



“Cast Resin Transformers (CRT)- The Path to a Greener Future”

By Paddy Padayachee
AMEU 2021



PADDY PADAYACHEE

CEO & FOUNDER

Paddy Padayachee is the founder and CEO of Revive Electrical Transformers, with firm knowledge of Design, Manufacturing and Distribution of Transformers-Oil , Dry Type & Mini Sub Stations.

As an engineer by trade and with more than a decade of successful Experience in the Engineering/manufacturing industry. Paddy worked for companies like Siemens and Eskom. Specializing in MV and LV switchboards, Motors, Transformers, Electronics, PLC, Hydraulics, Quality assurance and Design, He spent 4 years as an Eskom Quality Assurance Representative, 2 Years at Eskom Commercial MWP specialising on Transformer Procurement

He is also a Registered Professional Engineer with the Engineering Council of South Africa-ECSA Member of the South African Institute of Electrical Engineers-SAIEE. Member of the International Electro technical Commission (IEC), Member of the SANS 780 WG and Vice Chair Person of the AMEU Steering Committee

Revive Mini Substation Factory Johannesburg



Revive Transformer Factory - Midrand Gauteng



- Revive Electrical Transformers (Pty) Ltd is one of the leading manufacturer of Distribution Transformers & Mini Substations in South Africa up to 5MVA Oil and Dry Type Transformers
- With two manufacturing facilities in Gauteng, Steeledale and Midvaal South Africa
- Established in 1997, our company has grown tremendously along the way and acquired the knowledge and experience needed to make us experts in our field.
- Our business prospects are based on sound manufacturing and quality processes, a sound fiscal discipline, and a growing customer base.
- The company has been awarded various accreditations and conform to most local specifications and International requirements.
- Our customers include : Eskom, eThekweni Electricity, City Power, Siemens, ABB, Various Data Centres, Various Solar IPPs, Various Contractors, BPC and More.
- Product Design, Quality, Delivery and After Sales Service is paramount to our organization.

- *Revive is a local Hi Tech Cast Resin Transformer Manufacturer in South Africa certified to international standards SANS 60076-11”*
- *We Design and Manufacture Cast Resin Transformers for the South African Conditions*

ACCREDITATION

- ▶ ISO 9001 Quality Certification
- ▶ SANS 780 - 2021 - Oil Filled Transformers
- ▶ SANS 60076 Dry Type Transformers
- ▶ ISO 18001 & ISO 14001 SHEQ
- ▶ Member of the SAIEE
- ▶ Member of the Electrical Contractors Association/Board
- ▶ Engineering Council Of South Africa Membership
- ▶ Member of the Alberton Chamber of Commerce
- ▶ CIDB Level 6EE
- ▶ **Approved Level 1 BBBEE**
- ▶ SABS, Eskom & Municipality Approved Manufacturer of Distribution Transformers & Mini Sub Stations - up to 5MVA in South Africa



SABS

Permit to Apply Certification Mark

Subject to the provisions of the Standards Act, 2008
(Act 8 of 2008), the relevant regulations made thereunder and the permit
conditions contained in the under mentioned schedules, this permit authorizes

**REVIVE ELECTRICAL TRANSFORMERS
(PTY) LTD
Co Reg. 1996/009036/07
JOHANNESBURG**

to apply the certification mark



in respect of the mark specification:

**SANS 60076-11:2020
TO: POWER TRANSFORMERS
PART 11: DRY-TYPE TRANSFORMERS**

This permit, including schedules 1 to 3 which form an integral part thereof;
- is issued without alteration;
- is identified by the applicable permit number;
- is subject to any condition or limitation contained therein;
- is valid subject to ongoing compliance with permit conditions;
- bears the embossed SABS Commercial seal. In the absence of the
seal, the permit and the schedules shall be invalid; and
- the permit may be authenticated by referring to the register of
"Certified Clients" on the SABS Commercial website (www.sabs.co.za)

Permit Number 10505/16533

Effective Date 01 February 2021

Expiry Date 24 February 2024

Date of Original Registration 25 February 2015

Chief Executive Officer 



SABS COMMERCIAL SOC Ltd.
1 Dr Lategan Rd, Groenkloof, Pretoria,
Republic of South Africa

“Cast Resin Transformers (CRT)”

Distribution of Cast Resin Dry-Type Transformers (CRT) has been around for the last 30 years in Europe and has been used for various types of applications and installations.

Cast Resin Transformers are a relatively new product in South African market with limited information regarding CRT. This article will hopefully inform the general engineering community and assist engineers, projects leaders, buyers and contractors with the decision on:

“The path to a greener future using Cast Resin Dry Type Transformers in South African Installations”.

“Cast Resin Transformers (CRT)- The Path to a Greener Future”

South African Designers & Engineers are accustomed to Oil Filled Transformers and are aware of all the benefits as well as typical issues with Oil Filled Transformers. We all know that Oil Filled Transformers are able to withstand the extreme Weather and Grid conditions which our transformers are exposed to in Southern Africa.

Oil Filled Transformers have fulfilled its needs for an extended period of time.

In saying this, we have all experienced oil leaking transformers, oil and insulation degeneration, faulty protection (Buchholz, PRV, OTI), **Fire**, explosions and more. Most of the above mentioned can be avoided by choosing CRT's.

“Cast Resin Transformers (CRT)- The Path to a Greener Future”

Distribution CRT's (100kVA-5MVA up to 33kV) basically consist of the same basic components as an Oil Filled Transformer. It has a Magnetic Core, LV Winding and MV Winding. The only difference is that it has Resin encapsulated windings and Air that is used instead of Oil as the main insulation and cooling medium for the transformer. This is exceptional news, **“no oil means no leaks which means no fire”**, this means **“Going Green Technology”**, with no fire hazards due to its self-extinguishing medium used in CRT, and conformance to other SHE requirements, saving installation costs on a new project. The fact that there is no oil to worry about, also makes life easier as the regular maintenance regarding Transformer oil is no longer needed. Oil transport and on-site oil filling is also taken out of the picture. Oil Bund walls are not needed to contain oil spills. It also assists with any Safety and Environmental issues that might be regulatory or required by specific projects or clients. Insurance costs for installation of CRT in every high-risk areas should be much lower in such installations because of the low risk of fire hazard. Examples are Power Stations, Sub Stations, Hospitals, High Rise Buildings, Shopping Malls, Solar and Wind Farms etc.

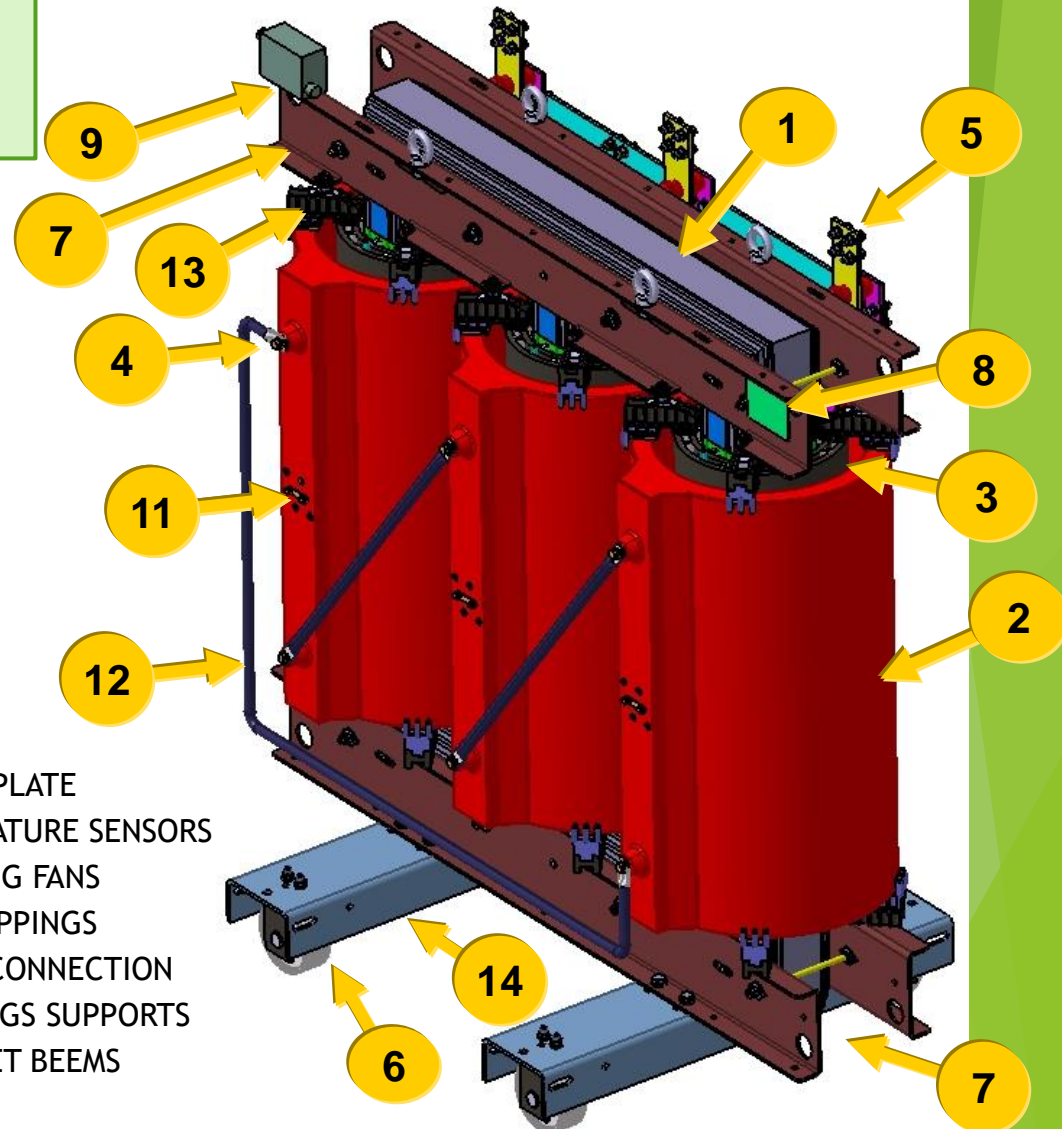
Cast Resin Transformer and Components

The Cast Resin Transformer is composed of three main components: H.V. Winding, L.V. Winding and Magnetic Core, and can be equipped with many accessories according to requirements.

- 1) MAGNETIC CORE
- 2) H.V. WINDING (CAST RESIN)
- 3) L.V. WINDING (Resin Impregnated)
- 4) H.V. TERMINALS
- 5) L.V. TERMINALS
- 6) SCROLL WHEELS
- 7) CORE CLAMPS



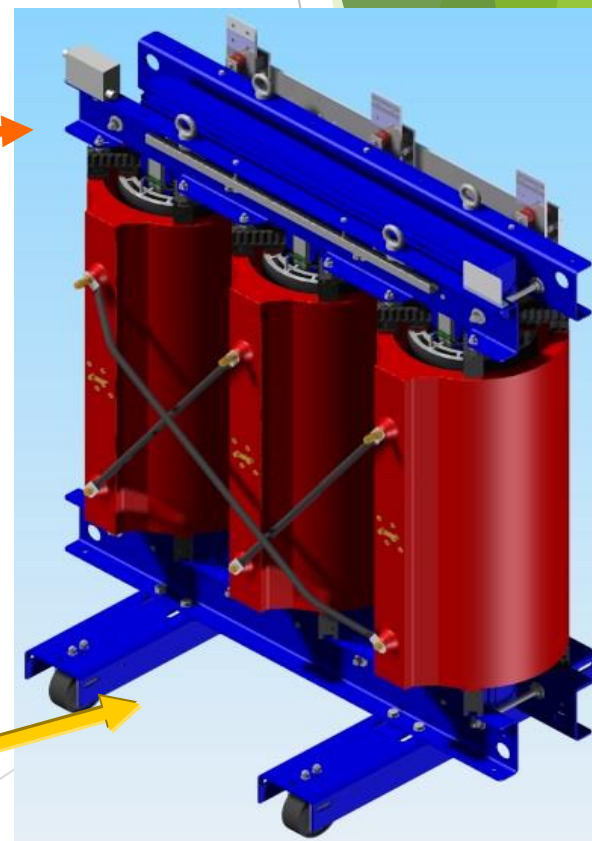
- 8) RATING PLATE
- 9) TEMPERATURE SENSORS
- 10) COOLING FANS
- 11) H.V. TAPPINGS
- 12) DELTA CONNECTION
- 13) WINDINGS SUPPORTS
- 14) BASEMET BEEMS



“Cast Resin Transformers (CRT)- The Path to a Greener Future”

CRT’s protection system easily monitors the temperatures of windings during normal operation. This is easily done with a simple thermal protection device connected to thermo couples. The thermal protection device is set to the needed values (according to insulation class and manufacture) and can provide an Alarm and Trip signal should these values be reached. In addition to the above, Fans could be added to the thermal protection device should it be desired to control the Transformer temperature.

Cast Resin Transformers: Installation and Protection



TEMPERATURE PROTECTION

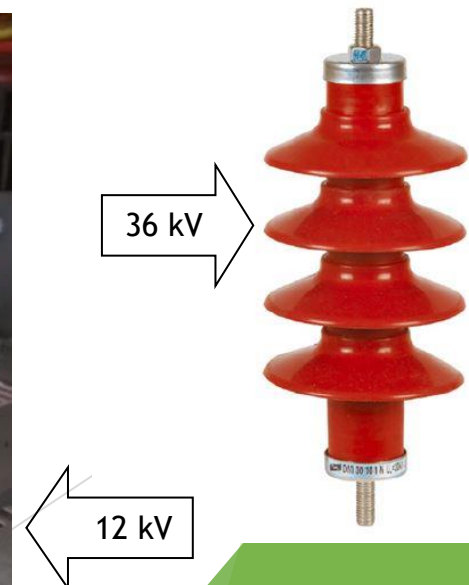


Cast Resin Transformers: Installation and Protection



SURGE PROTECTION

For Cast Resin Transformers the most adopted protection system for over voltages are the surge arresters. The selection has to be related to the Neutral Earthing Systems (low - medium or high) adopted in the supplying line.

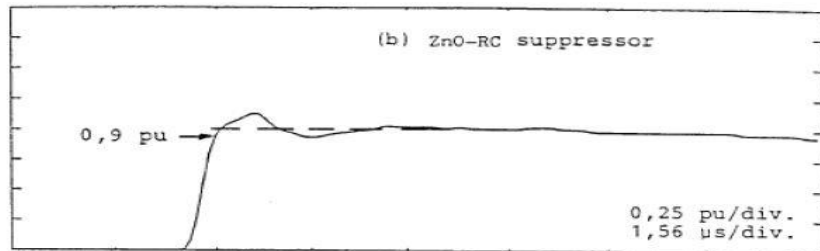
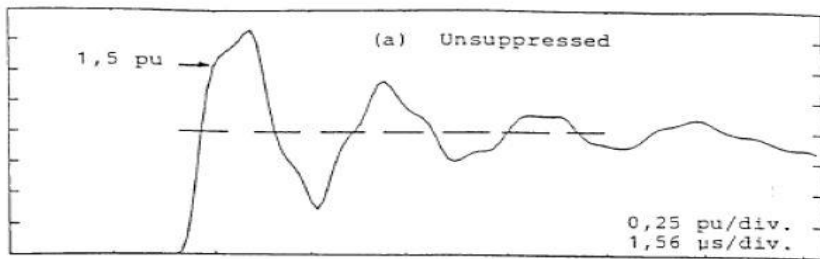




Impulse Test
conducted at
Revive Factory

Cast Resin Transformer frequent Energization Protection

For frequent energization (*more than 2 a month*) it is strictly recommended to use the voltage spike Suppressor.



11kV CONNECTION MODEL FOR DUAL RATIO CRT

AUTHORISED BY: P PADAYACHEE

COMPILED BY: Z VAN ROOYEN

Ref No: RET - 11kVCMDRCRT

Rev No: 0

Date: 17/05/2019



11kV CONNECTION CONFIGURATION

E and F must be kept closed/connected on all Limbs/Phases.

A and C, D and B Busbars must be removed/disconnected on all Limbs/Phases.

⚠ WARNING! ⚠

To obtain the needed **11kV +/- 2 x 2.5%** Voltage using the Tap Links, both Tap Links (Top and Bottom) must be at the exact same position (Tap) for each Limb/Phase.

Tap Link Connections:

- Tap 1: 3 - 4
- Tap 2: 3 - 6
- Tap 3: 5 - 6
- Tap 4: 5 - 8
- Tap 5: 7 - 8

⚠ WARNING! ⚠

'Any reconfiguration or Tap changing works, must be conducted when the Transformer is de-energized and earthed.'

Kindly refer to Manual for any other information needed.



“Cast Resin Transformers (CRT)- The Path to a Greener Future”

With reference to the installation of CRT's, there are some key factors to consider, CRT's is IP 00 and all electrical connections are exposed and thus carries a risk of environmental exposure and contact. It is recommended that the installation area is assessed to ensure all the needed ventilation and safety requirements are met. As the CRT's use natural air as cooling, it is very important to consult with the manufacture to ensure there is sufficient natural/forced air flow in the area with old or new installations. If needed, CRT's can be built into enclosures suited for the needed application, even for outdoors. Should the unit be installed in an area exposed to Lightning, it is recommended that suitable lightning arrestors are installed on the main incoming MV line. Should the MV Switch Gear be installed in close proximity to the CRT, it is highly recommended to install a Surge Suppression device to assist with unwanted Switching Over Voltages.

CRT's are basically maintenance free. Minor inspections/checks and cleaning is all that is needed to successfully maintain CRT's. Manufactures will usually assist with the maintenance when requested. To replace critical parts also become a lot easier as all the major parts can be replaced quite easily and quickly should it be required.



SUBSTATION SUBSTASIE

WARNING
DANGER OF ELECTRIC SHOCK
DO NOT TOUCH THE ELECTRICAL PARTS
UNLESS YOU ARE A QUALIFIED PERSON
AND YOU HAVE TAKEN THE NECESSARY PRECAUTIONS

CAUTION
DANGER OF ELECTRIC SHOCK
DO NOT TOUCH THE ELECTRICAL PARTS
UNLESS YOU ARE A QUALIFIED PERSON
AND YOU HAVE TAKEN THE NECESSARY PRECAUTIONS

EMERGENCY TELEPHONE NO.

WARNING
DANGER OF ELECTRIC SHOCK
DO NOT TOUCH THE ELECTRICAL PARTS
UNLESS YOU ARE A QUALIFIED PERSON
AND YOU HAVE TAKEN THE NECESSARY PRECAUTIONS

CAUTION
DANGER OF ELECTRIC SHOCK
DO NOT TOUCH THE ELECTRICAL PARTS
UNLESS YOU ARE A QUALIFIED PERSON
AND YOU HAVE TAKEN THE NECESSARY PRECAUTIONS

LIFTING POINT

“Cast Resin Transformers (CRT)- The Path to a Greener Future”

Revive Distribution CRT's have been successfully installed and used in South Africa in the last \pm 5 Years in various industries like: Mining, Data Centers, Renewables, Municipal, Commercial, Industrial and Telecommunication. All these applications require special specifications for the needed application to suit the needs of the project or client. It is advisable to consult with the manufacturer and provide as much information as possible regarding the project, to allow the manufacturer to review the requirements and to design to the international specifications (IEC/SANS 60076-11:2018) or project/client specifications. Consultants need to familiarize themselves on differences in the type test requirements specified for CRT transformers, as compared to oil filled transformers specified in IEC/SANS 60076-1.

Cast Resin Transformers: Installation sites

Cast Resin Transformers are suitable for almost all kinds of applications and may require the addition of an enclosure, temperature protection, cooling fans and surge protection:

Example:

- very hot or very cold environments;
- high pollution environments (*mines, construction sites...*);
- marine environment (*offshore wind farms, coastal applications...*);
- environments with high temperature range between day and night (*PV plants in deserts...*).



Revive CRT installation for Data Centre





REVIVE LOCALLY BUILT COMPLETE 33kV SOLAR INVERTER SUB STATION





New solar Plant in Lesatsi Bloemfontein Using Revive Dry Type Transformers

Wind and Solar PV Farm Applications



- ☐ In the wind turbine, particularly in large wind generators
- ☐ Inside the pole, on the ground floor
- ☐ Beside the pole, in a specific housing



Revive CRT Indoor Sub Station



“Cast Resin Transformers (CRT)- The Path to a Greener Future”

As with all things in life there are advantages and disadvantages. When considering your next Distribution Transformer keep the **advantages** of CRT's in mind:

- Environmentally Friendly
- Fire/Flame Retardant
- Can easily be designed and Installed according to needs
- Compact Dimensions
- Easy to perform Maintenance and visual checks.
- CRT's can be recycled if needed
- Low installation cost
- Low noise levels
- High Efficiency
- Lower insurance costs
- Small Footprint in installation
- No Contamination as there is no Mineral oil use.
- No need for oil protection Bund Walls.
- Easy visual Inspections of windings and assembly during Manufacture, Testing and Commissioning.

Oil Transformers are destroyed
and continue to burn when a fire occurs



Cast Resin Transformers: Classes Selection

It is clear that there is no universal Cast Resin Transformer good for all applications, but design and materials have to change in order to match requested features for each application.

It is extremely important to specify the actual requirements to avoid expensive design mistakes !

There's no need to ask for **C2 classification** (or Higher) when the transformer will not perform well in this environment.!!!



This CRT was F1 , but the cabin was not !!!!



C2 or higher is ONLY for cold countries - so please specify level of protection!

ENVIROMENTAL TESTS CONDUCTED ON CRT AT CESI LABOROTARY IN ITALY



Cast Resin Transformer under test at CESI for Environmental Class classification. E3 class grants transformer operation in ambient with very high pollution and humidity.

Transformer working in really cold environment. C2 class grants Cast Resin Transformer operation with very low temperatures (up to -25°C).



Cast Resin Transformer before and after F1 Test. F1 class grants a lower flammability and reduced combustion.

5 MVA Dry Type CRT verses OIL



Revive Oil Transformer Installation at a food processing plant





Revive CRT Assembly Plant

Revive Dry Type Transformer Factory in Gauteng South Africa

Acknowledgement



AROUND THE TABLE FROM LEFT

Yours Truly Paddy Padayachee- CEO, Romano Alloy Magnetic Core -CEO
Sumeshan Padayachee - MD, Teresio Barra -Conductor supplier, Dr Franco Marini -Dry Type
Consultant

Paddy in Action



“Cast Resin Transformers (CRT)- The Path to a Greener Future”

CONCLUSION:

Oil Filled Transformers will never be completely replaced in South Africa. However, from the above information provided, we hope you will consider CRT's.

They have a smaller environmental footprint with various other added advantages as explained. An added advantage is that you will save on your maintenance cost of your project in the long run and **Lead to a greener world for future generations to come.**



GET IT IN TOUCH



Address

27 Waterval Road Kliprivier
Johannesburg, South Africa
26°25'42.3"S 28°05'06.3"E

Social Media

Skype.com/Reviveelectrical
Linkdin.com/Reviveelectrical

Paddy Padayachee

Direct: +27 82 560 8953

Phone 1: +27 87 135 0149

Phone 2: +27 11 613 1508

Fax 1: +27 10 020 0852

Fax 2: +27 11 613 1510

Email: revive.global@ret.co.za

For further information please
contact Paddy Padayachee @
+27825608953 or Zander van
Rooyen @ +27767513386

THANK YOU!

