

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

This following is a Study Guide that helps you learn the details of **ASME PCC-2, Repair of Pressure Equipment & Piping - 2018 Edition**. There will probably be about 5-12 questions from this document on your API exam. We do **NOT** spend much time in class discussing this publication. So, it is important that you become familiar with this content in your personal study sessions.

The questions in this Guide are list in the order of the Repair Topics. An answer key is provided at the end of the Guide. We suggest you read the specific Repair Topic a couple of times before answering the questions. Do this Study Guide multiple times prior to your API exam! **Your Goal ... be able to score 85+% on this guide! Questions highlighted in Yellow are Open Book Questions!**

Good News! The majority of the PCC-2 questions will be Open Book!

Article 201: Butt-Welded Insert Plates

1. **An insert plate** is being used to repair a vessel shell that has experienced localized corrosion. Which of the following is correct? **This may have more than one correct answer, select all answers that apply.**
 - A. The repair plate must be the same material as the vessel shell.
 - B. The repair plate should be the same material as the vessel shell
 - C. The repair plate must have the same P-Number as the vessel material.
 - D. The repair plate should have the same P-Number as the vessel material.
2. The thickness of a butt-welded insert plate:
 - A. should be as thick as the current thickness of the adjacent shell piece.
 - B. must be as thick as the current thickness of the adjacent shell piece.
 - C. should be as thick as the nominal thickness of the adjacent shell piece.
 - D. must be as thick as the nominal thickness of the adjacent shell piece.
3. **A 1.5" thick rectangular** insert plate is being install per ASME PCC-2. What is the minimum allowed corner radius?
 - A. 1"
 - B. 3"
 - C. 6"
 - D. 12"
4. **A square insert plate** that is 1" thick is being install in a vessel in accordance with ASME PCC-2. What is the minimum allowed corner radius?
 - A. 1"
 - B. 3"
 - C. 6"
 - D. 12"

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

5. A rectangular insert plate that is 3/8" thick is being install per ASME PCC-2. What is the minimum allowed corner radius:
- A. 1"
 - B. 2"
 - C. 3"
 - D. Unspecified radius
6. A 1.5" thick insert plate is being install in a carbon steel vessel. The new welds will not be post weld heat treated. Per ASME PCC-2, what is the minimum dimension for patch plate (length, width or diameter)?
- A. 12"
 - B. 15"
 - C. 18"
 - D. 24"
7. A carbon steel 0.750" thick insert plate is being install per ASME PCC-2? The new welds will not be post weld heat treated. What is the minimum dimension for patch plate (length, width or diameter)?
- A. 6"
 - B. 9"
 - C. 12"
 - D. 15"
8. A 1.00" thick insert plate is being install per ASME PCC-2? The new welds will be post weld heat treated. What is the minimum diameter for patch plate?
- A. 6"
 - B. 12"
 - C. 18"
 - D. 24"
9. When installing an insert patch, the structural stability of the vessel may be affected in which of following situations?
- A. Any unsupported plate with a cutout in 300 Series SS vessel
 - B. Unsupported plates with a large repair cutout
 - C. Adding an insert plate which includes a nozzle
 - D. Replacing a stiffener ring for a vessel in vacuum service
10. A 4 NPS (4.5" OD) is being installed on a carbon steel vessel using a new insert plate. The nozzle-to-shell weld is not post-weld-heat-treated. What is the minimum size (diameter) of insert plate allowed by ASME PCC-2?
- A. 9"
 - B. 10.5"
 - C. 12"
 - D. 16.5"

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

11. A 16 NPS (16" OD) is being installed on a carbon steel vessel using a new insert plate. The nozzle-to-shell weld is **not** post-weld-heat-treated. What is the minimum size (diameter) of insert plate allowed by ASME PCC-2?
- A. 22"
 - B. 24"
 - C. 28"
 - D. 32"
12. A round insert patch is installed in a vessel tube. The standard bevel for the tube and the repair patch is:
- A. 15 - 30 degrees.
 - B. 22.5 - 37.5 degrees.
 - C. 25 - 35 degrees.
 - D. 33 - 45 degrees.
13. A rectangular insert patch is cold rolled to the proper curvature of the shell. The insert plate should be appropriately heat treated if the fiber elongation from cold rolling exceeds:
- A. 0.5% elongation.
 - B. 1% elongation.
 - C. 2.5% elongation.
 - D. 5% elongation.
14. When an insert plate is used for a repair, the maximum amount of misalignment allowed is:
- A. 1/16".
 - B. 1/8".
 - C. 3/16".
 - D. based on the applicable construction code.
15. An insert plate is used for a vessel repair. The misalignment exceeds what is allowed. The edge of the insert plate shall be tapered. The length of the taper must **not** be less than:
- A. 2 times the offset.
 - B. 3 times the offset.
 - C. 3".
 - D. 6".
16. A rectangular carbon steel insert patch is installed in a vessel shell. Which of the following is correct? **This may have more than one correct answer, select all answers that apply.**
- A. Weld procedure qualification should meet the applicable construction code.
 - B. Welder qualification should meet the applicable construction code.
 - C. Recommended to use low-hydrogen electrodes.
 - D. The weld must be a double-welded design.

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

17. Which of the following is not a potential concern when installing carbon steel insert plates?
- A. Cracking
 - B. Distortion
 - C. Embrittlement
 - D. Flat spot
18. An insert plate is used in a small diameter vessel. There is no way to weld from the inside. So, this will be a one-sided weld. What welding process is recommended for the root pass?
- A. GMAW
 - B. GTAW
 - C. SAW
 - D. SMAW
19. An insert plate is used in a small diameter vessel. There is no way to weld from the inside. What welding process is not recommended for welding any pass?
- A. All GMAW transfer modes
 - B. GMAW Globular mode
 - C. GMAW Short-circuit mode
 - D. GMAW Spray mode
20. An insert patch that is 0.500" thick is installed in a vessel shell. The maximum undercut allowed for the patch weld is:
- A. 0.031"
 - B. 0.050"
 - C. 0.062"
 - D. 0.100"
21. An insert patch that is 0.375" thick is installed in a shell. Per ASME PCC-2, the minimum spacing allowed between this new weld and an existing non-PWHT'd welds is:
- A. 1.5".
 - B. 3".
 - C. 6".
 - D. 8".
22. An 0.750" thick insert patch is installed in a vessel shell. Per ASME PCC-2, the minimum spacing allowed between this new weld and an existing non-PWHT'd welds is:
- A. 6".
 - B. 8".
 - C. 10".
 - D. 12".

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

23. A 1.500" thick insert patch is installed in a vessel shell. Per ASME PCC-2, the minimum spacing allowed between this new weld and an existing non-PWHT'd welds is:
- A. 6".
 - B. 8".
 - C. 10".
 - D. 12".
24. A 1.500" thick insert patch is installed in a vessel shell. The adjacent existing weld was previously post-weld heat treated. Per ASME PCC-2, the minimum spacing allowed between this new weld and the existing PWHT'd welds is:
- A. 3".
 - B. 6".
 - C. 10".
 - D. 12".
25. An insert plate is used to repair a vessel. It is impractical to avoid an existing weld. The insert plate should intersect the existing weld at an angle not less than:
- A. 10 degrees.
 - B. 22.5 degrees.
 - C. 30 degrees.
 - D. 45 degrees.
26. A 0.750" thick insert patch is installed in a vessel shell. The insert plate stops at an existing weld. It intersects the existing weld at 90 degrees. Per ASME PCC-2, what is the minimum distance to be cut the existing welds beyond the new insert plates welds?
- A. 6".
 - B. 9".
 - C. 12".
 - D. 18".
27. The insert plate stops at an existing weld. It intersects the existing weld at 90 degrees. How must all of the replaced existing welds be examined?
- A. 100% RT or UT at completion
 - B. 100% RT or MT at completion
 - C. 100% RT or UT at completion or MT or PT both sides at the completion of weld
 - D. 100% MT or PT on root pass and completion of weld
28. An insert plate is used to repair a vessel. Postweld heat treatment of the insert plate:
- A. is always required.
 - B. must be done if required by the applicable construction code.
 - C. if done should always be at a temperature about the lower transformation temperature.
 - D. is never recommended due to potential distortion of the shell.

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

29. An insert plate is used to repair a vessel. The extent of NDE for all the new welds shall be:
- A. Spot RT or UT.
 - B. Full RT or UT.
 - C. 100% MT or PT on the root pass, hot pass and final pass.
 - D. RT or UT in accordance with the applicable construction code.
30. An insert plate is used to repair a vessel. UT of 100% of the new welds will be performed. What else is recommended?
- A. UT procedure is qualified to ASNT SNT-TC-1A
 - B. UT technician is qualified to API 2201
 - C. MT or PT the root pass
 - D. MT or PT the root & final passes
31. An insert plate is used to repair a vessel. Spot RT will be performed on the new welds. What else is recommended?
- A. MT or PT only the root pass for single-groove welds
 - B. MT or PT the root & final pass single-grooves welds
 - C. MT or PT only the root pass for double-grooves welds
 - D. Spot UT to confirm RT results
32. An insert plate is used to repair a vessel. Spot RT is required on the new welds. What else is recommended? **This may have more than one correct answer, select all answers that apply.**
- A. The vessel shall be pressure tested
 - B. If practical, the vessel should be pressure tested in accordance with the construction code
 - C. NDE can always be used in lieu of a pressure test
 - D. NDE can be used in lieu of a pressure test if pressure testing is not practical
33. An insert plate is used to repair a vessel. A pressure test will be performed. Testing should be:
- A. completed prior to the application of coatings or insulation.
 - B. completed prior to the application of insulation. But can be done after coatings.
 - C. done at a pressure that 150% of vessel MAWP.
 - D. always performed with water and not air.

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

Article 202: External Weld Buildup for Internal Thinning

- Localized degradation has occurred on the shell internal surface. When can external weld buildup **not** be used to repair this damaged area?
 - Wall loss exceeds the corrosion allowance
 - Wall loss exceeds 50% of the nominal thickness
 - The type of degradation is a cracking mechanism
 - When the shell is made of nickel alloys
- Localized thinning has occurred** on the shell internal surface. When can external weld buildup **not** be used to repair this thinned area?
 - As an in-service repair to a vessel in gasoline service
 - As an in-service repair to a vessel in hydrogen cyanide service
 - Stainless steel vessels
 - Vessel is made from plate that is copper-aluminum alloy
- Localized thinning has occurred on the shell internal surface. When can external weld buildup **not** be used to repair this thinned area?
 - Vessel in liquid service that is "blocked-in"
 - Vessel in diesel service
 - Vessel with remaining wall less than 50% of t_{minimum}
 - Vessel subject to sulfidation corrosion
- Localized thinning has occurred on the shell internal surface. The Owner wishes to use external weld buildup to repair this area. Which of the following is correct?
 - Tensile strength of the base must be less than 70,000 psi
 - Tensile strength of the electrode must exceed 80,000 psi
 - Electrode's tensile strength shall be tested from electrodes of the same lot
 - Electrode's tensile strength shall be at least equal to the strength of the base
- Localized thinning has occurred** on the shell internal surface. The Engineer wishes to use external weld buildup to repair this area. The vessel diameter is 96", and the nominal thickness of the shell is 0.625", and t_{minimum} of the shell is 0.500". The full-thickness weld build shall extend past the corroded (*in all directions*) by:
 - 3.7"
 - 4.1"
 - 5.2"
 - 5.8"
 - "I HAVE NO IDEA !!!"



"E" may be true for you, but won't count on your test!

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

6. Localized thinning has occurred on the shell's internal surface. External weld buildup will be used to repair this area. The edge of the weld buildup should have a taper that does **not** exceed:
- A. 22.5 degrees.
 - B. 30 degrees.
 - C. 45 degrees.
 - D. 90 degrees.
7. External weld buildup will be used to repair an area that has thinned by internal corrosion. All corners of the weld buildup shall have a radius that is **not** less than:
- A. the t_{minimum} of the shell.
 - B. the weld buildup thickness.
 - C. 1".
 - D. 6".
8. External weld buildup will be used to repair an area that has thinned by internal corrosion. There is already one similarly repaired area on the shell. The shell is 60" in diameter and the nominal thickness of the shell is 0.500", and t_{minimum} of the shell is 0.400". These two repair areas must be at least:
- A. 2.6" apart.
 - B. 2.9" apart.
 - C. 3.7" apart.
 - D. 4.1" apart.
 - E. 6" apart.
9. External weld buildup will be used to repair an area that has thinned by internal corrosion. The shell has a 60" diameter and the nominal thickness of the shell is 0.625", and t_{minimum} of the shell is 0.450". The weld buildup thickness is:
- A. unlimited.
 - B. limited to 0.450".
 - C. limited to 0.625".
 - D. limited to 1.250".
10. External weld buildup will be used to repair an area that has thinned by internal corrosion: Prior to welding, what NDE should be done in the repair area? **This may have more than one correct answer, select all answers that apply.**
- A. Eddy current scans to determine average wall thickness.
 - B. Thickness readings are taken to determine the extent of the damage.
 - C. Volumetric examination to determine the repair area does not have any cracks.
 - D. Appropriate NDE to verify surface quality.

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

11. External weld buildup will be used for a repair. Prior to welding the repair area should be thoroughly cleaned with:
- A. Diesel.
 - B. Gasoline.
 - C. Solvent, like acetone.
 - D. Water.
12. External weld buildup will be used for a repair. But the vessel is in service and the area needing repair has a small leak. Which of the following statements is correct?
- A. The vessel must be taken out of service.
 - B. The leak may be stopped using a wooden plug.
 - C. The leak may be stopped using a non-metallic plug.
 - D. The leak may be stopped by peening.
13. External weld buildup is performed to restore the integrity of a shell caused by internal corrosion. One of the concerns is burn-through. Which of the following will minimize the risk of burn-through?
- A. Use a small diameter electrode.
 - B. Increase welding machine amperage.
 - C. Slow the travel speed of the electrode.
 - D. Use a high-hydrogen electrode.
14. When performing external weld buildup, the electrode should always have a:
- A. bead overlap less than 10%.
 - B. diameter that is less than the remaining base material thickness.
 - C. tensile strength that is greater than the base metal.
 - D. tensile strength that is less than the base metal.
15. Concerning external weld buildup, which of the following statements are correct? **This may have more than one correct answer, select all answers that apply.**
- A. The weld procedure used shall be qualified to Sect IX or as required by applicable code.
 - B. The welder that is welding shall be qualified to Sect IX or as required by applicable code.
 - C. If vessel is in service, then the requirements of API 580 must be followed.
 - D. A follow-up post weld heat treatment is never required.
 - E. The typical weld processes used for external weld buildup are SMAW and GTAW.
16. **Which are true concerning the** use of a Temper Bead welding for external weld buildup of a carbon steel vessel? **This may have more than one correct answer, select all answers that apply.**
- A. Temper bead welding can never be used.
 - B. Temper bead welding can never be used to eliminate a code required PWHT.
 - C. Temper bead welding can always be used to eliminate PWHT.
 - D. Temper bead welding can be used to eliminate code required PWHT.
 - E. Temper bead welding should not be used to eliminate a PWHT needed for service conditions.

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

17. External weld buildup is being performed. To minimize the risk of burn-through, the beads should be installed with a bead overlap of about:
- A. 10%.
 - B. 25%.
 - C. 33%.
 - D. 50%.
18. External weld buildup is performed to restore the integrity of a shell caused by internal corrosion. Where should the 1st weld passes be started?
- A. In the center of the repair area
 - B. On the outer perimeter of the repair area
 - C. At the thinnest part of the repair area
 - D. At the thickest part of the repair area
19. External weld buildup is performed to restore the integrity of a shell. At the completion of the repair, what NDE is required? **This may have more than one correct answer, select all answers that apply.**
- A. MT or PT
 - B. RT or UT flaw detection
 - C. UT thickness measurements
 - D. Light hammer testing

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

Article 209: Alternatives to PWHT

1. PWHT is used in ferritic welds to: This may have more than one correct answer, select all answers that apply.
 - A. diffuse hydrogen.
 - B. increase grain size.
 - C. provide tempering.
 - D. reduce hardness.

2. PWHT of ferritic materials is performed at a temperature that is:
 - A. below the lower transformation temperature.
 - B. between the lower and upper transformation temperature.
 - C. above the upper transformation temperature.
 - D. above the casting temperature.

3. During repairs to carbon steel vessels, when might the use of a PWHT alternatives **not** be a good idea?
 - A. If material is subject to reheat cracking
 - B. If PWHT is a requirement from the construction code
 - C. If PWHT is specified because of a process service, i.e caustic
 - D. On larger vessels

4. What is one type of alternative to PWHT?
 - A. Peening
 - B. Elevated Preheat Temperature
 - C. Elevated Interpass Temperature
 - D. Elevated Preheat Maintenance Temperature

5. What is one type of alternative to PWHT?
 - A. API - Applied Pressure Induction
 - B. Bead Cross-over Welding
 - C. MSTs - Minimum Stress Through Saturation
 - D. Stress Control Welding
 - E. Temper Bead Welding

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

Article 210: In-Service Welding on CS Components

1. What are the primary concern(s) technical concerns when performing In-Service welding?
This may have more than one correct answer, please select all answers that apply.
 - A. Burn through
 - B. Carburization
 - C. Coking
 - D. Hydrogen Cracking
2. **Which of the following is** correct concerning in-service welding on materials less than the 0.250" thick?
 - A. Welding machine should operate at less than 15 amps
 - B. Electrode diameter should not exceed 0.094"
 - C. Requirements detailed in API 2102 should be followed
 - D. Never perform in-service welding on materials ≤ 0.250 "
3. Which is **not** a factor in Hydrogen Cracking of welds?
 - A. Allowable stress of the base metal
 - B. Hydrogen ... Duh!
 - C. Residual tensile stresses from welding
 - D. Weld microstructure
4. Crack-susceptible microstructures typically have a microstructure high in:
 - A. Austenitic structure.
 - B. Ductility.
 - C. Hardness.
 - D. Toughness.
5. **For in-service welding, high** microstructure hardness is controlled by controlling the:
 - A. Preheat and PWHT temperatures.
 - B. Rod size and Shielding Gas.
 - C. Ferrite Equivalence and Preheat Temperature.
 - D. Carbon Equivalence and the Cooling Rate.
6. Why does likelihood of hydrogen cracking increase with in-service welding? (*compared to out-of-service welding*)
 - A. The process on the other side causes coking which causes high carbon in the weld.
 - B. The process on the other side causes rapid cooling.
 - C. With field welding, it is difficult to achieve adequate shielding of the weld.
 - D. Vibrations in the field causes molecular compaction which creates hard zones.
7. **During in-service welding, which** of the following is used to minimize microstructure hardness?
This may have more than one correct answer, please select all answers that apply.
 - A. Low Hydrogen Electrodes
 - B. Argon gas
 - C. Special weld procedures
 - D. Preheat



ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

8. During in-service welding, which of the following is correct?
- A. High heat input lowers likelihood of burn-through & minimizes microstructure hardness.
 - B. High heat input increases likelihood of burn-through & minimizes microstructure hardness.
 - C. Low heat input lowers likelihood of burn-through & minimizes microstructure hardness.
 - D. Low heat input increases likelihood of burn-through & increases microstructure hardness.
9. When welding on thinner materials it may be necessary to use a smaller diameter rod. What are the potential results? **This may have more than one correct answer, select all that apply.**
- A. Less likely to burn-through
 - B. More likely to burn-through
 - C. Less likely to form weld microstructure that is susceptible to hydrogen cracking
 - D. More likely to form weld microstructure that is susceptible to hydrogen cracking
10. During in-service welding, if there is an increase in the process flow rate the likelihood of:
- A. burn-through increases.
 - B. H₂ cracking increases.
 - C. forming martensitic structure increases.
 - D. forming microstructure soft zones increases.
11. During in-service welding, if there is a decrease in the process flow rate the likelihood of:
- A. burn-through increases.
 - B. H₂ cracking increases.
 - C. forming austenitic structure increases.
 - D. forming microstructure hard zones increases.
12. Which is difficult to perform with In-Service welding?
- A. Controlled deposition welding
 - B. Minimizing risk of burn-through
 - C. PWHT
 - D. Temper-bead welding
13. A weld procedure is being qualified for In-Service welding. Which of the following is considered an Essential Variable for the qualification test? **This may have more than one correct answer, select all that apply.**
- A. Bevel Angle
 - B. Carbon Equivalence
 - C. Cooling Rate
 - D. Peening
14. A weld procedure is being qualified for In-Service welding. Which of the following is considered an Essential Variable for the qualification test? **This may have more than one correct answer, select all that apply.**
- A. Deposition Sequence
 - B. Welding Position
 - C. Postweld Backout
 - D. Welding Current

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

15. An in-service welding procedure is being qualified for weld metal buildup. The test coupon wall thickness is $3/8"$. What bend tests should be conducted?
- A. Bends tests are not needed
 - B. 4 Face Bends
 - C. 2 Face Bends and 2 Side Bends.
 - D. 2 Face Bends and 2 Root Bends or 4 Side Bends.
16. An in-service welding procedure is being qualified for an attachment weld. The test coupon wall thickness is $5/8"$. What bend tests should be conducted?
- A. Bends tests are not used to qualify an attachment weld procedure
 - B. 4 Face Bends
 - C. 2 Face Bends and 2 Side Bends.
 - D. 2 Face Bends and 2 Root Bends or 4 Side Bends.
17. An in-service welding procedure is being qualified for weld metal buildup. The test coupon wall thickness is $3/4"$. What bend tests should be conducted?
- A. Bends tests are not needed
 - B. 4 Face Bends
 - C. 2 Face Bends and 2 Side Bends.
 - D. 2 Face Bends and 2 Root Bends or 4 Side Bends.
18. An in-service welding procedure is being qualified. Which of the following is correct? **This may have more than one correct answer, select all that apply.**
- A. Hardness test are done in accordance with ASTM E1EIO-50
 - B. At least 4 sets of hardness readings are required
 - C. Each set of hardness readings should have at least 5 Vickers hardness readings
 - D. Each set of hardness readings should have at least 5 Rockwell hardness readings
 - E. The hardness readings should be taken in the small-grain HAZ
19. An in-service welding procedure is being qualified for an attachment weld. In the bend tests, what is the acceptance criteria for flaws in the weld or HAZ?
- A. No flaw that exceeds $1/16"$ (0.063")
 - B. No flaw that exceeds $1/8"$ (0.125")
 - C. No flaw that exceeds the lesser of $1/16"$ or the one-half the wall thickness
 - D. No flaw that exceeds the lesser of $1/8"$ or the one-half the wall thickness
20. When In-Service welding is performed it should be examined with NDE in accordance with the applicable construction or post-construction code. If hydrogen cracking is a concern, the in-service welds should be examined:
- A. within 1 hour of the completion of the weld.
 - B. within 12 hours of the completion of the weld.
 - C. after a delay of 6-24 hours after the completion of the weld.
 - D. after a delay of 24-72 hours after the completion of the weld.

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

Article 211: Weld Buildup, Weld Overlay & Clad Repairs

1. Weld Overlay refers to adding:
 - A. weld metal to carbon steel or low alloy materials to restore base metal thickness.
 - B. corrosion resistant weld metal (*alloy*) to carbon steel or low alloy materials.
 - C. alloy weld metal to carbon steel or low alloy materials to restore alloy cladding.
 - D. weld passes in a specific method to temper the previous passes.

2. Weld metal buildup is performed on a corroded steel vessel shell. The tensile strength of the electrode, should:
 - A. greater than or equal the allowable stress of the shell plate.
 - B. greater than or equal the yield stress of the shell plate.
 - C. greater than or equal 95% of the tensile strength of the shell plate.
 - D. greater than or equal the tensile strength of the shell plate.

3. What are common electrodes that are used when performing SS weld overlay on carbon steel base metal?
 - A. Type 309
 - B. Type 310
 - C. Type 309 followed by Type 308
 - D. Type 308 followed by Type 309

4. What is one potential problem when using weld overlaid areas in equipment that operates in cyclic temperature?
 - A. Differential rates of thermal expansion
 - B. Lack of fusion
 - C. Polythionic stress cracking
 - D. Thermal carburization

5. Prior to performing Back Cladding, the existing cladding shall be:
 - A. checked for thickness on both sides of the weld within 6" of the new weld.
 - B. checked for disbonding on both sides of the weld within 12" of the new weld.
 - C. etched with nitric acid.
 - D. removed a minimum of 1/4" from the edge of the plate.

6. The Back Cladding weld cap height shall **not** exceed:
 - A. the height of the cladding.
 - B. 1/16".
 - C. 1/8".
 - D. the lesser of 10% of the plate thickness or 1/32".

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

7. SS weld overlay is performed on a 5% Cr shell that is 0.5" thick. There are some weld repairs needed to the 5 Cr material prior to performing the weld overlay. What should be done after the 5 Cr repairs are completed, but before the weld overlay is performed?
- A. No addition work is needed prior to performing weld overlay
 - B. Preheat to 500 °F
 - C. PWHT
 - D. UT flaw detection to check for delayed cracking
8. SS weld overlay is performed on a CS shell that is 0.5" thick. There are some weld repairs needed to the base material prior to performing the weld overlay. What should be done after the carbon steel repairs are completed, but before the weld overlay is performed?
- A. No addition work is needed prior to performing weld overlay
 - B. Preheat to 500 °F
 - C. PWHT
 - D. Use Metallography to determine if grain structure is appropriate
9. SS weld overlay is performed on a CS shell that is 2.0" thick. There are some weld repairs needed to the base material prior to performing the weld overlay. What should be done after the carbon steel repairs are completed, but before the weld overlay is performed?
- A. No addition work is needed prior to performing weld overlay
 - B. Preheat to 300 °F
 - C. PWHT
 - D. Use Metallography to determine if grain structure is appropriate
10. SS weld overlay is performed on a shell that has a 7% Cr base material that is 1.0" thick. PWHT heat will need to be performed. The final PWHT:
- A. may be substituted with a 300 °F preheat.
 - B. must be done prior to the weld overlay.
 - C. must be done after to the weld overlay is complete.
 - D. may be done after the 1st layer of weld overlay or when the overlay is completed.
11. Weld buildup is performed on a CS shell. After welding the repair area:
- A. may be examined by NDE (MT, PT, etc.).
 - B. may be examined by NDE (MT, PT, etc.) in accordance with appropriate code.
 - C. must be examined by NDE (MT, PT, etc.).
 - D. must be examined by NDE (MT, PT, etc.) in accordance with appropriate code.
12. Weld buildup is performed on a CS shell that is $\frac{1}{2}$ " thick. After welding the repair area:
- A. should be examined by RT.
 - B. should be examined by UT flaw detection.
 - C. should be examined by RT or UT flaw detection.
 - D. shall be examined by RT or UT flaw detection.

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

13. Existing SS overlay on a carbon steel base is eroded and will be repaired. The damaged overlay is removed. Prior to applying the new overlay, the carbon steel surface should be examined using:
- A. a copper sulfate solution to verify the complete removal of the stainless steel.
 - B. sulfuric acid to etch the CS to verify the complete removal of the HAZ.
 - C. metallography to assure embrittled areas have been removed.
 - D. WFMPPT to assure H₂S cracking has not occurred.
14. Multilayer SS weld overlay is being performed. What should be done after the 1st layer is welded?
- A. Examine with MT
 - B. Examine with PT
 - C. Raise the temperature to 500 °F for 1 hour to assist in out gassing hydrogen
 - D. Nothing, just weld the 2nd layer

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

Article 212: Fillet Weld Patches

1. Per PCC-2, a fillet-welded patch is acceptable provided the:
 - A. process temperature does not exceed 650°F.
 - B. process temperature does not exceed 800°F.
 - C. process pressure does not exceed 350 psig.
 - D. process pressure does not exceed 1000 psig.
 - E. the equipment is not subject to temper-embrittlement.

2. A vessel wall has a crack. Per PCC-2, which of the following is correct?
 - A. A fillet-weld patch can never be used to cover a crack.
 - B. The crack must be removed, area prepped and rewelding to original thickness.
 - C. The crack must be removed. The area is prepped & rewelding to original thickness, or the ground down area can be evaluated as a locally thinned area.
 - D. A fillet weld patch may be used if the crack growth has stopped.

3. A fillet-welded patch covering a corroded area:
 - A. should extend into sound metal by 6".
 - B. must be the same thickness as the equipment wall.
 - C. should be of the same or similar material as the equipment wall.
 - D. in alloy service must be the same material as the equipment wall.

4. The minimum thickness of a fillet-welded patch is:
 - A. the thickness of the equipment wall loss.
 - B. the nominal thickness of the equipment wall.
 - C. twice the nominal thickness of the equipment wall.
 - D. based on the calculated needed size of the attachment welds.

5. A fillet welded patch must overlap sound metal by:
 - A. 1".
 - B. 2".
 - C. the greater of 2T or 2".
 - D. the greater of 2T of 4".

6. Per PCC-2, the minimum radius on a patch plate is:
 - A. 1".
 - B. 2".
 - C. 3".
 - D. 6".

7. A vessel with internal pressure has a corroded area on the inside vessel wall. Per PCC-2, if a fillet welded patch is used, it:
 - A. can be used on the inside or the outside of the vessel.
 - B. must actually cover the corroded area whether inside or outside of the vessel.
 - C. must be placed on the outside of the vessel.
 - D. normally is placed on the outside of the vessel.

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

8. A locally thinned area on the inside of a vessel is repaired using an external fillet welded patch. Per PCC-2, which of the following is correct?
- A. The patch must have rounded corners with a minimum radius of 1".
 - B. The patch thickness must not exceed the vessel wall thickness.
 - C. If damage is expected to be through-wall, a fillet weld patch is not allowed.
 - D. If damage is expected to be through-wall, the engineer must consider possible corrosion between the vessel wall and inside of patch.
9. A fillet welded patch is installed on a 10' diameter vessel. The vessel wall thickness is 0.750". Per PCC-2, how far must this patch be from an existing fillet welded patch?
- A. 3"
 - B. 5.5"
 - C. 13.5"
 - D. 19"
10. A fillet welded patch is installed on a 72" diameter vessel near a nozzle. The vessel wall thickness is 0.500". Per PCC-2, if the patch does not extend to the nozzle, how far must this patch be set back from the nozzle?
- A. 4"
 - B. 8.5"
 - C. 12"
 - D. 14.5"
11. A fillet welded patch is installed on an 8' diameter vessel near a nozzle with a repad. Which of the following is correct?
- A. Patch can be contoured to repad & welded to the pad with a full penetration weld.
 - B. Patch can be contoured to repad & fillet welded 1" away from the repad fillet weld.
 - C. Patch must be set back from the repad by the greater of 2T or 3".
 - D. The repair patch can never be attached to the existing repad.
12. When designing a fillet welded patch per PCC-2, the joint efficiency used in the calculation is:
- A. 0.45.
 - B. 0.55.
 - C. 0.70.
 - D. same as the joint efficiency of the equipment.
13. When rolling a fillet welded patch to the shape of the equipment, the plate must be stress relieved if the patch's fiber elongation exceeds:
- A. 0.35%.
 - B. 2%.
 - C. 3.5%.
 - D. 5%.
14. A fillet welded patch is installed a large diameter pipe. The patch should be fitted tightly to the pipe surface. The maximum separation between the patch and the plate is:
- A. 1/32".
 - B. 1/16".
 - C. 1/8".
 - D. 3/16".

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

15. Welding procedures and welders used on a fillet welded patch should be qualified to the requirements of the appropriate equipment code or:
- A. ASME Sect IX.
 - B. API 579.
 - C. API 1104.
 - D. AWS D1.1.
16. Prior to welding a fillet welded patch, how much of the paint, rust & foreign material should be removed?
- A. 1.5" band, weld will be centered in the clean band.
 - B. 6" band, weld will be centered in the clean band.
 - C. 1.5" width on either side of the future weldment.
 - D. 6" width on either side of the future weldment.
 - E. 100% of the surface under the patch and 1" away from the future weldment.
17. Prior to welding a fillet welded patch, any existing butt welds covered the patch should be:
- A. ground flush.
 - B. ground flush and examined with either MT or PT.
 - C. examined with either RT or UT.
 - D. visually examined and caps tapered with weld metal to achieve a 3:1 taper.
18. A fillet welded patch should be should have a vent. What is the purpose of the vent?
- A. To provide indication if the equipment wall has through-wall damage.
 - B. To provide a vent during welding.
 - C. To provide a vent during welding and postweld heat treating.
 - D. To provide a spot to put extra UT grease.
19. The fillet welds on a fillet welded patch are normally examined with:
- A. MT or PT.
 - B. RT.
 - C. UT.
 - D. Light hammer taps.
20. Lifting lugs were used to place a fillet weld patch on a vessel. After patch installation the lifting lugs were removed. Which is correct concerning the area of the removed fillet welds?
- A. No need any special examination.
 - B. Need to be examined visually. Indications should be further examined with MT or PT.
 - C. Need to be examined with either MT or PT.
 - D. Need to be examined with UT.
21. Which of the following is correct concerning a pressure test of a fillet weld patch?
- A. Testing shall be performed prior to application of patch coatings.
 - B. Testing can be performed after application of patch coatings, but prior to adding insulation.
 - C. Testing of patch should be performed at 1.5 times the design pressure.
 - D. Testing is not required, since welds have been examined by NDE.

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

Article 215: Repair Welding for Cr-Mo Steels

1. A Cr-Mo vessel needs some weld repair. If the "aged condition" of the component cannot be determined what test should be done?
 - A. Bead-on Plate Test
 - B. Jominy End Quench Test
 - C. Stud Weld Test
 - D. Vickers Test
2. A bead-on plate test determines the:
 - A. austenitic phase formation during the transformation cooling.
 - B. cracking sensitivity of base materials and arc welding consumables.
 - C. creep sensitivity of the base material to welding temperatures
 - D. micro-hardness of the weld heat affected zone.
3. A Cr-Mo vessel needs to be repaired by welding. In order to prevent hardening of the welds the weld beads should **not** be less than:
 - A. 0.250" wide.
 - B. 0.500" wide.
 - C. 2" long.
 - D. 6" long.
4. During welding repairs of Cr-Mo equipment, what can be done to reduce the likelihood of hardening of the welds and cold cracking? **This may have more than one correct answer, please select all answers that apply.**
 - A. Dehydrogenation heat treatment
 - B. Peening
 - C. Postweld heat treatment
 - D. Preheat
 - E. Quenching
5. Repair welding is performed on Cr-Mo equipment. Per PCC-2, if dehydrogenation heating is required, the heating temperature shall be at least:

A. 300°F.	C. 570°F
B. 450°F.	D. 650°F
6. During repair welding of vessels in hydrogen service, when is temper-bead welding in lieu of PWHT **not** recommended?
 - A. Any chrome material
 - B. Chromes up to 2-1/4 chrome
 - C. Chromes that have \geq 2-1.4 chrome
 - D. Chromes that are either P5A & P5B

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

7. Why is temper-bead welding used in lieu of PWHT not recommended for some chrome weld repairs?
- A. Creates high hardness in weld and HAZ.
 - B. Creates high ferrite structures at the toe of the weld.
 - C. Creates high ductility in HAZ.
 - D. Creates formation of Moly-Ferrite at the toe of the welds.
8. Repair welding is performed on Cr-Mo equipment. When is NDE required? This may have more than one correct answer, please select all answers that apply.
- A. Prior to welding
 - B. After the 1st weld pass
 - C. After each remaining weld pass
 - D. After final weld is completed
 - E. After the pressure test
9. Repair welding is performed on Cr-Mo equipment. When performing NDE after repairs, the area to be inspected includes the weld plus:
- A. 1" away from the weld.
 - B. 2" away from the weld.
 - C. 6" away from the weld.
 - D. greater of twice the wall thickness or 4" away from the weld.
 - E. greater of twice the wall thickness or 6" away from the weld.
10. Temper embrittlement may occur on Low Chrome pressure equipment. Temper embrittlement can occur at what operating temperatures?
- A. 350°F - 750°F
 - B. 450°F - 825°F
 - C. 700°F - 1080°F
 - D. 850°F - 1250°F
11. Creep embrittlement begins to occur on 1-1/4Cr - 1/2Mo when the temperature exceeds:
- A. 450°F.
 - B. 650°F.
 - C. 750°F
 - D. 850°F
12. When High Temperature Hydrogen Attack occurs, what is formed in the metal?
- A. Carbides
 - B. Methane
 - C. Molecular hydrogen
 - D. Sulfide chrome oxide
13. What is the main concern about Chromes that have become Tempered Embrittled?
- A. Operating at high pressure
 - B. Operating at high temperature
 - C. Increasing residual welding stresses over prolonged high temperatures
 - D. Low toughness during start-ups and shutdowns

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

14. Per PCC-2, when repairing 5Cr-1/2Mo steel, what is the recommended minimum preheat temperature?
- A. 200°F.
 - B. 310°F.
 - C. 350°F
 - D. 390°F
15. Per PCC-2, when repairing 2-1/4Cr-1Mo steel (5C-1 material), what is the recommended maximum interpass temperature?
- A. 300°F.
 - B. 350°F.
 - C. 600°F
 - D. 1200°F
16. Hydrogen Attack has been discovered on a Cr-Mo steel. How can the material be heat treated to restore its original material properties?
- A. Hydrogen attack is irreversible
 - B. Perform a heat treatment at 570 °F
 - C. Perform a heat treatment at 1120 °F
 - D. Perform a heat treatment that is between Upper and Lower Transformation temps

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

Article 216: Welded Hot Taps in Pressure Equipment or Pipelines

1. Hot tapping is:
 - A. adding a branch connection to in-service pressure equipment (*vessel or pipe*).
 - B. how metal is poured from the ladle in the steel mill.
 - C. using a hammer lightly to check the condition of in-service refractory.
 - D. is a way to relief pressure in a volcano.

2. Which of the following is an important issue about hot tapping?
 - A. Construction code
 - B. Joint Efficiency
 - C. Minimum thickness of new nozzle
 - D. Safety

3. During a hot tap the equipment wall is cut out. This "cut out" wall piece is called the:
 - A. area of reinforcement.
 - B. coupon.
 - C. specimen.
 - D. test piece.

4. Hot tapping personnel should be familiar with:
 - A. ADA 4626.
 - B. API 576 & API 577.
 - C. API 2009 & API 2201.
 - D. AWS D1.1 or API 1104.

5. Per PCC-2, hot tapping should be approved by the:
 - A. Owner.
 - B. Owner and Jurisdiction.
 - C. Engineer and Owner.
 - D. Engineer and Jurisdiction.

6. Per PCC-2, hot tapping shall follow:
 - A. API 2001.
 - B. A jurisdiction approved written procedure.
 - C. an owner approved written procedure.
 - D. the hot tapping company's standard procedure.

7. Per PCC-2, hot tapping shall **not** be performed in which of the following applications? **This may have more than one correct answer, please select all answers that apply.**
 - A. Carbon steel piping operating in hydrogen service about 400°F
 - B. On steels having impact values that do not meet applicable construction code
 - C. Stainless steel piping handling sulfur compounds
 - D. Vapors within the flammable explosive range

8. Per PCC-2, hot tapping shall **not** be performed on Monel piping handling what compounds?
 - A. Chloride
 - B. Hydrocarbon
 - C. Nitrogen
 - D. Sulfur

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

9. Per PCC-2, in which services should hot tapping **not** be performed unless reviewed by subject matter expert(s) and special precautions are taken? **This may have more than one correct answer, please select all answers that apply.**
- A. CS vessel that operates in the creep range
 - B. Equipment that operates at a pressure above 250 psig
 - C. Equipment subject to stress corrosion cracking
 - D. Equipment that operates at cyclic temperatures.
10. Per PCC-2, in which services should hot tapping **not** be performed unless reviewed by subject matter expert(s) and special precautions are taken? **This may have more than one correct answer, please select all answers that apply.**
- A. Equipment that operates in a vacuum
 - B. Equipment that operates at a temperature above 500°F.
 - C. Processes where welding temperatures can cause exothermic reactions
 - D. Refractory lined equipment
11. What does PCC-2, say about hot tapping low chromes where air-hardening can occur and PWHT is required by the applicable construction code?
- A. Hot tapping is not allowed.
 - B. Hot tapping is allowed provided that a preheat of 200°F is maintained during welding.
 - C. Hot tapping is allowed provided the metal temp stays above the preheat temp required by the applicable construction code.
 - D. Hot tapping is allowed provided the metal temp stays above the preheat temp required by the applicable construction code, and PWHT is performed at next shutdown.
12. What is a major concern when hot tapping equipment with external pressure (*vacuum*)?
- A. Cracking
 - B. Distortion
 - C. Exothermic reaction
 - D. Fatigue
13. The chemical composition of the hot tap fittings and reinforcement shall be:
- A. same nominal composition of the hot tapped equipment (*vessel, pipe or tank*).
 - B. exact composition (*including grade*) of the equipment (*vessel, pipe or tank*).
 - C. same basic composition but higher strength than the equipment (*vessel, pipe or tank*).
 - D. upgraded to a alloy that is more corrosion resistant.
14. The hot tap connection welds should be welded using:
- A. a minimum of 4 welding passes.
 - B. down-hill welding for the verticals.
 - C. fillet welds with a leg size that is the greater of $\frac{1}{2}$ " or equipment wall thickness.
 - D. full-penetration welds.
15. All hot tap reinforcing pads shall:
- A. have a $\frac{1}{4}$ " vent hole.
 - B. be air tested at MAWP.
 - C. be hydro'ed at equipment MAWP.
 - D. welded with rods stronger than the repad.

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

23. What is/are potential problem(s) when performing a hot tap on the top of a pipe? **This may have more than one correct answer, please select all answers that apply.**
- A. More likely to lose the cutter into the pipe.
 - B. More likely to lose the "coupon".
 - C. Metal shavings fall into hot tap block valve and impact its ability to tightly close.
 - D. Metal shavings fall into pipe and damage downstream equipment.
24. What is a potential problem when performing a hot tap on pipe in a horizontal position?
- A. More likely to lose the cutter into the pipe.
 - B. More likely to lose the "coupon".
 - C. Metal shavings fall into hot tap block valve and impact its ability to tightly close.
 - D. Metal shavings fall into pipe and damage downstream equipment.
25. When performing a hot tap on pipe in a horizontal position, the hot tap block valve should be:
- A. a gate valve.
 - B. a $\frac{1}{4}$ turn valve (like a butterfly or ball valve).
 - C. a reduced port valve.
 - D. inverted (the valve stem is pointing at the ground).
26. **The hot tap valve should** have an inside diameter that:
- A. exceeds the cutter diameter so there is at least a 1/8" clearance.
 - B. exceeds the cutter diameter so there is at least a 1/2" clearance.
 - C. is at least as large as the inside diameter of the hot tap nozzle.
 - D. is at least as large as the outside diameter of the hot tap nozzle.
27. **When hot tapping pipe,** the minimum process flow rate (gas or liquid) should be:
- A. 0.4 ft/sec.
 - B. 1.3 ft/sec.
 - C. 3 ft/sec.
 - D. 5 ft/sec.
28. **When hot tapping a pipe in liquid service,** consideration should be given limiting the maximum liquid velocity. Why?
- A. Increased hardness in the HAZ's.
 - B. Increased likelihood of coupon being lost.
 - C. Increased possibility of burn-through.
 - D. Increased possibility of metal shavings ending up in the hot tap valve.
29. **When hot tapping a vessel or tank,** the minimum liquid height above the nozzle should be:
- A. 1 ft.
 - B. 3 ft.
 - C. 7 ft.
 - D. at its maximum fill height.

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

30. A hot tap is performed on a pipe that has a wall thickness of 0.237". For the 1st pass, the electrode used should be:
- A. $\leq 3/32$ " diameter.
 - B. ≤ 237 " diameter.
 - C. stronger than the main pipe's strength.
 - D. stronger than the nozzle's strength.
31. A hot tap is going to be performed. The area where the nozzle will be welded should be examined using:
- A. Light hammer taps.
 - B. Eddy Current.
 - C. Profile RT.
 - D. UT (*thickness*).
32. A hot tap connection is welded to the equipment (*vessel or pipe*). What should be done prior to cutting the hole in equipment?
- A. Examine the new weld.
 - B. Examine the new weld and perform a hydro test.
 - C. Examine the new weld and perform a pneumatic pressure test.
 - D. Obtain a 4-leaf clover & a rabbit's foot and cross your fingers!
33. When doing a hot tap, prior to cutting the equipment wall, can NDE be used in lieu of a pressure test?
- A. Never
 - B. Only if you have obtained a 4-leaf clover & a rabbit's foot.
 - C. Only if approved by the Engineer.
 - D. Only if approved by the Owner.
34. When performing a hot tap, which of the following are correct concerning the welding consumables? **This may have more than one correct answer, please select all answers that apply.**
- A. Low hydrogen electrodes should be used.
 - B. On 1st pass, maximum diameter is 3/16" when the SMAW process is used.
 - C. On 1st pass, stringers to be used with a max width of the 3 times rod's core diameter.
 - D. Bead thickness should not exceed 3/16".
35. The cutout coupon should be:
- A. left in the bottom of tanks and vessels.
 - B. given to the Owner.
 - C. examined to validate wall thickness.
 - D. examined to verify metallurgical properties of the equipment wall.
36. When hot tapping is performed what examinations are required on the nozzle-to-header weld? **This may have more than one correct answer, please select all answers that apply.**
- A. MT or PT the root pass
 - B. MT or PT all passes
 - C. MT or PT the final pass
 - D. UT or RT the final pass if possible

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

37. A hot tap nozzle will be added to a vessel. What should be pressure tested prior to cutting the hole in the equipment? **This may have more than one correct answer, please select all answers that apply.**
- A. The cutting equipment
 - B. Hot tap valve
 - C. Hot tap fitting after welding to shell
 - D. Flange prior to welding onto the nozzle
38. When hot tapping, water should be used for the pressure test if:
- A. the operating pressure of the vessel or pipe exceeds 15 psig.
 - B. the operating temperature of the vessel or pipe is between 32°F to 200°F.
 - C. the hot tap flange rating exceeds Class 150.
 - D. 30% H₂S is not available for a pneumatic test.
39. When performing a hot tap hydro on SS equipment, the chloride content of the water should **not** exceed:
- A. 25 ppm.
 - B. 50 ppm.
 - C. 100 ppm.
 - D. 250 ppm.
40. **A hot tap nozzle will be** hydrotested prior to cutting the vessel wall. The vessel has a design pressure of 200 psig. The flange has a pressure/temperature rating of 280 psig. The hydrotest pressure should **not** exceed?
- A. 200 psig
 - B. 220 psig
 - C. 280 psig
 - D. 300 psig
 - E. 420 psig

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

Article 304: Flaw Excavation & Weld Repair

1. **When grinding out a flaw**, overloading the grinding wheel can cause: **This may have more than one correct answer, select all correct answers**
 - A. formation of untempered martensite structure.
 - B. formation of tempered austenite.
 - C. shallow surface cracks.
 - D. wheel residue to be impregnated in the finished material.
2. When grinding out a flaw, uneven and rough finishes could result in a failure by:
 - A. erosion.
 - B. fatigue.
 - C. galvanic corrosion.
 - D. liquid-metal embrittlement.
3. **When removing a flaw, rotary** files should be considered for use on:
 - A. all alloyed materials.
 - B. austenitic materials.
 - C. chrome alloys.
 - D. nickel alloys.
 - E. titanium alloys. (*do I hear P-53's?*)
4. A flaw is removed by grinding on a carbon steel material. This grinding wheel should:
 - A. not be used again.
 - B. examined with PT for cracking.
 - C. only be used in the future on the same materials (*ASTM # & grade*).
 - D. only be used in the future on the materials with the same P#.
 - E. not be used on austenitic stainless materials.
5. **An austenitic SS is contaminated** with residue from a grinding wheel that was previously used on Carbon Steel materials. What is a possible future problem?
 - A. Fatigue
 - B. Hard microstructures
 - C. Surface pitting
 - D. Wet H₂S cracking
6. **What should be done prior to** grinding out stress corrosion cracks in stainless steel?
 - A. Qualify the amount of heat input
 - B. Qualify the grinding wheel type
 - C. Select a quick cutting tool like a rotary file
 - D. Select a wide cutting tool to distribute the heat input

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

7. Repairs are being made to a vessel that has experienced caustic cracking. To prevent additional cracking, which of the following should be considered during the repairs? **This may have more than one correct answer, select all correct answers**
- A. Clean the area with appropriate cleaning procedures
 - B. Preheat
 - C. Pre-PWHT
 - D. Use flaw-removal methods that generate lower heat
8. When removing flaws, flapping is:
- A. a technique that is commonly used to smooth large rough areas.
 - B. a technique that is commonly used prior to adding a hot tap.
 - C. good for quickly removing deep linear flaws.
 - D. good only for removal of superficial surface blemishes.
9. When removing a flaw, what is one potential problem when using thermal gouging?
- A. Brittle heat-affected zones may be created
 - B. Oxidation residue may damage the gouged area
 - C. Residue left in some alloys will cause future surface pitting
 - D. Stress corrosion cracking may occur
10. A small crack is going to be removed by grinding. Which of the following is correct?
- A. The excavated area must be repaired with weld-buildup.
 - B. When performing weld buildup in this area, the GTAW process must be used.
 - C. If weld buildup is not used, the edges of the excavated area must have a 3:1 taper.
 - D. The edges of the excavated area must always have a 3:1 taper.
11. Thermal gouging is used to remove a flaw. What needs to be done prior to welding?
- A. Remove an additional 1/32" of material by a type of grinding
 - B. Remove an additional 1/16" of material by a type of grinding
 - C. Acid-etch the remaining surface to look for hard microstructures
 - D. Caustic-etch the remaining surface to look for hard microstructures
12. A surface crack is going to be removed. Prior to grinding, what technique may be used to prevent the crack from growing during the crack-removal grinding?
- A. Drill the ends of the crack
 - B. Drill small holes along the crack at a spacing that does not exceed $\frac{1}{2}$ "
 - C. Peen the ends of the crack.
 - D. Peen the entire crack

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

Article 305: Flange Repair & Conversion

1. **Deep corrosion has occurred on** a flange-facing. After re-machining, the remaining thickness will **not** be adequate for the pressure design rating. Which of the following is correct?
 - A. The flange must be replaced.
 - B. Must either replace the flange or weld build-up & re-machine the flange face.
 - C. Could weld build-up & re-machine the flange face, or add a split-ring to the back of the existing flange.
 - D. Could add a split-ring to the back of the existing flange, or use bolts with higher tensile strength.
 - E. Could evaluate the reduced thickness per API 580.
2. Weld build-up of a flange facing is required. What is suggested by ASME PCC-2 that will help prevent future distortion of the flange that is the result of residual welding stresses?
 - A. PWHT prior weld build-up
 - B. PWHT after weld build-up but prior to re-machining
 - C. PWHT after re-machining
 - D. PWHT both after welding and after re-machining
 - E. Use a temper-bead welding procedure for the weld build-up
3. **When refinishing a flange face, the** minimum finished height of a raised face flange is:
 - A. 0.031".
 - B. 0.060".
 - C. 0.100".
 - D. 0.250".
4. **What is maximum flange face finish** specified in ASME B16.5 for a ring joint flange?
 - A. 63 micro-inch
 - B. 125-micro-inch
 - C. 250 micro-inch
 - D. 500 micro-inch
5. What is standard flange face finish specified in B16.5 for a raised face flange?
 - A. 63 micro-inch
 - B. 125-micro-inch
 - C. 125-250 micro-inch
 - D. 250-500 micro-inch
6. **Per B16.5, a refinished raised face** flange, should have a "groove density" of:
 - A. 10-25 grooves per inch.
 - B. 25-35 grooves per inch.
 - C. 35-45 grooves per inch.
 - D. 45-55 grooves per inch.

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

7. Which of the following is correct about converting a ring-joint flange to a raised-face flange?
- A. This flange type cannot be converted to a raised face flange.
 - B. If converting to a raised face flange, the weld material must match the base material.
 - C. The "R" marking must be removed or defaced.
 - D. The "R" marking must be changed to "RF".
8. An existing flange has damage on the flange facing. Weld build-up and re-machining of the flange facing is required. Which of following statements is correct concerning any NDE? **This may have more than one correct answer, select all correct answers.**
- A. Only NDE needed is the visual exam of the re-machined surface.
 - B. If welds are susceptible to cracking, MT or PT should be done after each weld pass.
 - C. MT or PT must be performed on the final weld pass.
 - D. MT or PT must be performed after the surface area is re-machined.
9. Any repaired flange should be:
- A. given a leak test prior to being placed in service or an initial service leak test.
 - B. marked with a "RF" indicated as a repaired flanged.
 - C. re-machined per the ASME Sect VIII Div 2 Article 6 requirements.
 - D. checked for delayed cracking.

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

Article 312: Inspect & Repair Shell & Tube Heat Exchangers

1. Per PCC-2, total replacement of an exchanger bundle is recommended in critical-operational services when wall loss is:
 - A. $\geq 20\%$ of corrosion allowance.
 - B. $\geq 40\%$ of corrosion allowance.
 - C. $\geq 20\%$ of nominal thickness.
 - D. $\geq 40\%$ of nominal thickness.
2. Per PCC-2, replacement of individual tubes in an exchanger bundle is recommended in critical-operation services when wall loss is:
 - A. 20-40% of corrosion allowance.
 - B. 20-40% of nominal thickness.
 - C. 40-60% of corrosion allowance.
 - D. 40-60% of nominal thickness.
3. What is a major concern about plugging tubes?
 - A. Crevice corrosion
 - B. Increased resistance to shell-side flow
 - C. Reduction in heat transfer area
 - D. Reduction in thermal conductivity
4. A tube had some excessive internal wall loss toward the middle of the tube. This tube:
 - A. can be repaired with a rolled ferrule.
 - B. can be repaired with a rolled sleeve.
 - C. must be plugged.
 - D. must be replaced.
5. How are ferrules used?
 - A. On the inside of tube ends to prevent erosion.
 - B. On the inside of tubes to restore wall loss.
 - C. On the outside to the bundle to prevent wall loss from the shell-side product flow.
 - D. On the shell outlet nozzle to prevent circular flow.
6. Which of the following are potential problems when installing a sleeve in a tube? **This may have more than one correct answer, select all correct answers.**
 - A. Crevice corrosion
 - B. Difficult to retube in future
 - C. Makes hydrotesting difficult
 - D. Reduction of flow

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

7. An exchanger bundle and all its parts (*tubes, tube sheet, baffles, etc.*) are made from carbon steel. The external corrosion rate of the tubes is about 2 mpy. What is the expected corrosion rate on the baffles?
- A. 0 mpy
B. 1 mpy
C. 2 mpy
D. 4 mpy
8. An exchanger bundle has tubes made from carbon steel. The baffle is made of a harder alloy. What is a potential problem?
- A. Crevice corrosion of tube exterior
B. Fretting damage to the tube exterior
C. Crevice corrosion of the baffle
D. Fretting damage to the baffle
E. Galvanic corrosion on the tube interior
9. What are tube "stakes"?
- A. Rods or plates installed in the bundle to provide additional support for the tubes.
B. Sleeves installed at tube inlets to prevent galvanic corrosion.
C. Sleeves installed inside tubes to restore tube integrity.
D. Spacing rods that separate the baffles.
10. **Design requirements for bundle impingement** plates can be found in:
- A. API 560.
B. API 660.
C. ASME Sect VIII Div. 2.
D. TAME.
11. There is a leak in a tube-to-tubesheet joint. Which is **not** an acceptable way to repair?
- A. Plug the tube
B. Remove tube and weld up the tubesheet hole
C. Replace the tube
D. Seal weld the tube-to-tubesheet joint
12. Two exchangers in the same service operate in a parallel configuration. One of the exchangers is out of service for extensive repairs. The flow rate in the remaining exchanger will be higher. Which of the following is a concern? **This may have more than one correct answer, select all correct answers.**
- A. Increased likelihood of corrosion
B. Increased likelihood of vibrations
C. Increased likelihood of cracking in the Tubesheet-to-Shell weld
D. Increased likelihood of leaking in the Tubesheet-to-Tube joints
13. When cleaning tubes with a high-pressure water blast the pressure is normally about:
- A. 10,000 psig.
B. 30,000 psig.
C. 20,000 psig.
D. 40,000 psig

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

14. The exchanger tubes will be cleaned with a chemical solution. Which statement is correct?
- A. A caustic solution should never be used on carbon steel tubes.
 - B. An acidic solution should never be used on stainless steel tubes.
 - C. The ph range must never be outside a 6.0-8.0 ph.
 - D. A materials engineer should be consulted.
15. All tubes that are repaired with plugs should:
- A. have plugs made as the same material as the tube.
 - B. have plugs made as the same material as the tubesheet.
 - C. be pierced.
 - D. have vented plugs.
16. Friction-fit taper plugs for tubes shall only be used when operating pressure does **not** exceed:
- A. 100 psig.
 - B. 200 psig.
 - C. 500 psig.
 - D. 750 psig.
17. Friction-fit taper plugs for tubes shall only be used if the operating temp does **not** exceed:
- A. 400 °F.
 - B. 500 °F.
 - C. 650 °F.
 - D. 750 °F.
18. Mechanical-fit tube plugs have been used at operating pressures up to:
- A. 1000 psig.
 - B. 2000 psig.
 - C. 5000 psig.
 - D. 7000 psig.
19. What are methods that can be used to install a tube sleeve or a ferrule? **This may have more than one correct answer, select all correct answers.**
- A. Spot welding
 - B. Hydraulic expansion
 - C. Roller expansion
 - D. Welding the sleeve/ferrule ends
20. When a tube-to-tubesheet joint has a small leak, it:
- A. can be repaired by rerolling.
 - B. can be repaired with a sleeve.
 - C. must be seal-welded.
 - D. must be either seal-welded or replaced.
21. What can be done if a tube is going to be replaced but the tube hole has been damaged?
- A. Enlarge hole by machining and install larger tube.
 - B. Install a pocket tube.
 - C. Weld buildup and machine the hole to the correct dimensions.
 - D. Weld the hole up.

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

22. A tube-to-tubesheet joint will be repaired by seal welding. The tube and the tubesheet are both carbon steel. Which of the following statements is correct?
- A. All seal welds should be considered full-strength welds.
 - B. Low hydrogen electrodes should be used.
 - C. Welding materials should have a higher tensile strength than the tubesheet.
 - D. Welding procedures should be qualified in accordance to API 1104.
23. Eddy current testing of tubes is used:
- A. for all tube materials.
 - B. only for magnetic materials.
 - C. only for non-magnetic materials.
 - D. only to find internal cracking.
24. Remote Field Eddy current testing of tubes is used:
- A. for all tube materials.
 - B. only for magnetic materials.
 - C. only for non-magnetic materials.
 - D. only to find internal cracking.
25. IRIS testing uses what NDE technology?
- A. Eddy Currents
 - B. Guided waves
 - C. Magnetism
 - D. Ultrasonics
26. IRIS testing is an NDE technique that is good:
- A. for detecting ID & OD tube wall corrosion.
 - B. to use if the tubes are dirty.
 - C. only on magnetic materials.
 - D. only on non-magnetic materials
27. A tube bundle has 100 tubes. As recommended by PCC-2, at the next inspection, how many tubes should be inspected?
- A. 25 tubes
 - B. 50 tubes
 - C. 75 tubes
 - D. All the tubes
28. A tube bundle has 400 tubes. As recommended by PCC-2, at the next inspection, how many tubes should be inspected?
- A. 25 tubes
 - B. 50 tubes
 - C. 100 tubes
 - D. 200 tubes
29. A tube bundle has 1200 tubes. As recommended by PCC-2, at the next inspection, how many tubes should be inspected?
- A. 50 tubes
 - B. 100 tubes
 - C. 120 tubes
 - D. 180 tubes
 - E. 240 tubes

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

30. Per PCC-2, when a tube bundle is inspected, which specific tubes should be inspected? **This may have more than one correct answer, select all correct answers.**
- A. First 3 rows adjacent to the inlet nozzle.
 - B. First 3 rows adjacent to the outlet nozzle.
 - C. Every 2nd tube around the perimeter.
 - D. Every 5th tube in the interior.
 - E. Every 10th tube in the interior.
31. What tool uses a minimal amount of data to accurately assess the remaining life of a large number of tubes?
- A. EIEIO
 - B. EVA
 - C. MOC
 - D. RBI
32. A tube bundle has concerns with wall loss. A statistical analysis tool will be used to evaluate the bundle. During the inspection, 50% of the tubes are inspected using IRIS. For the statistical model, what is the Effectiveness of this inspection?
- A. Highly
 - B. Usually Effective
 - C. Fairly Effective
 - D. Poorly Effective
33. A carbon steel tube bundle has concerns with cracking. A statistical analysis tool will be used to evaluate the bundle. What needs to be done in order to achieve an Inspection that has Usually Effective effectiveness?
- A. Use SWIRIS on 80% of the tubes.
 - B. Use SWIRIS on 100% of the tubes.
 - C. Use ET on 80% of the tubes.
 - D. Use ET on 100% of the tubes

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

Article 501: Pressure Testing & Tightness Testing

1. All other testing methods should be considered prior to performing a:
 - A. hydrotest.
 - B. in-service Leak test.
 - C. pneumatic test.
 - D. tightness test.
2. What is the primary purpose of a pressure test?
 - A. Ensure gross integrity of pressure equipment
 - B. Ensure overall tightness of pressure equipment
 - C. Substitute for a code required PWHT
 - D. Provides something to do for a bored API inspector.
3. What is the primary purpose of a tightness test?
 - A. Ensure bolts have appropriate thread engagement
 - B. Ensure overall leak tightness
 - C. Validate quality of welds
 - D. Ensure that threaded pipe has at least 4 threads of engagement
4. Hydrotesting can provide some:
 - A. embrittlement of welds.
 - B. fatigue resistance.
 - C. reduction of MDMT.
 - D. mechanical stress relieving.
5. **How does hydrotesting** provide some stress relief?
 - A. At local regions of high stress, a localized yielding occurs. So, after the test, this area has a localized region of compressive stresses.
 - B. At local regions of high stress, a localized fatiguing occurs. So, after the test, this area has a localized region of lower tensile stresses.
 - C. Throughout the equipment yielding occurs. So, after the test, the equipment has nothing but compressive stresses.
 - D. That's crazy! A pressure test does NOT relief stresses!
6. What can reduce or eliminate the benefits of the stress-relief occurring during a hydrotest?
 - A. Operating at elevated pressure
 - B. Operating at elevated temperature.
 - C. Operating at a vacuum.
 - D. Operating with a high concentration of C_3H_8



ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

7. When might an in-service leak test be considered?
- A. After replacing a top head of a vessel.
 - B. After a turnaround on a piping system that operates with 5% H₂S.
 - C. After installing an insert patch.
 - D. After an outage on a cooling water piping system.
8. What is the purpose of a pressure test? **This may have more than one correct answer, please select all answers that apply.**
- A. Improve MDMT.
 - B. Support the new conditions of a rerate.
 - C. Support needed recertification of integrity.
 - D. Validate integrity after a repair or alteration.
9. When should a hydrotest **not** be done? **This may have more than one correct answer, please select all answers that apply.**
- A. Foundation cannot support weight of liquid.
 - B. Vessel has a Teflon lining.
 - C. A hydrotest will be inconvenient to perform.
 - D. Traces of remaining liquid may contaminate the operating process.
 - E. Vessel has refractory lining.
10. A test device to perform a localized test, like hydrotesting just one weld or a nozzle instead of the whole vessel, is:
- A. never allowed in PCC-2.
 - B. allowed only to prevent having to do a pneumatic test.
 - C. allowed if the other system welds have already been tested.
 - D. allowed only if the equipment is made from higher alloys.
11. Per PCC-2, during a pressure test, the metal temperature should be:
- A. \geq freezing.
 - B. \geq MDMT.
 - C. \geq MDMT + 10°F.
 - D. \geq MDMT + 30°F.
12. The ductile-to-brittle transition temperature of a material may be altered when some equipment is operated above:
- A. 500 psig.
 - B. a pH of 9.0.
 - C. 700°F.
 - D. 250 ppm of chloride.
13. What materials are most subject to changes in the ductile-to-brittle transition temperature?
Note: In 510 this is change is called temper-embrittlement.
- A. Carbon Steels
 - B. Low Chromes
 - C. High chromes
 - D. Nickel alloys

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

14. Which of the requirements apply to pressure gauges used for a pressure test? This may have more than one correct answer, please select all answers that apply.
- A. All test gauges should be calibrated.
 - B. Should have a pressure range that is not more the six times the test pressure.
 - C. Gauges should be located at the high point of the vessel or pipe system being tested.
 - D. All gauges used in pressure tests shall have a digital display.
 - E. All gauges should meet requirements of ASME PTC 19.2 or similar.
15. For a specific hydrotest, the owner decides a relief device is needed to prevent any overpressure. The hydrotest pressure is 200 psig. Per PCC-2, what is the maximum set pressure for this relief device?
- A. 205 psig
 - B. 210 psig
 - C. 220 psig
 - D. 250 psig
16. For a specific hydrotest, the owner decides a relief device is needed to prevent any overpressure. The hydrotest pressure is 600 psig. Per PCC-2, what is the maximum set pressure for this relief device?
- A. 610 psig
 - B. 650 psig
 - C. 660 psig
 - D. 690 psig
17. What problem is created when the welds are painted prior to the pressure test?
- A. The paint may completely plug a pin-hole during the test.
 - B. Painted surfaces make it more difficult to see a leak.
 - C. Paint may contaminate the process.
 - D. Paint materials may contaminate the hydrotest water.
18. Per PCC-2, when hydrotesting an austenitic vessel the membrane stress shall not exceed:
- A. 90% of the material's yield stress.
 - B. 100% of the material's yield stress.
 - C. 90% of the material's tensile stress.
 - D. 100% of the material's tensile stress.
19. Per PCC-2, which of the following applies to the testing liquid? This may have more than one correct answer, please select all answers that apply.
- A. Salt water or brackish water should not be used.
 - B. Water should be free from microbes.
 - C. Water should not have sediments.
 - D. Chloride content shall always be less than 25 ppm.
20. Per PCC-2, during a hydrotest, the hydrotest pressure is reached and held. Then the pressure is reduced for the visual inspection. What is the minimum hold time while the equipment is at its maximum pressure?
- A. 10 minutes
 - B. 15 minutes
 - C. 30 minutes
 - D. 60 minutes

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

21. Per PCC-2, when a pneumatic test is performed, what is the preferred testing medium?
- A. Air
 - B. Operational Gas
 - C. Natural Gas
 - D. Nitrogen
22. What problem is created when performing a pneumatic test with air? **This may have more than one correct answer, please select all answers that apply.**
- A. If a hydrocarbon system being tested is not clean, an explosive mixer may be created.
 - B. High dew-point air when compressed will cause moisture to condense.
 - C. Chlorides are likely to condense
 - D. Compressed air has considerably more energy than compressed nitrogen.
23. Per PCC-2, when a pneumatic test is performed, the maximum allowed stored energy for the test shall not exceed:
- A. 2 lb of TNT.
 - B. 200 ft-lbs.
 - C. 200,000 ft-lbs.
 - D. 200,000,000 ft-lbs.
 - E. USA National Debt in ft-lbs.
24. For a specific pneumatic test, a relief device is needed to prevent any overpressure. The test pressure is 60 psig. Per PCC-2, what is the maximum set pressure for this relief device?
- A. 65 psig
 - B. 66 psig
 - C. 70 psig
 - D. 80 psig
25. For a specific pneumatic test, a relief device is needed to prevent any overpressure. The test pressure is 120 psig. Per PCC-2, what is the maximum set pressure for this relief device?
- A. 125 psig
 - B. 130 psig
 - C. 132 psig
 - D. 144 psig
26. When performing a pneumatic test, the amount of stored energy should be converted to equivalence of which of the following?
- A. Grains of Gunpower
 - B. Number of Grenades
 - C. Ounces of Uranium
 - D. Pounds of TNT
27. When performing a pneumatic test, what is the 1st step pressure?
- A. Raise pressure to the lesser of 10 psig or 10% of test pressure.
 - B. Raise pressure to the lesser of 25 psig or 25% of test pressure.
 - C. Raise pressure to the lesser of 50 psig or 35% of test pressure.
 - D. Raise pressure to the lesser of 50 psig or 50% of test pressure.
28. A pneumatic test is being done. No leaks were discovered in the 1st pressure step. What should be done in the first part of the 2nd testing step?
- A. Increase pressure to the lesser of 50 psig or 35% of test pressure.
 - B. Increase pressure to the greater of 50 psig or 35% of test pressure.
 - C. Increase pressure to the lesser of 75 psig or 50% of test pressure.
 - D. Increase pressure to the greater of 75 psig or 50% of test pressure.

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

29. A pneumatic test is being performed. The equipment is at 50% of test pressure and no leaks are discovered. What should be done to complete raising the pressure to the test pressure?
- A. Increase pressure in 10% increments of test pressure. Hold for 5 min. at each step.
 - B. Increase pressure in 10% increments of test pressure. Hold for 10 min. at each step.
 - C. Increase pressure in 20% increments of test pressure. Hold for 5 min. at each step.
 - D. Increase pressure in 20% increments of test pressure. Hold for 10 min. at each step.
30. A pneumatic test with nitrogen is being performed on a vessel that is 8' diameter and 28' tall. The test pressure will be 150 psig. The amount of stored energy in this test is about 25,000,000 ft-lbs of energy. This is equivalent to how many pounds of TNT?
- A. 0.2 lbs
 - B. 0.8 lbs
 - C. 10.7 lbs
 - D. 16.8 lbs
 - E. 328 lbs
 - F. 4100 lbs
31. A pneumatic test with nitrogen is being performed on a vessel. During the test the amount of stored energy is equivalent to 70 lbs of TNT. If during the test, the vessel fails by brittle fracture, how far could vessel fragments fly?
- A. 60 feet
 - B. 140 feet
 - C. 310 feet
 - D. 1320 feet (*quarter mile*)

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

Article 502: NDE in Lieu of Pressure Testing

1. Why is NDE sometimes a better option than a pressure test?
 - A. Caustic Service: Any residual testing water may react with the caustic to cause stress corrosion cracking.
 - B. Creep Service: Small flaws that are acceptable may cause a failure during the test.
 - C. Cyclic Service: Large flaws may be missed in a pressure test, but may grow during repeated pressure tests.
 - D. Any Service: The stored-up energy from a hydrotest can cause a catastrophic failure.

2. Why is NDE sometimes a better option than a pressure test? **This may have more than one correct answer, please select all answers that apply.**
 - A. Cost. A test may be practical but alternative NDE maybe less expensive.
 - B. Skill. A pressure test requires more skill to perform than NDE.
 - C. Structural Integrity. NDE can usually give a better indication of overall integrity.
 - D. Timing. NDE is usually much quicker than a pressure test.

3. Why is pressure testing preferred for new construction? **This may have more than one correct answer, please select all answers that apply.**
 - A. Can blunt the flaw tips (*reduces stress-multiplying effects of sharp notches*)
 - B. Often finds gross fabrication deficiencies
 - C. Provides a mechanical stress relief.
 - D. Provides 100% assurance the equipment will not fail once it is placed in service.

4. The pressure equipment (*vessel or piping*) was hydrotested after construction. Periodic future hydrotests are:
 - A. recommended in order to blunt any new in-service cracking.
 - B. recommended in order to provide operations more assurance of equipment integrity.
 - C. not recommended since it provides minimal new info on equipment integrity.
 - D. not recommended since a there are many safety issues pertaining to a hydrotest.

5. When is a hydrotest inadvisable for equipment than has previously been in-service? **This may have more than one correct answer, please select all answers that apply.**
 - A. Anytime a pneumatic test could be performed
 - B. Hydrotest fluids react adversely with any residual process fluids
 - C. When the cost to perform a hydrotest exceeds equipment rate of return.
 - D. Foundations or support structure is inadequate for the water weight.
 - E. When equipment linings or coatings could mask a leak.

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

Answers with References

201: Butt-welded Insert Plates

1. B,D 3.2
2. C 3.3
3. C 3.4
4. B 3.4
5. D 3.4
6. B 3.6.1 (See Calc)
7. B 3.6.1 (See Calc)
8. A 3.6.1 & 3.4 (See Calc)
9. B 3.7
10. A 3.8(b) (See Calc)
11. C 3.8(b) (See Calc)
12. C Fig 201-3.5-1
13. D 4.1.3
14. D 4.1.5
15. B 4.1.5
16. A,B,C 4.2.1, 4.2.3 & 4.2.4
17. C 4.2.7
18. B 4.2.8
19. C 4.2.8
20. A 4.2.9 (See Calc)
21. C 4.3.1(a)
22. C 4.3.1(b) (See Calc)
23. D 4.3.1(b) (See Calc)
24. A 4.3.3
25. C 4.4.1
26. A 4.4.1 & Fig 201-3.8-2
27. C 4.4.2 & Fig 201-3.8-2
28. B 4.5.1
29. D 5.1
30. C 5.1
31. B 5.2
32. B,D 6.1
33. A 6.4

201 Calcs

6. Less of $12t$ (12×1.5) or $15 = 18$ or $15 = 15''$
7. Less of $12t$ (12×0.75) or $15 = 9$ or $15 = 9''$
8. Diameter = $2 \text{ Radius} = 2 \times 3 = 6''$
10. Noz $\leq 12''$ OD: $2 \times \text{OD} = 2 \times 4.5 = 9''$
11. Noz $> 12''$ OD: $6 + \text{Noz} + 6 = 6 + 16 + 6 = 28''$
20. Less of $1/32$ or $10\%tw = 0.031$ or $0.050 = 0.031''$
22. Greater of 10 or $8tw$ (8×0.75) = 10 or $6 = 10''$
23. Greater of 10 or $8tw$ (8×1.5) = 10 or $12 = 12''$
24. $2 tw = 2 \times 1.5 = 3''$

202: Ext Weld Buildup

1. C 2.2
2. B 2.3
3. A 2.5
4. D 3.1.1.2
5. B 3.1.2.2 (See Calc)
6. C 3.1.2.3
7. B 3.1.2.5
8. B 3.1.2.7 (See Calc)
9. C 3.1.2.8
10. B,C,D 4.1.1, 4.1.2 & 4.1.3
11. C 4.2.2
12. D 4.2.3
13. A 4.4.3
14. B 4.4.4
15. A,B,E 4.5.1, 4.5.2 & 4.5.3
16. D,E 4.5.7
17. D 4.5.8
18. B 4.5.9.2
19. A,C 5.1 & 5.2

202 Calcs

5. $B = 0.75 \sqrt{48 \times 0.625} = 4.1''$
8. $B = 0.75 \sqrt{30 \times 0.500} = 2.9''$

209: Alternative to PWHT

1. A,C,D 1.2(a)
2. A 1.2(b)
3. C 2.5
4. B 4.1
5. E 4.2.1

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

210: In-Service Welding on CS

1. A,D 1.0 (2nd & 3rd ¶)
2. B 1.0 (2nd ¶)
3. A 1.0 (3rd ¶)
4. C 1.0 (3rd ¶)
5. D 1.0 (3rd ¶)
6. B 1.0 (4th ¶)
7. A,C,D 1.0 (4th ¶)
8. B 1.0 (5th ¶)
9. A,D 1.0 (5th ¶)
10. B 2.6
11. A 2.6
12. C 2.7
13. B,C 4.1.1.2 & 4.1.1.3
14. A,C,D 4.1.1.7, 4.1.1.9 & 4.1.1.11
15. B Table 210-4.2.1-1
16. B Table 210-4.2.1-1
17. C Table 210-4.2.1-1
18. C 4.2.1.2
19. D 4.2.1.4(a)
20. D 5.2

211: Buildup, O'lay & Clad Repair

1. B 1.5.1
2. D 3.5
3. C 3.6
4. A 3.8.1
5. D 4.4.2
6. B Fig 211-4.4.1-1(b)
7. C 4.5.3
8. A 4.5.3
9. C 4.5.3
10. D 4.7.3
11. B 5.1.2
12. C 5.1.2
13. A 5.2
14. B 5.3.1

212: Fillet Weld Patches

1. A 1.e
2. D 2.c.1
3. C 3.1.b
4. D 3.1.c
5. A 3.1.d

212: Fillet Weld Patches (cont)

6. C Fig 1-1
7. D 3.1.e
8. D 3.1.f
9. C 3.3.a (See Calc)
10. B 3.3.a (See Calc)
11. A 3.3.b
12. B 3.4.a
13. D 3.5.a
14. D 4.c
15. A 4.d
16. C 4.e.1
17. B 4.e.2
18. C 4.g
19. A 5.a
20. C 5.b
21. A 6.d

212 Calcs

9. $L = 2\sqrt{Rt} = 2\sqrt{60 \times 0.75} = 13.42''$
10. $L = 2\sqrt{Rt} = 2\sqrt{36 \times 0.5} = 8.5''$

215: Repair Cr-Mo Vessel

1. A 3.6
2. B 3.6
3. C 4.3.a
4. A,C,D 4.4
5. C 4.6
6. C 4.7.c
7. A 4.7.c
8. A,D,E 5.c & 5.d
9. D 5.d.1
10. C Table 3.2-1
11. D Table 3.2-1
12. B Table 3.2-1
13. D Table 3.2-2
14. D Table 4.4-1
15. C Table 4.4-1
16. A Table 4.5-1

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

216: Welded Hot Taps

1. A 1.1.a
2. D 1.1.c.1
3. B 1.2.b
4. C 1.3.1
5. A 1.3.2.d
6. C 1.3.2.d
7. A,B,D 2.4.a/f/g.2
8. D 2.4.d
9. A,C 2.5.c/e
10. C,D 2.5.g/k
11. D 2.6.d
12. B 2.7
13. A 3.3.c
14. D 3.3.d
15. A 3.3.e
16. C 3.3.e
17. A 3.3.f
18. D 3.4.a
19. B 3.4.c
20. B 3.4.e
21. A 3.6.c.1 (See Calc)
22. B 3.6.c.2 (See Calc)
23. B,D 3.8.1.a/b
24. C 3.8.2.a
25. D 3.8.2.b
26. A 3.9.d
27. B 3.10.b
28. A 3.10.c
29. B 3.10.e
30. A 3.11.a
31. D 3.11.d
32. B 4.a
33. D 4.b
34. A,C,D 4.1.3.a/b/b.2
35. B 4.2.c
36. A,C 5.2.b
37. A,B,C 6.1.a/6.2.a/6.3.a
38. B 6.4.a
39. B 6.4.d
40. D 6.5.1.a.1 (See Calc)

216 Calcs

21. Less of $8t (8 \times 0.5)$ or $6'' = 4$ or $6 = 4''$
22. $5 (Rt)^{1/2} = 5(48 \times 0.75)^{1/2} = 30''$
40. Less of 1.5 Design Pressure or 1.5 Flg Rating
= less of $1.5(200)$ or $1.5(280) = 300$ psig

304: Flaw Excavation

1. A,C 2.2.1
2. B 2.2.1
3. D 2.2.1
4. E 2.2.2
5. C 2.2.2
6. A 2.2.3
7. A,D 2.2.3
8. D 2.5.1
9. A 2.6.1
10. C 3.1
11. B 3.3
12. A 4.1.1

305: Flange Repair

1. C 2.3
2. B 2.4
3. A 3.1
4. A 3.3.2.b
5. C 3.3.2.c
6. D 3.3.2.c
7. C 4.5.3
8. B,D 5.2
9. A 6

312: Repair Exchangers

1. D 3.2.d.2.a
2. B 3.2.d.2.b
3. C 3.3.b
4. B 3.3.c
5. A 3.3.d
6. A,B,D 3.3.e.1/3/5
7. D 3.3.f.1
8. B 3.3.f.2

ASME PCC-2 Study Guide

Practice Questions for API 510 Exam

312: Repair Exchangers (cont)

- 9. A 3.3.f.4
- 10. B 3.3.g
- 11. B 3.5.a/b/d
- 12. A,B 4.1.a
- 13. A 4.1.b.1
- 14. D 4.1.b.2
- 15. C 4.2.a
- 16. B 4.2.b.1
- 17. A 4.2.b.2
- 18. D 4.2.c
- 19. B,C,D 4.3.b & 4.4
- 20. A 4.8.1.b
- 21. C 4.8.2.a
- 22. B 4.8.3.d
- 23. C 5.1.a
- 24. B 5.1.b
- 25. D 5.1.e
- 26. A 5.1.e
- 27. B I-1.1.a (See Calc)
- 28. C I-1.1.a (See Calc)
- 29. C I-1.1.d (See Calc)
- 30. A,C I-1.2
- 31. B I-1.4
- 32. C Table I-1.3-1
- 33. A Table I-1.3-1

312 Calcs

- 27. Greater of 25% or 50 = 25 or 50 = 50 tubes
- 28. Greater of 25% or 50 = 100 or 50 = 100 tubes
- 29. 10% of tubes - $1200 \times 0.1 = 120$ tubes

501: Pressure Testing

- 1. C 2.d
- 2. A 3.1
- 3. B 3.1
- 4. D 3.2.c
- 5. A 3.2.c
- 6. B 3.2.c
- 7. D 3.2.f
- 8. B,C,D 3.4.a

501: Pressure Testing (cont)

- 9. A,D,E 3.4.1.a/b/c
- 10. C 3.4.3.a.1
- 11. D 6.1.b
- 12. C 6.1.b.2
- 13. B 6.1.b.2
- 14. A,C,E 6.1.e
- 15. C 6.1.h (See Calc)
- 16. B 6.1.h (See Calc)
- 17. A 6.1.k
- 18. B 6.1.n.2
- 19. A,B,C 6.1.t.5&6
- 20. A 6.1.t.8
- 21. D 6.2.b
- 22. A,B 6.2.b
- 23. D 6.2.e
- 24. C 6.2.i (See Calc)
- 25. C 6.2.i (See Calc)
- 26. D 6.2.m
- 27. B 6.2.1. Step 1 .a
- 28. B 6.2.1. Step 2 .a
- 29. A 6.2.1. Step 3 .a
- 30. D App 501-II-1 (See Calc)
- 31. B Table 510-III-2-1

501 Calcs

- 15. Lesser of: Test + 50 or 1.1 of Test = $200 + 50 = 250$ or $1.1 \times 200 = 220$, Ans 220 psig
- 16. Lesser of: Test + 50 or 1.1 of Test = $600 + 50 = 650$ or $1.1 \times 600 = 660$, Ans 650 psig
- 24. Greater of: Test + 10 or 1.1 of Test = $60 + 10 = 70$ or $1.1 \times 60 = 66$, Ans 70 psig
- 25. Greater of: Test + 10 or 1.1 of Test = $120 + 10 = 130$ or $1.1 \times 120 = 132$, Ans 132 psig
- 30. $25,000,000/1,488,617 = 16.8$ lbs TNT

502: NDE in Lieu of Pressure Test

- 1. C 1.2.a
- 2. A 1.2.c
- 3. A,B,C 1.5.1.c/d/e
- 4. C 1.7
- 5. B,D,E 2.3.1/2/4

SDG