

# TUNISIE TRANSFORMATEURS S.A

## CAST RESIN TRANSFORMER

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# **CAST RESIN TRANSFORMER**

## **1- REGLEMENTATION**

The law of 18 October 1977 modified by law of 16 th of July 1992 stating the security for the construction of high building and their protection against the risks of fire and dangers which must be avoided and the use of the transformers whose dielectrics is superior to 25L capacity.

Implicitly, this reglementation impose the use of the cast resin transformer in these building and in all places where the security of the persons and their belongings is at state; such as; building, hotel, school, cinema, etc.

## **2- SECURITY**

The recommendation concerning the security of the properties, the persons, and the environment implies the use of the cast resin transformer in all the places where human life may be in danger such as hotels, high building, schools, hospital etc.

## **3- RESIN QUALITY**

The resin provides to this type of transformer a sufficient security, which is recommended by the regulation.

As this transformer is without an inflammable substance such as the oil it avoids any possibility of a danger whose cause is toxic gas release, the transformer explosion and the possibility of fire spreading due to probable oil, leakage or to an over temperature rise.

The good resistance of the resin to chemical and corrosive factors of which gives to this transformer the possibility to be installed in different areas. Without oil and eventual gas release, the cast resin transformer does not pollute environment where it is installed.

The resin, is considered as a material class 3, consists an anti fire barrier. Not only it protects the transformer but it stops fire spreading.

## **4- CONCEPTION**

The conception of its winding in oil and in a separated bloc will allow a good mechanical resistance against any short circuit.

Consequently, a long durability is assured.

Being in separated bloc and without oil, the cast resin transformer maintenance cost is reduced.

The resin is waterproof; it protects efficiently the active part against all humidity effects. All insulation materials are of type **F** and **H**.

### **5- THERMAL EXCHANGE**

The resin has a coefficient of thermal exchange higher than that of the oil in a way it reduces the internal temperature rise of the transformer and better (ameliorate) the transformer efficiency

### **6- ELECTROMAGNETIC DISTORTION**

The active parts being encapsulated in resin reduces the distortions of electrical characteristics due to magnetic phenomena. This transformer is recommended for computer use or where there is a need for low electrical distortion such as, operator room, telecommunication centers.

### **7- NOISE**

The active parts being encapsulated in the resin, are solidly fixed. The resin reduces the vibration and consequently the losses due to these phenomena :

- Magnetic losses of -10%,
- Noise reduction of -10 db

### **8- VENTILATION AND COOLING SYSTEM**

A cooling air supply must be provided or transformers placed in a metal enclosure.

A good ventilation system has to permit the entrance of fresh air from a "S" section placed on the base and the exit of warm air from "S" section placed on the top of the opposite side at "H" height from the centre.

### **FORMULA**

P= Transformer total losses (in kW)

S= Entry surface (without possible grate) in sq. mt.

S1=Exit surface (without possible grate) in sq.mt.

H= Distance between the two surface in mt.

$$S = \frac{0,1888 P}{V^2 H} \quad S1 = 1.10 \times S$$

If a sufficient cooling surface cannot be provided, it is a necessary to employ a mechanical activated means of ventilation.

The airflow should be 4.5 m<sup>3</sup> per minute for each kW loss, which corresponds to an air temperature rise of 12°C approximately.

Generally, the cooling system of the transformer is Air Natural (**A.N**). In this case the nominal power is equal to the indicated power. Under a cooling system A is forced, the power of the transformer can reach 1.4% of the nominal power.

In the cooling system (A F), the transformer needs 4.5m<sup>3</sup> /minute per kW of the nominal losses.

## Cooling Systems

### 9 – OVERLOAD

Our transformers design allow to bear overload conditions shown in the diagrams have below, according to average ambient temperature

PN: nominal power

PV: on load power

P: overload power

OVERLOAD

10 – INSTRUCTION, SUGGESTION, AND PRECAUTION FOR CAST RESIN TRANSFORMER INSTALLATION AND MAINTENANCE:

The cast resin transformer is easy to install and its maintenance is reduced to the lowest. Before power feeding the transformer we invite you to check the following:

- ◆ Windings shall not be moved and compression bolts shall be correctly Placed on the upper supports.
- ◆ Connections between M1 cables and their related insulators and Connections between cables or LV bars and their related transformer plates Shall be performed.
- ◆ The tapping plates shall be correctly set on all the three phases.
- ◆ The distance between the cast coils or the points under voltage of the Transformer and the cell walls shall not be lower than the following values:  
Class 12 kV: mm. 130  
Class 17.5 kV: mm. 150  
Class 24 KV: mm.220

Periodically check that:

- The thermometer, or whatever thermal control device, shall be perfectly working since temperature is important for resin lifetime.
- Check again all connections.
- Check that no cracking is found on the external surface of the coils.

### **ATTENTION!!!**

- The cast resin winding are not guarantee protection against contact.

### **CONCLUSION**

The choice and the chemical, physical composition of the resin are made in function with environment (tropical, temperature) and insulation class .The resin makes the transformer fire resistant.

Regulations enhance the use of the cast resin transformer for its security and protection of persons and properties – article GH41. 1992

It does not pollute the environment where it is installed, it is recommended for all ISO 14000 locations.

The regulation on the one hand and security recommendation on the other hand make this transformer the ideal equipment of electrical distribution in the specific locations.