Designation: F 1761 – 00

Standard Test Method for Pass Through Flux of Circular Magnetic Sputtering Targets[1]

This standard is issued under the fixed designation F 1761; 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.

1. Scope

1.1 This specification covers measuring the dc magnetic field transmitted through a ferromagnetic sputtering target ("pass through flux" or "PTF"). In this test method the source magnetic field is in the test target's circumferential direction.

1.2 Planar disk-shaped targets in the diameter range 5 to 8 in. inclusive (125 to 205 mm inclusive) and of thickness 0.1 to 0.5 in. inclusive (2.5 to 13 mm) may be characterized by this procedure.

1.3 This test method is also applicable to targets having an open center, for example, to targets 5-in. outside diameter by 2.5-in. inside diameter by 0.25-in. thick (127-mm outside diameter by 63.5-mm inside diameter by 6.35-mm thick).

1.4 Targets of various diameters and thicknesses are accommodated by suitable fixturing to align the piece under test with the source magnet mounted in the test fixture. Tooling, covering several popular target designs is specified in this procedure. Additional target configurations may be tested by providing special tooling. When special fixturing is used all parties concerned with the testing must agree to the test setup.

1.5 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.6 *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. Terminology

2.1 *Definitions:*

2.1.1 *pass through flux (PTF), (n)*—For purposes of this standard the ″pass through flux" is the dc magnetic field transmitted through a ferromagnetic sputtering target, from one face to the opposite face.

2.1.1.1 *Discussion*—PTF is also frequently called ″leakage flux."

2.1.2 *reference field, n*—For purposes of this standard the "reference field" is the dc magnetic field measured with the Hall probe Gaussmeter when no sputtering target is in position on the test stand. The strength of the reference field depends upon the height and position of the Hall probe relative to the source magnet.

2.1.3 *source field, n*—For purposes of this standard the "source field" is the dc magnetic field measured with the Hall probe at the top surface of the target support table.

3. Summary of Test Method

3.1 The sputtering target under test is mounted on a test fixture in which a permanent horseshoe-shaped magnet is held in proximity to one of the flat planar faces of the target. A Hall probe Gaussmeter is used to measure the dc magnetic field penetrating the target and entering the air space from target's opposite face.

4. Significance and Use

4.1 It is standard practice to use magnetron cathode sputter deposition sources in manufacturing thin film magnetic data storage media. But a ferromagnetic sputtering target tends to shunt a sputtering cathode's magnetic field, thus reducing the efficiency of the sputtering process.

4.2 Makers of sputtering targets have developed various means of controlling alloy microstructure to minimize the undesirable cathode shunting effect. Because of their differing manufacturing methods, however, the targets of one supplier may have magnetic properties significantly better or worse than those of another, even when the alloy compositions are the same.

4.3 This test method permits comparing the magnetic shunting power of magnetic targets under a standard test condition. The results are useful to sputtering target suppliers and buyers in predicting target performance, in specifying target quality, and in qualifying incoming target shipments. This test may also be useful in quantifying target improvement efforts.

4.4 Manufacturing process steps that lower a target material's magnetic permeability tend to increase the PTF, and vice versa. It would in principle be possible to predict the PTF by

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