



AMERICAN PETROLEUM INSTITUTE
ICP™



***API Qualification of Ultrasonic
Examiners Certification Program for
Phased Array
QUTE-PA***

Candidate Orientation

PURPOSE

The information in this handout is intended to provide an outline of the API Qualification of Ultrasonic Examiners Certification Program for manual non-encoded Phased Array. This handout is intended to provide a brief overview for each candidate/candidate organization regarding test administration and candidate preparation. The information contained with this handout is subject to change, therefore, all candidates will receive an additional orientation by the PDA (Performance Demonstration Administrator) prior to the start of each qualification session.

Testing Protocol

All candidate demonstrations are scheduled to be completed during a single eight-hour workday (0800 –1700). A one-hour lunch break will be available at the candidate's option. A defined security plan will be established during testing (including lunch and bathroom breaks) to prevent test sample compromise.

The following projected time schedule is provided for candidate reference. The actual practical demonstration (test sample evaluation) times identified below can be affected as a result of candidate readiness. It is strongly recommended that candidate's become familiar with the qualification protocol, specifically the data reporting forms and examination procedure to increase efficiency.

0800 – 0900	Candidate orientation
0900 – 1000	Equipment Inventories and Calibration's
1000 – 1200	Practical Demonstration
1200 – 1300	Lunch Break – In Room (optional)
1300 – 1600	Practical Demonstration
1600 – 1700	Post demonstration paperwork and reporting

Each candidate will be given a unique test set consisting of 4 qualification test specimens. Candidates must work independently and are not allowed to discuss specimen or examination information during or after the demonstration. In general, there will be no single sample time limit established, however, if a sample requires sharing between 2 candidates, sample time limit provisions may be established.

All paperwork must be completed and turned into the monitor by end of day. Time extensions will not be authorized. Candidates that fail to complete the examination in the allotted time will be considered unsuccessful.

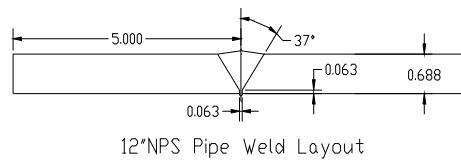
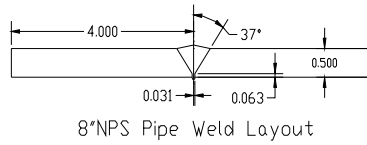
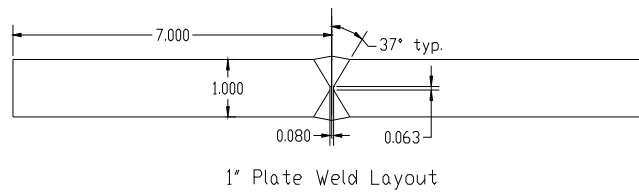
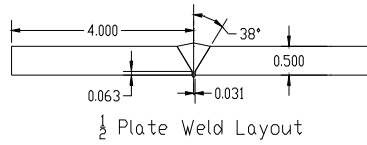
SPECIMEN PRESENTATION

Flaw location and "True" specimen identification shall be concealed to maintain a "blind test". Test specimens will be given a unique identifier or alias. Test specimens are divided into grading units. Each grading unit will be considered as either flawed or unflawed. The number of flawed and/or unflawed grading units and specific grading unit length will not be made available to the candidates. There will be no disclosure of particular specimen results or candidate viewing of unmasked specimens during or after the performance demonstration.

NOTE: API does not allow marks to be made directly on the test samples/specimens.

TEST SET AND TEST SPECIMEN DESIGN

Each candidate will be supplied a list defining the test specimens that make up their test set. Each test set will be comprised with the following samples (1 of each):





Potential Flaw Mechanism's

The following table identifies the potential flaw mechanism's that may be included in each test specimen. The number of flaws in each test specimen may vary for each test set. Test specimens may be unflawed along the entire length.

	½" Plate	1" Plate	8" Pipe Weld	12" Pipe Weld
Inside surface connected crack (ID Crack)	X	X	X	X
Outside surface connected crack (OD Crack)	X	X	X	X
Embedded Center Line Cracking		X		
Lack of root penetration (LOP)	X		X	X
Lack of side wall fusion (LOF)	X	X	X	X
Porosity	X	X	X	X
Slag inclusion	X	X	X	X

Specimen Geometry

1. Specimens will NOT contain counterbore geometry
2. Specimens may contain ID or OD mismatch
3. Specimen weld crowns and root geometry's will be in the "as-welded" condition and may be offset from sample centerline.

GRADING CRITERIA

Candidate performance will be evaluated in the following four areas;

- A. **Detection** - The detection portion of the test is applied to initially evaluate a candidate's data report. If the candidate does not detect an intended flaw, no further evaluation is required. The candidate will be required to detect approximately 80% of the flaws in the test set. Sufficient data must be provided in order for the monitor to determine if the candidate actually detected the flaw.
- B. **Flaw Characterization** - Once the intended flaw is determined to be a "detection", the candidate's ability to characterize the flaw will be evaluated. Candidates will be provided with a list of potential flaw mechanisms for each sample type. Characterization criteria will be weighted heavily on the location of the reported flaw (surface connected or volumetric). The candidate must correctly characterize approximately 80% of the detected flaws.
- C. **Flaw Positioning** - Reported flaws must also be positioned correctly with respect to the weld centerline (upstream/downstream). Evaluations will include the flaws approximate relationship to the weld centerline. Cross sectional plotting of flaw indications on the indication data sheets will be required in order to determine the location of the flaw. The candidate must correctly position approximately 80% of the detected flaws.
- D. **False Calls** - A false call is defined as the reporting of a flaw (regardless of length) within a non-flawed grading unit. Candidates will not know the location of unflawed grading units. The candidate must correctly evaluate approximately 80% of the unflawed grading units in order to be successful.

There is a maximum error allowance for each grading category. Unsatisfactory performance in any category will result in test failure. Additionally, there is a total error allowance for the entire test. This total error allowance is less than the sum of all errors allowed in each category. Test results provided by API will identify performance in each category to assist unsuccessful candidates for future preparation.

There are no length or depth sizing criteria's established at this time, however, candidates are required to provide sufficient flaw length and depth information in order to satisfy flaw detection, characterization, and positioning criteria. The generic procedure provides criteria for length sizing, which has proved to be accurate during the fingerprinting of these samples. Gross over-sizing of flaws may result in false calls.

TEST SPECIMEN RE-LOOKS

The candidate may re-look any specimen they have completed, provided they are within the time limits of the test.

RE-TESTING

Any unsuccessful candidate must apply to API for re-testing. Re-testing will be administered with the same rules and guidelines as the original test.

TEST RESULTS

Test results will not be given to candidates immediately upon completion of the demonstration. Testing paperwork will be reviewed at the end of the session for completeness and legibility. All grading will be done post session and forwarded to API for review and concurrence. Results will be forwarded from API to either the individual candidate or their organization.

PHASED ARRAY PROCEDURE

The Test Candidate shall provide the Phased Array Procedure that will be used during the QUTE-PA examination and document its use on the API Equipment List form.

EQUIPMENT REQUIREMENTS

Candidate or candidate organizations are responsible for supplying **ALL** the equipment needed for each demonstration. **Sharing of equipment will not be allowed during the demonstration.** Below is a recommended list of equipment and supplies that should be considered for use during the demonstration.

1. Phased Array Unit
2. Phased Array Probes
3. Calibration Standards (PACS, IIW, Rompas, DSC)
4. Indication Plotting Devices
5. Calculator
6. Pens/Pencils

The test administrators will provide couplant and rags.

REQUIRED PAPERWORK

All demonstration paperwork shall be completed on yellow paper to facilitate demonstration security requirements. Copying facilities will be available for candidates that arrive with pre-filled out inventory sheets or calibration records. It is requested that all pre-filled out paperwork be completed on white paper. No other paper or materials will be allowed at the testing station. The following demonstration paperwork will be required as a minimum;

Equipment Inventory

Ultrasonic instruments, search units, and other equipment essential to the examination system shall be inventoried and documented on the Equipment Inventory Sheet prior to the start of the qualification test. All non-inventoried equipment shall be stored in an area unrelated to the operation of the examination system. All subsequent inclusions of equipment for qualification purposes shall be documented on the sheet and verified by the Session Monitor. Blank inventory sheets are supplied in this document and can be completed prior to the demonstration, but will be verified prior to the start of the

demonstration. If the make model, frequency, size or shape can not be readily determined the equipment certification should be on hand during the demonstration.

Calibration Data Sheet

Calibration data record(s) shall be completed for each test specimen examined. PDA staff will review all calibration data sheets to ensure that they contain sufficient information to properly document the equipment was used during the demonstration and to document procedure compliance. The calibration data sheet will not be used as a pass-fail criterion, but shall be evaluated to determine correlation between successful and unsuccessful candidates. Several samples can be placed on one calibration data sheet.

Test Administrator Check List

The Test Administrator shall review the Phased Examination Process for each Test Candidate. The Test Administrator shall review the following:

1. Phased Array system
2. Scan technique
3. Focus method and depth
4. Data Acquisition
5. Data Analysis

Indication Data Sheet

For each sample, an indication data sheet shall be completed. The indication data sheet has been designed to properly identify indication start and stop positions (length), characterization, and flaw positioning. The candidate is responsible to ensure that all required fields are legibly filled out in their entirety.

Examples, along with a blank copy of each form are provided for reference.

SECURITY

1. Session Monitoring

The demonstration will be monitored by the PDA. The PDA will consist of a Session Monitor and an assistant, as needed. Continuous testing area surveillance will be maintained. Entry into and out of the testing area will be restricted. The testing area will be monitored during lunch to allow candidates additional time for testing if they choose not to take a lunch break.

Purses, backpacks, or briefcases will not be allowed at the candidates testing stations. Additionally, no cellular telephones, personal pagers, or laptop computers will be allowed in the testing area. Personal items shall be stored in a location specified by the session monitor and will be secured to prevent theft or loss during testing.

2. Test Data Security

The Phased Array unit digital memory shall be clean of all

The Flash Card or Memory Card shall be turned into the PDA at the end of the examination.

All on-board memory for data and images shall be erased from the Phased Array unit.

3. Candidate Expectations

Candidates are expected to adhere to the security rules as specified in this guideline. Candidates are not allowed to openly discuss information concerning the test samples or examination results. Any violations of the security rules may be cause for terminating the candidate's test and a failing grade to be posted.

4. Additional Security Rules

Additional security measures will be implemented as necessary to ensure the integrity of the testing program. Additional security will be covered in the orientation portion of the demonstration to address data storage, image files and the computer based software for data acquisition.

5. Dispute Resolution

A dispute resolution form will be available to document unresolved issues and concerns with the qualification program. Dispute resolutions will be forwarded to the API for comment and resolution.

FREQUENTLY ASKED QUESTIONS

1. How much weld length is in a typical test set?

A. The approximate length of weld is as follows;

0.50" thick plate	15"
1.00" thick plate	15"
8.0" diameter pipe	27"
12.0 diameter pipe (180°)	20"
Total	77"

2. What is a grading unit?

- A. The total length of the weld is divided into sections called grading units. Grading units do not have to be of equal length. Grading units do not have to be equally spaced. A single grading unit consists of both sides of the weld. Grading units are considered unflawed or flawed. Flawed grading units will contain only 1 flaw.
3. What is the minimum size flaw that must be detected?
- A. No fixed flaw size value has been established. Identifying flaw size tolerances is difficult because of the different potential flaw types presented. Each sample has been ultrasonically validated to ensure that the flaws meet the reporting threshold identified in the procedure. Flaws sizes are representative of those expected to be found during field applications. The test is designed to test a candidate's ability to perform fundamental UT.
4. Are all of the test sets similar?
- A. Yes. All of the samples and test sets have been ultrasonically validated. The test sets do differ from sample to sample in the number and types of flaws that may be in any single sample. Each set is equally challenging. Each test set is unique.
5. What happens if I do not finish the test in the prescribed time?
- A. Candidates that fail to complete the examination in the allotted time will be considered unsuccessful. Future attempts will require a complete re-test.
6. Is there anything beneficial I can do prior to the start of testing?
- A. Yes. Becoming familiar with this testing protocol document, the generic procedure, and all of the examination data records will be a great benefit. Additionally, inventory records may be filled out and calibrations may be performed and documented in advance on white paper. Copying facilities will be available to transfer these records onto yellow paper.
7. Do I have to provide proof of identity?
- A. Yes. A driver's license with picture or an equivalent proof of identification is necessary.
8. Can I leave the facility during lunch?
- A. No. Once testing has started the security requirements are put in place. Candidates are encouraged to bring lunch.