +20 °C which it can supply for a 5 hour discharged to 1.0 V after being fully charged for 10 hours at 0.2 C_5 A. This figure conforms to the IEC 60623 standard.

5.2 Cell Voltage :

The nominal voltage is 1.2V.

5.3 Internal Resistance :

The internal resistance of a cell varies with the temperature and the state of charge or battery is a somewhat obscure property.

It is difficult to define and measure and to give accurate values that are practical use. It's no indication of the efficiency of the battery.

Varies with temperature & state of charging, could be measured for fully charged cells.

For lower state of charge, the values increases for cell 50% discharged, the internal resistance is about 20% higher.

When 90% is discharged, it is about 80% higher.

5.4 Effect of Temperature on Performance :

Variations in ambient temperature affect the performance of the cell and this needs to be taken into account when sizing the battery.

Low Temperature reduces the performance of the battery, while high temperatures effect is similar to normal temperatures.

5.5 Short-Circuit Values :

The typical short-circuit value in amperes for a battery cell is approximately:

L Type: 9 C

M Type: 16 C

H Type: 28 C

* C: Capacity in AH

5.6 Open Circuit Loss :

Loss is relatively rapid during the first 2 weeks, but then stabilizes to about 2% per month at 20 °C, which occurs due to the self-discharge.

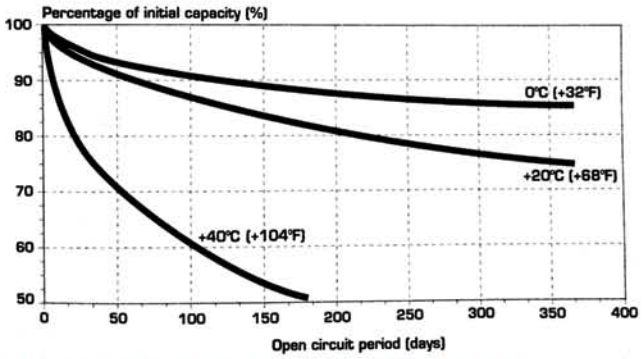


Figure 2: Capacity loss on open circuit stand

5.7 Cycling :

The block battery is designed to withstand the wide range of cycling behavior encountered in stationary applications.

The less deeply a battery is cycled the greater the number of cycles.

5.8 Effect of Temperature on Lifetime :

EGYTRAFO's Nickel Cadmium Batteries has 20 years of operation at normal conditions.

As temperature increases, the expected life time decreases. This effect on Nickel Cadmium Batteries is lower than that on lead acid one.

For every 10°C increase in temperature over normal operating temperature (25 °C), the reduction in service life for Nickel Cadmium Batteries will be 20% and for Lead acid 50%.

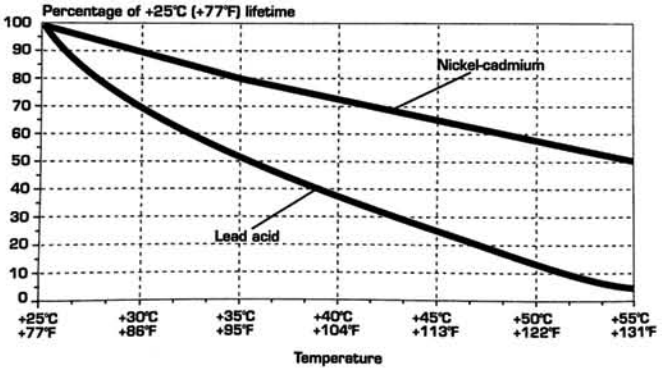


Figure 4: Effect of temperature on lifetime

6- Battery sizing principles:

The principle sizing parameters which are of interest are:

6.1 The Voltage Window :

This is the maximum voltage and the minimum voltage available to charge the battery, and the minimum voltage gives the lowest voltage acceptable to the system to which the battery can be discharged.

6.2 Discharge Profile :

This is the electrical performance required from the battery for the application.

6.3 Temperature :

The maximum and minimum temperatures and the normal ambient temperature will have an influence on the sizing of the battery.

6.4 State of Charge or Recharge Time :

Some applications may require that the battery shall give a full duty cycle after a certain time after the previous discharge. The factors used for this will depend on the depth of discharge, the rate of discharge, and the charge voltage and current.

6.5 Ageing :

Some customers require a value to be added to allow for the ageing of the battery over its lifetime (Such as 10% over).

6.6 Floating Effect :

When a NI-CD cell is maintained at a fixed floating voltage over a period of time, there is a decrease in the voltage level of the discharge curve begins after one week and reaches its Max. in about 3 months (It can be eliminated by a full discharge / charge cycle, it can't be eliminated by only a boost charge).

If the application has a particular recharge time requirement then this must be taken into account when calculating the battery.

7- Battery charging & discharging:

7.1 Charging Generalities :

The battery can be charged by all normal methods generally, batteries in parallel operation with charger and load are charged with constant voltage. In operations where the battery is charged separately from the load, charging with constant current or declining current is possible.

High-rate charging or overcharging will not damage the battery, but excessive charging will increase water consumption to some degree.

7.2 Constant Current Charge:

a) Charge for 10 h at 0.2 C_5 A recommended.

b) Discharge at 0.2 C_5 A to 1.0 V/cell.

c) Charge for 10 h at 0.2 C_5 A recommended

Note: At the end of the charge, the cell voltage may reach the level of 1.85 V per cell, thus the charger shall be able to supply such voltage.

When the charger maximum voltage setting is too low to supply constant current charging, divide the battery into two parts to be charged individually.

7.3 Constant Voltage Charge:

a) Charge for 30 h at 1.65 V/cell with current limited to 0.2 C_5 A.

b) Discharge at 0.2 C_5 A to 1.0 V/cell.

c) Charge for 30 h at 1.65 V/cell with current limited to 0.2 C_5 A or charge for 48 h at 1.55 V/cell current limited to 0.2 C_5 A.

7.4 Charging in Service:

7.4.1 Continuous Parallel Operation:

With occasional battery discharge.

Recommended charging voltage (+20 °C to +25 °C).

For two level charge:

Cell Voltage	Operating Voltages / Charging
1.2 V	Normal Voltage
1.47 - 1.7 (for L type) 1.45 - 1.7 (for M type)	Boost Charging
1.42 + 0.01 (for L type) 1.40 + 0.01 (for M type)	Float Charging

A high voltage will increase the speed and efficiency of the recharging

For Single Level Charge:

• Float level: 1.43 – 1.58 V/cell.

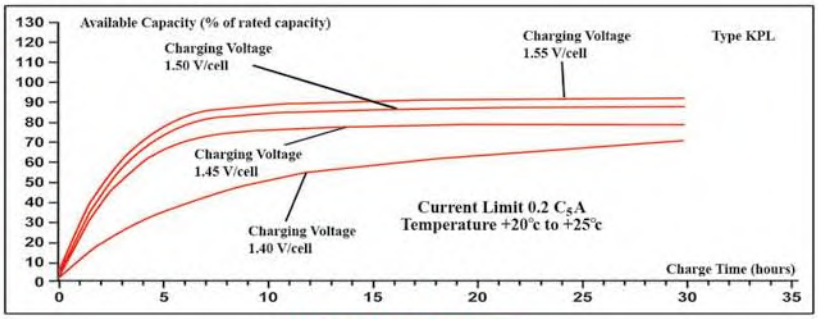
• Discharge the battery at the rate of 0.1 C_5 to 0.2 C_5 A (10 to 20 A for a 100 Ah battery) to a final end voltage of 1.0 V/Cell (i.e. 92 volts for a 92 cell battery).

• Measuring and recording current, voltage and time every hour, and more frequently towards the end of the discharge. This should be continued until a final average voltage of 1.0 V/ cell is (i.e. 92 volts for a 92 cell battery).

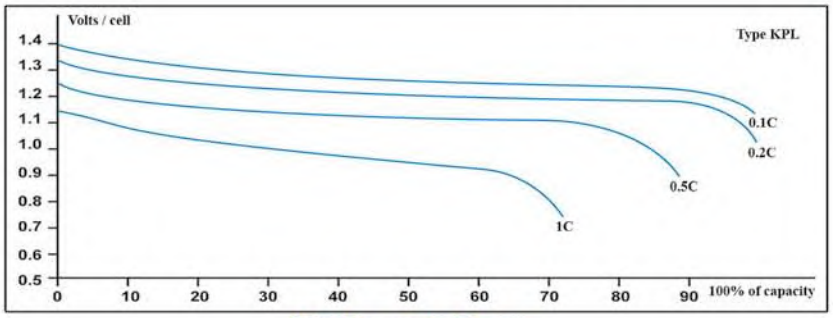
Charge & Discharge Curves:

The NI-CD battery will take 20 Hrs with current limit 0.2 C_5A to be in full charge.

KPL Type



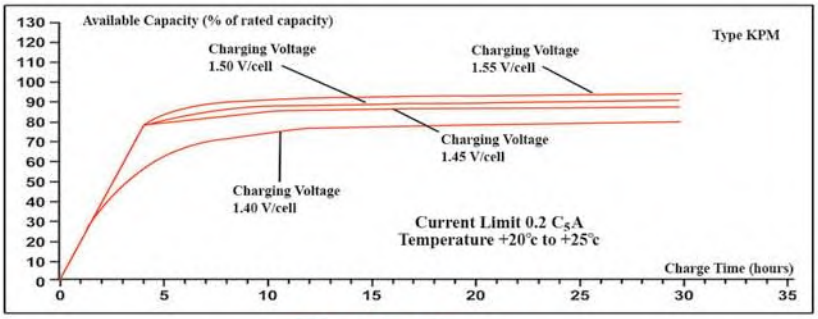
Charging Curves



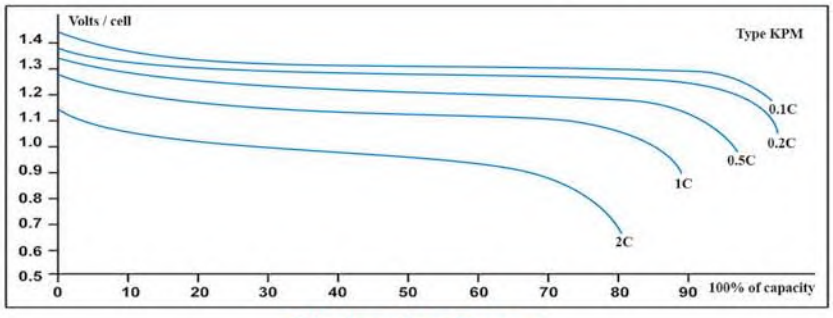
Discharging Curves

Figures (1) -Typical recharge duration for a fully discharged state for the L Type Cell.

KPM Type



Charging Curves



Discharging Curves

Figure (2) -Typical recharge duration for a fully discharged state for the M Type Cell.

8- Installtion, Operating Instructions & Maintenance:

Important Recommendations:

• Never allow an exposed flame or spark near the batteries, particularly while charging.

• Never smoke while performing any operation on the battery.

• For protection, wear rubber gloves, long sleeves, and appropriate splash goggles or face shield.

• The electrolyte is harmful to skin and eyes. In the event of contact with skin or eyes, wash immediately with plenty of water. If eyes are affected, flush with water, and obtain immediate medical attention.

• Remove all rings, watches and other items with metal parts before working on the battery.

• Use insulated tools.

• Avoid static electricity and take measures for protection against electric shocks.

• Discharge any possible static electricity from clothing and / or tools by touching an earth-connected part "ground" before working on the battery.

8.1 Storage:

Store the battery indoors in a dry, clean, cool location 10°C to + 30°C and well ventilated space on open shelves.

Do not store in direct sunlight or expose to excessive heat.

8.1.1 Cells Empty and Discharged:

• Egytrafo recommends to store cells empty and discharged. This ensures compliance with IEC 60623 section 4.9 (storage).

• Cells can be stored like this for many years.

8.1.2 Cells Filled and Charged:

• If cells are stored filled, they must be fully charged prior to storage.

• Cells may be stored filled and charged for a period not exceeding 12 months from date of dispatch from factory.

• Storage of a filled battery at temperatures above +30°C can result in loss of capacity. This can be as much as 5% per 10°C above + 30°C per year.

• When deliveries are made in the boxes, store without opening the boxes.

8.2 Electrolyte:

• Cells Delivered Filled and Charged:

Check the level of electrolyte. It should not be more than 20mm below the maximum level mark (upper). If this is not the case, adjust the level with distilled or deionized water. Cells delivered filled have already cell oil in place.

In case of spillage of electrolyte during the transport, the cells have to be topped-up with E22 electrolyte. Fill the cells about 20mm above the minimum level mark (lower) with electrolyte. Wait 4 hours and adjust if necessary before commissioning.

• Cells Delivered Empty and Discharged:

If the electrolyte is supplied dry, prepare it according to its separate instruction sheet. The electrolyte to be used is E22. Remove the transport seals just before filling.

Fill the cells about 20mm above the minimum level mark (lower) with electrolyte.

Wait 4 to 24 hours and adjust if necessary before commissioning.

8.3 Installation:

• Location

Install the battery in a dry and clean room.

Avoid direct sunlight and heat. The battery will give the best performance and maximum service life when the ambient temperature is between +10°C to +30°C.

• **Ventilation**

During the last part of charging, the battery is emitting gases (oxygen and hydrogen mixture) At normal float-charge the gas evolution is very small but some ventilation is necessary.

• **Mounting**

Verify that cells are correctly interconnected with the appropriate polarity. The battery connection to load should be with nickel plated cable lugs.

Recommended torques for terminal bolts are:

M6= 11 ± 1.1 N.m

M8= 20 ± 2 N.m

M10= 30 ± 3 N.m

The connectors and terminals should be corrosion-protected by coating with a thin layer of anti-corrosion oil.

Remove the transport seals and close the vent plugs

8.4 Commissioning

It is recommended that a good first charge should be given to the battery. This is a once only operation, and is essential to prepare the battery for its long service life. It is also important for discharged and empty cells which have been filled, as they will be in a totally discharged state. A constant current first charge is preferable and this should be such as to supply 200% of the rated capacity of the cell. Thus, a 250 Ah cell will require 500 ampere-hour's input, e.g. 50 A for 10 hours.

8.B- Servies & After Sales Servie:

Our concept is to ensure safety, efficiency and prolonged life of the NI - CD Batteries, consequently reduces operational risks.

Egytrafo can provide a comprehensive service and maintenance portfolio to support thier coustomers.

8.5 Periodic Maintenance

• Keep the battery clean using only water. Do not use a wire brush or solvents of any kind.

Vent plugs can be rinsed in clean water if necessary.

• Check the electrolyte level.

Never let the level fall below the minimum level mark (lower). Use only distilled or deionized water to top-up.

Experience will tell the time interval between topping-up.

• Check the charging voltage.

If a battery is parallel connected, it is important that the recommended charging voltage remains unchanged.

The charging voltage should be checked and recorded at least once yearly. If a cell float voltage is found below 1.35 V, high-rate charge is recommended to apply to the cell concerned.

• Check every two years that all connectors are tight. The connectors and terminal bolts should be corrosion-protected by coating with a thin layer of anti-corrosion oil.

• High water consumption is usually caused by high improper voltage setting of the charger.

Charging Electrolyte

In most stationary battery applications, the electrolyte will retain its effectiveness for the life of the battery.

However, under spicial battery operation conditions, if the electrolyte is found to be carbonated, the battery performance can be restored by replacing the electrolyte.

Environment & Safety

To protect the environment all used batteries must be recycle.

Contact your local Egytrafo Grp. representative for further information.

Quality Assurance & Achieved Certificates:

The quality assurance is systematically performed at all stages starting from the materials arrival, 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.

СИСТЕМА СЕРТИФИКАЦИИ РУССКОГО РЕГИСТРА
RUSSIAN REGISTER CERTIFICATION SYSTEM

CERTIFICATE

This is to certify that the Quality Management System of

EGYTRAFO

EGYTRAFO Group
Industrial Zone #4, Badr city, Egypt

has been assessed and found to be in accordance with the requirements of

ISO 9001:2015

in respect of Design, Development, Manufacturing and Sales of Oil Immersed Transformers and Dry Type Transformers - Manufacturing of Industrial Nickel Cadmium and Transformers Cores

No: 19.1112.026
of 1st July, 2019

This certificate is valid until 1st July, 2022

Director General of Certification
Association "Russian Register"

СИСТЕМА СЕРТИФИКАЦИИ РУССКОГО РЕГИСТРА
RUSSIAN REGISTER CERTIFICATION SYSTEM

CERTIFICATE

This is to certify that the Environmental Management System of

EGYTRAFO

EGYTRAFO Group
Industrial Zone #4, Badr city, Egypt

has been assessed and found to be in accordance with the requirements of

ISO 14001:2015

in respect of Design, Development, Manufacturing and Sales of Oil Immersed Transformers and Dry Type Transformers - Manufacturing of Industrial Nickel Cadmium and Transformers Cores

No: 19.1113.026
of 1st July, 2019

This certificate is valid until 1st July, 2022

Director General of Certification
Association "Russian Register"

СИСТЕМА СЕРТИФИКАЦИИ РУССКОГО РЕГИСТРА
RUSSIAN REGISTER CERTIFICATION SYSTEM

CERTIFICATE

This is to certify that the Occupational Health and Safety Management System of

EGYTRAFO

EGYTRAFO Group
Industrial Zone #4, Badr city, Egypt

has been assessed and found to be in accordance with the requirements of

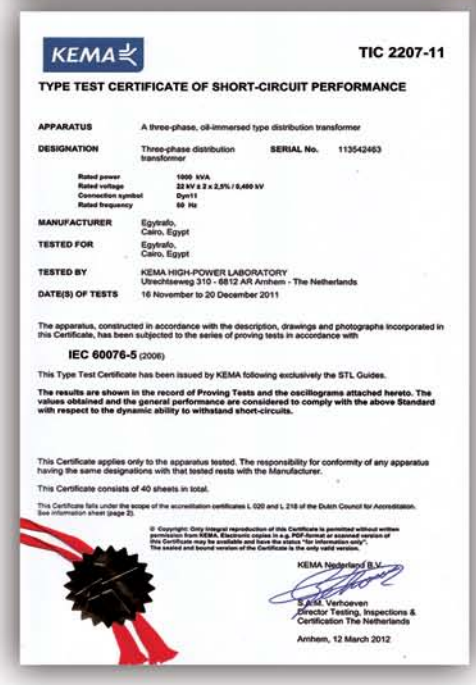
OHSAS 18001:2007

in respect of Design, Development, Manufacturing and Sales of Oil Immersed Transformers and Dry Type Transformers - Manufacturing of Industrial Nickel Cadmium and Transformers Cores

No: 19.1114.026
of 1st July, 2019

This certificate is valid until 12th March, 2021

Director General of Certification
Association "Russian Register"



KEMA

TIC 2207-11

TYPE TEST CERTIFICATE OF SHORT-CIRCUIT PERFORMANCE

APPARATUS	A three-phase, oil-immersed type distribution transformer
DESIGNATION	Three-phase distribution transformer — SERIAL No. 113542463
Rated power	1000 kVA
Rated voltage	22 kV ± 2 x 2.5% / 0.400 kV
Connection symbol	Dyn11
Rated frequency	50 Hz
MANUFACTURER	Egytrafo, Cairo, Egypt
TESTED FOR	Egytrafo, Cairo, Egypt
TESTED BY	KEMA HIGH-POWER LABORATORY Utrechtseweg 310 - 6812 AR Arnhem - The Netherlands
DATE(S) OF TESTS	16 November to 20 December 2011

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 40 sheets in total.

This Certificate falls under the scope of the accreditation certificates L 020 and L 218 of the Dutch Council for Accreditation. See information sheet (page 2).

KEMA Nederland B.V.

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

Arnhem, 12 March 2012

EGYTRAFO

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