TAM MANUAL

GENERAL INSTRUCTIONS

A - Introduction

The instructions in this manual have been prepared for users of our products, aiming at guiding them as to the necessary ***precautions*** and ***procedures*** for achieving a great performance of such products.
The recommendations hereby mentioned are in compliance with the items of the ABNT – NBR13297 standard.

Dry-Type Transformers for outdoor installation:

Consider items **A, B, C, D, E, F, G, H** and comments.

Dry-Type Transformers for indoor installation:

Consider items **A, C, E, H** and **I**.

B – General Considerations

Dry-type transformers for indoor installation are projected so that they are not affected by humidity when energized, as the heat produced by its own losses is enough to keep its insulation dry.
Transformers must be transported *without* wheels, being fully supported by the base.

C – Receiving

Whenever possible, the transformer must be unloaded directly on its permanent base. Before unloading it, a preliminary inspection must be performed by a specialized team on the transformer, thus verifying its external conditions, accessories and components, regarding any deformities and the condition of the paint. We must be immediately notified should any abnormalities arise.
All the unloading and transportation service of the transformer must be conducted by a *specialized* crew, in compliance to the *security* standards and making use of the appropriate points of support. The handling must be performed in a planned and cautious way, and any rough movements and sudden stops are to be avoided.

D - Storage

Whenever it is necessary to store the transformer, this must be conducted in a sheltered, dry and closed space.

Avoid:

a) – direct contact with the ground;
b) – penetration of humidity;
c) – opening of entrance of dust;
d) – corrosive gases nearby;
e) – keeping the temperature constant (heated if possible).

The condensation of humidity must be prevented or considerably reduced with the insertion of electric heating resisters (small heaters) around the transformer.

E - Installation

The transformer must be installed on an appropriate, level and resistant foundation. When the transformer has wheels, rails should be considered for the foundation. For moving, use the hooks or lugs for suspension / dragging that are meant for this purpose, according to our ZI4900 0002 diagram, being especially cautious not to touch the edges and flanges of the transformer.
The installation must be in full compliance with the NBR 14039/98 standard and the professionals involved, in compliance with the 4th item of the same standard.

F- Maintenance

- every 12 months in clean and dry environments
- every 3 months in polluted environments (dust)

With the transformer *de-energized*, it's possible to open the protection case and check it, carefully following the instructions below:

a) – check the condition of the paint (remove the occasional points of oxidation, by stripping and applying the paint).
b) – remove the accumulations of dust, preferably with a vacuum or dry compressed air or even dry nitrogen gas.
c) – when using compressed air or nitrogen gas, it must be dry and clean, apply relatively low pressure (approx. 2 atmospheres).
d) - the panel supports, the terminals, insulators and the entire insulating surface, must be cleaned with dry and clean cloths.
e) - never use water, solvent or detergents, because they damage the insulation.

G - Precautions

Never open the protection case with the transformer *energized*

Avoid:

a) – Installations with leaks;
b) – Installations with water infiltration;
c) – Installations with the possibility of flooding;
d) – Polluted installations (refer to atmosphere).

Provide:

a) – appropriate protection regarding the accidental entrance of water through open windows;
b) – appropriate protection regarding the condensation of humidity in water or steam piping;
c) – appropriate protection regarding the use of water in the surrounding areas;
d) – appropriate protection regarding the deposition of impurities (dust);
e) – appropriate ventilation for proper cooling (refer to cooling);
f) – heating around the transformer, when it's disconnected.

H - Protection

Special attention should be given when choosing lightning rods and the *grounding* system. A thermometer or over temperature relay is advisable. The transformer should, at least, have the protections from the NBR 14039/98 standard or be in compliance with the ZI 4900 0047 diagram, which is a reproduction of the same standard.

I - This item refers only to dry-type transformers for outdoor installation

a) – avoid storage in direct contact with the ground;
b) – never open the case with the transformer *energized;*
c) – never leave the viewing covers open, to avoid the penetration of humidity
d) – conduct periodic cleaning of the case's external surface, because good heat dissipation depends on it;
e) – appropriate ventilation for proper cooling;
f) – avoid installation close to hot surfaces.

General Comments

1 - Cooling

For proper cooling of the transformer, it is essential to have proper ventilation. When installed in closed spaces, there should be enough ventilation so that the current air temperature doesn't exceed a maximum of 40ºC and an average of 30ºC.
The values planned for projects with maximum ratings are based on a daily average of 30ºC.
The amount of air current must have the approximate value of 3 m per minute, per kW of losses from the transformers.
The effective area will have at least 1 m^2 per input and output opening, for each 100 kVA of transformer capacity, disregarding the area occupied for protection, grids or blinds.
A minimum of 50 cm distance must be kept between the transformer and walls that might obstruct the free circulation of air.

2 - Atmosphere

Dry-type transformers for indoor installation should not be used in atmospheres contaminated by *coal* dust or airborne *metallic* dust, as these impurities are deposited on the insulations, thus causing discharges and arcs, damaging it entirely.
Such accumulation must be extracted through a cleaning whose regularity will depend on environmental conditions.
Special attention should be paid in regards to the signs of *overheating* and *escape* routes in the insulating surfaces, which occur through carbonizations.
This type of transformer should not be installed in environments with unusual releases of *chemical gases* either.
In polluted environments, the air being filtered reduces the maintenance services.

DIMENSIONING OF SECTIONS OF VENTILATION OPENINGS TO KEEP THE AVERAGE AMBIENT TEMPERATURE OF 30ºC AND A MAXIMUM OF 40ºC

The calculation is based on an approximate minimum flow of 3.0m³/min/kW of losses. In case the ventilation through the natural circulation of air is not possible, forced circulation must be induced by means of ventilators.

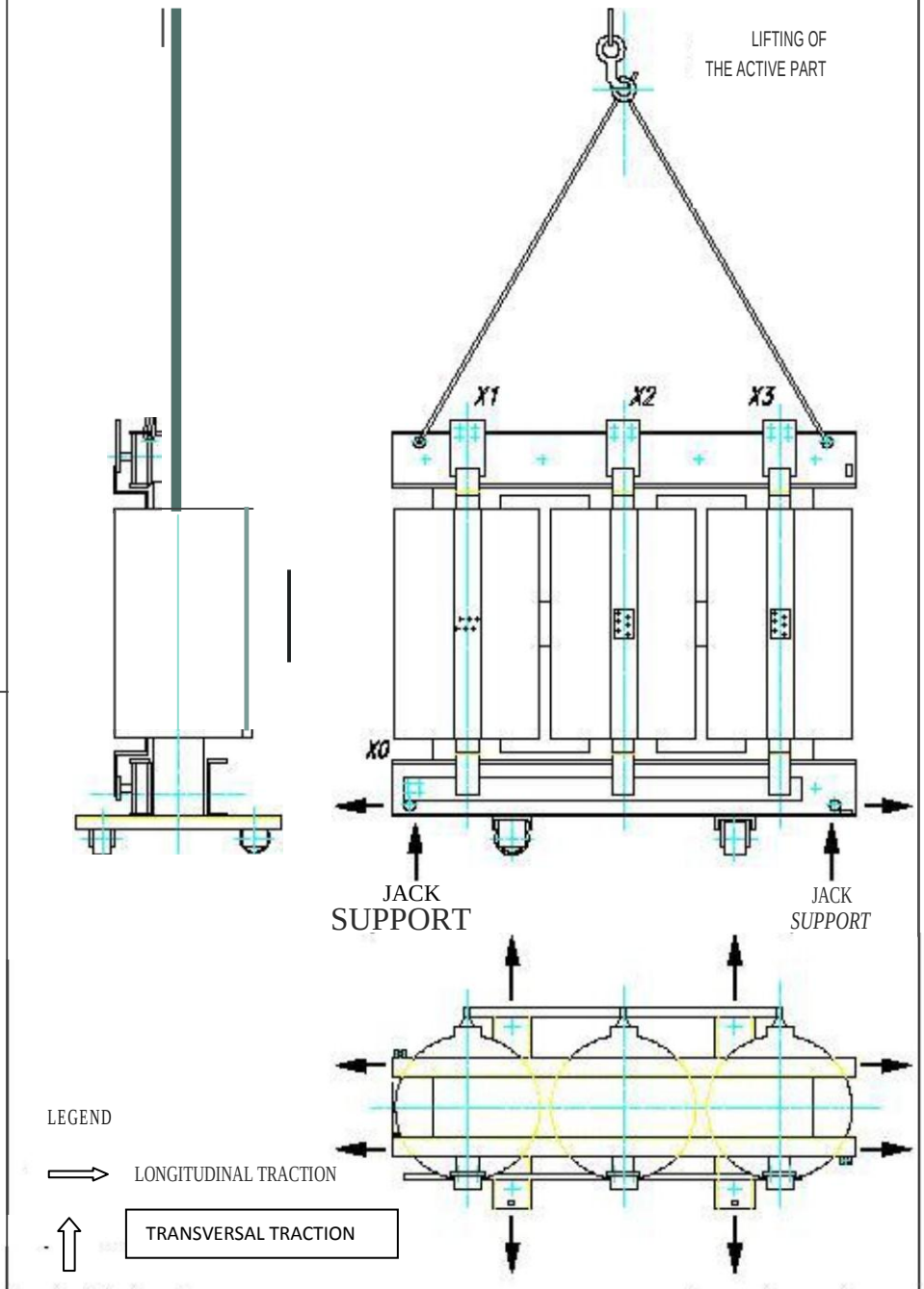
- It must have at least 500 mm of distance between the transformer and the walls that might obstruct the free circulation of air.

- S1 = S2 = Effective section of the output and input entrances [m²]. (Disregard the area occupied by the protection, grids or blinds)

- P = Maximum of total losses = Losses in empty + Losses in short-circuit in the lower tension position [kW].

- H= Height from the transformer core to the center of the upper opening [m].

ZILMER
TRANSFORMADORES



Rev.	Data	Descrição	Elab.	Verif.	Aprov.
0	16/01/96	EMISSÃO INICIAL	RICARDO		

ZILMER

Tol.
Dimensions: mm
Scale.: s/e

TITLE: MOVEMENT AND TRANSPORTATION

Z/ 4900 0002

Client:

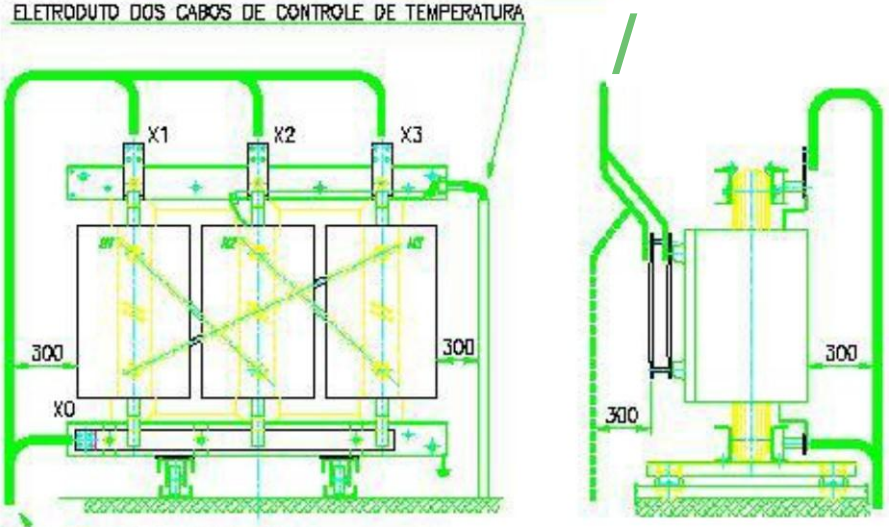
ZILMER

TRANSFORMADORES

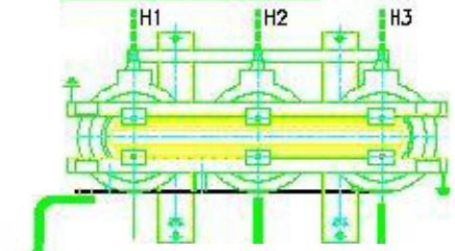
DIMENSÕES SEM TOLERÂNCIA FABRICAÇÃO VER P2 4900 0002

A.T. – SUPERIOR OU INFERIOR – CABOS OU BARRAS

ELETRODUTO DOS CABOS DE CONTROLE DE TEMPERATURA



B.T. – CABOS OU BARRAS



NOTES:

ALL CABLES OR *BUS PHASE* OR GROUNDING MUST BE KEPT IN THE MINIMUM DISTANCES RECOMMENDED (300 mm), FROM THE HIGH TENSION EPOXY CAST COILS.

TYPICAL UNIFILAR DIAGRAM FOR CABLE OR BAR INSTALLATION

DEALER LINE OR SUBTERRANEAN

----T3-+TERRA { 5 M }

POLYMERIC LIGHTNING-ROD – ZINC OXIDE WITHOUT CAP WITH A SECTIONED 10 KA CURRENT DISCHARGE OF POLYMERIC BODY

TERMINAL OR BUSHING

INSTALAÇÃO CONFORME NORMA NBR 14039

THE NON-COMPLIANCE WITH THESE MINIMUM CONDITIONS OF INSTALLATION MIGHT CAUSE THE LOSS OF THE WARRANTY.

Rev.	Data	Descrição	Elab.	Verif.	Aprov.
1	04/04/01	Alterado descritivo do para-raios	Apio		
0	15/01/99	EMISSÃO INICIAL	SCHUNK		

ZILMER INELTEC C.E. LTDA

Tol.

Dimensões mm

Esc.: S/E

Título: ESQUEMA TÍPICO DE INSTALAÇÃO TRANSFORMADOR SECO MOLDADO–TIPO TAM

Cliente:

ZI 4900 0047