ATT. 3

MAGNAFLUX
Quality Services

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[signature] AUTHORIZED FOR USE	3/5/83 DATE
Client Approval	Date

MAGNAFLUX QUALITY SERVICES
TEST & INSPECTION PROCEDURE

22.A.35-Summer 1978

ULTRASONIC EXAMINATION OF AUSTENITIC PIPING AND BRANCH CONNECTION WELDS FOR IGSCC

Reference: ASME Section XI, 1977 Edition with all addenda through Summer 1978

REVISION NO.	DESCRIPTION	BY	EFFECTIVE DATE
2	Issued for use	7683 MFS	3/5/83
1	Issued for use	7683 MFS	2/24/83
0	Issued for use	7683 MFS	1/31/83

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Q PDR

1.0 SCOPE

1.1 This procedure describes the volumetric method of examination for the detection of intergranular stress corrosion cracking (IGSCC) in Class 1 and Class 2 full penetration butt and branch connection welds in austenitic piping systems having a nominal wall thickness of 0.200 to 3.5 inches by the contact method.

1.2 This procedure shall be used in conjunction with Procedure 22.A.21 - Summer 1978, which contains the general requirements applicable to this procedure, unless otherwise specified.

1.3 Examination and evaluation of indications may be carried out utilizing the calibration and examination techniques of this procedure.

1.4 This method of examination, in conjunction with a surface examination fulfills the volumetric examination requirements for most austenitic piping and branch connection welds and some ferritic piping and branch connection welds. Notch depth requirements for ferritic piping calibration blocks may preclude the use of this procedure.

1.5 When remote recording devices are used to augment the recording of indications, Procedure 22.A.36 - Summer 1978 shall be used in conjunction with this procedure.

2.0 GENERAL

2.1 See 22.A.21 - Summer 1978, Section 2.0.

2.2 The objective of the ultrasonic method given herein is the location and recording of indications in the required examination volume.

2.2.1 Class 1 Exam Volumes

2.2.1.1 Circumferential and Longitudinal Pipe Welds: The lower 1/3 of the weld and any weld metal previously applied to either side of the lower 1/3 of the weld (cladding excluded) and the lower 1/3 of the base material either side of the weld center line for a distance of 1/4 inch from the widest point of the weld. See Figure 3.

2.2.1.2 Pipe Branch Connection Welds: The lower 1/3 of the weld and any weld metal previously applied to either side of the lower 1/3 of the weld (cladding excluded) and the lower 1/3 of the base material either side of the weld center line for a distance of 1/4 inch from the widest point of the weld. See Figures 4, 5 and 6.

2.2.1.3 Intersecting Longitudinal Seams: The examination volume required in Paragraph 2.2.1.1 for a length of at least one pipe diameter, but not more than 12 inches, of any longitudinal seam which intersects a circumferential seam weld required to be examined. See Figure 3.

2.2.2 Class 2 Exam Volumes

2.2.2.1 Circumferential and Longitudinal Pipe Welds: The examination volume required in Paragraph 2.2.1.1, except See Figure 7.

2.2.2.2 Pipe Branch Connection Welds: The examination volume required in Paragraph 2.2.1.2, except See Figure 8.

2.2.2.3 Intersecting Longitudinal Seams: The examination volume required in Paragraph 2.2.1.1 for a length of at least 2-1/2 times the nominal wall thickness of any longitudinal seam which intersects a circumferential weld required to be examined. See Figure 7.

2.3 The client shall provide all pertinent data, drawings and sketches to the examination team prior to examination to aid in the preparation of a scan/inspection plan.

3.0 REFERENCES

3.1 See 22.A.21 - Summer 1978, Section 3.0.

3.2 Specifically, ASME Section XI, Appendix III, Supplement 7, 1977 Edition with all addenda through Summer 1978.

3.3 Magnaflux Quality Services Procedures

3.3.1 22.A.31 - Summer 1978 Longitudinal Wave Examination of Welds in Piping Systems

3.3.2 27.A.1 Marking and Incrementing of Welds for Nondestructive Examination

3.4 IE BULLETIN NO. 83-02

4.0 PERSONNEL

4.1 See 22.A.21 - Summer 1978, Section 4.0.

4.2 All personnel performing examinations to this procedure shall receive training in the recognition of IGSCC signals. When required by the client, personnel shall demonstrate the procedure to the client or his designee prior to performing any examinations to this procedure.

5.0 EQUIPMENT

5.1 Test Instruments

5.1.1 Test instruments shall meet the requirements of 22.A.21-Summer 1978, paragraph 6.1, prior to the performance of any examinations.

5.1.2 The primary test instrument shall be a Magnaflux Corp., Model PS-710B, with an amplitude activated gating system capable of being utilized across 100% of the horizontal CRT presentation.

5.1.3 Alternately, Magnaflux Corp. Model 710 or 702 Series test instruments, or equivalent test instruments of other manufacturers, may be used to conduct examinations and evaluations. Alternate test instruments must meet the requirements of 5.1.1 of this

5.2 Search Units

5.2.1 The search units utilized for examination shall be dual element, zone isolation 45° refracted shear angle, ±2°, with a nominal operating frequency of 1.5 MHz.

5.2.2 The beam exit point of all flat shear wave search units shall be checked per paragraph 6.2.3 of procedure 22.A.21-Summer 1978.

5.2.3 KB-Aerotech Model 291-745 search units or Search Unit Systems, Inc. models, selected from the table below, shall be used.

PIPE WALL NOMINAL "T"	SEARCH UNIT MODEL NO.	DESCRIPTION
0.2 to 0.5 inches	SUS 11	1.5 MHz., 45° shear wave, 1/4 x 3/16 receiver element, 1/4 x 3/16 transmitter element
0.5 to 1.0 inches	SUS 10	1.5 MHz., 45° shear wave, 3/8 x 3/8 receiver element, 3/8 x 3/8 transmitter element
1.0 to 1.5 inches	SUS 16	1.5 MHz., 45° shear wave, 3/8 x 3/8 receiver element 3/8 x 3/8 transmitter element
1.5 to 3.5 inches	SUS 39	1.5 MHz., 45° shear wave, 1/2 x 1/2 receiver element, 1/2 x 1/2 transmitter element

5.2.4 Other angles, sizes, frequencies and configurations may be used to accommodate inspection of various geometries or to allow for the variables as outlined in paragraph 5.2.4 of this procedure.

5.2.4 Variables such as weld preparation, weld crown width, or physical interference may preclude 1/2-Vee (4/8 Node) examination of the weld root area as shown in Figure 1. If these variables are such that the dimension "A" is greater than:

0.93 T for $\theta = 43^{\circ}$ to 45°
1.6 T for $\theta = 58^{\circ}$ to 60°
2.5 T for $\theta = 68^{\circ}$ to 70°

the beam path shall be increased by 1-Vee. Alternatively, the interference may be eliminated by one or more of the following:

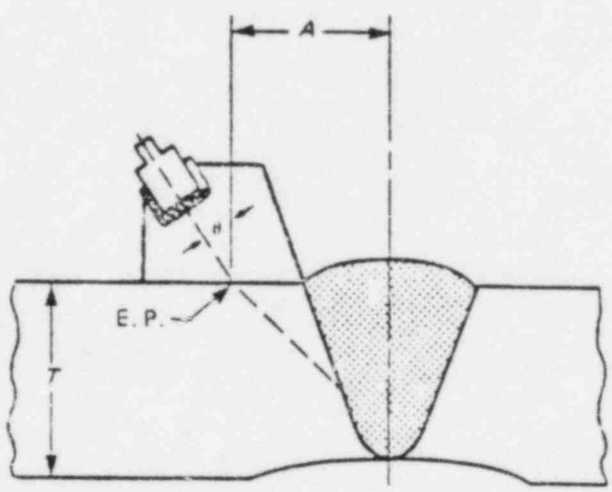
a. reducing the dimension of the wedge front face-to-point of incidence

b. reducing the search unit size

c. increasing the beam angle

d. conditioning the weld surface

Figure 1
Physical Restrictions to the Weld Examination



5.3 Calibration Blocks

5.3.1 Material

5.3.1.1 The basic calibration block shall be made from material of the same nominal diameter and wall thickness or pipe schedule as the pipe to be examined.

5.3.1.2 If material of the same specification is not available, material of similar chemical analysis, tensile properties, and metallurgical structure may be used.

5.3.1.3 The surface finish of the block shall be representative of the surface finish of the pipe to be examined.

5.3.1.4 Where the examination is to be performed from only one side of the joint, the block material shall be of the same specifications as the material on that side of the joint.

5.3.2 Design

5.3.2.1 The basic calibration block shall generally conform to the design shown in Figure 2A.

5.3.2.2 Side drilled holes for 1/2-Vee examinations shall be machined into the blocks. Their position shall not interfere with the metal path to the notches. Hole length shall be a minimum of 1-1/2 inches, drilled and reamed essentially parallel to the block surface, and of a diameter as selected from Table 1.

Table 1

BLOCK THICKNESS	HOLE DIAMETER (±1/32 in.)
1 inch or less	3/32 in.
over 1 in. to 2 in.	1/8 in.
over 2 in. to 4 in.	3/16 in.
over 4 in. to 6 in.	1/4 in.

5.3.2.3 For examination of austenitic piping welds (specifically 304 SS), a SUS 237-1 or SUS 237-2 block shall be used to determine the search unit refracted beam angle (See Figure 2B). Alternately a stainless steel IIW block may be used to check the beam angle.

NOTE: The method for checking the exit angle in a material utilizing the actual calibration block as outlined in Procedure 22.A.21 - Summer 1978, Paragraph 6.2.4.2, may also be used.

6.0 PROCESS

6.1 Surface preparation shall be in accordance with 22.A.21 - Summer 1978, Section 7.0 and shall be the responsibility of the client.

6.2 Welds shall be incremented in accordance with Procedure 27.A.1.

6.3 When determined necessary by the Level II or III technician, the volume through which the angle beam will pass shall be examined by L-wave in accordance with 22.A.31-Summer 1978 or an equivalent L-wave piping weld procedure.

6.4 Separate axial and circumferential shear wave calibrations shall be conducted for each Material/Diameter/Thickness range examined. If the axial and circumferential exams are conducted in conjunction with each other with the same inspection system, only the calibrated gain/attenuation control variations are allowed and separate calibration sheets must be maintained for each exam.

6.5 Shear Wave Sweep Range - General

6.5.1 Position the search unit to obtain the maximum signal amplitude from the I.D. Notch at the 4/8 Node position. Sweep and delay the signal to 40% of FSW on the base line.

6.5.2 Position the search unit to obtain the maximum signal amplitude from the O.D. Notch at the 8/8 Node position. Sweep and delay the signal to 80% of FSW on the base line.

6.5.3 Using the sweep and delay controls, adjust the 4/8 and 8/8 signals so that they appear at 40% and 80% of FSW respectively. When this adjustment is completed, the signals from the 3/8 and 5/8 Node SDH reflectors should appear at approximately 30% and 50% of FSW for block thicknesses over 1.0 inches. For blocks with a 1/2T SDH, the 2/8 and 6/8 Node reflectors will appear at approximately 20% and 60% of FSW.

NOTE: Other percentages of FSW may be used for sweep positions to utilize the CRT to the maximum extent practical to examine the required volume.

6.5.4 When the sweep and delay adjustments have been completed, lock the sweep and delay controls and record the instrument control settings, sweep positions on the CRT, the surface distance measurements (search unit front face to the notch edge closest to the search unit and the search unit front face to the SDH centerline scribe marker).

6.5.5 Measure the distance from the search unit point of incidence (beam exit point) to the search unit front face (SUFF) and record on the calibration data sheet.

6.6 <u>Shape and Slope of the DAC Curve</u>

6.6.1 <u>1/2-Vee Exam on Thicknesses Greater Than 1 Inches</u>

6.6.1.1 Position the search unit to obtain the maximum signal amplitude from the SDH reflector at the nodal point producing the highest response. In most cases this will be the SDH at the 3/8 Node position. However, in some material thicknesses, the 5/8 Node SDH will produce the highest response.

6.6.1.2 Set the maximum amplitude signal at 80% FSH using the calibrated gain/attenuation control and fine sensitivity control. Mark the amplitude of the signal on the CRT and lock the sensitivity control.

NOTE: Allow sufficient calibrated gain to allow for "hot" scanning and indication amplitude evaluation.

6.6.1.3 Without changing the instrument gain, determine the peak amplitudes from the remaining SDH reflectors and mark the amplitude on the CRT. Connect the points on the CRT in a smooth, best-fit curve. Extend the curve 1/4T in both directions to cover the examination range.

6.6.2 <u>1/2-Vee Exam on Thicknesses Up To 1.0 Inches</u>

6.6.2.1 Position the search unit to obtain the maximum signal amplitude from the SDH reflector at the nodal point producing the highest response. In most cases this will be the SDH at the 2/8 Node position. However, in some material thicknesses, the 6/8 Node SDH will produce the highest response.

6.6.2.2 Set the maximum amplitude signal at 80% FSH using the calibrated gain/attenuation control and fine sensitivity control. Mark the amplitude of the signal on the CRT and lock the sensitivity control.

NOTE: Allow sufficient calibrated gain to allow for "hot" scanning and indication amplitude evaluation.

6.6.2.3 Without changing the instrument gain, determine the peak amplitudes from the remaining SDH reflectors and mark the amplitude on the CRT. Connect the points on the CRT in a smooth, best-fit curve.

6.6.3 Establish the sensitivity by setting the signal from the I.D. Notch, at the 4/8 Node position, at the level of the DAC curve in accordance

6.6.3.1 (Cont'd)

with Paragraph 6.6.3.1 or 6.6.3.2, whichever is applicable.

6.6.3.1 If the I.D. Notch signal amplitude is less than DAC, raise the signal amplitude to the level of the DAC using the calibrated gain/attenuation control. This gain setting becomes the primary reference level for the examination.

6.6.3.2 If the I.D. Notch signal is greater than DAC:

a. Using the calibrated gain/attenuation control, bring the I.D. Notch signal to 80% FSH. Lower the notch signal to the SDH DAC line.

b. Raise the signals from the side drilled holes by the dB difference between the I.D. Notch at 80% FSH and the SDH DAC.

c. Re-form the DAC curve at this amplitude.

d. Return the calibrated gain/attenuation control the notch at 80% FSH setting. This setting becomes the primary reference level.

6.6.4 1-1/2 - Vee Examination Calibration

6.6.4.1 When the 1-1/2 - Vee examination technique is required, the shape and slope of the DAC curve shall be established using the I.D. and O.D. notches at the 4/8 (usually the primary reference response), 8/8, 12/8 and 16/8 node positions. The signals shall be placed at 20%, 40% 60% and 80% of FSW respectively.

6.6.4.2 Using the calibrated gain/attenuation control, raise the signal from the I.D. notch at the 12/8 node position to 80% FSH. This gain/attenuation setting becomes the evaluating gain for indications at the 1-1/2 - Vee position.

6.6.4.3 Raise the DAC curve by the dB difference between the original slope and that determined in 6.6.4.2 and reform the DAC curve at this amplitude.

NOTE: The 4/8 and 8/8 node reflectors may be over 100% FSH.

6.7 Record the instrument settings for gain/attenuation, fine sensitivity, and signal amplitudes on the calibration data sheet.

6.8 Examination

6.8.1 The examination volumes described in Paragraph 2.2 of this procedure shall be examined by angle beams perpendicular to the weld axis (axial scan) from both sides, parallel to the weld axis (circumferential scan) on both sides of the weld in the clockwise (CW) and counterclockwise (CCW) directions, and along the weld axis (weld crown) in the CW and CCW directions. Any restrictions which prevent the performance of these scans shall be noted on the data sheet.

6.8.2 Scanning sensitivity shall be a minimum of 10 dB "hot".

6.8.3 Scanning speed shall not exceed 3 inches per second.

6.8.4 Scanning overlap shall be a minimum of 25% of the search unit piezoelectric element dimension perpendicular to the direction of scan.

6.8.5 The search unit shall be oscillated at least 30° right and left of the search unit axis during all exams.

7.0 REPORTS

7.1 Recording

7.1.1 For each indication that equals or exceeds 20% DAC, the following information shall be recorded:

a. The maximum amplitude as percent of DAC or dB from DAC.

b. The sweep reading to the reflector at maximum amplitude, and the minimum and maximum sweep readings at half maximum amplitude (HMA).

c. The search unit location from the weld center line at maximum amplitude. The minimum and maximum locations at HMA (surface distance measurement).

d. The search unit location parallel to the reflector at maximum amplitude. The end points where the indication equals HMA (length).

e. Search unit orientation (sound beam direction).

f. The indication length may be carried out to less (below) HMA by the scanning technician at the direction of the master CRT monitor. Signal amplitude and search unit location at these extended points will be recorded on the data sheet.

7.1.2 Any indication producing a response of less than 20% and suspected by the examiner to be other than geometric in nature shall be recorded and investigated to the extent necessary to determine the shape, length and location of the reflector.

7.1.3 Ultrasonic indications that can be identified as being geometric in nature, (due to weld configuration, variation in metallurgical structure, etc.) shall be confirmed by comparison with fabrication drawings, radiographs, or visual examination. Supplemental examination methods shall be used to confirm the presence of geometric reflectors if necessary.

7.1.4 When recordable indications are found, the process outlined in either Paragraph 7.2.1 or 7.2.2 shall be used to record indication data on the data sheet.

7.2.1 Axial Scan

a. Maximize the indication signal. In relation to the reference level, record the maximum amplitude point on the CRT as % of DAC or DAC ±dB, the indication sweep position, the SUFF centerline position along the weld axis, and the beam direction(upstream or downstream).

b. Measure the width of the weld at the maximum amplitude point and record. Dividing the weld width by 2 will give the approximate weld center line.

c. Measure from the SUFF to the edge of the weld at the maximum amplitude position and record.

d. Move the search unit toward the weld center line until the signal drops to the HMA point on the CRT. Record the SUFF to weld edge measurement and the indication sweep position.

e. Move the search unit away from the weld center line, through the maximum amplitude point, until the signal drops to the HMA point on the CRT. Record the SUFF to weld edge measurement and the indication sweep position.

f. Return the search unit to the maximum amplitude position.

g. Move the search unit CCW parallel to the weld axis toward the lower reference number station until the signal amplitude drops to HMA. Record the SUFF center line position along the weld axis and the CRT sweep position.

7.2.1 Axial Scan (Cont'd)

h. Move the search unit CW parallel to the weld axis, through the maximum amplitude point, until the signal drops to HMA. Record the SUFF center line position along the weld axis and the CRT sweep position.

NOTE: Steps g and h may be carried beyond the HMA points. Record the signal amplitudes and sweep positions at the termination points.

7.2.2 Circumferential Scan

a. Maximize the indication signal. In relation to the reference level, record the maximum amplitude point on the CRT as % of DAC or DAC ±dB, the indication sweep position, and the beam direction (clockwise or counter-clockwise).

b. Measure the weld width at the maximum amplitude point and record.

c. Laying the measuring device across the SUFF, determine the search unit position from the SUFF center line to the weld edge and the SUFF position along the weld axis. See Figure 9.

d. Move the search unit in the beam direction until the signal drops to HMA. Record the SUFF position along the weld axis and the indication CRT sweep position.

e. Move the search unit back, through the maximum amplitude point, until the signal drops to HMA. Record the SUFF position along the weld axis and the indication CRT sweep position.

f. Return the search unit to the maximum amplitude position.

g. Move the search unit perpendicular to the beam direction toward the weld center line until the signal amplitude drops to HMA. Measure and record the SUFF center line to weld edge position and the indication CRT sweep position.

h. Move the search unit away from the weld center line, through the maximum amplitude point, until the signal drops to HMA. Measure and record the SUFF center line to weld edge position and the indication CRT sweep position.

NOTE: Steps g and h may be carried beyond the HMA points. Record the signal amplitudes and sweep positions at the termination points.

7.3 Evaluation of Indications

7.3.1 All recorded indications suspected of being flaws shall be evaluated by a tested and certified Level II or III ultrasonic technician.

7.3.2 Indications shall be plotted to the extent that the length and location, with respect to the weld centerline, can be determined.

7.3.3 When deemed necessary, a Level II or III technician shall scan the specific areas of suspected IGSCC to provide additional data as to size, shape and extent of the suspected flaw. These evaluations shall be conducted with equipment that is calibrated to and meets all the requirements of this procedure.

7.3.4 Special skewed scan angles may be used to determine the shape and orientation of the suspected flaw.

7.4 All calibration sheets, data sheets, and evaluations shall be provided to the client within the time frame stipulated by the client. All data becomes the property of the client who shall be responsible for retention.

8.0 ACCEPTANCE CRITERIA

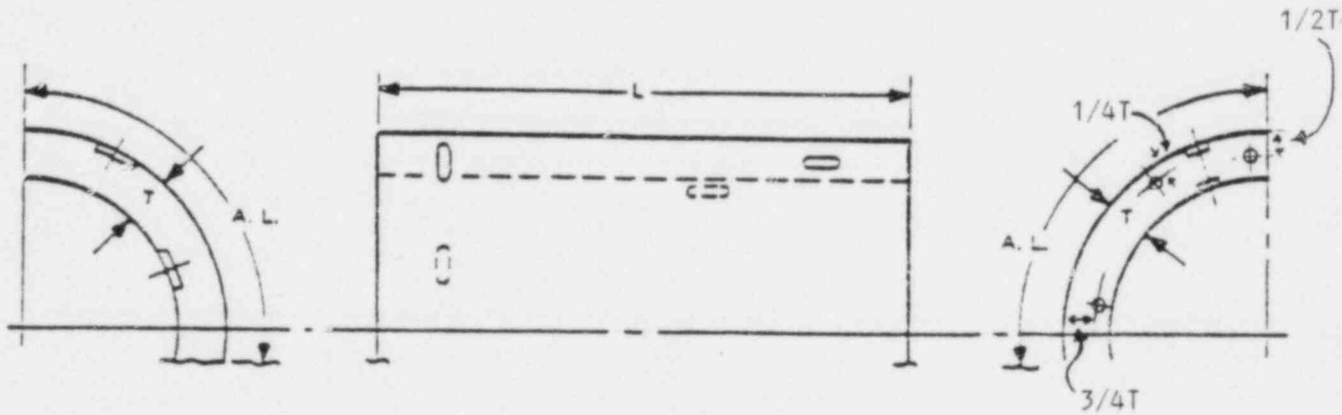
8.1 The indications recorded shall be evaluated in accordance with the criteria outlined in IWA-3000, ASME Section XI, 1977 Edition with all addenda through Summer 1978.

8.2 The indications recorded shall be compared to the acceptance standards of IWB-3514, ASME Section XI, 1977 Edition with all addenda through Summer 1978.

8.3 Other acceptance criteria may be used at the direction of the client and shall be considered a part of this procedure.

Figure 2A

General Calibration Block Design
Requirements



Typical Block Dimensions

Length (L) 8 in. or $8T$, whichever is greater

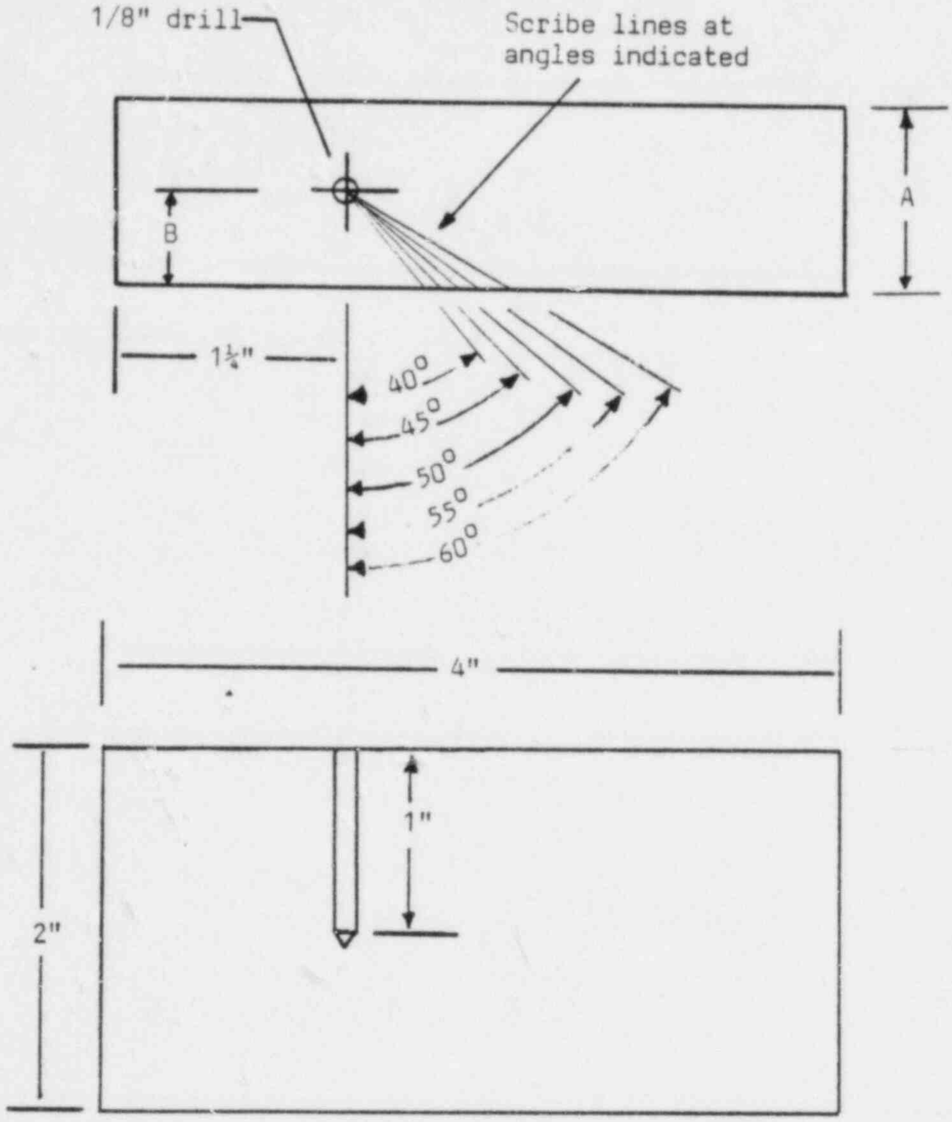
Minimum Arc Length ($A.L.$) (1) for O.D. 4 in. or less: 270 deg.
(2) for O.D. greater than 4 in.: the greater of $3T$ or 8 in.

Specific Notch Dimensions

Length (L)	— 1 in. minimum
Depth (D)	— 10% T with tolerance D $^{+10\%}_{-20\%}$ of Depth
Width	— 1/8 in. to 1/4 in.
Location	— not closer than T from any block edge

Figure 2B

Angle Beam Calibration Block

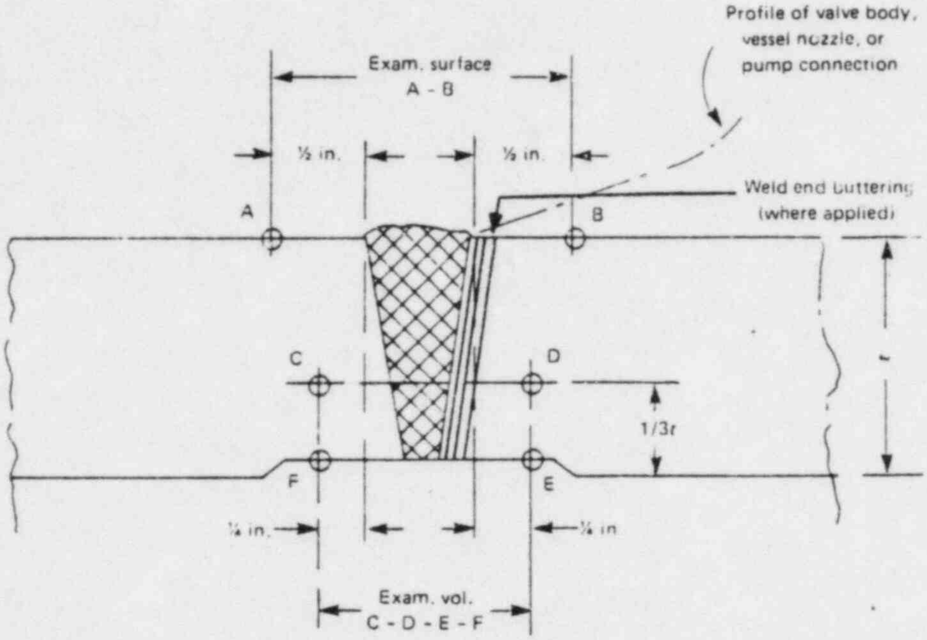


BLOCK	A	B
SUS 237-1	1 in.	½ in.
SUS 237-2	1½ in.	1 in.

250 RMS Finish

Figure 3

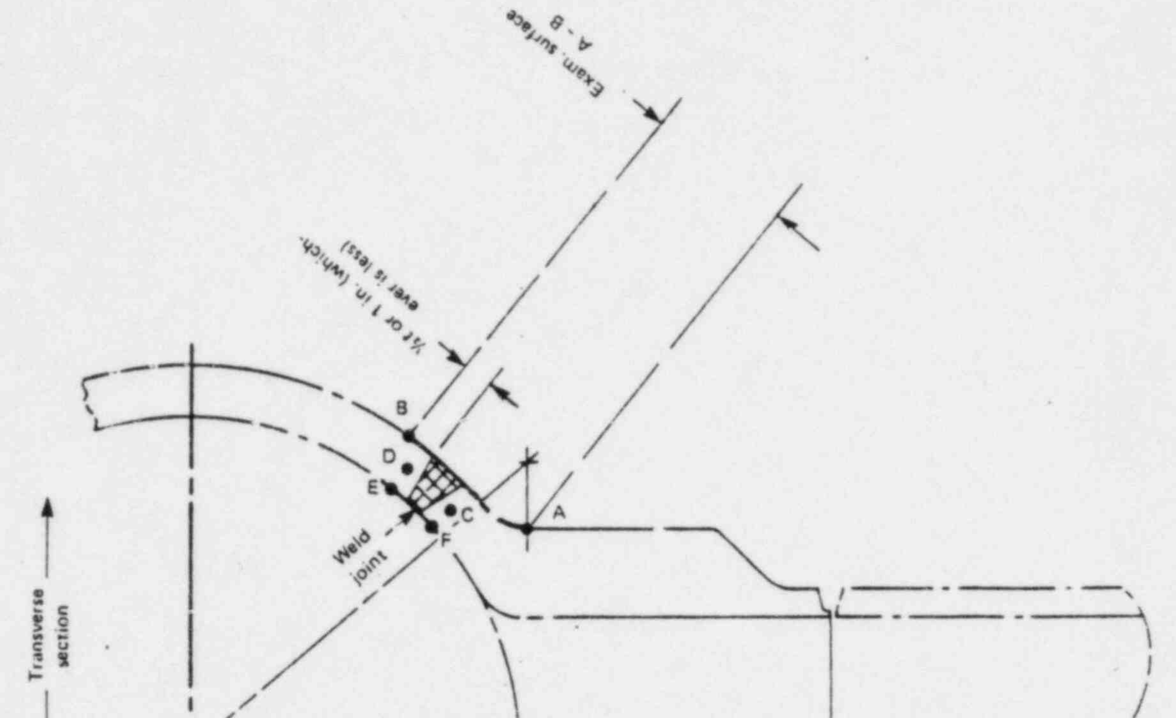
Class 1 Similar and Dissimilar Metal Welds in Piping-Nomiral Size 4 in. and Greater



(c) NPS ≥ 4 in.

Figure 4

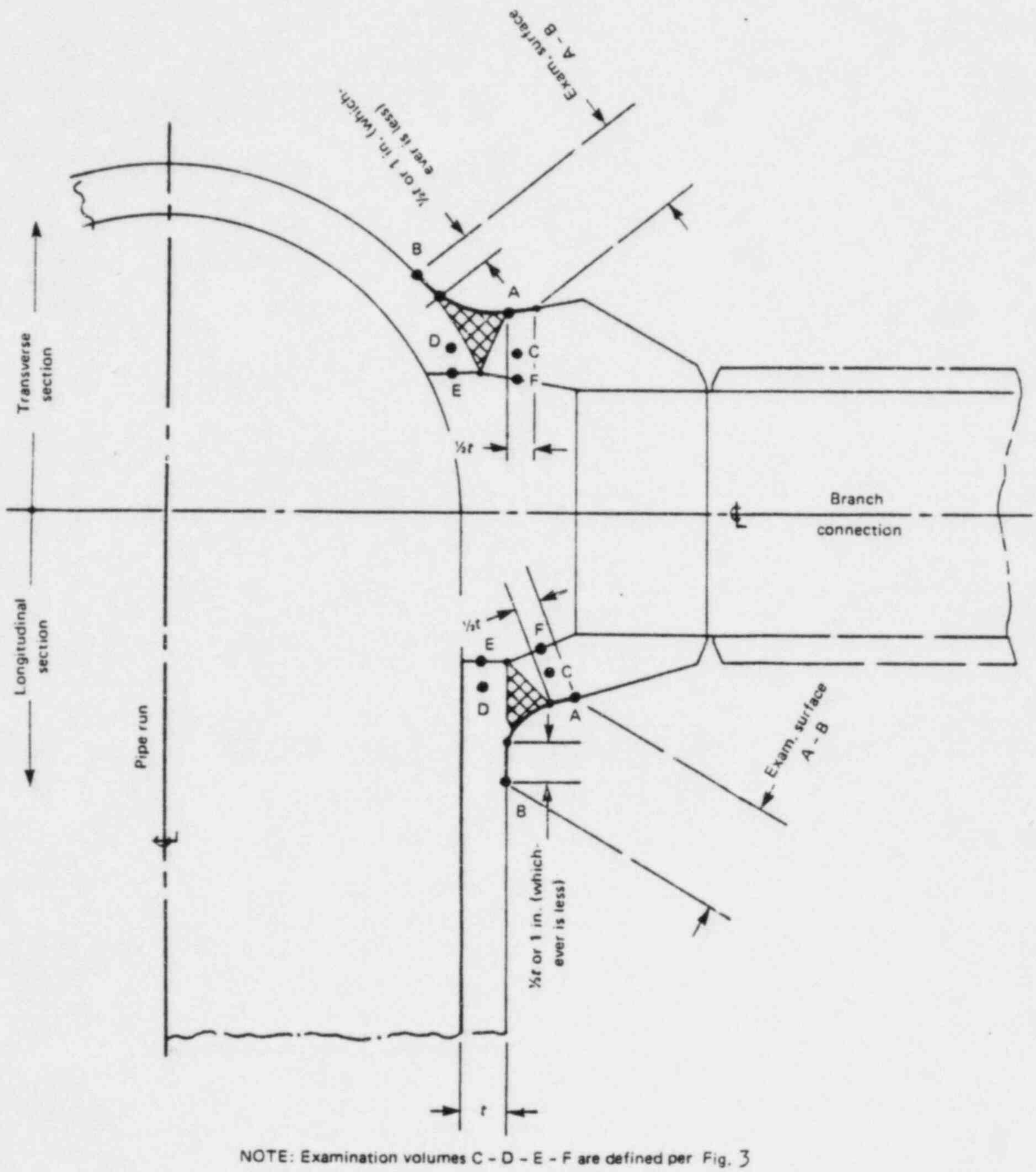
Class 1 Pipe Branch Connections



NOTE: Examination volumes C - D - E - F are defined per Fig. 3

Figure 5

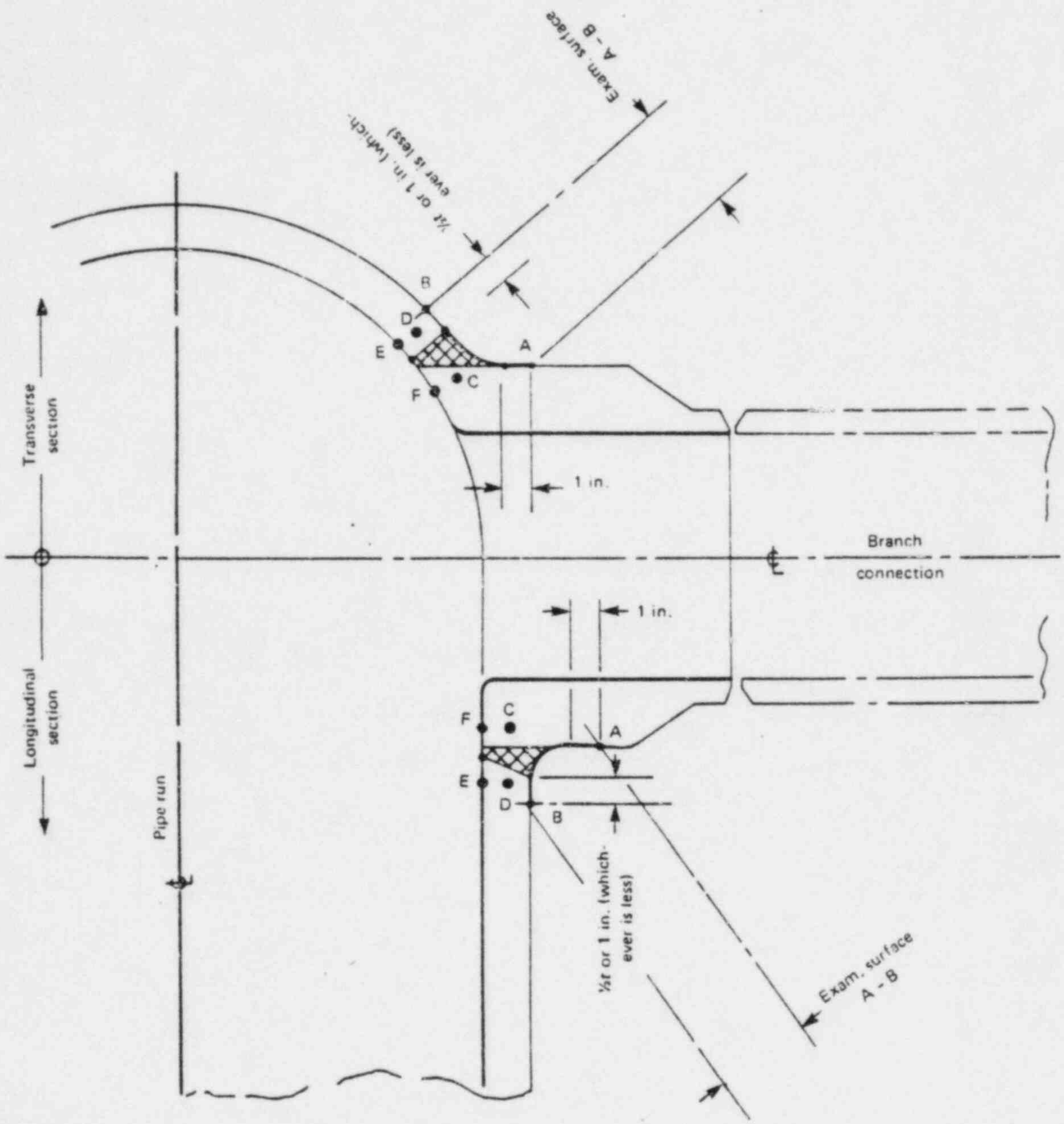
Class 1 Pipe Branch Connection



NOTE: Examination volumes C - D - E - F are defined per Fig. 3

Figure 6

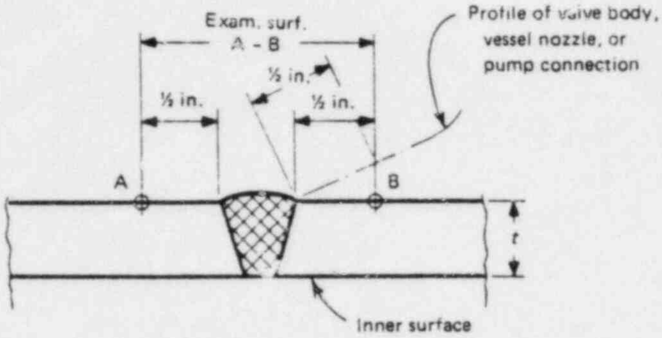
Class 1 Piping Branch Connection



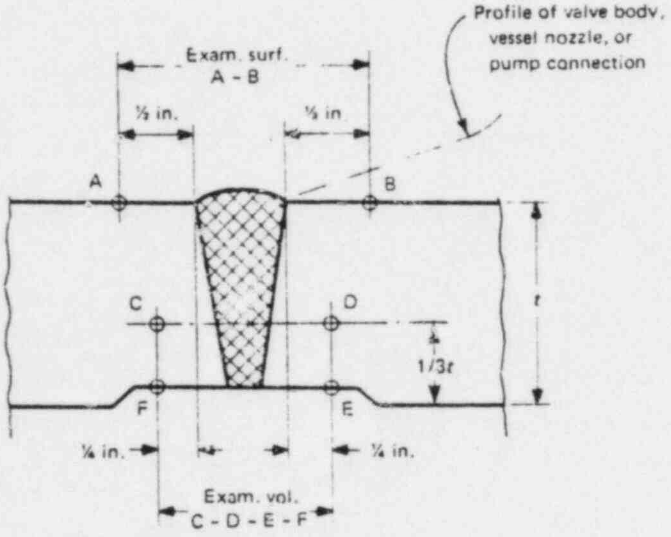
NOTE: Examination volumes C - D - E - F are defined per Fig. 3

Figure 7

Class 2 Piping Welds



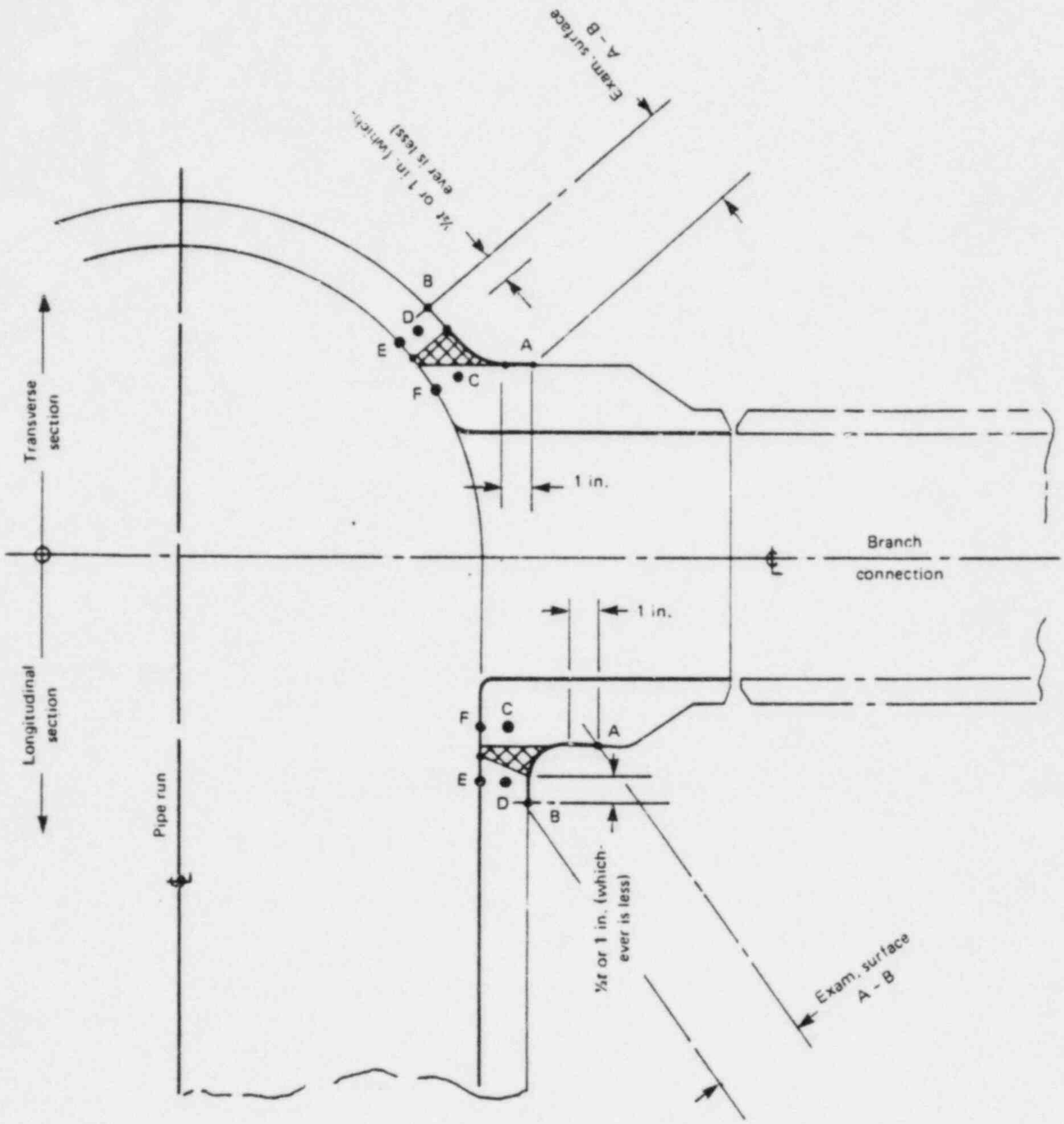
(a) Nominal pipe wall thickness $t \leq$ ½ in.



(b) Nominal pipe wall thickness $t >$ ½ in.

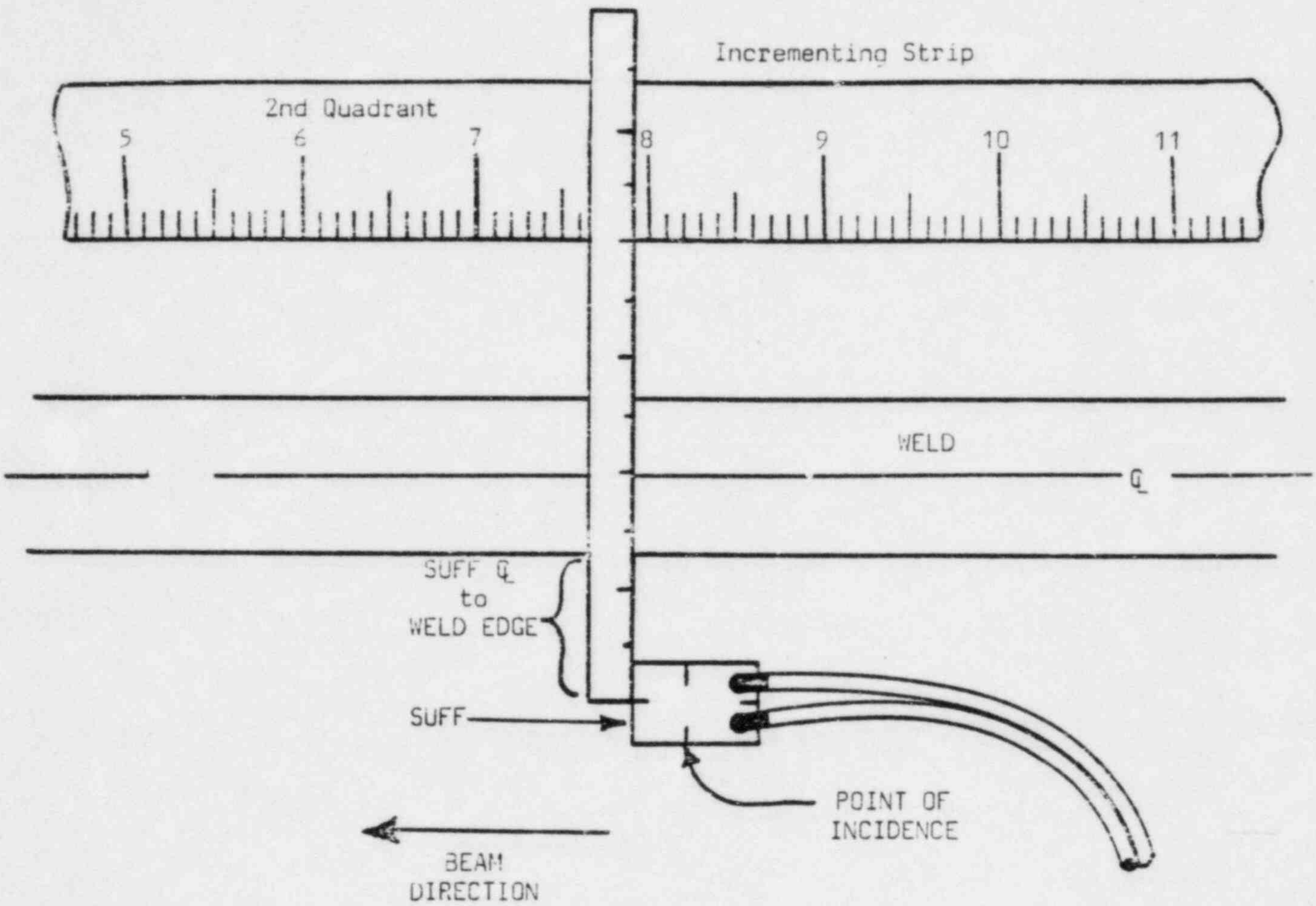
Figure 8

Class 2 Piping Branch Connection Welds



NOTE: Examination volumes C - D - E - F are defined per Fig. 3

Figure 9


Incrementing Strip
2nd Quadrant
5
6
7
8
9
10
11
WELD
℄
SUFF ℄
to
WELD EDGE
SUFF
POINT OF
INCIDENCE
BEAM
DIRECTION

MAGNAFLUX
Quality Services

UT CALIBRATION DATA SHEET

Form 22-9-1 NUCLEAR — CALIBRATION SHEET NO. ________

SITE: ____________ PROJECT NO. ________ EXAM DATE ________

PROCEDURE: ____________ REV. ____ REV. DATE ________

INSTRUMENT DATA:

MFG/MODEL ________ S/N ________

	START	END
SENSITIVITY		
EVALUATING GAIN		
SCANNING GAIN		
RANGE		
SWEEP		
DELAY		
DAMPING		
REJECT		
FILTER POSITION		
REPITITION RATE		

FREQUENCY ________ MHz.

T & R ☐ NORMAL ☐

SEARCH UNIT DATA:

MFG/MODEL ________ S/N ________

SIZE/SHAPE ________

FIXTURING ________

FREQUENCY ______ MHz. MODE ______

ANGLE ______ ° IIW ______ °

CABLE TYPE ________ LENGTH ______ ft.

COUPLANT ________ BATCH ________

CALIBRATION DATA:

CAL. BLOCK ________ THICKNESS ________ in.

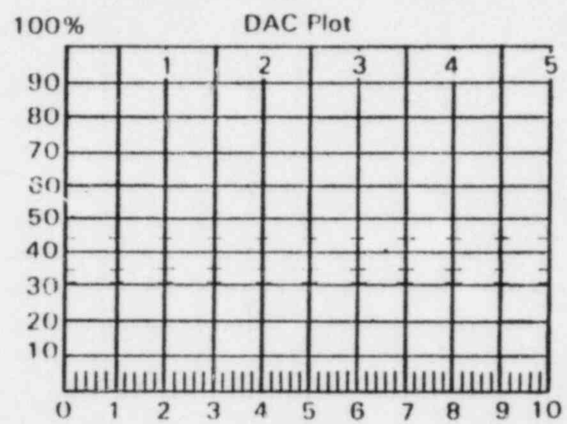
SIZE (O.D.) ________ in. TEMP. ________ °F.

SIMULATOR ________

dB	REFL. I.D.	NODE	DEPTH (in)	SWEEP	SURF. DIST.	MAX. AMP.

0°W/HAZ ☐ 0°BM ☐ AXIAL ☐ CIRC. ☐

DAC Plot



REMOTE RECORDING: YES ☐ NO ☐

(if "YES", a Form 22-RR-1 req.)

GATE SWEEP ________ DELAY ________

THRESHOLD ________ ACT. ______ %FSH

INIT. CAL. ______

CAL. CHECK ______

CAL. CHECK ______

CAL. CHECK ______

CAL. CHECK ______

CAL. CHECK ______

CAL. CHECK ______

FINAL CHECK ______

WELDS/COMP. EXAMINED	
I.D.	D.S.#

EXAMINERS:

________________ LEVEL ______

________________ LEVEL ______

APPROVALS:

MQS ________ LEVEL ______ DATE ______

CLIENT ________ LEVEL ______ DATE ______

ANI/ANI ________ DATE ______

MAGNAFLUX
Quality Services

UT DATA SHEET-SHEAR WAVE

DATA SHEET NO.________

Form 22-10-3 NUCLEAR EXAM ITEM NO.________ CAL. SHEET NO.________

SITE:________ PROJECT NO.____ EXAM DATE______ EXAM START______ EXAM END______

SYSTEM:________ WELD/COMPONENT I.D.________ MAT.______ "T"______ CONF.______

CATEGORY______ ITEM______ DWG. REF.________ LOCATION________

AXIAL ☐ CIRC. ☐ COMP. TEMP.______ ^{o}F. 45^{o} ☐ 60^{o} ☐ OTHER______ CAL. BLK.______ "T"______

REF. POINT________ REMOTE RECORD: YES ☐ NO ☐ ADDITIONAL SHEETS: YES ☐ NO ☐

INDICATION NO.	BEAM DIRECTION	MAX. AMPLITUDE	THROUGH WALL DIMENSION: SWEEP (s)			THROUGH WALL DIMENSION: MEASURED (w)			LENGTH (d)									W/W @ MAX. AMP.	NOTES: PAGE___ of___
			HMA	MAX. AMP.	HMA	HMA	MAX. AMP.	HMA	TERM. s/w	d_{t1} %FSH	d_{t1} TERM. PT.	d_1 HMA	d_m MAX. AMP.	d_2 HMA	d_{t2} TERM. PT.	d_{t2} %FSH	TERM. s/w		REMARKS

EXAMINER:________ LEVEL____ MQS REVIEW________ LEVEL____ DATE______

EXAMINER:________ LEVEL____ CLIENT REVIEW________ LEVEL____ DATE______

ANI/ANII________ DATE______

MAGNAFLUX
Quality Services

UT DATA SHEET-SHEAR WAVE

DATA SHEET NO.________

Form 22-10-4 NUCLEAR   EXAM ITEM NO.________   CAL. SHEET NO.________

SYSTEM:____________ WELD/COMPONENT I.D.____________ EXAM DATE________

AXIAL ☐ CIRC. ☐ 45^o ☐ 60^o ☐ OTHER________ REMOTE RECORD: YES ☐ NO ☐

INDICATION NO.	BEAM DIRECTION	MAX. AMPLITUDE	THROUGH WALL DIMENSION						LENGTH (d)									W/W @ MAX. AMP.	NOTES: PAGE ___ of ___
			SWEEP (s)			MEASURED(w)													
			HMA	MAX. AMP.	HMA	HMA	MAX. AMP.	HMA	TERM. s/w	d_{t1} %FSH	d_{t1} TERM. PT.	d_1 HMA	d_m MAX. AMP.	d_2 HMA	d_{t2} TERM. PT.	d_{t2} %FSH	TERM. s/w		REMARKS

EXAMINER:____________ LEVEL____   MQS REVIEW________ LEVEL____ DATE________

CLIENT REVIEW________ LEVEL____ DATE________

EXAMINER:____________ LEVEL____   ANI/ANII____________ DATE________

MAGNAFLUX
Quality Services

Form 22-10-5 Nuclear

SYSTEM:____________ WELD/COMPONENT I.D.____________ DATE________

CAL. SHEET NO.________ DATA SHEET NO.________ EXAM ITEM NO.____________

AXIAL ☐ CIRC. ☐ 45° ☐ 60° ☐ OTHER_____ REM. REC. YES ☐ NO ☐

SEG. / QUAD.	INDICATION NO.	BEAM DIRECTION	MAX. AMPLITUDE	THROUGH WALL DIMENSION						LENGTH (d)			W/W @ MAX. AMP.	NOTES: Page___ of ___
				SWEEP (s)			MEASURED(w)							
				HMA	MAX. AMP.	HMA	HMA	MAX. AMP.	HMA	d_1 HMA	d_m MAX. AMP.	d_2 HMA		REMARKS

EXAMINER:____________ Level_____ MQS Rev.____________ Lev.___ Date________

EXAMINER:____________ LEVEL_____ Client Rev.____________ Lev.___ Date________

ANI/ ANII____________ Date________