DESCRIPTION • INSTALLATION • MAINTENANCE

INSTRUCTIONS

TYPE SL
PRECIPITATION TRANSFORMERS
ELECTRONIC AND MECHANICAL TYPES

FIG. 1. Mechanical Type Indoor

TYPE SL PRECIPITATION TRANSFORMER is used to supply high-voltage alternating current to the input of high-voltage rectifiers. The Cottrell process of electrical precipitation requires unidirectional current at high voltage. One method of obtaining this high-voltage direct current is by means of a transformer such as that shown in Fig. 1 connected to a mechanical synchronous rectifier. Other means of rectification may be used, such as the electronic type which combines the transformer and rectifier tubes in one assembly, as shown in Fig. 1 and Fig. 2 of I.L. 44-640-1A.

DESCRIPTION

The most common transformer high voltages for precipitation service are 50,000, 75,000 and 100,000. Standard precipitation transformers are available in these voltage ratings and in Kva ratings of 10, 15, 25, 30, 40 and 50 Kva.

Fittings supplied on the mechanical type consist of a drain and sampling valve, magnetic liquid gauge, filling plug in top of case, diagram instruction plate, ground lug, lifting loops, and provision for attaching liquid thermometer.

Fittings on the electronic type are the same as for the mechanical type plus tube sockets for the exposed tubes for indoor service and suitable shielding for the submersed tube for outdoor service.

The core and coils are mounted on the bottom plate and held securely in place by means of end frames bolted to the bottom. The tank is closed by seal welding at the bottom. Bushing connections are made by fish-through leads.

There are only two gasket seals on this transformer. These are located in the top of the high-voltage bushings. All other seals are by means of solderseals, threaded or welded joints.

Low-voltage bushings are located in a junction box at the top of the transformer case. The bushings are sealed by means of pipe threads and solderseals, making the case pressure tight. A conduit is brought into the junction box running through the side wall and under the top of case

INSTALLATION

Unpacking. Westinghouse precipitation transformers are usually shipped completely assembled with oil in case. After crating or bracing is removed, the transformer is ready for setting in place.

Special methods of shipment are sometimes used, such as shipment in dry nitrogen. When a special method of shipment is used, refer to leaflet describing unpacking procedure for the type of shipment involved. This special leaflet is a part of the instruction book shipped with the transformer.

SUPERSEDES I.L. 44-640-2
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All boxes containing accessories must be stored carefully and thoroughly protected against moisture. As soon as the transformer is unpacked it should be examined carefully for damage in shipment. Normally it will not be necessary to break the seal on the tank. Inspection for shipment damage normally will require only an inspection of outside of case.

Location. Accessibility, ventilation, and ease of inspection should be given careful consideration in locating transformers. Indoor transformers must be so located that water cannot fall onto the case.

Self-cooled transformers depend entirely upon the surrounding air for carrying away their heat. For this reason care must be taken to provide adequate ventilating facilities. The ambient temperature should not exceed 40 degrees C without derating the transformer.

Self-cooled transformers should always be well separated from one another and from adjacent walls, partitions, etc., in order to permit free circulation of air about the cases. The separation should not be less than 24 inches for precipitation transformers.

Fire Risk. The possibility of fire is present in any oil-filled apparatus. Therefore, some precaution against fire should be taken. One method is to place transformers on concrete surrounded by a ledge. Suitable means should be provided for drawing off the oil and extinguishing the fire.

Care must be taken in handling and installing transformers, particularly those wound for high voltage. Normally the seal on the Westinghouse precipitation transformer will not have to be broken. If for any reason the transformer is opened at pipe plugs or bushings, care must be taken that foreign matter of any kind does not get into the transformer.

When a transformer cannot be handled by crane, it may be skidded or moved on rollers but in doing so, care must be taken that it is not tipped over. For a transformer with a round base, it is better to leave the unit in its crate and skid it with the crate in place.

Transformers may be most conveniently handled by means of crane. Lifting loops are provided on the cover for the crane hooks.

An outline drawing is furnished which shows the relative location of all fittings and this should be followed during installation.

Connections. The diagram, usually on the metal plate attached to the case shows the terminal connections. Care should be taken to see that all connections are properly made as a wrong connection may cause serious damage or burnout.

Connections for the mechanical type to the high-voltage rectifier circuits are made from the top of the high-voltage bushings. The top cap may be turned to the desired angle at 30-degree intervals by removing the six-fillister head machine screws that hold the cap in place. This will break the seal on the transformer. Care must be taken in replacing the cap that the gasket is not damaged.

For the electronic type one-piece, molded bakelite tube sockets are mounted on top of the H.V. and filament voltage bushings. Positive electrical contact for customer's electronic tubes is maintained by heavy spring pressure on large area of prongs. Filament voltage test terminals are provided. See Fig. 5 for details of tube sockets.

Connections to the low-voltage bushings are made by bringing leads into the terminal box through conduit. See Fig. 2 for connections. Low voltage bushings are equipped with solderless type adapter; it will not be necessary to remove adapter from bushing when making cable connections.

FIG. 2. Top View with Exposed Secondary Junction Box

When voltage is first applied to the transformer, it should if possible, be brought up slowly to its full value so that any wrong connection may be disclosed before damage can result. After full voltage has been applied successfully, the transformer should be operated in that way for a few hours without load. It should be kept under observation during this time and also during the first few hours that it delivers load.

MAINTENANCE

A regular program of inspection should be established and rigidly carried out.

The oil should be tested for dielectric strength and presence of acids at some interval, preferably not greater than once a yaer. If there is an indication of moisture or sludge formation, the oil should be tested further and treated as descirbed in I.B. 44-820-1. As long as oil tests satisfactorily, it will not be necessary to open the transformer. A careful inspection of all accessories should be made to see that they are functioning properly.

In event of any abnormal symptoms such as unusual noises, high or low oil levels, etc., the transformer should be taken out of service and the case removed.

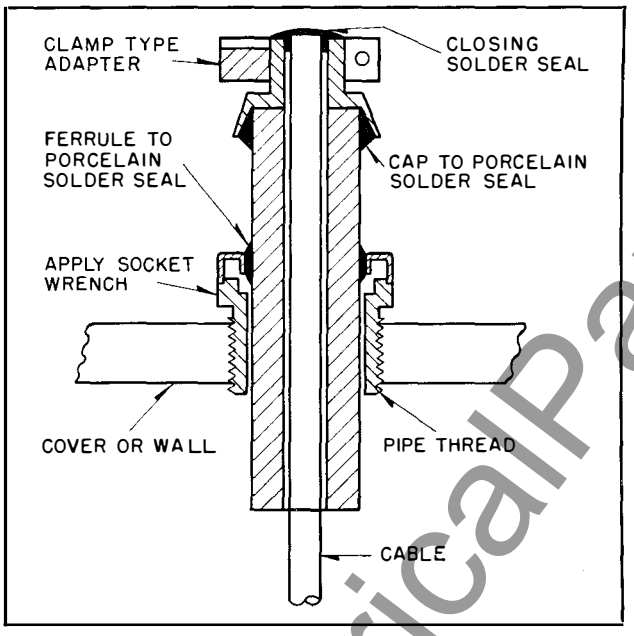

FIG. 3. Sectional View of Low-Voltage Bushing

Removing the Case. In order to remove the case, proceed as follows:

1. Drain the oil into suitable containers by removing pipe plug at top of case and removing the sampling valve at bottom.

2. Remove the low-voltage adapters and break the threads loose on all low-voltage bushings by applying a socket wrench to the hexagon nut. (See Figure 3). Wrap the top of the busihng with wet asbestos packing to prevent breaking the porcelain solderseals. Apply heat to the solderseal on cap of the bushing and unscrew the bushing as soon as solder is soft.

3. Remove the caps on the high voltage bushings (See Fig. 4) by removing the six-fillister head screws that hold the cap in place. Unsolder lead from top of bushing lead tube and allow lead to drop down into bushing tube.

4. Chip off the closing weld at the bottom of the tank (See instructions for removing a weldment.

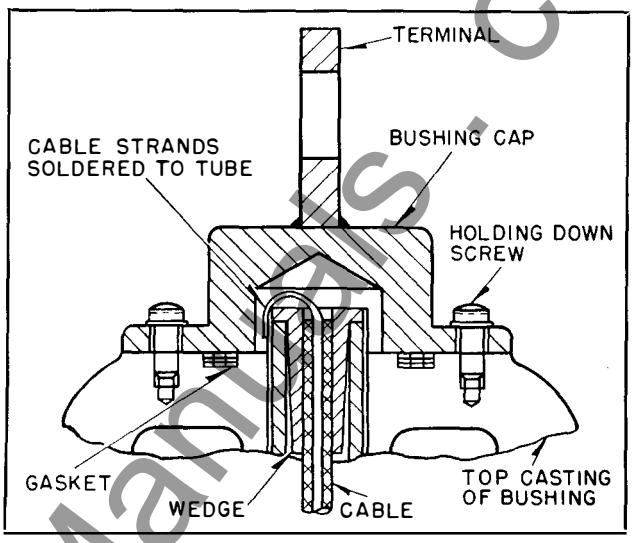

FIG. 4. Sectional View of High-Voltage Bushing at Top

5. Apply crane hooks to the lifting loops and slowly lift the case clear, guiding it away from the core and coils. Lift case clear and set aside. Core and coils are now accessible for inspection and repair.

Replacing the Case. The procedure for replacing the case over the core and coils is the reverse of removing the case. Some of the details which differ are listed below:

1. Before lowering case, make sure low-voltage cable leads are vertical so that they can be easily fished through the holes in the bottom of the low-voltage junction box. Tie string onto ends of the high-voltage bushing leads to aid in fishing leads up through the high-voltage bushings.

2. Lower case slowly over core and coils keeping it clear of coils.

3. When case is down, make sure guide pin on under side of the cover engages the hole in the end frame.

4. Tack weld the bottom and side walls at intervals of approximately six inches around circumference of bottom of tank.

5. Pull the high-voltage bushing leads up through the bushings and resolder leads at top of bushing tubes.

6. Replace the gasket in top of high-voltage bushing and cement in place with cement 7386-1. Replace fillister head screws and tighten with uniform pressure.

7. Replace all low-voltage bushings and pull up tight with socket wrench.

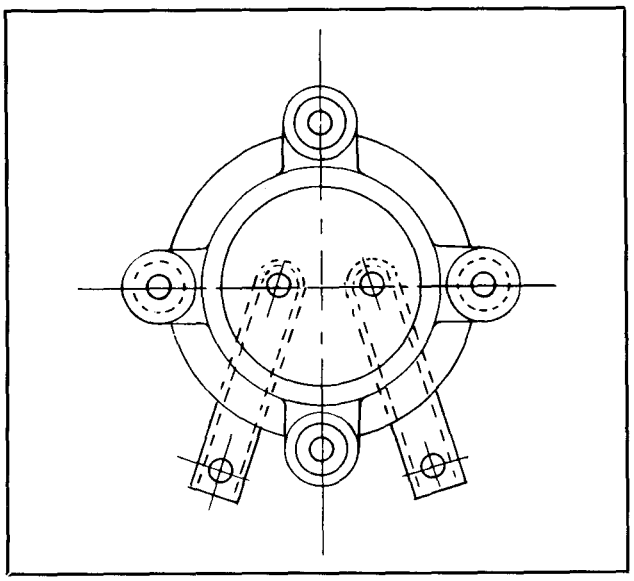

FIG. 5. Details of Tube Socket

8. Check fit of cable inside low-voltage bushings. If loose, fill surplus space with asbestos packing or wrap cable lead with asbestos tape to give a snug fit.

9. Wrap the low-voltage bushings with wet asbestos tape or rope to protect the porcelain solderseals. Close the solderseal at the top of the bushing using low temperature solder.

10. Close the case by applying a 3/16-inch sealing weld all round between wall and bottom.

11. Pressure test case for tightness at 15 pounds per square inch for one hour.

12. Fill case with oil by connecting suction line to the pipe plug hole at bottom of jucntion box. Apply vacuum to the pipe plug fitting at top of case. Fill case until gauge indicates full at 25 degrees C level.

13. Close pipe plug hole in bottom of low-voltage jucntion box by screwing in the plug using cement 7386-1 on threads.

14. Pressure test case for tightness at 15 pounds per square inch for four hours and if pressure test is satisfactory replace the pipe plug in top of case using cement 7386-1 on threads.

15. Replace low-voltage leads with adapters attached.

Replacing High-Voltage Bushings. In event it is necessary to replace a high-voltage bushing, proceed as follows:

1. Remove the six-fillister head screws that hold the top cap on the bushing. Break gasket seal and remove cap. (See Fig. 4).

2. Unsolder the high-voltage bushing lead from the top of the bushing and allow it to drop into the bushing.

3. Chip off the weld between bushing flange and top of case. See instructions for removing a weldment, I.L. 47-500-21.

4. Lift bushing clear and set aside.

To replace the high-voltage bushing, proceed as follows:

1. Tie string to the high-voltage lead and fish through the new bushing. Lower the new bushing into place.

2. Tack-weld the flange of the bushing making sure the bushing is turned to its proper position. The proper position of the bushing is when a flat side of the top casting is turned toward the center and lined up with two fillister head screws on the diameter.

3. Pull the cable lead up through the bushing tube and solder the lead to the tube (See Fig. 4).

4. Install a new gasket (if old one has been damaged) and cement in place with cement M-7386. Thoroughly clean all gasket surfaces before installing new gasket.

5. Replace the cap and tighten the holding down screws with uniform pressure.

6. Close the weld around the bushing by completing a 3/16-inch oil tight weld all around the flange.

7. Pressure test case for tightness.

8. Touch up damaged paint around weld with retouch paint.

Renewal Parts. When information is required concerning a transformer, always give its serial number whenever renewal or stock parts are ordered. The serial number will be found engraved on the nameplate attached to the transfomer case.

Whenever possible, a sketch showing the part or parts and their exact location will help to assure that proper parts are supplied by the factory.

It is recommended that a spare set of bushing cap gaskets be carried in stock.

When ordering renewal parts, write to the nearest Westinghouse District Office or direct to Sharon Plant, Sharon, Pennsylvania.

Service Department. Westinghouse maintains a service department to provide service for customers. It is recommended that questions of installation, operation and maintenance not covered by this instruction book be referred to the nearest service department or sales office.