# TABLE OF CONTENTS

1. FLAWED SPECIMEN CATEGORIES  
2. DISCONTINUITIES LIST  
3. FLAW CROSS SECTION VIEWS  
4. FLAW CROSS SECTION VIEWS  
5. FLAW CROSS SECTION VIEWS & CORROSION VISUAL  
6. STANDARD KITS  
7. STANDARD RADIOGRAPHIC KIT  
8. STANDARD ULTRASONIC KIT  
9. STANDARD MAGNETIC PARTICLE & LIQUID PENETRANT KIT  
10. STANDARD VISUAL KIT  
11. NDT DEMONSTRATION KIT  
12. PRACTICAL EXAM SPECIMENS  
13. ULTRASONIC PRACTICAL EXAM SPECIMENS  
14. MT/PT PRACTICAL EXAM SPECIMENS  
15. ADVANCED SPECIMENS  
16. API-UT-1 FLAWED SPECIMEN KIT  
17. API-UT-1 MINI KIT  
18. API RP-2X SPECIMEN KIT  
19. API RP-2X TEST KIT  
20. AWS / CWI VISUAL SPECIMEN KIT  
21. AWS / CWI PLUS PT ENDORSEMENT KIT  
22. AWS STRUCTURAL WELD SEISMIC KIT  
23. SOCKET WELD SPECIMEN KIT  
24. BOILER TUBE DAMAGE KIT  
25. ASME SECTION XI, APPENDIX VII KIT  
26. ASME SECTION XI, APPENDIX VII KITS  
27. UT CALIBRATION BLOCKS  
28. ASME UT CALIBRATION STANDARDS  
29. PDI UT 10 CALIBRATION STANDARDS
Flawed Specimen Categories

**Standard Specimen**

- 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 and development of new and veteran NDT technicians.
- Normally smaller in size and 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 Specimen**

- Have a tolerance of +/- 0.080” (2mm).
- Includes all Advanced Specimens, API & AWS Kits & 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-1 A, EN473 & PCN.
- Stock Advanced Specimens are larger in size than the standard Practical Exam Specimen and have a higher tolerance.
- Document package with CAD drawings is included with each kit or individual Advanced Specimen.
- Custom specimens are available at this level of tolerance.

**Critical Specimen**

- Have a tolerance of +/- 0.040” (1mm).
- Includes all ASME Section XI Appendix VIII specimens & most of the custom designed specimens.
- Designed to customer specifications for their training & qualification of NDT personnel, equipment, and procedures.
- Size of specimens range from a small bolt for the Space Shuttle to a 20,000 pound reactor nozzle.
- Detailed documentation is included with specimens. Contact FlawTech for exact details.
- Custom specimens are available at this level of tolerance.
<table>
<thead>
<tr>
<th>#</th>
<th>FLAW TYPE</th>
<th>WELD</th>
<th>NDT METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>TOE CRACK</td>
<td>SV/DV</td>
<td>- MT/PT UT RT</td>
</tr>
<tr>
<td>11</td>
<td>TOE CRACK</td>
<td>FILLET</td>
<td>- MT/PT UT -</td>
</tr>
<tr>
<td>12</td>
<td>ROOT CRACK</td>
<td>SV</td>
<td>- MT/PT UT RT</td>
</tr>
<tr>
<td>13</td>
<td>UNDERBEAD CRACK</td>
<td>FILLET</td>
<td>- - UT -</td>
</tr>
<tr>
<td>14</td>
<td>CENTER LINE CRACK (SURFACE)</td>
<td>SV/DV</td>
<td>- MT/PT UT RT</td>
</tr>
<tr>
<td>15</td>
<td>CENTERLINE CRACK (SUB-SURFACE)</td>
<td>SV/DV</td>
<td>- - UT -</td>
</tr>
<tr>
<td>16</td>
<td>CIRCUMFERENTIAL CRACK (FLUSH CROWN)</td>
<td>SV/DV</td>
<td>- MT/PT UT RT</td>
</tr>
<tr>
<td>17</td>
<td>TRANSVERSE CRACK (FLUSH CROWN)</td>
<td>SV/DV</td>
<td>- MT/PT UT -</td>
</tr>
<tr>
<td>18</td>
<td>BASE METAL CRACK (CROWN HAZ AREA)</td>
<td>SV/DV</td>
<td>- MT/PT UT -</td>
</tr>
<tr>
<td>19</td>
<td>BASE METAL CRACK (ROOT HAZ AREA)</td>
<td>SV</td>
<td>- MT/PT UT -</td>
</tr>
<tr>
<td>20</td>
<td>CRATER CRACK (CROWN STOP/START AREA)</td>
<td>SV/DV</td>
<td>VT MT/PT - -</td>
</tr>
<tr>
<td>30</td>
<td>POROSITY (SUB-SURFACE)</td>
<td>SV/DV</td>
<td>- - UT RT</td>
</tr>
<tr>
<td>31</td>
<td>POROSITY (SUB-SURFACE)</td>
<td>FILLET</td>
<td>VT - UT RT</td>
</tr>
<tr>
<td>32</td>
<td>POROSITY (SURFACE)</td>
<td>SV/DV</td>
<td>- - UT -</td>
</tr>
<tr>
<td>33</td>
<td>POROSITY (SURFACE)</td>
<td>FILLET</td>
<td>- MT/PT - -</td>
</tr>
<tr>
<td>34</td>
<td>SINGLE GAS PORE</td>
<td>SV/DV</td>
<td>- - UT RT</td>
</tr>
<tr>
<td>35</td>
<td>SINGLE GAS PORE</td>
<td>FILLET</td>
<td>- - - RT</td>
</tr>
<tr>
<td>36</td>
<td>SLAG INCLUSION (ROOT AREA)</td>
<td>SV</td>
<td>- - UT RT</td>
</tr>
<tr>
<td>37</td>
<td>SLAG INCLUSION (WELD GROOVE AREA)</td>
<td>SV/DV</td>
<td>- - UT RT</td>
</tr>
<tr>
<td>38</td>
<td>SLAG INCLUSION (ROOT AREA)</td>
<td>FILLET</td>
<td>- - UT RT</td>
</tr>
<tr>
<td>39</td>
<td>TUNGSTEN INCLUSION (ROOT AREA)</td>
<td>SV/DV</td>
<td>- - - RT</td>
</tr>
<tr>
<td>50</td>
<td>LAMINATION (BASE METAL)</td>
<td>SV</td>
<td>- - UT -</td>
</tr>
<tr>
<td>51</td>
<td>LAMINATION (BASE METAL)</td>
<td>WP FACE</td>
<td>- MT/PT - -</td>
</tr>
<tr>
<td>52</td>
<td>LACK OF FUSION (SUB-SURFACE)</td>
<td>SV/DV</td>
<td>- - UT -</td>
</tr>
<tr>
<td>53</td>
<td>LACK OF FUSION (SURFACE BREAKING)</td>
<td>SV/DV</td>
<td>- MT/PT UT -</td>
</tr>
<tr>
<td>54</td>
<td>LACK OF FUSION (SURFACE BREAKING)</td>
<td>FILLET</td>
<td>- MT/PT - -</td>
</tr>
<tr>
<td>55</td>
<td>LACK OF FUSION (ROOT AREA)</td>
<td>SV</td>
<td>- MT/PT UT -</td>
</tr>
<tr>
<td>56</td>
<td>INCOMPLETE ROOT PENETRATION</td>
<td>SV</td>
<td>VT MT/PT UT RT</td>
</tr>
<tr>
<td>57</td>
<td>INCOMPLETE ROOT PENETRATION</td>
<td>DV</td>
<td>- - UT RT</td>
</tr>
<tr>
<td>58</td>
<td>INCOMPLETE ROOT PENETRATION (BRIDGING)</td>
<td>FILLET</td>
<td>- - UT -</td>
</tr>
<tr>
<td>59</td>
<td>INCOMPLETE GROOVE WELD (CROWN AREA)</td>
<td>SV/DV</td>
<td>VT MT/PT UT RT</td>
</tr>
<tr>
<td>70</td>
<td>ROOT CONCAVITY</td>
<td>SV</td>
<td>VT - - RT</td>
</tr>
<tr>
<td>71</td>
<td>EXCESS ROOT PENETRATION</td>
<td>SV</td>
<td>VT - - RT</td>
</tr>
<tr>
<td>72</td>
<td>MISALIGNMENT (ROOT &amp; CROWN AREA)</td>
<td>SV</td>
<td>VT - - RT</td>
</tr>
<tr>
<td>73</td>
<td>UNEVEN LEG LENGTH</td>
<td>FILLET</td>
<td>VT - - -</td>
</tr>
<tr>
<td>74</td>
<td>EXCESS CROWN</td>
<td>SV/DV</td>
<td>VT - - -</td>
</tr>
<tr>
<td>75</td>
<td>EXCESS CROWN</td>
<td>FILLET</td>
<td>VT - - -</td>
</tr>
<tr>
<td>76</td>
<td>CONCAVE CROWN</td>
<td>SV/DV</td>
<td>VT - - -</td>
</tr>
<tr>
<td>77</td>
<td>CONCAVE CROWN</td>
<td>FILLET</td>
<td>VT - - -</td>
</tr>
<tr>
<td>78</td>
<td>UNDERCUT</td>
<td>SV/DV</td>
<td>VT - - -</td>
</tr>
<tr>
<td>79</td>
<td>UNDERCUT</td>
<td>FILLET</td>
<td>VT - - -</td>
</tr>
<tr>
<td>80</td>
<td>OVERLAP</td>
<td>FILLET</td>
<td>VT MT/PT - -</td>
</tr>
<tr>
<td>90</td>
<td>WELD SPLATTER</td>
<td>SV/DV</td>
<td>VT - - RT</td>
</tr>
<tr>
<td>91</td>
<td>WELD SPLATTER</td>
<td>FILLET</td>
<td>VT - - RT</td>
</tr>
<tr>
<td>92</td>
<td>CHIPPING HAMMER MARKS</td>
<td>SV/DV</td>
<td>VT - - RT</td>
</tr>
<tr>
<td>93</td>
<td>CHIPPING HAMMER MARKS</td>
<td>FILLET</td>
<td>VT - - -</td>
</tr>
</tbody>
</table>
Flaw Cross Section Views

10 Toe Crack in Single Vee MT/PT, UT
11 Toe Crack in Filet MT/PT, UT
12 Root Crack in Single Vee MT/PT, UT, RT
14 Centerline Crack, Single Vee (surface breaking) MT/PT, UT, RT
18 Base Metal Crack in Single Vee (top HAZ area) MT/PT, UT
19 Base Metal Crack in Single Vee (bottom HAZ area) MT/PT, UT
20 Crater Crack (crown stop-start area) MT/PT, UT
33 Porosity in Fillet (surface breaking) VT, MT/PT
34 Single Gas Pore in Single Vee UT, RT
36 Slag Inclusion in Single Vee (root area) UT, RT
37 Slag Inclusion in Single Vee (weld groove area) UT, RT
51 Lamination in Weld Prep MT/PT, UT
52 Lack of Fusion in Single Vee (crown area) UT
53 Lack of Fusion in Single Vee (surface breaking at crown) MT/PT, UT
54 Lack of Fusion in Fillet (surface breaking at crown) MT/PT
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
This is a view of a surface corrosion indication manufactured by FlawTech. The geometry and depth of the indication can be controlled and can be manufactured in most any alloy. This image was provided to FlawTech by MISTRAS Products and Programs Division using their ULTRAPAC™ Immersion System with Ultra Win™ data program.
FlawTech Standard Kit Specimens are designed to enhance the training and development of new and veteran technicians. Kits will assist with basic flaw detection and sizing of real flaws found in common weld geometries.

Each Kit Contains:
- RT Kit: 10 Carbon Steel Specimens per kit / custom alloys available
- UT Kit: 20 “Real” flaws per kit / 2 per specimen randomly placed
- MT/PT Kit: “Free” Carrying Case
- VT Kit: Detailed Document Package with CAD drawings

Demonstration Kit (Great Introduction to NDT kit)
- 5 Carbon Steel Specimens
- 2 Rt, 1 Ut, 1 Vt & 1 Mt/Pt Specimens
- Total Of 11 Real Flaws

Reference Radiographs
- Total of 16 Radiographs
- Showing 20 Real Flaws
- Plus 6 Processing Defects
- Includes Documentation and Film

See the following pages for Kit details.
Standard Radiographic Kit

THE RADIOGRAPHIC KIT CONTAINS:
8 Plates, 1 Pipe & 1 Tee / Carbon Steel

Each specimen contains 2 “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.

VISIT FLAWTECH WEBSITE OR CALL FOR PRICE INFORMATION

Kit Includes:
12 - Root Crack in SV
14 - Centerline Crack SV (Surface breaking)
15 - Centerline Crack, SV (Sub-surface)
30 - Porosity SV / DV
31 - Porosity Fillet (sub surface)
34 - Single Gas Pore SV
36 - Slag Inclusion SV (root area)
37 - Slag Inclusion SV (weld groove area)
38 - Slag Inclusion Fillet (root area)
39 - Tungsten Inclusion SV (root area)
56 - Incomplete Root Penetration SV
57 - Incomplete Root Penetration DV
59 - Incomplete Groove Weld (crown area)
70 - Root Concavity SV
71 - Excess Root Penetration SV
72 - Misalignment Root & Crown SV
90 - Weld Splatter SV
92 - Chipping Hammer Marks SV

See Pages 3-5 for Cross Section Views

All Specimens Contain Real Flaws
Standard Ultrasonic Kit

THE ULTRASONIC KIT CONTAINS:
8 Plates, 1 Pipe & 1 Tee / Carbon Steel

Each specimen contains 2 “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.

VISIT FLAWTECH WEBSITE OR CALL FOR PRICE INFORMATION

Kit Includes:
10 - Toe Crack SV
12 - Root Crack in SV
15 - Centerline Crack, SV (Sub-surface)
16 - Circumferential Crack SV (flush crown)
17 - Transverse Crack in SV (flush crown)
18 - Base Metal Crack SV (top HAZ area)
30 - Porosity DV (sub-surface)
31 - Porosity Fillet (sub-surface)
34 - Single Gas Pore SV
37 - Slag Inclusion SV (weld groove area)
38 - Slag Inclusion Fillet (root area)
50 - Lamination SV (base metal)
52 - Lack of Fusion SV (crown area)
55 - Lack of Fusion SV (surface breaking at root)
56 - Incomplete Root Penetration SV
57 - Incomplete Root Penetration DV
59 - Incomplete Groove Weld (crown area)

See Pages 3-5 for Cross Section Views

Shipping Weight 65 lbs
All Specimens Contain Real Flaws
Kit Includes:
10 - Toe Crack SV
11 - Toe Crack Fillet
12 - Root Crack in SV
14 - Centerline Crack SV (surface breaking)
16 - Circumferential Crack SV (flush crown)
17 - Transverse Crack in SV (flush crown)
18 - Base Metal Crack SV (top HAZ area)
19 - Base Metal Crack SV (bottom HAZ area)
20 - Crater Crack SV (surface stop-start area)
32 - Porosity SV (surface breaking)
33 - Porosity fillet (surface breaking)
51 - Lamination Weld Prep
53 - Lack of Fusion SV (surface breaking at crown)
54 - Lack of Fusion SV (surface breaking at root)
55 - Lack of Fusion SV (surface breaking at root)
80 - Overlap Fillet
See Pages 3-5 for Cross Section Views

THE MT/PT KIT CONTAINS:
8 plates & 2 Tees / Carbon Steel

Each specimen contains 2 “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.

VISIT FLAWTECH WEBSITE OR CALL FOR PRICE INFORMATION

Shipping Weight 35 lbs
All Specimens Contain Real Flaws
See Pages 3-5 for Cross Section Views
Flaw Manu

Facturing technology

Standard Visual Kit

8 Plates, 1 Pipe & 1 Tee / Carbon Steel

Each specimen contains 2 “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.

VISIT FLAWTECH WEBSITE OR CALL FOR PRICE INFORMATION

Kit Includes:
20 - Crater Crack SV (surface stop-start area)
32 - Porosity SV (surface breaking)
33 - Porosity fillet (surface breaking)
56 - Incomplete Root Penetration SV
59 - Incomplete Groove Weld (crown area)
70 - Root Concavity SV
71 - Excess Root Penetration SV
72 - Misalignment Root & Crown SV
73 - Uneven Leg Length Fillet
74 - Excess Crown SV
75 - Excess Crown Fillet
76 - Concave Crown SV
77 - Concave Crown Fillet
78 - Undercut SV
79 - Undercut Fillet
80 - Overlap Fillet
90 - Weld Splatter SV
91 - Weld Splatter on Filler

Shipping Weight 35 lbs

All Specimens Contain Real Flaws
See Pages 3-5 for Cross Section Views
**NDT Demonstration Kit**

**THE NDT DEMONSTRATION KIT CONTAINS:**
- 3 Plates, 1 Pipe & 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.

VISIT FLAWTECH WEBSITE OR CALL FOR PRICE INFORMATION

11 - Toe Crack fillet
15 - Center Line Crack DV (sub-surface)
18 - Base Metal Crack SV
19 - Base Metal Crack in root HAZ
20 - Crater Crack (crown stop-start area)
30 - Porosity SV (sub-surface)
32 - Porosity SV (surface)
37 - Slag Inclusion SV
54 - Lack of Fusion Fillet (surface breaking)
57 - Incomplete Root Penetration DV
71 - Excess Root SV
Practical Exam Specimens

DESIGN SPECIFICATIONS

- Practical exam specimens are larger than our “standard” kit specimens
- 12 UT and 12 MT / PT specimens to choose from
- Each specimen will contain 3 randomly placed “real” flaws
- Designed to enhance the training and qualification of level I & II personnel with regards to ISO9712, EN473, PCN & TC - 1A
- Customize your set to meet your requirements
- Purchase any combination of specimens to make your set
- Purchase 3+ specimens and receive a 10% discount & a “free” carrying case
- If you do not see what you need - custom specimens are available

Review the following pages for more details
UltraSonic Practical Exam Specimens

**SPECIMEN DETAILS:**

- 3 Flaws per specimen
- "REAL FLAWS" in each specimen
- Document Package with each specimen
- Standard tolerance (+/-) 0.150" (4mm)
- Blank specimens available
- Specimens are carbon steel
- Custom specimens available
- Discount & free carrying case with Purchase of 3+ specimens
- Applicable for ISO9712, EN473, PCN & TC - 1A

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Description</th>
</tr>
</thead>
</table>
| P101 | Plates & Sheets  
0.75" x 8" x 10" plate |
| P102 | BAR & ROD STOCK  
1.5" OD x 12" |
| P103 | BAR & ROD STOCK  
4" OD x 6" |
| P104 | L/R 90° ELBOW TO PIPE  
2" SCH160 (.344" T) |
| P105 | NODE TO PLATE WELD  
2" SCH160 to .375" PLATE |
| P106 | PIPE TO SOCKET WELD  
2" SCH160 PIPE to COUPLING |
| P107 | WELDED PLATE  
0.5"x8"x12" |
| P108 | WELDED PLATE  
1.0"x6"x10" |
| P109 | WELDED PIPING4"SCH160(0.53"T)  
x 8" |
| P110 | LAP JOINT  
0.5" x 12" x 6" |
| P111 | ORGED PIPE FLANGE  
6" OD x 0.75" thick |
| P112 | WELDED TEE  
0.5" x 8" x 8" x 4" |
MT / PT Practical Exam Specimens

SPECIMEN DETAILS:
- 3 Flaws per specimen
- "REAL FLAWS" in each specimen
- Document Package with each specimen
- Standard tolerance (+/-) 0.150” (4mm)
- Blank specimens available
- Specimens are carbon steel
- Custom specimens available
- Discount & free carrying case with Purchase of 3+ specimens
- Applicable for ISO9712, EN473, PCN & TC - 1A

P001 CAST FITTING
2.0” to 1.3” reducer, 5” long

P002 MACHINED SPINDLE
1.75” diameter x 8”

P003 BOLT & NUT
1.25” OD x 6”

P004 FORGED EYE HOOK
6” long with 2” eye

P005 FORGED SHACKLE & PIN
4.25” with 0.75” pin

P006 FORMED METAL PLATE
0.25” x 4”

P007 WELDED PLATE
0.25”x8”x12”

P008 WELDED PIPING
4” SCH40(0.25”T)x 8”

P009 FORGED PIPE FLANGE
6” OD x 0.75” thick

P006 WELDED PIPING
4” SCH40(0.25”T)x 8”

P010 MACHINED GEAR
4.6” diameter x 1.5” bore

P011 WELDED TEE
0.25” x 8” x 8” x 4”

P012 PIPE to SOCKET WELD 2”
SCH160 PIPE to COUPLING
# Advanced Specimens

**SPECIMEN DETAILS:**
- Larger than our practical exam specimens
- Complete document package included
- 3 Real flaws per specimen randomly placed
- Material carbon steel (custom alloys available)
- Custom specimens available (contact us for details)

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>SPECIMEN TYPE</th>
<th>DIMENSIONS (INCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UA-001</td>
<td>PLATE W/SV</td>
<td>0.5 X 12 X 12</td>
</tr>
<tr>
<td>UA-002</td>
<td>PLATE W/SV</td>
<td>0.75 X 12 X 12</td>
</tr>
<tr>
<td>UA-003</td>
<td>PLATE W/SV</td>
<td>1.0 X 12 X 12</td>
</tr>
<tr>
<td>UA-004</td>
<td>PLATE W/DV</td>
<td>1.25 X 12 X 17</td>
</tr>
<tr>
<td>UA-005</td>
<td>PIPE W/SV</td>
<td>6 SCH120 X 12</td>
</tr>
<tr>
<td>UA-006</td>
<td>PIPE W/SV</td>
<td>6 SCHXXH X 12</td>
</tr>
<tr>
<td>UA-007</td>
<td>PIPE W/SV</td>
<td>8 SCH80 X 12</td>
</tr>
<tr>
<td>UA-008</td>
<td>PIPE W/SV</td>
<td>12 SCH80s X 12</td>
</tr>
<tr>
<td>UA-009</td>
<td>PIPE W/SV</td>
<td>12 SCH120 X 12</td>
</tr>
<tr>
<td>UA-010</td>
<td>TEE W/SV</td>
<td>1.0 X 8 X 8 X 12</td>
</tr>
<tr>
<td>UA-011</td>
<td>TEE W/DV</td>
<td>1.0 X 8 X 8 X 12</td>
</tr>
<tr>
<td>UA-012</td>
<td>TEE W/DV</td>
<td>1.25 X 9 X 9 X 12</td>
</tr>
<tr>
<td>UA-013</td>
<td>Y-JOINT (45°)</td>
<td>1.25 X 9 X 9 X 12</td>
</tr>
<tr>
<td>UA-014</td>
<td>NODE &amp; CARRIER (STUB ON)</td>
<td>10 SCH120 X 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.0 X 20 X 20</td>
</tr>
<tr>
<td>UA-015</td>
<td>NOZZLE &amp; CARRIER (STUB IN)</td>
<td>8 SCH80 X 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.0 X 20 X 20</td>
</tr>
<tr>
<td>RA-001</td>
<td>PLATE W/SV</td>
<td>0.375 X 12 X 12</td>
</tr>
<tr>
<td>RA-002</td>
<td>PLATE W/DV</td>
<td>0.625 X 12 X 12</td>
</tr>
<tr>
<td>RA-003</td>
<td>PLATE W/SV</td>
<td>0.75 X 12 X 12</td>
</tr>
<tr>
<td>RA-004</td>
<td>PLATE W/SV</td>
<td>1.0 X 12 X 16</td>
</tr>
<tr>
<td>RA-005</td>
<td>PLATE W/DV</td>
<td>1.0 X 12 X 16</td>
</tr>
<tr>
<td>RA-006</td>
<td>PIPE W/SV</td>
<td>2 SCH80 X 12</td>
</tr>
<tr>
<td>RA-007</td>
<td>PIPE W/SV</td>
<td>6 SCH120 X 12</td>
</tr>
<tr>
<td>RA-008</td>
<td>PIPE W/SV</td>
<td>12 SCH80 X 12</td>
</tr>
<tr>
<td>MA-001</td>
<td>PLATE W/SV</td>
<td>0.375 X 12 X 12</td>
</tr>
<tr>
<td>MA-002</td>
<td>PIPE W/SV</td>
<td>6 SCH80 X 12</td>
</tr>
<tr>
<td>MA-003</td>
<td>PIPE W/SV</td>
<td>12 SCH40 X 12</td>
</tr>
<tr>
<td>MA-004</td>
<td>TEE W/SV</td>
<td>0.375 X 6 X 6 X 12</td>
</tr>
<tr>
<td>MA-005</td>
<td>Y-JOINT (45°)</td>
<td>0.375 X 6 X 6 X 12</td>
</tr>
<tr>
<td>MA-006</td>
<td>NODE &amp; CARRIER (STUB ON)</td>
<td>10 SCH60 X 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5 X 16 X 16</td>
</tr>
<tr>
<td>MA-007</td>
<td>NOZZLE &amp; CARRIER (STUB IN)</td>
<td>8 SCH60 X 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5 X 16 X 16</td>
</tr>
<tr>
<td>ET-001</td>
<td>ET-001</td>
<td>0.25 X 4 X 12</td>
</tr>
<tr>
<td>ET-002</td>
<td>ET-002</td>
<td>0.25 X 4 X 12 (4 FLAWS)</td>
</tr>
<tr>
<td>EL-003</td>
<td>EL-005</td>
<td>0.52 X 4 X 15 (4 FLYW)</td>
</tr>
</tbody>
</table>
API-UT-1 Flawed Specimen
FOR UT EXAMINATION OF FERRITIC WELDS

API KIT CUSTOM OPTIONS

• 10% ID / OD CALIBRATION NOTCHES
• 0.75” X 4.5 X 6” ASME SEC. V BASIC CALIBRATION BLOCK
• 8” SCH 80 (0.5” WALL) X 8” PIPE ASME SEC. V ANGLE BEAM CALIBRATION BLOCK
• LOCKING STORAGE CONTAINER
• RADIOGRAPHS “REAL FLAWS” USED IN KIT SPECIFICATIONS
• LACK OF PENETRATION
• CENTER LINE CRACK
• SLAG INCLUSION
• LACK OF FUSION
• ROOT CRACK
• POROSITY

API-UT-1 KIT CONTAINS:
TOTAL OF 4 SPECIMEN
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” SCH 80 PIPE (0.5” WALL X 12”, 360°)
1 – 12” SCH 80 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-UT-1 Mini Kit

COMPACT VERSION OF OUR API-UT-1 KIT

Specimens are Half Size

API-UT-1 MINI KIT CONTAINS:
TOTAL OF 4 SPECIMEN
1 - 1.0” Thick Plate W/ Double Vee (1” X 7.5” X 6”)
1 - 0.5” Thick Plate W/ Single Vee (0.5” X 6” X 5”)
1 - 8” Sch 80 Pipe (0.5” Wall X 6”, 180°)
1 - 12” Sch 80 Pipe (0.688”, Wall X 6”, 90° Seg.)

Note: Specimens may be too small for some UT search units. If this is a concern please consider our standard API-UT-1 Kit.

API MINI KIT STANDARD FEATURES
- COMPLETE DOCUMENT PACKAGE W/ CAD DRAWINGS
- 3 “REAL” FLAWS PER SPECIMEN
- FLAWTECH ADVANCED TOLERANCE +/- 0.080”
- SPECIMENS ARE CARBON STEEL
- DESIGNED FOR EASE OF HANDLING AND TRANSPORT
- CARRYING CASE 15” X 13” X 10”
- TOTAL WEIGHT 50lbs

www.flawtech.com
API RP-2X Specimen Kit

API RP-2X PRACTICE SPECIMENS KIT

SET OF 3 SPECIMENS

- 90° “T” CONNECTION - 0.75” (T) X 20” (WELD LENGTH) X 4” X 8”LEG
- 45° CONNECTION - 0.75” (T) X 20” (WELD LENGTH) X 4” X +8”LEG
- 60° CONNECTION - 0.75” (T) X 20” (WELD LENGTH) X 4” X +8”LEG

SPECIMEN DETAILS

- EACH SPECIMEN CONTAINS 4 FLAWS / 12 TOTAL
- API LEVEL “C” CRITERIA USED FOR FLAW DESIGN
- FLAW ACCEPT / REJECT BASED ON API RP-2X, FIG. 45 & 48
- UT SPECIMENS CAN BE USED FOR TECHNICIAN PRACTICE FOR OFFSHORE STRUCTURES
- FLAW ACCEPTABILITY IS NOT DETERMINED BY ULTRASONICS

CUSTOM OPTIONS AVAILABLE
Designed in the spirit of API RP-2X, these specimens offer a technician advanced training in UT flaw detection & sizing in unique configurations. This kit is a great tool for conducting practical examinations, as well as preparing technicians for typical industry exams.

THE AP RP-2X EXAM KIT CONTAINS:

- 0.75”T Tee Specimen w/ Double Vee Weld
- 0.75” T  60° “Y” Specimen
- 1”T Plate Specimen w/ Backing Bar
- 8” Sch40 Pipe Specimen, 180° Segment
- 10-12 Flaws Total, Including Cracks & Weld Discontinuities
AWS / CWI Visual Specimen Kit

Design Specifications Based On Aws D1.1

KIT CONTAINS 10 SPECIMENS

4 - Tees 4” X 6” X 2” X 0.25”
4 - Plates 4” X 6” X 0.25”
2 - Edge & Lap Joints 4” X 6” X 0.3125”

AWS / CWI KIT DESIGN FEATURES

- 2 Flaws Per Specimen
- Flaws Are Randomly Placed
- Flaws Are “Border Line” Acceptable Or Rejectable
- Carbon Steel Specimens
- Welding Process - Smaw
- Document Package W/ Cad Drawings
- “Free” Carrying Case
- Designed Specifically For Visual Weld Inspection Training

AWS / CWI KIT 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
Kit Contains 10 Specimens
2 - PLATES 4” X 6” X 0.25”
1 - PIPE 4” SCH80 X 6”
1 - TEE 4” X 6” X 2” X 0.25”
1 - SOCKET WELD 2” SCH80 X 6”
5 - PLATES 1” X 4” X 0.25”

AWS/CWI CERTIFIED KIT
• FlawTech worked in conjunction with AWS and EPRI in the development of this kit.
• This kit has been designed to incorporate both basic penetrant training and testing of the CWI.

AWS / CWI KIT DESIGN FEATURES:
• 2 + Flaws Per Specimen
• Flaws Are Randomly Placed
• Flaws Are “Border Line” Acceptable Or Rejectable
• Carbon Steel Specimens
• Welding Process - SMAW
• Document Package W/ CAD Drawings
• “Free” Carrying Case
• Designed Specifically For Visual Weld Inspection Training
AWS Structural Weld Seismic Kit
Based On Aws D1.8 Annex E For Structural Welds

A FlawTech Original Kit

AWS Seismic Supplement for UT Testing

AWS SEISMIC KIT CONTAINS:

TOTAL OF 8 CARBON STEEL SPECIMENS
2 - BUTT WELDS w/ V GROOVE (1) at 0.375” T & (1) at 0.75” T X 6” (WELD) X 8”
2 - BUTT WELDS w/ V GROOVE & BACKING BAR (1) at 0.375” T & (1) at 0.75” T X 6” (WELD) X 8”
2 - TEE WELDS w/ SINGLE GROOVE, (1) at 0.375” T & (1) at 0.75” T X 6” (WELD) X 4” (MAIN) X 7” (BRANCH)
2 - TEE WELDS w/ SINGLE GROOVE w/ BACKING BAR, (1) @0.375” T & (1) @ 0.75” T X 6” (WELD) X 4” (MAIN) X 7” (BRANCH)

KIT STANDARD FEATURES
• COMPLETE DOCUMENT PACKAGE W/ CAD DRAWINGS ~2-3 “REAL” FLAWS PER SPECIMEN
• FLAWTECH ADVANCED TOLERANCE +/- 0.080”
• AS WELDED CROWNS AND ROOTS
• CARRYING CASE 24” X 16” X 10”, ~110lbs
Socket Weld Specimen Kit
Pipe To Fitting & Pipe to Vessel Specimens

SET OF 6 SOCKET WELD SPECIMENS

A FlawTech Original Kit

3 ALLOY OPTIONS
• 304 S/S
• 316 S/S
• 106 C/S

PIPE DIMENSIONS
• 0.75” SCH80
• 1.0” SCH 80
• 2.0” SCH 80

FLAW SPECIFICATIONS
• 2 FLAWS EACH SPECIMEN
• TOTAL OF 12 REAL FLAWS
• FATIGUE, HAZ CRACKS, AND LACKS OF FUSION

2 SPECIMENS PER PIPE SIZE
• (1) PIPE TO SOCKET COUPLING
• (1) PIPE TO 1.5” X 6” X 6” PLATE w/ MACHINED SOCKET

PURCHASE OPTIONS
• KIT / SET CONTAINS 6 SPECIMENS
• INDIVIDUALLY / PURCHASE 1 OR MORE
• CUSTOMIZE YOUR SET / MIX DIFFERENT ALLOYS

SPECIMENS ARE DESIGNED FOR ULTRASONIC PRACTICE INSPECTION OF PIPE TO FITTING AND PIPE TO VESSEL WELDS
Flaw Manu
Facturing
technology

Boiler Tube Damage Kit

Designed and Manufactured to Replicate Field Removed Specimens

- EPRI PROGRAM 63 MEMBERS RECEIVE A SPECIAL DISCOUNT.

- USE THIS KIT TO ASSIST IN THE TRAINING AND QUALIFYING OF NDE TECHNICIANS TO ACCURATELY IDENTIFY SPECIFIC BOILER TUBE DAMAGE FOUND IN FOSSIL PLANTS.

KIT CONTAINS

• 19 BOILER TUBES:
  » Representing a complete range of fossil-fired boiler tube failure mechanisms steam and water touched.

• TUBE SPECIFICATIONS:
  » 18 Tubes at 2.5” OD X 0.25” WALL X 8” long
  » 1 Tube at 1.5” X 0.25” WALL X 8” long

• MATERIAL
  » 17 Tubes are SA513 T5 GR 1020/1026 C/S
  » 1 Tube is 304/304L
  » 1 Dissimilar metal weld

• FLAWS / INDICATIONS
  » Long term overeating/creep
  » Fire side corrosion (coal)
  » Toe crack, stress corrosion (stainless)
  » Soot blower erosion
  » Fatigue crack (toe)
  » Maintenance damage
  » Pitting
  » Rubbing / Fretting
  » Chemical cleaning damage (cleaning & pitting)
  » Material flaw (forging lap)
  » Corrosion fatigue crack
  » Fly ash erosion, Hydrogen damage
  » Acid Phosphate erosion
  » Caustic gouging
  » Supercritical waterwall cracking (1.5” OD tube)
  » Weld defects (lack of fusion and porosity)
  » Graphitization

OFFICIALLY LICENSED BY

EPRI | ELECTRIC POWER RESEARCH INSTITUTE
Flaw Manufacturing Technology
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
0.5” X 10” X 12”

2 - WELDED PLATES
ONE CARBON STEEL PLATE: #A7-CS-010
ONE STAINLESS PLATE: #A7-SS-010
1.0” X 10” X 12”

1 - WELDED PIPE
ONE STAINLESS PIPE: #A7-SS-020
2” SCH160 X 12”

1 - WELDED PIPE
ONE CARBON STEEL PIPE: #A7-CS-040
4” SCH160 X 12”

1 - WELDED PIPE
ONE STAINLESS PIPE: #A7-SS-060
6” SCH160 X 12”

1 - WELDED PIPE
ONE CARBON STEEL PIPE: #A7-CS-100 (180° SEGMENT)
10” SCH160 X 12”

KIT SPECIFICATIONS
• 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 Section XI Appendix VIII Kits

**ASME Boiler & Pressure Vessel Code, Section XI, Appendix VII, Supplements 2, 3 & 10 Kits**

### Pipe Specimen Dimensions

<table>
<thead>
<tr>
<th>Specimen Details</th>
<th>Unflawed Units</th>
<th>Flawed Units</th>
</tr>
</thead>
</table>

**Supplement 2 Kit for Austenitic Piping**

- 2" SCH80 X 24" 360°: 1 unit
- 4" SCH80 X 24° 360°: 3 units
- 6" SCH160 X 24° 360°: 4 units
- 12"SCH80s X 24° 360°: 9 units
- 24"SCH80s X 24° 120°: 5 units
- Kit Total: 22 units

**Supplement 3 Kit for Ferritic Piping**

- 2" SCH80 X 24° 360°: 1 unit
- 4" SCH80 X 24° 360°: 3 units
- 6" SCH160 X 24° 360°: 4 units
- 12"SCH80s X 24° 360°: 9 units
- 24"SCH80s X 24° 120°: 5 units
- Kit Total: 22 units

**Supplement 10 Kit for Dissimilar Metal Welds**

- 4" SCH80 X 24° 360°: 3 units
- 6" SCH160 X 24° 360°: 4 units
- 8" SCH80 X 24° 360°: 6 units
- 12"SCH80s X 24° 180°: 4 units
- 24"SCH80s X 24° 90°: 4 units
- Kit Total: 21 units

### Kit and Flaw Details:

- The kits are manufactured to meet the minimum requirements of ASME, Boiler & Pressure Code, Section XI, Appendix VIII, of Supplements 2, 3 & 10.
- At least 50% of the cracks will be coincident with fabricated conditions, such as: ground & as-welded crowns, counterbores & weld root conditions.
- Flaw depths will range from the 10-30% through the 61 - 100% depth ranges as specified in ASME Section XI, Appendix VIII.
- All the flaws will be mechanical fatigue or thermal fatigue cracks, with at least 75% of the cracks being thermal fatigue.
- Kits made to our critical tolerance ± 0.040" (1MM).
- Custom Appendix VIII specimens are available - contact Flawtech for details.
Contact Flawtech For All Your Standard And Custom Calibration Block Needs
*All Materials Available Upon Request*

**IIW BLOCKS**

- Type 1
- Type 2
- V1/5 (A2)

**STEP WEDGES**

- 5 Step
- 4 Step
- Custom Step Blocks

**AWS BLOCKS**

- DC Block
- Resolution Block (RC)
- DSC Block
- DS Block

**ASTM BLOCKS**

- Set of 8
- Set of 10
- Set of 19

- “PACS” Phased Array Test Block

**MINI ANGLE BEAM BLOCK**

- ISO 7963 Test Block #2
PDI Alternative ASME Calibration Blocks

The 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 blocks 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; A516 Grade 70 Carbon Steel, Type 304/304L Stainless Steel, and also in Type 316/316L Stainless Steel. Individual blocks of any one alloy may also be purchased. The blocks are made from ultrasonically inspected, heat number-traceable material.

The block design consists of four (4) steps (representing wall thicknesses) measuring 0.5", 1.0", 1.5", and 2.0". Each step contains an EDM notch 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 number, alloy, and heat number.

Contact FlawTech for all your Standard and Custom Calibration Block Needs
*all materials available upon request*
ASME SEC. V ANGLE BEAM CALIBRATION BLOCKS

The basic calibration block for weldments shall be a section of pipe of the same normal size, schedule, heat treatment and material specification as the material being examined. Standard will contain four (4) notches, two (2) longitudinal and two (2) circumferential on both the OD and ID at a target depth of 9.5% of nominal wall thickness and a minimum of 1” long. FlawTech can provide the material or use customer furnished material. In accordance with ASME Sec V, Article 4, Figure T-434.3 (Calibration Block for Pipe.)
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.

CONTACT FLAWTECH FOR ALL YOUR STANDARD AND CUSTOM CALIBRATION BLOCK NEEDS *ALL MATERIALS AVAILABLE UPON REQUEST*
The World Leader in Manufacturing Real Flaws

To Order the Highest Quality Flawed Specimens:
www.FLAWTECH.com
Tel: 704.795.4401
Fax: 704.795.4403