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## FAQ’s

**WHAT DO YOU DO?**

Flawtech is a world leader in the design and manufacture of flawed specimens for the non-destructive testing industry.

**HOW LONG HAVE YOU BEEN IN BUSINESS?**

Flawtech was started by Dr. George Pherigo in 1985 in an effort to supply the world with the rising demand for nondestructive test specimens that contain “real flaws”.

**WHO IS DR. GEORGE PHERIGO?**

Dr. Pherigo is one of the pioneers in the NDT community. An educator by trade and an innovator by nature, he recognized early on the need for trained NDT technicians. Dr. Pherigo was the founder of the Hutchinson School of Nondestructive Testing in 1970. Since then, Dr. Pherigo has held posts with the American Society of Nondestructive Testing (ASNT), as well as, the Electric Power Research Institute (EPRI).

Dr. Pherigo recently retired from Flawtech however remains on the board of directors. Flawtech is now under the direction of his son Mr. Aaron Pherigo. Aaron has been a member of the global NDT community his entire life. As president of Flawtech he has made a commitment to continue carrying the torch his father picked up 30 years ago.

**WHAT TYPE OF SPECIMENS CAN YOU MAKE?**

Flawtech has manufactured hundreds of thousands of NDT specimens. They range from the most basic visual specimen, for the new student, to the most complex dissimilar metal specimens containing branched cracks, for the experienced level III. See our “Specimen Categories” list or call us directly for more details.

**WHO ARE SOME OF YOUR CLIENTS?**

Flawtech has manufactured specimens for many different industries and for clients from every corner of the globe.

**CAN YOU MAKE A SPECIMEN TO MY SPECIFICATIONS?**

We manufacture specimens to specifications such as: ASME Section XI, API-UT-1, SNT-TC-1A, EN473 and PCN everyday. If our clients have a unique requirement we specialize in working with them to come up with a workable solution.

**HOW MUCH DO THE SPECIMENS COST?**

Our stock items are listed in our brochure and on our web site. If you do not see what you need, contact us for a free quote. Please note, the vast majority of our specimens are custom made.

**WHY SHOULD I BUY FLAWTECH SPECIMENS?**

Flawtech’s quality is unsurpassed, we are “NUPIC” approved and have a 10CFR-50 APP. B quality program. Our specimens, as well as our prices, are guaranteed.

**CALL FLAWTECH WHEN YOU NEED IT DONE CORRECTLY, THE FIRST TIME!**
STANDARD SPECIMENS:

Have a tolerance of +/- 0.150” (4mm).

Includes all standard kit specimens and all UT & MT/PT practical exam specimens.

Designed to enhance the training & qualification of level I & II personnel with regards to SNT-TC-1A, EN473 & PCN.

Normally less expensive than advanced and critical specimens.

Basic document package with CAD drawings is included with each kit or exam specimen.

Custom specimens are available at this level of tolerance.

ADVANCED SPECIMENS:

Have a tolerance of +/- 0.080” (2mm)

Includes all advanced specimens, API-UT-1 kit & all ASME Section XI Appendix VII specimen bank.

Designed to enhance the training & qualification of level I, II & III personnel with regards to SNT-TC-1A, EN473 & PCN.

Are larger in size than the standard specimen and higher tolerance.

Stock Advanced Specimens are designed with specific flaw types and geometry.

Document package with CAD drawings is included with each kit or individual advanced specimen.

Custom specimens are available at this level of tolerance.

CRITICAL SPECIMENS:

Have a tolerance of +/- 0.040” (1mm)

Includes all ASME Section XI Appendix VIII specimens and most of the custom designed specimens.

Designed to customer specifications for their specific training & qualification of NDT personnel and procedures.

Size of specimens range from a small bolt for the space shuttle to a 20,000 pound reactor nozzle.

Detailed document package is included with each specimen. Contact a member of FlawTech for more details.

All specimens in this category are custom specimens.

CALL FLAWTECH TODAY FOR DETAILS

SPECIMENS RECOGNIZED GLOBALLY

NDT INDUSTRY PIONEER

UNSURPASSED QUALITY

INDUSTRIES THAT USE FLAWTECH SPECIMENS

[Icons representing various industries]
FLAWTECH STANDARD KITS

- 20 FLAWS PER KIT
- 10 LARGE 4” X 8” SPECIMENS PER KIT
- “FREE” CARRYING CASE
- KIT SPECIMENS CONTAIN “REAL FLAWS”
- KIT CONTAINS DETAILED DOCUMENT PACKAGE WITH CAD DRAWINGS
- SEE KIT BROCHURES FOR MORE DETAILS

RT KIT..........$1,975.00
UT KIT..........$1,975.00
MT/PT KIT....$1,350.00
VT KIT.........$1,350.00

SPECIAL KITS

DEMONSTRATION KIT
..5 SPECIMENS & 11 FLAWS
.......................$1,100.00
REFERENCE RADIOPHGRAPHS
..FILM ONLY - 16 RADIOPHGRAPHS SHOWING 20 REAL FLAWS
.......................$575.00

FLAWTECH STANDARD KIT SPECIMENS ARE DESIGNED TO:
- ENHANCE THE TRAINING & QUALIFICATION OF LEVEL I & II PERSONNEL WITH REGARDS TO SNT-TC-1A, EN473 & PCN.
- ASSIST WITH BASIC FLAW DETECTION, SIZING AND INTERPRETATION USING COMMON WELD GEOMETRIES AND FLAW TYPES.

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INDUSTRIES THAT USE FLAWTECH SPECIMENS
# | FLAW TYPE | WELD METHOD | NDT METHOD  
---|------------|-------------|-------------
10 | TOE CRACK  | SV / DV     | MT/PT UT RT 
11 | TOE CRACK  | FILLET      | MT/PT UT -  
12 | ROOT CRACK | SV          | MT/PT UT RT 
13 | UNDERBEAD CRACK | FILLET | UT - 
14 | CENTER LINE CRACK (SURFACE) | SV / DV | MT/PT UT RT 
15 | CENTER LINE CRACK (SUB-SURFACE) | SV / DV | MT/PT UT RT 
16 | CIRCUMFERENTIAL CRACK (FLUSH CROWN) | SV / DV | MT/PT UT RT 
17 | TRANSVERSE CRACK (FLUSH CROWN) | SV / DV | MT/PT UT -  
18 | BASE METAL CRACK (CROWN HAZ AREA) | SV / DV | MT/PT UT -  
19 | BASE METAL CRACK (ROOT HAZ AREA) | SV       | MT/PT UT -  
20 | CRATER CRACK (CROWN STOP/START AREA) | SV / DV | VT MT/PT -  
30 | POROSITY (SUB-SURFACE) | SV / DV | - - UT RT 
31 | POROSITY (SUB-SURFACE) | FILLET    | - - UT RT 
32 | POROSITY (SURFACE) | SV / DV VT | MT/PT - - 
33 | POROSITY (SURFACE) | FILLET VT | MT/PT - - 
34 | SINGLE GAS PORE | SV / DV | - - UT RT 
35 | SINGLE GAS PORE | FILLET | - - - RT 
36 | SLAG INCLUSION (ROOT AREA) | SV | - - UT RT 
37 | SLAG INCLUSION (WELD GROOVE AREA) | SV / DV | - - UT RT 
38 | SLAG INCLUSION (ROOT AREA) | FILLET | - - UT RT 
39 | TUNGSTEN INCLUSION (ROOT AREA) | SV / DV | - - - RT 
50 | LAMINATION (BASE METAL) | SV | - - UT -  
51 | LAMINATION (BASE METAL) | WP FACE | - MT/PT - - 
52 | LACK OF FUSION (SUB-SURFACE) | SV / DV | - - UT -  
53 | LACK OF FUSION (SURFACE BREAKING) | SV / DV | - - MT/PT -  
54 | LACK OF FUSION (SURFACE BREAKING) | FILLET | - - MT/PT -  
55 | LACK OF FUSION (ROOT AREA) | SV | - - MT/PT -  
56 | INCOMPLETE ROOT PENETRATION | SV VT | MT/PT UT RT 
57 | INCOMPLETE ROOT PENETRATION | DV | - UT RT 
58 | INCOMPLETE ROOT PENETRATION (BRIDGING) | FILLET | - - UT -  
59 | INCOMPLETE GROOVE WELD (CROWN AREA) | SV / DV | VT MT/PT UT RT 
70 | ROOT CONCAVITY | SV VT | - - RT 
71 | EXCESS ROOT PENETRATION | SV VT | - - RT 
72 | MISALIGNMENT (ROOT & CROWN AREA) | SV VT | - - RT 
73 | UNEVEN LEG LENGTH | FILLET | VT - - - 
74 | EXCESS CROWN | SV / DV VT | - - - 
75 | EXCESS CROWN | FILLET | VT - - - 
76 | CONCAVE CROWN | SV / DV VT | - - - 
77 | CONCAVE CROWN | FILLET | VT - - - 
78 | UNDERCUT | SV / DV VT | - - - 
79 | UNDERCUT | FILLET | VT - - - 
80 | OVERLAP | FILLET | VT MT/PT - - 
90 | WELD SPATTER | SV / DV VT | - - VR 
91 | WELD SPATTER | FILLET | VT - - VR 
92 | CHIPPING HAMMER MARKS | SV / DV VT | - - VR 
93 | CHIPPING HAMMER MARKS | FILLET | VT - - VR 

**HOW TO REQUEST A CUSTOM SPECIMEN**

1ST
SELECT A TOLERANCE
Standard +/-0.150” (4mm)
Advanced +/-0.080” (2mm)
Critical +/-0.040” (1mm)

2ND
SELECT YOUR FLAWS 
FROM THE ABOVE TABLE 
OR SPECIFY YOUR 
SPECIAL REQUIREMENTS

3RD
SELECT THE MATERIAL 
TYPE, WELD PREP GEOMETRY 
AND THE REQUIRED NDT 
METHOD OF INSPECTION
The Radiographic Kit contains:
8 Plates, 1 Pipe and 1 Tee
20 Discontinuities, "REAL FLAWS", randomly placed

Actual X-Ray film is provided for each specimen. Specimens are packaged in 2 FREE CARRYING CASES. Complete with Document Package with "Flaw Truth" documented by CAD drawings with a Standard Tolerance of ±0.150" (4mm).

The standard Radiographic Examination Kit contains 20 flaws similar to those shown in the cross section drawings below.

Reference Radiograph Sets can be purchased separately.

See Kit Price List for price and additional details.

Shipping Weight 70lbs

ALL SPECIMENS CONTAIN "REAL FLAWS"
RADIOGRAPHIC EXAMINATION TERMINOLOGY

The following table is a brief refresher to assist in identifying the common terms used during Radiographic Examination of typical weldments. FlawTech specimens will have examples of weld discontinuities that require the technician to use all of the techniques below as they apply to actual welds. Typical Radiographic Examination discontinuities are described on the reverse side of this sheet.

X-RAY AND GAMMA RAY RADIOGRAPHY

[Diagrams showing X-ray tube, isotope source, specimen, and film with annotations for radiation source, weld, weld root, and pipe specimen.]
The Ultrasonic Kit contains:
- 8 Plates, 1 Pipe and 1 Tee
- 20 Discontinuities, "REAL FLAWS", randomly placed

Specimens are packaged in 2 FREE CARRYING CASES. Complete with Document Package with "Flaw Truth" documented by CAD drawings with a standard tolerance of ±0.150" (4mm).

The standard Ultrasonic Examination Kit contains 20 flaws similar to those shown in the cross section drawings below.

See Kit Price List for price and additional details.

Contact Your Local NDT Supplier or FlawTech for ordering details.
ULTRASONIC EXAMINATION TERMINOLOGY

The following table is a brief refresher to assist in identifying the common terms used during Ultrasonic Examination of typical weldments. FlawTech specimens will have examples of weld discontinuities that require the technician to use all of the techniques below as they apply to actual welds. Typical Ultrasonic Examination discontinuities are described on the reverse side of this sheet.
The MT/PT Kit contains:
8 Plates and 2 Tees
20 Discontinuities, "REAL FLAWS", randomly placed

Specimens are packaged in a FREE CARRYING CASE. Complete with Document Package with "Flaw Truth" documented by CAD drawings with a standard tolerance of +/- 0.150" (4mm).

The standard MT/PT Kit contains 20 "real" flaws similar to those shown in the cross section drawings below.

See Kit Price List for price and additional details.

Shipping Weight 35lbs

Drawings Not to Scale

All specimens contain "REAL FLAWS"

Contact your local NDT supplier or FLAWTECH for ordering details.
MAGNETIC PARTICLE / LIQUID PENETRANT TERMINOLOGY

The following information is intended to be a brief refresher to assist in identifying the common terms associated with Magnetic Particle and Liquid Penetrant testing. Both methods involve detection of surface indications and with proper cleaning, FlawTech specimens can be use for both MT and PT. FlawTech can provide flawed specimens that will contain examples of discontinuities that require the technician to use all of the techniques described below.

MAGNETIC PARTICLE

LIQUID PENETRANT

1  
Crack

2
Visible Dye Penetrant

3
Excess Penetrant Removed

4
Developer Applied

Visible Light
Developer
Specimen
Fluorescent Penetrant

UV Light
The Visual Kit contains:
7 Plates and 3 Tees
20 Discontinuities, "REAL FLAWS", randomly placed

Specimens are packaged in a **FREE CARRYING CASE**, complete with Document Package with "Flaw Truth" documented by CAD drawings with a standard tolerance of +/- 0.150" (4mm).

The standard Visual Examination Kit contains 20 flaws similar to those shown in the cross section drawings below.

See Kit Price List for prices and additional details.

---

**Shipping Weight 35lbs**

20. Crater Crack in Single Vee (surface stop-start area) MT/PT, VT
32. Porosity in Single Vee (surface breaking) VT, MT/PT
33. Porosity in Fillet (surface breaking) VT, MT/PT

---

**ALL SPECIMENS CONTAIN "REAL FLAWS"**

**CONTACT YOUR LOCAL NDT SUPPLIER OR FLAWTECH FOR ORDERING DETAILS**

---

56. Incomplete Root Penetration in Single Vee, VT, UT, RT
59. Incomplete Groove Weld (crown area) VT, MT/PT, UT, RT
70. Root Concavity in Single Vee VT, RT
71. Excess Root Penetration in Single Vee VT, RT
72. Misalignment, Root & Crown in Single Vee VT, RT
73. Uneven Leg Length in Fillet VT
74. Excess Crown in Single Vee VT
75. Excess Crown in Fillet VT
76. Concave Crown in Single Vee VT
77. Concave Crown in Fillet VT
78. Undercut in Single Vee VT
79. Undercut in Fillet VT
80. Overlap in Fillet VT, MT/PT
90. Weld Spatter on Single Vee VT, RT
91. Weld Spatter on Fillet VT, RT

---

**CONTACT YOUR LOCAL NDT SUPPLIER OR FLAWTECH FOR ORDERING DETAILS**

---

5040 Highway 49 South
Harrisburg, NC 28075
Phone: (704) 455-1322  FAX: (704) 455-1323
www.FlawTech.com
VISUAL EXAMINATION TERMINOLOGY

The following table is a brief refresher to assist in identifying the common terms used during Visual Examination of typical weldments. FlawTech specimens will have examples of weld discontinuities that require the technician to use all of the terms below as they apply to actual welds. Typical Visual Examination discontinuities are described on the reverse side of this sheet.

CONVEX FILLET WELD

CONCAVE FILLET WELD

GROOVE WELD BUTT JOINT
The NDT Demonstration Kit contains:
1 Pipe, 3 Plates and 1 Tee
11 Discontinuities, "REAL FLAWS", randomly placed

Specimens are packaged in a FREE CARRYING CASE. The "Flaw Truth" is documented on CAD drawings with a standard tolerance of +/- 0.150" (4mm).

This Kit contains actual X-Ray film for RT specimens and a "Flaw Locator" for UT specimens.

This standard NDT Demonstration Kit contains 11 flaws in 5 specimens. The flaws in these specimens can be examined by several different NDT methods to demonstrate the advantages and disadvantages of each NDT method. See Kit Price List for cost and listings of other flaw types available only from FlawTech.

Shipping Weight 35lbs

Demonstration Kit Flaw and Weld Prep Cross Sections

<table>
<thead>
<tr>
<th>Flaw Type</th>
<th>UT</th>
<th>RT</th>
<th>MT</th>
<th>PT</th>
<th>VT</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 - Toe Crack (fillet)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 - Center Line Crack</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 - Base Metal Crack</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 - Base Metal Crack</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 - Crater Crack</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 - Porosity (single vee)</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32 - Porosity (surface)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37 - Slag Inclusion</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>54 - Lack of Fusion</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>57 - Incomplete Root</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>71 - Excess Root</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Drawings Not to Scale
Typical NDT Terminology Related to FlawTech Specimens.

CONVEX FILLET WELD

CONCAVE FILLET WELD

GROOVE WELD BUTT JOINT

MAGNETIC PARTICLE

LIQUID PENETRANT

X-RAY AND GAMMA RAY RADIOGRAPHY

STRAIGHT BEAM - LONGITUDINAL WAVE

ANGLE BEAM - SHEAR WAVE
UT & MT/PT PRACTICAL EXAM SPECIMENS

- LARGER THAN STANDARD KIT SPECIMENS

- CUSTOMIZE YOUR SET PURCHASE 1, 2, 3 OR 12

- BUY 3 OR MORE AND RECEIVE 10% OFF & A “FREE” CASE

- CUSTOM EXAM SPECIMENS AVAILABLE UPON REQUEST

- SEE UT & MT/PT PRACTICAL EXAM BROCHURES FOR MORE DETAILS

UT PRACTICAL EXAM SPECIMENS
12 TO CHOOSE FROM 3 FLAWS PER SPECIMEN
$400.00 EACH

MT/PT PRACTICAL EXAM SPECIMENS
12 TO CHOOSE FROM 3 FLAWS PER SPECIMEN
$300.00 EACH

FLAWTECH PRACTICAL EXAM SPECIMENS ARE DESIGNED TO:
- ENHANCE THE TRAINING & QUALIFICATION OF LEVEL I & II PERSONNEL WITH REGARDS TO SNT-TC-1A, EN473 & PCN.
- ASSIST WITH BASIC FLAW DETECTION, SIZING AND INTERPRETATION USING COMMON WELD GEOMETRIES AND FLAW TYPES.

INDUSTRIES THAT USE FLAWTECH SPECIMENS
Specimen Details:
- 3 Flaws per specimen
- "REAL FLAWS" in each specimen
- Document Package w/ each specimen
- Standard Tolerance +/- 0.150" (4mm)
- Blank Specimens available
- Specimens are carbon steel
- No Two Specimens are Alike
- Custom Specimens Available
- <10% for the Purchase of 3+
- FREE Carrying Case w/ 3+
- See Practical Exam Price List For Price and additional Details
**Specimen Details:**
- 3 Flaws per specimen
- "REAL FLAWS" in each specimen
- Each Specimen has Document Package
- Standard Tolerance +/- 0.15" (4mm)
- Blank Specimens available

- Specimens are carbon steel
- No Two Specimens are Alike
- Custom Specimens Available
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- FREE Carrying Case w/ 3+
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  For Price and additional Details
## ADVANCED SPECIMENS

### PLATES • PIPES • TEES • Y's • NODES • NOZZLES

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>SPECIMEN TYPE</th>
<th>DIMENSIONS (INCHES)</th>
<th>WEIGHT (LBS)</th>
<th>PRICE EACH</th>
</tr>
</thead>
<tbody>
<tr>
<td>UA-001</td>
<td>PLATE W/SV</td>
<td>0.5 X 12 X 12</td>
<td>21</td>
<td>$500.00</td>
</tr>
<tr>
<td>UA-002</td>
<td>PLATE W/SV</td>
<td>0.75 X 12 X 12</td>
<td>31</td>
<td>$590.00</td>
</tr>
<tr>
<td>UA-003</td>
<td>PLATE W/SV</td>
<td>1.0 X 12 X 12</td>
<td>54</td>
<td>$650.00</td>
</tr>
<tr>
<td>UA-004</td>
<td>PLATE W/DV</td>
<td>1.25 X 12 X 17</td>
<td>74</td>
<td>$800.00</td>
</tr>
<tr>
<td>UA-005</td>
<td>PIPE W/SV</td>
<td>6 SCH120 X 12</td>
<td>36</td>
<td>$600.00</td>
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</table>

### Industries that use FlawTech Specimens

- Training & Qualification of Level I & II Personnel with regards to SNT-TC-1A, EN473 & PCN
- Flaw detection, sizing & interpretation using common weld geometries and flaw types.

---

**Larger than our practical exam specimens**

**Advanced specimens have a tolerance +/- .008"**

**Each specimen comes w/ document package**

**Global free freight**

**With purchase of 3 or more advanced specimens**

**3 flaws per specimen randomly placed**

**Custom specimens available upon request**
API-UT-1 QUALIFICATION SPECIMENS
FOR UT EXAMINATION OF FERRITIC WELDS

API-UT-1 KIT CONTAINS:

TOTAL OF 4 SPECIMENS:
- 1 - 1.0” THICK PLATE W/ DOUBLE VEE (1” X 12” X 15”)
- 1 - 0.5” THICK PLATE W/ SINGLE VEE (0.5” X 10” X 12”)
- 1 - 8” SCH80 PIPE (0.5” WALL X 12”, 360°)
- 1 - 12” SCH80 PIPE (0.688” WALL X 12”, 180° SEG.)

API KIT STANDARD FEATURES:
- COMPLETE DOCUMENT PACKAGE W/ CAD DRAWINGS
- 3 “REAL” FLAWS PER SPECIMEN
- FLAWTECH ADVANCED TOLERANCE +/- 0.080”
- SPECIMENS ARE CARBON STEEL

API KIT PRICE $3,395.00
LEASE OPTION AVAILABLE

API KIT CUSTOM OPTIONS:
- 10% ID / OD CALIBRATION NOTCHES
- 0.75” X 4.5” X 6” ASME SEC. V BASIC CAL. BLOCK
- 8” SCH80 (0.5” WALL) X 8” PIPE ASME SEC. V ANGLE BEAM CAL. BLOCK
- RADIOGRAPHS

CALL FLAWTECH FOR PRICES ON CUSTOM OPTIONS

“REAL FLAWS” USED IN KIT SPECIMENS
- LACK OF PENETRATION
- CENTER LINE CRACK
- SLAG INCLUSION
- LACK OF FUSION
- ROOT CRACK
- POROSITY

CUSTOM LOCKING STORAGE BOX AVAILABLE UPON REQUEST
AWS / CWI TRAINING SPECIMENS

DESIGN SPECIFICATIONS BASED ON AWS D1.1

10 SPECIMENS

- 4 - TEES 4” X 6” X 2” X 0.25”
- 4 - PLATES 4” X 6” 0.25”
- 2 - EDGE & LAP JOINTS 4” X 6” X 0.3125”

AWS/CWI KIT STANDARD FEATURES

- 2 FLAWS PER SPECIMEN
- “FREE” CARRYING CASE
- CARBON STEEL SPECIMENS
- WELDING PROCESS - SMAW
- DOCUMENT PACKAGE W/ CAD DRAWINGS

AWS / CWI KIT PRICE $1,650.00

REAL FLAWS

- UNDERCUT
- CRATER CRACK
- EXCESSIVE CONVEXITY
- UNDERSIZE LEG
- CLUSTER POROSITY
- ARC STRIKE
- OVERLAP
- LONGITUDINAL CRACK
- ALIGNED POROSITY
- INCOMPLETE PENETRATION
- EXCESSIVE REINFORCEMENT
- UNDERFILL
- CONCAVITY
- TRANSVERSE CRACK
- OVERSIZE LEG

FLAWTECH ORIGINAL KIT

THE FLAWS IN THIS KIT ARE RANDOMLY PLACED AND ARE DESIGNED TO BE “BORDER LINE” ACCEPTABLE OR REJECTABLE

CALL FLAWTECH FOR PRICES ON CUSTOM OPTIONS
ASME SECTION XI  
APPENDIX VII KIT

8 PIECE SPECIMEN SET  CONTAINS 20 "REAL FLAWS"  FOR TRAINING & QUALIFICATION

2 - WELDED PLATES
ONE CARBON STEEL PLATE: #A7-CS-005  
ONE STAINLESS PLATE: #A7-SS-005

2 - WELDED PLATES
ONE CARBON STEEL PLATE: #A7-CS-010  
ONE STAINLESS PLATE: #A7-SS-010

1 - WELDED PIPE
ONE STAINLESS PIPE: #A7-SS-020

1 - WELDED PIPE
ONE CARBON STEEL PIPE: #A7-CS-040

1 - WELDED PIPE
ONE STAINLESS PIPE: #A7-SS-060

1 - WELDED PIPE
ONE CARBON STEEL PIPE: #A7-CS-100 (180° SEGMENT)

1 - WELDED PIPE
ONE STAINLESS PIPE: #A7-SS-100 (180° SEGMENT)

1 - WELDED PIPE
ONE CARBON STEEL PIPE: #A7-CS-040 (180° SEGMENT)

1 - WELDED PIPE
ONE STAINLESS PIPE: #A7-SS-060

Sample of "FLAW TRUTH" documentation

Price for complete 8 specimen set
$11,750.00

Flawtech has redesigned this kit to be a cost effective solution to your training and qualification.

Kit Details:
- Each specimen contains 2 to 4 "real flaws", designed to meet Appendix VII specifications.
- Specimens are manufactured to Flawtech’s advanced tolerance of +/- 0.080".
- No two specimens are alike. Buy two sets, one for training and one for testing.
- Document package includes CAD drawings, certificates of conformance and NDT reports.
- Custom options available such as 10% notches, blank specimens and the purchase of individual flawed specimens. Contact Flawtech for more details.
# ASME BOILER & PRESSURE VESSEL CODE, SECTION XI, APPENDIX VIII, SUPPLEMENTS 2, 3 & 10 KITS

<table>
<thead>
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<th>FLAWED UNITS</th>
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<td>4&quot; SCH80 X 24&quot; 360°</td>
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<td>1</td>
</tr>
<tr>
<td>6&quot; SCH160 X 24&quot; 360°</td>
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<tr>
<td>24&quot; SCH160 X 24&quot; 120°</td>
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**Supplement 2 Kit for Austenitic Piping**

**Kit Total - 5 Specimens**

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**Supplement 3 Kit for Ferritic Piping**

**Kit Total - 5 Specimens**

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**Supplement 10 Kit for Dissimilar Metal Welds**

**Kit Total - 5 Specimens**

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**Supplement 2 Kit Price**

$24,900.00

**Supplement 3 Kit Price**

$18,900.00

**Supplement 10 Kit Price**

$29,900.00

---

**Kit and Flaw Details:**

- Each kit will contain a mix of crown geometries, such as, ground, as welded crowns and wide crowns.
- Each kit will contain non-crack geometric conditions.
- Each kit has typical limited scanning surface conditions.
- All flaws will be mechanical fatigue or thermal fatigue cracks.
- At least 75% of the cracks will be thermal fatigue.
- 10% of the flaws will be oriented axially & 50% for Sup.10.
- 50% of the cracks will be coincident with fabricated conditions.
- 60% of the flaw depths will be manufactured at 5-30%, 31-60% and 61-100% of wall thickness. Remaining 40% will have random depths.

---

The above kits are manufactured to meet the minimum requirements of ASME, Boiler & Pressure Vessel Code, Section XI, Appendix VIII, Supplements 2, 3 & 10.

Contact Flawtech for custom Appendix VIII Specimens.
FLAW IMPLANT TECHNIQUES

FlawTech has the capability to use several methods to implant flaws in a variety of configurations for nondestructive testing applications. In the following data we have described a few of these methods so you may gain a better understanding of our flaw manufacturing possibilities.

In-Situ Implant- This technique has been the cornerstone of flaw manufacturing for many years and usually involves thermal or mechanical fatigue cracks. The important characteristic is that the flaw occurs in virgin base material (i.e. HAZ) so that UT energy can impinge directly on the crack face without traveling through weld metal. The process allows for precise mechanical dimensions of the flaw face to be taken prior to implant. As shown below, this technique allows the crack to be "branched" and this is the best way to replicate the UT signal from IGSCC.

Coupon Implant- This process has the advantage of producing the flaw in a small coupon in the laboratory and then implanting the coupon into the mockup. The disadvantage is that precise mechanical dimensions are usually not possible and the coupon is surrounded by weld metal which may introduce additional UT reflectors.

Controlled Flaw- This is a unique proprietary process developed by FlawTech to progressively extend a "crack-like" indication in any area in carbon steel and within the weld groove in stainless steel or Inconel. This process is often used in the production of "Dissimilar Metal" specimens.

Weld-Solidification Crack- This technique is occasionally used when a crack is desired within the weld groove. The weld is "contaminated" by changing weld chemistry in a designated area to produce a crack. Disadvantages include uncertainty about the orientation and extent of cracking and crack size.

HIP (Hot Isostatic Process)- This technique is used to tighten the tips of manufactured flaws. HIP is also used to tighten EDM Notches in an effort to make them look like cracks. Disadvantages include uncertainty as to how the grain structure of the base metal is effected and the characteristics of the response to an EDM notch as well as adding time and cost to the manufacturing process.

In addition to the aforementioned, FlawTech uses a variety of other basic techniques for implanting slag, porosity, lack of fusion, under bead cracking, etc. FlawTech offers 3 levels of tolerance; Standard +/- 0.150", Advanced +/- 0.080" and Critical +/- 0.040", contact FlawTech for more details.
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).

DSC BLOCK
AWS-type clock 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 radius slot. Also contains a 0° reference point for checking exit point on wedge, and a .125" diameter through hole and corresponding markings at 45°, 60°, and 70° for measuring actual refracted angle. In accordance with ASTM E164 and AWS 6.16.1B. Metric version available. Special DSC blocks with radius scanning surfaces for NPS sizes also offered. In Stock.

Dimensions: 1.000" thick x 4.000” long

AWS Resolution Block (RC Block)
Also called an RC Block, the AWS Resolution Reference Block is used for checking resolution capabilities of angle beam transducers. Contains three sets of .0625" diameter through-holes for 45°, 60°, and 70°. In accordance with AWS Welding Highway and Railway Bridges specification D2.0-69, and Structural Welding Code ANSI/AWS D1.1-92. Metric version available. In Stock.

Dimensions: 1.0”x3.0”x6.0”

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”x4.0”x2.0”

All Blocks Available In: CS 1018, AL 7075-T6, & SS 304
*all other materials available upon request*
**PDI ALTERNATIVE ASME CALIBRATION BLOCKS**

The new PDI Alternative ASME blocks meet the requirements of the Performance Demonstration Initiative (PDI) Procedure No. PDI-UT-1, Rev. C, Fig. 4 (Ferritic) and PDI-UT-2, Rev. C, Fig. 4 (Austenitic). These cover the generic procedures for the ultrasonic examination of both ferritic and austenitic pipe welds. The blocks offer users an economical alternative to fabricating multiple curved cal blocks (pipe sections) in many diameters and wall thicknesses.

The blocks are normally supplied in sets of 3 individual blocks; one in A516 Grade 70 Steel, one in Type 304/304L Stainless Steel, and one in Type 316/316L Stainless Steel. Individual blocks of any one alloy are also offered.

Block design consists of steps (wall thicknesses) measuring 0.500", 1.000", 1.500", and 2.000". Each step contains an EDM machined to a depth of 10% of wall x .010" wide x 2.0" long. Overall block size is 2.00" wide x 2.25" tall x 10.00" long. The scanning and reflecting surfaces are intentionally machined to simulate pipe and plate surfaces of 250 Ra maximum finish. Each block is permanently machine-engraved on one edge to include the block description, serial no., alloy, heat no., and FlawTech. The blocks are made from ultrasonically inspected, heat number-traceable material supplied to FlawTech.

---

All Blocks Available In: CS 1018, AL 7075-T6, & SS 304
*all other materials available upon request*
EPRI CS-4774 Basic Calibration Block

Used for establishment of primary reference responses for UT examination of welds. Block contains three axial SDHs and two circ SDHs at 1.5" deep. Also contains one 1/8" diameter FBH at 0.5" deep and four notches at .031" deep x .063" wide x 1.5" long. In accordance with EPRI CS-4774, Fig. A-3

ASME Sec. XI Basic Piping Calibration 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 circumferential OD notch, one circ ID notch, three axial SDHs at 1/4, 1/2, and 3/4T, and three circ SDHs at 1/4, 1/2, and 3/4T. Can also be made from customer supplied material. We can upgrade your existing blocks to Sec. XI requirements by adding needed holes and notches.

All Blocks Available In: CS 1018, AL 7075-T6, & SS 304
*all other materials available upon request*
**PH Diversified, Inc. Announces the Revision of Nondestructive Testing Handbooks**
(Revised from the NASA/General Dynamics series, and replacing the ASNT Series)

**Level I - Programmed Instruction Books**

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<td>Smilie</td>
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</table>

This classic series of General Dynamics Programmed Instruction and Classroom Training Handbooks has been the standard of the NDT industry for many years and is now revised and available directly from the publisher, PH Diversified, Inc. (704-455-3717).

**Level I - Programmed Instruction Books** This entry-level material is designed as self-study instruction with quizzes at the end of each chapter to reinforce learning. The "Introduction to NDT" book (PI-1) should be read prior to starting any of the other books in the series. Typically, it takes about 10-12 hours to complete each volume of Programmed Instruction (PI) text. Written examinations suitable for Level I-II qualifications are included in the PI series. Level II qualifications must also include questions addressing specific applications.

**Level II - Classroom Training Books** This material is a compilation of the information taught in the corresponding Programmed Instruction Books, deleting some of the processing details and adding tabular matter and other technical details. These texts are best used in conjunction with classroom lectures after the student has completed the Programmed Instruction Books. For a complete Level II program, it is recommended that the instructor add practical applications involving industry specific NDT equipment and hands-on exercises.

**Buy Direct and Save:** • 20% Discount for quantities of 20 or more of same title.

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5040-B Hwy 49
Harrisburg NC 28075
Phone: 704-455-3717
Fax: 704-455-1323
Email: GPherigo@FlawTech.com

• Add only $5.00 to each order for shipping and handling.
• International orders require a proforma invoice.

• VISA or Master Card
APPENDIX VIII PRACTICE SESSIONS

# Appendix VIII Hands-On Practice Session: Unlimited access to INQUAL’s inventory. One day of "Guided Practice Exercises" with a certificate to document compliance with USNRC, ASME & PDI Guidelines.
- $195 per person with a minimum of three and a maximum of 6 people.
- Six (6) persons from the same company will cost $895.
- There is no charge for attendance of Level III, NDE instructor or PDI qualified administrator.

# Basic Practice Session: Unlimited access to INQUAL’s inventory of piping specimens at Harrisburg, NC facility:
- 1-2 people at INQUAL facility per 10 hour day: $290
- 3-4 people at INQUAL facility per 10 hour day: $380
- 5-6 people at INQUAL facility per 10 hour day: $460

OR;

# At Remote Site: The per specimen cost is $75-$125 per day, depending on pipe size (2" -24" dia.), and the user pays all shipping charges.

APPENDIX VIII QUALIFICATIONS

# Using IN "performance demonstrations" will be administered at the Harrisburg, NC facility:
- 1 person at INQUAL facility per 10 hour day: $1,300
- 2 people at INQUAL facility per 10 hour day: $1,600
- 3-4 people at INQUAL facility per 10 hour day: $2,000
- 5-6 people at INQUAL facility per 10 hour day: $2,700

# INQUAL will review procedures, administer the Appendix VIII qualification and provide full documentation in accordance with the ASME Code and the user’s "written program."

# A typical piping qualification (procedure/equipment/personnel) will take from 2-4 days depending on number of essential variables listed in the procedure.

# Contact INQUAL for a complete package of information.

Notes: INQUAL will make arrangements with an ANII to witness the qualification activities and user will be billed for actual charges. Weekends and holidays at above rates x 1.5. All specimens will be mounted on stands and user furnish all equipment, transducers, etc. INQUAL’s QA program complies with 10CFR50 and has been audited by NUPIC. The INQUAL facility is air conditioned/heated and is only 20 miles from Charlotte airport.

Contact: George Pheigo, 5040-B Hwy 49, Harrisburg, NC 28075 ---- Phone 704/455-3717 ---- email: Pherigo@aol.com