



P S I P A Q U A T I C P R A C T I C E E X A M · F R E E D I A G N O S T I C

Most Pool Builders

Do It Right And

Cannot Prove It.

The readiness check that shows you the exact gap between building a shell right and proving it. Same bar as the real certification. Fifteen questions, the full why behind every answer.

READ THIS FIRST

WHO THIS IS FOR

You build pools. Shotcrete and gunite shells, coping, and decks. You have been around long enough to know the difference between a crew that shoots a shell to a standard and a crew that just covers the steel and moves on.

This is for the builder who already does most of it right and has never once been asked to prove it on paper. If you shoot shells and you have never built a documented project record, you are exactly who this was built for. If you are looking for a shortcut around the work, close this now. There is no shortcut in here.

This is a diagnostic, weighted on purpose. It front-loads the areas where working pool builders most often score low: the materials chemistry that changed under your feet after 2018, the shell application protocol, and the documentation that decides who can defend their work years later. You will also see at least one question from every domain on the real exam, so the number you walk away with is an honest readiness signal, not a setup. PSIP scores, it does not spin.

THE STAKES

The concrete you shoot today is not the concrete you shot ten years ago. The bag did not warn you. The plant did not call you. But the chemistry changed, and the liability did not move off your shoulders.

Around 2018, the Class F fly ash that quietly protected concrete from Alkali-Silica Reaction got scarce as coal plants closed, and the cement itself shifted toward Type 1L, a Portland-Limestone Cement now dominant in the U.S. market. Same product names on the ticket. Different concrete at the nozzle.

A pool shell is the worst place for that change to go unmanaged. ASR needs moisture to feed its expansive gel, and a shell lives in near-constant water with wet and dry cycling at the waterline. When the protective material comes out of the mix and nobody changes the spec, the reaction has everything it needs to keep going. It does not buff out. It does not get sealed away. And a shell is far harder to fix than a slab.

Here is the part that should keep you up at night. If the integrity of a shell is ever questioned, the builder who cannot produce a record of what they shot, what SCM was in the mix, and what the conditions were on shoot day has nothing factual to offer. Doing the job right is not enough on its own. Proving it is the other half of the job.

This exam states the problem. It does not sell you an outcome. PSIP does not promise your shell will never crack. No honest builder can. What PSIP proves is that the process was followed and documented.

THE PRACTICE EXAM

Single best answer. One letter per question. Do not check the key until you have committed to all questions.

Q1

AQUATIC ASR RISK

Why does Alkali-Silica Reaction tend to be more destructive in a pool shell than in exterior flatwork?

- A.** A pool shell lives in near-constant moisture with wet and dry cycling at the waterline, and ASR needs moisture to keep feeding its expansive gel, so the perpetual water contact lets the reaction continue and worsen far beyond what a periodically dry slab experiences
- B.** Pool water chlorine dissolves the cement paste, so ASR in a shell is really just surface loss
- C.** A shell is thinner than a slab, so it simply cracks sooner under identical conditions
- D.** Pool shells get more direct sun, and ultraviolet light is the main driver of ASR

Q2

APPLICATION SYSTEMS, SHOTCRETE VS GUNITE

On a pool shell, what is the difference between wet-mix shotcrete and dry-mix gunite, and how does PSIP treat them?

- A.** They are two names for the same thing, and the choice is purely regional preference
- B.** Shotcrete is only for decks and gunite is only for shells
- C.** Gunite always contains a nano silica admixture and shotcrete never does
- D.** Wet-mix shotcrete arrives pre-mixed with its water and is sprayed pneumatically, while dry-mix gunite keeps the dry materials and the water separate until they meet at the nozzle under the nozzleman's control. Both are pneumatically placed shell systems, and PSIP applies the full Aquatic Six Pillars to either one

Q3

PSIP AQUATIC PILLAR 1, MIX AND THE BATCH-TICKET ASR GATE

A shotcrete crew is staged and ready to shoot a residential shell. Per PSIP Aquatic Pillar 1, what is the critical gate before the shoot proceeds?

- A.** The homeowner signs the final change order
- B.** The batch ticket is photographed and verified, and if it does not show a qualifying Tier 1 SCM (a colloidal nano silica admixture or a natural pozzolan), verified Class F fly ash at 25 to 30 percent, or slag at 50 percent or more, the shoot does not proceed. This batch-ticket gate is PSIP doctrine
- C.** The plaster subcontractor confirms next week's schedule
- D.** The deck forms are set so the shell and deck can be placed in one monolithic pour

Q4

SCM TIER HIERARCHY

In the locked PSIP SCM Tier Hierarchy, which two chemistries comprise the parallel Tier 1, the doctrinally preferred ASR mitigation strategies?

- A.** Class C Fly Ash and Slag Cement (GGBFS)
 - B.** Class F Fly Ash and Silica Fume
 - C.** Tier 1A natural pozzolan (Class N per ASTM C618) and Tier 1B colloidal nano silica admixtures (modern ASTM C1260 verified)
 - D.** Low-alkali Portland cement and standard Type II cement
-

Q5

POOL SCM, CLASS C EXCLUSION

A supplier offers a pool-shell mix that uses Class C fly ash as its supplementary cementitious material. Per PSIP Aquatic doctrine, how should a certified builder treat that?

- A.** Accept it, all fly ash performs the same in a shell
 - B.** Accept it only if the dose is above 30 percent
 - C.** Accept it because Class C raises early strength
 - D.** Treat Class C as not accepted for aquatic ASR mitigation. Its higher calcium content can add alkalis to the mix, and in a perpetually wet shell that can feed ASR rather than suppress it. PSIP doctrine excludes Class C fly ash as a qualifying ASR-mitigation SCM
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Q6

NANO SILICA, MECHANISM

How does colloidal nano silica improve concrete durability at the microstructural level?

- A.** It increases slump, making concrete more workable for finishing
 - B.** Nano-scale particles fill the microscopic pores and capillary pathways in the cement paste, reducing permeability and limiting the moisture and alkali movement that drives ASR
 - C.** It replaces Portland cement at 25 to 30 percent via direct pozzolanic reaction
 - D.** It accelerates set time, preventing bleed water from forming at the surface
-

Q7

SHELL CURING, HOT WEATHER

Ambient temperature is above 85 degrees at placement on a shotcrete shell. Per PSIP Aquatic Pillar 4, what does the curing protocol require?

- A.** No curing, the shell will be filled with water within a week so it stays wet on its own
 - B.** A high-gloss acrylic topcoat sprayed on immediately after the shoot
 - C.** Wet burlap or continuous light misting on the accessible shell surfaces through the first 48 to 72 hours, the most vulnerable early window. Below 85 degrees, PSIP doctrine pairs a colloidal nano silica internal cure with an approved curing compound on accessible surfaces. The temperature triggers are PSIP doctrine
 - D.** Leave the shell uncovered so it can air-cure faster in the heat
-

Q8

SHELL CURING, COLD-WEATHER TRIGGERS

A shotcrete shoot is scheduled and the forecast is turning cold. Per PSIP Aquatic doctrine, what are the cold-weather triggers?

- A.** Concrete temperature at the nozzle below 55 degrees triggers a low-temperature pozzolan accelerator dosed per the product data sheet, and an ambient forecast below 40 degrees within 72 hours triggers rescheduling the shoot. These thresholds are PSIP doctrine
 - B.** Any shoot between November and February is automatically cancelled
 - C.** Cold weather is handled by adding water so the mix stays workable
 - D.** Cold-weather steps apply only to commercial pools, not residential shells
-

Q9

SHELL THICKNESS AND REBAR COVERAGE

On a residential pool shell, which figures reflect the PSIP Aquatic documented minimums for shell thickness and rebar coverage, and how are they verified?

- A.** 4 inch shell, 1 inch cover, checked once by eye after the shoot
 - B.** 3 inch shell, half-inch cover, set by the nozzleman's judgment alone
 - C.** Thickness and cover do not need to be documented as long as a nano silica admixture is used
 - D.** Minimum 6 inch shell thickness and minimum 2.5 inch rebar coverage, each measured and documented at a minimum of three points per wall panel. These minimums are PSIP doctrine. Shallow cover lets chlorinated water reach the steel and corrode it, which compounds any ASR damage
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Q10

DOCUMENTATION AND CONTRACTOR DEFENSE

Picture a homeowner raising a concern about a pool shell two years after completion. What in a complete PSIP Aquatic project record actually answers that concern?

- A.** A warranty card capping liability at 12 months
 - B.** The builder's license and insurance certificates
 - C.** The documented chain built as the work happened, the verified batch ticket showing the mix and SCM tier, the substrate pre-hydration photo, the rebar coverage and shell thickness measurements, the curing record, the post-cure treatment record, and the signed PSIP Aquatic Workmanship Certificate, all captured with timestamped photos
 - D.** A copy of the original contract and the final invoice
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Q11

THE DOCUMENTATION PRINCIPLE

Per PSIP Aquatic, what is the single strongest protection a builder has if the integrity of a shell is ever questioned later?

- A.** A contemporaneous documented record, above all the photographed batch ticket proving a qualifying ASR-mitigation SCM was actually in the mix, because the question almost always comes back to what chemistry went into the shell. A builder who cannot produce that record has no factual basis to answer
 - B.** A verbal assurance to the homeowner that the work was done right
 - C.** The lowest bid on the job, showing the homeowner got a fair price
 - D.** The pool equipment manufacturer's warranty
-

Q12

POOL DECK AND COPING

Per PSIP Aquatic, how is the pool deck and coping concrete handled, as distinct from the shell?

- A.** The deck is excluded from PSIP and left to a separate landscape trade
 - B.** The deck and coping must be placed monolithically with the shell in one pour
 - C.** The deck only needs a film-forming acrylic topcoat and no penetrating sealer
 - D.** The deck and coping are cast-in-place flatwork governed by the standard PSIP flatwork pillars, typically with a colloidal nano silica admixture batched at the plant, and a penetrating silane or silane-siloxane sealer at 40 percent or higher active content applied to the exposed deck after it has cured
-

Q13

CODE VS PERFORMANCE

Under PSIP doctrine, what does code compliance actually represent?

- A.** A guarantee that the concrete will perform as designed for 25 or more years
 - B.** The minimum acceptable performance to legally complete the work, a floor, not a target. Code does not assess long-term durability, chemical stability, or resistance to modern material changes
 - C.** Confirmation that the contractor used ACI 318-compliant materials throughout
 - D.** An independent verification by a structural engineer of the as-built concrete
-

Q14

PRE-SHOOT VERIFICATION AND THE AQUATIC CERTIFICATE

What does the signed PSIP Aquatic Workmanship Certificate document at closeout, and how is it captured?

- A.** A 10-year warranty against any plaster cracking
 - B.** Only the pool builder's contact information
 - C.** The mix design and ASR-mitigation confirmation, the batch ticket data, the pre-hydration photo record, the rebar coverage and shell thickness measurements, the curing method, and the Tier 1 SCM admixture lot information, captured through the PSIP Field App with GPS-timestamped photos, batch-ticket capture, and on-screen signatures. The certificate and Field App record are PSIP doctrine
 - D.** The building department's certificate of occupancy
-

Q15

THE FIVE QUESTIONS

What are the Five Questions PSIP teaches homeowners to ask any concrete contractor before signing?

- A.** How long in business, license number, insurance, warranty, references
 - B.** What PSI mix and can I see the batch ticket; how are you preventing ASR; what SCM is in your mix; what is your curing protocol for the conditions; will I receive a signed workmanship certificate at completion
 - C.** Hourly rate, who supplies your concrete, when can you start, do you take credit cards, will you haul off the old deck
 - D.** Color options, do you do waterline tile, can you match my coping, do you offer financing, how soon can we swim
-

ANSWER KEY + RATIONALE

Score one point per correct answer. Read every rationale, even the ones you got right.

Q1 · AQUATIC ASR RISK

CORRECT: A

ASR runs on moisture. A driveway dries out between rains, which slows the reaction. A shell is wet almost all the time, with wet and dry cycling at the waterline, so the gel keeps absorbing water and expanding. It is the same three-ingredient reaction in both, reactive silica, sufficient alkalis, and moisture. The water just never leaves the shell, which is why mix-side ASR mitigation matters even more in aquatic work than on flatwork.

Source: Building on Solid Ground, Ch 4B and Ch 11. ASTM C1778 (guide for reducing the risk of ASR), ASTM C1260 (aggregate reactivity, mortar-bar method).

Q2 · APPLICATION SYSTEMS, SHOTCRETE VS GUNITE

CORRECT: D

Both methods spray concrete pneumatically to build the shell. The difference is where the water joins. Wet-mix is batched wet and pumped to the nozzle. Dry-mix gunite meets its water at the nozzle. PSIP does not prefer one over the other, it holds both to the same Aquatic Six Pillars, which is PSIP doctrine, not a code framework. Industry practice for both is described in ACI PRC-506-22, the guide to shotcrete, with placement specified under ACI 506.2-13(18), the specification for shotcrete.

Source: Building on Solid Ground, Ch 11. ACI PRC-506-22, ACI 506.2-13(18).

Q3 · PSIP AQUATIC PILLAR 1, MIX AND THE BATCH-TICKET ASR GATE

CORRECT: B

Pillar 1 puts a hard gate at the batch ticket. Before any concrete hits the rebar, the ticket is photographed and checked for a qualifying ASR-mitigating SCM. No qualifying SCM on the ticket, no shoot. This gate is PSIP doctrine, not a code rule, and it exists because a shell with no documented ASR protection is the highest-risk concrete a builder can place. The tier names and the rates, Tier 1 colloidal nano silica or natural pozzolan, Tier 2 Class F fly ash at 25 to 30 percent, Tier 3 slag at 50 percent or more, are PSIP doctrine thresholds, not code minimums.

Source: Building on Solid Ground, Ch 11 and Ch 4. ASTM C618 (classifies fly ash as Class F or C and natural pozzolan as Class N), ASTM C1260.

Q4 · SCM TIER HIERARCHY

CORRECT: C

PSIP runs a locked supplementary cementitious material hierarchy, and the doctrinally preferred mitigation sits in a parallel Tier 1. Tier 1A is natural pozzolan, Class N per ASTM C618, the same pozzolanic tradition behind Roman concrete and the early mass-concrete dams of the last century. Tier 1B is a colloidal nano silica admixture, verified to modern ASTM C1260 testing. Class C fly ash and low-alkali cement alone are not the preferred answer, and low-alkali cement by itself is specifically not accepted as sole mitigation. The hierarchy is PSIP doctrine, and it is how PSIP turns ASR prevention from an opinion into a documented decision.

Source: Building on Solid Ground, Ch 4 (SCM Replacement Strategies). ASTM C618, C1260. (Reused trade-neutral core item from the cleared Concrete diagnostic.)

Q5 · POOL SCM, CLASS C EXCLUSION

CORRECT: D

Not all fly ash protects against ASR. Class F is the low-calcium ash that helps suppress the reaction. Class C carries more calcium, which can introduce alkalis, and in a shell that never dries out that works against you. PSIP doctrine excludes Class C as a qualifying ASR-mitigation SCM in aquatic work. ASTM C618 is the specification that classifies fly ash as Class F or Class C and natural pozzolan as Class N. The exclusion itself is PSIP doctrine, not a code prohibition.

Source: Building on Solid Ground, Ch 4B and Ch 11. ASTM C618.

Q6 · NANO SILICA, MECHANISM

CORRECT: B

Colloidal nano silica works at a scale you cannot see. The nano-scale particles fill the microscopic pores and capillary pathways in the cement paste, which cuts permeability and starves ASR of the moisture and alkali movement it needs to expand. It is not a slump aid, it is not a cement replacement at 25 to 30 percent, and it is not an accelerator. Understanding the mechanism is what separates specifying a chemistry from repeating a brand name.

Source: Building on Solid Ground, Ch 6 (Nano Silica as a Tier 1 SCM). (Reused trade-neutral core item from the cleared Concrete diagnostic.)

Q7 · SHELL CURING, HOT WEATHER

CORRECT: C

Heat at placement drives water out of fresh concrete fast, and the shell's early days are when it is most vulnerable. Above 85 degrees PSIP holds wet burlap or continuous light misting on accessible surfaces for the first 48 to 72 hours. Below 85, the doctrine pairs an internal cure from a colloidal nano silica admixture with an approved curing compound. The external curing methods follow ACI 308R-16, the guide to external curing of concrete. The 85-degree trigger and the internal-cure pairing are PSIP doctrine, not code.

Source: Building on Solid Ground, Ch 11 and Ch 5. ACI 308R-16.

Q8 · SHELL CURING, COLD-WEATHER TRIGGERS

CORRECT: A

PSIP draws two cold lines. At the nozzle, concrete below 55 degrees gets a low-temperature pozzolan accelerator dosed to the product data sheet. Looking ahead, an ambient forecast below 40 degrees within 72 hours is a reschedule, because early freezing permanently weakens the shell and no later step undoes it. Both the 55-degree dose trigger and the 40-degree, 72-hour reschedule trigger are PSIP doctrine thresholds, not code minimums.

Source: Building on Solid Ground, Ch 11 and Ch 5.

Q9 · SHELL THICKNESS AND REBAR COVERAGE

CORRECT: D

PSIP Aquatic carries hard, documented minimums, at least a 6 inch shell and at least 2.5 inches of rebar cover, each verified at a minimum of three points per wall panel and recorded. These are PSIP doctrine quantities, not code figures. Cover matters because too little of it lets chlorinated water reach the steel, and corroding steel plus ASR is a compounding failure. By PSIP doctrine, rebound material is never worked back into the shell, since it has lost the gradation the shell needs.

Source: Building on Solid Ground, Ch 11. Shotcrete practice per ACI PRC-506-22.

Q10 · DOCUMENTATION AND CONTRACTOR DEFENSE

CORRECT: C

Two years on, memory and a paid invoice prove nothing. What answers a concern is the record built while the work happened, the batch ticket with the verified SCM, the pre-hydration photo, the thickness and coverage measurements, the curing and post-cure records, and the signed certificate, all timestamped. A builder who can produce that chain can show exactly what was placed and how. A builder who cannot has nothing factual to stand on. This is a general principle, not a statement about any specific project, party, or dispute.

Source: Building on Solid Ground, Ch 8B, Ch 9, and Ch 11.

Q11 · THE DOCUMENTATION PRINCIPLE

CORRECT: A

The recurring question on a troubled shell is what was in the concrete. The batch ticket, photographed at the gate before the shoot, is the independent answer, because the builder did not write it, the plant did. That single document, kept as part of the record, is the strongest evidence a builder can hold. Without it there is only a verbal claim, which proves nothing. This is the documentation principle stated generally, with no reference to any specific dispute, location, or party. The batch-ticket gate itself is PSIP doctrine.

Source: Building on Solid Ground, Ch 8B and Ch 11.

Q12 · POOL DECK AND COPING

CORRECT: D

The shell is sprayed, the deck is poured. The deck and coping are flatwork, so PSIP runs them under the standard flatwork pillars, commonly with a colloidal nano silica admixture in the mix. After the deck cures, a penetrating silane or silane-siloxane sealer at 40 percent or higher active content protects it without trapping moisture, consistent with ACI 201.2R guidance on durable concrete. The pillars and the sealer standard are PSIP doctrine and durability guidance, and the admixture is named only as a chemistry, not a brand.

Source: Building on Solid Ground, Ch 11 and Ch 5B. ACI 201.2R.

Q13 · CODE VS PERFORMANCE

CORRECT: B

Code compliance is a floor, not a target. It is the minimum acceptable performance to legally finish the work. It does not assess long-term durability, chemical stability, or whether your mix can survive the material changes of the last several years. Meeting code is not the same as building something that lasts and can be defended. PSIP starts where code stops.

Source: Building on Solid Ground, Ch 2 and Ch 9B (What Code Compliance Actually Means).
(Reused trade-neutral core item from the cleared Concrete diagnostic.)

Q14 · PRE-SHOOT VERIFICATION AND THE AQUATIC CERTIFICATE

CORRECT: C

Pillar 6 ties the shell's whole story into one signed record, the verified mix and SCM, the batch ticket, the pre-hydration photo, the coverage and thickness numbers, the curing method, and the SCM lot information. The PSIP Field App captures it as the work happens, with GPS-timestamped photos, batch-ticket capture, and on-screen signatures, so the record cannot be assembled after the fact. The certificate is not a warranty and not a code document, it is the PSIP doctrine closeout that proves the shell was built to the standard.

Source: Building on Solid Ground, Ch 11, Ch 7, and Ch 9.

Q15 · THE FIVE QUESTIONS

CORRECT: B

The Five Questions are the ones PSIP teaches homeowners to ask, what PSI mix and can I see the batch ticket; how are you preventing ASR; what SCM is in your mix; what is your curing protocol for the conditions; and will I receive a signed workmanship certificate. License, insurance, and references are fine questions, but they do not touch the chemistry or the proof. Here is the business angle, the certified builder is the only one at the table who can answer all five without flinching. When homeowners start asking these, the gap sells itself.

Source: Building on Solid Ground, Ch 9B, Appendix C. (Reused trade-neutral core item from the cleared Concrete diagnostic.) ---

WHAT YOUR SCORE MEANS

Count your correct answers. The certification passes at 80 percent. The same bar applies here.

12 TO 15 CORRECT

You are closer than you think. You already carry most of the body of knowledge. Here is the hard part. The knowledge is not the product. The credential is. The builders you are bidding against who scored lower than you will get certified, and then they walk into the same backyards you want carrying a signed, documented standard you cannot answer on price alone. Getting certified turns what you already know into the proof that wins the job, and keeps the next builder from taking it from you.

8 TO 11 CORRECT

You know the work, not yet the proof. You can shoot a shell. What this score exposes is the gap between doing it and documenting it to a standard that holds up. That gap is closeable, and it is exactly what PSIP certification is built to close. Every question you missed is a place a future concern would find daylight. Close the gap on purpose, on your terms.

7 OR FEWER CORRECT

You are exactly who this was built for. Do not take this as a knock. Take it as the clearest signal you will get. The material under your feet changed, and this readiness check just proved it. This is not a reason to feel behind. It is a reason to get certified now, while the cost of learning it is a PDF and not a callback. You are precisely the builder PSIP was created to protect.

ONE DOOR

GET CERTIFIED

You just saw the body of knowledge that separates a documented pool builder from an exposed one. Certification is how you own it, prove it, and put it to work on your next bid.

Your next step is certification enrollment at

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Questions? `info@psipprotocol.com`

DISCLAIMER AND SCOPE

This practice exam is an educational readiness tool produced by Performance Structural Standards Group, Inc. for the Performance Structural Integrity Protocol (PSIP). It is educational in nature and does not constitute legal advice, engineering advice, or a warranty of any kind. All concrete and shell work should be reviewed by a qualified engineer where required by local code, and project-specific legal questions should go to a licensed attorney.

What PSIP is, and is not. PSIP is a documented workmanship and quality assurance protocol. It is not a warranty, not a guarantee, not an insurance policy, and not an engineering stamp. PSIP proves that the process was followed and documented. PSIP does not promise that concrete will never crack, discolor, settle, or fail. No honest contractor can make that promise. PSIP is an independent body. The governing line is simple: we do not recommend, we score.

Hairline cracking within industry-acceptable tolerances per ACI 224R is inherent to the material and is not a workmanship failure. Surface discoloration, ground settlement and subgrade movement, third-party damage, and ready-mix composition produced by the plant are outside PSIP workmanship scope, as documented in the PSIP exclusions.

Exam integrity and third-party references. The questions in this diagnostic are original practice items written to mirror the certification blueprint. They are not reproductions of the live certification exam, which remains secure. Any scenario describing a concern, complaint, or dispute is hypothetical and illustrative, stated as a general principle, and is not an account of any specific case, party, location, or outcome. Statements about materials and supply, such as the reduction in fly ash availability beginning around 2018, describe documented industry conditions. No product or trade name is referenced. Chemistries are named generically. No efficacy figures are claimed.

Founder reference. PSIP and this material reflect 30 years of experience in construction. Where the founder is referenced in cleared materials, the canonical framing from Building on Solid Ground governs.