

KSL Procedures/Work Instructions



**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 – Ultrasonic Examination for ASME Weld Inspection Procedure- 16-30-006</p>	<p>Rev. No.: 3</p>	<p>Date: 3/7/07</p>
<p>Manual, Policy or Procedure Title: Ultrasonic Examination for ASME Weld Inspection Procedure- 16-30-006</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 qualified personnel to perform Ultrasonic Examination to ASME for acceptance of welding & related fabrications.</p>		
<p>Description of Change:</p> <p>1.0 Purpose – No Changes</p> <p>2.0 Scope – delete – “by Quality Control Department (QC)”</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 “QC 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. Delete subparagraph - 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. 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 - No Changes</p>		

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6.0 Records – Modify to read

Recordable indications shall be reported as to length, width and location and recorded on LANL NDE Inspection Report Form. GWS 1-11 Attachment 4

Modify last paragraph to read - The original report shall be given to the customer with a copy placed in inspectors file for a period of 1 year unless instructed by the customer to retain copies longer.

7.0 References – Delete –

16-00-05, NDE Inspection Report (ASME UT Inspection form)

Add –

ESM, Chapter 13 – Welding & Joining, Volume 1, GWS 1-11 Attachment 3, Qualification and Certification of NDE Personnel.

Implementation Support Document ISD 330-5.0 – Special Processes

8.0 Attachment - Delete –

16-00-05, NDE Inspection Report (ASME UT Inspection form)

Add - ESM, Chapter 13 – Welding & Joining, Volume 1, GWS 1-11 Attachment 4, NDE Inspection Report Form

Date Revision Required: 12/1/10

Changes as marked

Reviewed by:

Kelly Bingham
LANL Welding Program Administrator

Date: 12-2-08

Approved by:

____ Signature on File ____ Date: 3/31/09 ____
ES - DE Group Leader

____ Signature on File ____ Date: 3/31/09 ____
ES - DE Division Leader

MSS Policy/Procedures Review Team please forward original Blue Sheet to Luci Chavez upon approval



ULTRASONIC EXAMINATION FOR ASME WELD INSPECTION

16-30-006

IMPLEMENTATION

Affected Personnel: PERSONNEL PERFORMING ULTRASONIC INSPECTION OF WELDS PER ASME SECTION 5, ARTICLE 5.

Training Determination: Required Reading

Procedure Owner: Test and Inspection Department

Release Date: 3/7/07	Next Revision Date: 3/7/2010
Procedure Type: Operational Procedure	Revision Number: 3
Procedure Level: Department	Effective Date: 3/8/07

DOCUMENT MODIFICATION HISTORY

Rev No.	Description of Modification
1	Format changes and transfer to KSL
2	Major Revision
3	Minor changes to content

DOCUMENT REVIEW AND APPROVAL

Function	Name	Position Title	Date	Signature
Prepared by	Gerald Woodson	Subject Matter Expert	3/8/07	Signature on file
	Melissa Vigil	Technical Writer	3/7/07	Signature on file
Reviewed and approved by	Gerald Woodson	Quality Control Department Manager	3/8/07	Signature on file
Final approval by	Dan Gibson	Performance Assurance Director	3/8/07	R. Maestas for D. Gibson Signature on file

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1.0 PURPOSE

This procedure establishes the method and technique for ultrasonic testing (UT) of welds in accordance with ASME Section V- Article 5, ANSI B31.1 and ANSI B31.3.

2.0 SCOPE

This procedure applies to ultrasonic weld inspection activities performed by Quality Control Department (QC) on welds specified by contract, specification, code, or Work Order to be inspected in accordance with ASME Section V-Article 5.

3.0 DEFINITIONS/ACRONYMS

ASME – American Society of Mechanical Engineers

ASTM – American society for Testing and Materials

DAC - Distance-Amplitude Correction

MSDS – Material Safety Data Sheet

NDT – Nondestructive Testing

UT – Ultrasonic Testing

QC – Quality Control Department within Performance Assurance Division

4.0 RESPONSIBILITIES

QC 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 inspections/activities covered by this procedure. Personnel performing inspections shall be qualified and certified in accordance with KSL QC Department Procedure 16-02-001, Nondestructive Examination (NDE) Personnel Qualification and Certification.

QC Inspector- 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 welds that have been inspected and provide documentation of the inspection.

- 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.
- 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 Ultrasonic Testing (UT) testing shall wear appropriate safety and protective equipment during field testing, which may include the following:

- Hard Hat
- Safety Shoes
- Eye protection

Attend pre-job briefings, read and understand applicable IWDs, wear proper protective equipment and read material safety data sheets (MSDS).

5.0 METHODOLOGY

5.1 EQUIPMENT

1. Instrument – Use a pulse echo ultrasonic flaw detector capable of generating frequencies from 1.0 to 5.0 MHz and equipped with a stepped gain control calibrated in units of 2 dB or less.
 - a. Calibrate the ultrasonic instrument internal alignment at least once every 12 months in accordance with manufacture's specifications by independent calibration vendor.
 - b. Assure instrument bears a valid calibration sticker.
 - c. The amplitude control linearity shall be checked using the procedure in Appendix II at a minimum of 3-month intervals.
 - d. The screen height linearity shall be checked using the procedure in Appendix I at a minimum of 3-month intervals.
 - e. Search unites may contain single or dual elements search units with contoured wedges may be used but, calibration shall be done with the contact wedge to be used during the examination. Transducer frequencies shall be a nominal 2.25 MHz, unless attenuation or a need for greater resolution makes other frequencies more suitable. The nominal angle shall be 45°, but other angles may be used when appropriate.
2. Couplant Materials
 - a. Use Ultragel II or equivalent as a couplant.
 - b. Alternate couplants may be used provided they meet the client's requirements.

5.2 CALIBRATION BLOCK

1. The calibration block shall be a section of pipe the same nominal size, schedule, Heat treatment and material specification or equal P-Number as one of the materials being examined. For the purpose of this procedure P-Numbers 1, 3, 4 and 5 are considered equivalent. The block size and reflector location shall be adequate to perform the calibration. The surface finish of the calibration block shall be representative of the surface finish of the piping. The overall length will be 8 times the thickness or 8 inches which ever is greater. For pipe 4 inches OD and under the arc length will be 270°. For OD's > 4 inches the arc length will be the greater of 3 times the thickness or 8 inches.
2. The notches shall be a square or rectangular grooves with a depth equal to 10% of the thickness of the calibration block +10% - 20% of the depth. The notches will be 2 in. from the end of the calibration block and 1inch minimum in length. Notches will be cut on both the top and bottom surface so that a ½, 1, and 1-1/2 vee-path can be obtained from the top surface of the calibration block.
3. The calibration blocks shall meet the requirements of ASME Section V, Article 5, Fig. T542.2.1 Basic Calibration Block for welds in plate and ASME Section V, Article 5, Fig. T-542.8.1.1 Angle Beam Calibration (Pipe Welds)

4. For alternate method ("KBA FAST Probe") use similar material with 1/32" side drill hole at varying depths.

5.3 CALIBRATION PROCEDURE

1. Set up a DAC curve (3 or more points) using the basic calibration block for plate welds or the pipe calibration block, for pipe welds. Adjust the response of the first reflector to 80% FSH and mark its position on the screen and then without adjusting the amplitude move the transducer to the 2nd reflector and mark it's position on the screen and then proceed in a similar manner until all the DAC points have been marked. Draw the DAC Curve on the screen by connecting the points. The gain setting during this procedure shall be noted as the Reference Level.
2. An alternate procedure for thin wall austenitic stainless steel pipe or tubing can be done by using a "KBA FAST" Model 1 probe.
3. Establish a linear depth calibration using a 1" range and the 1/32" SDH Calibration block.
4. The reference sensitivity shall be set at 50% FSH using the 1/32' SDH at the depth closest to the actual wall thickness of the pipe.

5.4 EXAMINATION PROCEDURE

1. Angle Beam Transducer
 - a. Use a single or dual element search unit (transducer) that generates transverse or longitudinal waves with nominal frequencies over a range of 2 to 5 MHz. The beam angle shall be in the range of 45° to 70° in steel.
 - b. Other transducer angles and frequencies may be used to further evaluate indications.
 - c. The base metal on each side of the weld shall be free of weld spatter, surface irregularities, or foreign matter that would interfere with the examination. Where the weld metal interferes with the examination, the weld metal shall be prepared as needed to permit the examination.
 - d. The angle beam shall be directed at approximate right angles to the weld axis from two directions where possible. The angle beam shall be manipulated so that the sound beam passes through the required volume of weld and adjacent base metal. The scanning shall be performed at a gain setting of 12 dB above the reference level. Evaluation shall be performed with respect to the Reference Level.
2. Alternate procedure using a "KBA FAST" Model 1 probe.
 - a. Scan line 1: Shall be at the exit point of transducer to the root of the centerline of the root of the weld.
 - b. Scan line 2: 1/2" forward of scan line 1 or Butt up to weld (only required for single side access).

5.5 ACCEPTANCE STANDARD

1. Any discontinuity that causes an indication in excess of 20% DAC shall be investigated to the extent that it can be evaluated in terms of the acceptance standards of the referencing Code Section.
2. Alternate procedure using a "KBA FAST" Model 1 probe

3. Indications that exceed the reference level shall be investigated to the extent that it can be evaluated in terms of the acceptance standards of the referencing Code Section.

6.0 RECORDS

Record data and any recordable indications on NDE Inspection Report Form, 16-30-005.1. Place original in project file and provide a copy to QC files for a period of six months.

7.0 REFERENCES

16-30-005.1, NDE Inspection Report (ASME UT Inspection Form)

8.0 ATTACHMENTS

16-30-005.1, NDE Inspection Report (ASME UT Inspection Form)



NDE Inspection Report

Project	Work Order #	Date
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Product Nomenclature	Procedure Specification	Type of Material
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METHOD MT <input type="checkbox"/> UT <input type="checkbox"/> PT <input type="checkbox"/> RT <input type="checkbox"/>	<i>Welder Identification</i> <i>Surface Indications</i> <i>Porosity</i> <i>Slag Inclusions</i> <i>Cracks</i> <i>Incomplete Fusion</i> <i>Inadequate Penetration</i> <i>Tungsten Inclusions</i> <i>Undercut</i> <i>Burn Through</i> <i>Gas and Blow Holes</i> <i>Accept</i> <i>Reject</i>	DATA Straight/Angle Beam Db Level Unit Serial # Ducer Serial # Calibration Block #
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		Casting
		Other
		Single wall
		Double Wall
		Material Thickness
		Film to Source
		Exposure time
		Source type
		Curie Strength
		Kilovolts
		Milli-amperes
		Screens
		Filters
		Pene. Type
		Shim Size
		Sensitivity
		Film Size
		Film Type
		Film Quantity
		Pene. (dye) Flour:
		Dwell Time
		Mag (AC) (DC)
		Coil
		Yokes
		Central Bar
		Head Shot
		Prod.
		Amps
		Unit Calibration Date:

Batch #(Ut, PT,MT)	
Remarks	

	Inspectors Signature	Level
Reviewed By	This inspection was performed in accordance with the above named procedure/specification.	