



Designation: A720/A720M – 02 (Reapproved 2021)

## Standard Test Method for Ductility of Nonoriented Electrical Steel<sup>1</sup>

This standard is issued under the fixed designation A720/A720M; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method covers determination of ductility utilizing Epstein test strips and a bending device for bending the strip over a predetermined radius. It is intended for commercial silicon-bearing steel sheet or strip of nonoriented types in the thickness range from 0.010 to 0.031 in. [0.25 to 0.79 mm], inclusive.

1.2 The values and equations stated in customary (cgs-emu and inch-pound) or SI units are to be regarded separately as standard. Within this test method, SI units are shown in brackets. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with this test method.

1.3 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

### 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

[A34/A34M Practice for Sampling and Procurement Testing of Magnetic Materials](#)

[A677 Specification for Nonoriented Electrical Steel Fully Processed Types](#)

[A683 Specification for Nonoriented Electrical Steel, Semi-processed Types](#)

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee A06 on Magnetic Properties and is the direct responsibility of Subcommittee A06.01 on Test Methods.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[E290 Test Methods for Bend Testing of Material for Ductility](#)

### 3. Summary of Test Method

3.1 A test strip is placed in the special test apparatus designed to clamp one end of the specimen securely while the other end is free to move, but held in tension by a spring. The specimen is repeatedly bent through 180° reversals until a crack appears at the bend or until sudden failure occurs by complete rupture. The number of reversals until failure is taken as a measure of the ductility.

### 4. Significance and Use

4.1 This is a specialized bend test for nonoriented electrical steel not covered under the provisions of Test Methods [E290](#).

4.2 This test is applicable to nonoriented silicon steel such as described in Specifications [A677](#) and [A683](#) in commercial thicknesses.

4.3 It is not intended to be applied to steels considered inherently ductile.

### 5. Apparatus

5.1 The apparatus, [Fig. 1](#), consists of a set of stationary jaws and a movable arm to which is attached another set of jaws and a spring.

5.1.1 The stationary jaws shall have working edges with radii of approximately 0.2 in. [5 mm] over which the test specimen is bent. Stationary jaws shall be of the quick-clamping type.

5.1.2 The jaws attached to the movable arm shall allow the specimen to move freely during bending.

5.1.3 The spring clamped to the free end of the specimen shall provide sufficient tension in the specimen to localize the bend.

5.1.4 Design of the movable arm shall permit a rotation of approximately 180°.

### 6. Sampling

6.1 Select samples from at least two well separated locations in each test lot or lift.

6.1.1 The test specimens may be cut from samples used for the core loss or other tests in accordance with the practice in Practice [A34/A34M](#).