NONDESTRUCTIVE TESTING

Reference Standards
Calibration Blocks

for the **NDT INDUSTRY**



Power Generation
Manufacturing
Aerospace
Research
Transportation
Aircraft
Petrochemical
Naval
Medical
Primary Metals

REFERENCE STANDARDS

PH TOOL

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About the Company...



PH Tool Reference Standards, headquartered in Pipersville PA, has supplied the NDT industry with high quality Reference Standards and Test Blocks since its founding in 1973. Whether you need EDM notches, Flat-bottom holes, Micro-holes or Test Blocks, PH Tool can handle your order. We are a family-managed business, founded by Phil Herman Sr. In 1990 Phil Herman Jr. joined the business and serves as President/CEO. The entire staff is dedicated to the development and fabrication of the finest quality reference standards available today. Our growth and high degree of product acceptance can be attributed to our emphasis on quality, attention to detail and innovative approaches to meeting the reference standard needs of our valued customers.

Our Reference Standards and Test Blocks are used in ultrasonic, eddy current, magnetic particle, liquid penetrant and radiographic testing. Reference Standards can be fabricated from customer-supplied pipe, tube, bar, plate or actual parts. Twenty-four hour and forty-eight hour RUSH service is available on many standards. We will supply the material to your specifications if needed.

Standard Test Blocks are available from stock in steel, stainless steel and aluminum for immediate shipment. Test Blocks in exotic alloys are also available, including: alloy steel, stainless steel, inconel, titanium, copper-nickel, NAB, monel, hastelloy and others.

Specials can be fabricated to your design by our fully-equipped CNC machine shop. All Test Blocks are permanently engraved with the block description, material and serial number. Artwork and logos can be laser engraved on our blocks.

The QA Program meets all industry and government specifications. We are nuclear industry (NUPIC) and Navy approved, and listed as the suggested vendor in several Alert Service Bulletins (ASB) including Bell Helicopter, Boeing and McDonnell Douglas. All Reference Standards and Test Blocks are delivered with an automated Certification Report providing NIST traceability. Replicas of EDM notches are archived at PH Tool and are available if needed.

This catalog identifies all of the standard test blocks available, as well as many of the popular EDM notch and Flat-bottom hole Reference Standards used in industry today. In addition, you'll find information on other services including recertification of existing standards, custom machined ultrasonic wedges and radius/angle gages.

Throughout our history, PH Tool has earned an excellent reputation with our customers for supplying the best Reference Standards and Test Blocks available. Our manufacturing and technical support staff are always prepared to assist the NDT engineer or technician with their Reference Standard needs. Meeting the demands of the increasingly complex and quality-conscious NDT marketplace is a challenge we gladly accept. We welcome your inquiries and look forward to serving you.



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Get it right the FIRST time ... with our help!

In all cases, if you need assistance with the application, design, or the interpretation of specifications of your NDT reference standards, contact us. The benefits of past experience with similar requirements and the specialized knowledge available at PH Tool could eliminate the waste of trial-and-error engineering and lead to a quicker, more cost-effective solution. We serve our customers best by offering them personalized advice, guidance, customized solutions to their complex problems, and expert design and manufacture of standards.

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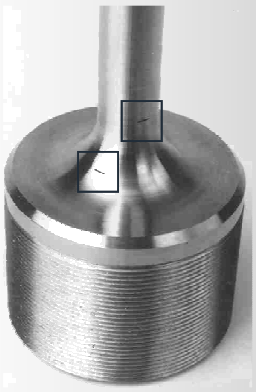
EDM NOTCHES

EDM NOTCHES

Since 1973....

PH Tool Reference Standards has been the recognized leader in the manufacture of EDM Notch standards used in the Non-Destructive Testing (NDT) industry. We are the only company who makes standards, and **nothing** but standards. As a result, our expertise is second-to-none, as is our commitment to producing the finest notch standards available today. Let's face it, without professionally-manufactured, NIST traceable standards, how reliable are the results of your inspection? In the quality-conscious age we're in, it is increasingly important to trust your critical masters to the company who can deliver on the promise of making "the standards of excellence."

What are EDM Notches?



Electrical Discharge Machined (EDM) notches are produced by PH Tool using both Sinker and Wire EDM technology. Sinker EDM utilizes a carefully-made electrode to "burn" the desired notch. Wire EDM uses a traveling wire as the electrode. Think of the wire EDM like a sophisticated band saw, where the wire is the blade. The limitation with wire is the inability to machine captive notches, blind notches, or especially narrow notches. Wire can be used to cut completely through a thickness only, and cannot burn a notch 0.100" deep on a .500" thick part for example. As a result, PH Tool's EDM equipment consists of 12 sinkers and one wire. Our machines have undergone considerable modification and retrofitting in order to handle the unique needs of the NDT industry. This means that we can handle a wide range of items, from tiny parts that fit in the palm of your hand to 5,000 pound components that require a forklift. We are not limited to what will fit in the work tanks. Tubular and bar standards can be as long as 40 feet.

What can be notched?

Notches can be placed in any conductive material, and can be shaped in a variety of ways including rectangular, radius-conforming, or thumbnail, among others. Hollow cylindrical items (tube and pipe) can be notched on the OD and ID, in axial, circumferential or off-angle orientations. Notches can be placed in welded components in the weld, toe, heat-affected zone, or base metal. A wide range of items can be notched including, but not limited to: tube, pipe, bar, plate, wire, rod, engine components, structural aircraft parts, automotive parts, pistons, turbine blades, impellors, disks, hubs, springs, and surgical implants.

What widths are possible?

EDM notches used for Eddy Current, Liquid Penetrant and Magnetic Particle testing are typically very narrow, perhaps in the .004-.005" wide range. Notches used in Ultrasonic testing normally do not require notches this narrow. PH Tool has developed a proprietary method of machining NANO Notches as small as 0.0006 inch (15 microns) wide for applications requiring widths as narrow as possible. Refer to our Literature sheet on NANO notches for more details on this capability.

NIST Traceability

All EDM Notch Reference Standards are 100% inspected, NIST traceable, and include a comprehensive certification report. At PH Tool our dimensions are carefully obtained via replication and observation using video measurement systems, and contain reliable/repeatable dimensions traceable to the National Institute of Standards and Technology (NIST).

Industry Applications

Aerospace · Airline · Automotive · Manufacturing
Medical · Military · Petrochemical · Power Generation
Primary Metals · Research · Transportatio·

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NANO NOTCH



NANO NOTCH

That's really small!

If there were a Guinness Book of World Records category for the narrowest EDM Notch ever made, PH Tool would be in it. Through our proprietary Sinker EDM process, we have developed a unique way to cut our **Nano Notches** smaller than ever thought possible. Nanos as small as 0.0006 inch (15 microns) wide have been successfully machined in our lab.

What is the process?

The trick lies in making a very thin blade, also known as an "electrode." We have always been able to machine our electrodes thin, but we've pushed the limits of late in order to meet your needs. Electrodes in the 0.0003-0.0004 inch thickness range are required to maintain resulting notch widths under .001 inch.



Even at extremely low power settings, an "overcut" results as the microscopic metal particles are evacuated from the notch cavity. In ideal situations, this overcut can be kept in the .0003 inch neighborhood.

How deep can we go?

Everyone asks this question. The simple answer is about 15 to 1. We can machine a notch approximately 15 times deeper than the notch is wide. This means that our maximum depth at 0.0006 inch is about 0.009 to 0.010 inch. If the notch needs to be 0.015 inch deep, the width will be about 0.001 inch. Need 0.030 inch deep? Plan on 0.002 inch wide then. Certainly, other factors can have an effect on this rule of thumb, but it is a good starting point. Notches required in IDs or in a bore will typically be wider due to vibration of the smaller electrode rod required for access. Notches with excellent access are the most easily-produced Nanos.

What about length?

Most Nano notches we've made so far have been very short; in the 0.010 to 0.100 inch range. Longer notches are also possible however. As with all notches that we machine, Nanos can be shaped to follow a contour, or to have some other tip shape if needed. Thumbnail nanos with a 2-to-1 length-to-depth ratio are very common, for example.



Industry Applications

- Aerospace
- Airline
- Automotive
- Manufacturing
- Medical
- Military
- Petrochemical
- Power Generation
- Primary Metals
- Research
- Transportation

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WHAT IS EDM?

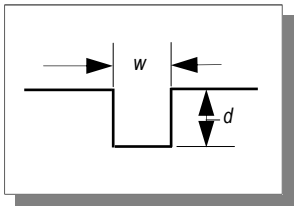
Electrical Discharge Machining (EDM) is a nonconventional metal removal machining method that employs the use of an electrode to machine the desired shape into a workpiece under carefully controlled conditions. EDM offers several advantages over conventional, "chip-making" machining methods including:

1. *The ability to machine extremely narrow notches.*
2. *The ability to access hard-to-reach locations such as pipe/tube IDs without the need to section the workpiece.*
3. *The ability to hold very close dimensional tolerances.*
4. *The ability to machine harder materials and exotic alloys.*
5. *The ability to machine irregular shapes not otherwise possible.*

All conductive materials are able to be EDM'd. EDM notches can be machined on both the OD and ID of pipe and tube. Notches can be machined on IDs as small as 0.040". Transverse (circumferential) notches are normally made with electrodes precisely ground to the respective radius of the workpiece. This ensures uniform notch depth along the notch length. Notches can also be made to match an irregular surface, or have a thumbnail (semi-elliptical) profile.

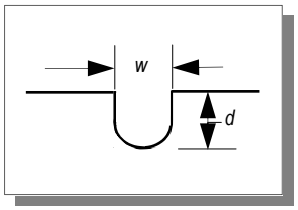
The basic notch shapes available are detailed below. All notch shapes below can be longitudinally or circumferentially oriented, and can be located on the OD or ID of hollow cylindrical products.

BASIC NOTCH SHAPES



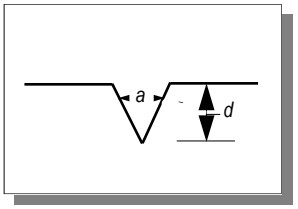
Square Notch

This notch is also referred to as a "Buttress" notch, and has parallel-sided walls and minimal corner radius at notch bottom. Typical of notches over 0.010" wide. Available in depths from 0.0001"; widths from 0.010"; and lengths from 0.005" through 3.00".



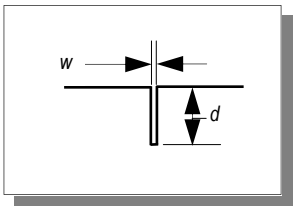
U-Notch

This notch has parallel-sided walls at the entry surface and a corner radius at notch bottom resembling a "U-shape". Typical of notches under 0.010" wide. Available in depths from 0.0001"; widths from 0.003"; and lengths from 0.005" through 3.00".



V-Notch

This notch has angled side walls that meet at the notch bottom. Typical V-notch included angles (a) are 40°, 45°, 60°, 70°, 75° and 90°, with 60° being the most common. V-notch half-angle should complement beam angle for maximum response. Available in depths from 0.002", and lengths from 0.020" through 2.00".



Nano Notch

The absolute narrowest notch available today. Available in widths from 0.0006", depths from 0.0001"; lengths from 0.005" through 1.00". Some depth limitations exist on ultra-narrow notches depending on configuration and alloy. Call Technical Sales to discuss possibilities.

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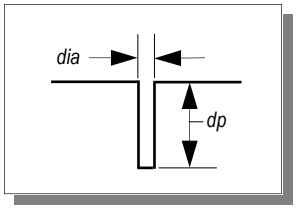
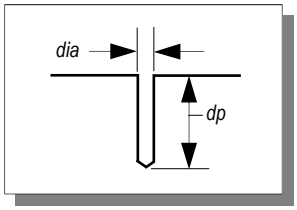
HOLES, FLAT-BOTTOM AND OTHER

PH Tool offers many different types of holes used in NDT today. The popular ones are listed below. If you don't find what you're looking for, call us and we'll be happy to discuss how it can be done. We employ both conventional machining (drilling) and nonconventional (EDM) in the hole-making process. The determining factors we consider in choosing a method are machinability of the workpiece, accessibility, hole diameter and depth.



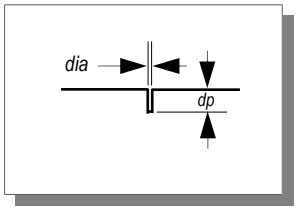
Flat-bottom hole

The flat-bottom hole (FBH) is machined to have a flat reflecting surface at the hole bottom. The hole bottom is typically parallel to the beam entry surface, but can be machined at other desired angles. Primarily used in Ultrasonic testing, with some application in Eddy Current testing, FBHs can be machined just about anywhere they are needed for a particular inspection. Available in diameters from .010". ID FBHs can be machined without the need to section the part by our EDM process.



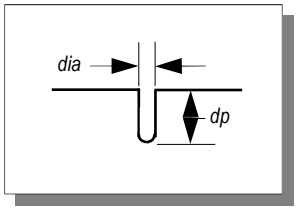
Side-drilled hole

The side-drilled hole (SDH) is typically a drilled hole, the side wall of which is used as the reflecting surface. Unlike a FBH, the bottom of a SDH serves no purpose. SDHs are often reamed after initial drilling. SDHs are often drilled in pipe walls at specified locations from the diameter, e.g.: 1/4T, 1/2T, and 3/4T. They can be drilled either longitudinally or circumferentially to the axis of the pipe. They can also be machined in plate, bar or other products. Primary use is Ultrasonic testing. Available in diameters from .010".



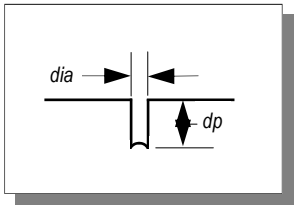
Micro-sized hole

The micro-sized hole (MSH) is a small diameter hole used primarily in Liquid Penetrant inspection. Hole diameter is normally 0.004 to 0.005", and hole depth is 0.008 to 0.010". These micro-sized holes meet the requirements of the U.S. Navy's NSTR-99 Rev. 2 (Qualification Examination Requirements for Nondestructive Test Personnel). They can be machined in welded plate, pipe, bolts, or any test prop. Also available in diameters and depths other than stated above. Diameters as small as 0.0015" (0.038mm) are possible, depending on depth.



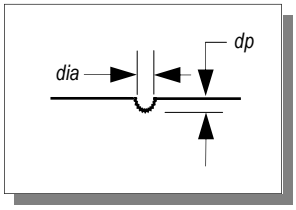
Concave Radius-bottom hole

The concave radius-bottom hole is machined with a concave radius at the hole bottom. Applications include ID pitting of tube or pipe for Eddy Current Inspection; and Liquid Penetrant test props. Referred to as a "Round-bottom hole" on the ASME J-10 block. Available in diameters from 0.003".



Convex Radius-bottom hole

The convex radius-bottom hole is machined with a convex radius at the hole bottom. Available in diameters from 0.030".



Irregularly-shaped pits

These holes and pits are machined in irregular configurations, not described above. Includes oval-bottom pits, round-bottom pits, 90° conical pits, star-shaped, square holes, hex holes, and realistic pits. EDM pit electrodes can be cast from real pits and used to reproduce actual pits very accurately. If you still haven't seen the hole you need, use your imagination...we'll figure out how to accomplish it.

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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 180º 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 0º reference point for checking exit point on wedge, and a .125" diameter through hole and corresponding markings at 45º, 60º and 70º 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".

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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 45º, 60º and 70º. 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.)

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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

PACS™ 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 PACS™ Block



Mini PACS™ Block is a smaller, portable version of the original PACS™ 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.

PACS™ Notch Block



The PACS™ 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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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.



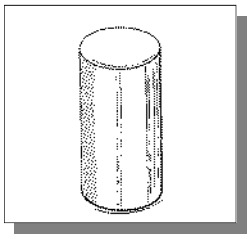
ASTM Distance/Area Amplitude Set of 10

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.



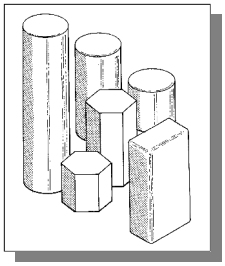
ASTM Distance Amplitude Set of 19

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.



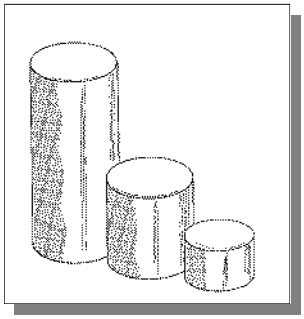
ASTM Single Blocks

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.

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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.

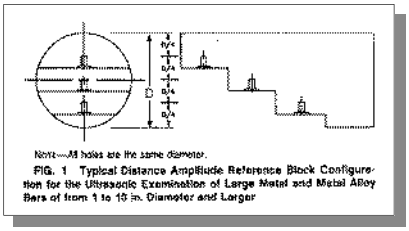


FIG. 1 Typical Distance Amplitude Reference Block Configuration for the Ultrasonic Examination of Large Metal and Metal Alloy Bars of from 1 to 10 in. Diameter and Larger

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.

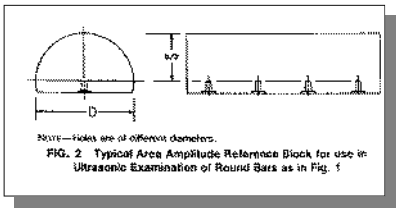


FIG. 2 Typical Area Amplitude Reference Block for use in Ultrasonic Examination of Round Bars as in Fig. 1

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", 1½", 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.



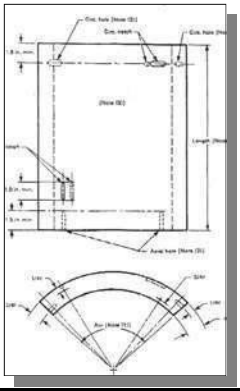
ASME Sec. V Basic Calibration Blocks Long Version

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", 1½", & 3".



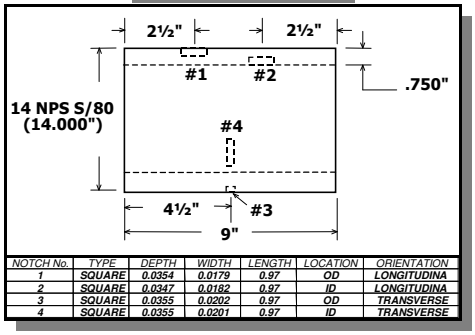
ASME Sec. V Angle Beam Cal Blocks

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 9½% 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.



NOTCH No.	TYPE	DEPTH	WIDTH	LENGTH	LOCATION	ORIENTATION
1	SQUARE	0.0354	0.0179	0.97	OD	LONGITUDINA
2	SQUARE	0.0347	0.0182	0.97	ID	LONGITUDINA
3	SQUARE	0.0355	0.0202	0.97	OD	TRANSVERSE
4	SQUARE	0.0355	0.0201	0.97	ID	TRANSVERSE

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.

PH TOOL REFERENCE STANDARDS

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.

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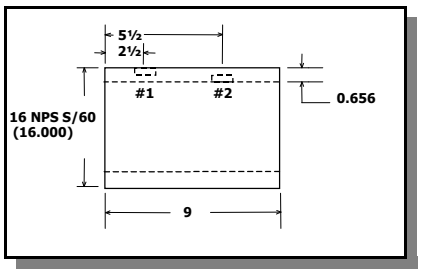
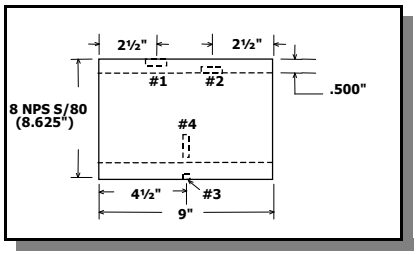


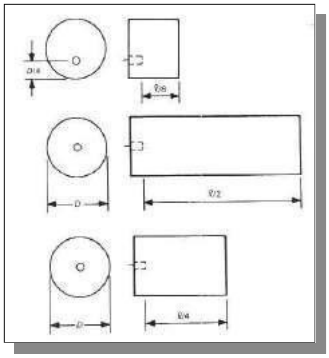
2-Notch Pipe Standard

Typical standard for circumferential scanning containing two (2) notches, one (1) OD longitudinal and one (1) ID longitudinal. The material shall be of the same diameter, wall thickness, material spec, and heat treatment as the material being inspected. Can be customer-supplied or PH Tool-supplied. Typical length required is 9 to 12" for contact testing, and 36 to 48" for immersion testing. Notch location can be customer-specified. Standards can be made 360° (full diameter), however, arc lengths of 90° to 180° are common for larger diameters. This design is typical of many UT specifications including: ASTM E-213, ASME Sections III and V, GE P3C-AL-0300, MIL-T-16420K, ASME SA-655, MIL-STD-271F, MIL-STD-2132, among others.



4-Notch Pipe Standard

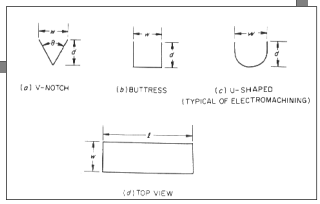
Typical standard for circumferential and longitudinal scanning containing four (4) notches, one (1) OD longitudinal, one (1) ID longitudinal, one (1) OD circumferential, and one (1) ID circumferential. The material shall be of the same diameter, wall thickness, material spec, and heat treatment as the material being inspected. Can be customer-supplied or PH Tool-supplied. Typical length required is 9 to 12" for contact testing, and 36 to 48" for immersion testing. Notch location can be customer-specified. Standards can be made 360° (full diameter), however, arc lengths of 90° to 180° are common for larger diameters. This design is typical of many UT specifications including: ASTM E-213, ASME Sections III, V and XI, MIL-T-16420K, ASME SA-655, MIL-STD-271F, among others.



ASME Sec. V Art. 5 Straight Beam Calibration Blocks for Bolting

These calibration blocks are manufactured in accordance with Figure T-534.3 and contain FBHs drilled in the axial direction of the block. Block material and examination surface finish shall be the same or equivalent to the bolting under examination. Block designations A, B, and C are available. Contains one (1) FBH from 1/16" to 3/8" diameter depending on examination material diameter. In accordance with ASME Section V, Article 5, Figure T-534.3, Straight Beam Calibration Blocks for Bolting.

ASME Section V
Article 23
Ultrasonic Standards



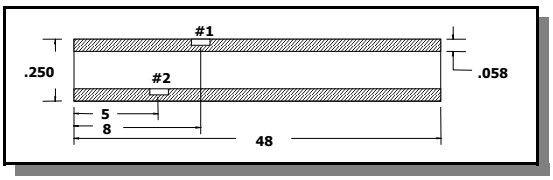
ASME Sec. V Art. 23 Ultrasonic Standards

All calibration and reference standards identified in Article 23 are available. Specifications include SA-388, SA-435/SA-435M, SA-577/SA-577M, SA-578/SA-578M, SA-609, SA-745, SB-509, SB-510, SB-513, SB-548, SE-113, SE-114, SE-213, SE-214, and SE-273.

ULTRASONIC REFERENCE STANDARDS (TUBE)

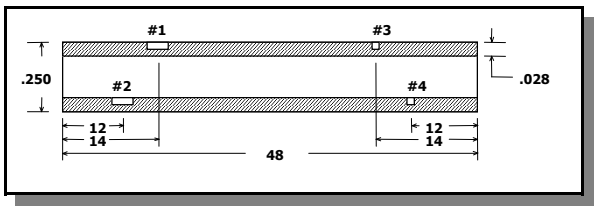
2-Notch Tube Standard

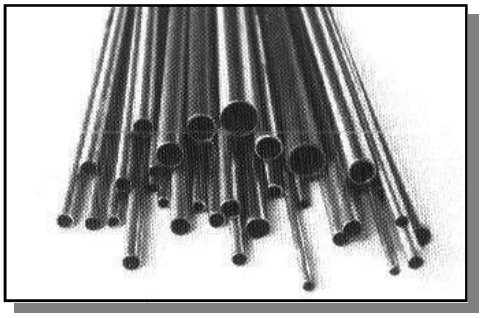
Typical standard for circumferential scanning containing two (2) notches, one (1) OD longitudinal and one (1) ID longitudinal. Typical length required is 48". Notch depth, width, and length vary by specification. Notch location can be customer-specified. ID notch location can be 12" from end on IDs over approximately 0.180". Reduces to 6" from end on 0.080" ID. This design is common to many UT specifications including MIL-T-16420K and MIL-T-23226.



4-Notch Tube Standard

Typical standard for circumferential and longitudinal scanning containing four (4) notches, one (1) OD longitudinal, one (1) ID longitudinal, one (1) OD circumferential, and one (1) ID circumferential. Typical length required is 48". Notch depth, width, and length vary by specification. Notch location can be customer-specified.
ID notch location can be 12" from end on IDs over approximately 0.180". Reduces to 6" from end on 0.080" ID. This design is common to many UT specifications including Pratt & Whitney's PWA SIM 4E SIS 26B.



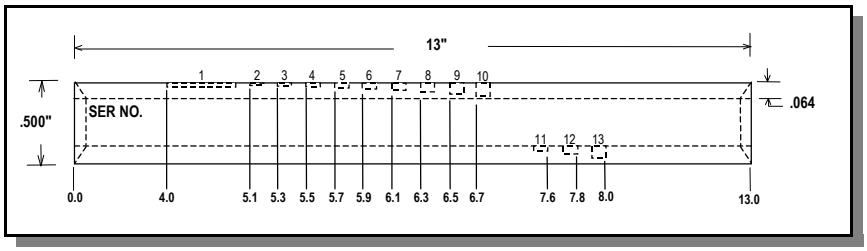


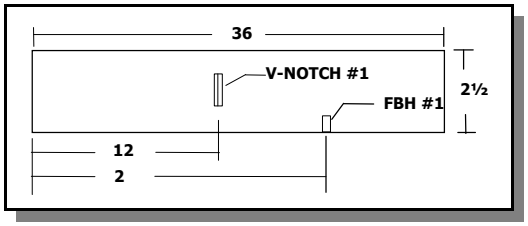
Unique Tube Standards for UT

Custom variations are also available containing EDM notches, FBHs (OD and ID), wall thinning, simulated ID pitting, and other unusual discontinuities. Also includes standards of extra-long overall length, very small IDs, and exotic alloys such as tantalum and iridium. Send us your sketch of any unique standard and we'll provide a prompt price quotation.

13-Notch UT Standard

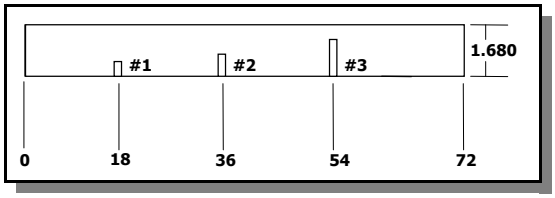
Custom standard containing 13 EDM notches. Twelve (12) are .100" long and are separated by .100". One (1) is 1.000" long. Notch depth varies from 10% to 90% of wall thickness. Notch width is 0.005". Narrower notch widths are available if preferred or if standard will be dual purpose UT/ET., All notches on this standard are longitudinally oriented, however circumferential notches can be machined also.





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.

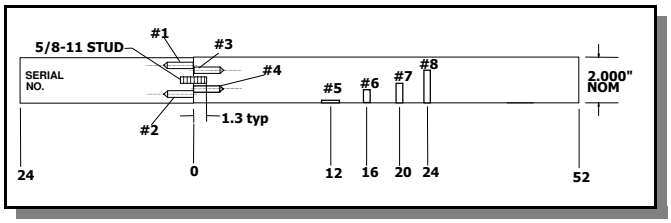


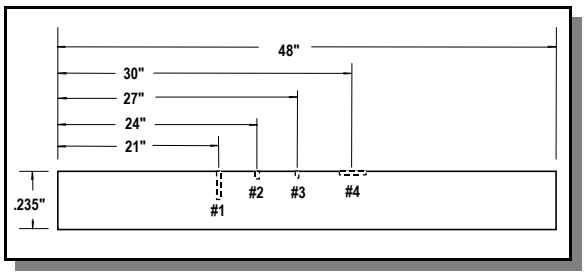
3-FBH Bar Standard

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.

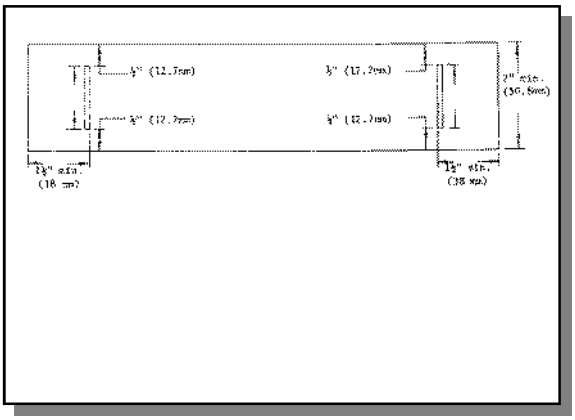
ULTRASONIC REFERENCE STANDARDS (OTHER)



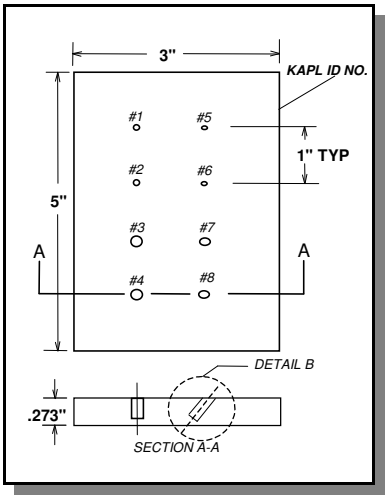
Projectile Body UT Standards

Typical projectile body and/or base standard will include OD and ID notches oriented both longitudinally and circumferentially. Notches can be uniformly deep across length, or thumbnail profile. Notch depth, width, length, and location are normally customer specified. Standards often contain FBHs also.

API RP 2X Reference Standard



American Petroleum Institute Reference Standard for Level "C" Examination for Recommended Practice 2X (RP 2X), Ultrasonic Examination of Offshore Structural Fabrication and Guidelines for Qualification of Ultrasonic Technicians. Set of four (4) blocks required. One block containing a square (buttress) notch and one each with V-notches for 45°, 60°, and 70° orientations for establishing scanning sensitivity for root reflectors. Note: Simulated references for rejectable flaws established by the Operator's UT specialist should be added to this block for the calibration of internal reflectors, i.e. 3/32" diameter side-drilled hole. In accordance with API RP 2X,



Miniature FBH Standard

Standard shown contains a total of eight (8) FBHs as follows: one (1) at .020" diameter with .100" clad depth (metal travel distance) oriented at 90° to the scanning surface, one (1) at .020" dia. x .050" clad at 90°, one (1) at .020" dia. x .100" clad at 45°, and one (1) at .020" dia. x .050" clad at 45°, and four (4) more same as above but at .060" diameter. Custom variations containing additional FBHs, other diameters, and different angles are available. Fax your sketch of any unique standard and we'll provide a prompt price quotation.



Ask us about our...

On-Time Delivery Guarantee!

Remember, we routinely build Specials and Purpose-built Blocks for UT. If you need one block or 100, we can make it. And if your need is an Emergency, such as a plant outage or a grounded plane, our Rush service will get it to you when you need it.

PH TOOL REFERENCE STANDARDS

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STANDARDS FOR IN-LINE PHASED ARRAY CALIBRATION SYSTEMS



Phased Array Calibration Standards

At PH Tool, our entire staff is dedicated to finding innovative ways to meet the demands of an increasingly-complex NDT marketplace.

Recently, PH Tool has been involved in supporting the commissioning of several in-line phased array bar and tube inspection systems. When the bar and tube industry adopted sophisticated phased array ultrasonic and eddy current technology to inspect their product, they turned to PH Tool to manufacture complex calibration standards.

In the wake of these new developments, PH Tool has pioneered a number of deep Flat-Bottom Hole (FBH) drilling and EDM notch machining techniques used in the manufacture of these longer/heavier calibration standards.

DEEP FLAT-BOTTOM HOLE DRILLING



FBH Calibration Standards

In past years, if a customer needed deep FBHs drilled, the standard needed to be "stepped," due to machine and tooling limitations.

Thanks to the experience and pioneering spirit of PH Tool, our customers can now calibrate on large-diameter standards that are not compromised with invasive steps or access pockets and slots.

To support this effort, we have added three vertical CNC mills dedicated to deep FBH drilling. The largest of the three has an incredible Z-axis travel of 41 inches. Combined with our specially-engineered tooling, PH Tool can now drill FBHs at 20 inches deep into a 21 inch diameter bar!

TECH SCALES



Tech Scales (Pack of 5)

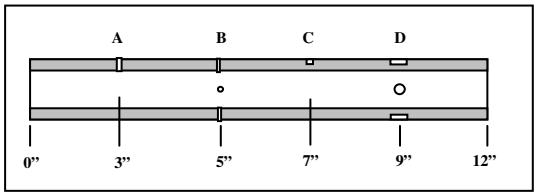
You've seen them at our booth at trade shows over the years, now our handy NDT Technician scales are available for sale in packages of five scales. Made of sturdy, anodized aluminum, these great little scales are Inch on one side (0 to 8 inch in increments of .050, and .100), and Metric on the other (0 to 200 mm in 1 mm increments.) Dimensions: .063" thick x 8.0" (200mm) long.



PH TOOL REFERENCE STANDARDS

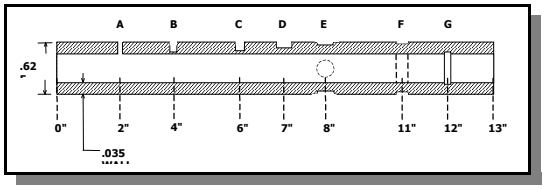
EDDY CURRENT CALIBRATION STANDARDS

ASME Sec. V Calibration Reference Standard 2007 Code

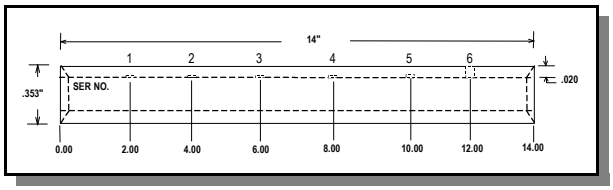


This standard is used to establish and verify system response for ET examination of nonferromagnetic steam generator heat exchanger tubing. Manufactured from tubing of the same nominal size and material type as that being examined. Discontinuities include one (1) through-wall hole (0.052" dia for tubing 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

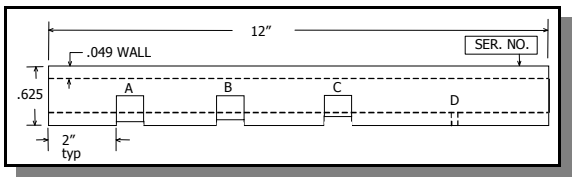


This standard is used to establish and verify system response for ET examination of nonferromagnetic steam generator heat exchanger tubing. Manufactured from tubing of the same nominal size and material type as that being examined. Discontinuities include one (1) through-wall hole (0.052" dia for tubing 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.



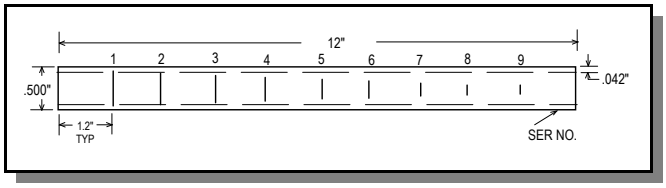
ID FBH Calibration Standard

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 Wearscar 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.

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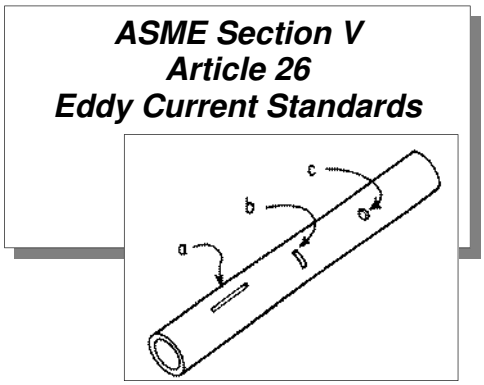
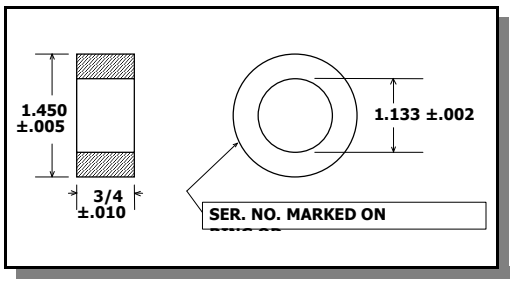
EDDY CURRENT CALIBRATION STANDARDS



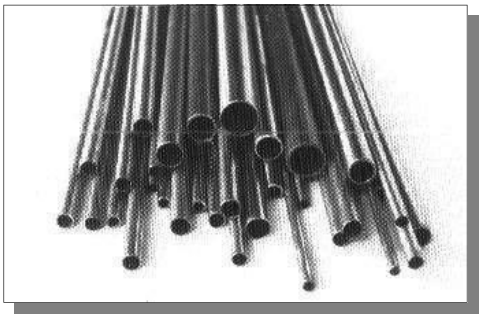
ASME Sec. V Art 26 ET Standards

All calibration and reference standards identified in Article 26 are available. Specifications include SE-215, SE-243, SE-309, SE-426, and SE-571. Inset shows SE-309, Figure 2, Various Types of Artificial Discontinuities, including longitudinal notch, transverse notch, and through-wall drilled hole.



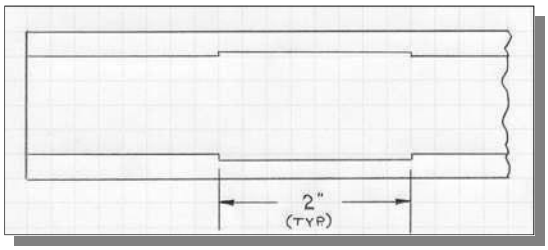
Tube Support Simulation Ring

Used with ASME and other eddy current calibration standards. ID of support ring fits OD of tube standard with approximately 0.010" clearance. Length of support ring typically varies from 1/4" to 1" depending on application. Available in many materials.



Specialized Tube Standards for ET

Custom variations are also available containing EDM notches, FBHs (OD and ID), wall thinning, simulated ID pitting, and other unusual discontinuities. Also includes standards of extra-long overall length, very small IDs, and exotic alloys such as tantalum and iridium. Send us your sketch of any unique standard and we'll provide a prompt price quotation.



ID Thinning Standard

Popular eddy current standard used to represent general uniform wastage (ID wall loss). Contains four (4) 2.0" long bands @ 10%, 20%, 30%, and 40% wall loss at 360° circumferential extent. Standard is made in two (2) 11" long pieces (22" overall) and is joined with a plastic coupling on the OD. Can be made in any tube alloy and size. Material is typically available from our stock with MTRs. If we don't stock it, we'll get it. Or, as always, this standard can be made from customer-supplied material.

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.

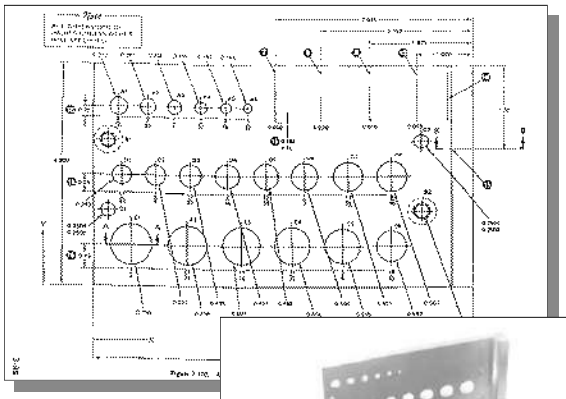


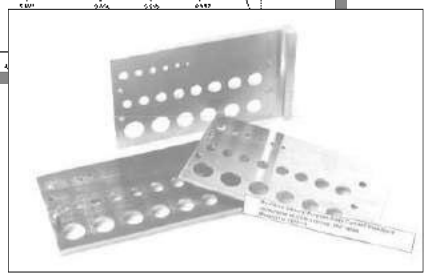
Wheel Inspection Reference Standards

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.

PH TOOL REFERENCE STANDARDS

EDDY CURRENT CALIBRATION STANDARDS (OTHER)

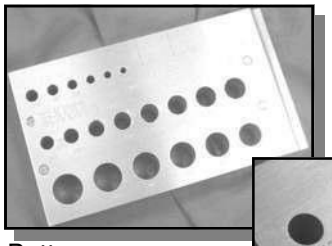




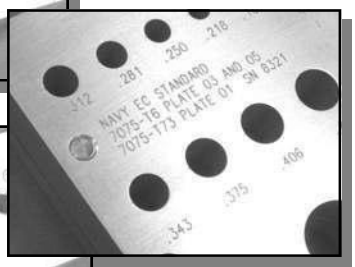
Air Force General Purpose Eddy Current Standard

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.

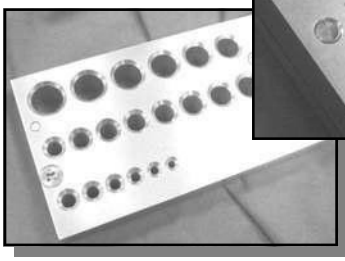
Top



Close-Up



Bottom



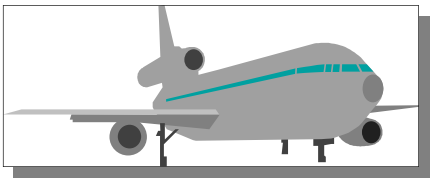
Navy Eddy Current Ref. Std. Kit (Universal Eddy Current Reference Std.)

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.

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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, McDonnel 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.

MAGNETIC PARTICLE STANDARDS



MIL-STD-271F Magnetic Particle Test Plate

Used to verify system performance, this plate contains EDM notches oriented 90° to the magnetic flux. Notch dimensions are 0.063" long x 0.006" wide x 0.020" deep (maximum dimensions). Material is 3/8" thick low alloy steel plate of convenient size. Notches are normally filled flush with a nonconducting material, such as epoxy, to prevent mechanical holding of the indicating medium. Plate at left shows one (1) notch oriented parallel to the weld, and another perpendicular to the weld. In accordance with MIL-STD-271F (SHIPS), Paragraph 4.3.1.2.



Weight Lifting Gear Magnetic Particle Props

These standards will normally contain EDM notches of varying degree and severity. Notches can be machined in the high-stress areas including, the bight on both sides and in the throat, the shank, and the area below the shank. Notches are normally filled flush with a nonconducting material, such as epoxy, to prevent mechanical holding of the indicating medium. Hooks, shackles, pins, eyebolts, rings, etc., can be notched.

LIQUID PENETRANT STANDARDS



NSTR-99 Liquid Penetrant Personnel Qualification Test Props

These liquid penetrant test props contain at least four (4) micro-sized holes 0.004" to 0.005" diameter by 0.008" to 0.010" deep. Holes can be machined in welded plate, pipe, bolts, bevel canopies, c-canopies, socket welds, or any test prop. Materials can be customer-supplied or PH Tool-supplied. In accordance with U.S. Navy's NSTR-99 Rev. 3 (Qualification Examination Requirements for Nondestructive Test Personnel).

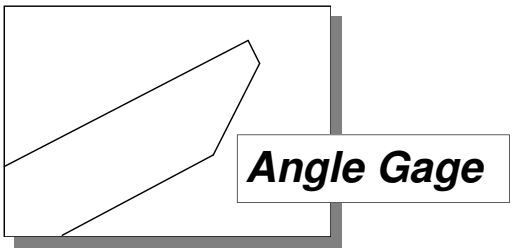


Liquid Penetrant Test Prop

Popular Navy LP prop consisting of a Stainless Steel plate with three (3) welds. Both the plate material and weld filler material are 300 series Stainless Steel. One weld is 1/32" reinforcement and is contoured (ground); the second is 1/16" reinforcement in the as-welded condition, the third is an as-welded root weld in a 90° V-groove. Plate contains twelve (12) micro-sized holes (NSTR-99) and one (1) linear indication (EDM notch). Notch is typically 0.250" long x 0.002 - 0.003" wide x 0.010 - 0.015" deep. Plate size is 5" x 7" x 1/2". Plates can be customer or PH Tool-supplied. Notches and holes of varying dimensions are also available. Certification Report with "as-built" hole and notch dimensions, and a map of defect locations.

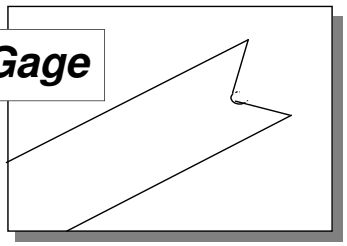
PRECISION DIMENSIONAL GAGES

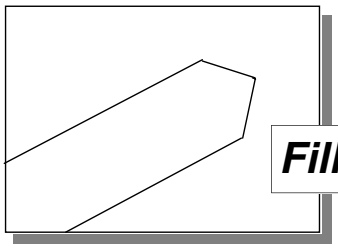
PH Tool manufactures close-tolerance mechanical gages, examples of which appear below. Available in Tool Steel and other materials. These gages are custom made to your design. Send us a print of your special gage and we'll provide a prompt quote. High-precision machining methods enable us to maintain tolerances of "tenths". Gages are accurately measured and certified traceable to NIST using a high magnification video measurement system. Gages are laser-engraved with a unique serial number and as-built dimensions.



Angle Gage

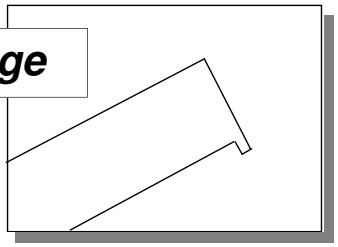
Corner Radius Gage



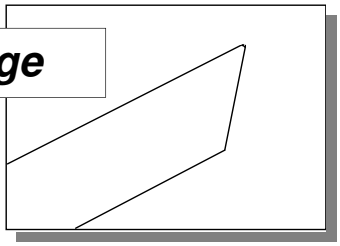


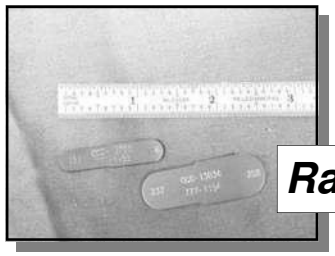
Fillet Radius Gage

Go No-Go Gage



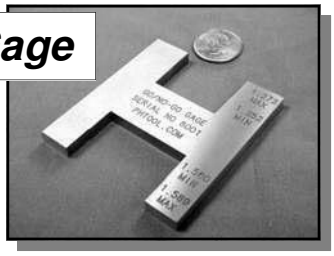
Fillet Angle Gage





Radius Gage

Stepped Min/Max Gage



SERVICES AVAILABLE



Sinker EDM

Electrical Discharge Machining (EDM) using Sinker or "Ram" machines has been our specialty since the 1970's when this technology first became available to industry. As a pioneer in EDM, PH Tool quickly became known as the logical source for EDM Notch reference standards for the NDT community. Today, we have 13 Sinkers in our EDM Department ready to handle your notch requirements. All of our machines are purpose-built and allow us to accommodate any size standard from the smallest weighing only a few ounces to those exceeding 2 tons.



Wire EDM

EDM using Wire machines is another area of expertise for the company. This unique, non-conventional machining method allows the precise shaping of metals that cannot be machined any other way. Of the two wire EDMs we have in our EDM Department, one is especially large with table travels of 27" x 16" x 16" tall and is one of only 10 of its kind in service in the US. These machines can make complex shapes up to 16" tall including turbine disks, hubs, wheels, pipe sections of special size or heavy walls, dovetails, gears,



CNC Machining of Standards

PH Tool manufactures special test blocks and reference standards to customer specifications in our fully-equipped CNC machine shop. We are a full-capability manufacturer, from start to finish, so lead times are always reasonable. Our broad range of machining capabilities and expertise enables us to respond quickly to emergency or 24-hour Rush delivery requirements. We offer the complete package, including computer-aided design, CNC milling and EDM, drilling, turning, boring, grinding, video measuring, welding, cladding, and more. Variations of any standard in this catalog are available, including those required in special alloys.



CNC Milling

When we decided to expand our capabilities beyond EDM Notch standards into the manufacture of ultrasonic test blocks, eddy current standards, and magnetic particle/liquid penetrant standards, we knew that we'd need to invest in CNC machining centers. Today we have six CNC mills running every day making test blocks for NDT and peck drilling flat bottom holes (FBH).



Turning and Boring

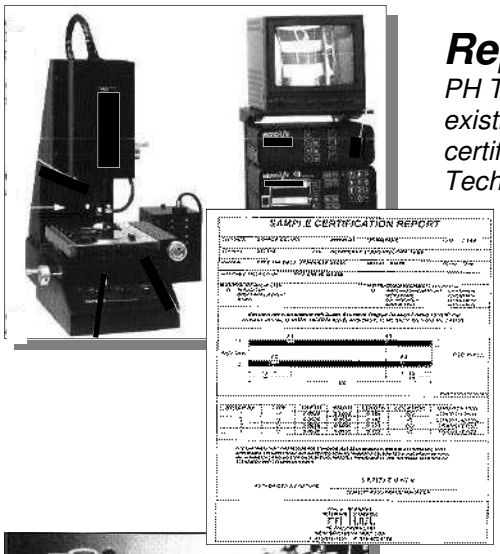
Four lathes cover a wide range of capability up to 26" diameter turning. Our largest turret lathe has a through-hole measuring 6.250" and is tailored to machining UT bar and pipe standards requiring axial holes and the machining of weld preps for subsequent joining. Our CNC lathe is perfect for the complex turning of EDM notch blanks or special-purpose test blocks, bolthole standards, and more. Turning, boring, and facing is easily accomplished at PH Tool.

SERVICES AVAILABLE



Surface Grinding

Ten surface grinders give us capacities that are unheard of in the NDT world. Our largest wet grinders are perfect for the incredibly accurate grinding of test blocks, while ensuring the exacting surface finishes that are expected in our industry. Beyond our normal range of grinders, we built a custom machine for grinding tall parts such as extra-long ASTM flat bottom hole reference blocks up to 48".



Replication and Recertification to NIST

PH Tool offers replication (where applicable) and recertification services of existing standards. Standards of unknown origin, or those lacking certification, can be certified to the National Institute of Standards and Technology (NIST). Recertified standards are inspected using the same exacting methods and procedures as "new" standards. One of many calibrated devices used, our Video Measurement Systems provide accurate measurement of parts of all sizes within an 864 cubic inch working area. All standards are inspected using instruments calibrated in accordance with ISO 10012-1, ANSI/NCSL Z540-1, and MIL-STD-45662A using master gage blocks directly traceable to NIST. Quality Assurance Program complies with MIL-Q-9858A, 10CFR50 Appendix B, ANSI N45.2, ASME Section III Division 1, and MIL-I-45208. Inset at left shows a sample Certification Report, typical of one supplied with all standards. Refer to full-size sample cert in this catalog for clarity.



Welding and Cladding

PH Tool offers both welding and cladding services. GTAW (Gas Tungsten Arc Welding), GMAW (Gas Metal Arc Welding), and SMAW (Shielded Metal Arc Welding) are available in many materials. Cladding of pipe and plate products for ASME calibration blocks, and welding of pipe or plate mockups and test props for UT, ET, PT and MT are routinely performed. Another popular application is the joining of two sections (butt-weld) of a Round Bar UT bar standard after machining the axial SDHs (side-drilled holes), and precisely re-attaching two halves of an Ultrasonic Cylinder standard after EDM of the ID reflectors.



Surface Roughness Measurement

Precise surface roughness measurements of machined standards are obtained using an electro-mechanical surface analyzer. Measurement of roughness is normally reported in R_a (Roughness Average in micro-inches), the universally recognized parameter of surface roughness. Standards can be manufactured to meet the surface roughness requirements of a particular testing application. We can also alter the surface finish of existing standards.



Electrical Conductivity Measurement

More and more customers are requesting that we report the actual Electrical Conductivity measurement (in % IACS) for the Eddy Current test standards we manufacture for them. Our Conductivity Meter allows us to accurately do just that. In addition to the alloy designation, and heat or lot number, we are now able to report conductivity on the Certification Report when requested.

PH TOOL REFERENCE STANDARDS

www.phtool.com
email: sales@phtool.com

6021 Easton Road, Pipersville, PA 18947 USA Tel: 267-203-1600 Fax: 267-203-1601

CERTIFICATION REPORT

CUSTOMER: **SAMPLE CO, INC.** DATE: **10/16/13**

SERIAL NO: **ABC970** ITEM: **EDDY CURRENT STANDARD** PO NO: **004123**

MATERIAL: **ALLOY 600** HEAT NO.: **NX5562HK9** SIZE: **.500" OD x .048" WALL x 48" LONG**

APPLICABLE SPECIFICATION: **CUSTOMER INSTRUCTION**

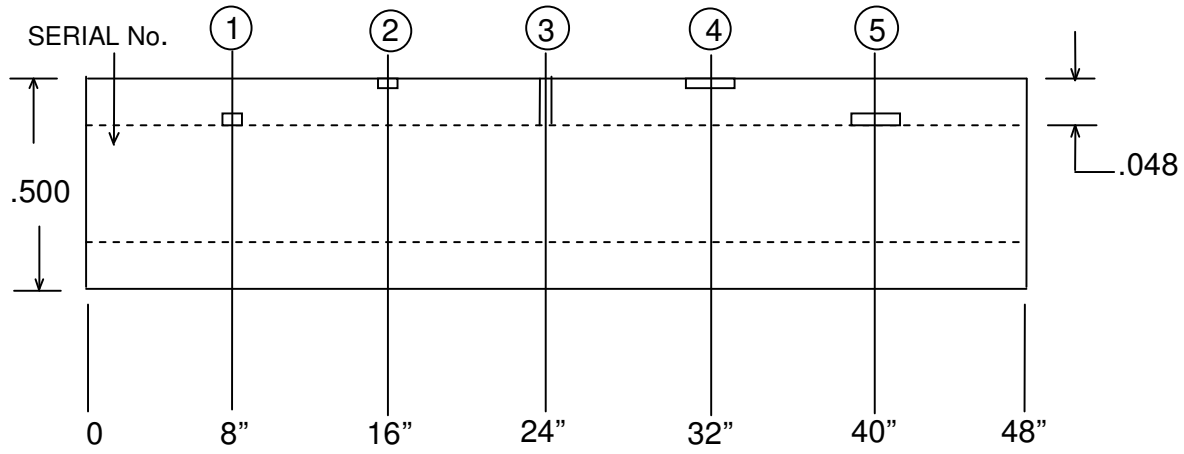
MEASURING TECHNIQUE USED:

- **XX REPLICATION**
- **XX DIRECT MEASUREMENT**
- OTHER

NIST TRACEABLE EQUIPMENT USED /TEST NO:

XX	**VIDEO MEASUREMENT SYS**	**821/262115-99**
	DIAL INDICATOR	821/263248-00
	MICROMETER	821/263248-00
XX	**GAGE BLOCKS**	**821/263248-00**

Manufactured in accordance with Quality Assurance Program Revision 1 dated 6/15/05 that complies with MIL-Q-9858A, 10CFR50 App B, ANSI N45.2, ASME Sec III Div 1 and MIL-I-45208A.



DIMENSIONS IN INCHES

DEFECT	TYPE	DEPTH	WIDTH	LENGTH	LOCATION	ORIENTATION
1	EDM NOTCH	0.0049	0.0390	0.0990	ID	TRANSVERSE
2	EDM NOTCH	0.0028	0.0050	0.0991	OD	TRANSVERSE
4	EDM NOTCH	0.0048	0.0393	0.0990	OD	LONGITUDINAL
5	EDM NOTCH	0.0029	0.0051	0.0990	ID	LONGITUDINAL

DEFECT	TYPE	DEPTH	DIAMETER
3	EDM THRU-HOLE	THRU	0.0242

IT IS CERTIFIED THAT THIS REFERENCE STANDARD HAS BEEN MANUFACTURED IN ACCORDANCE WITH APPLICABLE SPECIFICATIONS AND INSPECTED WITH INSTRUMENTS CALIBRATED IAW MIL-STD-45662 (LATEST REV.), ISO 10012-1 AND ANSI/NCSL Z540-1 USING MASTER GAGE BLOCKS AND MICRORULE MASTER SCALES DIRECTLY TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST).

SAMPLE ONLY

AUTHORIZED SIGNATURE _____

PHILIP R. HERMAN JR., QA MANAGER

PH TOOL REFERENCE STANDARDS

6021 EASTON ROAD, PIPERSVILLE, PA 18947 USA

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This Certification Report shall not be reproduced except in full, without the written approval of PH TOOL.

Quick Fax

Rapid Response Form

To: ***PH TOOL SALES DEPT.*** *Fax:* ***267-203-1601***

From: _____ *Date:* _____

Company: _____ *Address:* _____

Tel: _____ *City/State:* _____

Fax: _____ *email:* _____

☐ *RFQ - Request for Quotation*

Please provide a quotation on the following item(s): (Describe standard below or attach sketch.)

_____

_____

_____

☐ *RFI - Request for Information*

Please provide information on the following item(s): (Describe standard below or attach sketch.)

_____

_____

_____

☐ *Order*

Descibe item(s) you wish to order below or attach purchase order.

PO No.: _____ *Need date:* _____

Ship method: _____ *Call to discuss?* *Yes* ___ *No* ___

_____

_____

_____

☐ *Other*

_____

_____

_____

ULTRASONIC TEST BLOCK PRICE LIST

PRICES EFFECTIVE: 1-1-2018 through 12-31-2018

FILE: test block price list 1-1-18.xls
Prices in US Dollars
email: sales@phtool.com

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PHONE: 267-203-1600
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TEST BLOCK TYPE	ALLOY	LIST PRICE
IIW-TYPE 1	STEEL	486
IIW-TYPE 1	ALUM	486
IIW-TYPE 1	SS	851
IIW-TYPE 1	TITANIUM	Call
CASE		77
IIW-TYPE 1, METRIC	STEEL	557
IIW-TYPE 1, METRIC	ALUM	557
IIW-TYPE 1, METRIC	SS	980
IIW-TYPE 1, METRIC	TITANIUM	Call
CASE		77
IIW-TYPE 2	STEEL	565
IIW-TYPE 2	ALUM	565
IIW-TYPE 2	SS	990
IIW-TYPE 2	TITANIUM	Call
CASE		77
IIW-TYPE 2, METRIC	STEEL	650
IIW-TYPE 2, METRIC	ALUM	650
IIW-TYPE 2, METRIC	SS	1137
IIW-TYPE 2, METRIC	TITANIUM	Call
CASE		77
MINI IIW-TYPE 2, 1x2x6", Dwg. 10147	STEEL	565
MINI IIW-TYPE 2, 1x2x6", Dwg. 10147	ALUM	565
MINI IIW-TYPE 2, 1x2x6", Dwg. 10147	SS	990
MINI IIW-TYPE 2, 1x2x6", Dwg. 10147	TITANIUM	Call
CASE		56
MINI IIW-TYPE 2, METRIC, 25x50x150mm, Dwg. 10160	STEEL	650
MINI IIW-TYPE 2, METRIC, 25x50x150mm, Dwg. 10160	ALUM	650
MINI IIW-TYPE 2, METRIC, 25x50x150mm, Dwg. 10160	SS	1137
MINI IIW-TYPE 2, METRIC, 25x50x150mm, Dwg. 10160	TITANIUM	Call
CASE		56
PACS™ BLOCK	STEEL	1828
PACS™ BLOCK	ALUM	1828
PACS™ BLOCK	SS	2438
PACS™ BLOCK	TITANIUM	Call
CASE		110
AWS-TYPE PACS™ BLOCK (0.060" SDHs)	STEEL	1828
AWS-TYPE PACS™ BLOCK (0.060" SDHs)	ALUM	1828
AWS-TYPE PACS™ BLOCK (0.060" SDHs)	SS	2438
AWS-TYPE PACS™ BLOCK (0.060" SDHs)	TITANIUM	Call
CASE		110
MINI PACS™ BLOCK	STEEL	972
MINI PACS™ BLOCK	ALUM	972
MINI PACS™ BLOCK	SS	1296
MINI PACS™ BLOCK	TITANIUM	Call
CASE		70

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TEST BLOCK TYPE	ALLOY	LIST PRICE
PACS™ NOTCH BLOCK	STEEL	2140
PACS™ NOTCH BLOCK	ALUM	2140
PACS™ NOTCH BLOCK	SS	2893
PACS™ NOTCH BLOCK	TITANIUM	Call
CASE		64
ASTM E2491 PHASED ARRAY ASSESSMENT BLOCK, METRIC	STEEL	1854
ASTM E2491 PHASED ARRAY ASSESSMENT BLOCK, METRIC	ALUM	1343
ASTM E2491 PHASED ARRAY ASSESSMENT BLOCK, METRIC	SS	2594
ASTM E2491 PHASED ARRAY ASSESSMENT BLOCK, METRIC	TITANIUM	Call
CASE		74
ASTM E2491 PHASED ARRAY ASSESSMENT BLOCK, INCH	STEEL	1854
ASTM E2491 PHASED ARRAY ASSESSMENT BLOCK, INCH	ALUM	1343
ASTM E2491 PHASED ARRAY ASSESSMENT BLOCK, INCH	SS	2594
ASTM E2491 PHASED ARRAY ASSESSMENT BLOCK, INCH	TITANIUM	Call
CASE		74
PHASED ARRAY TYPE A BLOCK (IIW-TYPE), METRIC	STEEL	1676
PHASED ARRAY TYPE A BLOCK (IIW-TYPE), METRIC	ALUM	1676
PHASED ARRAY TYPE A BLOCK (IIW-TYPE), METRIC	SS	2262
PHASED ARRAY TYPE A BLOCK (IIW-TYPE), METRIC	TITANIUM	Call
CASE		77
PHASED ARRAY CALIBRATION BLOCK NO. 2	STEEL	1009
PHASED ARRAY CALIBRATION BLOCK NO. 2	ALUM	1009
PHASED ARRAY CALIBRATION BLOCK NO. 2	SS	1364
PHASED ARRAY CALIBRATION BLOCK NO. 2	TITANIUM	Call
CASE		85
DC BLOCK	STEEL	269
DC BLOCK	ALUM	269
DC BLOCK	SS	468
DC BLOCK	TITANIUM	Call
CASE		47
SC BLOCK	STEEL	270
SC BLOCK	ALUM	270
SC BLOCK	SS	470
SC BLOCK	TITANIUM	Call
CASE		41
DSC BLOCK	STEEL	353
DSC BLOCK	ALUM	353
DSC BLOCK	SS	619
DSC BLOCK	TITANIUM	Call
CASE		48
DSC BLOCK, METRIC	STEEL	406
DSC BLOCK, METRIC	ALUM	406
DSC BLOCK, METRIC	SS	713
DSC BLOCK, METRIC	TITANIUM	Call
CASE		48

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TEST BLOCK TYPE	ALLOY	LIST PRICE
DS BLOCK	STEEL	710
DS BLOCK	ALUM	710
DS BLOCK	SS	1239
DS BLOCK	TITANIUM	Call
CASE		118
4-STEP BLOCK, .250, .500, .750, 1.000"	STEEL	204
4-STEP BLOCK, .250, .500, .750, 1.000"	ALUM	204
4-STEP BLOCK, .250, .500, .750, 1.000"	SS	357
4-STEP BLOCK, .250, .500, .750, 1.000"	TITANIUM	Call
CASE		38
4-STEP BLOCK - METRIC 4A, 6.25, 12.50, 18.75, 25.00mm	STEEL	235
4-STEP BLOCK - METRIC 4A, 6.25, 12.50, 18.75, 25.00mm	ALUM	235
4-STEP BLOCK - METRIC 4A, 6.25, 12.50, 18.75, 25.00mm	SS	410
4-STEP BLOCK - METRIC 4A, 6.25, 12.50, 18.75, 25.00mm	TITANIUM	Call
CASE		38
4-STEP BLOCK - METRIC 4B, 5.0, 10.0, 15.0, 20.0mm	STEEL	235
4-STEP BLOCK - METRIC 4B, 5.0, 10.0, 15.0, 20.0mm	ALUM	235
4-STEP BLOCK - METRIC 4B, 5.0, 10.0, 15.0, 20.0mm	SS	410
4-STEP BLOCK - METRIC 4B, 5.0, 10.0, 15.0, 20.0mm	TITANIUM	Call
CASE		38
5-STEP BLOCK, .100, .200, .300, .400, .500"	STEEL	226
5-STEP BLOCK, .100, .200, .300, .400, .500"	ALUM	226
5-STEP BLOCK, .100, .200, .300, .400, .500"	SS	394
5-STEP BLOCK, .100, .200, .300, .400, .500"	TITANIUM	Call
CASE		38
5-STEP BLOCK - METRIC 5A, 2.5, 5.0, 7.5, 10.0, 12.5mm	STEEL	258
5-STEP BLOCK - METRIC 5A, 2.5, 5.0, 7.5, 10.0, 12.5mm	ALUM	258
5-STEP BLOCK - METRIC 5A, 2.5, 5.0, 7.5, 10.0, 12.5mm	SS	452
5-STEP BLOCK - METRIC 5A, 2.5, 5.0, 7.5, 10.0, 12.5mm	TITANIUM	Call
CASE		38
5-STEP BLOCK - METRIC 5B, 2.0, 4.0, 6.0, 8.0, 10.0mm	STEEL	258
5-STEP BLOCK - METRIC 5B, 2.0, 4.0, 6.0, 8.0, 10.0mm	ALUM	258
5-STEP BLOCK - METRIC 5B, 2.0, 4.0, 6.0, 8.0, 10.0mm	SS	452
5-STEP BLOCK - METRIC 5B, 2.0, 4.0, 6.0, 8.0, 10.0mm	TITANIUM	Call
CASE		38
10-STEP BLOCK, 0.1 to 1.0" x 0.1" Increments	STEEL	785
10-STEP BLOCK, 0.1 to 1.0" x 0.1" Increments	ALUM	785
10-STEP BLOCK, 0.1 to 1.0" x 0.1" Increments	SS	1376
10-STEP BLOCK, 0.1 to 1.0" x 0.1" Increments	TITANIUM	Call
CASE		64
10-STEP BLOCK - METRIC 10A, 2.5 to 25.0 x 2.5mm Increments	STEEL	904
10-STEP BLOCK - METRIC 10A, 2.5 to 25.0 x 2.5mm Increments	ALUM	904
10-STEP BLOCK - METRIC 10A, 2.5 to 25.0 x 2.5mm Increments	SS	1584
10-STEP BLOCK - METRIC 10A, 2.5 to 25.0 x 2.5mm Increments	TITANIUM	Call
CASE		64

ULTRASONIC TEST BLOCK PRICE LIST

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FAX: 267-203-1601
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TEST BLOCK TYPE	ALLOY	LIST PRICE
10-STEP BLOCK - METRIC 10B, 2.0 to 20.0 x 2.0mm Increments	STEEL	904
10-STEP BLOCK - METRIC 10B, 2.0 to 20.0 x 2.0mm Increments	ALUM	904
10-STEP BLOCK - METRIC 10B, 2.0 to 20.0 x 2.0mm Increments	SS	1584
10-STEP BLOCK - METRIC 10B, 2.0 to 20.0 x 2.0mm Increments	TITANIUM	Call
CASE		64
THIN-STEP BLOCK - .040, .060, .080, .100"	STEEL	473
THIN-STEP BLOCK - .040, .060, .080, .100"	ALUM	473
THIN-STEP BLOCK - .040, .060, .080, .100"	SS	759
THIN-STEP BLOCK - .040, .060, .080, .100"	TITANIUM	Call
CASE		38
THIN-STEP BLOCK - METRIC, 1.0, 1.5, 2.0, 2.5mm	STEEL	542
THIN-STEP BLOCK - METRIC, 1.0, 1.5, 2.0, 2.5mm	ALUM	542
THIN-STEP BLOCK - METRIC, 1.0, 1.5, 2.0, 2.5mm	SS	872
THIN-STEP BLOCK - METRIC, 1.0, 1.5, 2.0, 2.5mm	TITANIUM	Call
CASE		38
MAGNA THIN-STEP BLOCK - .020, .040, .060, .080, .100"	STEEL	697
MAGNA THIN-STEP BLOCK - .020, .040, .060, .080, .100"	ALUM	697
MAGNA THIN-STEP BLOCK - .020, .040, .060, .080, .100"	SS	1155
MAGNA THIN-STEP BLOCK - .020, .040, .060, .080, .100"	TITANIUM	Call
CASE		38
MAGNA THIN-STEP BLOCK- METRIC, 0.5, 1.0, 1.5, 2.0, 2.5mm	STEEL	803
MAGNA THIN-STEP BLOCK- METRIC, 0.5, 1.0, 1.5, 2.0, 2.5mm	ALUM	803
MAGNA THIN-STEP BLOCK- METRIC, 0.5, 1.0, 1.5, 2.0, 2.5mm	SS	1328
MAGNA THIN-STEP BLOCK- METRIC, 0.5, 1.0, 1.5, 2.0, 2.5mm	TITANIUM	Call
CASE		38
TIPSY STEP BLOCK, 1.0 to 4.5" x .5" Increments	STEEL	666
TIPSY STEP BLOCK, 1.0 to 4.5" x .5" Increments	ALUM	666
TIPSY STEP BLOCK, 1.0 to 4.5" x .5" Increments	SS	1066
TIPSY STEP BLOCK, 1.0 to 4.5" x .5" Increments	TITANIUM	Call
CASE		85
TIPSY STEP BLOCK - METRIC, 25 to 112.5, 12.5mm Increments	STEEL	768
TIPSY STEP BLOCK - METRIC, 25 to 112.5, 12.5mm Increments	ALUM	768
TIPSY STEP BLOCK - METRIC, 25 to 112.5, 12.5mm Increments	SS	1227
TIPSY STEP BLOCK - METRIC, 25 to 112.5, 12.5mm Increments	TITANIUM	Call
CASE		85
UNIVERSAL TIPSY BLOCK, 1.0 to 4.0" and 25mm to 100mm	STEEL	734
UNIVERSAL TIPSY BLOCK, 1.0 to 4.0" and 25mm to 100mm	ALUM	734
UNIVERSAL TIPSY BLOCK, 1.0 to 4.0" and 25mm to 100mm	SS	1172
UNIVERSAL TIPSY BLOCK, 1.0 to 4.0" and 25mm to 100mm	TITANIUM	Call
CASE		85
CURVED OD 5-STEP BLOCK - .100, .200, .300, .400, .500"	STEEL	412
CURVED OD 5-STEP BLOCK - .100, .200, .300, .400, .500"	ALUM	412
CURVED OD 5-STEP BLOCK - .100, .200, .300, .400, .500"	SS	723
CURVED OD 5-STEP BLOCK - .100, .200, .300, .400, .500"	TITANIUM	Call
CASE		45

ULTRASONIC TEST BLOCK PRICE LIST

PRICES EFFECTIVE: 1-1-2018 through 12-31-2018

FILE: test block price list 1-1-18.xls
Prices in US Dollars
email: sales@phtool.com

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TEST BLOCK TYPE	ALLOY	LIST PRICE
EDM SLOT SIZING BLOCK - .100 to .900" x .100" Increments	STEEL	1278
EDM SLOT SIZING BLOCK - .100 to .900" x .100" Increments	ALUM	1278
EDM SLOT SIZING BLOCK - .100 to .900" x .100" Increments	SS	2121
CASE		81
DRILLED HOLE SIZING BLOCK - .100 to .900" x .100" Increments	STEEL	1111
DRILLED HOLE SIZING BLOCK - .100 to .900" x .100" Increments	ALUM	1111
DRILLED HOLE SIZING BLOCK - .100 to .900" x .100" Increments	SS	1816
CASE		81
"FAST" UT SIZING BLOCK, P/N 10072	STEEL	1402
CASE		81
TYPE MAB MINI ANGLE BEAM	STEEL	276
TYPE MAB MINI ANGLE BEAM	ALUM	276
TYPE MAB MINI ANGLE BEAM	SS	481
TYPE MAB MINI ANGLE BEAM	TITANIUM	Call
CASE		48
IOW BEAM PROFILE BLOCK, Inch or mm	STEEL	655
IOW BEAM PROFILE BLOCK, Inch or mm	ALUM	655
IOW BEAM PROFILE BLOCK, Inch or mm	SS	1146
IOW BEAM PROFILE BLOCK, Inch or mm	TITANIUM	Call
CASE		85
AWS RESOLUTION BLOCK	STEEL	320
AWS RESOLUTION BLOCK	ALUM	320
AWS RESOLUTION BLOCK	SS	565
AWS RESOLUTION BLOCK	TITANIUM	Call
CASE		53
NAVSHIPS TEST BLOCK	STEEL	495
NAVSHIPS TEST BLOCK	ALUM	495
NAVSHIPS TEST BLOCK	SS	864
NAVSHIPS TEST BLOCK	TITANIUM	Call
CASE		85
NAVSHIPS "3020" TEST BLOCK - NAVY TYPE	1018 STEEL	1019
NAVSHIPS "3020" TEST BLOCK - NAVY TYPE	HY-80	1256
NAVSHIPS "3020" TEST BLOCK - NAVY TYPE	ALUM	1019
NAVSHIPS "3020" TEST BLOCK - NAVY TYPE	SS	1807
NAVSHIPS "3020" TEST BLOCK - NAVY TYPE	TITANIUM	Call
CASE		85
PHASED ARRAY NAVSHIPS TEST BLOCK	STEEL	744
PHASED ARRAY NAVSHIPS TEST BLOCK	ALUM	744
PHASED ARRAY NAVSHIPS TEST BLOCK	SS	1307
PHASED ARRAY NAVSHIPS TEST BLOCK	TITANIUM	Call
CASE		85
MINI RESOLUTION BLOCK	STEEL	515
MINI RESOLUTION BLOCK	ALUM	515
MINI RESOLUTION BLOCK	SS	897
MINI RESOLUTION BLOCK	TITANIUM	Call
CASE		40

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TEST BLOCK TYPE	ALLOY	LIST PRICE
30 FBH RESOLUTION BLOCK	STEEL	2606
30 FBH RESOLUTION BLOCK	ALUM	2606
30 FBH RESOLUTION BLOCK	SS	4560
30 FBH RESOLUTION BLOCK	TITANIUM	Call
CASE		100
ASME N-625 REFERENCE PLATE	STEEL	779
ASME N-625 REFERENCE PLATE	ALUM	779
ASME N-625 REFERENCE PLATE	SS	1362
ASME N-625 REFERENCE PLATE	TITANIUM	Call
CASE		85
ASME SEC V BASIC CAL BLOCK (½"T)	STEEL	909
ASME SEC V BASIC CAL BLOCK (½"T)	ALUM	909
ASME SEC V BASIC CAL BLOCK (½"T)	SS	1230
CASE		85
ASME SEC V BASIC CAL BLOCK (½"T) - LONG VERSION	STEEL	1139
ASME SEC V BASIC CAL BLOCK (½"T) - LONG VERSION	ALUM	1139
ASME SEC V BASIC CAL BLOCK (½"T) - LONG VERSION	SS	1541
CASE		105
ASME SEC V BASIC CAL BLOCK (3/4"T)	STEEL	936
ASME SEC V BASIC CAL BLOCK (3/4"T)	ALUM	936
ASME SEC V BASIC CAL BLOCK (3/4"T)	SS	1262
CASE		85
ASME SEC V BASIC CAL BLOCK (3/4"T) - LONG VERSION	STEEL	1172
ASME SEC V BASIC CAL BLOCK (3/4"T) - LONG VERSION	ALUM	1172
ASME SEC V BASIC CAL BLOCK (3/4"T) - LONG VERSION	SS	1576
CASE		105
ASME SEC V BASIC CAL BLOCK (1½"T)	STEEL	1066
ASME SEC V BASIC CAL BLOCK (1½"T)	ALUM	1066
ASME SEC V BASIC CAL BLOCK (1½"T)	SS	1464
CASE		110
ASME SEC V BASIC CAL BLOCK (1½"T) - LONG VERSION	STEEL	1603
ASME SEC V BASIC CAL BLOCK (1½"T) - LONG VERSION	ALUM	1603
ASME SEC V BASIC CAL BLOCK (1½"T) - LONG VERSION	SS	2198
CASE		164
ASME SEC V BASIC CAL BLOCK (3"T)	STEEL	1357
ASME SEC V BASIC CAL BLOCK (3"T)	ALUM	1357
ASME SEC V BASIC CAL BLOCK (3"T)	SS	1977
CASE		229
ASME SEC V BASIC CAL BLOCK (3"T) - LONG VERSION	STEEL	2375
ASME SEC V BASIC CAL BLOCK (3"T) - LONG VERSION	ALUM	2375
ASME SEC V BASIC CAL BLOCK (3"T) - LONG VERSION	SS	3459
CASE		Call
ASME SEC V BASIC CAL BLOCK (5"T)	STEEL	2591
ASME SEC V BASIC CAL BLOCK (5"T)	ALUM	2591
ASME SEC V BASIC CAL BLOCK (5"T)	SS	Call
CASE		Call

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TEST BLOCK TYPE	ALLOY	LIST PRICE
ASTM AREA AMPLITUDE SET OF 8	STEEL	2160
ASTM AREA AMPLITUDE SET OF 8	ALUM	2471
ASTM AREA AMPLITUDE SET OF 8	SS	3432
ASTM AREA AMPLITUDE SET OF 8	TITANIUM	Call
CASE		134
ASTM DISTANCE/AREA AMPL. SET OF 10	STEEL	2463
ASTM DISTANCE/AREA AMPL. SET OF 10	ALUM	2956
ASTM DISTANCE/AREA AMPL. SET OF 10	SS	3931
ASTM DISTANCE/AREA AMPL. SET OF 10	TITANIUM	Call
CASE		144
ASTM DISTANCE AMPLITUDE SET OF 19, #3/5/8	STEEL	4465
ASTM DISTANCE AMPLITUDE SET OF 19, #3/5/8	ALUM	5164
ASTM DISTANCE AMPLITUDE SET OF 19, #3/5/8	SS	7050
ASTM DISTANCE AMPLITUDE SET OF 19, #3/5/8	TITANIUM	Call
CASE		229
V1/5 (A2) TEST BLOCK (BS2704)	STEEL	675
V1/5 (A2) TEST BLOCK (BS2704)	ALUM	675
V1/5 (A2) TEST BLOCK (BS2704)	SS	1156
V1/5 (A2) TEST BLOCK (BS2704)	TITANIUM	Call
CASE		77
V2 (A4) 12.5, 20, and 25mm TEST BLOCK	STEEL	420
V2 (A4) 12.5, 20, and 25mm TEST BLOCK	ALUM	420
V2 (A4) 12.5, 20, and 25mm TEST BLOCK	SS	713
V2 (A4) 12.5, 20, and 25mm TEST BLOCK	TITANIUM	Call
CASE		48
CALIBRATION BLOCK No. 1 (K1) (EN12223 / ISO2400)	STEEL	675
CALIBRATION BLOCK No. 1 (K1) (EN12223 / ISO2400)	ALUM	675
CALIBRATION BLOCK No. 1 (K1) (EN12223 / ISO2400)	SS	1156
CALIBRATION BLOCK No. 1 (K1) (EN12223 / ISO2400)	TITANIUM	Call
CASE		77
CALIBRATION BLOCK No. 2 (12.5, 20, and 25mm)	STEEL	420
CALIBRATION BLOCK No. 2 (12.5, 20, and 25mm)	ALUM	420
CALIBRATION BLOCK No. 2 (12.5, 20, and 25mm)	SS	713
CALIBRATION BLOCK No. 2 (12.5, 20, and 25mm)	TITANIUM	Call
CASE		48
VW STEP BLOCK, 1-8mm STEPS	STEEL	704
VW STEP BLOCK, 1-8mm STEPS	ALUM	828
VW STEP BLOCK, 1-8mm STEPS	303 SS	897
VW STEP BLOCK, 1-8mm STEPS	TITANIUM	Call
CASE		38
ASTM E317 RESOLUTION BLOCK, FIG. 1	STEEL	602
ASTM E317 RESOLUTION BLOCK, FIG. 1	ALUM	602
ASTM E317 RESOLUTION BLOCK, FIG. 1	SS	1055
CASE		66

ULTRASONIC TEST BLOCK PRICE LIST

PRICES EFFECTIVE: 1-1-2018 through 12-31-2018

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Prices in US Dollars

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TEST BLOCK TYPE	***ALLOY***	***LIST PRICE***
ASTM E317 RESOLUTION BLOCK, FIG. 6, #3 FBHs	*STEEL*	*1828*
ASTM E317 RESOLUTION BLOCK, FIG. 6, #3 FBHs	*ALUM*	*1828*
ASTM E317 RESOLUTION BLOCK, FIG. 6, #3 FBHs	*SS*	*3198*
CASE		*98*
ASTM E317 RESOLUTION BLOCK, FIG. 6, #1 FBHs	*STEEL*	*2113*
ASTM E317 RESOLUTION BLOCK, FIG. 6, #1 FBHs	*ALUM*	*2113*
ASTM E317 RESOLUTION BLOCK, FIG. 6, #1 FBHs	*SS*	*3697*
CASE		*98*

NOTES:

1. METRIC BLOCKS NOT SEPARATELY PRICED MUST ADD 15% TO IMPERIAL (INCH) PRICING.
(does not apply to IOW, V1, V2, VW, or ISO 7963 Blocks)

2. ALL OTHER STANDARDS IN THIS CATALOG, INCLUDING SPECIAL TEST BLOCKS, ARE QUOTED INDIVIDUALLY.

3. ASTM SET OF 19 WITH #1 FBH ADDS 35% TO PRICE.

4. ASTM SET OF 19 WITH #2 FBH ADDS 15% TO PRICE.

5. PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE.

DIMENSIONAL INSPECTION PRICE LIST

ULTRASONIC & EDDY CURRENT TEST BLOCKS
PRICES EFFECTIVE: 1-1-2018 through 12-31-2018

FILE: dimension inspection price list 1-1-18.xls
Prices in US Dollars
email: sales@phtool.com

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TEST BLOCK TYPE	LIST PRICE FOR DIMENSIONAL INSPECTION
IIW-TYPE 1	167
IIW-TYPE 2	197
MINI IIW-TYPE 2	167
PACS BLOCK	216
PA TYPE A BLOCK (IIW-TYPE)	431
DC BLOCK	104
SC BLOCK	88
DSC BLOCK	147
DS BLOCK	240
4-STEP BLOCK	75
5-STEP BLOCK	81
90° CURVED 5-STEP BLOCK	144
10-STEP BLOCK	157
THIN-STEP BLOCK	75
MAGNA-THIN STEP BLOCK	81
TIPSY STEP BLOCK	147
TYPE MAB MINI ANGLE BEAM	104
IOW BEAM PROFILE BLOCK	211
AWS RESOLUTION BLOCK	104
NAVSHIPS TEST BLOCK	167
MINI RESOLUTION BLOCK	147
30 FBH RESOLUTION BLOCK (UT PLOTTING ONLY)	1514
ASME N-625 REFERENCE PLATE	211
ASME SEC V BASIC CAL BLOCK (½"T)	322
ASME SEC V BASIC CAL BLOCK (3/4"T)	322
ASME SEC V BASIC CAL BLOCK (1½"T)	351
ASME SEC V BASIC CAL BLOCK (3"T)	426
ASTM AREA/AMPLITUDE SET OF 8 - Steel & SS	644
ASTM AREA/AMPLITUDE SET OF 8 - Alum	761
ASTM DISTANCE/AREA AMPL. SET OF 10 - Steel & SS	804
ASTM DISTANCE/AREA AMPL. SET OF 10 - Alum	949
ASTM DISTANCE/AMPLITUDE SET OF 19 - Steel & SS	1528
ASTM DISTANCE/AMPLITUDE SET OF 19 - Alum	1805
SINGLE ASTM BLOCK, UT CERT TO E127 (BALL TO BLOCK METHOD)	235
SINGLE ASTM BLOCK, DIMENSIONAL INSP. ONLY (2" dia up to 6.75")	113
ASTM DISTANCE/AMPLITUDE SET OF 12 - Alum - 2" Dia	1130
ASTM DISTANCE/AMPLITUDE SET OF 12 - Alum - 4" Dia	1613
V1/5 (A2) TEST BLOCK	197
V2 (25mm) TEST BLOCK	162
VW STEP BLOCK, 1-8mm STEPS	147
ASME ANGLE BEAM CAL STANDARD, 4 EDM NOTCHES	587
USAF or NAVY EC STANDARD	1425
ASTM E317 FIG. 1	220
ASTM E317 FIG. 6	467
3-NOTCH EDDY CURRENT STANDARD	256

DIMENSIONAL CERTIFICATION INCLUDES CERT WITH AS-BUILTS.
ASTM SET CERTIFICATION IS NOT DIMENSIONAL; UT PLOTS ONLY.
MINIMUM LOT CHARGE FOR DIMENSIONAL INSPECTION IS $100. TRY TO COMBINE ITEMS.
ABOVE SERVICES AT TIME BLOCK IS ORDERED ARE 50% OFF.
PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE.

Reference Standards and Calibration Blocks for the NDT Industry



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