

Laboratory	Transformer Oil Testing laboratory-Essar Steel India ltd, CA-CEID Building 27 km, Surat, Hazira Road, Hazira, Gujarat		
Accreditation Standard	ISO/IEC 17025: 2005		
Discipline	Electrical Testing	Issue Date	06.07.2014
Certificate Number	T-2286	Valid Until	05.07.2016
Last Amended on	-	Page	1 of 2

S.No.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
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I. ELECTRICAL MATERIALS – LIQUID DIELECTRIC MATERIALS

1. Transformer Oil	Appearance	IS 1866 : 2000 (Cl. No. 7.1), IS 335 : 1993	Clear, free from sediment & suspended matter
	Density @ 29.5°C	IS 1866 : 2000 (Cl. No. 7.11), IS 1448 [P-16] : 1990	0.70 g/cm ³ to 1.0 g/cm ³ / (0.005 g/cm ³)
	Interfacial Tension	IS 1866 : 2000 (Cl. No. 7.7), IS 6104 : 1971	0 to 90 mN/m / (1 mN/m)
	Neutralization Value	IS 1866 : 2000 (Cl. No. 7.4), IS 1448 [P:1/Sec 1] : 2002, ASTM D-664 : 11a	0.0001 mgKOH/g to 10 mgKOH/g of oil / (0.0001 mgKOH/g of oil)
	Water Content	IS 1866 : 2000 (Cl. No. 7.3), IS 13567 : 1992	1 mg/kg to 50000 mg/kg (1 mg/kg)
	Flash Point	IS 1866 : 2000 (Cl. No. 7.9), IS 1448 [P-21] : 2012	40°C to 400°C / 2°C
	Dielectric Dissipation Factor @ 90°C	IS 1866 : 2000 (Cl. No. 7.6), IS 6262 : 1971	0.00001 to 1.00000 (0.00001)
	Specific Resistance @ 90°C	IS 1866 : 2000 (Cl. No. 7.6), IS 6103 : 1971	1x10 ⁹ Ω-cm to 1x10 ¹⁵ Ω-cm/ (1x10 ⁹ Ω-cm)
	Breakdown Voltage	IS 1866 : 2000 (Cl. No. 7.2), IS 6792 : 1992	1x10 ⁹ Ω-cm/ 0 to 100 kV/ (0.1 KV)
	Sediments & Sludge	IS 1866 : 2000 (Cl. No. 7.5), (Annex 'A')	0 to 1% by Wt./ (0.01% by Wt.)

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Last Amended on - **Page** 2 of 2

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	Transformer Oil	Dissolved Gas Analysis	IS : 9434 : 1992 , IS 10593 : 2006 IEC 60599 (1999)	1 µL/L to 10 ⁵ µL/L (1 µL/L)
		1. Hydrogen (H ₂)		
		2. Methane (CH ₄)		
		3. Ethane (C ₂ H ₆)		
		4. Ethylene (C ₂ H ₄)		
		5. Acetylene (C ₂ H ₂)		
		6. Carbon Dioxide (CO ₂)		
		7. Carbon Monoxide (CO)		
		8. Propane(C ₃ H ₈)+ Propylene(C ₃ H ₆)		
		9. Nitrogen (N ₂)		
	10. Oxygen(O ₂)	50 µL/L to 10 ⁶ µL/L (50 µL/L)		

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