

NONDESTRUCTIVE TESTING

Reference Standards Calibration Blocks

for the **NDT INDUSTRY**



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REFERENCE STANDARDS



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ULTRASONIC TEST BLOCKS

IIW-Type 1 Block

Used for calibration of shear and longitudinal transducers, and verification of shear wedge exit point and refracted angle. Can also be used for resolution and sensitivity checking. Includes a 4.0" radius on one end and a 1.0" radius by .060" deep. Also includes a .060" diameter and a 2.0" diameter hole.

In accordance with International Institute of Welding and ASTM E164 specifications. Dimensions: 12.0" x 4.0" x 1.0". Metric version available.



IIW-Type 2 Block

This is a modified version of the original IIW-Type 1 design. Includes a 2.0" radius x .250" deep cut-out superposed on the 4.0" radius for distance calibration. Also includes numbers 3, 5 and 8 through holes (3/64", 5/64" and 8/64" diameter) and distance calibration marks to the 2.0" hole. In accordance with International Institute of Welding, ASTM E164, and U.S. Air Force NDI Manual T.O. 33B-1-1 specifications. Dimensions: 12.0" x 4.0" x 1.0". NSN is 6635-00-415-9225. Metric version available.



DC Block

AWS-type block used for shear wave distance calibration. Contains a 1.0" radius overlaying a 2.0" radius on a 180° segment. In accordance with ASTM E164 and BRR/AWS X-1 specifications.

Dimensions: 2.0" radius section is .5" thick, 1.0" radius section is 1.0" thick. Metric version available.



SC Block

AWS-type block used for shear wave sensitivity calibration. Contains two .062" diameter through holes. In accordance with ASTM E164 and BRR/AWS requirements. Dimensions: 3.00" x 1.25" x .905". Metric version available.



DSC Block

AWS-type block used for shear wave distance and sensitivity calibration. Contains a 1.0" radius opposite a 3.0" radius. The 3.0" radius includes a .375" deep x .032" wide radiused slot. Also contains a 0° reference point for checking exit point on wedge, and a .125" diameter through hole and corresponding markings at 45°, 60° and 70° for measuring actual refracted angle. In accordance with ASTM E164 and AWS 6.16.1B.

Dimensions: 1.0" thick. Metric version available.



DS Block

AWS-type block used for longitudinal distance and sensitivity calibration. Contains a 2.0" high section between two 4.0" sections. In accordance with AWS requirements. Dimensions: 6.0" x 4.0" x 2.0".



ULTRASONIC TEST BLOCKS



4-Step Block

Thickness and linearity calibration. This 4-Step block comes in thicknesses of .250", .500", .750", and 1.000". Step face measures .750" x .750". In accordance with ASTM E797. Two metric versions available. (4A and 4B)
NOTE: Variations of this block and the 5-Step block below are available if additional steps are preferred. Also, larger step faces are offered for use with large diameter transducers.



5-Step Block

Thickness and linearity calibration. This 5-Step block comes in thicknesses of .100", .200", .300", .400" and .500". Step face measures .750" x .750". In accordance with ASTM E797. Two metric versions available. (5A and 5B)



Type MAB Miniature Angle-Beam Calibration Block

Also known as a "Rompas" block, this ASTM and U.S. Air Force miniature angle beam block is a substitute for the DSC block for distance, beam index, refracted angle and sensitivity calibration. Contains a 1.0" radius opposite a 2.0" radius, and a 5/64" diameter x .750" deep flat-bottom hole. In accordance with ASTM E164 and U.S. Bureau of Public Roads, Type B specifications. Dimensions: 1.0" thick. Metric version available.



IOW Beam Profile Block

Used for beam profile measurement of angle beam transducers and measurement of transducer angles. Contains nine 1.5mm diameter x 22mm deep side drilled holes. In accordance with British Standard 2704 requirements. Dimensions: 305mm x 75mm x 50mm (approx. 12" x 3" x 2").



AWS Resolution Block (RC Block)

Used for checking resolution capabilities of angle beam transducers. Contains three sets of .062" diameter through holes for 45°, 60° and 70°. In accordance with AWS Welding Highway and Railway Bridges specification D1.1 and D2.0. Dimensions: 6.0" x 3.0" x 1.0"



NAVSHIPS Test Block

Used for distance amplitude correction, sensitivity levels and flaw depth information. Contains six 3/64" diameter side-drilled through holes at distances of .25" to 2.75" in .25" increments. In accordance with MIL-STD-271G Figure 9, and NAVSHIPS specification 0900-006-3010/Section 6. Also known as a "Mare Island block." Dimensions: 12.0" x 3.0" x 1.25". Metric version also available. A Navy "3020" version, containing an additional near-surface (0.125") hole and 125-250 Ra scanning surfaces, is also available.

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ULTRASONIC TEST BLOCKS



Miniature Resolution Block

Used for checking resolution capabilities and calibrating high resolution test equipment. Contains four .188" wide x .625" long milled slots to simulate flat plate reflectors at metal travel distances of .015", .020", .025" and .030". Also contains six flat-bottom holes, three each with diameters of 1/64" and 3/64" at metal travel distances of .020", .025" and .030". Dimensions: 3.625" x 1.0" x .125".



30 FBH Resolution Block

Used for determining resolution and sensitivity capabilities and for producing area amplitude and distance amplitude plots for normal beam transducers. Contains ten flat-bottom holes at 3/64" diameter, ten at 5/64", and ten at 8/64". Metal travel distances range from .050" to 1.250". In accordance with ASTM E127 and E428. Dimensions: 11.0" x 4.0" x 1.5". Metric version also available.



ASME N-625 Reference Plate

Used for longitudinal, shear, and surface wave sensitivity calibrations. Contains six flat-bottom holes: three 4/64" diameter, one each at depths of .050", .250", and .500"; one 4/64" diameter at 1.500" deep; one 8/64" diameter at 1.625" deep; and one 16/64" diameter at 1.750" deep. In accordance with ASME 1275N Boiler and Pressure Vessel Code, Section III, Nuclear Vessels.



Miniature IIW-Type 2 Block

This small and lightweight version of the full-sized IIW-2 does everything its big brother does, at a fraction of the size and weight. The PH Tool Mini IIW-2 measures 1" thick x 2" tall x 6" long, and contains both 1" and 2" radii. An .080" wide sensitivity slot and two sensitivity holes, one at 1/16" diameter, and one at 1/8", are located .500" from each scanning surface. A large 1" diameter through-hole is included, along with a convenient step measuring .500" thick in one corner. Angle beam exit markers from 35° to 75° are machine-engraved on one face. Dimensions are 1.000" x 2.000" x 6.000". In accordance with PH Drawing. No. 10147.



V1/5 (A2) Calibration Block

For calibrating ultrasonic flaw detection equipment in both laboratory and on-site conditions. Our version of this block includes a 100mm radius, 1.5mm and 50.0mm holes, engraved reference mark scales, and two optional slots at the zero point which provide calibrating signals at intervals of 100mm range. In accordance with British Standard BS 2704 Block A2 Mod. 1, Fig.2, German Standard DIN 54-120, EN 12223, Fig. 2, and ISO 2400. This block is not to be confused with the new EN 12223 / ISO 2400 Calibration Block No. 1 (also called the K1 block) which is similar but contains a 3.0mm through-hole rather than a 1.5mm hole. See our test block store for this block. Dimensions are 300mm x 100mm x 25mm.



V2 (A4) Calibration Block

Small calibration block for on-site checking of miniature shear wave probe index, time base, beam angle and gain. Includes a 25mm and 50mm radius, 1.5mm hole (or 5mm), engraved reference mark scales from 35 to 75 degrees. In accordance with British Standard BS 2704 block A4, Fig. 4, and ISO 7963 Cal block No. 2, Fig. 1. Dimensions: 75mm x 43mm x 25mm (12.5 and 20mm thick blocks are also available.)

ULTRASONIC TEST BLOCKS



90° Curved 5-Step Block

Special curved step block for thickness and linearity calibration of curved surfaces. This 90° Curved 5-Step block is machined from solid 2" diameter bar with step thicknesses of .100", .200", .300", .400" and .500". ID radius is 0.50". In accordance with PH Tool Drawing No. 10177. Step face is 1.000" x 90° arc.



VW Step Block

Metric 8-step thickness and linearity calibration block. This block comes in thicknesses of 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, and 8.0mm. Step face measures 15mm x 15mm.



Thin Step Block

Special 4-step block for thickness and linearity calibration of thin materials. This block comes in thicknesses of 0.040", 0.060", 0.080", and 0.100". Step face measures 0.750" x 0.750". Manufactured in accordance with PH Tool drawing no. 10073. Metric version with steps measuring 1.0, 1.5, 2.0, and 2.5mm and face size of 20mm x 20mm is also available.



Magna-Thin Step Block

Special 5-step block for thickness and linearity calibration of thin materials. This block comes in thicknesses of 0.020", 0.040", 0.060", 0.080", and 0.100". Step face measures 0.750" x 0.750". Manufactured in accordance with PH Tool drawing no. 10183. Metric version with steps measuring 0.5, 1.0, 1.5, 2.0, and 2.5mm and face size of 20mm x 20mm is also available.



10-Step Block

Special step block for thickness and linearity calibration. There are three versions of the block available. The 10-Step Inch version is made to PH Tool drawing no. 10142 and goes from 0.100" to 1.000" in 0.100" increments. Face measures 0.750" x 0.750". The 10-Step Metric 10A version (drawing no. 10143) goes from 2.5 to 25.0mm in 2.5mm increments. The 10-Step Metric 10B version (drawing no. 10144) goes from 2.0 to 20.0mm in 2.0mm increments. Step face on both metric versions is 20mm x 20mm.



Tipsy Step Block

Special Step Block for thickness and linearity calibration. This versatile block contains eight (8) steps. Set it down on one side and get the 1.0, 2.0, 3.0 and 4.0" steps. Then "Tip" it over and get the 1.5, 2.5, 3.5, and 4.5" steps. Step faces measures 1.00" x 1.00". Manufactured in accordance with PH Tool drawing no. 10068. Step thickness tolerance is ± 0.002 ". Metric version with steps measuring 25.0, 37.5, 50.0, 62.5, 75.0, 87.5, 100.0, and 112.5mm also available. Step faces on metric block measure 25.0mm x 25.0mm. Our new **Universal Tipsy Block** design combines both measurement scales on one handy block. Stand it up to calibrate on the 1.0, 2.0, 3.0, and 4.0" thicknesses; then "Tip" it over to get the 25.0, 50.0, 75.0, and 100.0 mm steps.

ULTRASONIC TEST BLOCKS

Sizing Blocks



EDM Slot Sizing Block No. 10072 - This block contains nine EDM slots from 0.100" to .900" deep. Slot width is 0.011". Nominal depth is laser engraved on the side of the block. In accordance with PH Dwg No. 10072. Alloys: 1018 steel-nickel plated, Type 304 stainless steel, 7075-T6 aluminum-anodized, and others by request. Block dimensions are 1.000" x 1.000" x 10.000". Alternative version of this block with nine 1/16" diameter through holes is called Drilled Hole Sizing Block No. 10074. In accordance with PH Dwg. No. 10074.



"FAST" UT Sizing Block - This popular block contains 1/32" dia. SDHs at 0.100", 0.200", 0.300", 0.400" with corresponding beam exit marks for 70° engraved on both sides. Also contains two EDM notches at 0.050" and 0.100" deep x .011" wide x 0.500" long. Alloy: ASTM A516 Grade 70 PVQ plate. In accordance with PH Dwg. No. 10539 Rev. 01. Dimensions: 0.500" x 1.000" x 12.000".

Specials with EDM slots and holes are also available.

PHASED ARRAY TEST BLOCKS

PACSTM Block



New Phased Array calibration block used for angle beam verification, probe angle exit point, calibration for wedge delay, sensitivity, DAC/TCG for thicknesses up to 2", and crack sizing. The three radii (0.500", 1.000", and 2.000") allow for velocity and sound path calculations. Block contains five holes at 3/64" diameter drilled through the 1.000" width, located at .100, .200, .400, .600, .800, 1.200, 1.400, 1.600, 1.800, and 1.900" from the respective scanning surface. Generous hole spacing eliminates "ghost" images from adjacent holes. Also includes an engraved scale from 30° to 70° associated with the .800" hole. Dimensions: 18.0" x 2.0" x 1.0". In accordance with PH Tool Drawing No. 10173. Designed jointly by PH Tool LLC and Davis NDE.

Mini PACSTM Block



Mini PACSTM Block is a smaller, portable version of the original PACSTM Block. The block includes a total of four holes at 3/64" diameter drilled through the 1.000" width, located at .200, .400, .600, .700, .800, .900, 1.100, and 1.300" from the respective scanning surface. Dimensions: 1.500" tall x 1.000" wide x 10.00" long. In accordance with PH Tool Drawing No. 10192. Designed jointly by PH Tool LLC and Davis NDE.

PACSTM Notch Block



The PACSTM Notch Block has been specially designed for use with Phased Array instruments used for sizing of OD and ID-connected cracks. The block contains four EDM slots at depths of 20, 40, 60, and 80% and a width of .031". Standard thickness is 1.000"; however, other sizes can be ordered. Dimensions: 1.000" thick x 2.000" wide x 7.00" long. In accordance with PH Tool Drawing No. 10210. Designed jointly by PH Tool LLC and Davis NDE.

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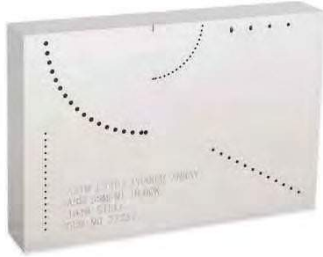
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PHASED ARRAY TEST BLOCKS

ASTM E2491 PA Assessment Block



The PH Tool ASTM E2491 Phased Array Assessment Block is a general purpose Phased Array calibration block used for beam characterization and evaluation of system performance characteristics. Use it as baseline block to determine long-term instrument performance changes, generate DAC curves, and evaluate linear/angular resolution, focusing ability and beam steering capability. With a variety of targets, this small, lightweight block is also perfect for customer demonstrations of phased array ultrasonics capabilities. This block is also referred to as a "Type B" block. Dimensions: 150mm x 100mm x 25mm. In accordance with ASTM E2491 and PH Tool Drawing No. 10208.

Phased Array Type A Block (IIW-Type)



The Phased Array "Type A" Calibration Block is used during the initial setup and calibration of a phased array ultrasonic unit. This block can be used to perform tasks such as beam angle verification, calibration for wedge delay, sensitivity calibration, performing DAC/TCG, and more. This block has similar dimensions to an IIW-Type Block, but has been specially-engineered for phased array applications. Blocks include both 50.0mm and 25.0mm radii, (19) through holes at 1.0mm diameter, (1) through hole at 2.0mm diameter, (4) FBHs at 2.0mm diameter x 2.0, 4.0, 6.0, and 8.0mm deep, (4) FBHs at 4.0mm diameter x 1.0, 3.0, 5.0, and 7.0mm deep, (3) FBHs at 2.0mm diameter x 3.0mm deep machined into the 25mm radius, and (4) EDM notches at 0.1, 0.2, 0.3, and 0.4mm deep x 0.5mm wide x 25.0mm long. Block dimensions are 25.0mm thick x 100.0mm tall x 300.0mm long. In accordance with PH Tool Drawing No. 10217.

Phased Array Calibration Block No. 2



This new Phased Array calibration block design by PH Tool contains all of the required features on the ASME Section V, Article 4 Basic Calibration Block yet spaces the holes out on a longer, narrower block. The block contains three holes at 3/32" diameter drilled through the 1.500" width, located at 1/4T, 1/2T, and 3/4T. It also contains two EDM notches at 2% deep x .010" wide x 1.500" long on opposite surfaces of one end. Dimensions: 14.0" x 1.5" x .75" thick. In accordance with PH Tool Drawing No. 10178.

Phased Array NAVSHIPS Block



This special Phased Array version of the popular NAVSHIPS block solves the problem of too many holes interfering with one another. The block contains four holes at 3/64" diameter drilled through the 1.250" width. The holes are located at .250, .750, 1.250, 1.750, 2.250, and 2.750". Dimensions: 12.0" x 3.0" x 1.25". In accordance with PH Tool Drawing No. 10168.

ULTRASONIC TEST BLOCKS



ASTM Area Amplitude Set of 8

Set of eight blocks used to determine the relationship between flaw size and echo amplitude by comparing signal responses. Metal travel distance is 3.000" for all blocks. In accordance with ASTM E127 and E428. Flat-bottom hole diameters for this set per E127 Table 3 are: 1/64", 2/64", 3/64", 4/64", 5/64", 6/64", 7/64" and 8/64". Includes ultrasonic response plot. ASTM blocks in aluminum and steel are not recommended for long-term immersion. If blocks are intended for this purpose, please contact Technical Sales to discuss industrial coating options.



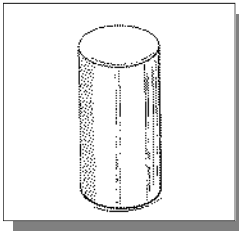
ASTM Distance/Area Amplitude Set of 10

Basic set of ten blocks used to determine dead zone, sensitivity, distance and area amplitude linearity measurements. In accordance with ASTM E127 and E428. Flat-bottom hole diameters and metal travel distances for this set per E127 Table 1 are: 3/64" at 3.000" MTD; 5/64" at .125", .250", .500", .750", 1.500", 3.000" and 6.000" MTD; and 8/64" at 3.000" and 6.000" MTD. Includes ultrasonic response plot. ASTM blocks in aluminum and steel are not recommended for long-term immersion. If blocks are intended for this purpose, please contact Technical Sales to discuss industrial coating options.



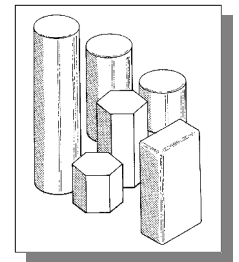
ASTM Distance Amplitude Set of 19

Set of nineteen blocks used to determine the relationship between metal distance and signal amplitude. All blocks have the same size flat-bottom hole. Hole diameter must be specified when ordering. (3/64", 5/64" or 8/64") In accordance with ASTM E127 and E428. Metal travel distances for this set per E127 Table 4 are: .063", .125", .250", .375", .500", .625", .750", .875", 1.000", 1.250", 1.750", 2.250", 2.750", 3.250", 3.750", 4.250", 4.750", 5.250" and 5.750". Includes ultrasonic response plot. ASTM blocks in aluminum and steel are not recommended for long-term immersion. If blocks are intended for this purpose, please contact Technical Sales to discuss industrial coating options.



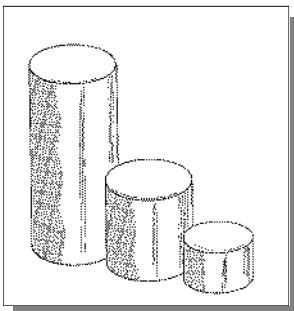
ASTM Single Blocks

Used for measurement of the sensitivity and/or resolution of normal beam transducers. Available with flat-bottom holes with diameters from 1/64" to 8/64", with MTD from .063" to 12.000". Per ASTM E127 and E428. ASTM blocks in aluminum and steel are not recommended for long-term immersion. If blocks are intended for this purpose, please contact Technical Sales to discuss industrial coating options.



ASTM Specials

Special blocks are available in exotic alloys, shapes other than the standard 2" diameter, metric dimensions, concave or convex radius ends, or non-typical quantities of blocks per set. Extra-long blocks up to 40" metal travel distance at 4 inch diameter are available. In accordance with ASTM E127 and E428 specifications. Custom hardwood storage cases available.



Westinghouse Reference Standards

The Westinghouse Reference Standard Set 84350KA is made of AISI 4340 steel, which has been found to be acoustically similar to rotor and disc material. The set consists of one B-1, one B-3 and one B-11 block. In accordance with Westinghouse Process Spec - Ultrasonic Examination No. 84350KA Appendix I, and ASTM E428 requirements. Flat-bottom hole diameter is .0625" for all blocks. Metal travel distance is 1.000", 3.000" and 11.000". Block diameter is 2" for B-1 block and 3" for B-3 and B-11 blocks.

ULTRASONIC TEST BLOCKS



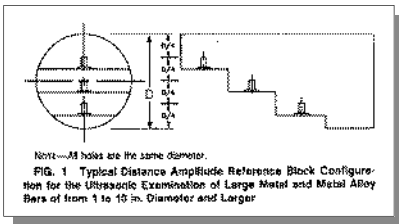
ASTM E317 Horizontal and Vertical Linearity Block, Fig. 1

Used for evaluating the horizontal and vertical linearity characteristics of ultrasonic pulse-echo testing systems. Figure 1 block is constructed from 7075-T6 Aluminum and contains two 3/64" diameter side-drilled holes. In accordance with ASTM E317 Figure 1. Dimensions: 3.00" x 2.00" x 1.00".



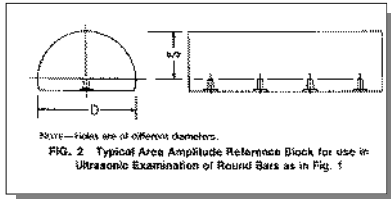
ASTM E317 Resolution Block, Fig. 6

Used for evaluating the resolution characteristics of ultrasonic pulse-echo testing systems. Figure 6 block is constructed from 7075-T6 Aluminum and contains six 3/64" diameter flat-bottom holes. In accordance with ASTM E317 Figure 6. Dimensions: 2.00" x 1.00/3.30" x 8.00". Other alloys and hole diameters available. Metric version also available.



ASTM E1158 Distance Amplitude Blocks

This specification governs the material selection and fabrication of reference blocks for the pulsed longitudinal wave contact or immersion ultrasonic examination of metal and metal alloy production round bar stock between 1" and 10" in diameter. It is recommended that the blocks be fabricated from material representative of the production material to be examined. The Figure 1 block contains a number of holes of the same diameter at various distances from the scan surface. Typical hole diameter is 5/64" or larger. Figure 3 block for square or rectangular bar over 1" is also available.



ASTM E1158 Area Amplitude Blocks

This specification governs the material selection and fabrication of reference blocks for the pulsed longitudinal wave contact or immersion ultrasonic examination of metal and metal alloy production round bar stock between 1" and 10" in diameter. It is recommended that the blocks be fabricated from material representative of the production material to be examined. The Figure 2 block contains holes of different diameters at the same distance from the scan surface. Typical hole diameters range from 2/64" and 8/64" or larger. Figure 4 block for square or rectangular bar over 1" is also available.

MIL-STD-2154 Ultrasonic Test Blocks

MIL-STD-2154 UT Test Blocks

The following UT Test Blocks from MIL-STD-2154 are available:

- **Figure 3** - Convex Surface Reference Standard Configuration for Longitudinal Wave Inspection.
- **Figure 4** - Standard Ultrasonic Test Block for Angle Beam Examination.
- **Figure 5** - Hollow Cylindrical Standards.

ULTRASONIC CALIBRATION BLOCKS/STANDARDS



ASME Sec. V Basic Calibration Blocks

Used for establishment of primary reference responses for UT examination of welds. Block contains three DAC side-drilled holes at 1.5" deep minimum at diameters between 3/32" and 1/4" depending on the block thickness (T). Hole locations through the thickness are 1/4, 1/2 and 3/4T. Also contains two notches measuring 2%(T) deep x 1.0" long minimum. Spec: ASME Section V, Article 4, Figure T-434.2.1. Dimensions: T x 6.25" x 3(T) min. Available in thicknesses of 1/2", 3/4", 1 1/2", 3", and 5". Older version to ASME Section V, Article 5, Figure T-542.2.1 (.040" deep min / 2.0" long minimum) is also available upon special request.

ASME Sec. V Basic Calibration Blocks Long Version

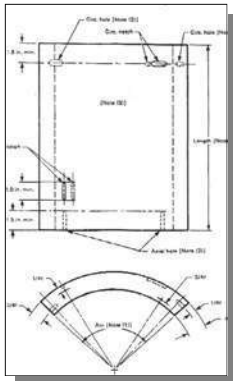


Special long version for 60/70° transducers or phased array. The additional length allows for a full skip to the "top" notch. Used for establishment of primary reference responses for UT examination of welds. Block contains three DAC side-drilled holes at 1.5" deep minimum at diameters of between 3/32" and 3/16" depending on the block thickness (T). Hole locations through the thickness are 1/4, 1/2 and 3/4T. Also contains two notches measuring 2%(T) deep x 1.0" long minimum. Spec: ASME Sec V, Art 4, Fig T-434.2.1. Dimensions: T x 6.25" x 8(T). Available in thicknesses of 1/2", 3/4", 1 1/2", & 3".



ASME Sec. V Angle Beam Cal Blocks

The basic calibration block for weldments shall be a section of pipe of the same nominal size, schedule, heat treatment, and material specification as the material being examined. Contains four (4) notches (longitudinal and circumferential on both OD and ID) at a depth of 9 1/2% of nominal wall by 1" long min. Standards can be machined from either PH Tool or customer-supplied material. Spec: ASME Sec. V, Article 4, Figure T-434.3 (Calibration Block for Pipe).

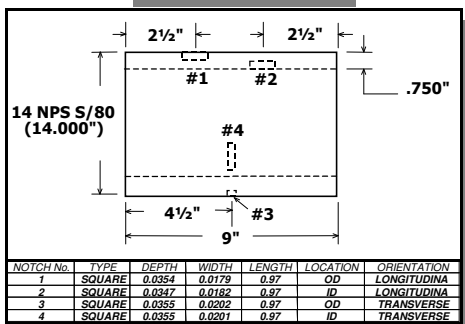


ASME Sec. XI Basic Piping Cal Block

Complete manufacture of the ASME Section XI Blocks including: supplying of pipe, machining of OD/ID (if needed), cladding (if needed), machining of all notches and side-drilled holes (SDH), machine engraving of all essential info including alloy, specification, diameter, wall thickness and serial number. Blocks normally contain: one axial OD notch, one axial ID notch, one circ OD notch, one circ ID notch, two axial SDHs at 1/4 and 3/4T, and two circ SDHs at 1/4 and 3/4T. Can also be made from customer-supplied material. In accordance with ASME Sec. XI, Div. 1, Fig. III-3230-2. PH Tool is NUPIC approved.

ASME Sec. III NB-2552.3 Standards

Used for ultrasonic examination of pipe and tubing in both circumferential and axial directions. The reference specimen shall be of the same nominal diameter, wall thickness, nominal composition and heat treated condition as the product being examined. Contains four (4) notches of square, U or V shape at a depth not greater than the larger of 0.004" or 5% of nominal wall by 1" long max. Defects are located so that indications are separate and distinct. In accordance with ASME Section III, Division 1, NB-2552.3. Sample sketch at left shows a 14" NPS Schedule 80 pipe section with notch As-builts in grid below.



ULTRASONIC CALIBRATION BLOCKS/STANDARDS

PDI Contoured Calibration Blocks for Dissimilar Metal (DM) Welds



Contoured calibration blocks are used in the manual examination of dissimilar metal (DM) welds and base materials including piping susceptible to Stress Corrosion Cracking (SCC). The blocks are used to establish a reference sensitivity level from which subsequent exams may be compared. The blocks are precisely machined to fit contoured search units for axial and circumferential scanning directions. Customer specifies block contour radius based on diameter of material being inspected. Blocks are manufactured in Type 304 or Type 316 Stainless Steel, and are certified to meet Performance Demonstration Initiative PDI-UT-10 and PDI-UT-8.



RECERTIFICATION OF TEST BLOCKS



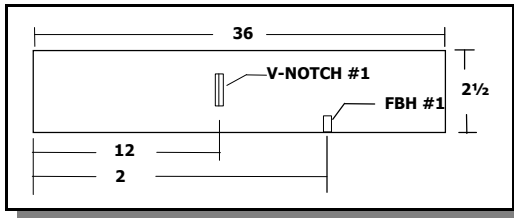
In addition to the inspection of newly-made standards and test blocks, PH Tool also offers recalibration/recertification services. This service is offered on products manufactured by us, as well as by other manufacturers. Typical items that we recertify are: ultrasonic test blocks such as IIW and step blocks, and ASTM flat bottom hole reference block sets made to ASTM E127 and E428. Blocks of unknown origin or with missing documentation may be able to be recertified, saving the expense of replacement.

If the specific alloy or grade of an existing specimen is in question, PH Tool also offers **Positive Material Identification (PMI)** services. These tests are capable of positively determining the exact chemistry of the item in question in a non-invasive manner.

How often should I have my Ultrasonic Test Blocks recertified?

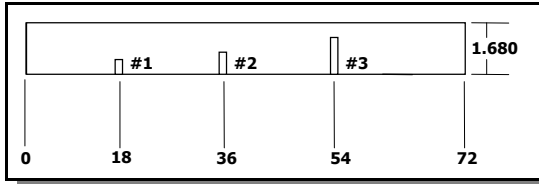
This question is becoming more and more common. Ten years ago, customers rarely sent UT blocks back to the manufacturer for recertification. Now, many do. It may be that the auditing or certifying agencies are beginning to look at test blocks as Measuring & Test Equipment (M&TE) and require that they be verified as time passes. We have seen situations where blocks that have been used extensively begin to exhibit dimensional changes. We have even observed blocks that are worn to the point that they no longer meet the intended specifications. Conversely, some blocks still look absolutely new after 10 years. Clearly, block condition, and the need to recertify, is influenced by the amount of use/abuse to which the block has been subjected.

ULTRASONIC REFERENCE STANDARDS (BAR)



V-Notch and FBH Bar Standard

Popular standard for round bar inspection containing one (1) circumferentially oriented V-Notch (normally 60° included angle), and one (1) FBH. Notch depth and length, and FBH depth and diameter vary by specification. V-Notches are uniformly deep relative to the diameter. V-Notch angles other than 60° are available.

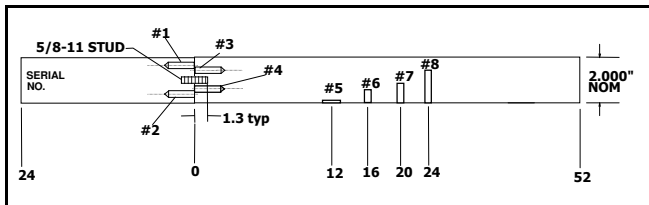


3-FBH Bar Standard

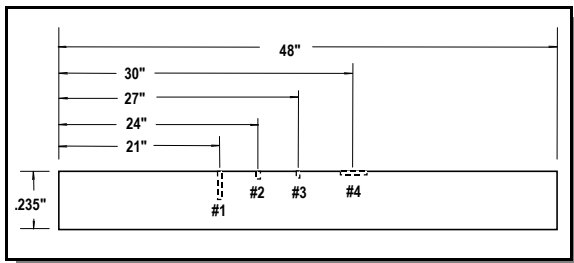
Popular standard for round bar inspection containing three (3) FBHs of the same diameter at different depths. FBH depths on this standard are 1/4D (25% of diameter), 1/2D, and 3/4D. FBH diameters are normally from 1/64" through 5/64", with 3/64" being most common. More complex standards containing additional holes and/or notches are available. See below for details.

2-Piece Round Bar Standard

Standard consists of two sections of round bar joined either by welding or drilling/tapping/bolting, depending on diameter. The parting and subsequent joining allows for the machining of axially-oriented side-drilled holes (SDHs) at prescribed metal travel



distances from the diameter of the bar. Normally two (2) or four (4) SDHs are used. SDH diameter is typically 1.0 mm (0.0394") or 3/64" (0.047"). Standard also contains three (3) FBHs (radially-oriented) at 1/4D, 1/2D, and 3/4D. FBH diameters are normally from 1/64" through 5/64", with 3/64" being most common. An axial EDM notch is often included in this design.

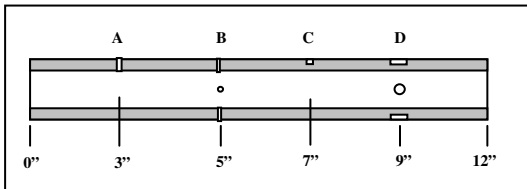


PWA SIS-315A; SIM-1 Standard

Pratt & Whitney Aircraft standard for round bar/rod inspection. Variation depicted at left shows standard containing one (1) 3/64" diameter FBH at 50% depth; one (1) 3/64" dia. at 10%; one 1/32" dia. at 10%; and one (1) axial EDM notch at 3% deep by 1/4" long.

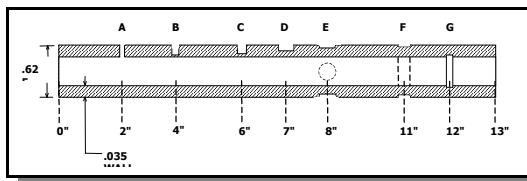
EDDY CURRENT CALIBRATION STANDARDS

ASME Sec. V Calibration Reference Standard 2007 Code

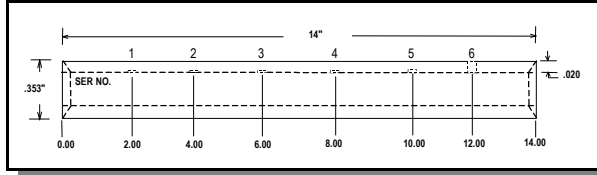


This standard is used to establish and verify system response for ET examination of nonferromagnetic steam generator heat exchanger tubing. Manufactured from tubing of the same nominal size and material type as that being examined. Discontinuities include one (1) through-wall hole (0.052" dia for tubing 3/4" and under; 0.067" dia for over 3/4"); four (4) through-wall holes @ .026" dia (for tubing 3/4" and under) or .033" dia (for tubing over 3/4") indexed 90°; one (1) 7/64" FBH @ 60%; and four (4) 3/16" FBHs @ 20% indexed 90°. Tubing can be customer or PH Tool-supplied. In accordance with 2007 ASME Section V, Article 8, Appendix II, Paragraph II-860.2.

ASME Sec. V Calibration Reference Standard Pre - 2007 Code

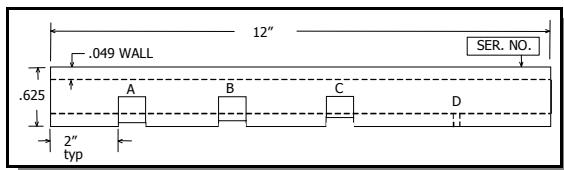


This standard is used to establish and verify system response for ET examination of nonferromagnetic steam generator heat exchanger tubing. Manufactured from tubing of the same nominal size and material type as that being examined. Discontinuities include one (1) through-wall hole (0.052" dia for tubing 3/4" and under; 0.067" dia for over 3/4"); one (1) 5/64" dia FBH @ 80% deep; one (1) 7/64" FBH @ 60%; one (1) 3/16" FBH @ 40%; four (4) 3/16" FBHs @ 20% indexed 90°; one (1) 1/8" wide 360° OD groove at 20% deep; and one (1) 1/16" wide 360° ID groove @ 10%. Tubing can be customer or PH Tool-supplied. In accordance with ASME Section V, Article 8, Appendix I, Paragraph I-865.



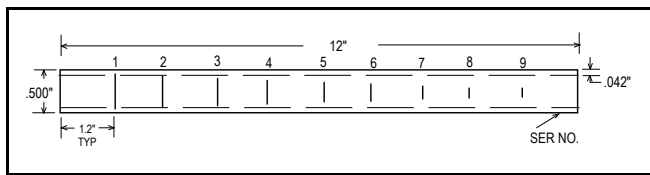
ID FBH Calibration Standard

Custom standard containing five (5) 0.010" diameter FBHs at varying depths from 0.002" to 0.006", and one (1) 0.010" diameter through-wall hole. FBH depth and location can be customer-directed. Typical separation between holes is 2".



180° 3-Flaw Wearscale Standard

Popular standard containing three (3) wearscars at 180° circumferential extent at depths (wall loss) of 25%, 50%, and 75% of wall thickness. 20%, 40%, 60% also popular. Extent of wearscar can be other than 180° if preferred. Standard also contains one (1) through-wall hole (0.052" dia. for tubing 3/4" and under; 0.067" dia. for tubing over 3/4". Circ extents of 120° and 360° also available.



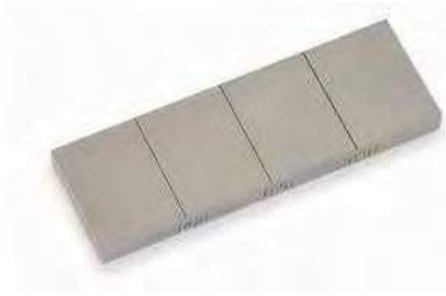
Circ Notch Eddy Current Standard

This standard contains nine (9) circumferentially-oriented OD EDM notches. All notches are 20% TWD (through-wall depth). Circumferential extent is 10° through 90° in 10° increments. Notch width is normally 0.005" to 0.010". Other variations are available.

EDDY CURRENT CALIBRATION STANDARDS (OTHER)

3-Notch Surface Defect Calibration Std.

This common standard contains three (3) surface notches at depths of 0.008", 0.020", and 0.040". Notch width typically 0.004" to 0.005", with other widths possible. Optional notch #4 is a 0.030" by 0.030" 45° corner notch. (not pictured on sketch) Materials offered include 7075-T6 Aluminum, AISI 4340 Steel, Type 304 Stainless Steel, 6Al-4V Titanium, Inconel 600, Inconel 625, Inconel 690, and others. Notch depths are machine engraved on one edge; serial number and alloy on the other. NIST traceable. Block dims: 3.0" x 1.0" x .25". In accordance with PH Drawing No. 10075.



Bolthole Calibration Blocks

Common blocks containing bolthole notches. Notches can be oriented axially in hole, full thickness of block or less, 45° corner notches, thumbnail corner notches, or other. Block at left contains one (1) bolthole of .438" diameter with axial notch 0.030" deep x 0.004" wide x .030" long. Block dimensions: 2" diameter x .250" thick. Blocks with multiple holes and notches are common also. Typical hole diameters range from 0.125" to 1.000". Many different block thicknesses, overall sizes, and materials are available. Multiple layer blocks available.



MIL-STD-271F Performance Verification Reference Block

The Performance Verification Reference Block meets the requirements of MIL-STD-271F, Paragraph 7.4.2. Block is approximately 4" x 6" x 3/8" thick and made of the same material type as that being inspected. Blocks normally contain four (4) notches machined to 0.015" deep x 0.250" long x 0.010" wide (maximum dimensions). Blocks used for inspection of welds in the as-welded condition contain a similar weld with notches positioned in the weld. PH Tool will supply the complete block, or machine the notches in customer-supplied welded blocks.



Turbine Blade Reference Standards

This standard is made from a customer-supplied blade of the same nominal composition as the blades being tested. EDM notches are machined on the leading and trailing edge of the convex and concave side. Notch dimensions per Westinghouse Process Specification 84351B4 are: 0.010" deep x 0.0025" wide x 0.250" long. Variations of this spec with additional notches are also available.

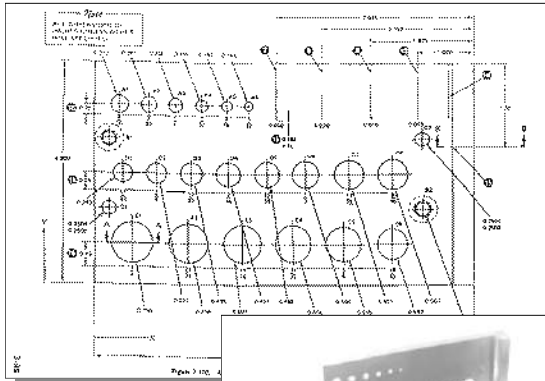


Wheel Inspection Reference Standards

This type of standard is made from a wheel of the same nominal composition and size as those being tested. EDM notches of various dimensions can be machined in high-stress areas of the wheel standard. Standards can be made from aircraft, truck, or automobile wheels. Wheels or wheel segments are customer-supplied.



EDDY CURRENT CALIBRATION STANDARDS (OTHER)



Air Force General Purpose Eddy Current Standard

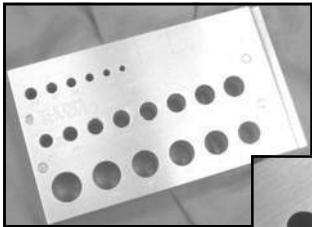
Standard is a three (3) plate assembly measuring 4" x 7" x 1.06". Contains twenty (20) fastener holes with diameters from 0.156 to 0.750", two (2) screw holes, and two (2) dowel pins holes.

Standard also contains a total of 66 EDM notches in various locations. Notch depth and length vary. Width is 0.004" for all notches. Material is Aluminum Alloy 7075-T6, QQ-A-250/12.

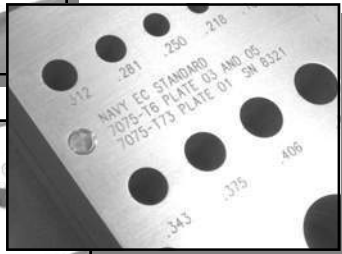
Finished standard is anodized per MIL-A-8625, Type II, Class I. Standard can also be made in titanium, steel, stainless steel or other alloy. Manufactured in accordance with U.S.A.F. Tech Order 33B-1-1, Figures 4-47 through 4-49. NSN 6635-01-092-5129, P/N 7947479-10.



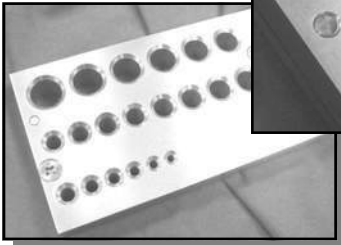
Top



Close-Up



Bottom



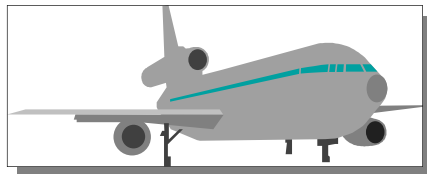
Navy Eddy Current Ref. Std. Kit (Universal Eddy Current Reference Std.)

Standard used by all AIMD NDI shops shorebased and shipboard intermediate maintenance activities for calibrating eddy current units prior to inspection. Standard is a three (3) plate assembly measuring 4" x 7" x .875". Contains twenty (20) fastener holes with diameters from 0.156 to 0.750", two (2) screw holes, and two (2) dowel pins holes. Standard also contains a total of 71 EDM notches in various locations.

Notch depth and length vary. Width is 0.004" for all notches. Manufactured in accordance with U.S.A.F. Tech Order 33B-1-1, Figure 4-50. Kit P/N is NRK-3AST and consists of (1) Aluminum, P/N NRK-3A, 7075-T651 top and middle layer, 7075-T73 bottom layer; (1) Steel, P/N NRK-3S, 4340 alloy all three layers, and (1) Titanium, P/N NRK-3T, 6Al-4V alloy all three layers.

DC-10 Service Bulletin Reference Stds

PH Tool is a recommended source for Eddy Current Reference Standards required per Service Bulletin 55-24. All four (4) standards are available including part numbers: SB10550024-3 (10RS.51), SB10550024-5 (10RS.51), SB10550024-7 (10RS.51), and SB09530016-5 (DAC GSET AL.01).



Aircraft Manufacturer Standards

Boeing, McDonnell Douglas, Airbus, Lockheed, Bombardier, Cessna, Saab, Gulfstream, Fairchild, others.

Standards are available to all aircraft manufacturer's specifications. We can manufacture the complete standard, or machine the EDM notches only in customer-supplied blanks. Both ET and UT standards offered.

MAGNETIC PARTICLE STANDARDS



GE Compressor Blade Standard

This compressor blade standard is made from a customer-supplied blade similar to those being inspected. It contains seven (7) EDM slots (notches) located in the areas shown at left. Notch dimensions are 0.020" long x 0.005" and 0.010" deep x 0.0035" wide maximum. Notches are normally filled flush with a nonconducting material, such as epoxy, to prevent mechanical holding of the indicating medium.

In accordance with GE Power Generation Engineering Spec. P3C-AG16.



Ketos Ring

The Ketos Ring is used to check overall performance of the magnetic particle examination system. The Ketos Ring is 5" in diameter and .875" thick, with a 1-1/4" diameter center hole. The block includes (12) thru-holes at .070" diameter and distances of .070, .140, .210, .280, .350, .420, .490, .560, .630, .700, .770, and .840" from the OD surface. Made from O-1 Tool Steel, and dimensionally certified to MIL-STD-1949A, ASTM E1444, McDonnell Douglas P.S. 21201, DPS 4.704, and SAE-AS5282.



"Flat Ketos" Block

Capable of indicating smaller subsurface discontinuities than its "ring-shaped" cousin, the "Flat Ketos" Block includes (12) thru-holes at .040" diameter, at distances of .060, .080, .100, .120, .160, and .200" from the upper indication surface, and at .240, .310, .390, .470, .550, and .630" from the lower indication surface. Also known as "Test Block with Artificial Subsurface Discontinuities." In accordance with PH Tool Drawing No. 10234. Metric Version also available. Made from O-1 Tool Steel (HRB 90-95).



ASTM E709 Magnetic Particle System Performance Verification Plate

Used to check the overall performance of wet or dry techniques using probes and yokes. This test plate contains ten (10) EDM notches 0.125" long x 0.005" through 0.050" deep x 0.005" wide. Material should be the same alloy as the material to be tested.

Plate measures 1" thick x 10" x 10". Notches are filled flush with a nonconducting material, such as epoxy, to prevent mechanical holding of the indicating medium. In accordance with ASTM E709, Figure 13.

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