~~Designation:B831–05~~ Designation: B831 – 11

Standard Test Method for Shear Testing of Thin Aluminum Alloy Products[1]

This standard is issued under the fixed designation B831; 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*

~~1.1This test method covers single shear testing of thin wrought and cast aluminum alloy products to determine shear ultimate strengths.~~

1.1 This test method covers single shear testing of thin wrought and cast aluminum alloy products to determine shear ultimate strengths. It is intended for products that are too thin to be tested according to Test Method B769.

1.2 The values stated in inch-pound units are to be regarded as standard. The SI values given in parentheses are provided for information only.

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 The following documents of the issue in effect on the date of material purchase, unless otherwise noted, form a part of this specification to the extent referenced herein:

2.2 *ASTM Standards:*[2]

B565 Test Method for Shear Testing of Aluminum and Aluminum-Alloy Rivets and Cold-Heading Wire and Rods

B769 Test Method for Shear Testing of Aluminum Alloys

E4 Practices for Force Verification of Testing Machines

E6 Terminology Relating to Methods of Mechanical Testing

3. Terminology

3.1 *Definitions*—The definitions of terms relating to shear testing in Terminology E6 are applicable to the terms used in this test method.

4. Summary of Test Method

4.1 This test method consists of subjecting a full thickness or machined rectangular test specimen to single shear force to failure in a test fixture using a tension testing machine. The shear strength is calculated from the maximum force required to fracture the specimen.

5. Significance and Use

5.1 The intent of this test method is to provide a means of measuring the ultimate shear strength of thin aluminum alloy wrought and cast products. ~~Data obtained by this test method are used to calculate minimum properties that can be utilized in the design of structural members such as found in aircraft.~~ It is recognized that the loading conditions developed by this test method, and by most others, are not ideal in that they do not strictly satisfy the definitions of pure shear. However, rarely do pure shear conditions exist in structures.

NOTE~~1—This test method is not interchangeable with that described in Methods~~ 1—Results from this test method are not interchangeable with results

[1] This test method is under the jurisdiction of ASTM Committee B07 on Light Metals and Alloys s and is the direct responsibility of Subcommittee B07.05 on Testing.

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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.

***A Summary of Changes section appears at the end of this standard.**

from Test Methods B565 and B769. Shear strengths obtained by this test method have been shown to ~~vary~~differ from ~~those developed by the~~values determined with other methods.[3]

6. Apparatus

6.1 *Testing Machines*—The testing machines shall conform to the requirements of Practice E4. The maximum force used to determine the shear strength shall be within the verified force range of the testing machine as defined in Practice E4.

6.2 *Loading Device*:

6.2.1 The device for applying force to the specimen from the testing machine shall be a clevis of the type shown in Fig. 1 and shall be made of a hardened steel.

7. Test Specimens

~~7.1The~~7.1 The specimen size shall be ~~1½~~1.5 in. (38.1 mm) wide by ~~4½~~4.5 in. (114 mm) long. The specimen geometry is shown in Fig. 2. The specimen thickness shall be the full product thickness for a product thickness of 0.250 in. (6.35 mm) or less. For a product thickness greater ~~then~~than 0.250 in. (6.35 mm), the specimen shall be machined to a thickness of 0.250 in. (6.35 mm) by machining equal amounts from each side of the product.~~.~~ The minimum specimen thickness that can be reasonably tested will be dictated by the material's ability to resist buckling around the pin hole area during testing.

7.2 The test area to be sheared shall be centered within 0.001 in. (0.025 mm) of the load line of the specimen.

7.3 ~~Measurement of the thickness and length of the area to be sheared shall be made as follows:~~ Measure and record the thickness (t) and length (L) of the area to be sheared. Measurements shall be made as follows:

[3] Davies, R. E., and Kaufman, J. G., "Effects of Test Method and Specimen Orientation on Shear Strengths of Aluminum Alloys," *Proceedings*, ASTM, Vol 64, 1964.

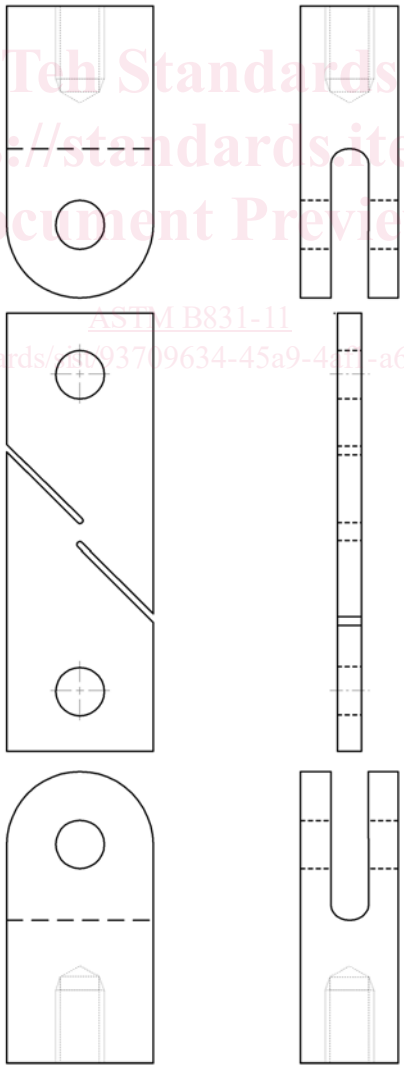

FIG. 1 Slotted Single Shear Test Fixture