

CRT

Cast Resin Transformers



Tadeo Czerwony Tesar





Since their appearance and introduction in the electric market, Cast Resin Transformers (CRT) have acquired an important position in every sector due to:

- The use of special epoxy self-extinguishing resins which are flame retardant and also very stable during service, complying with E2 C2 F1 classification.
- Less inorganic content as compared to the oil-based transformers.
- Highly resistant structure in front of short-circuits and non-higrosopic windings.
- Easy placement in all types of indoor installation, making it recommended for strategic uses.

STANDARD FITTINGS

- Off-load tap changer (OFTC) with $\pm 2 \times 2,5\%$ steps, on high voltage (HV) side.
- Primary terminals for easy wire connection.
- Secondary terminals for bar connection.
- Hoisting eyebolts.
- Grounding terminals.
- Bidirectional wheeled-wagon
- Specifications plate.
- Acrylic covers on each OFTC
- Set of 3 PT-100 thermoprobes wired to a Terminal box.

OPTIONAL FITTINGS

Upon client request, CRT's can be provided with:

- Electronic thermometric Unit (TMU), different types.
- Forced air cooling system to increase available nominal power.
- Terminal box for auxiliary circuits.
- Protective cabinets to comply with Ingress Protection standards (IP21, IP23, IP31 and Outdoor).
- Bimetallic terminal adaptors, since main terminals on LV side are in aluminium.
- 7 points Off-load tap changer switch with $\pm 3 \times 2,5\%$ steps, other options on request.
- Electrostatic shields.
- 4th. PT-100 thermoprobe to measure room or core temperature.
- Zinc smithy.
- Special wooden packing.
- Polymeric arresters.
- Other requirements will be evaluated by our Engineering Department.

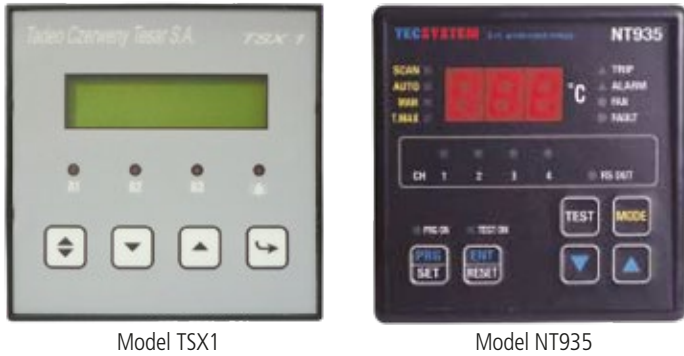


Figure 1

- Temperature Monitoring Unit (TMU) fully programmable with alarm, trip and forced ventilation outputs (Figure 1). If necessary, it also handles installation room blowers.

The basic provision includes three (3) Pt100 sensors to be installed inside pre-conceived ventilation channels in each LV winding. A fourth Pt100 thermal probe is also available upon request for:

- a) monitoring room temperature and eventually to drive room blowers or
- b) to check Transformer core's temperature.

More sophisticated monitoring units are available in the market, like TMU that handles six (6) Pt100 sensors and TMU that can integrate measurements and signals sending them to a Control/Monitoring PC or a SCADA system.

REMARKABLE ADVANTAGES

- Compact design, requiring no important surfaces for installation if compared to oil filled transformers type.
Very easy to install; they can be directly placed close to the load, without the need for conditioning and space installations, like: tanks, flame arrestors and/or space foundations.
- Very low risk of fire due to the usage of self-extinguishing materials, which require no special fire precautions.
- Since cooling fluid is not used, they require very low maintenance; only cleaning and periodical adjustment of connections. For indoor clean facilities, they can be considered maintenance-free.
- Important nominal power reserve. The adding of forced ventilation, acting directly on HV and LV windings, allows an increase of up to 25% in the original plate capacity. For other rates, please contact us.
- Due to their nature, the manufacturing materials are environmental-friendly and their behaviour towards fire, caused by an external source or by internal electrical arcs do not produce toxic gases and just a minimum amount of smoke.
- Extra capacity during temporary overcharges. Their windings design with low current density and the use of resins with high mechanical resistance and optimum temperature behaviour, allow higher capacity to withstand short-period overcharges.
- Two important parameters to consider when analysing Overcharges for CRT transformers are room temperature and loading status prior to overcharge. (Figure 2)

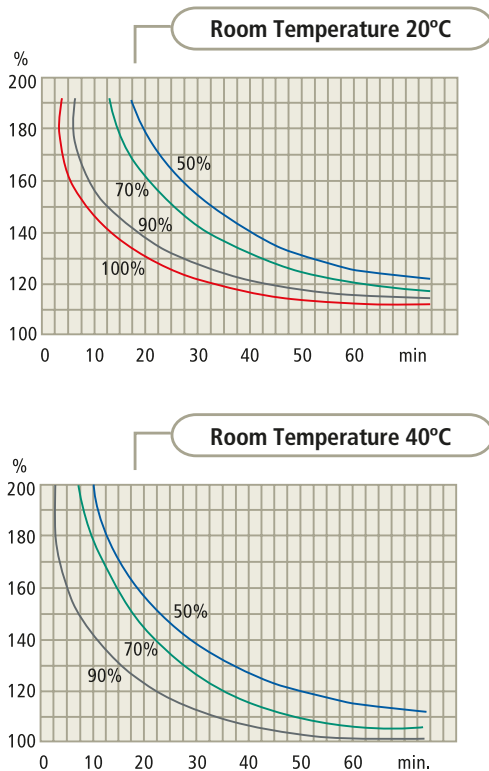


Figure 2

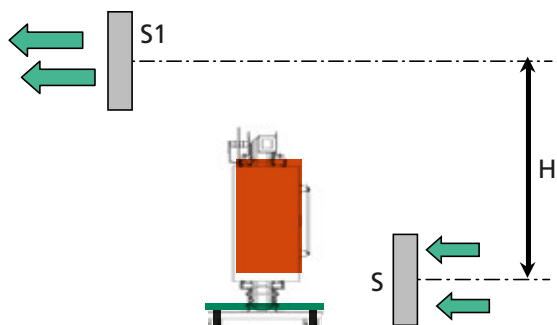


Figure 3

INDOOR INSTALLATION (Figure 3)

To be able to use the maximum capacity of the transformer, the installation room must have a fresh air inlet through a lower ventilation window S (m²) and a hot air outlet through a higher ventilation window S_1 (m²). S_1 must be located on the opposite wall and at a certain height H (m).

Being P , transformer total losses (in kW), they should verify:

$$S = \frac{0,188 \times P}{\sqrt{H}} \quad S_1 = 1,10 \times S$$

H (m): Diferencia de altura entre S y S_1 .

If required natural ventilation is not possible, forced ventilation must be provided. This should be able to remove 4,5 m³/min of air for every kW of transformer total losses.

To drive this ventilation system, one option is to use the fourth Pt100 sensor.

ELECTRICAL DISTANCES

The minimum distances from the windings to the security enclosure should be as follows:

ISOLATION TYPE	MINIMUM DISTANCE IN mm
15 kV	220
36 kV	320



2000 kVA 13,2 ± 2 x 2,5 % /0,4 kV/kV



1250 kVA 33,0 ± 2 x 2,5 % /0,4 kV/kV

CLASSIFICATION E2 C2 F1

The European standard, handled by the CENELEC (Comité Européen de Normalisation Electrotechnique), for dry type transformers covers these aspects:

- Humidity, condensation and pollution
- Ambient temperature (indoor and outdoor conditions)
- Emission of toxic fumes in the event of pyrolysis or combustion
- Flammability or better still self-extinguishing properties when exposed to external flames.

E2: Frequent condensation and high pollution or a combination of both.

C2: Operation, transport and storage at ambient temperatures down to -25°C; installation outside.

F1: Risk of fire exists, limited flammability is acceptable. Self extinguishing of the fire must occur within 60 minutes following the start of the special test in accordance with appendix Z.C.3 as per HD 464 S1; materials must be free from halogens; emission of toxic substances and thick smoke must be reduced to a minimum.

Only Certificates issued by International and approved Laboratories, validate the compliance with this important classification.

We reserve the right to modify the values herein this document without prior notice.



Technology and Special Designs

Tadeo Czerweny Tesar S.A. produces a wide variety of CRT transformers using high technological and guaranteed quality components to provide an excellent uninterrupted service, and therefore an improved return on investment (ROI).

The whole casting process of the windings is performed in modern installations automatically controlled, with hardware and software of latest generation.

Raw materials and supplies used to build the electrical windings are premium class and submitted to strict tests during Suppliers' selection and their reception at Industrial Plant.

High Voltage windings (figure 4) and Low Voltage windings (figure 5) are manufactured using the most advanced Foll Winding Machines.



Application for electrical excitation circuits

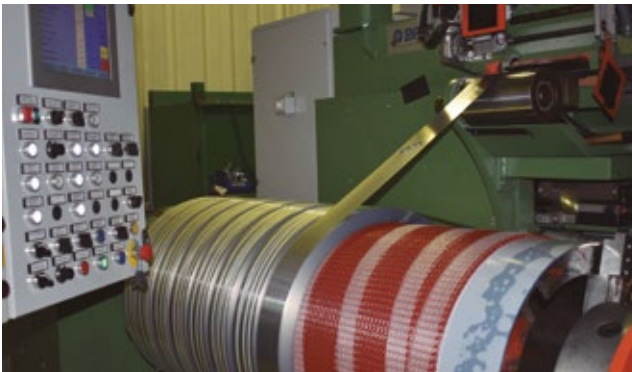


Figure 4



Heavy Duty Model (for mining and extreme transportation)



Figure 5

As of June 21st 2010, the whole manufacturing process is certified under ISO 9001. At present, we are backed by the ISO 9001:2015 certification, by DET NORSKE VERITAS V.B.



Outdoor Cabinet example

Technical and electrical especifications (****)

CLASS "F" 17,5 kV TRANSFORMERS - Ratio 13,2 ± 2 x 2,5 % /0,4 kV/kV

Power (kVA)	Losses (W)		Vcc (%)	Sizes (mm) / Masz(kg) - IP00				Sizes (mm) / Mass(kg) - Including Cabinet IP (***)				Trail (**) (mm)
	Po	Pcc		Depth	Width	Height	Mass	Depth	Width	Height	Mass	
100 (*)	480	1700	6	1300	690	1325	1000	1750	1100	1700	1250	600
125 (*)	600	2200	6	1300	690	1310	1040	1750	1100	1700	1290	600
160 (*)	700	2400	6	1300	690	1310	1100	1750	1100	1700	1350	600
200 (*)	720	2900	6	1300	690	1340	1150	1750	1100	1700	1490	600
250 (*)	880	3300	6	1350	690	1300	1240	1750	1100	1700	1570	600
315 (*)	1000	4000	6	1350	690	1350	1320	1750	1100	1700	1570	600
400 (*)	1200	4800	6	1400	1000	1450	1450	1950	1200	2050	1730	800
500 (*)	1400	5900	6	1400	1000	1550	1575	1950	1200	2050	1855	800
630 (*)	1650	6800	6	1500	1000	1600	1875	1950	1200	2050	2155	800
800 (*)	2000	8000	6	1550	1000	1750	2150	1950	1200	2050	2430	800
1000 (*)	2300	9400	6	1650	1000	1850	2650	2250	1350	2550	3030	800
1250 (*)	2800	11500	6	1750	1240	1900	3090	2250	1350	2550	3470	1000
1600 (*)	3300	13500	6	1800	1240	2150	3775	2250	1350	2550	4155	1000
2000 (*)	4200	16000	6	1950	1240	2250	4700	2600	1450	2750	5150	1000
2500 (*)	5000	18000	6	2050	1240	2300	5600	2600	1450	2750	6050	1000
3000 (*)	5500	18500	8	2260	1200	2370	7100	2600	1450	2750	7750	1000
3150 (*)	6000	20500	8	2300	1240	2375	7450	2600	1450	2750	7900	1000

CLASS "F" 36 kV TRANSFORMERS - Ratio 33,0 ± 2 x 2,5 % /0,4 kV/kV

Power (kVA)	Losses (W)		Vcc (%)	Sizes (mm) / Mass(kg) - IP00				Sizes (mm) / Mass(kg) - Including cabinet IP (***)				Trail(**) (mm)
	Po	Pcc		Depth	Width	Height	Mass	Depth	Width	Height	Mass	
100 (*)	700	1800	6	1910	720	1750	1850	2700	1700	2400	2250	800
160 (*)	1000	2500	6	1910	720	1750	1850	2700	1700	2400	2370	800
250 (*)	880	3300	6	1850	1000	1810	2650	2700	1700	2400	3050	800
315 (*)	1300	4000	6	2000	1000	1800	3000	2700	1700	2400	3400	800
400 (*)	1700	4300	6	2100	1000	1800	3500	2700	1700	2400	3900	800
500 (*)	1900	4800	6	2100	1000	1900	3850	2700	1700	2400	4250	800
630 (*)	2300	6000	6	2150	1000	2000	4250	2700	1700	2400	4650	800
800 (*)	2700	8000	6	2200	1000	2100	4900	3000	1900	2950	5400	800
1000 (*)	3350	9400	7	2300	1540	2300	5100	3000	1900	2950	5600	1000
1250 (*)	3800	12700	8	2400	1540	2450	5350	3000	1900	2950	5850	1000
1600 (*)	4000	13500	8	2400	1540	2500	6000	3000	1900	2950	6500	1000
2000 (*)	4700	17400	8	2500	1460	2700	7700	3500	2100	3450	8300	1000
2500 (*)	5500	21000	8	2600	2000	2850	9200	3500	2100	3450	9800	1150
3000 (*)	6700	23000	8	2750	1540	3000	10850	3500	2100	3450	11450	1300
3150 (*)	7500	26000	8	2900	1540	3000	11200	3500	2100	3450	11800	1300

(*) Standard rated Power according to IEC 60076-11 and IEC 60076-1 (5.1.2)

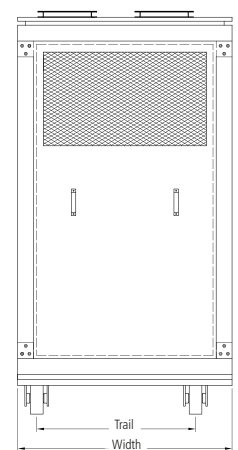
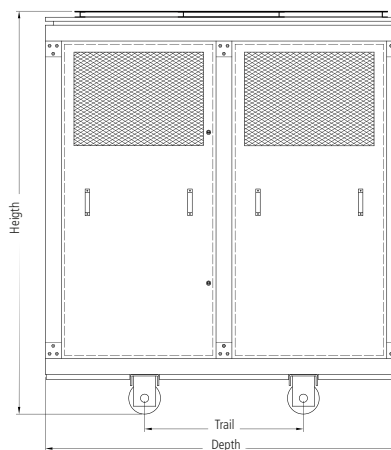
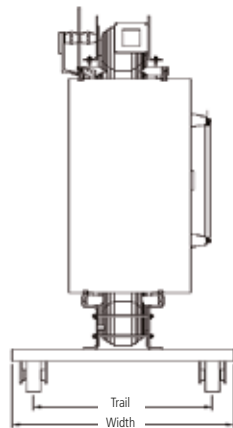
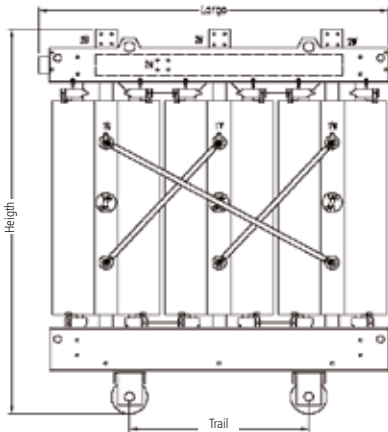
(**) Trail may be changed as per client needs

(***) IP cabinets only upon request

(****) Reduced Losses transformers according to EU 548-14, please contact us

For other thermal classes than "F", please contact us

For other special transformers, please contact us



Tadeo Czerweny Tesar



SERVICE
Phone call or e-mail to
+ 54 - 3404 - 487200 - Int. 113
servicios1@tadeoytesar.com.ar

Administration, Industrial Plant and Sales:

República 328 (S2252BQQ), Gálvez, Santa Fe, Argentina / Phone: + 54 - 3404 - 487200

E-mail: administracion@tadeoytesar.com.ar / ventas@tadeoytesar.com.ar

Buenos Aires Commercial Office:

Bernardo de Irigoyen 330 5º piso of. 121 (C1072AAH) C.A.B.A., Argentina / Phone: + 54 - 11 - 5272 8001 to 5

E-mail: tczbsas@tadeoytesar.com.ar

Córdoba Sales Representative:

Gato y Mancha 1766 · X5009FVJ · Córdoba · Argentina / Tel: + 54 351 – 4890070

seguraeduardom@gmail.com / emsegura2011@hotmail.com

www.tadeoczerwenytesar.com.ar

Sales and Service direct line
(only for Argentina)
0810 88TADEO (0810 88 82336)

