

Distribution Transformer Instruction Manual



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SHIPPING

Distribution transformers are shipped completely sealed. Core and coils are assembled in a tank with the insulating liquid covering the coils.

This method of construction preserves the quality of insulation, the cooling and insulating liquid by preventing contamination from external sources.

INSPECTION ON RECEIPT

When a transformer is received, a thorough external inspection should be made before the unit is removed from the truck. If there is evidence of damage and/or indication of rough handling in transit, an inspector representing the carrier should be requested and the manufacturer immediately notified.

NOTE: An internal inspection is necessary only if internal damage is suspected because of external indications of rough handling.

HANDLING

A. COMPLETE TRANSFORMER

The transformer should always be handled in the normal upright position unless information from the manufacturer indicates that it can be handled otherwise. Where a transformer cannot be handled by a crane, it may be skidded or moved on rollers into place, depending upon compatibility of transformer base design and the type of surface over which it is to be moved. During the handling operation, care must be taken to prevent overturning. When a transformer is shipped it is usually ready to be set in place.

B. LIFTING WITH SLINGS

Lifting lugs and eyes are designed to be lifted with a maximum sling angle of 30° from the vertical. For lift angles of greater than 30° from the vertical, spreader bars must be used to provide a vertical lift on the lugs.

STORAGE

It is advisable to locate a transformer, complete with liquids in its permanent location even if it will not be placed in service for some time. It is well to check the paint finish and to repair all damaged painted surfaces. If the transformer is shipped and stored in dry inert gas, the gas pressure should be maintained and periodically tested. If an oil-filled, indoor-type transformer is stored outdoors it should be thoroughly covered to keep out rain. A transformer should not be stored or operated in the presence of corrosive vapors or gases, such as chlorine. Should it become necessary to store accessories for a long period of time, they should be stored in a clean, dry place or

the manufacturer should be contacted for explicit instructions on the storage of individual pieces.

LOCATION

Accessibility, ventilation and ease of inspection should be given careful consideration in the location of transformers. Self-cooled transformers depend entirely upon the surrounding air for carrying away their heat. For this reason, care must be taken to provide adequate ventilation.

For indoor installation, the room in which the transformers are placed must be well ventilated so that heated air can escape readily and can be replaced by cool air. Inlet openings should be near the flow and distributed so as to be most effective. The outlet opening(s) should be as high above the apparatus as the construction of the building will permit. The number and size of the outlets required will depend on their distance above the transformer and on the efficiency and load cycle of the apparatus. In general, about 6 square meters of outlet opening or openings should be provided for each 1000 kva of transformer capacity. Air inlets should be provided with the same total area as the outlets. Self-cooled transformers should always be separated from one another and from adjacent walls, partitions, etc., in order to permit free circulation of air about the tanks. This separation should not be less than 80cm.

PREPARING FOR SERVICE

PRELIMINARY INSPECTION: Before any work is done on a transformer in preparation for service, a careful inspection of all external parts is needed to disclose any evidence of mistreatment or damage. This inspection should include a check of all parts required to complete the erection, making certain that all parts have arrived and are in first-class condition. Accessible bolted parts should be checked for tightness. Liquid should be checked to determine physical level. Any indication of leaks, which may have resulted in moisture entering the transformer should be noted and appropriate action taken.

NOTE: Pressurized and sealed at ambient temperature at time of manufacture. It is common that a pressure vacuum gauge if supplied could read negative due to lower temperature at the site of installation. This is not an indication of an abnormality, but in fact an indication that the tank is properly sealed.

PUTTING INTO SERVICE

Before applying voltage to transformer, check the following items:

1. Are feeder cables on bus connected to bushing terminals without stressing the porcelains?

2. Are winding neutral terminals properly grounded or ungrounded as required by system operation?
3. Is the tank solidly grounded at grounding pads located near bottom of tank?
4. Are all current transformers connected to a load or short-circuited?

CAUTION: Open secondary can produce voltages dangerous to humans and connected equipment.

5. Is the tap changer set in desired position to give desired voltage ratio?
6. Have all tools and foreign objects been removed from transformer?
7. Are all openings and joints sealed?
8. Is insulating liquid at proper level in tank?
9. Are all fans and control circuits (if supplied) operational?
10. Are all personnel in the clear?

After energizing, watch transformer closely for the first three hours of operation for evidence of abnormal conditions.

LOADING

Transformers are suitable for full-load operation at rated temperature rise without loss of life, providing the following conditions are met:

1. Ambient temperature does not exceed 40°C; or average more than 30°C; in one 24 hour period.
2. Installed elevation does not exceed 1,000 meters above sea level.

PERIODIC INSPECTION

1. Sample and test insulating/cooling liquid for dielectric strength.

CAUTION: If a vacuum is indicated on the pressure vacuum gauge, care must be used to eliminate it prior to oil sampling. Failure to do so may result in air being pulled into the tank through the drain valve which may lead to insulation failure if energized or upon re-energization. Contact factory for specific instructions.

2. Check level of liquid in main tank and liquid-filled compartments. Add clean liquid if necessary.
3. Check fan operation on Forced Air units.

CAUTION: Before entering a transformer that has been in service, BE SURE to lock open the line switches on both the HV and LV side, then connect a grounded line to transformer terminals in order to discharge any stored energy in the windings.

DO NOT ENTER THE UNIT UNTIL THE GAS SPACE ABOVE LIQUID HAS BEEN PURGED WITH DRY AIR. BREATHING THE NITROGEN ABOVE THE TRANSFORMER LIQUID CAN CAUSE ASPHYXIATION. MAINTENANCE DURING PERIODS OF SHUTDOWN

Clean any contamination from bushings Rotate the tap changer handle back and forth a few times. This will clean the contacts. Be sure to return the handle to its original position if no change in voltage ratio is desired.

CHECKING FOR LEAKS:

Check pressure vacuum gauge daily the first week of transformer operation. If pressure- vacuum gauge stays at zero reading, it indicates a faulty seal. If transformer cannot be de-energized, be careful to not come into contact with live parts such as bushing terminals and leads. Slowly add nitrogen or dry air AT LOW PRESSURE until gauge reads 5 PSI. Apply with a paintbrush soapy water or detergent to all seals above liquid level. Small bubbles will indicate the location of the leak.

ACCESSORIES

PRESSURE RELIEF DEVICE

When required by the specifications, a mechanical automatic resealable type pressure relief device can be supplied. This device requires no adjustment after it operates. After relieving the pressure due to the gas build-up in the tank, it automatically recloses and reseals. Alarm contacts are available if specified.

DIAL TYPE THERMOMETER

When required by specifications, a dial type thermometer is mounted in a thermometer well located on the transformer's tank wall and can be easily removed. The thermometer reads the top oil temperature.

DGPT 2

When required by specifications a DGPT 2 is mounted on the tank cover. This device was conceived from the need to integrate the functions performed by a number of transformer accessories in a single, compact and reliable instrument, which was capable of replacing their applications, as well as guaranteeing numerous advantages ranging from an economic to functional-aesthetic viewpoint.

PRESSURE SWITCH - closes/opens a circuit on pressure ranging (from 100 up to 500 mbar).

THERMOMETER - visual indication of oil temperature and max. Temperature reached.

"T2" THERMOSTAT SWITCH - (alarm) closes/opens a circuit at a predetermined temperature level (from 30 °C up to 120 °C).

"T1" THERMOSTAT SWITCH (stop closes/opens a circuit at a prede termined temperature level (from 30 °C up to 120 °C).

OIL LEVEL

INDICATOR - visual indicator of slight oil level variation.

DETECTOR - visual detector of significant oil level variation through closing/opening of an electric circuit.

GASSING

DETECTOR - closes/opens a circuit when the max. Gas volume is reached (max. 170 cm³)

FILLING WITH OIL

A. CHECKING OIL

Check the dielectric strength of oil while it is still in containers. If free water is present, drain off the water before putting the oil through the filter press. Continue passing oil through the filter press until the prescribed dielectric strength is met.

B. NON-VACUUM FILLING

In cases where vacuum filling is not required, the tank should be filled through the main drain valve. A second opening at the top should be provided to relieve the air being displaced. Full voltage may not be applied to the transformer for a period of 24 hours.

C. VACUUM FILLING

Entrapped air is a potential source of trouble in all transformers. In general, therefore, it is desirable to fill transformers with oil under as high a vacuum as conditions permit. Particularly is it essential to vacuum-fill high voltage transformers shipped in nitrogen or dry gas in order to develop their full insulation strength before they are energized.