

7. OPERATING INSTRUCTION



OPERATING INSTRUCTION

B 2 / 2002 - 40°C

(35°C pressureless)

TRANSPORT, ERECTION, OPERATION AND MAINTENANCE OF DISTRIBUTION TRANSFORMERS WITH HERMETICALLY SEALED TANK

1. General Information

Hermetic transformers do not have a conservator tank. The tank is hermetically sealed and does not have a gas cushion to adjust to the changes in oil volume caused by temperature changes. The corrugated tank is designed to adjust to changes in volume by the elasticity of the cooling corrugation.

The standard type does not have an oil-level indicator since refilling and checking of the cooling and insulating fluids is due to the hermetical sealing not required.

The filling of the tank is performed in such a way that there is no negative or excess pressure existing at a certain medium oil temperature. This oil temperature - which depends on minimum and maximum coolant temperature, maximum temperature rise of oil and the gradient between the copper of the windings and the oil - is calculated for each type. For this reason we urgently recommend to avoid opening of the cap of filling pipe as well as ventilating the bushings after delivery of the transformer. For any works requiring opening of the transformers such as later mounting of pressure relief valve or any other monitoring device, exchange of bushings or gaskets please observe the instructions given in section 4 'Maintenance and Repairs' when draining and refilling the oil.

2. Transport

- 2.1 Basically road transport should be performed by using vehicles with compressed-air suspension.
- 2.2 Any damages incurred during the transport shall be notified to the forwarding agent responsible for the delivery immediately after arrival of the goods.
- 2.3 Damages to the coating should be removed immediately.
- 2.4 Use only the lifting lugs on the cover for lifting the transformer.
- 2.5 Fixing lugs attached to the tank or the brim of the cover only serve to the transportation security.

3. Assembly and Commissioning

- 3.0 The necessary protection against live parts is to arrange and to carry out by the operator.
- 3.1 Fix the transport rollers.
- 3.2 Earth the transformer to the grounding screw.
- 3.3 HV and LV connections:
 - 3.3.1 In order to connect the HV and LV bushings, clean the connectors and use the following torque (without lubricant):

Bolt	M 12	:	15.5	Nm
	M 20	:	52.0	Nm
Connection piece with screw				
	M 10	:	40.0	Nm
	M 12	:	70.0	Nm
	M 16	:	110.0	Nm
 - 3.3.2 The torque's and the network connections are to be checked by the assembly firm before and after the connection.
 - 3.3.2 Connect with plug on the HV side. Remove protective cap/cover and check contact area to be clean and dry, plug connector in plug-in bushings and tighten it.
 - 3.3.3 The connections of the network should be mounted to the bushings without previous stress.

- 3.4 If extant check distance between upper and lower sparkhorn:
 Um = 7,2 kV : 60 mm; 12 kV : 85 mm;
 Um = 17,5 kV : 115 mm; 24 kV : 155 mm;
 Um = 36 kV : 220 mm at mean sea level
- 3.5 If provided, connect and check auxiliary devices (controlling devices etc.).
- 3.6 If transformers are provided with different ratios, the required ratio can be adjusted according to the circuit diagram, the marking and the rating plate.
- 3.7 The tap-changer can only be used during off-circuit.
- 4. Maintenance and Repair**
- 4.1 Check gaskets and sealing at the transformer and, if necessary, retighten screws/bolts slightly.
- 4.2 Please keep insulators clean.
- 4.3 Remove rust and recoat/repaint the surfaces concerned.
- 4.4 Oil Drainage**
- If maintenance and repairs require opening of the transformer the following instructions have to be followed:
- 4.4.1 Drain insulation fluid at closed filling pipe through the oil-draining device mounted at the bottom of the tank till pressure compensation (standstill).
- 4.4.2 Open filling pipe on the cover and drain insulation fluid to about 50 mm under cover (test with measuring stick through the filling pipe).
- 4.5 Refilling of the oil**
- After the works have been finished the transformers have to be filled and hermetically sealed as follows:
- 4.5.1 Unscrew the cap on the filling pipe.
- 4.5.2 Refill the transformers with oil, filling pipe included.
- 4.5.3 De-air the bushings.
- 4.5.4. Fill filling pipe to the brim and close with cap or with similar auxiliary device and seal it.
- 4.5.5. The correct pressure level is to be adjusted by draining a certain amount of oil which is influenced by the oil temperature (tolerance ± 3 K). The necessary information about oil temperature and the quantity of oil to be drained are stipulated on the rating plate. The existing oil temperature can be measured with the thermometer located in the thermometer pocket on the cover. Adjust with closed filling pipe by draining the amount of oil stated on the rating plate through the draining device on the bottom of the tank.
- 4.6. Please observe the instructions of the protection and control systems.
- 5. Oil Samples**
- Occasional tests of oil samples and examination as per VDE 0370 are recommended.
 Minimum breakdown voltage levels are:
 New oil : ≥ 50 kV
 Operating oil : ≥ 30 kV
 Purification of the oil is necessary at levels less than 30 kV.
- 5.1 Taking Oil Samples at Oil Temperature ≥ 35 °C**
- At an oil temperature of ≥ 35 °C the tank operates under excess pressure. An oil sample of approximately 0.2 l is taken from the oil drainage device. The filling pipe must not be ventilated during this procedure.
- 5.2. Taking Oil Samples at Oil Temperature < 35 °C**
- At an oil temperature of < 35 °C the tank operates under negative pressure. If the oil sample of approximately 0.2 l is not to be taken from the drainage device, ventilate the filling pipe and then refill according to the instructions given in section 4.4.