

API

Generic Procedure

for the

Ultrasonic Examination

of

Ferritic Welds

API-UT-1

This Procedure Defines the Minimum Mandatory Requirements for the API Qualification of Ultrasonic Examiners Certification Program.

1.0 SCOPE

- 1.1 This procedure is applicable only to ultrasonic examinations conducted for the American Petroleum Institute (API) Qualification of Ultrasonic Examiners Certification Program.
- 1.2 This procedure applies to the manual, contact ultrasonic examination of the material product forms and component designs identified in Figure 1.
- 1.3 The objective of examinations performed in accordance with this procedure is to accurately detect, characterize, and length size discontinuities within the specified examination volume from the outside surface.

2.0 REFERENCE

- 2.1 American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section V

3.0 PERSONNEL REQUIREMENTS

- 3.1 Personnel performing this qualification should be, as a minimum, certifiable to UT Level II or III in accordance with their employers written practice.

4.0 EQUIPMENT

- 4.1 Ultrasonic Instruments
 - 4.1.1 Any ultrasonic instrument may be used provided that it satisfies the requirements of this procedure.
- 4.2 Search Units
 - 4.2.1 Any search unit may be used provided that it satisfies the requirements of this procedure.
 - 4.2.2 Search unit frequency should be between 2.25 and 5.0 MHz.

4.2.3 Search unit wedges designed to produce nominal inspection angles of 45°, 60°, or 70° ($\pm 3^\circ$) in ferritic material should be used.

4.2.4 Any search unit size may be used provided that adequate contact can be maintained.

4.3 Cabling

4.3.1 Any convenient type and length of cable may be used.

4.4 Couplant

4.4.1 Any couplant material may be used.

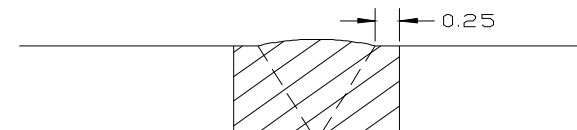
4.5 Calibration Blocks

4.5.1 ASME B & PV Code, Section V, Calibration blocks shall be provided.

5.0 EXAMINATION AREA REQUIREMENTS

5.1 Examination Volume

5.1.1 The examination volume shall consist of the entire weld volume and base material for a distance of 1/4 inch from each weld toe shown below. This volume applies to all configurations.



6.0 CALIBRATION

6.1 General Information

6.1.1 Calibration should be performed and recorded prior to the start of any examination or series of examinations.

6.2 Time Base Calibration

6.2.1 A linear time base (screen range) representing either metal path or material depth should be obtained.

6.3 Primary Reference Sensitivity and DAC

6.3.1 The primary reference sensitivity level and associated distance amplitude correction curve (DAC) should be established using the inside and outside surface notches in the following manner:

a.) Maximize the signal response from the ID notch at $\frac{1}{2}$ V-Path and set the response at $\sim 80\%$ FSH, establishing a flat line DAC at 80% for $\frac{1}{2}$ V-Path examinations. For examinations beyond $\frac{1}{2}$ V-Path continue the DAC curve as defined in step b.

b.) Without changing the gain control established in step a, determine and mark the maximum signal response obtainable from the OD notch at a full V-Path and the ID notch at one and one half ($1 \frac{1}{2}$) V-Paths as applicable. Construct the DAC curve from these points.

7.0 EXAMINATION

7.1 Examination Sensitivity (Scan Gain)

7.1.1 The examination sensitivity (scan gain) should be a minimum of twice (+ 6 dB) the primary reference level.

8.0 INDICATION EVALUATION

8.1 General Information

8.1.1 All suspected flaw indications shall be plotted on a cross sectional drawing of the weld in order to accurately identify the specific origin of the reflector.

8.2 Flaw Indications

8.2.1 All actual flaw indications e.g., slag, LOP, LOF, cracks etc., exceeding 20% of the primary reference level shall be reported.

9.0 RECORDING AND REPORTING OF EXAM RESULTS

9.1 General Information

9.1.1 Component reference information (datum 0 position, direction of flow) used for indication reporting shall be identified on the examination sample.

9.1.2 Exam results shall be reported on the API indication report sheet.

9.2 Non Relevant Indications

9.2.1 Reporting of non-relevant indications is not required.

9.3 Flaw Indications

9.3.1 Flaw indications 20% of DAC or greater shall be reported.

9.3.2 The following information shall be recorded on the applicable indication report sheets for each reported flaw:

- a.) The flaw length dimension (L_1 and L_2)
- b.) The flaw location in relationship to the weld centerline (e.g., upstream, downstream, centerline)
- c.) The flaw location in relationship to the weld volume (e.g., inside surface connected, outside surface connected, embedded)
- d.) Recording amplitude (% of DAC)
- e.) Flaw type

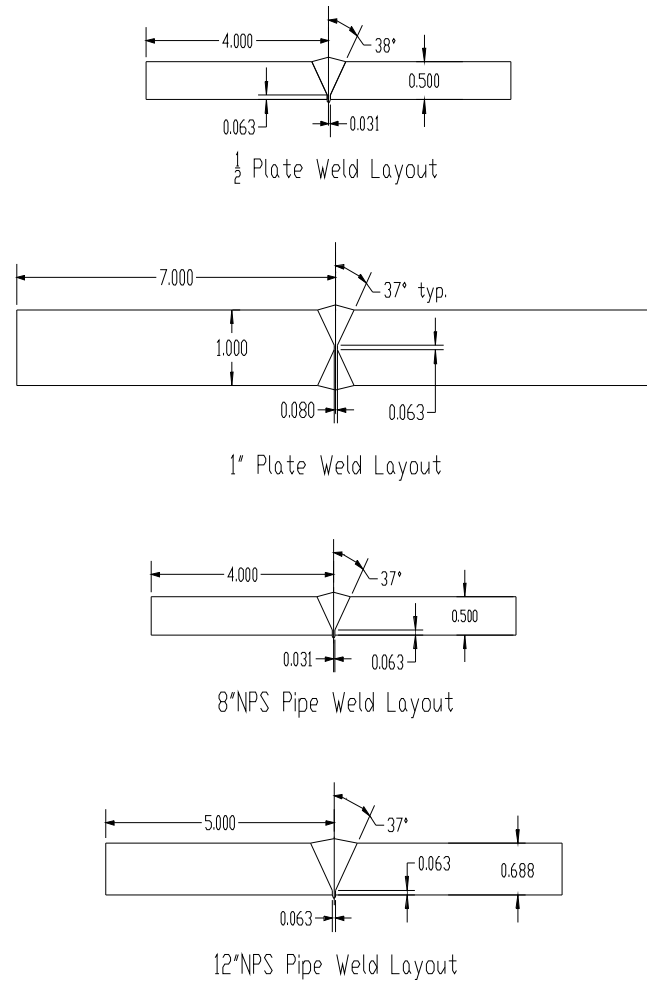


Figure 1
Demonstration Sample Design
(Typical)