ASNT Level III Study Guide: Ultrasonic Testing Method

Text Corrections

The following text corrections apply to the third printing (09/01) of ASNT Level III Study Guide: Ultrasonic Testing Method. Subsequent printings of the document will incorporate the corrections into the published text.

Page 11:

- Q.1-8 Plate thickness = 25.4 mm, pulse-echo, straight beam measured elapsed time = $8 \mu s$. What is the most likely material?
 - A. carbon steel
 - B. lead
 - C. titanium
 - D. aluminum

Page 12:

- Q.1-20 Two plates yield different backwall reflections in pulse-echo testing (18 dB) with their only apparent difference being in the second material's void content. The plates are both 3 in. thick. What is the effective change in acoustic attenuation between the first and second plate based on actual metal path distance?
 - A. 3 dB/in.
 - B. 6 dB/in.
 - C. 18 dB/in.
 - D. none of the above

Page 30:

- Q.2-11 Angle beam search units are used to:
 - A. inspect butt joint welds in thick-wall steel piping.
 - B. produce shear waves through mode conversion.
 - C. examine material volumes inaccessible to normal beams.
 - D. all of the above.

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- Q.2-12 An angle beam <u>transducer</u> produces a 45-degree shear wave in steel. What is the approximate incident angle? (velocity in steel = 0.125 in./ms, velocity in plastic = 0.105 in./ms)
 - A. 54.9 degrees
 - B. 19 degrees
 - C. 36.4 degrees
 - D. 45 degrees

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- Q.3-15 In the tandem technique a signal is received from the test material. The reflector may be located:
 - A. near the front surface.
 - B. at the back surface.
 - C. somewhere near midwall.
 - D. by any of the above, depending on the material thickness, the refracted angle, the distance between search units, and the distance between transducer and the reflector.

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- Q.3-21 A test on a thick part will be performed using a focused search unit with a 0.50 in. long focal zone as determined by the 3 dB down points. To ensure complete coverage at uniform sensitivity, the operator should take which of the following actions?
 - A. Set the focal zone midway in the part and proceed with the examination.
 - B. Set the focal spot at the front surface such that the divergent beam will attain maximum coverage.
 - C. Set the focal zone at the back surface because that is the most critical area.
 - D. Perform multiple examinations with the <u>metal</u> path decreased by no more than 0.5 in. per examination.

Page 52:

Q.3-23 Delete question.

- Q.3-28 In contact testing, the back surface signal from a 2 in. plate was set at full screen height. Passing over a coarse grained area, the back surface signal dropped to 10 percent of the full scale signal. What would be your estimate of the change in attenuation in this local area <u>based on actual metal path</u> distance?
 - A. 20 dB/in.
 - B. 10 dB/in.
 - C. 5 dB/in.
 - D. 10 percent/in.

Page 59:

The equations on this page should read:

2T tan
$$\beta = 2 \tan \frac{70^{\circ}}{} = 5.5 \text{ in.}$$

$$2T/\cos \beta = 2/\cos \frac{70^{\circ}}{} = 5.85 \text{ in.}$$

Page 67:

- Q.4-17 A 0 degree axial test is being performed on a steel railroad axle 8 ft long and 6 in. in diameter. A strong but unsteady signal is seen near the center of the CRT screen. A similar signal is seen from the other end of the axle. The following conditions are given:
 - Screen Distance: 10 ft (12 in./div.)
 Damping: Minimum, Gain: 85 dB
 Pulse Repetition Rate: 2000 pulses per
 second
 - Frequency: 2 MHz, Range: 50 in.
 - Reject: Off, Filter: Off, Sweep Speed: As Required Sweep Delay: As Required
 - What action should the operator take?
 - A. Record the indication and notify supervisor.
 - B. Change the PRR to 1000 <u>pulses per</u> <u>second</u> and observe the effect.
 - C. Compare the signal to the reference standard and reject the axle if the reference level is exceeded.
 - D. Determine if the signal responds to finger damping by touching the opposite end.

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- Q.5-22 The signal from a weld discontinuity, set at 80 percent FSH, results in the gain being set at 50 dB. The reference reflector required a gain setting of only 44 dB. The travel path was less than 1 in. The material thickness is 2.6 in. and a 45-degree angle beam transducer was used. What is the flaw severity class?
 - A. A
 - B. B
 - C. C
 - D. D

Page 99:

- 5.3 Verify all equipment qualification and system calibration checks prior to testing:
 - 5.3.1 Verify that all equipment to be used has been qualified in accordance with NE-1 and the schedule requirements of <u>Table A</u>.

Page 105:

- Q-A4 One of two Class II indications in a 0.75 in.

 weld that is carrying primary tensile stress is

 0.45 in. from the end of the weld and 0.15 in.

 long. The other is 0.25 in. long and they are

 within 0.35 in. of each other. The status of the

 weld should be identified as:
 - A. acceptable, based on proximity to the next nearest indication.
 - B. acceptable, based on indication-length-to-weld-thickness ratio.
 - C. rejectable, based on proximity to the end of the weld.
 - D. rejectable, based on proximity to the next nearest indication.
- Q-A5 A Class III indication found at a fusion interface in a weld that is in a region which is carrying a primary tensile stress is 1 in. from the end of the <u>0.75</u> in. thick weld and within 0.5 in. of another <u>Class II</u> indication that has been determined to be 0.2 in. long. The Class III indication has been determined to be 0.5 in. long. The status of the weld should be identified as:
 - A. acceptable, based on proximity to the next nearest indication.
 - B. acceptable, based on the indication being at a fusion interface but less than 1.25 in.
 - C. rejectable, based on proximity to the next nearest indication.
 - D. rejectable, based on proximity to the end of the weld.

Page 107:

- Q-A14 Longitudinal wave testing conducted for the purpose of <u>screening</u> base materials prior to angle beam testing for weld discontinuities, requires an overlap scan pattern of at least:
 - A. 10 percent.
 - B. 15 percent.
 - C. 20 percent.
 - D. none of the above.

Page 108:

- Q-A20 A series of welds are examined and found to contain several <u>unacceptable</u> indications.

 Thus:
 - A. each <u>unacceptable</u> weld needs to be marked with a check mark at the end of each weld loaded in tension.
 - B. each <u>unacceptable</u> indication location needs to be marked directly over the discontinuity.
 - C. location and depth/class of each discontinuity need to be marked directly over the discontinuity and nearby on the base material, respectively.
 - D. Form B, completed in compliance with the procedure, is the full documentation required for each indication.