

Nuclear Power Corporation of India Limited	
700 MWe Atomic Power Projects Technical Specification for Generator Transformers, Unit Transformers and Start Up Transformers	Section: CC-11 Page 1 of 19 Rev-0
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A) ANNEXURE-A

Un-Inhibited Napthenic based EHV grade Transformer Oil for 700 MWe Projects

S.NO.	Characteristics	Limiting values of parameter	Test Results
1	Appearance	Clear & transparent and free from suspended matter or sediments	
2	Density at 20 Deg.C Kg/dm ³ , Maximum.	0.895	
3	Kinematic Viscosity, mm ² /S		
	a) at 40 deg.C, Maximum	11	
	b) at Minus 30 deg.C, Maximum.	1800	
4	Interfacial Tension at 27 deg.C (N/m), Minimum	0.04	
5	Flash Point deg.C, Minimum.	140	
6	Pour Point deg.C, Minimum	Minus 45	
7	Neutralization Value		
7-a	Total Acidity, Maximum	0.03 mg KOH/g	
7-b	Inorganic Acidity / alkalinity	Nil	
8	Corrosive Sulphur (CIGRE test method (TF A2.32.01 Revision of tests and pecifications for corrosive sulphur in Transformer Oils)	Non-Corrosive	
9	Electric Strength (Break Down Voltage)		
	a) New Unfiltered oil, kV, Minimum	30 kV	
	a) After Filtration kV, Minimum	70 kV	
10	Dielectric Dissipation Factor (Tan Delta) at 90 deg.C , Maximum	0.002	
11	Specific Resistance (Resistivity)		
	a) at 90 deg.C, Minimum	35x10 ¹² Ohm - cm	
	b) at 27 deg.C, Minimum	1500x10 ¹² Ohm - cm	
12	Oxidation Stability after 164 Hrs. at 100 deg.C		
	a) Neutralization Value, Maximum	0.2 mg KOH/g	
	b) Total sludge % Wt., Maximum	0.05% by weight	

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13	Ageing characteristics after accelerated aging (Open beaker method with Copper Catalyst)		
	a) Specific resistance :		
	At 27 deg.C, Minimum	2.5 x 10 ¹² Ohm - cm	
	At 90 deg.C Minimum	0.2 x 10 ¹² Ohm - cm	
	b) Tan Delta at 90 deg.C, Maximum	0.20	
	c) Total acidity , Maximum	0.05 mg KOH/g	
	d) Total sludge, Maximum	0.05% by Wt.	
14	Water content, mg/kg	30 in bulk delivery 40 in drum delivery	
15	Presence of oxidation inhibitor, percent by weight	Not Detectable with respect to IS-335 Amendment-1997	
16-a	Napthenic Content	46 to 53%	
16-b	Paraffinic Content	36 to 46%	
16-c	Aromatic Content	Remaining/balance	
17	Health, Safety and Environment (HSE)		
17.1	PCA content (BS 2000 Part 346), %, Maximum	3 %	
17.2	PCB content (IEC 61619), mg/kg	Less than 1	
17.3	Negative Impluse Voltage testing kVp (ASTM D-3300), Minimum	145	
18	Total sulphur content (BS 2000 part 373 or ISO 14596), %	0.15 %	
19	2-Furfural content (IEC 61198) , mg/kg, Maximum	0.1	
20	Gassing (IEC 60628 A)	No general requirement, however, negative gassing tendency is not acceptable	
NOTE: 1 Oil samples (One Composite and 8 individual) shall be tested at the works of transformer oil manufacturer)			
NOTE: 2 Test Results of 1 (One) Composite sample shall meet test requirement as per Item Nos. 1 to 20 above.			
NOTE: 3 Test Results of 8 Individual samples shall meet test requirement as per Item Nos. 9,10& 11 above.			
NOTE: 4 In case , test facilities of any test mentioned above are not available at the works of transformer oil manufacturer, the same test shall be conducted at any third party test lab Approved by CE(EP)/CE(ED) of NPCIL.			

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