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Standard Test Method for STABILITY OF INSULATING OILS UNDER ELECTRICAL STRESS (MERRELL TEST)¹

This standard is issued under the fixed designation D 2298; 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.

1. Scope

1.1 This method covers the determination of stability of electrical insulating oils, such as are used in cables and capacitors, by subjecting them to electric discharge under prescribed conditions for a fixed period of time and evaluating the amount of gas evolved.

2. Applicable Document

2.1 *ASTM Standard:*

D 923 Sampling Electrical Insulating Liquids²

3. Summary of Methods

3.1 A sample of oil is admitted under vacuum into the evacuated cell and, at room temperature, 10 000 V is applied between the high-voltage electrode and the grounded salt-water electrode for 1000 min. At the conclusion of the test, the manometer is read. The amount of gas evolved is a function of the pressure attained. The power factor of the oil at 100°C, or other pertinent characteristics, may be determined before and after the stability test.

4. Significance

4.1 When subjected to load cycling, some types of oil-impregnated paper cable may develop partial vacuums or reduced pressure. The resistance of an oil to gas evolution or the change in other pertinent characteristics, such as the amount of power factor increase when the oil is exposed in a vacuum to electrical discharge, are criteria indicative of the suitability of an oil for use in a cable.

5. Apparatus

5.1 *Discharge Cell*,³ shown in Fig. 1, includ-

ing a closed-tube mercury manometer.

5.2 *Glass Dish*, approximately 4 in. (100 mm) in diameter for holding salt-water ground electrode.

5.3 *Test Chamber*, with safety interlocked door which de-energizes the test transformer when opened and large enough to contain the desired number of cells with at least 1-in. (25-mm) clearance between cells and sides, and top.

5.4 *Transformer*, 60-Hz, 200-VA, 115 or 230 V to at least 10 000 V. The crest factor (ratio of maximum to mean effective) of the output voltage shall not differ from a sine wave by more than $\pm 5\%$.

5.5 *Variable-Tap Autotransformer or Equivalent*, 500 VA min, 115 or 230 V for applying voltage to transformer.

5.6 *Relay*, 115 or 230-V, double-pole, for energizing transformer.

5.7 *Switch, double-pole*, 115 or 230-V, on-off switch for applying voltage to circuit.

5.8 *Voltmeter*—A voltmeter connected across the transformer primary may be used to determine voltage, provided it has been calibrated in terms of the transformer high-voltage output when cells are under test.

5.9 *Vacuum Pump*, laboratory-type capable of attaining a vacuum of less than 100 $\mu\text{m Hg}$.

5.10 *Clamp Stand*, for supporting cell in chamber.

¹ This method is under the jurisdiction of ASTM Committee D-27 on Electrical Insulating Liquids and Gases. Current edition approved Feb. 27, 1981. Published April 1981. Originally published as D 2298-64 T. Last previous edition D 2298-76.

² *Annual Book of ASTM Standards*, Part 40.

³ A suitable discharge cell is obtainable from the Lapine Scientific Corp., 375 Chestnut St., Norwood, N.J. 07648.