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ADDENDUM 1

Add the following text to Section 1:

1.8 Appendix D of this document provides a procedure for sizing planar non-surface breaking imperfections from the pipe's outside surface.

Add the attached Appendix D.

NOTE *Bars in the outside margins with "09" denote changes and additions made April 2009 to the original document, Second Edition, published June 2005.*

APPENDIX D

D.1 Sizing of Subsurface Planar Imperfections

This appendix establishes minimum requirements related to manual ultrasonic compression wave prove-up of subsurface planar imperfections (primarily inclusions and laminations) using an ultrasonic flaw detector, or similar instrument with an A-scan display. This technique is applicable for outlining the edges of these imperfections from the outside pipe surface of API tubular products.

Other techniques may be used by agreement between the purchaser and the agency.

D.2 Equipment Requirements

D.2.1 Ultrasonic Instrument

The ultrasonic instrumentation shall be the pulse-echo type with an A-scan display.

D.2.2 Compression Wave Transducer

The high resolution, dual-element, compression wave transducer shall be capable of detecting a $^{1}/_{32}$ in. (0.8 mm) flat-bottom hole at least $^{3}/_{8}$ in. (9.5 mm) from the front surface of a parallel-surface test block with a measurement accuracy of ± 0.010 in. (± 0.25 mm). 09

A transducer having a diameter of 0.375 in. (9.5 mm) and a nominal frequency of 7.0 MHz or higher is suggested. These characteristics have proven capable of providing the resolution specified in the preceding paragraph.

An adapter cable or connector may be required to connect some dual element transducers to flaw detectors.

D.2.3 Reference Standard

An area of the pipe to be inspected, which is imperfection free and represents the pipe's specified wall thickness, within applicable tolerances, shall be used for Distance Standardization.

D.2.4 Linear Measuring Device

A linear measuring device, such as a vernier caliper or steel rule, capable of resolving $^{1}/_{32}$ in. (1 mm) or smaller.

D.3 Standardization Procedure

D.3.1 For analog ultrasonic instruments, the A-scan shall be viewed perpendicular at all times during standardization and evaluation to eliminate parallax error.

D.3.2 The material to be inspected, equipment, couplants and the reference standard shall be exposed to the same ambient temperature for a minimum of 30 minutes prior to standardization.

D.3.3 Use of the REJECT/noise suppression control is not recommended.

D.3.4 Distance Standardization

Note: Because acceptance/rejection criteria for subsurface imperfections is based on imperfection area and is not dependent on imperfection depth from the outside surface, precise distance standardization is not required. The standardization procedures below will result in relative distance discrimination only.

D.3.4.1 Couple the transducer to the reference standard ensuring that the barrier between the transmitting and receiving sides of the transducer is perpendicular to the longitudinal axis of the pipe.

D.3.4.2 A signal corresponding to the pipe's wall thickness should appear on the A-scan display. This will be the "back wall reflection."

D.3.4.3 If no signal appears, adjust the sweep, delay and gain controls until the initial pulse and back wall reflection are visible on the A-scan display. The initial pulse should be on the left side of the screen and the pipe's back wall reflection on the right side of the screen. 09

D.3.4.4 Adjust the sweep and delay controls until the initial pulse is located at zero (0) and the pipe's back wall reflection is located at eight (8) on the horizontal baseline. The distance between the positions of the initial pulse and back wall reflection represents the inspection area.

D.3.4.5 Adjust the gain until the back wall reflection is at 100% full screen height (FSH), then add 6 dB for scanning.

D.3.5 Standardization checks shall be performed at the start of each shift, or either of the following conditions.

D.3.5.1 If the power source (battery or AC) to the instrument is terminated for any reason.

D.3.5.2 Anytime another technician uses the instrument.

D.4 Procedure

D.4.1 The area requiring investigation shall have been previously marked on the material outside surface prior to this examination using a digital ultrasonic thickness gauge.

D.4.2 Place the transducer firmly onto the surface in the area of the indication, ensuring that the barrier between the transmitting and receiving sides of the transducer is perpendicular to the longitudinal axis of the pipe.

D.4.3 Once an imperfection to be evaluated is located, adjust the gain until the indication signal is at approximately 80% FSH.

D.4.4 Scan the transducer over the imperfection slowly in minute increments, searching for the edge of the imperfection.

D.4.5 If multiple indications are noted on the display, at varying baseline positions (time), these are separate imperfections and their size must be determined individually (see Figure D.1).

D.4.6 As the edge of the subsurface imperfection is located, by noting when the signal amplitude drops by 50% (6 dB), mark the edge with a metal scribe or similar fine-point marking device (do not use chalk, crayon, or a metal marker), (see Figure D.2). The mark shall be located to coincide with the middle of the transducer, not it's edge or side.

Repeat this process in the opposite direction and also in the other orientation until a complete outline of the subsurface imperfection is present. In other words, the longitudinal dimension must be determined and the transverse dimension must be determined.

To determine the area if the imperfection, measure its longest dimension in both directions. Multiply these two (2) values for the imperfection's area.

The following data should be included on all prove-up reports and defect sheets when documenting imperfection or defect results:

- length
- width
- area (L × W) in in.^{2} or mm^2

D.5 Acceptance/Rejection Criteria

D.5.1 Refer to the applicable product specification for the acceptance limits.

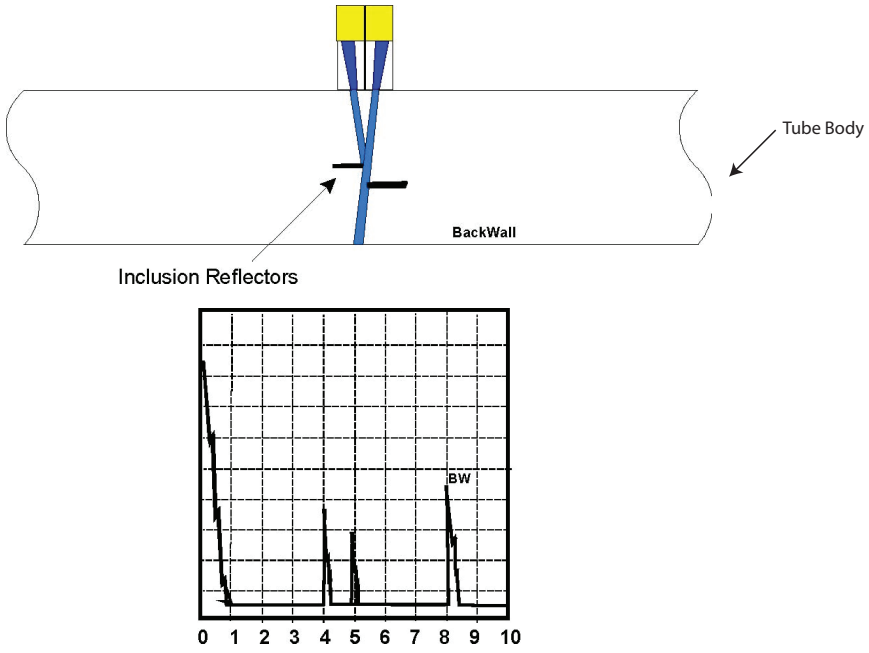

Figure D.1

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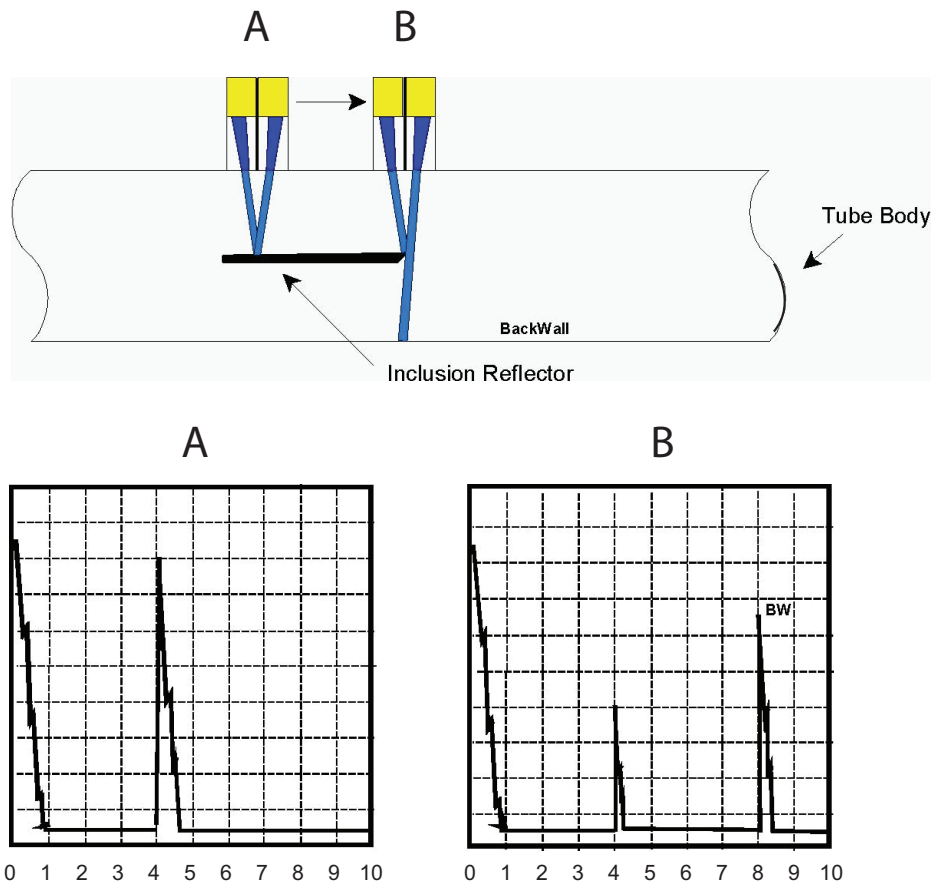
A
B
Tube Body
BackWall
Inclusion Reflector
A
B
BW
0 1 2 3 4 5 6 7 8 9 10
0 1 2 3 4 5 6 7 8 9 10

Figure D.2