

Designation: A1073/A1073M - 17

Standard Practice for Using Hand Micrometers to Measure the Thickness of Uncoated Steel Sheet and Nonmetallic and Metallic-Coated Steel Sheet¹

This standard is issued under the fixed designation A1073/A1073M; 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 practice defines procedures for measuring the thickness of uncoated steel sheet and nonmetallic and metalliccoated steel sheet. Thickness is a significant quality characteristic of steel sheet products. The ability to accurately measure thickness using hand micrometers is critical in determining product conformance to specifications. The methods described are designed and intended for use in both laboratory and plant situations and their environments.

1.2 The flat steel product shall conform to all the requirements of the appropriate specifications as follows: Specifications A109/A109M, A505, A568/A568M, A635/A635M, A684/A684M, and A924/A924M.

1.3 Quantitative limits are not addressed and are established in the general requirements, or individual product specifications, or both; or when applicable, as agreed to between supplier and user.

1.4 This specification is applicable to orders in either inch-pound units or SI units. Values in inch-pound and SI units are not necessarily equivalent. Within the text, SI units are shown in brackets. Each system shall be used independently of the other.

1.5 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.

1.6 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:²
- A109/A109M Specification for Steel, Strip, Carbon (0.25 Maximum Percent), Cold-Rolled
- A505 Specification for Steel, Sheet and Strip, Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
- A568/A568M Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
- A635/A635M Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Alloy, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability, General Requirements for
- A684/A684M Specification for Steel, Strip, High-Carbon, Cold-Rolled
- A902 Terminology Relating to Metallic Coated Steel Products
- A924/A924M Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

3. Terminology

3.1 *Definitions*—See Terminology A902 for definitions of general terminology relating to metallic-coated hot-dip products.

3.2 The definitions and procedures for measuring thickness characteristics of steel sheet products are provided so that purchasers and suppliers have common definitions and measuring procedures for thickness measurements. The intention of these definitions and measuring methods is not to provide dimensional specifications for thickness characteristics, but rather common procedures for quantifying thickness values. For determining compliance with thickness specifications, references are provided to appropriate ASTM standards.

¹ This practice is under the jurisdiction of ASTM Committee A05 on Metallic-Coated Iron and Steel Products and is the direct responsibility of Subcommittee A05.07 on Methods of Testing.

Current edition approved May 1, 2017. Published May 2017. Originally approved in 2012. Last previous edition approved in 2016 as A1073/A1073M-16. DOI:10.1520/A1073_A1073M-17.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.



4. Apparatus

4.1 Micrometers used for thickness measurement shall be constructed with anvils and spindles having minimum diameters of 0.188 in. [4.80 mm]. The tip of the anvil shall be flat or rounded with a minimum radius of curvature of 0.10 in. [2.55 mm] and the tip of the spindle shall be flat. Micrometers with conical tips, rounded anvil with rounded spindle, pointed tips or any surface that may penetrate the surface of the item being measured shall not be used for thickness measurements of sheet steels. Micrometers can be electronic digital, mechanical digital, or analog with vernier scale, as shown in Fig. 1(a), (b), and (c).

4.2 Unlock the micrometer and if electronic digital, turn it on.

4.3 Typical ways to hold/secure the micrometer are:

4.3.1 Grasp the micrometer as shown in Fig. 2, with the small finger placed in the frame of the micrometer for support. This allows the other hand to insert the sample for measuring after cleaning (see 4.4).

4.3.2 Support the micrometer with a micrometer mount. This allows the other hand to insert the sample after cleaning (see 4.4). Inserting the sample with one hand while lightly clamping with the other hand, as shown in Fig. 3.

4.4 Clean the micrometer tips at regular intervals. Place cleaning material, such as clean dry paper, lint free cloth, cardboard or fabric (not abrasive such as sandpaper) in between the anvil and spindle. Tighten the micrometer until lightly snug. Pull the cleaning material until free of the micrometer. Repeat until the micrometer is clean. Usually once or twice is adequate.

4.5 Close the micrometer by turning the friction thimble and zero out (reset) the micrometer in accordance with manufacturer's instructions. For mechanical vernier micrometers, adjust the barrel to read zero in accordance with manufacturer's instructions, and as mechanical micrometers are sensitive to barrel adjustments, recalibrate in accordance with the manufacturer's instructions.

4.6 Measure material thickness by opening the micrometer wide enough so the sample can be placed between the anvil and



FIG. 2 Holding a Micometer

spindle tip. Turn the friction thimble until there is no further movement of the spindle. Spin the friction thimble one further turn to secure the measurement. For electronic digital micrometers, read the viewing screen for the measurement. Follow the manufacturer's instructions for mechanical micrometers with or without vernier micrometer scales.

4.7 Repeat measurements as required. Note that the micrometer readings are subject to the precision of the type of micrometer used.

4.8 Recording Readings:

4.8.1 If required on the sample, identify where the reading(s) was made using a circle, box, cross hairs, etc.



FIG. 1 Micrometer Types



FIG. 3 Mounted Micrometer

4.8.2 In the measurement record of readings, use a traceable identification back to the sample or product that was measured.

5. Calibration Checks

5.1 It is common practice to calibrate micrometers on a regular basis in accordance with operational standards of each company. The micrometers must be calibrated to appropriate NIST or equivalent standards within the prescribed time limits. The maximum length of time recommended between calibrations is one year.

5.2 Zero out the micrometer.

5.3 Measure at least three (3) (different) thicknesses so that the range of typical measurement is covered. Zero may be one of the reference measurements. Use NIST or equivalent traceable standards (test blocks) in increments of 0.050 in. that are within the thickness range of the product being measured. Example: To measure thin sheet such as 0.048 in., use zero and two standards of 0.050000 in. [1.30 mm] and 0.100000 in. [2.54 mm]. Heavy thickness sheet such as 0.205 in., would use 0.200000 in [5.08 mm], 0.250000 in. [6.35 mm], and 0.300000 in. [7.60 mm]. If the micrometer readings of the standards (test blocks) are satisfactory, the device can be used to measure sheet steel with confidence.

6. Proper Care of the Instrument

6.1 Do not disassemble a digital micrometer.

6.2 Store the micrometer at room temperature, typically 60 to 100°F [16 to 38°C]. When measuring, let the micrometer acclimate to the ambient temperature of the sample. It is then appropriate to set the micrometer at zero.

6.3 Keep the micrometer clean and in a clean environment.

6.4 Keep micrometer away from liquids of any kind.

6.5 Do not subject the micrometer to sudden shocks such as from dropping, or to excessive force during measuring.

6.6 Wipe off dust, cutting chips, oil, and moisture from the micrometer after each use.

6.7 When cleaning the micrometer, use a soft cloth using a neutral detergent. Do not use any organic solvent (thinner, etc.) as it may cause damage to the device.

6.8 Do not use an electric marking pen or other such device on the micrometer.

7. Accuracy Statement³

7.1 Accuracy of Electronic Digital Micrometers is \pm 0.0003 in. [\pm 0.008 mm].

7.2 Accuracy of Vernier Micrometers is \pm 0.0004 in. [\pm 0.010 mm].

7.3 The accuracy statement was determined through statistical examination of four studies from 31 laboratories on steel samples and NIST traceable standards.

Note 1—The studies used micrometers with resolutions of 0.0001 in. $\left[0.00254 \text{ } \text{mm}\right]$ or finer.

8. Keywords

8.1 micrometer; steel sheet; steel sheet - metallic-coated

SUMMARY OF CHANGES

Committee A05 has identified the location of selected changes to this standard since the last issue (A1073/A1073M-16) that may impact the use of this standard. (Approved May 1, 2017.)

(1) Added references to uncoated sheet specifications in 1.2 and Section 2.1; deleted reference to A917.

³ Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:A05-1005. Contact ASTM Customer Service at service@astm.org.



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