

**ATLANTIS NDT**

Ultrasonic Testing (UT) Level II Specific Examination — Practice Questions

20 multiple-choice questions with an answer key and explanations

Candidate name	
Date	
Time allowed (suggested)	60 minutes
Score	____ / 20

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Before you start

Written against the documents named below; check the edition your written practice and contract name. The questions test applying a written procedure: essential variables, calibration confirmation, scanning, records and acceptance decisions on described indications.

Documents these questions are written against: ASME BPVC Section V, Article 4 (2023 edition); ASME BPVC Section V, Article 5 and adopted standard SE-797 (2023 edition); ASME BPVC Section VIII, Division 1, Mandatory Appendix 12 (2023 edition); ASME B31.3-2022, Process Piping (ultrasonic examination acceptance criteria); AWS D1.1/D1.1M:2020, Clause 8, Part F (UT of groove welds). Your employer's written practice and the contract decide which edition applies; if yours differs, check the answer against your edition.

Choose the single best answer for each question. Work without notes first, then check yourself against the answer key at the back. Under ASNT SNT-TC-1A your employer's written practice sets the passing grade and the number of questions in the real examination.

These are original study questions written by Atlantis NDT. They are not taken from, and do not reproduce, any ASNT or employer examination.

1. A UT procedure has been qualified by demonstration because the referencing Code Section requires it. Under ASME Section V Article 4, which change requires the procedure to be requalified?

- A. Using a different brand of couplant of the same type
- B. Changing the post-examination cleaning method
- C. Changing the format in which the calibration data are recorded on the report
- D. Changing the search-unit nominal frequency from 2.25 MHz to 5 MHz

2. A technician needs to use a couplant type other than the one named in the written procedure, and the new couplant meets the contaminant limits. Under Article 4, what does this change require with respect to the written procedure?

- A. Nothing, because couplant selection is outside the scope of the written procedure
- B. Requalification of the procedure by demonstration
- C. A revision of, or an addendum to, the written procedure, without requalification
- D. Nothing, provided the couplant actually used is named on the examination report

3. For UT of austenitic stainless steel or titanium, which couplant contaminant must be controlled by certification under Article 4?

- A. Halides (chlorides plus fluorides)
- B. Sulfur
- C. Free water content
- D. Lead and other low-melting-point metals

4. At a calibration check during an Article 4 examination, the response from a calibration reflector is higher than at calibration by more than the permitted tolerance (sensitivity has increased). What must be done?

- A. Void every data sheet since the last valid calibration and re-scan all of that area
- B. Correct the calibration and re-examine the indications recorded since the last valid check
- C. Record the change in the report and take no other action, because nothing could have been missed
- D. Reduce the gain by the amount of the change and carry on, leaving earlier results as they are

5. Partway through an Article 4 weld examination, a damaged search-unit cable is replaced with another of the same type and length. What is required before scanning continues?

- A. Nothing, because the replacement cable is the same type and length
- B. Requalification of the written procedure
- C. A screen height linearity check only
- D. A calibration check of the examination system

6. Article 4 requires a curved basic calibration block for examination surfaces of 20 in. (500 mm) diameter or less. A curved block of 10 in. (250 mm) diameter is available. On which of these component surface diameters may it be used?

- A. 8 in. (200 mm)
- B. 14 in. (350 mm)
- C. 16 in. (400 mm)
- D. 30 in. (750 mm)

7. For this examination, none of Article 4's conditions that permit scanning faster than the standard maximum speed have been demonstrated. Which manual scanning practice meets Article 4?

- A. 100 mm/s (4 in./s), each pass overlapping 15% of the element dimension
- B. 200 mm/s (8 in./s), each pass overlapping 15% of the element dimension
- C. 100 mm/s (4 in./s), each pass overlapping 5% of the element dimension
- D. 200 mm/s (8 in./s), each pass overlapping 50% of the element dimension

8. Besides the rejectable indications found, which item must an Article 4 examination record include?

- A. The welding procedure specification number used for the weld
- B. Heat numbers from the material test reports of both members
- C. The identification stamp of each welder who deposited the weld
- D. Areas of restricted access or welds that could not be examined

9. Under ASME Section VIII, Division 1, Mandatory Appendix 12, which weld indications must be investigated to determine their shape, identity and location?

- A. Only indications that exceed 100% of the reference level
- B. Only indications longer than 1/4 in. (6 mm)
- C. Any indication greater than 20% of the reference level
- D. Only indications that also appear on radiographs

10. Under Section VIII, Division 1, Appendix 12, a butt weld 1/2 in. (12.7 mm) thick, excluding reinforcement, shows a slag-type indication that exceeds the reference level and is 5/16 in. (8 mm) long. What is the decision?

- A. Acceptable, because slag is volumetric and has no length limit
- B. Acceptable, because the limit for this thickness is $t/3$
- C. Rejectable, because the length exceeds 1/4 in. (6 mm) for t up to 3/4 in. (19 mm)
- D. Rejectable, because any indication above the reference level is rejectable regardless of length

11. Under Appendix 12, what is the maximum acceptable length of an indication that exceeds the reference level, is not characterized as a crack, lack of fusion or incomplete penetration, and lies in a weld 1-1/2 in. (38 mm) thick?

- A. 1/4 in. (6 mm)
- B. 1/2 in. (12.7 mm)
- C. 3/4 in. (19 mm)
- D. 1-1/2 in. (38 mm)

12. Under Appendix 12, an indication at 60% of the reference level, 3 mm long, is investigated and characterized as lack of fusion. What is the decision?

- A. Acceptable, because its amplitude is below the reference level
- B. Acceptable, because it is shorter than 1/4 in. (6 mm)
- C. Acceptable once a second technician has confirmed the length and amplitude
- D. Rejectable, because lack of fusion is unacceptable regardless of length

13. Under Appendix 12, a slag-type indication in a 1 in. (25 mm) weld peaks at 80% of the reference level and is 1 in. (25 mm) long. What is the decision?

- A. Acceptable: below the reference level, and not a crack, lack of fusion or incomplete penetration
- B. Rejectable, because its length exceeds $t/3$ for this thickness, whatever its amplitude
- C. Rejectable, because no indication longer than 3/4 in. (19 mm) is permitted
- D. Acceptable only after radiography confirms that the indication is slag

14. Under ASME B31.3, a butt weld joins a 12.7 mm (0.500 in.) wall pipe to a 22 mm (0.875 in.) wall fitting. A linear-type indication exceeds the reference level. Above what length is it unacceptable?

- A. 4.2 mm
- B. 6 mm (1/4 in.)
- C. 7.3 mm
- D. 19 mm (3/4 in.)

15. Under ASME B31.3, a linear-type indication exceeding the reference level is found in a butt weld with $T_w = 65$ mm (2.56 in.). Above what length is it unacceptable?

- A. 6 mm (1/4 in.)
- B. 19 mm (3/4 in.)
- C. 21.7 mm ($T_w/3$)
- D. 65 mm (T_w)

16. Under AWS D1.1 Clause 8, using an instrument with gain controls in dB, an indication reaches the reference line at a gain of 45 dB. The reference level from the 1.5 mm (0.060 in.) hole in the IIW block was set at 48 dB, and the sound path to the indication is 3.5 in. (89 mm). What is the indication rating d?

- A. -8 dB
- B. -2 dB
- C. +2 dB
- D. +8 dB

17. Which angle-beam search unit meets AWS D1.1 Clause 8 requirements for testing groove welds, assuming the element size is within the permitted range?

- A. 5 MHz, 70° refracted angle
- B. 2.25 MHz, 55° refracted angle
- C. 2.25 MHz, 60° refracted angle
- D. 1 MHz, 45° refracted angle

18. Before angle-beam testing under AWS D1.1, the base metal in the scanning area is checked with a straight beam. One area shows total loss of back reflection where it would interfere with normal weld scanning. What is required?

- A. Reject the weld, because a lamination in the scanning area is rejectable under Clause 8
- B. Raise the gain until the back reflection returns and continue the normal scanning pattern
- C. Disregard it, because base metal is outside the scope of groove-weld testing
- D. Report its size, location and depth, and examine the weld by an alternate scanning procedure

19. ASME Section V Article 5 refers the examination of carbon and low-alloy steel forgings to which adopted standard, as amended by the Article?

- A. SA-388/SA-388M
- B. SA-578/SA-578M
- C. SA-609/SA-609M
- D. SE-797

20. A thickness-measurement procedure for carbon steel piping, written to ASME Section V Article 5 and SE-797, expects readings between 6 mm and 18 mm. Which calibration approach best fits the method?

- A. A single point on a 25 mm block, because the gauge response is linear
- B. Two points on an aluminum step block, converted afterward by the velocity ratio
- C. Two points on a carbon steel step block, one near 6 mm and one near 18 mm
- D. No block, entering the published handbook velocity for carbon steel

Answer key and explanations

1. D	2. C	3. A	4. B	5. D	6. B	7. A	8. D	9. C	10. C
11. B	12. D	13. A	14. B	15. B	16. A	17. C	18. D	19. A	20. C

1. D — Table T-421 lists search-unit type, frequency and element size and shape as essential variables, so a frequency change requires requalification by demonstration. Couplant brand or type, post-examination cleaning and the records to be kept are nonessential variables. [ASME BPVC Section V, Article 4, Table T-421 (2023)]

2. C — Couplant brand name or type is a nonessential variable, so no requalification is needed. Article 4 still requires every change from the written procedure, essential or nonessential, to be covered by a revision of the procedure or an addendum to it. Because the couplant is part of the examination system, a calibration check is also made before scanning with it. [ASME BPVC Section V, Article 4 (2023), written procedure requirements]

3. A — Couplant used on austenitic stainless steel or titanium must be certified for halide content (chlorides plus fluorides), because halides can promote stress corrosion cracking. Sulfur is the contaminant controlled for nickel-base alloys. [ASME BPVC Section V, Article 4 (2023), couplant contaminant control]

4. B — With sensitivity higher than calibrated, nothing was missed but recorded amplitudes are overstated, so the calibration is corrected, the correction is noted in the record, and indications recorded since the last valid calibration or calibration check are re-examined and their values changed or re-recorded. Voiding the data sheets and re-examining the area is the action when sensitivity has decreased. [ASME BPVC Section V, Article 4 (2023), calibration confirmation]

5. D — Article 4 calibrates the complete examination system, so when any part of it is changed (a cable, search unit, wedge or instrument, for example) a calibration check on the basic calibration block must confirm the distance range points and sensitivity. Requalification is triggered by essential-variable changes, and linearity checks follow their own interval. [ASME BPVC Section V, Article 4 (2023), calibration confirmation (system changes)]

6. B — A single curved block may be used on surfaces from 0.9 to 1.5 times its own diameter, here 9 in. to 15 in. (225 mm to 375 mm), so only 14 in. qualifies. Above 20 in. a block of essentially the same curvature, or a flat block, is used instead. [ASME BPVC Section V, Article 4 (2023), calibration block curvature]

7. A — Article 4 limits search-unit speed to 150 mm/s (6 in./s) unless the Article's conditions for faster scanning are demonstrated, and requires each pass to overlap at least 10% of the transducer element dimension parallel to the direction of scan indexing. Only the first option meets both limits. [ASME BPVC Section V, Article 4 (2023), scanning]

8. D — The Article 4 record must show areas of restricted access or inaccessible welds, alongside items such as procedure, instrument and search-unit identification, calibration data, the surfaces examined, the indications or areas cleared, personnel and date. Welding and material details belong to other records. [ASME BPVC Section V, Article 4 (2023), examination records]

9. C — Appendix 12 requires imperfections producing indications greater than 20% of the reference level to be investigated far enough to determine shape, identity and location, so they can be judged against the acceptance standards. Amplitude relative to the reference level and length are applied in that judgment. [ASME BPVC Section VIII, Division 1, Mandatory Appendix 12 (2023)]

10. C — For imperfections other than cracks, lack of fusion and incomplete penetration, an indication exceeding the reference level is rejectable if longer than 1/4 in. (6 mm) for t up to 3/4 in. (19 mm). At 5/16 in. (8 mm) this one exceeds the limit; t/3 applies only from 3/4 in. to 2-1/4 in. [ASME BPVC Section

VIII, Division 1, Mandatory Appendix 12 (2023)]

11. B — For t from $3/4$ in. to $2-1/4$ in. (19 mm to 57 mm) the limit is $t/3$: $1-1/2$ in. $\div 3 = 1/2$ in. (38 mm $\div 3 \approx 12.7$ mm). Longer than that, with amplitude above the reference level, the indication is rejectable. [ASME BPVC Section VIII, Division 1, Mandatory Appendix 12 (2023)]
12. D — Indications characterized as cracks, lack of fusion or incomplete penetration are unacceptable regardless of length. The reference-level amplitude and length limits apply only to other imperfections. [ASME BPVC Section VIII, Division 1, Mandatory Appendix 12 (2023)]
13. A — For imperfections other than cracks, lack of fusion and incomplete penetration, the length limits apply only to indications that exceed the reference level. At 80% of the reference level this one is acceptable whatever its length, though it is still investigated and documented as the procedure requires. [ASME BPVC Section VIII, Division 1, Mandatory Appendix 12 (2023)]
14. B — T_w is the nominal wall of the thinner component, 12.7 mm. Because T_w is not more than 19 mm, the limit is 6 mm ($1/4$ in.). $T_w/3$ applies only for T_w over 19 mm up to 57 mm, and the thicker member is never used. [ASME B31.3-2022, ultrasonic examination acceptance criteria]
15. B — For T_w over 57 mm ($2-1/4$ in.) the limit is capped at 19 mm ($3/4$ in.). $T_w/3$ would give $65 \div 3 \approx 21.7$ mm, but that formula applies only up to $T_w = 57$ mm. [ASME B31.3-2022, ultrasonic examination acceptance criteria]
16. A — Attenuation factor $c = 2$ dB per inch of sound path beyond the first inch $= 2 \times (3.5 - 1) = 5$ dB. $d = a - b - c = 45 - 48 - 5 = -8$ dB. A more negative rating is a stronger, more severe indication, and it is then compared with the acceptance table for the thickness and probe angle. [AWS D1.1/D1.1M:2020, Clause 8, Part F (indication rating)]
17. C — D1.1 requires angle-beam search units of 2 to 2.5 MHz producing a refracted angle within $\pm 2^\circ$ of 70° , 60° or 45° . The 5 MHz and 1 MHz units are outside the frequency range, and 55° is not one of the permitted angles. [AWS D1.1/D1.1M:2020, Clause 8, Part F (UT equipment)]
18. D — The straight-beam check finds laminar reflectors that would block or redirect the angle beam. Such an area is reported with its size, location and depth from the scanning face, and the weld is examined using an alternate scanning procedure so that coverage is still achieved. [AWS D1.1/D1.1M:2020, Clause 8, Part F (base metal testing)]
19. A — SA-388 covers ultrasonic examination of steel forgings (Article 5 names SA-745 for austenitic steel forgings). SA-578 is straight-beam examination of rolled plate, SA-609 covers castings, and SE-797 is thickness measurement by the contact pulse-echo method. [ASME BPVC Section V, Article 5 (2023), examination of product forms]
20. C — Calibrating on the same material at a thin and a thick step that bracket the expected range sets both the zero offset (probe delay and V-path effects) and the velocity. A single point outside the range, a different material or a handbook velocity alone leaves errors that grow toward the thin end. [ASME BPVC Section V, Article 5 (2023); SE-797 (ASTM E797)]

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