

**ATLANTIS NDT**

Radiographic Testing (RT) 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

Twenty questions written against the documents named below: the ASME Section V Article 2 technique and image-quality requirements, and the acceptance criteria an RT Level II most often applies. Check the edition your written practice and contract name before relying on any value.

Documents these questions are written against: ASME BPVC Section V, Article 2 (2023 edition); ASME BPVC Section VIII, Division 1 (2023 edition): UW-51, UW-52 and Mandatory Appendix 4; ASME B31.3 Process Piping (2022 edition): Table 341.3.2 and para. 341.3.4; AWS D1.1/D1.1M:2020 Structural Welding Code - Steel, Clause 8. 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. When a densitometer is calibrated under ASME Section V Article 2, readings are taken at the steps closest to 1.0, 2.0, 3.0 and 4.0 on a calibrated step tablet. The densitometer is acceptable if every reading is within what tolerance of the stated value?

- A. ± 0.02 density units
- B. ± 0.05 density units
- C. ± 0.10 density units
- D. ± 0.20 density units

2. An IQI of the same alloy material group as the part is not available. Under ASME Section V Article 2, which IQI may be used instead?

- A. Any IQI of the correct designation, whatever its material
- B. An IQI of a material with greater radiation absorption than the part, to be conservative
- C. None; the examination must wait for an IQI of the same group
- D. An IQI of a material group with less radiation absorption than the part

3. A butt weld in 12.7 mm ($\frac{1}{2}$ in.) nominal plate has an estimated cap reinforcement of 2 mm, within the referencing code's maximum, and a 6 mm backing strip left in place. Under ASME Section V Article 2, what thickness is the IQI selected for?

- A. 12.7 mm
- B. 18.7 mm
- C. 14.7 mm
- D. 20.7 mm

4. When a wire IQI is used on a butt weld under ASME Section V Article 2, how must it be placed?

- A. On the weld, with the wires running across the weld (perpendicular to its length)
- B. On the base metal beside the weld, with the wires parallel to the weld
- C. On the weld, with the wires running along the weld length so that each one lies on the cap
- D. On the film side only, with the wires at 45° to the weld

- 5. A complete girth weld is radiographed in one exposure with the source on the vessel axis and several film holders around the outside. Under ASME Section V Article 2, what is the minimum number of IQIs required?**
- A. One, placed anywhere on the circumference
 - B. Two, about 180° apart
 - C. Three, spaced about 120° apart
 - D. One per film holder, whatever the number of holders
- 6. On a single-film X-ray radiograph made without a shim, the density through the body of the hole-type IQI is 2.5. Densities across the area of interest range from 2.2 to 3.4. Applying ASME Section V Article 2, what is required?**
- A. Nothing further, because every reading lies within 1.8 to 4.0
 - B. A new exposure with an additional IQI for the area at 3.4, which is more than 30% above the IQI density
 - C. Rejection of the radiograph, because the area at 2.2 is more than 15% below the IQI density
 - D. An additional IQI for the area at 2.2 only, because the low-density areas are always the least sensitive ones
- 7. A butt weld in 19 mm plate has a 2 mm cap on the source side and 1.5 mm of root reinforcement on the film side, and the film is in contact with the root (ignore cassette and screen thickness). The source size is 3.0 mm and the source-to-cap distance is 600 mm. Using the Article 2 definitions, what is the geometric unsharpness?**
- A. 0.095 mm
 - B. 0.105 mm
 - C. 0.108 mm
 - D. 0.113 mm
- 8. How does ASME Section V Article 2 require the lead 'B' backscatter check symbol to be used?**
- A. Attached to the back of each film holder during each exposure
 - B. Placed on the source side of the part, next to the IQI, during each exposure
 - C. Attached to the front of the film holder, facing the source, for the first exposure of each shift only
 - D. Used only when the film holder rests on a floor, wall or other surface that may reflect radiation
- 9. Which statement reflects the ASME Section V Article 2 requirement for identifying radiographs?**
- A. Lead letters and numbers must be used; light imprinting or other marking methods are not permitted
 - B. Identification is needed only on radiographs that show rejectable indications or repairs
 - C. It must keep a permanent correlation between film and part, and must not obscure the area of interest
 - D. It may be recorded on the film envelope only, provided the envelope stays with the film

10. Under ASME Section V Article 2, where must location markers be placed, and how are their positions recorded?

- A. On the cassette, with their positions written on the film envelope
- B. On the film before exposure, with positions kept in the radiographer's logbook
- C. Anywhere convenient, because the IQI image already demonstrates coverage
- D. On the part, with positions permanently marked on it or recorded on a map

11. Which group of items must appear in the documented radiographic technique details under ASME Section V Article 2?

- A. Isotope or X-ray voltage, source size, and the distances D and d used in the Ug calculation
- B. Ambient temperature, humidity and wind conditions recorded at the time of each individual exposure
- C. Developer and fixer lot numbers, replenishment rates and the processor temperature log
- D. The radiographer's eye-examination date and the densitometer's serial number

12. A fully radiographed (UW-51) butt weld joins a 50 mm (2 in.) shell course to a 38 mm (1.5 in.) course, with no fillet weld. An isolated slag inclusion 14 mm (0.55 in.) long is found. What is the decision?

- A. Accept: the limit is one-third of 50 mm, about 16.7 mm
- B. Reject: the limit is one-third of the thinner member, 38 mm, about 12.7 mm
- C. Accept: the limit is 19 mm ($\frac{3}{4}$ in.) for welds of this thickness
- D. Reject: no elongated indication over 6 mm ($\frac{1}{4}$ in.) is permitted at any thickness

13. On a fully radiographed (UW-51) weld 25 mm thick, an indication 4 mm long is interpreted as lack of sidewall fusion. What is the decision?

- A. Accept: it is shorter than 6 mm
- B. Accept: it is shorter than $t/3$ (about 8.3 mm)
- C. Reject: incomplete fusion is unacceptable at any length
- D. Evaluate it as a rounded indication under Appendix 4

14. A fully radiographed (UW-51) weld has $t = 25$ mm. Four aligned slag indications, 7, 7, 6 and 6 mm long, are each separated by 20 mm of sound weld, all within 100 mm of weld length. What is the decision?

- A. Accept: each indication is shorter than $t/3$ (about 8.3 mm)
- B. Accept: the whole group lies within a length of $12t$ (300 mm)
- C. Reject: aligned indications of any size are never permitted in a fully radiographed weld, whatever their spacing
- D. Reject: their aggregate length (26 mm) exceeds t in $12t$, and the spacing is less than $6L$ (42 mm)

15. On a fully radiographed Section VIII, Division 1 weld, an indication measures 3.0 mm long and 0.8 mm wide. How is it classified for evaluation?

- A. As a rounded indication, because it is under 4 mm long
- B. As an elongated indication, because its length is more than three times its width
- C. As a rounded indication, because its length is less than four times its width
- D. As a nonrelevant indication, because it is under 1 mm wide

16. Under UW-52 spot radiography, a spot radiograph shows a rejectable slag inclusion. Apart from repairing that defect, what does UW-52 require next?

- A. Full radiography of every weld in the vessel
- B. No further radiography is needed, provided the repaired area is re-radiographed and found acceptable
- C. Two additional spots in the same weld increment, at locations away from the original spot
- D. A repeat exposure of the same spot with a more sensitive IQI

17. A girth weld in ASME B31.3 Normal Fluid Service shows incomplete penetration at the root. Its depth is within the table limit, but the indications total 45 mm in one 150 mm length of weld. What is the decision?

- A. Reject: cumulative incomplete penetration exceeds 38 mm in a 150 mm weld length
- B. Accept: the depth is within the limit, so length is not a factor
- C. Accept: incomplete penetration has no length limit in Normal Fluid Service
- D. Reject: incomplete penetration is never permitted in any fluid service

18. Random radiography under ASME B31.3 finds a defective girth weld. Under the progressive examination rules, what must happen next, besides repairing that weld?

- A. Every weld in the piping system must be radiographed
- B. The repaired weld is re-radiographed, with no further sampling
- C. The welder must be requalified on a new test coupon before any further production welds are examined or accepted
- D. Two additional welds of the same kind, by the same welder or welding operator, get the same examination

19. Before applying the AWS D1.1 Clause 8 radiographic acceptance criteria to a nontubular groove weld, which fact must the interpreter know?

- A. The date of the welder's most recent qualification test, and the position in which that test was taken
- B. Whether the connection is statically or cyclically loaded (and, if cyclic, tension or compression)
- C. The filler metal brand and classification used for the root and fill passes
- D. Whether the weld was made in the flat, horizontal or vertical position

20. AWS D1.1 requires edge blocks when radiographing thicker butt joints. What is their purpose?

- A. To reduce edge burn-off and scatter at the plate edges so the weld ends can be evaluated
- B. To hold the IQI in position on the weld
- C. To act as the shim under the hole-type IQI
- D. To carry the weld identification numbers and the location markers clear of the area of interest

Answer key and explanations

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

1. B — Article 2 accepts the densitometer when each reading is within ± 0.05 of the density stated for the national standard step tablet or traceable step wedge calibration film. A densitometer outside this tolerance cannot be used to verify radiograph density until it has been corrected and recalibrated.

[ASME BPVC Section V (2023), Article 2 - densitometer calibration]

2. D — A less-absorbing IQI is harder to see than one matching the part, so resolving its essential hole or wire still shows at least the required sensitivity. A more-absorbing IQI would image too easily and overstate the sensitivity achieved. [ASME BPVC Section V (2023), Article 2 - IQI selection (material)]

3. C — For welds with reinforcement, the IQI is based on the nominal single-wall thickness plus the estimated reinforcement (not exceeding the code maximum): $12.7 + 2 = 14.7$ mm. Backing rings and strips are not counted as part of the thickness for IQI selection, so 18.7 mm and 20.7 mm are wrong.

[ASME BPVC Section V (2023), Article 2 - IQI selection (size)]

4. A — Article 2 requires the wire IQI to be placed on the weld with the length of the wires perpendicular to the length of the weld, so each wire crosses the weld metal being evaluated. The identification numbers, and any 'F' letter, must stay out of the area of interest unless the geometry makes that impractical. [ASME BPVC Section V (2023), Article 2 - IQI placement]

5. C — For a single exposure with the source on the axis covering the full circumference, Article 2 requires at least three IQIs about 120° apart. Extra film locations may be needed to achieve that spacing. [ASME BPVC Section V (2023), Article 2 - number of IQIs (special cases)]

6. B — The permitted band is -15% to $+30\%$ of the IQI density: $2.5 \times 0.85 = 2.125$ and $2.5 \times 1.30 = 3.25$. Even with the rounding to the nearest 0.1 that Article 2 allows, 2.2 is inside the band and 3.4 is above it, so that area needs an additional IQI and the radiograph must be retaken. [ASME BPVC Section V (2023), Article 2 - density limitations and density variation]

7. D — Article 2 measures d from the source side of the weld to the film, so $d = 2 + 19 + 1.5 = 22.5$ mm, and D from the source to the weld. $U_g = F \cdot d / D = 3.0 \times 22.5 / 600 = 0.1125$, about 0.113 mm. Using only the plate (0.095 mm) or plate plus cap (0.105 mm) understates it, and 0.108 mm comes from wrongly dividing by the source-to-film distance (622.5 mm). [ASME BPVC Section V (2023), Article 2 - geometric unsharpness]

8. A — The symbol goes on the back of each film holder for every exposure, because its image is how the interpreter judges whether radiation scattered from behind the cassette reached the film. Backscatter conditions change with every set-up, so a sample check is not enough; the minimum letter height and thickness are stated in the edition your procedure names. [ASME BPVC Section V (2023), Article 2 - backscatter radiation]

9. C — Article 2 requires permanent identification on the radiograph, traceable to the contract, component, weld or part, plus the manufacturer's name or symbol and the date. The information need not appear as radiographic images, so lead letters are one option rather than a requirement, but it must not obscure the area of interest; marking only the envelope breaks the link once the film is removed. [ASME BPVC Section V (2023), Article 2 - radiograph identification]

10. D — Markers on the part stay with the part, so the area of interest on each film can be traced to its exact location and the overlap between films proves full coverage. Where the surface cannot be marked, a dimensional map kept with the technique details serves the same purpose. [ASME BPVC Section V (2023), Article 2 - location markers]

11. A — The technique details record what governs image quality and allows the exposure to be repeated: the radiation source, source size, D and d, film type and number per holder, material and weld thickness, single- or double-wall exposure and viewing, and the marker map if used. The other items may be kept elsewhere but are not part of the technique details. [ASME BPVC Section V (2023), Article 2 - technique documentation details]
12. B — UW-51 limits elongated indications to $t/3$ for t from 19 mm to 57 mm ($3/4$ in. to $2\frac{1}{4}$ in.), and where members differ in thickness t is the thinner one: $38 / 3 \approx 12.7$ mm, so 14 mm is rejectable. The 19 mm limit applies only above 57 mm, and the 6 mm limit only up to 19 mm. [ASME BPVC Section VIII, Division 1 (2023), UW-51(b)]
13. C — UW-51 rejects any indication characterized as a crack or a zone of incomplete fusion or penetration, whatever its length. Length limits apply only to other elongated indications such as slag, so identifying the indication type correctly decides the outcome. [ASME BPVC Section VIII, Division 1 (2023), UW-51(b)]
14. D — Each indication passes the individual $t/3$ limit, but UW-51 also rejects an aligned group whose total length exceeds t in a length of $12t$, unless successive indications are more than $6L$ apart, where L is the longest indication (7 mm). Here $26 \text{ mm} > 25 \text{ mm}$ and $20 \text{ mm} < 42 \text{ mm}$, so the group is rejectable. [ASME BPVC Section VIII, Division 1 (2023), UW-51(b)]
15. B — Appendix 4 defines rounded indications as those with a length of three times the width or less. $3.0 / 0.8 = 3.75$, so this indication is elongated and is judged against the UW-51 elongated-indication limits instead. [ASME BPVC Section VIII, Division 1 (2023), Mandatory Appendix 4]
16. C — A failed spot triggers two more spots in the same weld increment. If both are acceptable the increment is accepted once the defect is repaired and re-examined; if either fails, the whole increment is either rewelded or fully radiographed with all defective welding corrected. [ASME BPVC Section VIII, Division 1 (2023), UW-52]
17. A — For girth welds in Normal Fluid Service, Table 341.3.2 limits both the depth of incomplete penetration and its cumulative length: no more than 38 mm (1.5 in.) in any 150 mm (6 in.) of weld, or 25% of the total weld length if that is less. Incomplete penetration is not rejected outright in this service, but both limits must be met, and 45 mm exceeds the length limit. [ASME B31.3-2022, Table 341.3.2]
18. D — Progressive examination adds two more samples of the same kind for each defect found. If they pass, the welds they represent are accepted; if either fails, two further samples are taken for each defective item, and a further failure means all items represented are repaired or replaced, or fully examined and corrected. [ASME B31.3-2022, para. 341.3.4]
19. B — D1.1 sets different RT acceptance limits for statically and cyclically loaded nontubular connections, with separate limits for tension and compression under cyclic loading. The contract documents state which applies, and using the wrong set can accept a weld that should be rejected. [AWS D1.1/D1.1M:2020, Clause 8]
20. A — Without edge blocks, radiation passing around the plate edge overexposes and undercuts the image at the ends of the weld, where discontinuities often occur. Blocks of radiographically clean steel, centered on the weld and set tight against the plate, make the ends image like the rest of the joint. [AWS D1.1/D1.1M:2020, Clause 8 (radiographic procedure)]

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