



***API Qualification of  
Ultrasonic Examiners for  
Thickness Measurement  
Examination Program  
QUTE-TM***

***Candidate Orientation***

## **PURPOSE**

The information in this handout is intended to provide an outline of the API Qualification for Thickness Measurement Certification (QUTE-TM) Program. 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 Test Administrator PDA (Performance Demonstration Administrator) prior to the start of each qualification session.

## **Thickness Measurement Examination Test Protocol**

1. All thickness measurement examinations shall be scheduled to be completed during a single six-hour workday (0800 – 1400 hours).
2. All candidates must present a valid government issued photo ID as proof of identification.
3. A defined security plan shall be established during testing (including breaks) to prevent test sample compromise. **Only one candidate shall be allowed to leave the examination area at any time.**
4. It is strongly recommended that candidates become familiar with the qualification protocol, specifically the data reporting forms and examination procedure to increase efficiency.
5. The following projected time schedule is provided for candidate reference. The practical examination (test sample evaluation) times identified below may be affected if the candidate is not well prepared.

0800 – 0830	Candidate Orientation
0830 – 0900	Equipment Inventories and Calibration
0900 – 1400	Thickness Measurement Practical Examination

## **Ultrasonic Thickness Specimen Examination**

1. This ultrasonic thickness measurement performance examination shall be considered a “blind test”. There will be no disclosure of specimen results or candidate examination of test specimens by viewing of masked specimen areas during or after the performance demonstration.
2. Test specimens shall only be examined using manual (non-encoded) ultrasonic straight-beam compression wave transducers within the following transducer designs:
  - A. Single element straight-beam
  - B. Dual element straight-beam
  - C. Delay tip single element straight-beam
3. Candidates shall work independently and are not allowed to discuss specimen information or results during or after the examination.
4. Candidates shall ultrasonically examine and report the minimum thickness for each one-inch grid point and report flawed or un-flawed conditions on the QUTE-TM data report form.
5. All paperwork shall be completed and turned into the examination proctor by end of day. Requests for examination time extensions will not be authorized. Candidates that fail to complete the examination in the allotted time will be considered unsuccessful.

**TEST SET AND TEST SPECIMEN DESIGN**

1. Each candidate will be given a unique test set consisting of 10 carbon steel specimens.
  - Each specimen may have artificial and or in-service material wall loss features or may have inherent or in-service base metal material flaws.
  - Test set specimens may include flat plate, pipe, small bore pipe or fittings (elbows, reducers, tees) with approximate nominal wall thicknesses from 0.160-inches through 2.00-inches.
2. Each test specimen shall have a 4-inch by 4-inch thickness examination grid unless otherwise noted on the specimen. Each test set and test specimen shall be designated by a unique temporary test specimen ID number.
3. All specimen surfaces shall be masked except for the 4-inch by 4-inch examination grid.
  - Candidates shall not remove identification numbers or masking materials from the surface of the test specimen.
  - If it is determined that a candidate has tampered with identification numbers or specimen masking, the candidate shall be immediately disqualified from the exam.
4. Test specimens can be uncoated or coated with fusion bonded epoxy (FBE) or fiberglass layer approximately 0.045-inches thick.
5. Each 4-inch by 4-inch examination grid shall consist of approximately one square inch Grading Units, as indicated in the figure below.

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

**Typical API Test Specimen Grid with 16 Grading Units**

### **Prior to the Start of the Exam**

1. No pre-stored set-ups or calibrations shall be allowed on the ultrasonic instruments. The examination proctor shall inspect the ultrasonic test instrument for stored set ups or calibrations before the exam.
2. Each candidate shall demonstrate to the examination proctor completed instrument and transducer calibration on a standard carbon steel step wedge for each of the following UT-TM transducers:
  - A. Single element straight-beam
  - B. Dual element straight-beam
  - C. Delay tip single element straight-beam
3. The exam proctor may supply any of the above transducers for the purposes of this performance demonstration exam.

### **Grading Unit Categories**

Each Grading Unit (GU) may or may not have an area that is corroded whereby the wall thickness has been reduced by a material loss or contains inherent or service induced base material flaws. Grading Units are divided into categories:

Table 1: Grading Unit Categories List

<b>Category</b>	<b>Wall Thickness</b>
A No Corrosion	Minimum Remaining Wall Thickness
B General Corrosion	Minimum Remaining Wall Thickness
C Isolated Corrosion/Erosion	Minimum Remaining Wall Thickness
D Pitting Corrosion	Minimum Remaining Wall Thickness
E Base Metal Laminations	Minimum and Maximum Depths or Total Wall Loss
F Base Metal Inclusions	Minimum and Maximum Depths or Total Wall Loss
G Weld overlay Disbonds	Depth and Minimum Remaining Wall Thickness
H External Corrosion	Minimum Remaining Wall Thickness - Pit Gauge Depth

### **GRADING CRITERIA**

1. 80% of the grading units must be accurately categorized.
2. 80% of the thickness measurements shall be within +/-0.010-inches of the actual thickness.

### **TEST SPECIMEN RE-EXAMINATIONS**

The candidate may not re-examine any specimen that they have completed.

## **RE-TESTING**

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

## **EXAMINATION RESULTS**

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

## **Defined Ultrasonic Thickness Measurement Procedure (API-UT-30)**

Ultrasonic procedure API-UT-30 was developed during test specimen and test set validation (fingerprinting). This procedure defines the equipment and techniques that have been proven successful and efficient for UT Thickness Measurement of Plating. Use of this procedure is not mandatory; however, it is strongly recommended.

If an alternative procedure is used it shall be submitted to the API Test Administrator.

## **EQUIPMENT REQUIREMENTS**

1. Candidate or candidate organizations are responsible for supplying **ALL** the equipment needed for each examination. This includes any special 0-degree thickness measurement transducers or probes, as well as any thickness measurement calibration blocks.
2. **Sharing of equipment will not be allowed during the examination unless approved by the Test Administrator.**
3. Below is a recommended list of equipment and supplies that should be considered for use during the demonstration.
  - A. Ultrasonic Instrument
  - B. Ultrasonic Cables
  - C. Ultrasonic Transducers/Search Units
  - D. Calibration Thickness Standards (Step Wedge)
  - E. Calculator
  - F. Pens/Pencils
4. The Exam proctor shall provide couplant and rags.

## **REQUIRED PAPERWORK**

All examination 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 shall be allowed at the testing station.

The following examination 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 Exam proctor.
- Blank inventory sheets are supplied in this document and can be completed prior to the examination but will be verified prior to the start of the demonstration.
- If the make model, frequency, size or shape cannot be readily determined the equipment certification should be on hand during the examination.

### **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 examination 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.

### **Thickness Measurement Data Report Form**

- For each Grading Unit, a remaining wall thickness measurement shall be recorded on the Thickness Measurement Data Report Form.
- In addition, each Grading Unit shall be designated a Category A-H from the Grading Unit Category List (Table 1) provided above.
- The candidate is responsible to ensure that all required fields are legibly filled out in their entirety.

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

## **SECURITY**

### 1. Session Monitoring

The examination will be monitored by the PDA. The PDA will consist of a Session Monitor. Continuous testing area surveillance will be maintained. Entry into and out of the testing area will be restricted (as noted above). 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 cameras, cellular telephones, personal pagers, tablets or laptop computers will be allowed in the examination area. Personal items shall be stored in a location specified by the Exam Proctor and will be secured to prevent theft or loss during testing.

## 2. 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.

## 3. Additional Security Rules

- Additional security measures – specific to the test facility – will be implemented as necessary to ensure the integrity of the testing program. This will be covered in the orientation portion of the demonstration.

## 4. Dispute Resolution

- A dispute resolution form will be available from the Examination Proctor to document unresolved issues and concerns with the examination. Dispute resolutions will be forwarded to the API for comment and resolution.

## **FREQUENTLY ASKED QUESTIONS**

### 1. What special transducers will be needed?

Standard zero-degree straight beam single element, dual element and delay tip transducers may be used. Special transducers may also be used. The test candidate should understand the effects of near fields and make the appropriate selection of transducer diameter, frequency and type, i.e., dual versus single.

### 2. What special thickness measurements calibration blocks will be needed?

Thickness measurement calibration blocks, which must be supplied by the candidate, should be manufactured of mild steel materials to cover the examination for a 0.160-inch through 2.00-inch thick test specimens.

3. Do I have to follow the defined procedure (API-UT-30)?

No, the use of alternative procedures and techniques is allowable provided the methods and techniques are clearly identified in a procedure supplied to the Test Administrator. However, the use of the defined procedure (API-UT-30) is strongly recommended, as it has proven both successful and efficient in performing examinations on these specimens. Calibration records and equipment inventory records will be used to record the equipment used.

4. Are all of the test sets similar?

Yes. All of the QUTE- TM Test Plates and Test Sets have been ultrasonically validated. The degree of difficulty has been adjusted for fairness. The test sets do differ from sample to sample in the depths of the corroded areas. Each test set is equally challenging. Each test set is unique to that grouping of flaws with a variety of flaw depths.

5. What happens if I do not finish the examination in the prescribed time?

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 the examination?

Yes. The candidate should be familiar with this testing protocol document, the Ultrasonic Thickness Procedure API-UT-30 generic procedure, and all of the examination data records. Additionally, inventory records may be filled out and calibrations may be performed and documented in advance on white paper (as stated above). Copying facilities will be available to transfer these records onto yellow paper.

7. Is Corrosion/Erosion thickness measurement training a prerequisite for taking the API flaw sizing examination?

Although not a prerequisite, it is strongly recommended that some type of organized training in Ultrasonic thickness measurement methods be obtained prior to the examination.

8. Do I have to provide proof of identity?

Yes. A government issued photo ID or an equivalent proof of identification is necessary.



9. Can I leave the facility during breaks?

No. Once testing has started the security requirements are put in place.