



Standard Practice for Use of the Ultrasonic Time of Flight Diffraction (TOFD) Technique¹

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1. Scope*

1.1 This practice establishes the requirements for developing ultrasonic examination procedures using the ultrasonic technique known as Time-of-Flight Diffraction (TOFD).

1.2 Consistent with ASTM Policy, TOFD may be regarded as an ultrasonic test method whereby the qualities and characteristics of the item tested are evaluated, measured and in some cases identified. Measurements may be subject to precision and bias that may be determined statistically or as a function of some parameter(s) such as wavelength. This practice may be used for applications that would be qualitative and properly addressed as examinations as well as quantitative and more properly addressed as tests.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.4 *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

- E164 Practice for Contact Ultrasonic Testing of Weldments
- E543 Specification for Agencies Performing Nondestructive Testing
- E1065 Practice for Evaluating Characteristics of Ultrasonic Search Units

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.

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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.

E1316 Terminology for Nondestructive Examinations

E1324 Guide for Measuring Some Electronic Characteristics of Ultrasonic Testing Instruments

E1961 Practice for Mechanized Ultrasonic Testing of Girth Welds Using Zonal Discrimination with Focused Search Units

2.2 ASNT Documents:³

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

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

2.3 Aerospace Industries Association Document:⁴

NAS-410 Certification and Qualification of Nondestructive Testing Personnel

2.4 ISO Standard:⁵

ISO 9712 Non-destructive Testing—Qualification and Certification of NDT Personnel

2.5 Other Documents:

Code Case 2235 ASME Boiler and Pressure Vessel Code⁶

EN 583-6 Non-destructive Testing: Ultrasonic Examination. Time-of-flight Diffraction Technique as a Method for Detection and Sizing of Discontinuities

3. Terminology

3.1 *Definitions*—Related terminology is defined in Terminology E1316.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *B-scan display*—a sectional view of the plotted inspection data formed by the stacking of A-scans. (Some users refer to stacked A-scans from non-parallel scans as D-scans and reserve those used with parallel scans as B-scans.)

3.2.2 *back-wall echo*—a specular reflection from the back-wall of the component being examined (usually assumed to be a plate).

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>.

⁵ Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, <http://www.iso.org>.

⁶ Available from the American Society of Mechanical Engineers, ASME International, 22 Law Drive, Box 2900, Fairfield, NJ 07007-2900.

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