



Technical Bulletin

TB 0267 - Requirements of Recycled Mineral Insulating Oil for Bulk Oil Circuit Breakers and Bolt on Tap Changers

Purpose

To provide the requirements of recycled mineral insulating oil to be used in select bulk oil circuit breakers and bolt on tap changers.

Background

A review of risks associated with mineral oil for use as primary insulation in certain equipment has been undertaken. Recycled mineral insulating oil can now be used provided it meets the required parameters and is restricted to equipment listed.

Recycled mineral oil is oil that has undergone a process of vacuum drying and filtration.

Action

Oil shall be handled and managed in accordance with EMS 0017 – Oil Management.

Oil shall be tested prior to recycling, post recycling and prior to use in accordance with the tables below.

1. Pre-recycling

Prior to recycling oil, the used oil must be tested for neutralisation value, dielectric dissipation factor, corrosive sulphur and total PCB content, and the test results must meet the following specifications:

Property	Test method	Permissible limits
Neutralisation value/Acidity (mg KOH/g)	IEC 62021	< 0.1
Dielectric Dissipation Factor @ 90 deg. C and 40-60 Hz	IEC 60247	< 0.1

Property	Test method	Permissible limits
Corrosive sulphur	DIN 51353	Not corrosive
Total PCB content (mg/kg)	IEC 61619	Not detectable (< 2 mg/kg)

If the oil fails any of these tests, the oil is not suitable for recycling.

2. Oil recycling treatment precautions

In order to maintain appropriate properties of the insulating oil; the oil should not be vacuum treated at temperatures exceeding 85°C.

3. Post recycling

After the oil recycling process (prior to decanting into drums), the oil must be tested for appearance, water content and breakdown voltage, and the test results must meet the following specifications:

Property	Test method	Permissible limits
Colour and Appearance	IEC 60296	No visible contamination (i.e. no sediment or suspended matter)
Water content (mg/kg)	IEC 60814	< 20
Breakdown voltage (kV) (gap between electrodes 2.5 mm)	IEC 60156	> 55

If the oil fails any of these tests, the oil must be further recycled or treated until it passes the test.

4. Pre-use

Prior to using recycled oil, the oil must be tested for breakdown voltage. Where not possible, water content test can be performed instead. The test results must meet the following specifications prior to filling equipment:

Property	Test method	Permissible limits
Water content (mg/kg)	IEC 60814	<20
Breakdown voltage (kV) (gap between electrodes 2.5 mm)	IEC 60156	> 55

5. Drum allocation

The drum for storing the recycled oil ready for use must be as shown in Figure 1 below. That is, Black Drums only with Red writing 'Recycled Oil Only'



Figure 1 - Drum used for storing recycled oil

List of equipment to use recycled mineral insulating oil

The recycled mineral insulating oil is restricted for use in:

- 11kV and 33kV bulk oil circuit breakers.
- Bolt on tap changers of power transformers with a voltage of 33kV and below.

Impacted Standards

These changes will be updated in the next release of the following standards:

- SMI 200 – HV circuit breakers.
- SMI 151 – On load tap changers and tap changer motor boxes.
- SMI 103 – Testing of in-service insulating oil.

Contacts

Andrew Tang, Engineer – Transmission Substation Assets, (98536714)

Deepika Parihar, Acting Senior Engineer – Transmission Substation Assets, (98536718).