

FED. SUPPLY CLASS  
53GP

FOREWORD:

- ③ This standard sets forth a standard test procedure for determining the thickness of a metallic coating (plating) on threaded and non-threaded fasteners.

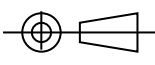
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THE INITIAL RELEASE OF THIS DOCUMENT SUPERSEDES MIL-STD-1312-12.  
DESIGNATION FOR THIS TEST METHOD REMAINS MIL-STD-1312-12.

THIRD ANGLE PROJECTION 	CUSTODIAN NATIONAL AEROSPACE STANDARDS COMMITTEE	REVISION <b>3</b>
PROCUREMENT SPECIFICATION  NONE	TITLE <b>FASTENER TEST METHODS, METHOD 12, THICKNESS OF METALLIC COATINGS</b>	CLASSIFICATION STANDARD PRACTICE <b>NASM1312-12</b> SHEET 1 OF 7

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FORM 19-01

ISSUE DATE: AUGUST 1997 REVISION DATE: APRIL 30, 2019

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**1. SCOPE**

1.1 **3** Applicability. This test method outlines a standard procedure for determining the thickness of a metallic coating (plating) on threaded and non-threaded fasteners. This procedure applies to all types of threaded and non-threaded fasteners and is not limited by configuration or size.

**2. REFERENCED DOCUMENTS**

2.1 Government documents

2.1.1 **3** Specifications, standards and handbooks. Unless otherwise specified, the following specifications, standards and handbooks of the issue listed in the current DLA Document Services ASSIST Quicksearch (<http://quicksearch.dla.mil>) and the supplement thereto (if applicable), form a part of this standard to the extent specified herein.

STANDARDS

Federal

FED-STD-H28/6 Screw Thread Standards for Federal Services, Section 6, Gages and Gaging for Unified Screw Threads

**3** Copies can be obtained from DLA Document Services. <http://quicksearch.dla.mil>

2.2 Other publications. The following document(s) forms a part of this specification to the extent specified herein. The issues of the documents which are indicated as DOD adopted shall be the issue in the current DoDISS and the supplement thereto, if applicable.

ASTM International

- 3** ~~ASTM B487 Test Method for Measurement of Metal and Oxide Coating Thicknesses by Microscopic Examination of a Cross Section~~
- ASTM B499 Measurement of Coating Thicknesses by the Magnetic Method
- 3** ASTM B504 Measurement of Thickness of Metallic Coatings by the Coulometric Method
- ASTM B530 Measurement of Coating Thicknesses by the Magnetic Method: Electrodeposited Nickel Coatings on Magnetic and Nonmagnetic Substrates
- ASTM B555 Measurement of Electrodeposited Metallic Coating Thicknesses by the Dropping Test
- 3** ~~ASTM B567 Measurement of Coating Thickness by the Beta Backscatter Method~~
- ASTM B568 Measurement of Coating Thicknesses by X-Ray Spectrometry
- ASTM B767 Determining Mass per Unit Area of Electrodeposited and Related Coatings by Gravimetric and Other Chemical Analysis Procedures
- 3** ASTM D693 Standard Specification for Crushed Aggregate for Macadam Pavements
- ASTM D2270 Standard Practice for Calculating Viscosity Index from Kinematic Viscosity at 40°C and 100°C
- ASTM E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- ASTM E376 Standard Practice for Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Testing Methods

Copies can be obtained from ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. [www.astm.org](http://www.astm.org)

**3. DEFINITIONS**

Not applicable.

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**4. GENERAL REQUIREMENTS**

**4.1 Test apparatus**

- 4.1.1 ~~Drop test method.~~ The apparatus shown in Figure ~~—~~ of Method ~~—~~ of FED-STD 151 illustrates one method of applying the corroding medium. Other types of apparatus may be used if the drops are applied in conformance with Method ~~—~~ of FED-STD 151.
- 4.1.1 Drop test method. Coating thickness shall be determined by applying a corrosive solution, dropwise, at a constant rate, and measuring the time required to penetrate the coating and expose the parent material. The apparatus shown in Figure 1 of ASTM B555 illustrates one method of applying the corroding medium. Other types of apparatus may be used if the drops are applied in conformance with ASTM B555 (see 5.1.1).
- 4.1.2 ~~Magnetic test method (Magne Gage or equivalent).~~ Four different magnets and seven different calibration curves are used for various materials and thickness ranges. Table I of Method 522.1 of FED-STD 151, titled "Magnetic and calibration curves for use with the standard Magne Gage", specifies the proper combination of magnets and calibration curve to use for different coatings and thickness ranges.
- 4.1.2 Magnetic test method. This test method covers the use of magnetic instruments for the nondestructive measurement of the coating thickness. Coating thickness shall be determined by measuring either the magnetic attraction between a magnet and the coating-substrate combination, or the reluctance of a magnetic flux path passing through the coating and the base metal (see 5.1.2).
- 4.1.3 Eddy-current method. Coating thickness shall be determined with an electromagnetic instrument that measures the changes in apparent impedance of the coil inducing the eddy currents into the basis metal. The design of the instrument shall be such that variations in apparent impedance, produced by variations in coil to base metal spacing, can be calibrated to indicate the thickness of the coatings (see 5.1.3).
- 4.1.4 Microscopic method. Coating thickness shall be determined at a magnification of 400X or more, using a suitable metallographic microscope and a filar micrometer ocular. The ocular shall be calibrated to determine the value of the unit scale division against a scale so graduated that the error will not exceed 2.0 percent. An additional coating shall be applied to the specimen prior to mounting to support the metal coating and assure accurate readings of metal coating thickness.
- 4.1.5 Dimensional change method. Functional diameter-indicating type thread gages with gaging elements which in length approximate the width of the applicable "Go" thread ring gage, and which have been checked or set with master thread-setting plug gages conforming to FED-STD-H28/6 shall be used.
- 4.1.6 ~~Anodic dissolution method.~~ An electronic thickness tester (e.g., Kokour) and accessory equipment shall be used.
- 4.1.6 Coulometric method. Coating thickness shall be determined by measuring the quantity of electricity (Coulombs) required to dissolve the coating anodically from a known and accurately defined area. This method is also known as the anodic solution, anodic dissolution, or electrochemical stripping method.
- 4.1.7 Strip and weigh method. Coating thickness shall be determined, using a laboratory balance capable of reading to an accuracy of ±.0001 grams, by the differential of the weights plated and unplated.
- 4.1.8 Beta Backscatter method. Beta Backscatter equipment shall include a radiation source emitting primarily beta particles and a detection system.
- 4.1.9 X-Ray method. X-Ray spectrometry equipment which includes an X-Ray source and detection system shall be used.

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