



भारत सरकार / Government of India
विद्युत मंत्रालय / Ministry of Power
केन्द्रीय विद्युत प्राधिकरण / Central Electricity Authority
New Delhi

Subject: Advisory on use of Ester Oil as a Technological Option in Transformers, Reactors etc. – reg.

1. The Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2023 provide that every electrical plant, electric line and apparatus shall be of adequate rating, mechanical strength, insulation level and shall be constructed, installed, protected, operated and maintained so as to ensure safety of persons, property and the electrical system.
2. In the case of transformers, reactors etc., the insulating and cooling medium, including transformer oil, is required to be suitable for the voltage class, temperature rise, and fault duty and service conditions of installation. Equipment containing oil is also required to be provided with adequate fire protection, safe clearances, earthing, ventilation and suitable arrangements to prevent danger arising from leakage, explosion or fire.
3. It has been observed that Mineral Oil is presently the most widely used insulating and cooling medium in power and distribution transformers, reactors etc. across the electricity sector. However, Ester Oil is also being used as an alternative technological option as a Transformer Oil by few utilities viz. GETCO, NTPC, Powergrid & Indian Railway. Further, relevant Indian Standard (IS) exists for both Mineral Oil and Ester Oil as a Transformer Oil.
4. With rapid expansion of electricity sector and growing demands, use of Ester Oil as Transformer Oil may be considered as a technological option in installations where use of Mineral Oil is prevalent. Further, as per regulatory provisions, both types of oil i.e. Mineral or Ester Oil, are allowed and utilities may choose the specific oil as per their requirement. Also, Utilities may also use any other Oil which are compliant to IS Standards as cooling medium based on utilities / transformer manufacturer's experience.
5. While adopting ester oil technology, the concerned owner / utility needs to ensure suitability of transformer design for ester oil, certification / recommendation of the Original Equipment Manufacturer (OEM), compliance with applicable standards and

specifications, availability of appropriate testing, filtration, maintenance and monitoring facilities.

6. It is also noted that globally Ester Oil adoption is accelerating due to its high fire safety and being bio-degradable and more environmentally friendly. However, insulating oil used in India are predominantly mineral oil based, derived from crude oil which India is predominantly importing from foreign countries.
7. Considering the above aspect, the use of **ester oil filled transformers, reactors and other electrical equipment**, along with conventional **mineral oil based transformers, reactors and other equipment**, may be considered as a technological option wherever technically feasible, except in cases where any statutory provision, regulation or applicable standard specifically requires dry type transformers or any other specified technology, in which case such provisions shall prevail.
8. Accordingly, all Central/State/Private Transmission Utilities are hereby advised to use Ester Oil as insulating/ cooling fluid in at least 10% (preferably 5% Natural & 5% Synthetic Ester) of new Transformers, Reactors etc. to be procured/installed for all voltage classes 33 kV and above.
9. All utilities are requested to implement above advisory as soon as possible in view of present West Asia crisis scenario.

This issues with the approval of Competent Authority.

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To,

1. Central Power Sector Undertakings
2. State Power Utilities
3. CTUIL / PGCIL / STUs
4. All DISCOMs / GENCOs / TRANSCOs
5. DG, IEEMA