



Standard Practice for Ultrasonic Examination of Metal Pipe and Tubing¹

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1. Scope

1.1 This practice² covers a procedure for detecting discontinuities in metal pipe and tubing using pulse-reflection ultrasonic contact or immersion angle beam techniques. Artificial discontinuities consisting of longitudinal reference notches are employed as the primary means of standardizing the ultrasonic system. If transverse as well as longitudinal examination is desired, a procedure for employing transverse notches is provided.

1.2 This practice is intended for use with tubular products having outside diameters approximately ½ in. (12.7 mm) and larger, provided that the examination parameters comply with and satisfy the requirements of Section 12. These procedures have been used successfully for smaller sizes, however, and may be specified upon contractual agreement between the using parties.

NOTE 1—**Caution:** Exercise caution when examining pipe or tubes near or below the ½-in. specified limit. Certain combinations of search unit size, frequency, *thin* wall thicknesses, and small diameters could cause generation of unwanted sound waves that may produce erroneous test results.

1.3 This practice does not establish acceptance criteria; they must be specified by the using party or parties.

1.4 The values stated in inch-pound units are to be regarded as standard. The SI equivalents are in parentheses and may be approximate.

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 ASTM Standards:

E 543 Practice for Evaluating Agencies that Perform Non-destructive Testing³

E 1316 Terminology for Nondestructive Examinations³

¹ This practice is under the jurisdiction of ASTM Committee E-7 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.06 on Ultrasonic Method.

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² For ASME Boiler and Pressure Vessel Code applications see related Practice SE-213 in the Code.

³ *Annual Book of ASTM Standards*, Vol 03.03.

2.2 ASNT Documents:

Recommended Practice SNT-TC-1A for Nondestructive Testing Personnel Qualification and Certification⁴

ANSI/ASNT CP-189 Standard for Qualification and Certification of Nondestructive Testing Personnel⁴

2.3 Military Standards:

MIL-STD-410 Nondestructive Testing Personnel Qualification and Certification⁵

3. Terminology

3.1 **Definitions**—For definitions of terms used in this practice, see Terminology E 1316.

4. Summary of Practice

4.1 A pulsed ultrasonic angle beam by either the surface contact or immersion method shall be used. Fig. 1 illustrates the characteristic angle beam sound entry into the pipe wall for both contact and immersion testing using a single search unit.

NOTE 2—Immersion test method may include tanks, wheel search units, or systems that use liquid streams.

4.2 Variations of the single-search unit method using multiple-search units with the same or various angles and special gating are sometimes desirable and may be necessary for efficient examination of thicker wall material.

5. Significance and Use

5.1 The purpose of this practice is to outline a procedure for detecting and locating significant discontinuities such as pits, voids, inclusions, cracks, splits, and the like, by the ultrasonic pulse-reflection method.

6. Basis of Application

6.1 The following are items that must be decided upon by the using party or parties.

6.1.1 Size and type of tubing to be examined,

6.1.2 Extent of examination, that is, scanning in one or both circumferential directions, scanning in one or both axial directions, weld zone only if welded, pitch of feed helix during scanning, etc.,

6.1.3 The point(s) in the manufacturing process at which the material will be examined,

⁴ Available from American Society for Nondestructive Testing, Inc., 1711 Arlingate Lane, Columbus, OH 43228.

⁵ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.