Designation: D 117 – 02

Standard Guide for Sampling, Test Methods, and Specifications for Electrical Insulating Oils of Petroleum Origin [1]

This standard is issued under the fixed designation D 117; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This guide describes methods of testing and specifications for electrical insulating oils of petroleum origin intended for use in electrical cables, transformers, oil circuit breakers, and other electrical apparatus where the oils are used as insulating, or heat transfer media, or both.

1.2 The purpose of this guide is to outline the applicability of the available test methods. Where more than one is available for measuring a given property, their relative advantages are described, along with an indication of laboratory convenience, precision, (95 % confidence limits), and applicability to specific types of electrical insulating oils.

1.3 This guide is classified into the following categories: Sampling Practices, Physical Tests, Electrical Tests, Chemical Tests, and Specifications. Within each test category, the test methods are listed alphabetically by property measured. A list of standards follows:

Category	Section	ASTM Method
Sampling:	3	D 923, D2759, D3305, D3613
Physical Tests:		
Aniline Point	4	D 611
Coefficient of Thermal Expansion	5	D 1903
Color	6	D 1500
Examination: Visual Infrared	7	D 1524, D2144
Flash and Fire Point	8	D 92
Interfacial Tension	9	D 971, D2285
Pour Point of Petroleum Products	10	D 97
Refractive Index	11	D 1218, D1807
Relative Density (Specific Gravity)	12	D 287, D 1217, D1298, D1481
Specific Heat	13	D 2766
Thermal Conductivity	14	D 2717
Turbidity	15	D 6181
Viscosity	16	D 88, D445, D2161
Electrical Tests:		
Dielectric Breakdown Voltage	17	D 877, D1816, D3300
Dissipation Factor and Relative Permittivity (Dielectric Constant)	18	D 924
Gassing Tendency	19	D 2300
Resistivity	20	D 1169
Stability Under Electrical Discharge	21	D 6180
Chemical Tests:		
Acidity, Approximate	22	D 1534
Carbon-Type Composition	23	D 2140
Compatibility with Construction Material	24	D 3455
Copper Content	25	D 3635
Furanic Compounds	26	D 5837
Gas Analysis	27	D 3612
Gas Content	28	D 831, D1827, D2945
Inorganic Chlorides and Sulfates	29	D 878
Neutralization (Acid and Base) Numbers	30	D 664, D974
Oxidation Inhibitor Content	31	D 2668, D4768
Oxidation Stability	32	D 1934, D2112, D2440
Polychlorinated Biphenyl Content	33	D 4059
Sediment and Soluble Sludge	34	D 1698
Sulfur, Corrosive	35	D 1275
Water Content	36	D 1533
Specification:		
Mineral Insulating Oil for Electrical Apparatus	37	D 3487
High Firepoint Electrical Insulating Oils	38	D 5222

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 88 Test Method for Saybolt Viscosity [2]

D 92 Test Method for Flash and Fire Points by Cleveland Open Cup [3]

D 97 Test Method for Pour Point of Petroleum Products [3]

D 287 Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method) [3]

D 445 Test Method for Kinematic Viscosity of Transparent

[1] This guide is under the jurisdiction of ASTM Committee D27 on Electrical Insulating Liquids and Gases, and is the direct responsibility of Subcommittee D27.01 on Mineral Oils.

Current edition approved Oct. 10, 2002. Published December 2002. Originally published as D 117 – 21 T. Last previous edition D 117 – 96.

[2] *Annual Book of ASTM Standards*, Vol 04.04.

[3] *Annual Book of ASTM Standards*, Vol 05.01.

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