



**Blue Sheet
Engineering Division**

DCN:

<p>This Blue Sheet applies to: <input checked="" type="checkbox"/> Individual Policy/Procedure Listed Below</p>		
<p>LANL review date: 12/3/08</p>		
<p>Policy/Procedure No: # KSL – UT – ASTM A577-2001 Ultrasonic Angle Beam Examination of Steel Plate - 16-30-010</p>	<p>Rev. No.: 0</p>	<p>Date: 5/25/06</p>
<p>Manual, Policy or Procedure Title: ASTM A577-2001 Ultrasonic Angle Beam Examination of Steel Plate - 16-30-010</p>		
<p>Reason for Revision (if complete revision is checked above) Roll over of SSS contractor activities and work to LANL/LANS</p>		
<p>Documents listed above will be reviewed and conformed to by: All personnel qualified to perform Ultrasonic Examination of Steel Plate for acceptance of welding & related fabrications.</p>		
<p>Description of Change:</p> <p>1.0 Purpose – No Changes</p> <p>2.0 Scope – No Changes</p> <p>3.0 Definitions – Modify “QC” – to read – Test & Inspection personnel qualified in accordance with Engineering Standards Manual (ESM), Chapter 13 – Welding & Joining, Volume 1, GWS 1-11 Attachment 3, Qualification and Certification of NDE Personnel.</p> <p>4.0 Responsibilities – Delete “Quality Control Manager” responsibilities paragraph Modify “QC Inspector” title to UT Inspector Change “QC Inspector paragraph” to - It is the responsibility of the UT Inspector to inspect items to acceptance criteria specified by contract, specification, code, or work order. It is also the UT Inspector’s responsibility to identify, mark or document the welds that have been inspected and provide documentation of the inspection. Add - “UT Inspection personnel shall be qualified and certified in accordance with ESM, Chapter 13 – Welding & Joining, Volume 1, GWS 1-11 Attachment 3, Qualification and Certification of NDE Personnel.</p> <p>5.0 Methodology – 5.1.1 Delete - The qualification of personnel for Ultrasonic Examination shall meet the requirements of KSL QC Procedure 16-02-001, Nondestructive Examination (NDE) Personnel Qualification and Certification.</p>		



**ASTM A-577-2001 ULTRASONIC ANGLE BEAM EXAMINATION OF
STEEL PLATE**

16-30-010

IMPLEMENTATION

Affected Personnel: QC INSPECTORS

Training Determination: Required Reading

Procedure Owner: Performance Assurance Division

Release Date: 06/05/2006	Next Revision Date: 06/05/2009
Procedure Type: Operational Procedure	Revision Number: 0
Procedure Level: Department	Effective Date: 06/06/2006

DOCUMENT MODIFICATION HISTORY

Rev No.	Description of Modification
0	New Procedure, Initial Release.

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DOCUMENT REVIEW AND APPROVAL

Function	Name	Position Title	Date	Signature
Prepared by	Richard Bingham	ASNT UT Level III	06/05/06	Signature On File
	Morgan Dungan	PA Document Coordinator	06/05/06	Signature On File
Reviewed and Approved by	Thomas Bentley	ASNT UT Level III	06/05/06	Signature On File
	Gerald Woodson	QC Manager	06/05/06	Signature On File
Final Approval by	Mike Goodwin	Performance Assurance Division Director	06/06/06	Signature On File

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1.0 PURPOSE

The purpose of this procedure is to delineate the procedural steps for ultrasonic angle-beam examination of steel plates per ASTM A-577-2001 for detection and evaluation of defects other than laminar types.

2.0 SCOPE

This procedure covers the requirements and acceptance standards for angle-beam, pulse-echo, ultrasonic examination of carbon and alloy steel plates,

3.0 DEFINITIONS/ACRONYMS

ASNT – American Society for Non Destructive Testing

ASTM – American Standard for Testing and Materials

DAC – Distance Amplitude Curve

MHz – Megahertz – a unit of frequency equal to 1,000,000 cycles per second

PAD – Performance Assurance Division

QC – Quality Control Department within the Performance Assurance Division

UT – Ultrasonic Testing

4.0 RESPONSIBILITIES

Quality Control Manager

It is the responsibility of the QC Manager to ensure only those personnel who meet the requirements of this procedure are permitted to perform inspection/activities covered by this procedure. Personnel performing inspections shall be qualified and certified in accordance with QC Department procedure 16-30-001 Nondestructive Examination (NDE) Personnel Qualification and Certification Quality Control Inspector http://intranet.ksl.lanl.gov/crypt/dept_ap/16-30-001.pdf.

It is the responsibility of the QC Inspector to inspect items to acceptance criteria specified by contract, specification, code, or Work Order. It is also the QC Inspector's responsibility to identify, mark or document the items that have been inspected and provide documentation of the inspection. The Qualification of personnel for Ultrasonic Examination shall meet the requirements of QC Department procedure 16-30-001 Nondestructive Examination (NDE) Personnel Qualification and Certification.

Personnel certified to Level I, II, or III may perform the examination described herein and record the results of that examination.

Personnel certified to Level II or III shall supervise the examination when performed by a Level I, and shall evaluate the results of this examination.

Personnel performing UT testing shall wear appropriate safety and protective equipment.

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5.0 METHODOLOGY

5.1 PROCEDURAL STEPS

Personnel performing the examination shall be certified in accordance with QC Department procedure 16-30-001 Nondestructive Examination (NDE) Personnel Qualification and Certification http://intranet.ksl.lanl.gov/crypt/dept_ap/16-30-001.pdf.

5.1.1

The surface condition of the plate shall be conditioned as necessary to provide a clear, easily interpreted trace pattern on the screen.

5.1.2

1. The instrument shall be a pulsed-echo type. The amplitude linearity shall be checked in accordance with ASTM A-577-2001 Paragraph 5.1.
2. The transducer shall a 45-deg (in steel) angle-beam type with as active transducer length and width dimensions of ½ inch minimum and 1 inch maximum
3. The ultrasonic frequency selected for the examination shall be the highest frequency that permits detection of the required calibration notch, such that the amplitude of the indication yields a signal-to-noise ratio of at least 3:1.
4. The calibration reflector shall be a rectangular notch at least 1 inch in length and 3% of the plate thickness in depth. When the notch cannot be machined into the plate, then a calibration block of ultrasonically similar material may be used for calibration.
 - a. The notch shall be placed on the surface of the plate so that they are perpendicular to the major axis of the plate at a distance of 2 inches or more from the short edge. Locate the notch not more than 2 inches from the long edge of the plate.
 - 1) For plate thickness greater than 2 inches place a second notch as described above on the bottom surface of the plate or calibration block.
 - 2) The calibration block shall be within 1 inch of the thickness of the plates to be tested, for plates 2 inches thick and greater. For plates less than 2 inches thick the block shall be within 10% of the thickness of the plates to be inspected.

5.2 CALIBRATION PROCEDURE

1. Plate 2 inches and under (Calibration notch on one side only).
 - a. Place the transducer on the notched surface with the sound beam directed towards the broad side of the notch and position to obtain the maximum amplitude at the first v-path which is clearly resolved from the initial pulse. Adjust the gain so that the reflection amplitude is at least 50 screen but not more than 75% of full screen height. Record the location and amplitude of this indication on the screen. Then move the search unit away from the notch until the second v-path is obtained. Position the search unit for maximum amplitude of this signal and record the location and amplitude on the screen. Draw a line between the peaks of the 2 successive indications. This line is the distance amplitude

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curve (DAC) and shall be the 100% reference line for evaluation and reporting indication amplitudes.

2. Plates 2 inches to 6 inches inclusive (Calibration notch on both sides)
 - a. Place the search unit on the on the test plate aimed at the broad side of the notch on the opposite side of the plate. Position the search unit to obtain a maximum one-half vee-path indication amplitude. Adjust the instrument gain so that this amplitude is at least 50% but not more than 80% of full screen height. Record the location and amplitude on the screen.
 - b. Without adjusting the instrument settings, repeat this procedure for the 1-1/2 vee-path indication. Record the location and amplitude on the screen.
 - c. Without adjusting the instrument settings, reposition the search unit to obtain a maximum full vee-path indication from the notch on the test surface. Record the location and amplitude on the screen.
 - d. Draw a line on the screen connecting the points established for the ½, full, and 1-1/2 vee-path. This curve shall be a DAC for reporting indications amplitudes.
3. Plates over 6 inches (Calibration notch on both sides)
 - a. Place the search unit on the on the test plate aimed at the broad side of the notch on the opposite side of the plate. Position the search unit to obtain a maximum one-half vee-path indication amplitude. Adjust the instrument gain so that this amplitude is at least 50% but not more than 80% of full screen height. Record the location and amplitude on the screen.
 - b. Without adjusting the instrument settings, reposition the search unit to obtain a maximum full vee-path indication from the notch on the test surface. Record the location and amplitude on the screen.
 - c. Draw a line on the screen connecting the points established for the ½ and full vee-path. This curve shall be a DAC for reporting indications amplitudes.

5.3 EXAMINATION PROCEDURE

1. Scan one major surface of the plate on grid lines perpendicular and parallel to the major rolling direction, Grid lines shall be on 9-in. centers. Use a suitable couplant. Scan by placing the search unit near one edge and move the search unit along the grid line in a direction perpendicular to the edge to a location two plate thickness beyond the plate center. Repeat this scanning procedure on all grid lines from each of the four edges.
2. Measure grid lines from the center or one corner of the plate
3. Position the search unit to obtain maximum indication amplitude from each observed discontinuity.
4. For each discontinuity indication that equals or exceeds the DAC, record the location and length, and the amplitude to the nearest 25%. No indication with amplitude less than the DAC shall be recorded.
5. At each recorded discontinuity location, conduct a 100% examination of the mass under a 9-in. square which has the recorded discontinuity position at its center. Conduct the examination in directions perpendicular and parallel to the major rolling direction.

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5.4 ACCEPTANCE STANDARD

1. Any discontinuity indication that equals or exceeds the DAC shall be considered unacceptable unless additional exploration by the longitudinal method indicates it is laminar in nature.

6.0 RECORDS

1. The report shall include the following data:
 - a. Plate identification.
 - b. Pin pointed recordable indication location, lengths, and amplitudes.
 - c. Examination parameters, including: couplant, search unit type, angle, frequency and size; model and serial number of instrument and calibration plate description.
 - d. Date of examination and name of operator.

7.0 REFERENCES

ASTM A577-2001

ASNT Standard SNT-TC-1A

QC Department procedure 16-30-001 Nondestructive Examination (NDE) Personnel Qualification and Certification http://intranet.ksl.lanl.gov/crypt/dept_ap/16-30-001.pdf.

8.0 ATTACHMENTS

None