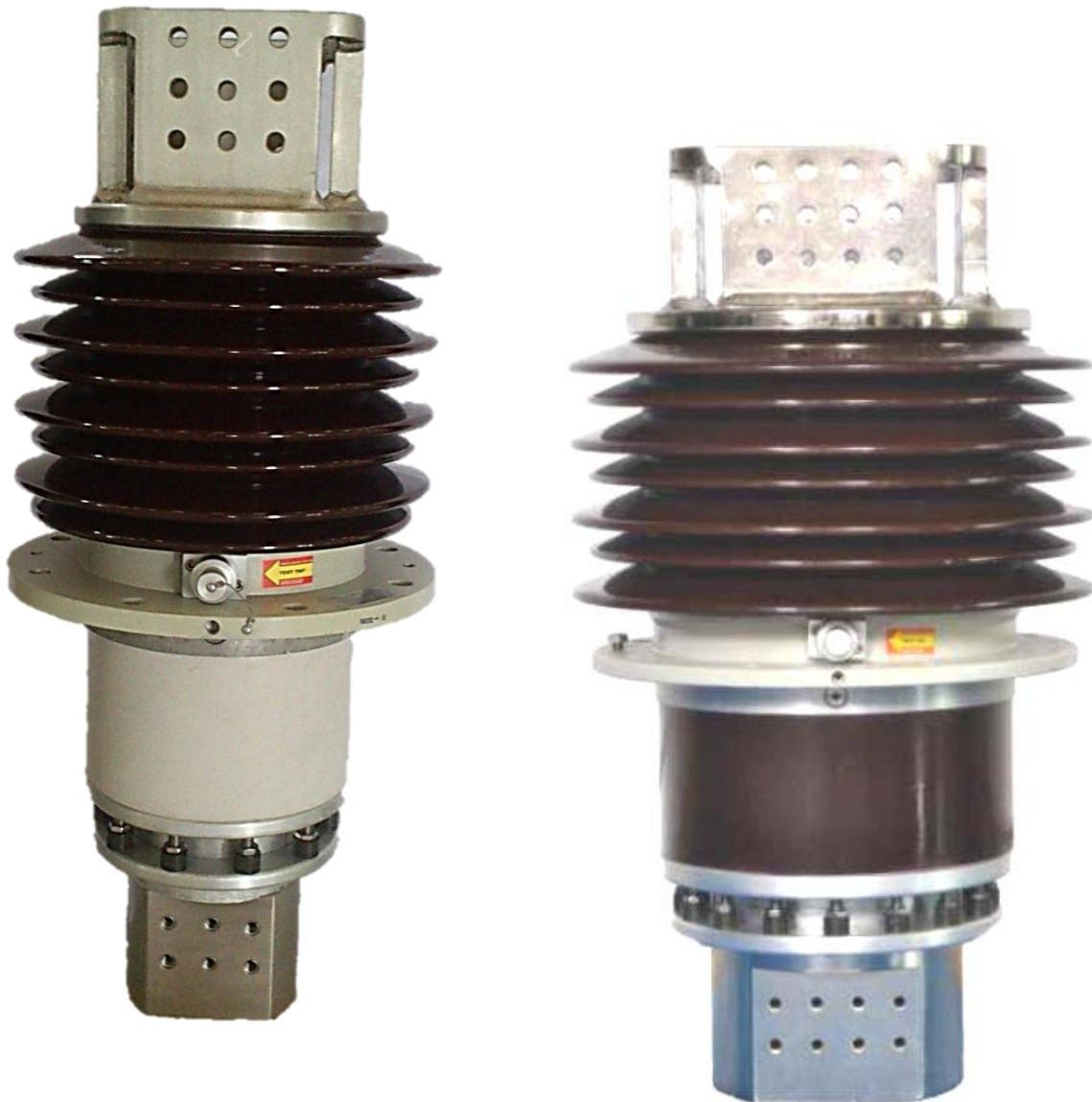


**OIL TO AIR – OIP INSULATED
HIGH CURRENT TRANSFORMER BUSHING-HCA**



transport, installation, operation and maintenance instructions



YASH HIGHVOLTAGE INSULATORS PVT LTD

Vadodara, Gujarat, India-Pin-391510

e-sales@yashhighvoltage.co.in

web-www.yashhighvoltage.co.in

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1. IMPORTANT NOTE:

Danger:

Always ensure that the power supply is switched off and high voltage terminal is earthed before performing any service work on bushing.

Warning:

Do not remove Oil filling plug. Removal of oil filling plug may cause oil contamination due to exposure and may cause irreparable damage to the bushing.

2. DESIGN

TERMINATION

Terminals are electro-plated.

The main current carrying conductor is electrical grade aluminum material with integral bottom termination.

Top terminals have free holes, suitable for connections with bus-bars through flexible jumper.

Bottom terminals have either free or threaded holes for connection with transformer winding jumper. (Refer GA drawing for bottom terminal hole details)

INSULATION

The bushing is self-contained and hermetically sealed.

The main insulation between high-voltage potential and earth potential of bushing is provided by Oil-impregnated paper insulation.

The OIP Insulation is connected to earth potential through test tap.

During operation test tap cover must be closed, failing to which can cause irreparable damage to bushing.

An adequate cushioning of dry nitrogen gas is provided to provide compensation for oil contraction and expansion during operation of bushing,

Air end insulator is porcelain material and oil end insulator is either porcelain or epoxy material.

ASSEMBLY

The bushing assembly is pre-stressed with a spring assembly located at oil end side of the bushing.

3. OPERATING CONDITIONS

The product is designed to operate satisfactorily and meet the requirements of IEC-60137 at the ambient conditions specified in table-1.

Table 1 – Operating Conditions

Type	Oil to Air
Insulation	OIP Insulation
Ambient temperature range	+40 to -20 °C
Bus-duct temperature	70 °C
Oil temperature	60 °C above ambient
Altitude of site	< 1000 m above MSL
Mounting angle	≤30 degree to Vertical
Oil level below bushing mounting flange	Max 25 mm

In case of operating conditions other than above specified limits, YASH HIGHVOLTAGE must be concerned before installation and operation of Bushing.

4. TRANSPORT AND STORAGE

The bushing shall be transported and stored as labeled on packing case. Sturdy mechanical protection must be provided to avoid any damage to bushing. Storage of bushing must be done indoor in dry and clean condition. Bushing must not be stored outdoor.

5. HANDLING

Caution:

For lifting the bushing from the packing case, attach a clean lifting sling on the lifting eye as shown in the figure below. Top terminal holes must not be used for lifting.

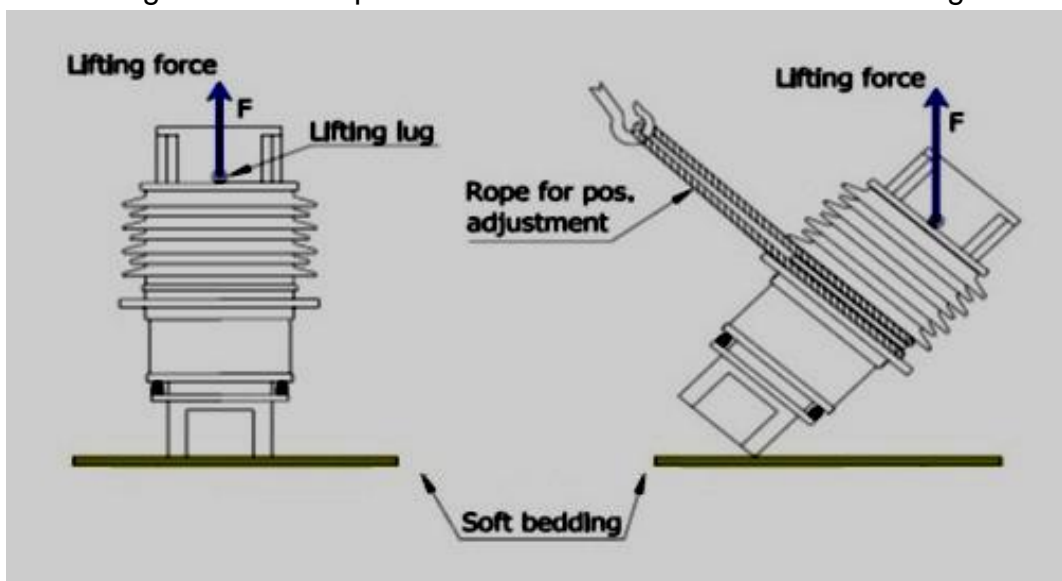


Fig.1 Bushing handling

6. MOUNTING

Caution:

Carefully clean and inspect the bushing for any oil leakage and any abnormality before mounting on the transformer.

Warning:

Surfaces for electrical contact are electro plated; hence do not use emery or any abrasive articles to clean. Wipe clean with a lint free cloth using spirit or petrol.

7. DISMANTLING FROM TRANSFORMER

Bushing can be un-mounted from transformer and kept in the vertical fashion in a clean and dry environment. Storage conditions should be as per cl. 4.0

8. CONNECTIONS

Caution:

Connections to transformer lead and bus duct shall be done carefully so that the contact faces are properly seated on the flat terminals of the bushing.

Warning:

Failure to perform a proper connection may result in overheating and hence failure.

The terminals of the bushings are electroplated hence DO NOT USE ABRASIVES for cleaning, but use soft lint free cloth to clean. Flat to flat seating is very important, in case of doubt check with a slip-gauge.

If bare aluminum bus to be connected, remove the oxide layers positively by abrasive cloth polishing in two directions, just before connection. Apply contact grease to expel moisture from joint area. Connections may also be made to bare copper or copper with tin coating. Silver coating on aluminum or copper may also be used if the adhesion to the substrate can be guaranteed in the actual environment.

The average contact pressure shall be at least one kg/Ampere.

For M12 fasteners recommended torque is 60 N.m.

All screws shall be lubricated before tightening.

Use of torque wrench is recommended

In order to maintain a contact pressure, every screw at the terminals should have proper spring washers. At the air side, use spring washers on both sides of the terminal plate. Every spring washer shall be placed on a flat washer of appropriate diameter.

9. Flange earthing

The bushing flange is provided with two M12 tapped holes for earth connection. After mounting the bushings on transformer turret, the flange should be earthed. This prevents electrical discharges between bushing flange and transformer tank under normal service conditions.

Recommended minimum size of copper material earth cable is 50mm².

10. WAITING TIME BEFORE ENERGIZING

Warning:

When a bushing has been stored horizontally for less than 1 month, it must be held in vertical position with the Top part facing up for at least 12 hours before service voltage is applied.

If by mistake, the bushing has been stored horizontally more than one year, it must be placed in the vertical position for at least one week before energizing.

11. RECOMMENDED TESTS BEFORE ENERGIZING

The following tests may be performed to check the condition of insulation, sealing and leakage current path from the bushing. The tests must be administered after mounting, but before connecting the outer terminal of the bushing to the rest of the switchyard power circuit.

1. Tightness test between transformer and bushing flange.

This can be ensured by oil leak proof joint between mounting flange and transformer turret after oil level is maintained inside transformer conservator for normal operation.

2. Insulation resistance at 5kV or 10 kV.

The test results should be comparable to factory test results with deviations not more than 10%

3. Measurement of capacitance and tangent delta measurement at voltage between 2kV to 10kV.

The test results should be comparable to factory test results with deviations in capacitance value not more than 10% and for tangent delta value not more than 0.1%.

12. MAINTENANCE

The bushings are self contained, hermetically sealed and hence maintenance free. Periodic cleaning and checking as under may be practiced.

DANGER!!!

No work at all can be performed on the bushing while it is energized or not earthed.

1. Cleaning of air side insulator surface
2. Insulation Resistance (As per cl.11)
3. Thermo vision (infrared camera) check for local overheating on connectors while in operation at maximum rated current.

The bushing outer terminal normally takes a temperature of about 35 to 45 °C above the ambient air. Significantly higher temperatures, is indication of improper connections.

4. Check for oil leakage from bushing joints
For any oil leakage YASH HIGHVOLTAGE must be concerned immediately.
5. Measurement of capacitance and tangent delta measurement at voltage between 2kV to 10kV every 6 months.

The test results should be compared with previous test results.

Deviations in capacitance value should not be more than 10% than that during the commissioning of the bushing.

Tangent delta value should not show any increasing trend with respect to time.

In case of increase of tangent delta value more than 50% than that during commissioning of bushing should not be accepted and bushing must be taken off from the service.