



Standard Practice for Ultrasonic Inspection of Aluminum-Alloy Wrought Products¹

This standard is issued under the fixed designation B594; 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 practice covers the requirements for pulse-echo ultrasonic inspection and includes criteria used to define applicable quality levels of aluminum-alloy wrought products when performance of the ultrasonic test by the producer is specified, or when ultrasonic inspection is performed by the purchaser upon receipt.

1.2 This practice is not applicable if plastic deformation is introduced into the material after delivery.

1.3 The ultrasonic test described in this practice is employed to detect internal discontinuities oriented in a direction parallel to, or nearly parallel to, the surface of the product. The test is performed either by the immersion method or the contact method using pulsed longitudinal waves which are transmitted and received by a search unit containing either a single crystal or a combination of electrically interconnected multiple crystals. Ultrasonic tests employing either the through-transmission or the angle-beam techniques are not included.

NOTE 1—Ultrasonic tests employing angle-beam techniques require special reference blocks, search units, and scanning procedures and are subject to negotiation between the purchaser and the seller when such tests are required by the contract or purchase order.

1.4 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are mathematical conversions to SI units which are provided for information only and are not considered standard.

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.*

2. Referenced Documents

2.1 The following documents of the issue in effect on date of material purchase form a part of this practice to the extent referenced herein:

¹ This practice is under the jurisdiction of ASTM Committee B07 on Light Metals and Alloys and is the direct responsibility of Subcommittee B07.03 on Aluminum Alloy Wrought Products.

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2.2 ASTM Standards:²

B881 Terminology Relating to Aluminum- and Magnesium-Alloy Products

E114 Practice for Ultrasonic Pulse-Echo Straight-Beam Contact Testing

E127 Practice for Fabrication and Control of Aluminum Alloy Ultrasonic Standard Reference Blocks

E214 Practice for Immersed Ultrasonic Testing by the Reflection Method Using Pulsed Longitudinal Waves (Withdrawn 2007)³

E317 Practice for Evaluating Performance Characteristics of Ultrasonic Pulse-Echo Testing Instruments and Systems without the Use of Electronic Measurement Instruments

2.3 American Society for Nondestructive Testing Standard: ASNT Recommended Practice for Nondestructive Testing Personnel Qualification and Certification—Ultrasonic Testing Method, SNT-TC-1A⁴

2.4 National Aerospace Standard:

NAS-410 Certification of Inspection Personnel⁵

3. Terminology

3.1 *Definitions*—Refer to Terminology B881 for definitions of product terms used in this practice.

4. Summary of Practice

4.1 The product is inspected ultrasonically by scanning specified entry surfaces with a beam of pulsed longitudinal waves oriented in a direction perpendicular to the entry surface. The ultrasound is transmitted into the product either by the direct contact or the immersion method. During the scan, indications representing discontinuities are displayed on an A-scan screen of the test instrument and may be detected by auxiliary electronic monitors, if used.

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.

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from American Society for Nondestructive Testing (ASNT), P.O. Box 28518, 1711 Arlington Ln., Columbus, OH 43228-0518, <http://www.asnt.org>.

⁵ Available from Aerospace Industries Association of America, Inc. (AIA), 1000 Wilson Blvd., Suite 1700, Arlington, VA 22209-3928, <http://www.aia-aerospace.org>.

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