Designation: E127 – 15

Standard Practice for Fabrication and Control of Aluminum Alloy Ultrasonic Standard Reference Blocks[1]

This standard is issued under the fixed designation E127; 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 U.S. Department of Defense.

1. Scope*

1.1 This practice covers a procedure for fabricating aluminum alloy ultrasonic standard reference blocks that can be used for assessing performance of ultrasonic testing equipment and for standardization and control of ultrasonic tests of aluminum alloy products using pulsed longitudinal waves introduced into test material either by the direct-contact method or by the immersion method. **(1-18)**.[2]

NOTE 1—Practice E428 and Guide E1158 also describe procedures for selecting material, fabricating blocks, and checking response.

1.2 *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:*[3]

E317 Practice for Evaluating Performance Characteristics of Ultrasonic Pulse-Echo Testing Instruments and Systems without the Use of Electronic Measurement Instruments

E428 Practice for Fabrication and Control of Metal, Other than Aluminum, Reference Blocks Used in Ultrasonic Testing

E1065 Practice for Evaluating Characteristics of Ultrasonic Search Units

E1158 Guide for Material Selection and Fabrication of Reference Blocks for the Pulsed Longitudinal Wave Ultrasonic Testing of Metal and Metal Alloy Production Material

E1316 Terminology for Nondestructive Examinations

E1324 Guide for Measuring Some Electronic Characteristics of Ultrasonic Testing Instruments

E2375 Practice for Ultrasonic Testing of Wrought Products

B594 Practice for Ultrasonic Inspection of Aluminum-Alloy Wrought Products

3. Terminology

3.1 *Definitions*—For definitions of terms not specific to this practice, refer to Terminology E1316.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *angular error*—the condition observed in ultrasonic tests of reference blocks when the response from the hole bottom is not maximum while the search unit is positioned to obtain either a maximum number of back reflections from a reference block or a maximum indication from its entry surface. Angular error results when the entry surface, hole bottom, and back surface are not parallel to each other.

3.2.2 *area-amplitude response curve*—a curve showing the relationship between different areas of reflecting targets located at a constant distance in an ultrasonic transmitting medium and their respective amplitudes of ultrasonic response.

3.2.3 *entry surface*—the end of a reference block through which ultrasonic energy must pass when reflections from the hole bottom are obtained.

3.2.4 *hole bottom*—the flat reflecting surface in a reference block that is obtained by making the entire end of a drilled hole smooth and flat using best machining practices. The hole bottom is parallel to the entry surface of the block.

3.2.5 *hole size*—the diameter of the hole in a reference block that determines the area of the hole bottom.

3.2.6 *metal distance*—the distance in a reference block from its entry surface to the hole bottom.

4. Summary of Practice

4.1 Aluminum alloy stock is ultrasonically evaluated to ensure freedom from significant discontinuities and is then precisely fabricated into cylindrical blocks of prescribed lengths. A single, flat-bottom hole of specific diameter is drilled to a constant depth into the end of each block at its center, and

[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] The boldface numbers in parentheses refer to the list of references at the end of this practice.

[3] 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.

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

TABLE 1 Dimensions and Identification of Reference Blocks in the Basic Set (see Fig. 1)

Block Identification Number	Hole Diameter (A)	Metal Distance (B)		Overall Length (C)	
	1/64 ths in.	in.	mm	in.	mm
3-0300	3	3.000	76.2	3.750	95.2
5-0012	5	0.125	3.2	0.875	22.2
5-0025	5	0.250	6.4	1.000	25.4
5-0050	5	0.500	12.7	1.250	31.8
5-0075	5	0.750	19.0	1.500	38.1
5-0150	5	1.500	38.1	2.250	57.2
5-0300	5	3.000	76.2	3.750	95.2
5-0600	5	6.000	152.4	6.750	171.4
8-0300	8	3.000	76.2	3.750	95.2
8-0600	8	6.000	152.4	6.750	171.4

TABLE 2 Diameter of Flat-Bottom Holes in Inch-Pound Units and the Nearest Metric Drill Hole Diameter

NOTE 1—Ratio of the area of the nearest metric drill size to the area of the inch-pound drill size is 1.016 throughout.

Hole Diameter in Inch-Pound Units, in.	Nearest Metric Drill Size, mm
1/64	0.40
2/64	0.80
3/64	1.20
4/64	1.60
5/64	2.00
6/64	2.40
7/64	2.80
8/64	3.20

the blocks are grouped into sets according to hole size and block length, or metal distance.

4.2 Each block is checked ultrasonically using a calibrated ultrasonic test system at a prescribed test frequency. Distance-amplitude and area-amplitude characteristics are established for sets of fabricated blocks using specific reflectors to provide a standard response. Curves are plotted to establish the interrelationship between the various blocks in the sets.

5. Significance and Use

5.1 Reference blocks fabricated to this practice will exhibit specific area-amplitude and distance-amplitude relationships only with an immersion test at 5 MHz using the search unit, test instrument, and test parameters described in this practice. Comparison tests at other frequencies or with uncalibrated test systems will not necessarily give the same relationships shown in this practice.

5.2 Although the primary ultrasonic evaluation of blocks is performed at a specified frequency, the blocks may be used to standardize ultrasonic tests at any frequency and with any pulse-echo ultrasonic test system. Establishment of distance-amplitude and area-amplitude characteristics is necessary for each application. This use may be inappropriate for other materials and curved surfaces without special compensation. Also see (**3**) for cautions regarding use of standard blocks for test standardization.

6. Description of Various Recommended Sets

6.1 In ultrasonic testing of aluminum alloy products, a standard reference usually is necessary to establish a specified test sensitivity. A standard ultrasonic reference also is required frequently to determine the effect of variations in metal distance upon the ultrasonic response from detected discontinuities. Test sensitivity standardizations and corrections for metal distance are most reliable when made under the same conditions employed for the actual tests. For these purposes, aluminum alloy reference blocks containing various combinations of hole size and metal distance are necessary.

6.2 The following combinations or sets of blocks are recommended:

6.2.1 *Basic Set*——The basic set consisting of ten reference blocks is listed in Table 1. Area-amplitude relations are obtained by intercomparison of blocks containing the 3-in. (76.2-mm) metal distance and 3/64-in., 5/64-in., and 8/64- in. (see Note 2) diameter holes, respectively. Distance-amplitude relations are obtained by intercomparison of the blocks of various lengths which contain 5/64-in. diameter holes.

NOTE 2—Direct conversion from inches to millimetres (1 in. = 25.4 mm) gives hole size dimensions for which there are no standard metric drills; however, Table 2 gives the nearest standard metric drill size.

6.2.2 *Area-Amplitude Set*—The area-amplitude set consisting of eight ultrasonic standard reference blocks is listed in Table 3. Area-amplitude relationships are obtained by intercomparison of any three or more blocks with different flat bottom-hole sizes at the same metal distance from front surface to hole bottom.

6.2.3 *Distance-Amplitude Set*—A distance-amplitude set may include any convenient number of the reference blocks shown in Table 4 and does not necessarily include all blocks listed. A recommended distance-amplitude set contains at least 12 blocks, and each set contains only one of the three hole sizes shown in Table 4. Blocks comprising the 19 block distance-amplitude sets, which are customarily supplied commercially, are indicated in Table 4. Increments of metal distance in each of the three groups of blocks in the recommended set should be identical. Distance-amplitude relationships are obtained by intercomparison of all blocks containing the same size hole.

6.3 If the blocks are to be used for immersion testing, they should be suitably anodized or otherwise protected to enhance resistance to corrosion. Uncoated blocks shall be designated as Type 1; coated blocks shall be designated as Type 2.

6.4 A number of important variables that affect the response from reference blocks can be controlled during fabrication by accurate machining practices. The roughness of the entry surface; the alignment of entry surface, hole bottom, and back surface; and the surface condition of the hole bottom are the more important physical variables that must be controlled during the fabrication of reference blocks. The quality of material used for blocks also is a factor.

7. Material

7.1 The material for reference blocks is wrought aluminum alloys.

TABLE 3 Dimensions and Identification of Reference Blocks in the Area-Amplitude Set (see Fig. 1)

Block Identification Number	Hole Diameter *(A)*	Metal Distance *(B)*		Overall Length *(C)*	
	1/64 ths in.	in.	mm	in.	mm
1-0300	1	3.000	76.2	3.750	95.3
2-0300	2	3.000	76.2	3.750	95.3
3-0300	3	3.000	76.2	3.750	95.3
4-0300	4	3.000	76.2	3.750	95.3
5-0300	5	3.000	76.2	3.750	95.3
6-0300	6	3.000	76.2	3.750	95.3
7-0300	7	3.000	76.2	3.750	95.3
8-0300	8	3.000	76.2	3.750	95.3

TABLE 4 Dimensions and Identification of Reference Blocks in Distance-Amplitude Sets (see Fig. 1 and refer to 6.2.3)

Block Identification Number, 3-, 5-, and 8-[A]	Metal Distance *(B)*		Overall Length *(C)*	
	in.	mm	in.	mm
–0006[B]	0.0625	1.6	0.812	20.6
–0012[B]	0.125	3.2	0.875	22.2
–0025[B]	0.250	6.4	1.000	25.4
–0038[B]	0.375	9.5	1.125	28.6
–0050[B]	0.500	12.7	1.250	31.8
–0062[B]	0.625	15.9	1.375	34.9
–0075[B]	0.750	19.1	1.500	38.1
–0088[B]	0.875	22.2	1.625	41.3
–0100[B]	1.000	25.4	1.750	44.5
–0125[B]	1.250	31.8	2.000	50.8
–0150	1.500	38.1	2.250	57.2
–0175[B]	1.750	44.5	2.500	63.5
–0200	2.000	50.8	2.750	69.9
–0225[B]	2.250	57.2	3.000	76.2
–0250	2.500	63.5	3.250	82.6
–0275[B]	2.750	69.9	3.500	88.9
–0300	3.000	76.2	3.750	95.3
–0325[B]	3.250	82.6	4.000	101.6
–0350	3.500	88.9	4.250	108.0
–0375[B]	3.750	95.3	4.500	114.3
–0400	4.000	101.6	4.750	120.7
–0425[B]	4.250	108.0	5.000	127.0
–0450	4.500	114.3	5.250	133.4
–0475[B]	4.750	120.7	5.500	139.7
–0500	5.000	127.0	5.750	146.1
–0525[B]	5.250	133.4	6.000	152.4
–0550	5.500	139.7	6.250	158.8
–0575[B]	5.750	146.1	6.500	165.1
–0600	6.000	152.4	6.750	171.5

[A] Hole diameters *(A)* 3/64, 5/64, and 8/64 in.
[B] Blocks customarily included in commercial 19 block distance-amplitude sets.

7.2 The stock shall not be less than 2.00 in. (50.8 mm) nor more than 2.25 in. (57.2 mm) in diameter and up to 6.75 in. (171 mm) in length for the blocks covered by this practice. Other sizes (diameters and lengths) may be used when agreed upon by the customer and user of the standard.

8. Material Selection

8.1 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, and so forth) are variables to be considered in matching acoustic responses.

8.2 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 immersion examination method using clean water as a couplant, or a contact method using appropriate couplant (oil, glycerin, and so forth) is satisfactory. The examination instruments, frequency, and search unit used in the evaluation of the raw material intended for the fabrication of the reference blocks shall be comparable to that used in the examination of the production material.

8.3 The material used for reference blocks shall be 100 % scanned while the examination system is adjusted to display, whenever possible, an acoustic noise level from the material of 20 % of full-scale deflection (FSD). In cases of materials that are acoustically transparent to the extent that this requirement cannot be satisfied, a readable acoustic noise level shall be displayed. The acoustic noise level from the material is not to be confused with inherent electrical instrument noise often observed when the system sensitivity is adjusted to its maximum level range.

8.4 The material used for reference blocks shall be free of discrete ultrasonic discontinuity indications greater than twice the amplitude of the noise level displayed in accordance with the requirements of 8.3.

8.5 Attenuation shall be checked by comparing multiple reflections from the back surface of the test block material with that of the material to be examined. With the amplitude from the first back reflection adjusted to 90 % of FSD, the sum of the amplitude of the first three back reflections from both samples shall compare within ±25 % or as required by the application. On samples that are to have FBHs smaller than 3/64 in. (1.2 mm) in diameter, the decay patterns shall compare within ±10% or as required by the application.

8.6 Lowering the examination frequency tends to minimize discernible differences in response. At 1.0 MHz, a large group of materials may be acoustically penetrable with relatively similar results and may satisfy the requirements of 8.4. At frequencies such as 5.0 MHz and higher, microstructure changes usually yield readily discernible differences in acoustic response and restrict the applicability of reference blocks.

9. Procedure for Fabricating Blocks

9.1 Machine reference blocks to a uniform finish within the dimensional tolerances given in 9.2 to 9.10, inclusive, and as specified in Fig. 1. Dimensions of each block are given in Table 1, Table 3, and Table 4.

9.2 *Final Diameter of Block*—Finish the block to a true diameter of 2 ± 0.020 in. (50.8 ± 0.51 mm) and a surface finish of 63 µin. (1.6 µm) rms, or smoother.

NOTE 3—The close tolerance on the diameter is to assure a good fit in the holders that are sometimes used for retaining blocks.

9.3 *End Facing*—The machined ends shall be flat within 0.0002 in. (0.005 mm) and perpendicular to the longitudinal axis. The two ends shall be parallel within 0.001 in. (0.03 mm). The surface finish of the entry surface shall be 30 µin. (0.76 µm) rms, or smoother, and the back surface 63 µin. (1.6 µm) rms, or smoother.

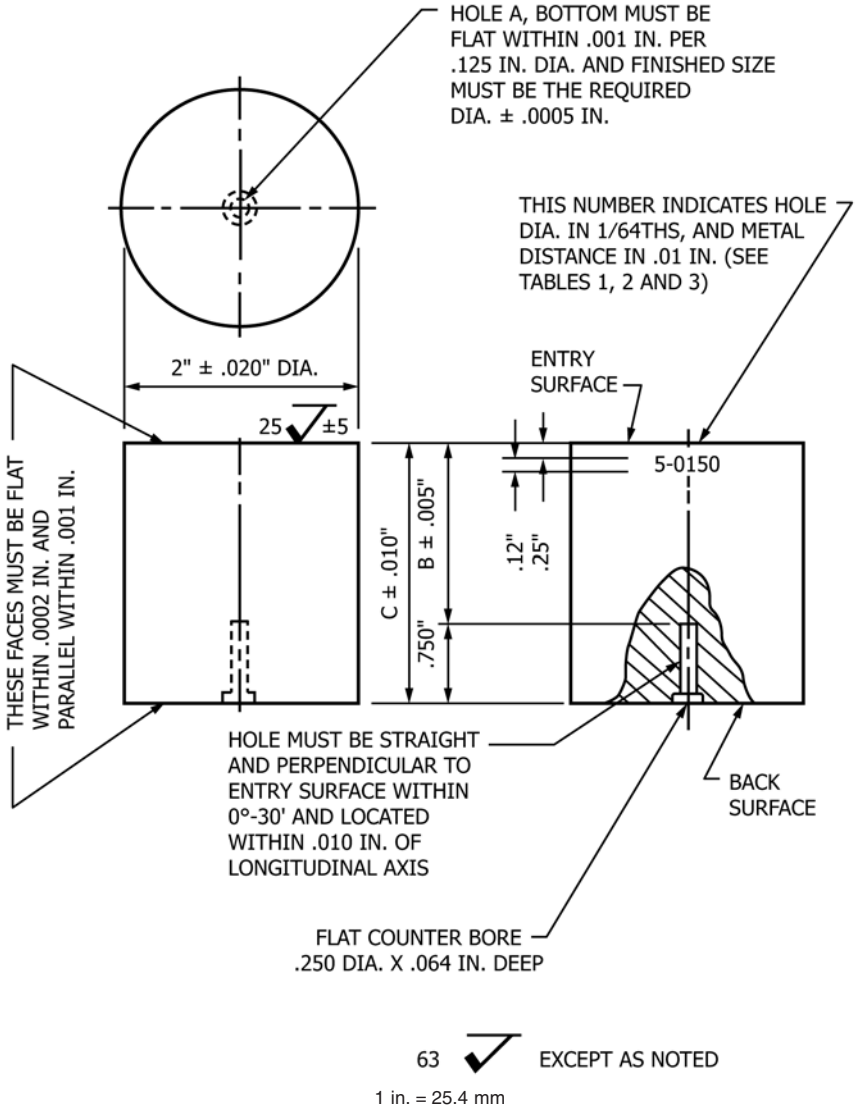


FIG. 1 Ultrasonic Standard Reference Block

9.4 *Hole Alignment*—The hole must be perpendicular to the end of the block within a tolerance of 30 min. The hole should be located within 0.010 in. (0.25 mm) of the longitudinal axis of the block.

9.5 *Hole Bottom*—Make the hole bottom flat by final drilling with a flat-end drill or cutter. The end of the drill or cutter used for this purpose should be flat within 0.001 in. (0.03 mm) per 0.125 in. (3.2 mm) of diameter and should be perpendicular to its longitudinal axis. The final depth of the finished flat-bottom hole is 0.75 in. (19.0 mm). Make the finished hole bottom as smooth as possible.

9.6 *Counterbore for Plug*—Machine a flat counterbore, 0.250 in. (6.35 mm) in diameter by 0.063 in. (1.62 mm) deep, into the end of the block at its center as shown in Fig. 1.

9.7 *Cleaning and Drying Hole*—Upon completion of the counterboring and drilling operations, clean the hole bottom with a suitable cleaning fluid and dry with a fine stream of dried, filtered, compressed air blown through a capillary tube inserted in the hole.

9.8 *Deburring*—Remove all burrs resulting from the machining procedure. Round the outside edges of entry and back surfaces to a radius of not more than 0.032 in. (0.81 mm).

9.9 *Block Identification*—Identify each reference block by a stenciled block identification number, designating hole size, and metal distance, as given in Table 1, Table 3, and Table 4. In the case of additional and equivalent blocks, as defined in 13.1, which are fabricated to a precise metric system dimension or to mixed English/metric dimensions, the metric dimension shall be indicated by the marking "mm" immediately following the dimension number. For example, a block with a 5⁄64-in. diameter flat-bottom-hole target and a 3 mm metal path would be identified as "5-3 mm" and a block with a 1 mm diameter flat-bottom-hole target and a 1 in. metal path would be

identified as "1 mm-0100". The size and location of the stenciled numbers are indicated in Fig. 1. Take special care to protect the block, particularly the entry surface, from handling marks and scratches during the stenciling operation. Stamp or stencil on the block additional information designating the manufacturer and compliance with this practice. However, this information should be located at a point at least 90° about the periphery from the aforementioned block identification number. Letter size and spacing of this additional information should not be greater than letter size and spacing used for the identification number.

9.9.1 Ink identification may be written on the block sound entry surface provided that it has been established that the markings do not affect the block's measured echo-amplitude response. Etching, scratching, or physical defacing of the block's sound entry surface is not permitted.

9.10 *Plugging Procedure*—Check the completed unplugged reference block for ultrasonic response prior to plugging. Plug a reference block that exhibits satisfactory ultrasonic response by seating an aluminum plug of the same alloy that has an interference fit of 0.0005 in. (0.013 mm) in the counterbore. Coat both the counterbore and the faying surface of the plug with a permanent water-impervious rubber-base adhesive before the plug is driven into place. The exposed surface of the seated plug can be slightly below, but should not extend above, the surface.

10. Procedure for Assessing Physical Characteristics of Blocks

10.1 *Entry Surface*—Check each finished reference block to ensure flatness and parallelism of entry surface and back surface. A dial gage reading to 0.0001 in. (0.003 mm) and a surface plate may be used for this check. A finished reference block exhibiting misalignment greater than 0.001 in. (0.03 mm) or lack of flatness greater than 0.0002 in. (0.005 mm) over the entire entry surface area is not acceptable.

10.2 *Entry Surface Roughness*—Roughness of the entry surface may be checked using any one of several commercially available roughness measuring instruments. The recommended procedure involves moving the roughness detector (scanning device) of the instrument diametrically across the entry surface. Note deviation in surface roughness during the scan. Finished blocks shall have a surface roughness no greater than 30 µin. (0.76 µm).

11. Procedure for Assessing Ultrasonic Characteristics of Blocks

11.1 All measurements of area/amplitude and distance amplitude characteristics are to be made using a 5-MHz, ⅜-in. (9.5-mm) flat transducer at a water path distance equal to the measured distance to the last near-field maximum (Y0+) and a calibrated test instrument. The transducer shall be characterized according to Practice E1065. Reference blocks that exhibit satisfactory external physical characteristics and proper configuration of the replicated hole shall be subjected to additional examination to check their ultrasonic response characteristics. If the ultrasonic-response characteristics are to be established by immersion techniques, the drilled flat-bottom holes shall be cleaned and temporarily plugged by a press-fit TFE-fluorocarbon insert or sealed by some other suitable technique to ensure a leak-tight closure. It is recommended that blocks fabricated as sets be compared with each other to determine their relative ultrasonic-response characteristics. This is particularly desirable in the cases of sets containing flat-bottom holes smaller than 3⁄64 in. (1.2 mm) in diameter that cannot be satisfactorily replicated.

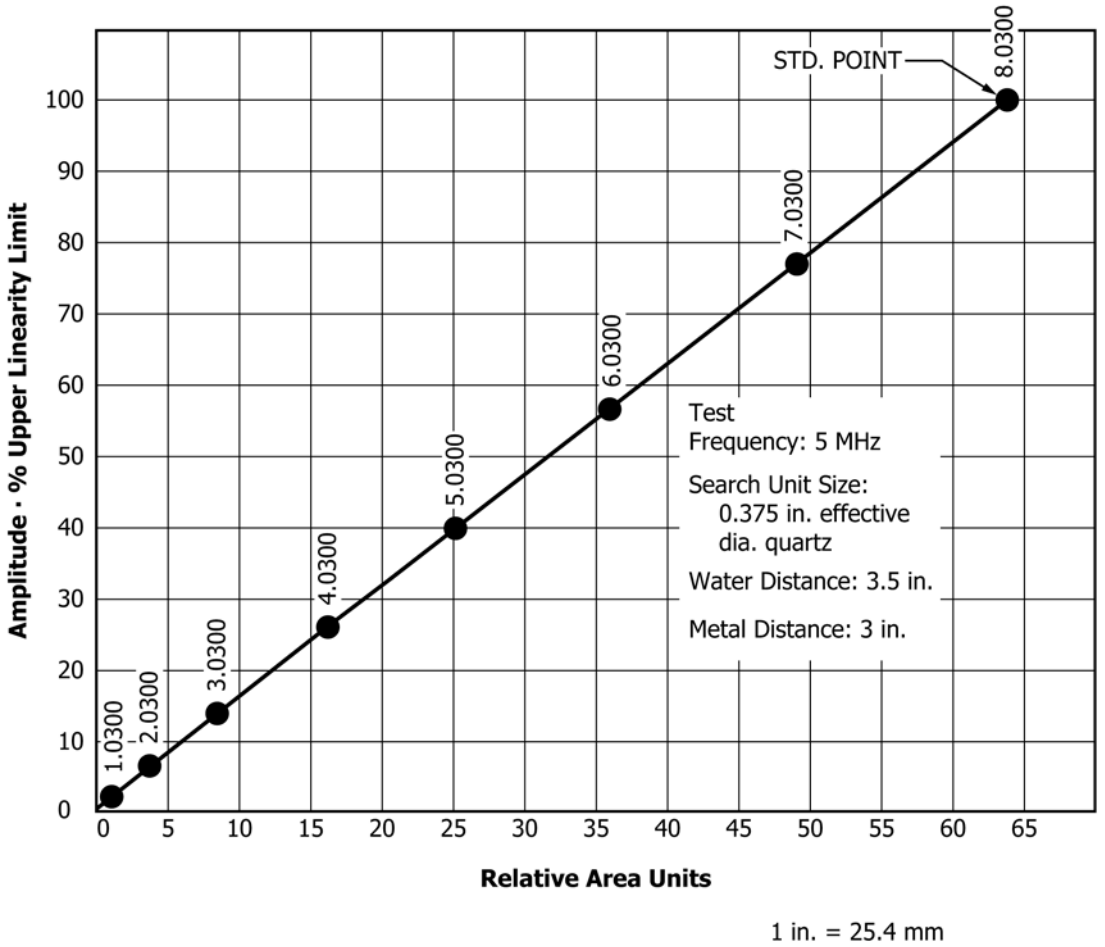
11.2 *Area/Amplitude Response Curves*—An area/amplitude set may contain several blocks with same external dimensions and distance from the entry surface to the selected FBHs of varying sizes. An area/amplitude-response curve may be obtained by adjusting the examination sensitivity to give a signal with an amplitude of 30 to 40 % of FSD from the block nearest the middle of the range of the reflector sizes. Without changing any examination parameters, the ultrasonic response from the remaining blocks with both smaller and larger size reflectors are plotted on the response curve. A typical area/amplitude curve for a set of aluminum blocks is shown in Fig. 3. Any block that exhibits an erratic ultrasonic response and does not fall within the apparent normal area/amplitude-response curve is considered unsatisfactory and shall not be used. Modification of the FBH to meet the required ultrasonic response is not an acceptable procedure. Area/amplitude responses between different FBH sizes is shown in Fig. 2.

11.3 *Distance/Amplitude Response Curves*—A distance/amplitude set may contain a number of blocks with identical dimensions and hole sizes but with varying distances from the entry surface to the FBHs. A distance/amplitude-response curve may be obtained by adjusting the test sensitivity to give a signal with an amplitude of 70 to 80 % of FSD from a block with a distance from the entry surface to the FBH in the lower ¼ of the distance range. Without changing any test parameters, the ultrasonic response from the remaining blocks with both shorter and longer distances are plotted on the response curve. A typical distance/amplitude curve for a set of 15 blocks is shown in Fig. 4. Any block that exhibits an erratic ultrasonic response and does not fall within the apparent normal distance/amplitude-response curve should be considered unsatisfactory and shall not be used. Under no circumstances may the FBH be altered to change the ultrasonic response characteristics of the reference block.

NOTE 4—Because of the resolution obtainable with 5 MHz transducers, blocks with metal distances of less than 0.500 in. (12.7 mm) may not be able to be checked in accordance with this recommended practice.

11.4 Area/amplitude and distance/amplitude response curves are greatly affected by the variation in beam profile of the search unit (probe), by the near field/far field characteristics and by the horizontal and vertical linearity responses of the test instrument. Therefore, consideration should be given to the operating characteristics of the search unit and instrument (generally available from the equipment manufacturer) when evaluating the response curves from the reference blocks.

11.5 As shown in Fig. 3 and Fig. 4, a gain increase may be used to provide more accurate details for blocks with responses of less than about 20 % of full scale.



1 in. = 25.4 mm

FIG. 2 Area-Amplitude Response Curve Showing Interrelationship between Ultrasonic Standard Reference Blocks Containing Holes of Various Sizes at Constant Metal Distances

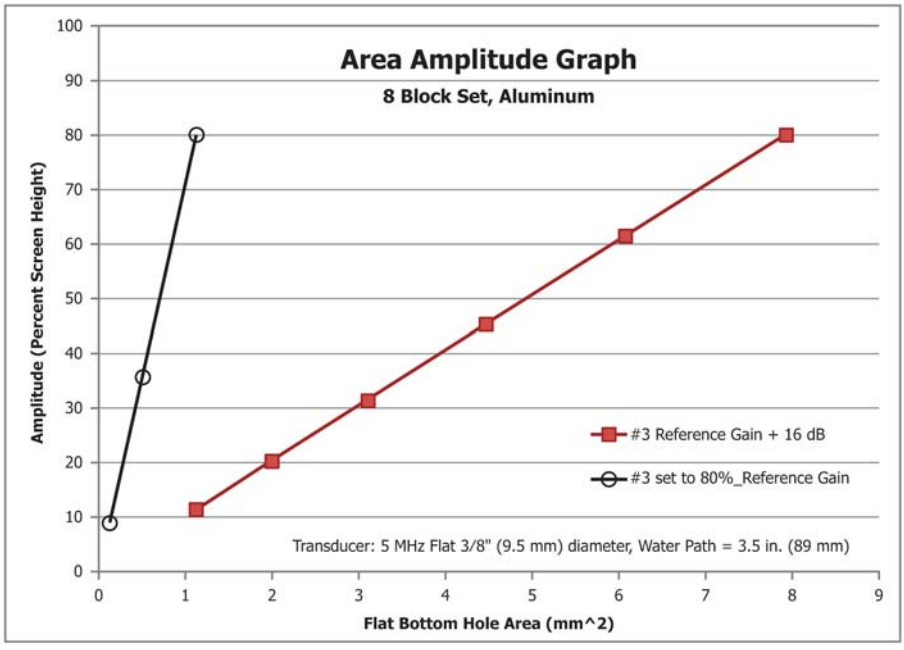


FIG. 3 Typical Area Amplitude Ultrasonic Response Curve

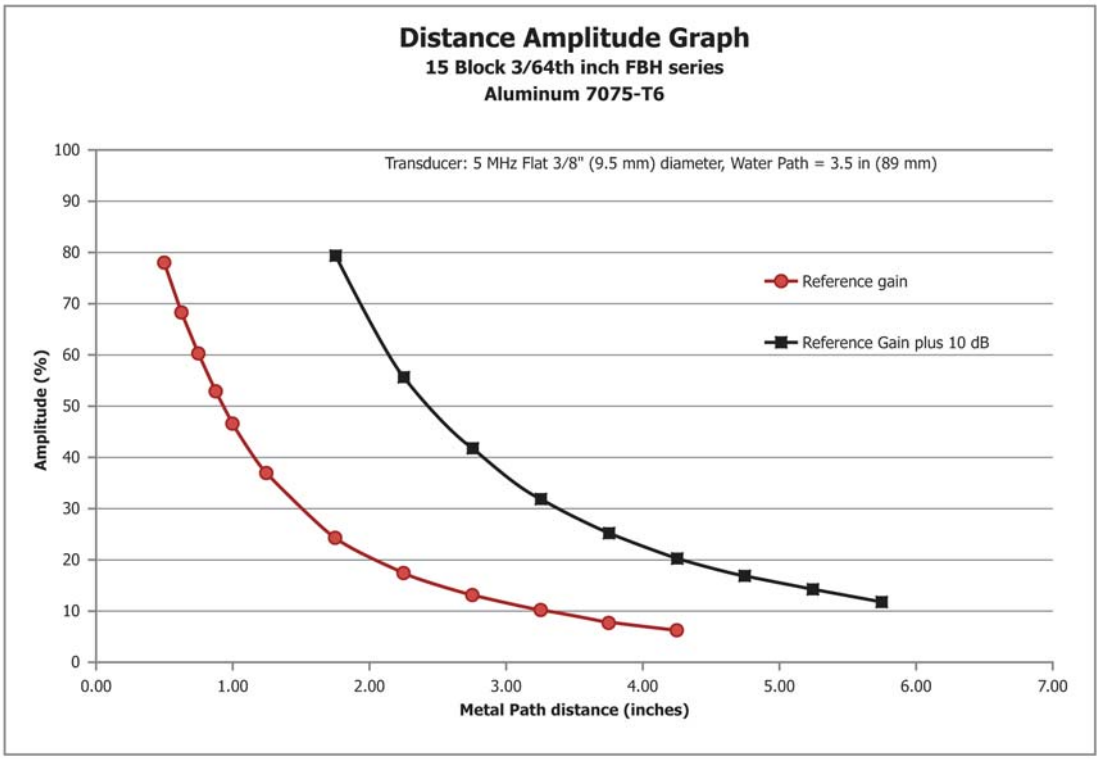


FIG. 4 Typical Distance-Amplitude Ultrasonic Response Curve

12. Report

12.1 Report the following information:

12.2 *Equipment Used:*

12.2.1 Instrument: manufacturer, type, modules (where applicable) and serial numbers.

12.2.2 Search unit: type, part number, and serial number.

12.3 *Area/Amplitude Block Sets:*

12.3.1 Numerical response values obtained by procedure 11.2.

12.3.2 Provide data plot in accordance with Fig. 3.

12.3.3 For 3-0300, 5-0300 and 8-0300 blocks, report numerical values obtained by the procedures in 11.2.

12.4 *Distance/Amplitude Block Sets:*

12.4.1 Numerical values obtained by procedure 11.3.

12.4.2 Provide data plot in accordance with Fig. 4.

12.5 *Basic Sets:*

12.5.1 For 3-0300, 5-0300 and 8-0300, follow 11.2.

12.5.2 For all other blocks follow 11.3 for applicable metal distances.

12.6 *Blocks Not in Sets*—Unless otherwise specified by the requesting party, for blocks with 3⁄64, 5⁄64 or 8⁄64 in. diameter FB holes, report numerical values obtained by the procedures in Section 11.

13. Additional and Equivalent Blocks

13.1 Additional blocks can be used, where advantageous, to supplement the recommended sets. If additional blocks are fabricated, their ultrasonic response should conform to the area-amplitude and distance-amplitude interrelationships defined by the curves in Fig. 3 and Fig. 4.

13.2 Blocks that do not meet the ultrasonic response requirements given in 11 are not considered equivalent to the ASTM Aluminum Alloy Ultrasonic Standard Reference Blocks. If they meet all other requirements, and if a correction curve or table is furnished with these blocks so that their amplitude of response can be corrected to give a response equivalent to the requirements of this recommended practice, they may be considered ASTM-type reference blocks.

13.3 Excessive wear and use may require the occasional introduction of a newly-fabricated block into an existing set. These replacement blocks must align (fit in) with Fig. 3 and Fig. 4, or both.

13.4 An exception to the requirements of 13.2 for acceptance of additional blocks exists in the case of blocks that meet all other requirements of this practice except that they produce, at some metal path distances, higher amplitude responses from flat bottom holes than the upper limit figures of Table 5 due to their fabrication from material of lower ultrasonic attenuation. If these blocks were certified as acceptable under an earlier version of this practice, they may be considered acceptable under the criteria of the current version if they are used to test material that can be shown to have similar low attenuation. Recertification of such blocks must show conformance to all requirements of this Standard Practice.

14. Technical Precaution

14.1 When Practice E127-type reference blocks are used for transfer or penetration comparisons caution is recommended. Back wall reflection amplitude measurements may be influenced by sidewall reinforcement or edge-to-center differences in metallurgical structure. Practice E127-type blocks were designed primarily for flat-bottomed hole amplitude response comparisons in flat surface material of 2 in. width or greater. Recent work has suggested that a more appropriate use is in determining comparisons and consistency of characteristics of instruments and transducers. (see (Ref. 3)). Caution must be exercised when using these blocks for other purposes.

15. Keywords

15.1 aluminum reference blocks; area-amplitude calibration blocks; distance-amplitude calibration blocks; nondestructive testing; standard reference blocks; ultrasonic reference blocks

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SUMMARY OF CHANGES

Committee E07 has identified the location of selected changes to this standard since the last issue (E127-10) that may impact the use of this standard.

(1) Editorial review, updated technical content.

(2) Revised the sections relating to "Quality of Material" to maintain consistency with "Material Selection," Section 6 from Practice E428.

(3) Rewrote Section 11 to maintain consistency with Section 9 in Practice E428.

(4) Aligned block fabrication with E428.

(5) Removed Annex A1 ("Block to Block") and Appendix X1 ("Recommended Tuning Network for Low Capacitance Search Units").