Designation: E 164 – 03

Standard Practice for Ultrasonic Contact Examination of Weldments[1]

This standard is issued under the fixed designation E 164; 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 Department of Defense.

1. Scope

1.1 This practice covers techniques for the ultrasonic A-scan examination of specific weld configurations joining wrought ferrous or aluminum alloy materials to detect weld discontinuities (Note 1). The reflection method using pulsed waves is specified. Manual techniques are described employing contact of the search unit through a couplant film or water column.

1.2 This practice utilizes angle beams or straight beams, or both, depending upon the specific weld configurations. Practices for special geometries such as fillet welds and spot welds are not included. The practice is intended to be used on thicknesses of 0.250 to 8 in. [6.4 to 203 mm].

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 Practice E 317, Terminology E 1316, and Practice E 587.

1.3 Values stated in inch-pound units are to be regarded as the standard. SI units are given for information only.

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:*

E 317 Practice for Evaluating Performance Characteristics of Ultrasonic Pulse-Echo Examination Systems Without the Use of Electronic Measurement Instruments[2]

E 543 Practice for Agencies Performing Nondestructive Testing[2]

E 587 Practice for Ultrasonic Angle-Beam Examination by the Contact Method[2]

E 1316 Terminology for Nondestructive Examinations[2]

2.2 *ASNT Standard:*

Practice SNT-TC-1A Personnel Qualification and Certification in Nondestructive Testing[3]

2.3 *ISO Standard:*

ISO 2400 Reference Block for the Calibration of Equipment for Ultrasonic Examination[4]

3. Significance and Use

3.1 The techniques for ultrasonic examination of welds described in this practice are intended to provide a means of weld examination for both internal and surface discontinuities within the weld and the heat-affected zone. The practice is limited to the examination of specific weld geometries in wrought or forged material.

3.2 The techniques provide a practical method of weld examination for internal and surface discontinuities and are well suited to the task of in-process quality control. The practice is especially suited to the detection of discontinuities that present planar surfaces perpendicular to the sound beam. Other nondestructive tests may be used when porosity and slag inclusions must be critically evaluated.

3.3 When ultrasonic examination is used as a basis of acceptance of welds, there should be agreement between the manufacturer and the purchaser as to the specific reference standards and limits to be used. Examples of reference standards are given in Section 6. A detailed procedure for weld examination describing allowable discontinuity limits should be written and agreed upon.

3.4 *Personnel Qualification*—In order to meet the intent of this recommended practice, it is essential that evaluation be performed by properly trained and qualified testing personnel. The user is referred to Practice SNT-TC-1A published by American Society of Nondestructive Testing (ASNT) or other equivalent programs.

3.5 *Nondestructive Testing Agency Evaluation*—Use of an NDT agency (as defined in Practice E 543) to perform the examination may be agreed upon by the using parties. If a

[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] *Annual Book of ASTM Standards*, Vol 03.03.

[3] Available from The American Society for Nondestructive Testing (ASNT), P.O. Box 28518, 1711 Arlingate Ln., Columbus, OH 43228-0518.

[4] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

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