



Standard Practice for Examination of Seamless, Gas-Filled, Steel Pressure Vessels Using Angle Beam Ultrasonics¹

This standard is issued under the fixed designation E2223; 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 a contact angle-beam shear wave ultrasonic technique to detect and locate the circumferential position of longitudinally oriented discontinuities and to compare the amplitude of the indication from such discontinuities to that of a specified reference notch. This practice does not address examination of the vessel ends. The basic principles of contact angle-beam examination can be found in Practice E587. Application to pipe and tubing, including the use of notches for standardization, is described in Practice E213.

1.2 This practice is appropriate for the ultrasonic examination of cylindrical sections of gas-filled, seamless, steel pressure vessels such as those used for the storage and transportation of pressurized gasses. It is applicable to both isolated vessels and those in assemblies.

1.3 The practice is intended to be used following an Acoustic Emission (AE) examination of stacked seamless gaseous pressure vessels (with limited surface scanning area) described in Test Method E1419.

1.4 This practice does not establish acceptance criteria. These are determined by the reference notch dimensions, which must be specified by the using parties.

NOTE 1—Background information relating to the technical requirements of this practice can be found in the references cited in Test Method E1419, Appendix X1.

1.5 Dimensional values stated in inch-pound units are regarded as standard; SI equivalents, in parentheses may be approximate.

1.6 *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.*

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

Current edition approved June 1, 2013. Published June 2013. Originally approved in 2002. Last previous edition approved in 2012 as E2223 - 12. DOI: 10.1520/E2223-13.

2. Referenced Documents

2.1 ASTM Standards:²

E213 Practice for Ultrasonic Testing of Metal Pipe and Tubing

E543 Specification for Agencies Performing Nondestructive Testing

E587 Practice for Ultrasonic Angle-Beam Contact Testing

E1316 Terminology for Nondestructive Examinations

E1419 Practice for Examination of Seamless, Gas-Filled, Pressure Vessels Using Acoustic Emission

E2192 Guide for Planar Flaw Height Sizing by Ultrasonics

2.2 ASNT Documents:³

Recommended Practice SNT-TC-1A for Personnel Qualification and Certification

ANSI/ASNT-CP-189 Standard for Qualification and Certification of Nondestructive Testing Personnel

2.3 AIA Document:

NAS-410 Nondestructive Testing Personnel Qualification and Certification⁴

3. Terminology

3.1 Terminology relating to this practice for angle-beam shear wave ultrasonic examination is defined in Terminology E1316.

4. Summary of Methodology

4.1 An ultrasonic pulse-echo contact angle-beam, shear wave technique with the beam directed circumferentially is used to locate surface breaking discontinuities in the cylindrical wall of a pressure vessel. The amplitude of the reflected signal from the discontinuity is compared to that of a known reference notch. Scanning is performed in both clockwise and counter clockwise directions to detect and confirm the position of the discontinuity identified in the AE examination report.

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

⁴ 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