



Standard Test Method for Lamination Factor of Magnetic Materials¹

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1. Scope

1.1 This test method covers measurement of the lamination factor (Note 1) of a specimen composed of strips cut from magnetic material.

1.2 This method shall be used in conjunction with Practice A 34.

1.3 The values stated in either customary units or SI units are to be regarded separately as standard. Within this test method, the SI units are shown in brackets except for the sections concerning calculations which are separate.

1.4 *This standard does not purport to address the safety problems 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.*

NOTE 1—Lamination factor is also termed space factor or stacking factor.

2. Referenced Documents

2.1 *ASTM Standards:*

A 34 Practice for Sample and Procurement Testing of Magnetic Materials²

3. Summary of Test Method

3.1 The laminated test specimen is subjected to pressure in a compression device and the resulting volume is then determined from the measured specimen height, width, and length. An equivalent solid volume is calculated from the specimen mass and the true density of the specimen material. The ratio of the calculated (equivalent solid) volume to the measured volume is the lamination factor.

4. Significance and Use

4.1 Lamination factor, S , indicates the deficiency of effective steel volume which is due to the presence of oxides, roughness, insulating coatings, and other conditions affecting the steel surface.

¹ This test method is under the jurisdiction of ASTM Committee A-6 on Magnetic Properties and is the direct responsibility of Subcommittee A06.01 on Test Methods.

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² *Annual Book of ASTM Standards*, Vol 03.04.

5. Apparatus

5.1 *Testing Machine*—A compression testing machine or other compression device capable of exerting the specified pressure.

5.2 *Metal Plates*—Two flat, smooth, rigid metal plates with square edges and ends are required. They shall be of sufficient stiffness to distribute the pressure uniformly over the surface of the sample. Each plate shall be 8.46 in. [215 mm] long and have a minimum width of 1.97 in. [50 mm] so that the area of strips under pressure when testing 1.18-in. [30-mm] wide specimens will be 10 in.² [6450 mm²].

5.2.1 Extensions can be added to the plates to allow the use of micrometers or outside calipers instead of inside calipers for determining plate separation. Precautions must be taken to ensure that, within the limits of accuracy of the measurements, no significant deflection of these extensions result from the test pressure.

5.3 *Length-Measuring Tools*—Calipers or other devices of adequate accuracy for measurement of plate separation.

6. Sampling

6.1 Test strips shall be selected as representative of the surface condition. Core loss test specimens (Epstein test specimens) are normally used for this purpose.

6.2 In routine testing, where the core loss specimens are too small to conform to the number of strips requirement of Table 1, sufficient specimens may be combined to provide an adequate test specimen. The combined specimens must be of the same thickness and material, have similar surfaces, and be representative of the surface condition of the test lot.

6.3 When a referee test becomes necessary, the test specimen must be composed of strips taken from one lot of steel. It must be representative of the surface condition, thickness, and other variables. The shearing burrs should be removed and the strips wiped free of loose particles.

7. Test Specimen

7.1 The test specimens shall consist of the number of strips prescribed in Table 1.

7.2 Each strip shall have a minimum length of 9.84 in. [250 mm] and a width of 1.18 in. [30 mm]. Refer to Practice A 34.

7.3 Length and width dimensions should be known to at least 0.25 % and preferably to 0.1 %.