



Guidance on auditing Manual Contact Straight Beam Ultrasonic Testing (UT)

This document is a guidance for API Monogram/APIQR auditors conducting API audits. This document does not prescribe any requirements that must be complied with by Licensed and/or Registered organizations. Actual requirements are listed in API product specifications and quality management system standards. Specifically, auditors are expected to ensure that the facility is conforming to (1) applicable product specification requirements for this activity, and (2) quality management system requirements, such as conformance with the company's own procedures, regulatory requirements, or contract requirements.

Auditors should familiarize themselves with standards referenced in the applicable API product specification. In the case of Straight Beam UT, such referenced standards may include ASTM A388, ASTM E213, ASTM A435, ASTM A578, ASTM E114, ASTM E164 and ASTM A609. Auditors may review the following areas of emphasis:

Auditors may review the Ultrasonic Testing procedure(s) to identify the type and method of UT described by the procedure. For example:

1. Are the required parameters for the equipment used to perform UT defined in the procedure and is the appropriate equipment used by the inspector, including:
 - a. Electronic apparatus
 - b. Search Units (also referred to as transducer or probe), including frequencies, size, and type (single or double)
 - c. Couplants (including type, viscosity, temperature)
 - d. Reference blocks for calibration (including material, acoustic properties, surface finish, type, size, and location of reflectors)
 - e. Are the records available (certification of calibration blocks, calibration record of equipment) in accordance with required standards?
2. Personnel Competence
 - a. Is there evidence of the required personnel competence (NDE qualification and certification level) of personnel performing and/or interpreting inspections?
 - b. Are the personnel qualified and certified in accordance with a written practice (e.g. ASNT or ISO 9712)?
 - c. Are the inspector's competence records available (e.g. testing scores, practical hours of inspection, continuance log) as required?
3. Part preparation: Prior to performing the inspection on the production part, what are the requirements identified in the procedure, if any, for:
 - a. Surface roughness
 - b. Parallelism between surfaces
 - c. Presence or absence of foreign matter such as paint, dirt, corrosion, loose material, pits, gouges, etc.

4. Calibration

- a. Is the facility performing calibration/instrument distance & sensitivity check using the appropriate method (e.g. reference-block calibration) at the frequency defined by its procedure (e.g. prior to each shift)?
- b. Has the organization established the distance amplitude correction (DAC) curve or sensitivity calibration, as required per the procedure?
- c. Has the organization verified linearity and horizontal linearity?
- d. Has the calibration demonstrated that the system can detect the smallest indications defined by the procedure/product specification?
- e. Is the criteria required for recalibration defined in the procedure and has it been performed as required?

5. Inspection

- a. What areas of the part must be examined, per the facility's procedures, drawings, or product specification?
- b. Is the inspection performed in the appropriate sequence (e.g. prior to heat treatment, after machining, etc. as applicable)?
- c. Is the required scanning rate defined in the procedure and is the technician maintaining the required rate?
- d. Is scanning required to be performed in multiple directions or follow a defined path as defined in the procedure? Is the technician following the pattern?
- e. Is there a requirement for scanning overlap?
- f. Does the organization define the acceptance criteria and is the operator aware of the criteria?
- g. Are the properties of the reference block (e.g. material, temperature, surface roughness, acoustic properties) similar to those of the production part, to the extent required by the specification or procedure?
- h. If the reference block and the production part diverge in the required properties, what modifications have been performed by the technician to compensate for the differences? Are the instructions defined?
- i. Are the reporting/records requirements defined in the procedure and is the inspector generating the required records?

If possible, auditors can observe facility personnel performing UT on a production part to determine if the facility is conforming to its procedures.