Designation: B428 – 09 (Reapproved 2013)

Standard Test Method for Angle of Twist in Rectangular and Square Copper and Copper Alloy Tube[1]

This standard is issued under the fixed designation B428; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This test method establishes the requirements for the determination of the angle of twist in rectangular and square copper and copper alloy tube.

1.2 The values stated in inch-pound units are to be regarded as standard. No other units of measurement are included in this standard.

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

2. Referenced Documents

2.1 *ASTM Standards:*[2]

B846 Terminology for Copper and Copper Alloys

3. Terminology

3.1 For definitions of terms related to copper and copper alloys, refer to Terminology B846.

4. Significance and Use

4.1 The rectangular or square copper alloy tube covered by this test method may be used in applications in which control of twist is important to proper fit in final assembly and to minimize rework to bring the tube into compliance. It is recognized that the amount of twist, in degrees, per increment of length can change as a result of the weight of the product and its length during measurement.

4.2 This test method provides a procedure for measuring the twist in square and rectangular copper and copper alloy tubes as a measure of the deviation from straightness.

4.3 This test method allows the purchaser and supplier or manufacturer to inspect square and rectangular copper and copper alloy tube with a standard technique that provides acceptable twist in delivered tubes.

5. Apparatus

5.1 *Horizontal Reference Plane* (see Fig. 1 (a) and (b)) of sufficient length to support the tube specimen and a clamping device to hold one end of the specimen against the reference plane.

5.2 *Transparent Plastic Protractor Segment* engraved with angle lines as shown in Fig. 1 (c).

5.3 *Parallel Face Blocks.*

6. Test Specimen

6.1 The test specimen shall be cut to a minimum length of 10 in. and a maximum length of 15 in.

7. Procedure

7.1 Place the tube specimen lengthwise on the reference plane. Whenever the specimen has noticeable edgewise curvature, place the specimen so that a side having convex curvature is in contact with the reference plane. Further placement requirements are as follows:

7.1.1 For rectangular tube, place a major outer dimension side (width side) against the reference plane, as shown in Fig. 1 (a).

7.1.2 For square tube, having curvature along all edges, place the specimen so that the side with the least convex curvature is against the reference plane.

7.2 Clamp one end of the specimen so that the tube surface, adjacent to that end and facing the reference plane, will be in firm contact with this plane. Keep the other end of the specimen free.

7.3 Position the protractor segment flush against the free end of the specimen, as shown in Fig. 1 (b), and measure the

[1] This test method is under the jurisdiction of ASTM Committee B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.06 on Methods of Test.

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[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.