Ultrasonic Testing Level 2 Practice Test (Sample)

Study Guide

Everything you need from our exam experts!

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Introduction

Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.

This guide was designed to help you do exactly that.

Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.

The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:

- **Practice answering questions under realistic conditions,**
- **Improve accuracy and speed,**
- **Review explanations to strengthen weak areas, and**
- **Approach the exam with greater confidence.**

We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.

Remember: successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.

Let's begin.

How to Use This Guide

This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here’s how to get the most out of your Examzify study guide:

1. Start with a Diagnostic Review

Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.

2. Study in Short, Focused Sessions

Break your study time into manageable blocks (e.g. 30 – 45 minutes). Review a handful of questions, reflect on the explanations.

3. Learn from the Explanations

After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.

4. Track Your Progress

Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.

5. Simulate the Real Exam

Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.

6. Repeat and Review

Don’t just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.

There’s no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!

Questions

1. **In immersion testing, which wave type tends to be rapidly damped, reducing correlation with surface conditions?**
   - A. Surface waves
   - B. Longitudinal waves
   - C. Transverse waves
   - D. Shear waves

2. **In ultrasonic calibration, which quantity is defined by establishing the index point?**
   - A. Index point
   - B. Verification of wedge angle
   - C. Sensitivity calibration
   - D. Resolution

3. **In immersion testing, near-field effects may be eliminated by using a transducer with a larger diameter. Which choice best describes this effect?**
   - A. Shortens near-field
   - B. Lengthens near-field
   - C. Eliminates near-field effects
   - D. No effect

4. **What is the velocity of sound in water as used in immersion testing data?**
   - A. 6.32 cm/s
   - B. 1.49 x 10^5 cm/s
   - C. 6.32 x 10^5 cm/s
   - D. 1.00 x 10^3 cm/s

5. **Lamb waves can be used to detect**
   - A. Laminar type defects near the surface of a thin material
   - B. Lack of fusion in the center of a thick weldment
   - C. Internal voids in diffusion bonds
   - D. Thickness changes in heavy plate

6. Which outcome describes the near-field region when a transducer is moved laterally in testing?

   A. Fluctuating amplitude due to lateral movement

   B. Stable amplitude

   C. No reflections

   D. Continuous-wave only

7. A longitudinal ultrasonic wave is transmitted from water into steel at an angle of 5 degrees from the normal. The refracted angle of the transverse wave is

   A. Less than the refracted angle of the longitudinal wave

   B. Greater than the refracted angle of the longitudinal wave

   C. Not present at all

   D. Equal to the refracted angle of the longitudinal wave

8. An ultrasonic instrument calibrated to obtain a 2 inch indication from a 0.08 inch diameter flat bottom hole located 3 inches from the front surface. When testing a forging, a 2 inch indication is obtained from a discontinuity located 3 inches from the entry surface. The cross sectional area of this discontinuity is probably:

   A. The same as the area of the 0.08 in. flat bottom hole

   B. Slightly less than the area of the 0.08 in. flat bottom hole

   C. Greater than the area of the 0.08 in. flat bottom hole

   D. About 1/2 the area of the 0.08 in. flat bottom hole

9. What is the name of a hole formed during solidification due to escaping gases?

   A. A blow hole

   B. A burst

   C. A cold shut

   D. Flaking

10. The random distribution of crystallographic direction in alloys with large crystalline structures is a factor in determining:

- **A. All of the above**
- **B. Acoustic noise levels**
- **C. Scattering of sound**
- **D. Selection of test frequency**

Answers

1. A
2. A
3. C
4. B
5. A
6. A
7. A
8. C
9. A
10. A

Explanations

1. **In immersion testing, which wave type tends to be rapidly damped, reducing correlation with surface conditions?**

   A. Surface waves

   B. Longitudinal waves

   C. Transverse waves

   D. Shear waves

In immersion testing, surface-bound waves are the ones that get damped most quickly. Surface waves travel along the specimen's exterior and are highly sensitive to surface conditions, but when the surface is in contact with water, the liquid loads the surface and extracts energy from those waves. That rapid energy loss causes Rayleigh (surface) waves to attenuate quickly, so their signal becomes less tied to the exact state of the surface. The remaining energy comes from bulk waves that penetrate the material, which is why immersion setups emphasize signals that are less influenced by surface roughness and more representative of subsurface features.

2. **In ultrasonic calibration, which quantity is defined by establishing the index point?**

   A. Index point

   B. Verification of wedge angle

   C. Sensitivity calibration

   D. Resolution

Setting up the index point establishes the zero reference on the time (and thus distance) axis of the ultrasonic display. This reference anchors how travel time translates into material depth, using the known sound velocity. By aligning the front-surface or a known reflector to a fixed position, you define the point from which all subsequent echoes are measured. With this origin in place, the instrument can accurately convert two-way travel times into distances, which is the essence of the calibration step that the index point provides. Other calibration steps serve different purposes: verifying wedge angle checks the geometry of the probe path, sensitivity calibration adjusts the signal level to fit the display range, and resolution concerns the ability to distinguish closely spaced features—none of these establish the time-zero origin used for depth measurement.

3. **In immersion testing, near-field effects may be eliminated by using a transducer with a larger diameter. Which choice best describes this effect?**

   A. Shortens near-field

   B. Lengthens near-field

   C. Eliminates near-field effects

   D. No effect

In immersion testing, near-field effects come from the irregular, interference-filled beam that starts right at the transducer face. A transducer with a larger diameter emits a beam that is more collimated and dominated by a Strong central lobe, giving a more uniform field as it travels through the water toward the test piece. That more uniform, plane-like wavefront reduces the unpredictable variations that characterize the near-field, so the region where those near-field distortions occur becomes negligible in the area where you're inspecting. In practice, using a larger diameter transducer tends to eliminate the visible near-field effects in the measurement zone by producing a steadier beam.

4. What is the velocity of sound in water as used in immersion testing data?

A. 6.32 cm/s

B. 1.49 x 10^5 cm/s

C. 6.32 x 10^5 cm/s

D. 1.00 x 10^3 cm/s

In immersion testing data, the speed of sound in the coupling water is the value used to translate time into distance. Water carries ultrasonic waves at about 1,490 meters per second, which is 1.49 x 10^5 centimeters per second. This is the standard reference speed because the pulse travels through water on its way to the reflector and back, so distance to the reflector is half of (speed in water × time). The options with speeds far from this range (too slow like a few cm/s, or too fast like hundreds of thousands of cm/s) don't match how sound propagates in water. Therefore, the correct value is approximately 1.49 x 10^5 cm/s.

5. Lamb waves can be used to detect

A. Laminar type defects near the surface of a thin material

B. Lack of fusion in the center of a thick weldment

C. Internal voids in diffusion bonds

D. Thickness changes in heavy plate

Lamb waves are guided plate waves that travel along thin materials, with their motion and energy distribution strongly influenced by the plate's surfaces. Because certain Lamb-wave modes have displacement and energy concentrated near the surfaces, a laminar defect close to or at the surface disrupts the wave's boundary conditions, causing detectable changes in arrival time, amplitude, or mode content. This makes Lamb waves particularly good at picking up laminar flaws such as delaminations or near-surface laminations in thin materials. In contrast, defects buried deep inside a thick weld, internal voids that are far from the surfaces, or simple thickness changes in heavy plates are less readily detected by these surface-sensitive, plate-bound waves and often require other inspection approaches.

6. Which outcome describes the near-field region when a transducer is moved laterally in testing?

A. Fluctuating amplitude due to lateral movement

B. Stable amplitude

C. No reflections

D. Continuous-wave only

In the near-field, the beam is in a Fresnel-like zone where the energy distribution is highly sensitive to position. Moving the transducer laterally changes how the wavelets from the transducer face overlap at a given point in the material, so constructive and destructive interference varies. That causes the received amplitude to rise and fall as you shift sideways. This lateral sensitivity is a hallmark of the near-field. In the far-field, the beam tends to spread and stabilize, so amplitude fluctuations from small lateral moves are less pronounced. The ideas of no reflections or being limited to a continuous wave don't describe this positional variability seen in the near-field.

7. A longitudinal ultrasonic wave is transmitted from water into steel at an angle of 5 degrees from the normal. The refracted angle of the transverse wave is

A. Less than the refracted angle of the longitudinal wave

B. Greater than the refracted angle of the longitudinal wave

C. Not present at all

D. Equal to the refracted angle of the longitudinal wave

When a wave passes from a liquid into a solid, the refraction angles follow Snell's law for the specific wave speeds in each medium. In steel, the longitudinal (P) wave travels much faster than the transverse (S) wave, while in water the speed is about 1480 m/s for the incident longitudinal wave. Using Snell's law, sin of the refracted angle equals the speed in the second medium divided by the speed in the first medium, times sin of the incident angle. For the longitudinal wave in steel, sin theta_t ≈ (5900/1480) * sin(5°) ≈ 0.35, giving theta_t ≈ 20°. For the transverse wave in steel, sin theta_t ≈ (3200/1480) * sin(5°) ≈ 0.19, giving theta_t ≈ 11°. Since 11° is smaller than 20°, the refracted angle of the transverse wave is less than that of the longitudinal wave. This is why the correct choice states the transverse refracted angle is smaller.

8. An ultrasonic instrument calibrated to obtain a 2 inch indication from a 0.08 inch diameter flat bottom hole located 3 inches from the front surface. When testing a forging, a 2 inch indication is obtained from a discontinuity located 3 inches from the entry surface. The cross sectional area of this discontinuity is probably:

A. The same as the area of the 0.08 in. flat bottom hole

B. Slightly less than the area of the 0.08 in. flat bottom hole

C. Greater than the area of the 0.08 in. flat bottom hole

D. About 1/2 the area of the 0.08 in. flat bottom hole

The key idea is that the amount of energy a reflector sends back to the probe—and thus the size of the indication on the instrument display—depends on the reflector's cross-sectional area. A larger area presents more boundary to the ultrasonic beam and returns more energy, producing a stronger signal that the instrument interprets as a longer or larger indication, assuming depth and coupling are similar. Here, a 0.08 inch diameter flat bottom hole at the same depth (3 inches) gives a 2 inch indication. The discontinuity in the forging at the same depth also yields a 2 inch indication. For the same depth and transducer, obtaining the same indication length with the forging discontinuity is best explained by the discontinuity having a cross-sectional area larger than the FBH's. A smaller or equal area would typically produce a smaller or equal indication, not the same length. Therefore, the cross-sectional area of the discontinuity is greater than that of the 0.08 inch flat bottom hole.

9. What is the name of a hole formed during solidification due to escaping gases?

A. A blow hole

B. A burst

C. A cold shut

D. Flaking

Gas porosity forms holes during solidification when dissolved gases escape but become trapped as the metal freezes. As the molten metal cools, gases like hydrogen come out of solution; if venting or flow isn't adequate, these gas pockets stay in the solid as cavities. This specific defect is called a blow hole. Other defects have different causes—cold shuts are from two metal fronts not fusing properly, bursts refer to different rupture issues, and flaking is a surface fracture or spall—so they don't describe holes formed by escaping gas during solidification.

10. The random distribution of crystallographic direction in alloys with large crystalline structures is a factor in determining:

A. All of the above

B. Acoustic noise levels

C. Scattering of sound

D. Selection of test frequency

When many grains in a metal are oriented randomly, ultrasound doesn't travel through a uniform medium. Each grain can have a different propagation speed and impedance, and waves crossing grain boundaries scatter in multiple directions. This leads to fluctuations in the received signal, which show up as acoustic noise. The same random grain structure causes more or less scattering of the sound depending on how the wave interacts with the boundaries, so the overall scattering behavior is strongly affected. Since scattering and attenuation depend on how the ultrasound wavelength compares to the grain size, the test frequency becomes a knob you use to optimize detection: higher frequencies increase resolution but also increase scattering and reduce penetration in coarse-grained materials, while lower frequencies improve penetration but reduce resolution. Because all three aspects—noise levels, scattering, and frequency choice—are influenced by the random crystallographic directions in large-crystal alloys, all of these factors are affected, making "All of the above" the best answer.

Next Steps

Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.

As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.

If you need help, have suggestions, or want to share feedback, we'd love to hear from you. Reach out to our team at hello@examzify.com.

Or visit your dedicated course page for more study tools and resources:

https://ultrasonictesting2.examzify.com

We wish you the very best on your exam journey. You've got this!