



Standard Practice for Contact Ultrasonic Testing of Welds Using Phased Arrays¹

This standard is issued under the fixed designation E2700; 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 describes ultrasonic techniques for inspecting welds using phased array ultrasonic methods (see [Note 1](#)).

1.2 This practice uses angle beams, either in S-scan or E-scan modes, primarily for butt welds and Tee welds. Alternative welding techniques, such as solid state bonding (for example, friction stir welding) and fusion welding (for example, electron beam welding) can be inspected using this practice provided adequate coverage and techniques are documented and approved. Practices for specific geometries such as spot welds are not included. The practice is intended to be used on thicknesses of 9 to 200 mm (0.375 to 8 in.). Greater and lesser thicknesses may be tested using this standard practice if the technique can be demonstrated to provide adequate detection on mockups of the same wall thickness and geometry.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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

NOTE 1—This practice is based on experience with ferrous and aluminum alloys. Other metallic materials can be examined using this practice provided reference standards can be developed that demonstrate that the particular material and weld can be successfully penetrated by an ultrasonic beam.

NOTE 2—For additional pertinent information, see Practices [E2491](#), [E317](#), and [E587](#).

2. Referenced Documents

2.1 ASTM Standards:²

[E164 Practice for Contact Ultrasonic Testing of Weldments](#)

[E317 Practice for Evaluating Performance Characteristics of Ultrasonic Pulse-Echo Testing Instruments and Systems without the Use of Electronic Measurement Instruments](#)
[E543 Specification for Agencies Performing Nondestructive Testing](#)
[E587 Practice for Ultrasonic Angle-Beam Contact Testing](#)
[E1316 Terminology for Nondestructive Examinations](#)
[E2192 Guide for Planar Flaw Height Sizing by Ultrasonics](#)
[E2491 Guide for Evaluating Performance Characteristics of Phased-Array Ultrasonic Testing Instruments and Systems](#)

2.2 ASME Standard:³

[ASME B and PV Code Section V, Article 4](#)

2.3 ISO Standards:⁴

[ISO 2400 Reference Block for the Calibration of Equipment for Ultrasonic Examination](#)

[ISO 9712 Nondestructive Testing—Qualification and Certification of NDT Personnel](#)

2.4 ASNT Documents:⁵

[SNT-TC-1A Recommended Practice for Personnel Qualification and Certification in Nondestructive Testing](#)

[ANSI/ASNT CP-189 Standard for Qualification and Certification of NDT Personnel](#)

2.5 AIA Standard:⁶

[NAS-410 Certification and Qualification of Nondestructive Testing Personnel](#)

3. Terminology

3.1 *Definitions*—For definitions of terms used in this practice, see Terminology [E1316](#).

4. Summary of Practice

4.1 Phased arrays are used for weld inspections for numerous applications. Industry specific requirements have been developed to control the use of this technology for those applications. A general standard practice document is required

¹ This practice is under the jurisdiction of ASTM Committee E07 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.06 on Ultrasonic Method.

Current edition approved Oct. 1, 2014. Published October 2014. Originally approved in 2009. Last previous edition approved as E2700–09. DOI: 10.1520/E2700-14.

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 Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990, <http://www.asme.org>.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁵ Available from American Society for Nondestructive Testing (ASNT), P.O. Box 28518, 1711 Arlington Ln., Columbus, OH 43228-0518, <http://www.asnt.org>.

⁶ Available from Aerospace Industries Association of America, Inc. (AIA), 1000 Wilson Blvd., Suite 1700, Arlington, VA 22209-3928, <http://www.aia-aerospace.org>.