



Standard Practice for Fabrication and Control of Steel Reference Blocks Used in Ultrasonic Examination¹

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This specification has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This practice covers a procedure for fabrication and control of metal alloy reference blocks used in ultrasonic examination that have a flat-surface sound entry, are cylindrical in shape, and contain flat-bottom holes (FBH) which may be used for checking the performance of ultrasonic examination instrumentation and search units and for standardization and control of ultrasonic examination of metal alloy products. The reference blocks described are suitable for use with either the direct-contact method or immersion pulse-echo ultrasonic methods.

1.2 While this procedure is basically designed for the fabrication and control of carbon and alloy steel blocks to be used in conjunction with the examination of these materials, the fabrication and control procedures may also be suitable for the preparation of blocks for other types of materials such as nickel-base alloys, certain types of aluminum alloys, and so forth. Additional procedures and controls may be required when fabricating reference blocks from other than carbon or alloy steel material. This practice shall in no way preclude the specification or addition of any supplemented requirements as deemed necessary for the specific application. This practice, however, must not be confused with, nor does it supersede Practice E 127, specifically governing the fabrication and evaluation of 7075-T6 aluminum alloy ultrasonic standard reference blocks.

NOTE 1—Practice E 127 and Guide E 1158 also describe procedures for selecting material, fabricating blocks, and checking response. Unlike this practice, Practice E 127 has requirements for evaluation relative to a specified standard target.

1.3 The values stated in inch-pound units are to be regarded as the standard.

1.4 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appro-*

priate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. Referenced Documents

2.1 ASTM Standards:

E 127 Practice for Fabricating and Checking Aluminum Alloy Ultrasonic Standard Reference Blocks²

E 1158 Guide for Material Selection and Fabrication of Reference Blocks for the Pulsed Longitudinal Wave Ultrasonic Examination of Metal and Metal Alloy Production Material²

E 1316 Terminology for Nondestructive Examinations²

3. Terminology

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

4. Summary of Practice

4.1 This practice details a basic fabrication and control procedure and defines the minimum requirements to be met in matching carbon and alloy steel reference blocks with the material to be examined. Additional supplemental requirements may be needed when using this practice to fabricate reference blocks from other types of materials or with larger diameter holes. The physical characteristics of the hole may be established by evaluating plastic replicas. It must be recognized however that there are limitations on the size hole that may be replicated and evaluated.

5. Material Selection

5.1 The material to be used for reference blocks should be similar in its acoustic attenuation to the material which is to be examined. The grain size, heat treat condition, physical and chemical composition, surface finish, and manufacturing procedure (rolling, forging, etc.) are variables to be considered in matching acoustic responses.

5.1.1 The general evaluation procedure shall be to introduce a longitudinal pulse-echo beam into either side of the block on the axis to be used for determining metal-path distance. An

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 Testing Procedures.

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² *Annual Book of ASTM Standards*, Vol 03.03.

