NTT DIAGNOSTIC REPORT For Conventional Petroleum (mineral) Dielectric Oils

DGA PLUS DGA EXPERT SYSTEMS™ BENCHSTOCKING Metal Cylinders · Glass Syringes http://www.nttworldwide.com NORTHERN TECHNOLOGY & TESTING NTT

Copyright © 1994-2009 NTT

IEEE Guide for Acceptance and Maintenance of Insulating Oil in Equipment IEEE C57.106-2006			Table 1	Table 2		Table 3		Table 5			Table 6	Table 7	Table 8	Table 9	Table 10
IEEE Suggested Applications			New Mineral Insulating Oil as Received from the Supplier	New Mineral Insulating Oil Received in New Equipment, Prior to Energization		New Mineral Insulating Oil Processed from Equipment, Prior to Enerization		Suggest Limits for Continued Use of Service-Aged Insulating Oil Group I			Shipments of New Mineral Insulating Oil for OCBs	New OCB Insulating Oil After being Processed, in Equipment, Prior to Energizing	Continued Use of Service-Aged OCBs	New Mineral Insulating Oil for LTC Prior to Energizing	Suggested Limits for Continued Use of Service-Aged Insulating Oil for LTCs
Apparatus Voltage Class or Group			Not Specified by IEEE	≤69kV	69-230kV	230-345kV	≥ 345 kV	≤69kV	69-230kV	≥ 230 kV	OCB	OCB	OCB	LTC	LTC Neutral/≤69/>69kv
Analysis	ASTM Method	*Current NTT Result*	I E E E L i m i t V a l u e s												
Moisture Content (ppm)	D-1533		Maximum 25	Maximum 20	Maximum 10	Maximum 10		Maximum 35	Maximum 25	Maximum 20	Maximum 25	Maximum 20	Not Specified by IEEE	Maximum 10	Maximum 40/30/25
Interfacial Tension (Dynes/Cm)	D-971		Minimum 40	Minimum 38		Minimum 38		Minimum 25	Minimum 30	Minimum 32	Minimum 40	Minimum 35	Minimum 25	Not Specified by IEEE	Not Specified by IEEE
Acid or Neutralization Number (mg KOH/gm)	D-974		Maximum 0.015	Maximum 0.015		Maximum 0.015		Maximum 0.20	Maximum 0.15	Maximum 0.10	Maximum 0.015	Maximum 0.015	Not Specified by IEEE	Not Specified by IEEE	Not Specified by IEEE
Color	D-1500		Maximum 0.5	Maximum 1.0		Maximum 1.0	Maximum 0.5	Not Specified by IEEE			Maximum 0.5	Maximum 0.5	Maximum 2.0	Not Specified by IEEE	Not Specified by IEEE
Visual Examination	D-1524		Bright and Clear	Bright and Clear		Bright and Clear		Not Specified by IEEE			Bright and Clear	Bright and Clear	No Excessive Carbon in Oil	Not Specified by IEEE	Not Specified by IEEE
Power Factor @ 25ºC (%)	D-924		Maximum 0.05	Maximum 0.05		Maximum 0.05		Maximum 0.5			Maximum 0.5	Maximum 0.10	Maximum 1.0	Not Specified by IEEE	Not Specified by IEEE
Power Factor @ 100ºC (%)	D-924		Maximum 0.30	Maximum 0.40		Maximum 0.30		Maximum 5.0			Maximum 0.30	Not Specified by IEEE	Not Specified by IEEE	Not Specified by IEEE	Not Specified by IEEE
Dielectric Breakdown Voltage (kv)	D-877		Not Specified by IEEE	Not Specified by IEEE		Not Specified by IEEE		Not Specified by IEEE			Not Specified by IEEE	Not Specified by IEEE	Minimum 25	Not Specified by IEEE	Not Specified by IEEE
Dielectric Breakdown Voltage 0.04 inch gap (kv)	D-1816		Minimum 20	Minimum 25	Minimum 30	Minimum 32	Minimum 35	Minimum 23	Minimum 28	Minimum 30	Minimum 20	Minimum 30	Minimum 20	Minimum 35	Minimum 20/25/28
Dielectric Breakdown Voltage 0.08 inch gap (kv)	D-1816		Minimum 35	Minimum 45	Minimum 52	Minimum 55	Minimum 60	Minimum 40	Minimum 47	Minimum 50	Minimum 35	Minimum 60	Minimum 27	Minimum 55	Minimum 27/35/45
Specific Gravity	D-1298		Maximum 0.91	Not Specified by IEEE		Not Specified by IEEE		Not Specified by IEEE			Not Specified by IEEE	Not Specified by IEEE	Not Specified by IEEE	Not Specified by IEEE	Not Specified by IEEE
Gas Content (%)	D-2945		Not Specified by IEEE	Not Specified by IEEE		0.5% or per manufacturer		Not Specified by IEEE			Not Specified by IEEE	Not Specified by IEEE	Not Specified by IEEE	Not Specified by IEEE	Not Specified by IEEE

Northern Technology and Testing, Inc. ◆ 8140 Industrial Parkway, Suite 8 ◆ Sacramento, CA 95824 ◆ Tel: (916) 383-6800 ◆ Fax (916) 383-7794 ◆ http://www.nttworldwide.com

Note: Our test results relate only to the sample or samples tested. Northern Technology and Testing, Inc. does not imply that the contents of the sample received by this laboratory are the same as all such material in the environment from which the sample was taken. The analysis, opinions, or interpretations contained in this report are based upon material and information supplied by the client. Any interpretations or opinions express represent the best judgment of Northern Technology and Testing, Inc. Northern Technology and Testing, Inc. assumes no responsibility and makes no warranty or representation, expressed or implied as to the conditions, productivity, proper operation, or profitableness of any equipment or other property for which this report may be used or relied upon for any reason whatsoever. NTT assumes no responsibility for foreign lab data which is provided by the customer.