



Transformer Oil Survey 107 (2014)
Provided by the Doble Insulating Materials Laboratories
Sponsored by the Doble Oil Committee

Doble 2014
Survey Report
No. 107

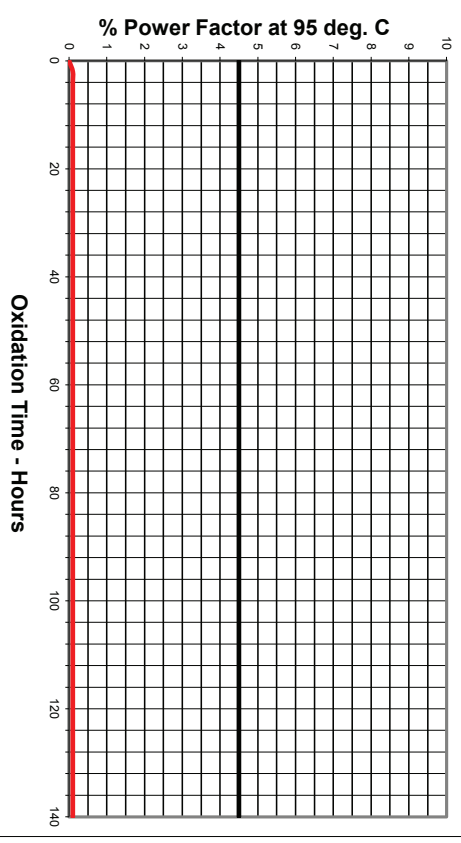
Product	ASTM Test	Units	
	D 611	°C	Aniline Point
Transformer Oil	73.0		
	D 1500		Color
	LO.5		
	D 1275B		Corrosive Sulfur
	Pass		
	D 877	kV	Dielectric Breakdown Voltage
	57		
	D 1816 (a)	kV	Dielectric Breakdown Voltage
	39		
	D 1533	mg/kg	Water Content
	11		
	D 92	°C	Flash Point
	156		
	D 971	mN/m	Interfacial Tension
	50		
	D 974	mg KOH/g	Neutralization Number
	<0.01		
	D 97	°C	Pour Point
	-54		
	D 924	%	Power Factor at 100°C
	0.032		
	D 924	%	Power Factor at 25°C
	0.001		
	D 1298		Relative Density 60/60
	0.890		
	D 445	KIN mm ² /s	Viscosity at 0C
	74.30		
	D 445	KIN mm ² /s	Viscosity at 100C
	2.38		
	D 445	KIN mm ² /s	Viscosity at 40°C
	9.86		
	D 2161	SUS	Viscosity at 40°C
	58.4		
	D 2668	% wt.	Oxidation Inhibitor Content
	0.30		
	Doble (b)	Hrs	Sludge-Free Life
	>88		
	None	% wt.	Oxidation Stability D2440
	<0.01		
	D 974	mg KOH/g	
	<0.01		
	None	% wt.	72 Hrs. Sludge
	<0.01		72 Hrs. Neut. No.
	D 974	mg KOH/g	164 Hrs. Sludge
	<0.01		164 Neut. No.
	D 974	mg KOH/g	
	<0.01		
	D 2112	Min.	Rotating Pressure Vessel
	275		
	D 2300	uL/min	Gassing Tendency at 80°C
	29.4		
	D 3300	kV	Impulse Breakdown Voltage
	>300		
	D 2140	%	Carbon Type Composition, C _A
	6.7		
	D 2140	%	Carbon Type Composition, C _N
	49.0		
	D 2140	%	Carbon Type Composition, C _P
	44.3		
	D 4059	mg/kg	Polychlorinated Biphenyls
	<2		

Notes:
(a) : Firm gap
(b) : Doble Procedure
+ : Refer to Written Discussion

ND : None Detected
NA : Not Applicable
INS : Insufficient sample

C_A = % Aromatics
C_N = % Naphthenics
C_P = % Paraffinics

Power Factor vs. Oxidation Time



Doble CCD Test	
Breathing Tube	Sealed tube
Non-corrosive	Non-corrosive

Furanic Compounds	
D 5837	5-Hydroxy-2-methyl furfural
<25	ug/L
D 5837	Furfuryl alcohol
<25	ug/L
D 5837	2-Furfural
<25	ug/L
D 5837	5-Acetyl-2-furfural
<25	ug/L
D 5837	5-Methyl-2-furfural
<25	ug/L

Passivator Compounds	
Doble(b)	Benzotriazole
<1	mg/kg
Doble(b)	Irgamet 39 or similar
<1	mg/kg