

6 Tips to Study for API 510 Closed Book Questions

Study the 16 Topics in Part 4 of the Study Module

Tip # 1: Closed Book exam questions total 100 on a real exam. Over fifty (50) or even more (maybe even 60+) may be from API 510 code.

Tip # 2: Always copy module examples & highlights to your API 510 code book as this is allowed as long as there are no loose pages. These examples are very important reminders (for the open book) that help you remember key words and points regarding the code! This is called “WORD ASSOCIATION” and is a critical part of memory!

Tip # 3: Memorize key words in the study guide in Part 4 (16 Topics) and these may be highlighted, underlined or **bold letters**!

Tip # 4: Associate key words with a general section or subsection (Organization & Certification reqmts, Insp Intervals, etc) or a code requirement ... **Know YOUR Chapters VERY WELL (1 thru 8)**

Tip # 5: Always use the study guide Part 4 (16 Topics) with the Practice Exam questions and make sure that whenever you miss a question, you check references & review code sections again and again until you understand them clearly! Retake all Practice exams (daily if preparing for an API 510 exam) until you score above 95%+ (better is to practice until you score 100% & have full memory of questions and concepts)!

Tip # 6: Real API Exams NEVER use the following type of answers:

❖ All of the above → You will NEVER see this on a real API exam
❖ Both A & B → You will NEVER see this on a real API exam
❖ None of the above → Sometimes, you may see this, but not often!
IF you see ... None of these ... or ... None of the above → Watch out!!!
Reason: It is likely a correct answer to a “very easy” question!

API 510 CODE OPEN BOOK QUESTIONS = RED COLOR CODE

API 510 Code Closed Book Exam Questions (Sections 1 & 2)

1. A non-code vessel is one is:

- A) Not fabricated to a recognized construction code & meeting no known recognized standards
- B) Not constructed & approved as jurisdictional special based on jurisdiction acceptance rules
- C) Fabricated to a recognized construction code but has lost its nameplate or stamping
- D) Not constructed in accordance with an applicable construction code

Answer = A ... Reference: API 510, Para. 1.1.1.b → Non-Code vessel = self explanatory answer

2. A non-standard vessel is one is:

- A) Not constructed in accordance with an applicable construction code
- B) Fabricated to a recognized construction code but has lost its nameplate or stamping
- C) Not fabricated to recognized construction codes and meeting no known recognized standard
- D) Not constructed and approved as jurisdictional special based on jurisdiction acceptance rules

Answer = B ... Reference: API 510, Para. 1.1.1.d → Non-Standard vessel = missing a nameplate

3. API 510 is restricted to owner/users that employ or have access to:

- A) An authorized Insp Agency, an Inspector and Examiners
- B) An authorized Insp Agency and an Engineering Organization
- C) An authorized Insp Agency, Engineering Organization and a Repair Organization
- D) An authorized Insp Agency, Inspector, Examiners, Engineer, and a Repair Organization

Answer = D ... Reference: 510, Par. 1.1.2 → Ans = C → All 5 entities are required

4. Which API 510 Appendix lists qualification and certification requirements for Inspectors?

- A) Appendix A
- B) Appendix B
- C) Appendix C
- D) Appendix D

Answer = B ... Reference: 510, Par. 1.1.1 & Appendix B

5. Which statement is true regarding conflicts between API 510 and jurisdictional regulations?

- A) Even if 510 code rules are less stringent, 510 code rules will always apply
- B) Both 510 and jurisdiction rules must always be met and conflicts resolved
- C) If 510 code rules are more stringent, then the 510 code rules will always apply
- D) Owner/User may elect to follow either of the rules as long as it is documented

Answer = C ... Reference: 510, Par. 1.1.3. ... Also, remember this * Star Question ... We can never break any jurisdiction rules by following API 510 code ... API 510 does not allow this!!!**

API 510 Code Closed Book Exam Questions (Sections 1 & 2)

6. Which Appendix in API 510 lists the types of vessels that MAY be excluded from the code?

- A) Appendix A B) Appendix B C) Appendix C D) Appendix D

Answer = A ... Reference: 510, Par. 1.2.2

7. Which of these are NOT to be excluded from specific requirements of API 510 code?

- A) Classes of containers listed for exemption from the scope of ASME Section VIII, Div. 1 & 2
B) Those with internal/external operating pressures not exceeding 15 psi regardless of size
C) Cargo or volume tanks on trucks, ships, and barges covered by jurisdictional regulations
D) Those containing water with design pressure/temp above 300 psi & above 210°F (99°C)

Answer = D ... Ref: 510, Para. 1.2.2 & App. A, item a.1, b.1, b.6, b.8 ... OPEN OR CLOSED BOOK

Note: B might also be correct except that the 6 inch (15 cm) minimum rule applies to the size

8. Which of these are excluded from the specific requirements of the API 510 code?

- A) Pressure vessels on movable structures not covered by other jurisdictional regulations
B) All classes of containers not exempted by the scope of ASME Sect. VIII, Div 1
C) Pressure vessels designed for an internal pressure less than 15 psig
D) Pressure vessels with designs exceeding NPS 6 (inside diameter)

Answer = C ... Reference: 510, Appendix A, Sections A & B ... OPEN OR CLOSED BOOK

9. Pressure Vessels excluded from the API 510 code rules may include all of the following that are located on movable structures and covered by jurisdictional regulations EXCEPT for:

- A) Cargo or volume tanks for trucks, ships, and barges
B) Pressure vessels installed for railways or those that use railcars
C) Air receivers associated with braking systems of mobile equipment
D) Pressure vessels installed in ocean-going ships, barges, and floating craft

Answer = B ... Ref: 510, Appendix A, Sect A ... NO MENTION OF RAILWAYS/RAILCARS IN CODE

10. Vessels containing water under pressure are excluded from 510 code rules if design pressure & temperature does not exceed:

- A) 250 psi and 212°F (100°C)
B) 300 psi and 210°F (99°C)
C) 350 psi and 212°F (100°C)
D) 400 psi and 210°F (99°C)

Answer = B ... Reference: 510, App. A, Subsection B.6.a/b

API 510 Code Closed Book Exam Questions (Section 1 & 2)

11. Which of these are covered (not excluded) by specific requirements of API 510 code?

- A) Maximum Volume of 5ft³ (0.141 m³) with a maximum design pressure of 250 psi (1723 KPa)
- B) Maximum Volume of 3ft³ (0.08 m³) with a maximum design pressure of 350 psi (2410 KPa)
- C) Maximum Volume of 2.5ft³ (.07 m³) with a maximum design pressure 1000 psi (6892 KPa)
- D) Maximum Volume of 1.5ft³ (.042 m³) with a maximum design pressure 600 psi (4137 KPa)

Ans = C ... Ref: 510, App. A, Subsect.* reads d ... 510 Typo ... C exceeds limits → OPEN BOOK

12. API 510 recognizes fitness-for-service concepts for:

- A) Evaluating in-service damage using API 579 rules
- B) Evaluating in-service damage using API 580 rules
- C) Evaluating in-service damage using API 510 rules only
- D) Evaluating any damage found during any inspection using API 510 rules only

Answer = A ... Reference: 510, Para. 1.3

13. API 510 recognizes risk-based-inspection concepts for:

- A) Evaluating in-service damage using API 579 rules
- B) Evaluating in-service damage using API 580 rules
- C) Evaluating in-service damage using API 510 rules only
- D) None of these are correct

Answer = B ... Reference: 510, Para. 1.3 → API 580 is used to determine inspection intervals!

14. What API Publication covers welding & hot tap procedures for in-service pressure vessels?

- A) API 572
- B) API 510
- C) API 582
- D) API 2201

Answer = D ... Reference: 510, Section 2

15. What documents cover NDE examiner qualification and certification respectively?

- A) CP-189 Standard and ASNT Practice SNT-TC-1A
- B) CP-189 Standard and ASME Section V Code rules
- C) ASNT Practice SNT-TC-1A and ASME V Code rules
- D) ASNT Practice SNT-TC-1A and ASME Section V Code rules

Answer = A ... Reference: 510, Section 2

API 510 Code Closed Book Exam Questions (Section 3)

16. Which of these should be considered an alteration to a pressure vessel per API 510?

- A) Addition of a size 8 NPS reinforced nozzle in a vessel having nozzles sized 2NPS, 3NPS & 6NPS
- B) Addition of several new LWN-type nozzles size 2 NPS and 3 NPS not requiring reinforcement
- C) Replacement of an existing size 18 NPS reinforced man way nozzle
- D) None of the above should be considered an alteration

Answer = A ... Reference: API 510, Section 3.2 (Definition of Alteration)

17. Which of these should be considered an alteration to a pressure vessel per API 510?

- A) Replacement of a portion of a severely corroded shell using a flush insert patch
- B) Replacement of a size 16 NPS nozzle due to severe internal corrosion
- C) Adding a reinforced 24 NPS man way nozzle when 3 such nozzles already exist on a vessel
- D) None of these should be considered an alteration

Answer = D ... Reference: API 510, Section 3.2 (Definition of an Alteration)

18. Which of these should be considered an alteration to a pressure vessel per API 510?

- A) Replacement of a 2:1 Ellipsoidal head due to severe corrosion
- B) Replacement of corroded Hemispherical heads with two new 2:1 Ellipsoidal Heads
- C) Replacement of reinforced size 16 NPS nozzle neck & flange due to severe internal corrosion
- D) Addition of another reinforced size 18 NPS man way nozzle when 1 already exists on a vessel

Answer = B ... Reference: API 510, Section 3.2 (Definition of an Alteration)

19. Which of these should be considered an alteration to a pressure vessel per API 510?

- A) Addition of small bore nozzles or welded couplings not requiring reinforcement
- B) Any comparable or duplicate replacement due to severe corrosion or other reasons
- C) Addition of any reinforced nozzle greater than the size of existing reinforced nozzles
- D) Adding a reinforced nozzle (12 NPS or greater) equal to a size of existing reinforced nozzles

Answer = C ... Reference: API 510, Section 3.2 (Definition of an Alteration)

20. Which of these should NOT be considered an alteration to a pressure vessel per API 510?

- A) Replacement of a corroded sump (20 NPS Schedule 40) with a new sump (20 NPS Sch. 80)
- B) Addition of a reinforced nozzle less than or equal to the size of existing reinforced nozzles
- C) Replacement of a corroded hemi head ($E = 0.85$, RT 2) with a new hemi head ($E = 1.00$, RT 1)
- D) Addition of 2 new reinforced nozzles in a shell with no shell nozzles & 2 smaller head nozzles

Answer = B ... Reference: API 510, Section 3.2 (Definition of an Alteration)

API 510 Code Closed Book Exam Questions (Section 3)

21. A physical change in any component with design implications affecting pressure-containing capability of a pressure vessel is called a(n):

- A) Rerating
- B) Redesign
- C) Repair
- D) Alteration

Answer = D ... Reference: API 510, Section 3.2 (Definition of an Alteration)

22. The code, code section, or other recognized and generally accepted engineering standard or practice to which the pressure vessel was built or which is deemed by the owner/user or the engineer to be most appropriate for the situation is called the:

- A) Design code
- B) Inspection code
- C) Construction code
- D) Applicable construction code

Answer = D ... Reference: API 510, Section 3.3 (Definition of applicable construction code)

23. The code or standard for which a vessel was originally built to is called the:

- A) Design code
- B) Inspection code
- C) Construction code
- D) Applicable construction code

Answer = C ... Reference: API 510, Section 3.10 (Definition of construction code)

24. A shortened title for API 510 is ... Or ... API 510 is called the:

- A) Design code
- B) Inspection code
- C) Construction code
- D) Applicable construction code

Answer = B ... Reference: API 510, Section 3.31 (Definition of Inspection code)

25. Which one of these is NOT considered an Authorized inspection agency per API 510?

- A) Inspection organization of the jurisdiction outside of that in which the pressure vessel is used
- B) An Insurance company's inspection organization that is licensed & writes insurance for a PV
- C) Inspection organization of an owner/user of pressure vessels who maintains an inspection organization for his equipment only and not for vessels intended for sale or resale
- D) Independent organization under contract and under the direction of an owner/user that is recognized by the jurisdiction in which the pressure vessel is used.

Answer = A ... Reference: API 510, Section 3.6 (Definition of Authorized Inspection Agency)

API 510 Code Closed Book Exam Questions (Section 3)

26 duplicated. Which of these is NOT considered Authorized inspection agency per API 510?

- A) Inspection organization of the jurisdiction outside of that in which the pressure vessel is used
- B) An Insurance company's inspection organization that is licensed & writes insurance for a PV
- C) Inspection organization of an owner/user of pressure vessels who maintains an inspection organization for his equipment only and not for vessels intended for sale or resale
- D) Independent organization under contract and under the direction of an owner/user that is recognized by the jurisdiction in which the pressure vessel is used.

Answer = A ... Reference: API 510, Section 3.6 (Definition of Authorized Inspection Agency)

27. Which one of these is NOT considered an Authorized inspection agency per API 510?

- A) Inspection organization of the jurisdiction in which the pressure vessel is used
- B) An Insurance company's inspection organization that is licensed & writes insurance for a PV
- C) Inspection organization of an owner/user of pressure vessels who maintains an inspection organization for his equipment and also for the sale or resale of pressure vessels
- D) Independent organization under contract and under the direction and controls of an owner/user that is recognized by the jurisdiction in which the pressure vessel is used.

Answer = C ... Reference: API 510, Section 3.6 (Definition of Authorized Inspection Agency)

28. An employee of an authorized inspection agency who is qualified and certified to perform inspections under the API 510 is called a(n):

- A) QA Inspector
- B) QC Inspector
- C) Examiner
- D) None of these

Answer = D ... Ref: API 510, Section 3.7 (Definition of Authorized Pressure Vessel Inspector)

29. Whenever the term inspector is used in API 510, it refers to a(n):

- A) QA Inspector
- B) QC Inspector
- C) Examiner
- D) None of these

Answer = D ... Ref: API 510, Section 3.7 (Definition of Authorized Pressure Vessel Inspector)

EXAM TIP: When you see a "None of the Above" answer → It's most likely a correct answer

Correct answer was "too easy" ... so they used "None of these" ... EXPECT A FEW LIKE THIS!

30. A shortened title used in API 510 for Authorized Pressure Vessel Inspector is:

- A) QA Inspector
- B) Inspector
- C) Examiner
- D) Vessel Inspector

Answer = B ... Ref: API 510, Section 3.33 (Definition of Inspector)

API 510 Code Closed Book Exam Questions (Section 3)

31. Person who assists an inspector by performing specific NDE on pressure vessels but does not evaluate exam results per API 510 unless trained and authorized to do so by owner/user:

- A) QA Inspector
- B) QC Inspector
- C) Examiner
- D) AWS CWI Inspector

Answer = C ... Ref: API 510, Section 3.20 (Definition of Examiner)

32. Designated areas on pressure vessels where periodic exams are conducted are called:

- A) Examination points
- B) Thickness measurement points
- C) Inspection points
- D) None of these are correct

Answer = D ... Ref: API 510, Section 3.9 (Definition of Condition Monitoring Locations or CMLs)

Correct answer was "too easy" ... I used "None of these" hoping to trick you! Did it work? 😊

33. CMLs are an abbreviation (for what term) and were previously referred to (as what term) in past API 510 code editions?

- A) Corrosion monitoring locations previously were Thickness Monitoring Locations (TMLs)
- B) Condition monitoring locations previously were Thickness Monitoring Locations (TMLs)
- C) Corrosion measurement locations previously were Thickness Measurement Locations (TMLs)
- D) Condition measurement locations previously were Thickness Measurement Locations (TMLs)

Answer = B ... Ref: API 510, Section 3.9 (Definition of Condition Monitoring Locations or CMLs)

34. Any welding technique used to obtain controlled grain refinement and tempering of the underlying heat affected zone (HAZ) in the base metal is called:

- A) Controlled-deposition welding
- B) Temper-bead welding
- C) Half-bead welding
- D) None of these is correct

Answer = A ... Ref: API 510, Section 3.11 (Definition of Controlled-Deposition Welding)

35. In the half-bead welding technique, the term "half-bead" refers to the fact that:

- A) The weld shall be deposited with stringer beads and is half the width of a normal weld bead
- B) All welded layers must be ground down after being deposited (removal of half of all layers)
- C) The thickness of the first weld layer deposited must be reduced by one-half by grinding
- D) The thickness of the final weld layer deposited must be reduced by one-half by grinding

Answer = C ... Ref: API 510, Section 3.11 (Definition of Controlled-Deposition Welding)

Note: Temper-bead technique refers to "tempering of the layer below the current bead being deposited" ... Know both are Controlled-Deposition Welding Methods used in lieu of PWHT

API 510 Code Closed Book Exam Questions (Section 3)

36. A methodology whereby flaws and conditions contained within an equipment item are assessed in order to determine the integrity of the equipment for continued service is called:

- A) Risk-based Inspection Assessment
- B) Fitness-for-service evaluation
- C) Nondestructive examination
- D) In-Service Inspection assessment

Answer = B ... Ref: API 510, Section 3.22 (Definition of Fitness-for-service evaluation)

37. A point in the repair or alteration process beyond which work may not proceed until the required inspection or NDE has been performed and documented is called a(n):

- A) Hold Point
- B) Witness Point
- C) Inspection Point
- D) Examination Point

Answer = A ... Ref: API 510, Section 3.24 (Definition of Hold Point)

38. A response or evidence resulting from the application of a Nondestructive exam is called:

- | | |
|------------------|-----------------|
| A) Defect | B) Imperfection |
| C) Discontinuity | D) Indication |

Answer = D ... Ref: API 510, Section 3.26 (Definition of Indication)

39. An imperfection whose type or size exceeds the applicable acceptance criteria is called:

- | | |
|------------------|---------------|
| A) Discontinuity | B) Flaw |
| C) Defect | D) Indication |

Answer = C ... Ref: API 510, Section 3.15 (Definition of Defect) → Beware of the Open Book question on Table 8,9,10 of API 577 Pg 56 that asks for Definition of Discontinuity, flaw, etc)

40. A Flaw or other discontinuity noted during inspection that may or may not exceed the applicable acceptance criteria is called:

- | | |
|---------------|------------------|
| A) Defect | B) Imperfection |
| C) Indication | D) None of these |

Answer = B ... Ref: API 510, Section 3.25 (Definition of Imperfection)

API 510 Code Closed Book Exam Questions (Section 3)

41. A strategy defining how and when a pressure vessel or pressure-relieving device will be repaired, inspected, and/or maintained is called a(n):

- A) Repair Plan
- B) Inspection Plan
- C) Quality Plan
- D) QA Inspection/Repair Mgmt System

Answer = B ... Ref: API 510, Section 3.32 (Definition of Inspection Plan)

42. Work needed to restore a vessel to a condition suitable for safe operation at design conditions is called a(n):

- A) Alteration
- B) Rerating
- C) Repair
- D) Derating

Answer = C ... Ref: API 510, Section 3.53 (Definition of Repair)

43. If any of the restorative work to a pressure vessel results in a change to the design temperature, MDMT, or MAWP, the work shall be considered a(n):

- A) Alteration
- B) Rerating
- C) Repair
- D) Derating

Answer = A ... Ref: API 510, Section 3.53 (Definition of Repair)

44. A change, either an increase or a decrease, in either design temperature rating, MDMT or MAWP rating of a vessel is called a(n):

- A) Alteration
- B) Rerating
- C) Modification
- D) Derating

Answer = B ... Ref: API 510, Section 3.56 (Definition of Rerating)

45. When a vessel is nearing its minimum allowed thickness, a permissible way to provide for additional corrosion allowance without using a repair organization is:

- A) Perform an alteration on the vessel and change the original design conditions
- B) Rerating the vessel above the original design conditions
- C) Repairing the vessel to restore the original design conditions
- D) Derating the vessel below original design conditions

Answer = D ... Ref: API 510, Section 3.56 (Definition of Rerating)

API 510 Code Closed Book Exam Questions (Section 3)

46. This type of pressure is based upon calculations using the minimum (or average pitted) thickness for all critical vessel elements and is exclusive of the corrosion allowance and may be adjusted for static head pressure and other loads such as wind and earthquakes:

- A) MAWP
- B) Design Pressure
- C) MAOP
- D) MDMT

Answer = A ... Ref: API 510, Section 3.37 (Definition of MAWP)

47. A repair organization may be any one of the following EXCEPT:

- A) Holder of a valid ASME Certificate of Authorization (U-stamp)
- B) Holder of a valid ASME Certificate of Authorization (R-stamp)
- C) Owner/User of pressure vessels who repairs his own equipment
- D) An individual or organization that is authorized by the legal jurisdiction

Ans = B ... Ref: API 510, Sect 3.54 (Definition of Repair Org) → National Board issues R-Stamp

48. A repair organization may be any one of the following EXCEPT:

- A) Holder of a valid ASME U-stamp or National Board R-Stamp
- B) Owner/User of pressure vessels who repairs his own equipment
- C) An individual or organization that is authorized by the legal jurisdiction
- D) A contractor whose qualifications are acceptable to the Authorized Pressure Vessel Inspector

Ans = D ... Ref: API 510, Sect 3.54 (Definition of Repair Org) → acceptable to the Owner/User

49. A repair organization may be any one of the following EXCEPT:

- A) Holder of a valid ASME U-stamp or National Board R-Stamp
- B) Owner/User of pressure vessels who repairs his own equipment
- C) An individual or organization that operates within a legal jurisdiction
- D) A contractor whose qualifications are acceptable to the Owner/User

Ans = C ... Ref: API 510, Sect 3.54 (Definition of Repair Org) → authorized by legal jurisdiction

50. Which of the following is a repair organization according to API 510?

- A) Holder of a valid National Board U-stamp or ASME R-Stamp
- B) Owner/User of pressure vessels who does not repair his own equipment
- C) An individual or organization that operates within a legal jurisdiction
- D) A contractor whose qualifications are acceptable to the Owner/User

Answer = D ... Ref: API 510, Sect 3.54 (Definition of Repair Organization)

API 510 Code Closed Book Exam Questions (Section 3)

51. Required thickness is defined by API 510 as the minimum thickness for each element of a pressure vessel based on the appropriate design code calculations and code allowable stress that considers all of the following factors EXCEPT:

- A) Pressure
- B) Mechanical loadings
- C) Structural loadings
- D) Corrosion Allowance

Answer = D ... Ref: API 510, Sect 3.55 (Definition of Required Thickness)

52. Alternative to code calculations, required thickness can be reassessed using:

- A) Structural Design Minimum Thickness
- B) Fitness for service analysis per API 579
- C) There are no alternatives to code calcs
- D) Risk-based Inspection assessments per API 580

Answer = B ... Ref: API 510, Sect 3.55 (Definition of Required Thickness)

53. Type of assessment & management process that is focused on inspection planning for loss of containment of pressurized equipment in process facilities due to material deterioration is:

- A) Inspection Plan
- B) Fitness-for-Service
- C) Risk-based Inspection
- D) Quality Assurance

Answer = C ... Ref: API 510, Sect 3.57 (Definition of Risk-Based Inspection)

54. Regarding RBI, risks are managed primarily through Inspection in order to influence:

- A) The probability of failure
- B) The consequence of failure
- C) The profitability of the service
- D) The length of inspection intervals

Answer = A ... Ref: API 510, Sect 3.57 (Definition of Risk-Based Inspection)

55. Reduction in toughness due to a metallurgical change can occur in some low alloy steels as a result of long term exposure at 650°F – 1100°F (345°C – 595°C) temp range is called:

- A) Creep
- B) Brittle Fracture
- C) Temper Embrittlement
- D) High Temperature Hydrogen Attack (HTHA)

Answer = C ... Ref: API 510, Sect 3.59 (Definition of Temper Embrittlement)

API 510 Code Closed Book Exam Questions (Section 3)

56. Temper Embrittlement affects which low alloys and occurs in what temperature range?

- A) TE affects 1.25Cr-0.5Mo alloy steels in the 650°F – 1100°F (345°C – 595°C) temp range
- B) TE affects 2.25Cr-1.0Mo alloy steels in the 650°F – 1100°F (345°C – 595°C) temp range
- C) TE affects 1.25Cr-0.5Mo alloy steels in the 750°F – 1100°F (400°C – 595°C) temp range
- D) TE affects 2.25Cr-1.0Mo alloy steels in the 750°F – 1100°F (400°C – 595°C) temp range

Answer = B ... Ref: API 510, Sect 3.59 (Definition of Temper Embrittlement)

57. The “transition temperature” as defined by API 510 is the:

- A) Temperature at which a material’s modulus of elasticity changes
- B) Temperature at which a material fracture mode changes from ductile to brittle
- C) Temperature at which a material undergoes chemical and metallurgical changes
- D) None of these is correct

Answer = B ... Ref: API 510, Sect 3.60 (Definition of Transition Temperature)

API BODY OF KNOWLEDGE PART 2 (SPECIAL QUESTION)

58. For P1, P3, P4, and P5 materials (for purpose of API 510 examination) the lower transition temperature and the upper transformation temperature will be (respectively):

- A) 1200°F & 1500°F B) 1250°F and 1500°F C) 1300°F and 1600°F D) 1330°F & 1600°F

Answer = D ... Ref: API 510, Sect 2 (References) → See the API 510 BODY OF KNOWLEDGE

API 510 Code (16 Closed Book Topics) → Topic # 1

Topic 1: Organization & Certification Requirements

59. Which of these does NOT qualify a person for an API 510 certification?

- A) BS Eng. degree with 2 years total PV experience (1 year in PV Inspection per API 510)
- B) AS Eng. degree with 2 years total PV experience (1 year in PV Inspection per API 510)
- C) HS graduate with 2 years total PV experience (1 year in PV Inspection per API 510)
- D) Any Person with 5 years total PV experience (1 year in PV Inspection per API 510)

Answer = C ... Ref: API 510, Para. B.2.1.c → Three years total PV experience is required

60. All of these describe experience that may qualify one to be an API 510 Inspector EXCEPT?

- A) Both performance & supervision of Inspection activities per API 510
- B) Experience in design of PVs & supervision of Inspection activities per API 510
- C) Experience in operation of PVs & performance of Inspection activities per API 510
- D) Experience in Construction & Repair of Pressure Vessels in accordance with API 510

Answer = D ... Ref: API 510, Para. B.2.1.b/c/d → 1 year must be in Insp Supervision/Performance

API 510 Code (16 Closed Book Topics) → Topic # 1

61. Which of these is NOT an authorized inspection agency according to API 510?

- A) Inspection organization of a jurisdiction where the pressure vessel is used
- B) Inspection organization of an insurance company that insures pressure vessels
- C) Owner or User who maintains an inspection organization for his own equipment
- D) Independent contractor hired by an owner or user that is not recognized by a jurisdiction

Answer = D ... Reference: API 510, Para. 3.6.d → Must be “recognized” by a jurisdiction

62. Which of these is an authorized inspection agency according to API 510?

- A) Insurance company inspection organization that did not insure a given pressure vessel
- B) Independent outside contractor hired by owner or user but not recognized by a jurisdiction
- C) Owner or user who maintains an insp org for his equip only (not for vessels for sale or resale)
- D) Inspection organization of a jurisdiction outside a jurisdiction where a pressure vessel is used

Answer = C ... Ref: API 510, Para. 3.6.c → His equipment only ... not intended for sale or resale

63. Which of these is NOT a repair organization according to API 510?

- A) An individual or organization that is not authorized by the legal jurisdiction
- B) An owner or user of pressure vessels who makes repairs on his own equipment
- C) Contractor whose qualifications are acceptable to the pressure-vessel owner or user
- D) Holder of valid *U STAMP* (ASME certificate of authorization) and/or a valid *R STAMP* (National Board)

Ans = A ... Ref: API 510, Para. 3.54.a/b/c/d → Must be “authorized” by the legal jurisdiction

64. Who is responsible to execute the inspection plan including the established schedule?

- A) Authorized Inspection Agency
- B) Owner/User (Insp) Organization
- C) Authorized Pressure Vessel Inspector
- D) Repair Organization

Ans = B ... Ref: API 510, Para. 4.1 → Owner/User responsibilities

65. Who shall exercise overall control of activities relating to in-service inspection, repair, alteration & rerating of pressure vessels and pressure relieving devices?

- A) Authorized Inspection Agency
- B) Owner/User (Insp) Organization
- C) Repair Organization
- D) API 510 Authorized Inspector

Answer = B ... Ref: API 510, Para. 4.1 → Owner/User responsibilities

API 510 Code (16 Closed Book Topics) → Topic # 1

66. Who is responsible for developing, documenting, implementing, executing, and assessing pressure vessel/pressure-relieving device inspection systems & inspection/repair procedures that meet API 510 inspection code requirements?

- A) Owner/User (Insp) Organization
- B) Authorized Inspection Agency
- C) Authorized Pressure Vessel Inspector
- D) None of these are correct

Answer = A ... Ref: API 510, Para. 4.2.1 → Owner/User responsibilities

67. All repairs and alterations shall be performed by a(n):

- A) Owner/User approved Contractor holding a valid ASME R-Stamp
- B) Owner/User approved Contractor holding a valid ASME U-Stamp
- C) Repair Organization (Can be owner/user repairing his own equip)
- D) Owner/User approved Maintenance Group doing repairs

Answer = C ... Ref: API 510, Para. 4.2.3 → Repair Organization responsibilities → MUST KNOW

68. Owner/user quality assurance insp/repair management system contains all these EXCEPT:

- A) Organization and reporting structure for inspection personnel
- B) Documenting of inspection and quality assurance procedures
- C) Documenting and reporting inspection and test results
- D) Developing and documenting repair plans

**Answer = D ... Ref: API 510, Para. 4.2.1.a/b/c/d → Owner/User Organization responsibilities
→ The correct answer is ... Developing & documenting INSPECTION PLANS ... Not repair plans**

69. Who is responsible to owner/user for activities involving design, analysis, or evaluation of pressure vessels and pressure-relieving devices covered by the API 510 code?

- A) Authorized Inspection Agency
- B) Authorized Pressure Vessel Inspector
- C) Corrosion Specialist
- D) None of these are correct

Answer = D ... Ref: API 510, Para. 4.2.2 → ENGINEER RESPONSIBILITIES → Tricky answer = D!!!

70. Who is responsible to the owner/user to assure that the inspection, NDE, and pressure testing activities meet API 510 requirements?

- A) Authorized Inspection Agency
- B) Authorized Pressure Vessel Inspector
- C) Examiner
- D) Repair Organization

Answer = B ... Ref: API 510, Para. 4.2.4 → Inspector responsibilities

API 510 Code (16 Closed Book Topics) → Topic # 1

71. To maintain/repair vessels or pressure-relieving devices, the repair organization is responsible to the owner/user and shall provide all of the following items EXCEPT:

- A) Materials
- B) Quality Assurance
- C) Equipment
- D) Workmanship

Answer = B ... Ref: API 510, Par. 4.2.3 → Repair Organization provides Quality Control, not QA

72. Inspectors may be assisted in performing inspections by OTHER PROPERLY TRAINED AND QUALIFIED INDIVIDUALS called:

- A) Certified welding inspectors and NDE technicians
- B) Operating Personnel and NDE technicians
- C) Examiners and Operating personnel
- D) Examiners

Answer = C ... Ref: API 510, Para. 4.2.4 & 4.2.6 → Inspector responsibilities

73. All NDE results must be evaluated and accepted by the:

- A) Certified welding inspectors and NDE technicians doing the examinations
- B) NDE technicians doing the work in assistance to the inspector
- C) Examiners doing the work in assistance to the inspector
- D) None of these is correct

Answer = D ... Ref: API 510, Para. 4.2.4 → Inspector responsibilities → Did you miss it again? 😊

74. Regarding examiner responsibilities, which of the following is not a true statement?

- A) He must be proven competent by owner/users & must hold certs in all NDE procedures used
- B) He does not need 510 certification and does not need to be an employee of the owner/user
- C) He needs to be trained and competent in the NDE procedures being used
- D) He shall perform the NDE in accordance with job requirements

Answer = A ... Ref: API 510, Para. 4.2.5.1/2 → Examiner responsibilities → MAY NOT MUST

75. Who shall maintain certification records of examiners employed, including dates and results of personnel qualifications (that shall be made available to the inspector)?

- A) Owner/user
- B) Examiner's employer
- C) Inspector's Employer
- D) Authorized Pressure Vessel Inspector

**Ans = C ... Ref: 510, Par. 4.2.5.3 → Inspector's employer → By definition = Auth. Insp Agency
Note: API 570 requires the Examiners' Employer to maintain certification records**

API 510 Code (16 Closed Book Topics) → Topic # 2

76. Per API 510, a strategy defining how and when a pressure vessel or pressure-relieving device will be inspected, repaired, and/or maintained is called a(n):

- A) In-service Inspection Plan
- B) On-Stream Inspection Plan
- C) Quality Plan
- D) Inspection Plan

Ans = D ... Ref: API 510, Par. 3.32 → Inspection Plan definition

77. The inspection plan should be developed by the:

- A) Authorized Inspection agency
- B) Inspector or Engineer
- C) Owner/User
- D) Engineer

Answer = B ... Ref: API 510, Para. 5.1.1.1 → Development of an Inspection Plan

78. Who shall be consulted when needed to clarify potential damage mechanisms and specific damage locations when developing an Inspection Plan?

- A) Corrosion Specialist
- B) Inspector or Engineer
- C) Inspector only
- D) Engineer only

Answer = A ... Ref: API 510, Para. 5.1.1.1 → Development of an Inspection Plan

79. Corrosion specialist shall be consulted when developing the inspection plan for vessels that operate at elevated temperatures above:

- A) 650°F (345°C)
- B) 700°F (371°C)
- C) 750°F (400°C)
- D) 800°F (427°C)

Ans = C ... Ref: API 510, Para. 5.1.1.1 → Development of an Inspection Plan

80. Examinations must be scheduled at intervals that consider ALL THESE FACTORS EXCEPT:

- A) The type of damage and the rate of damage progression
- B) The tolerance of the equipment to the type of damage
- C) Probability of the NDE method to identify the damage
- D) Maximum intervals as defined in the Inspection Plan

Answer = D ... Ref: API 510, Para. 5.1.1.2 → Development of an Inspection Plan ... Maximum intervals are defined in the codes and standards, not in the inspection plan

API 510 Code (16 Closed Book Topics) → Topic # 2

81. *Inspection plans shall contain inspection tasks and schedule required to MONITOR DAMAGE MECHANISMS & ASSURE EQUIPMENT'S MECHANICAL INTEGRITY*. Inspection plans should cover all of the following details EXCEPT:

- A) Describe any required repairs and include the repair plan in detail
- B) Describe necessary pressure tests, type of tests, test pressures, and duration
- C) Define type(s) of inspection needed & identify next inspection date for each inspection type
- D) Describe insp & NDE technique & extent & location of insp & NDE including cleaning needed

Answer = A ... Ref: API 510, Para. 5.1.2 → MINIMUM CONTENTS OF AN INSPECTION PLAN

82. What types of inspection plans are based on industry standards and practices and may be used under API 510 rules:

- A) Similar service inspection plans
- B) Generic inspection plans
- C) Standard Industry Practices
- D) Risk-based inspection plans

Answer = B ... Ref: API 510, Para. 5.1.2 → Minimum Contents of an Inspection Plan

83. Inspection plans may or may not exist in a single document, but the contents of the plan should be readily accessible from:

- A) Inspection Records
- B) Inspection data systems
- C) Authorized Inspection Agency files
- D) Progressive records

Answer = B ... Ref: API 510, Para. 5.1.2 → Minimum Contents of an Inspection Plan

84. Inspection plans may also contain “other additional details” to assist in understanding the rationale for the plan and in executing the plan that may include:

- A) Defining the location of the damage
- B) Defining any special access requirements
- C) Defining repair details regarding the damage
- D) Describing the types of damage anticipated or experienced in the equipment

Answer = C ... Ref: API 510, Para. 5.1.3 → Additional Contents of an Inspection Plan

85. An inspection plan shall be established for:

- A) All pressure vessels for a given owner/user
- B) All pressure vessels within the scope of API 510 code
- C) All pressure vessels and pressure-relieving devices for a given owner/user
- D) All pressure vessels and pressure-relieving devices within the scope of API 510 code

Answer = D ... Ref: API 510, Para. 5.1 → Inspection Plans

API 510 Code (16 Closed Book Topics) → Topic # 2

86. RBI can be used to determine:

- A) Inspection methods and techniques
- B) Inspection intervals and future inspection plans
- C) Inspection intervals and the type of future inspections
- D) Inspection intervals and type and extent of future inspections and examinations

Answer = D ... Reference: API 510, Para. 5.2 → Risk-based Inspection

87. RBI assessments determine risk by:

- A) Combining the probability and the consequence of equipment failure
- B) Assessing the likelihood of failure and the cost associated with equipment failure
- C) Assessing the likelihood of failure and documenting the risks associated with a given process
- D) None of these are correct

Answer = A ... Reference: API 510, Para. 5.2 → Risk-based Inspection

88. When owner/user conducts an RBI assessment, it must include a systematic evaluation of:

- A) The probability and consequence of failure in accordance with API 579
- B) The probability and consequence of failure in accordance with API 580
- C) The consequence of failure in accordance with API 579 and API 580
- D) The consequence of failure in accordance with API 580 and API 581

Answer = B ... Ref: API 510, Para. 5.2 → Risk-based Inspection

89. In RBI, important steps in assessing the probability of a pressure vessel failure include:

- A) Identifying and evaluating effectiveness of past equipment inspection methods & techniques
- B) Assessing those existing damage mechanisms (DMs) that are most likely to affect equipment
- C) Identifying/evaluating potential DMs/current equip conditions/past inspection effectiveness
- D) Assessing all possible DMs likely to affect current equipment using existing insp techniques

Answer = C ... Ref: API 510, Para. 5.2 → Risk-based Inspection

90. In RBI, important steps in assessing the consequence of a pressure vessel failure include identifying and evaluating all of these EXCEPT:

- A) The nature of the process fluid(s)
- B) Potential injuries that could occur
- C) Environmental/equipment damage
- D) Potential damage mechanisms

Answer = D ... Ref: API 510, Para. 5.2 → Risk-based Inspection

API 510 Code (16 Closed Book Topics) → Topic # 2

91. For RBI, the probability assessment must be based on:

- A) All forms of damage that is possible within a process unit
- B) All forms of damage that has been documented by Inspection
- C) All forms of damage that could reasonably be expected to affect a vessel in a given service
- D) None of these is correct

Answer = C ... Ref: API 510, Para. 5.2.1 → Probability Assessment (related to RBI)

92. The consequence of a release is dependent on the:

- A) Associated health effects, environmental and equipment damage and equipment downtime
- B) Type and amount of process fluid contained in the equipment
- C) Potential incidents that may occur as a result of fluid release
- D) Size and the type of a potential release

Answer = B ... Ref: API 510, Para. 5.2.2 → Consequence Assessment (related to RBI)

93. After an RBI assessment is conducted, the results can be used to establish the:

- A) Vessel inspection plan
- B) Most appropriate inspection and NDE methods, tools, and techniques
- C) Extent of NDE and the interval for internal, external, and on-stream inspections
- D) Need for pressure testing after damage has occurred or after repairs/alterations are done

Answer = A ... Ref: API 510, Para. 5.2.3 → Documentation (related to RBI)

94. After an RBI assessment is conducted, the results can be used to establish the VESSEL INSPECTION PLAN and better define all of these items EXCEPT:

- A) The most appropriate inspection and NDE methods, tools, and techniques
- B) The extent of NDE (percentage of vessel to examine) and the applicable inspection interval
- C) The need for pressure testing after damage has occurred or after repair/alterations are done
- D) The prevention & mitigation steps to eliminate probability & consequences of a vessel failure

Answer = D ... Ref: API 510, Para. 5.2.3 → Documentation (related to RBI) Reduce probability

95. When RBI assessments are used to set vessel inspection intervals, assessments shall be:

- A) Documented one time and shall remain on file for the life of the vessel
- B) Updated only when the vessel inspection interval will be changed
- C) Updated after any a vessel undergoes any process change
- D) Updated after each vessel inspection

Answer = D ... Ref: API 510, Para. 5.2.4 → Frequency of RBI Assessments

API 510 Code (16 Closed Book Topics) → Topic # 2

96. Safety precautions are important in pressure vessel inspection and maintenance activities and regulations govern many aspects of vessel entry and must be followed. In addition, the:

- A) Safety requirements of OSHA regarding confined space rules apply to API 510 inspections
- B) Owner/user's safety procedures must be reviewed and followed in all cases
- C) Vessel Inspection Plan must detail any confined space entry requirements
- D) None of these are correct

Answer = B ... Ref: API 510, Para. 5.3 → Preparation for Inspection

97. Personal protective equipment shall be worn when required for all these reasons EXCEPT:

- A) Regulations (Jurisdictional & others)
- B) Owner/user requirements
- C) Authorized Inspection Agency rules
- D) Repair organization requirements

Answer = C ... Ref: API 510, Para. 5.3 → Preparation for Inspection (Equipment)

98. Which of these statements are not true regarding precautions to be taken before beginning any vessel inspection & maintenance activities (NDE, pressure test, repair, etc)?

- A) Obtain permission to work in the area from operating personnel responsible for a vessel
- B) When individuals are inside a vessel, all persons working around a vessel should be informed
- C) Individuals working inside vessels should be informed when work is going on outside a vessel
- D) Permission should be obtained from the owner/user Safety Department

Answer = D ... Ref: API 510, Para. 5.3 → Preparation for Inspection (Communication)

99. All of the following statements are true regarding precautions to be taken prior to entering a vessel EXCEPT:

- A) Vessel shall be isolated from all sources of liquids, gases, vapors, radiation and electricity
- B) Vessel shall be drained, purged, cleaned, ventilated, and then gas tested before it is entered
- C) Procedures to ensure continuous safe ventilation and precautions to ensure safe egress and emergency evacuation of personnel from the vessel should be clear
- D) Documentation of safety precautions is required prior to any vessel entry. Before entering a vessel, individuals must obtain permission from the responsible operating personnel

Answer = B ... Ref: API 510, Para. 5.3 → Preparation for Insp (Vessel Entry) ... Should not shall

100. Before performing any of the required API 510 inspections, inspectors shall familiarize themselves with the vessel's prior history and should review:

- A) Prior inspection results/repairs, current inspection plan, and similar service inspection results
- B) Prior inspection and repair results, prior inspection plans & similar service inspection results
- C) Prior inspection and repair results, and prior inspection plans only
- D) Prior inspection and repair results only

Answer = A ... Ref: API 510, Para. 5.3 → Preparation for Inspection (Records Review)

API 510 Code (16 Closed Book Topics) → Topic # 2

101. Pressure vessels are susceptible to various types of damage mechanisms that include all of these EXCEPT:

- A) Isolated and localized metal loss and blistering
- B) Surface connected cracking and subsurface cracking
- C) Metallurgical changes and material property changes
- D) Dimensional changes and microfissuring/microvoid formation

Answer = A ... Ref: API 510, Par. 5.4.1 → Types of Damage → General and localized metal loss

102. The presence or potential of damage in a vessel is dependent upon its material of construction, quality of construction, operating conditions and:

- A) Location in the plant
- B) Design characteristics
- C) Quality of Corrosion protection
- D) Plant's geographical location

Answer = B ... Reference: API 510, Para. 5.4.2 → Damage Mechanism Inspection

103. Detailed information in API 571 about common damage mechanisms (DMs) includes:

- A) The most important DMs, such as CUI & general and localized metal loss
- B) Critical factors, affected equipment, and appearance or morphology for each DM
- C) Critical factors, appearance and typical inspection & monitoring techniques for each DM
- D) Critical factors, appearance, prevention and mitigation, and affected equipment for each DM

Answer = C ... Reference: API 510, Para. 5.4.3 → Damage Mechanism Inspection

104. General types of inspection recognized by API 510 are:

- A) Internal, On-stream, and External inspections
- B) Internal, On-stream, External, and Thickness inspections
- C) Internal, On-stream, External, Thickness, and CUI inspections
- D) Internal, On-stream, External, Thickness, CUI, and Routine inspections

Answer = C ... Ref: API 510, Para. 5.4.3 → General types of Inspection → There are Routine inspections, but the routine inspection is not considered one of 5 general types of inspection!

105. Imperfections identified during inspections and examinations should be:

- A) Evaluated per API 510 Section 6 rules
- B) Evaluated per API 510 Section 7 rules
- C) Characterized, sized, and evaluated per API 510 Section 6 rules
- D) Characterized, sized, and evaluated per API 510 Section 7 rules

Answer = D ... Ref: API 510, Para. 5.4.3 → General rules for the 5 general types of Inspection

API 510 Code (16 Closed Book Topics) → Topic # 2

106. The internal inspection shall be performed by:

- A) An inspector in accordance with the detailed procedures of the Authorized Insp agency
- B) An examiner acceptable to the inspector in accordance with quality manual
- C) An inspector in accordance with the owner/user quality manual
- D) An inspector in accordance with the inspection plan

Answer = D ... Ref: API 510, Para. 5.5.2.1 → Internal Inspection

107. A primary goal of the internal inspection is to:

- A) Determine the serviceability of the entire vessel
- B) Determine the maximum allowed inspection interval for the vessel
- C) Find damage that cannot be found by regular monitoring of external CMLs
- D) None of these is correct per API 510

Answer = C ... Ref: API 510, Para. 5.5.2.1 → Internal Inspection

108. For equipment not designed for entry by personnel, what must be done per API 510?

- A) Only On-Stream inspections must always be done when a vessel is inaccessible
- B) A combination of On-Stream and External inspections and UT thickness must be employed
- C) A best effort internal insp may be done by removing pipe spools (view through the nozzle)
- D) Inspection ports shall be opened for ID surface exams allowing remote visual insp techniques

Answer = D ... Ref: API 510, Para. 5.5.2.1 → Internal Inspection

109. When vessels are equipped with removable internals, internals may need removal to:

- A) Assure no unusual condition or corrosion on inaccessible parts of removable internals exist
- B) Allow inspection of pressure boundary surfaces to an extent deemed necessary by Inspector
- C) Allow inspection of vessel internal components to an extent deemed necessary by Inspector
- D) Assure that the removable internals are in serviceable condition and fit for continued service

Answer = B ... Ref: API 510, Para. 5.5.2.2 → Internal Inspection of Vessel Internals

110. Vessel internals need not be removed completely as long as reasonable assurance exists that damage at vessel areas covered by the internals is:

- A) Occurring to an extent that is not greater than that found in more accessible vessel areas
- B) Occurring to an extent that is not lesser than that found in more accessible vessel areas
- C) Occurring to an extent that is considered negligible or insignificant by the Inspector
- D) None of these is correct

Answer = A ... Ref: API 510, Para. 5.5.2.2 → Internal Inspection of Vessel Internals

API 510 Code (16 Closed Book Topics) → Topic # 2

111. Who should determine when it is necessary to remove deposits or linings to perform adequate internal inspections?

- A) Inspector in consultation with corrosion specialist
- B) Engineer and Corrosion Specialist
- C) Coating specialist and Inspector
- D) Corrosion Specialist

Answer = A ... Reference: API 510, Para. 5.5.2.3 → Internal Inspection of Deposits and Linings

112. If internal linings are in good condition and there is no reason to suspect that damage is occurring behind them, what does API 510 state?

- A) Perform spot exams for reasonable assurance no damage exists
- B) It not necessary to remove linings during the internal inspection
- C) Extent & examination percentage beneath linings must be as stated in the Inspection Plan
- D) It is left to the discretion of the Authorized Pressure Vessel inspector & Corrosion Specialist

Answer = B ... Reference: API 510, Para. 5.5.2.3 → Internal Inspection of Deposits and Linings

113. If the lining appears damaged, bulged or cracked, it may be advisable to take all of the following actions (EXCEPT):

- A) Completely remove damaged, bulged & cracked linings for inspection of vessel beneath
- B) Remove small portions of linings & investigate lining condition (Consult Corrosion Specialist)
- C) Remove small portions of linings & investigate vessel surfaces below (Consult Corr. Specialist)
- D) Perform external NDE techniques to explore for vessel damage beneath these internal linings

Answer = A ... Reference: API 510, Para. 5.5.2.3 → Internal Inspection of Deposits and Linings

114. All on-stream inspections should be conducted by:

- A) An Inspector only
- B) An inspector approved Examiner
- C) Either an inspector or examiner
- D) A trained examiner

Answer = C ... Ref: API 510, Para. 5.5.3.1 → On-Stream Inspection

115. All on-stream inspection work performed by an examiner shall be:

- A) Authorized and approved by owner/user who may require additional qualification tests
- B) Authorized and approved by the Authorized Inspection Agency
- C) Authorized and approved by the Engineer
- D) Authorized and approved by Inspector

Answer = D ... Ref: API 510, Para. 5.5.3.1 → On-Stream Inspection

API 510 Code (16 Closed Book Topics) → Topic # 2

116. When on-stream inspections of a pressure boundary are specified, they shall be designed to:

- A) Detect the damage mechanisms expected by the Inspector
- B) Detect the damage mechanisms expected for a given process
- C) Detect the damage mechanisms identified in the inspection plan
- D) Detect the damage mechanisms identified from similar service inspections

Answer = C ... Ref: API 510, Para. 5.5.3.1 → On-Stream Inspection

117. Which of the following statements are NOT TRUE regarding On-Stream Inspections?

- A) An external inspection may be a part of an on-stream inspection
- B) Inspections may include several NDE techniques to check for various types of damage
- C) Techniques are chosen for ability to identify internal damage mechanisms from the exterior
- D) Techniques are chosen for capabilities to perform at on-stream conditions (e.g. metal temps)

Answer = A ... Ref: API 510, Para. 5.5.3.2 → On-Stream Inspection → External Thickness Insp

118. Where on-stream inspection is acceptable, such inspections may be conducted:

- A) Only when approved by the Inspector
- B) Only when approved by the Owner/user
- C) Either while a vessel is depressurized or pressured
- D) Only when a vessel is under pressure or on-stream

Answer = C ... Ref: API 510, Para. 5.5.3.3 → On-Stream Inspection

119. External inspections are normally performed by:

- A) An inspector approved Examiner
- B) An inspector or an examiner
- C) A trained examiner
- D) An Inspector

Answer = D ... Ref: API 510, Para. 5.5.4.1.1 → External Inspection

120. When acceptable to the Inspector, who may conduct external inspections per API 510?

- A) Any Operations personnel who are acceptable to the Inspector
- B) Other personnel qualified with the appropriate training
- C) Any examiner approved by the owner/user
- D) None of these is correct

Answer = B ... Ref: API 510, Para. 5.5.4.1.1 → External Inspection

API 510 Code (16 Closed Book Topics) → Topic # 2

121. Which of these is not part of an external inspection?

- A) Associated structure, allowance for expansion, and general vessel alignment on its supports
- B) Condition of the outside surface of the vessel and the insulation and coating systems
- C) Leakage, hot spots and evidence of vibration
- D) Thickness measurement checks

Answer = D ... Ref: API 510, Para. 5.5.4.1.1 → External Inspection

122. During the external inspection, particular attention should be given to:

- A) Welded attachments such as reinforcement plates & clips checking for cracks or defects
- B) Associated structure, allowance for expansion & general vessel alignment on supports
- C) The outside surface of the vessel and the insulation and coating systems
- D) Leakage, hot spots and evidence of vibration

Answer = A ... Ref: API 510, Para. 5.5.4.1.2 → External Inspection

123. During External inspection, vessels shall be examined for visual indications (evidence) of:

- A) Bulging, out-of-roundness, sagging, and distortion
- B) Foundation settlement, out-of-roundness and distortion
- C) Foundation settlement, Bulging and distortion and leakage
- D) Foundation settlement, out-of-roundness, Bulging and distortion

Answer = A ... Ref: API 510, Para. 5.5.4.1.3 → External Inspection

124. If any distortion of a vessel is suspected or observed, overall vessel dimensions shall be:

- A) Checked and recorded in the Inspection Plan
- B) Checked to determine extent of distortion
- C) Checked and evaluated by Engineering
- D) None of these is correct

Answer = B ... Ref: API 510, Para. 5.5.4.1.3 → External Inspection

125. What API document provides more information on external pressure vessel inspection and should be used when performing an API 510 external pressure vessel inspection?

- A) API 510
- B) API 571
- C) API 572
- D) API 571 and API 572

Answer = C ... Ref: API 510, Para. 5.5.4.1.3 → External Inspection

API 510 Code (16 Closed Book Topics) → Topic # 2

126. Any personnel who observe vessel deterioration should report the condition to the:

- A) Owner/User representative
- B) Engineer
- C) Repair or Maintenance Organization
- D) Inspector

Answer = D ... Ref: API 510, Para. 5.5.4.1.3 → External Inspection

127. Buried vessels shall be inspected to determine external surface condition & inspection intervals shall be based on corrosion rate info obtained from any of these (methods) EXCEPT:

- A) During maintenance activity on any connecting piping that is attached to the buried vessel
- B) From the interval examination of similarly buried corrosion test coupons of like material
- C) From representative (random areas chosen by Inspection) portions of the actual vessel
- D) From a vessel in similar circumstances (having similar buried conditions, i.e., soil conditions)

Ans = A ... Ref: API 510, Par. 5.5.4.2 → Ext Insp of Buried Vessel → Must be similar type piping

128. Thickness measurement data taken from pressure vessels is used to:

- A) Determine the minimum remaining corrosion allowance of the vessel.
- B) Determine the minimum thickness remaining at vessel components.
- C) Determine the corrosion rates and remaining life of the vessel.
- D) None of these is correct

Answer = C ... Ref: API 510, Par. 5.5.5.1 → Thickness Inspection

129. Thickness measurements shall be obtained by the:

- A) Examiner
- B) Inspector
- C) Inspector or examiner
- D) Anyone authorized by the Inspector

Answer = C ... Ref: API 510, Par. 5.5.5.1 → Thickness Inspection

130. Which of these statements are true regarding Thickness measurements per API 510?

- A) Measurements to be obtained are required while the pressure vessel is on-stream
- B) Measurements to be obtained are required while the pressure vessel is not on-stream
- C) On-stream monitoring is not a good tool for monitoring corrosion
- D) On-stream monitoring is a good tool to assess potential damage due to process changes

Answer = D ... Ref: API 510, Par. 5.5.5.2 → Thickness Inspection

API 510 Code (16 Closed Book Topics) → Topic # 2

131. Regarding Thickness Measurement Inspection, When short term corrosion rates change significantly from the previous identified rate, who must the Inspector notify?

- A) No one, because the Inspector is responsible for determining the corrosion rate
- B) Owner/User representative responsible for Operations
- C) Pressure Vessel Engineer responsible for Operations
- D) None of these is correct

Answer = D ... Ref: API 510, Par. 5.5.5.3 → Thickness Insp → Answer = Corrosion Specialist

132. The inspector should consult with a corrosion specialist when the short term corrosion rate changes significantly from the previous identified rate (for what reason)?

- A) To support his requests for additional thickness readings
- B) To identify additional suspect locations where UT scans might be performed
- C) To determine the cause for the significant change in the corrosion rate
- D) To improve the corrosion and process monitoring of the vessel

Answer = C ... Ref: API 510, Par. 5.5.5.3 → Thickness Inspection

133. Regarding thickness measurement inspection, an appropriate response to accelerated corrosion rates may include any of the following EXCEPT:

- A) Additional thickness readings
- B) UT scans in any random areas
- C) Corrosion/process monitoring
- D) Revision to a vessel's inspection plan

Answer = B ... Ref: API 510, Par. 5.5.5.3 → Thickness Insp → UT scans in suspect areas

134. Which of the following statements is true regarding the training and qualification requirements in API 510 for personnel taking thickness measurement readings (UTT exams)?

- A) They only need to be trained & qualified by their employers before performing any exams
- B) They need to be trained & qualified enough to demonstrate their proficiency to the Inspector
- C) They only need to be trained & qualified as per the applicable procedure used during exams
- D) None of these is correct per API 510

Answer = C ... Ref: API 510, Par. 5.5.5.4 → Thickness Insp

135. Who is responsible to assure that all individuals taking thickness readings are trained and qualified in accordance with the applicable procedure to be used during examinations?

- A) Owner/User
- B) Inspector
- C) Authorized Inspection Agency
- D) Examiner's employer

Answer = A ... Ref: API 510, Par. 5.5.5.4 → Thickness Insp → Owner User ... again!

API 510 Code (16 Closed Book Topics) → Topics # 2 & # 7

Thickness Measurement Methods (API 510 Section 5.7.2)

136. Regarding corrosion & thickness determination, which of these statements are TRUE?

- A) Metal loss is always generally smooth and uniform, and may be difficult to detect visually, so thickness measurements may be necessary to determine the extent of the corrosion
- B) Metal loss may be irregular (pitted) or generally uniform and not difficult to detect visually, so thickness measurements may be necessary to determine the extent of the corrosion
- C) Pitted surfaces may actually be thinner than they appear during visual exams & when there is uncertainty about the original surface location, thickness determinations may be necessary
- D) If no uncertainty exists for an original surface location in pitted areas, take thickness readings

Ans = C ... Ref: API 510, Par. 5.7.2.1 → Thickness Meas. Meth! → If uncertainty exists → UTT

137. Which of these is not suitable to determine minimum remaining vessel part thickness?

- A) If other measurement methods produce considerable uncertainty, use UT A, B, or C-scans
- B) Gauging from corroded surfaces within a vessel if such surfaces are near a corroded area
- C) Ultrasonic thickness measuring instruments (possibly requiring insulation removal)
- D) Profile radiographic examinations (not requiring insulation removal)

Ans = B ... Ref: 510, Par. 5.7.2.1.a/b/c → Thickness Meas Meth → Gauging from uncorroded ...

138. Proper repair of insulation and insulation weather coating following ultrasonic readings at CMLs is recommended to reduce the potential for:

- | | |
|-------------|--------------------|
| A) CUI | B) Coating Failure |
| C) Cracking | D) Chloride SCC |

Answer = A ... Ref: API 510, Par. 5.7.2.1.c → Thickness Measurement Methods!

139. What thickness measurement techniques are preferred where corrosion is localized or the remaining thickness is approaching the required thickness.

- | | |
|-------------------------------------|------------------------------|
| A) Ultrasonic scanning only | B) Radiographic profile only |
| C) Either UT scanning or RT profile | D) None of these are correct |

Answer = C ... Ref: API 510, Par. 5.7.2.2 → Thickness Measurement Methods!

140. Above what temperature must UT readings be corrected due to high temp effects?

- | | | | |
|-----------------|-----------------|------------------|------------------------------|
| A) 100°F (38°C) | B) 150°F (65°C) | C) 212°F (100°C) | D) None of these are correct |
|-----------------|-----------------|------------------|------------------------------|

Answer = B ... Ref: API 510, Par. 5.7.2.3 → Thickness Measurement Methods!

API 510 Code (16 Closed Book Topics) → Topics # 2 & # 7

Thickness Measurement Methods (API 510 Section 5.7.2) ... we jump ahead!

141. Factors that can contribute to reduced accuracy of ultrasonic measurements include all of the following EXCEPT:

- A) Improper instrument calibration
- B) External coatings or scale
- C) Excessive surface roughness
- D) Excessive “rocking” of the probe on flat surfaces

Ans = D ... Ref: API 510, Par. 5.7.2.4 → Thickness Meas. Methods → (On curved surfaces)

142. Factors that can contribute to reduced accuracy of ultrasonic measurements include all of the following EXCEPT:

- A) Doubling of the thickness response on thicker materials
- B) Subsurface material flaws, such as laminations
- C) Temperature effects at temperatures above 150°F (65°C)
- D) Small flaw detector screens

Ans = A ... Ref: API 510, Par. 5.7.2.4 → Thickness Meas. Methods → (On thinner materials)

143. Factors that can contribute to reduced accuracy of ultrasonic measurements include all of the following EXCEPT:

- A) Excessive surface roughness
- B) Excessive “rocking” of the probe on curved surfaces
- C) Doubling of the thickness response on thinner materials
- D) Temperature effects at temperatures above 210°F (99°C)

Answer = D ... Ref: API 510, Par. 5.7.2.4 → Thickness Measurement Methods → 150°F (65°C)

144. Due to the effects of doubling, where UT readings are doubled on very thin components, what method(s) best determine thickness (nearing the minimum required) for NPS 1 nozzle?

- A) Ultrasonic scanning techniques only using an A-scan display
- B) Radiographic profile techniques only
- C) Either UT scanning (A-scan) or RT profile techniques
- D) Eddy Current Techniques

Answer = C ... Ref: API 510, Par. 5.7.2.2 → Thickness Measurement Methods!

145. What type of ultrasonic display is best used on a corroded surface (reflecting surfaces are pitted) and where digital meter (D-Meter) results produced considerable uncertainty?

- A) A-scan
- B) B-scan
- C) C-scan
- D) D-scan

Ans = A ... Ref: 510, Par. 5.7.2.1.a & ASME V Article 23, SE-797, Para. 8.8 → Thick Meas!

API 510 Code (16 Closed Book Topics) → Topic # 2

146. Regarding CUI Inspection of externally-insulated vessels, the susceptible temperature range for Carbon & Low Alloy steels refers to which of these operational temperature ranges?

- A) 10°F (−12°C) to 350°F (175°C)
- B) 10°F (−12°C) to 400°F (205°C)
- C) 50°F (10°C) to 350°F (175°C)
- D) 50°F (10°C) to 400°F (205°C)

Answer = A ... Ref: API 510, Par. 5.5.6.1.a/b → CUI Inspection!

147. Regarding CUI Inspection of externally-insulated vessels, the susceptible temperature range for Austenitic Stainless Steel refers to which of these operational temperature ranges?

- A) 10°F (−12°C) to 350°F (175°C)
- B) 10°F (−12°C) to 400°F (205°C)
- C) 50°F (10°C) to 350°F (175°C)
- D) 140°F (60°C) to 400°F (205°C)

Answer = D ... Ref: API 510, Par. 5.5.6.1.a/b → CUI Inspection!

148. Regarding CUI Inspection of externally-insulated vessels, the susceptible temperature range includes the susceptible operating temperature range based on the material and which other of these following factors per API 510?

- A) There is no other factor, and it's all based on Operating temperature ranges only
- B) The other factor is the type of insulation that is applied to the pressure vessel
- C) The other factor is the continuity of the service (all intermittent services are susceptible)
- D) The other factor is ambient temperature of the location of the pressure vessel

Answer = C ... Ref: API 510, Par. 5.5.6.1 → CUI Inspection!

149. With carbon and low alloy steels, CUI usually causes:

- A) General corrosion
- B) Localized corrosion
- C) Stress corrosion Cracking
- D) None of these is correct

Answer = B ... Ref: API 510, Par. 5.5.6.2 → CUI Inspection!

150. With austenitic stainless steel materials, CUI usually is evident as:

- A) General corrosion
- B) Localized corrosion
- C) Stress corrosion Cracking
- D) None of these is correct

Answer = C ... Ref: API 510, Par. 5.5.6.2 → CUI Inspection!

API 510 Code (16 Closed Book Topics) → Topic # 2

151. When developing the inspection plan for CUI inspection, inspectors should consider:

- A) Areas that are the most susceptible to CUI
- B) Areas that might be susceptible to CUI
- C) Areas listed in the API 572 checklists
- D) None of these is correct per API 510

Answer = A ... Ref: API 510, Par. 5.5.6.2 → CUI Inspection!

152. Areas most susceptible to CUI on vessels include all of the following EXCEPT:

- A) Insulation penetrations (Nozzles, ladder clips, pipe supports) that can allow moisture ingress
- B) Areas showing evidence of damaged insulation or caulking (sealant) failure
- C) Top and bottom heads and other areas that tend to trap and hold water or moisture
- D) Insulation rings or stiffening rings having designs where water or moisture cannot collect

Answer = D ... Ref: API 510, Par. 5.5.6.2 → CUI Inspection!

153. If CUI damage is found in an area that is considered among the most susceptible on a vessel, the inspector should:

- A) Inspect 100% of all susceptible areas on the vessel after removal of all insulation necessary
- B) Consult the Corrosion Engineer prior to any significant removal of the vessel's insulation
- C) Inspect other susceptible areas on the vessel
- D) None of these is correct

Answer = C ... Ref: API 510, Par. 5.5.6.2 → CUI Inspection!

154. CUI inspection may require removal of some or all insulation. If external coverings are in good condition and there is no reason to suspect damage behind them, what should be done?

- A) Only a small sampling should be removed to verify that no damage exists
- B) It is not necessary to remove any insulation for the inspection of the vessel
- C) The portion to be removed as given in the inspection plan must be removed
- D) The portion to be removed as given in the inspection plan may or may not be removed depending upon the Inspector's judgment

Answer = B ... Ref: API 510, Par. 5.5.6.3 → CUI Inspection!

155. Considerations for insulation removal may include all of these EXCEPT:

- A) History of CUI for a vessel or comparable equipment (Incl. Condition/age of external coating)
- B) Visual condition of external covering and insulation and evidence of fluid leakage or stains
- C) Equipment that does not see full time operation (equipment in intermittent service)
- D) Equipment that sees full time operation below the susceptible temperature range

Answer = D ... Ref: API 510, Par. 5.5.6.3 → CUI Inspection!

API 510 Code (16 Closed Book Topics) → Topic # 2

156. In lieu of insulation removal for a vessel, what alternative is given in API 510?

- A) Inspector may use similar service results from another similar vessel at owner/user's location
- B) Shell thickness measurements taken internally (during int. insp.) at typical CUI problem areas
- C) Use of special "removable & replaceable" type insulation is a preferred method of the code
- D) None of these is correct per API 510

Answer = B ... Ref: API 510, Par. 5.5.6.3 → CUI Inspection!

API 510 Code (16 Closed Book Topics) → Topics # 2 & # 7

157. CML is an abbreviation for:

- A) Condition monitoring location
- B) Corrosion monitoring location
- C) Corrosion measurement location
- D) Condition measurement location

Answer = A ... Ref: API 510, Par. 5.6.1 & Def: 3.9 → Condition Monitoring Locations (CMLs)

158. Condition monitoring locations (CMLs) are designated areas on pressure vessels where periodic examinations are conducted (for what primary purpose):

- A) Monitor the presence of damage
- B) Monitor the presence and rate of damage
- C) Monitor the remaining vessel wall thickness
- D) Monitor the vessel's coating system condition

Answer = B ... Ref: API 510, Par. 5.6.1 → CMLs

159. Which of the following factors (or combination of factors) shall be considered regarding the type of CMLs selected and the placement of the CMLs on a given pressure vessel?

- A) Potential for both localized and general corrosion
- B) Potential for general corrosion & service-specific damage modes of deterioration & failure
- C) Potential for localized corrosion & service-specific damage modes of deterioration & failure
- D) None of these is correct

Answer = C ... Ref: API 510, Par. 5.6.1 → CMLs

160. Examples of CMLs may include all of the following locations EXCEPT:

- A) Locations for thickness measurement
- B) Locations for stress cracking exams
- C) Locations for high temp hydrogen attack exams
- D) Locations for insulation system checks

Answer = D ... Ref: API 510, Par. 5.6.1 → CMLs

API 510 Code (16 Closed Book Topics) → Topics # 2 & # 7

161. Per API 510, each pressure vessel shall be monitored by performing how many exams at CMLs and for what purpose?

- A) Representative number on each vessel component to meet requirements for external insp.
- B) Minimal number for each vessel component based only upon the approved Inspection Plan
- C) Minimal number for each vessel component based on Corrosion Specialist Recommendation
- D) Representative number for each vessel component to satisfy the requirements for internal or On-stream inspection

Answer = D ... Ref: API 510, Par. 5.6.2.1 → CMLs

162. Exam results at CMLs determine the limiting component of a vessel (by what means)?

- A) Results help to identify Corrosion rates, remaining life and set the next inspection intervals
- B) Results help to identify damage mechanisms that may shorten the life of the pressure vessel
- C) Results help to identify improvements and revisions needed to the Vessel's inspection plans
- D) None of these is correct

Answer = A ... Ref: API 510, Par. 5.6.2.1 → CMLs

163. All of the following types of pressure vessels will normally have more CMLs and will also be monitored more frequently EXCEPT for:

- A) Pressure vessels with high potential consequences if a failure should occur
- B) Pressure vessels that are subjected to higher corrosion rates
- C) Pressure vessels that are subjected to general corrosion
- D) Pressure vessels subject to high rates of damage from code recognized damage mechanisms

Answer = C ... Ref: API 510, Par. 5.6.2.2 → CMLs

164. What data shall be used from CMLs (examination points) to calculate corrosion rates?

- A) The thinnest reading is taken and used for a given examination point always (this is t min)
- B) An average of several measurement readings taken within an area of an examination point
- C) Lesser of thinnest reading OR average of several readings taken within an examination point
- D) Thinnest reading OR average of several readings taken within area of an examination point

Answer = D ... Ref: API 510, Par. 5.6.2.4 → CMLs

165. CMLs and examination points should be permanently recorded (marked on inspection drawings and equipment) in order to achieve which of the following results?

- A) To allow repetitive measurements at CMLs to effectively determine vessel remaining life
- B) To allow repetitive measurements at CMLs improving accuracy of calculated damage rates
- C) To allow repetitive measurements at CMLs allowing the identification of damage
- D) None of these is correct

Answer = B ... Ref: API 510, Par. 5.6.2.5 → CMLs

API 510 Code (16 Closed Book Topics) → Topics # 2 & # 7

166. A decision on the type, number, and location of the CMLs should consider all of the following EXCEPT:

- A) Potential consequence of loss of containment
- B) Locations of similar vessel failures and leaks
- C) Expected Patterns of corrosion and damage
- D) Results for previous inspections

Answer = B ... Ref: API 510, Par. 5.6.3.1 → CMLs

167. A minimal number of CMLs are acceptable when:

- A) Established corrosion rates are low and corrosion is not localized.
- B) Corrosion rates are low (any time) and corrosion is not localized
- C) Established corrosion rates are low
- D) Corrosion rates are low (any time)

Answer = A ... Ref: API 510, Par. 5.6.3.1 → CMLs

168. For pressure vessels susceptible to localized corrosion, who should be consulted about the appropriate placement and number of CMLs.

- A) The owner/user using similar service methods or published data
- B) The inspector determines this based on his experience
- C) The engineer using published data and procedures
- D) None of these is correct

Answer = D ... Ref: API 510, Par. 5.6.3.1 → CMLs → The Corrosion Specialist → Tricky 😊

169. CMLs may be eliminated or the number significantly reduced when all of the following conditions exist EXCEPT:

- A) Corrosion specialist was consulted and concurs with the reduction or elimination of CMLs
- B) Probability of failure is low due to the service (such as a clean noncorrosive hydrocarbon)
- C) Consequence of failure is high
- D) None of these is correct

Answer = C ... Ref: API 510, Par. 5.6.3.2 → CMLs → The consequence of failure = LOW

170. In circumstances where CMLs will be substantially reduced or eliminated, WHO should be consulted?

- A) Owner/user
- B) Inspector
- C) Engineer
- D) None of these

Answer = D ... Ref: API 510, Par. 5.6.3.2 → CMLs → The Corrosion Specialist → Tricky 😊

API 510 Code (16 Closed Book Topics) → Topics # 2 & # 7

171. When selecting an examination technique to use during an inspection, the possible types of damage for that vessel should be considered. The Inspector should consult with whom to help define the type of damage, the NDE technique and extent of examination

- A) The Inspector should not need to consult with anyone and can call for any NDE on his own
- B) The Inspector should consult with the Examiner's employer or Level III NDE specialist
- C) The Inspector should consult with the Corrosion Specialist or the Engineer
- D) The inspector should consult with the Corrosion Specialist only

Answer = C ... Ref: API 510, Par. 5.7.1 → Condition Monitoring Methods

172. Which of these exam techniques should NEVER be selected if cracks extending to the surface of a Carbon Steel Vessel must be detected?

- A) Magnetic particle examination or Fluorescent/Dye-penetrant examination
- B) Radiographic examination or Ultrasonic flaw detection (shear wave, etc) examination
- C) Alternating current flux leakage examination (ACFM) or Eddy current examination
- D) Pressure Testing or Field metallographic replication or Acoustic emission examinations

Answer = D ... Ref: API 510, Par. 5.7.1.1 → Condition Monitoring Methods Read API 577 well and have a basic understanding of all NDE methods ... Know which to recommend on vessels!

173. What type of examiner shall owner/user specify when it requires detection & thru-wall sizing of interior surface (ID) breaking flaws when inspecting from external surface (OD)?

- A) Any certified Magnetic particle or Fluorescent/Dye-penetrant examiner
- B) Any certified Radiographic examiner
- C) Any certified Ultrasonic flaw detection examiner
- D) None of these

Ans = D ... Ref: Par. 5.7.1.2 → Cond Monit. Methods → Industry Qualified Shearwave Examiner

174. Which of the following is an application example for the use of an Industry-qualified UT Shear Wave Examiner?

- A) Monitoring known interior flaws from the external surface (determining any crack growth)
- B) Resolving conflicts related to fitness for service evaluations
- C) Collecting data for Risk-based Inspection assessments
- D) None of these is correct

Answer = A ... Ref: API 510, Par. 5.7.1.2 → Condition Monitoring Methods

175. Which of the following is an application example for the use of an Industry-qualified UT Shear Wave Examiner?

- A) Monitoring known interior flaws from the external surface (determining any crack growth)
- B) Collecting data for Fitness for Service Evaluations
- C) Collecting data for Risk-based Inspection assessments
- D) None of these is correct

Answer = B ... Ref: API 510, Par. 5.7.1.2 → Condition Monitoring Methods

API 510 Code (16 Closed Book Topics) → Topics # 2 & # 16

176. Pressure tests are normally required after:

- A) Any types of repairs are completed
- B) All permanent repairs are completed
- C) After an alteration is completed
- D) After major repairs are completed

Answer: C ... (API 510, Para. 5.8.1.1) → Pressure Testing Requirements

177. After repairs are completed, a pressure test SHALL be applied IF:

- A) Inspector believes one is necessary
- B) Engineer believes one is necessary
- C) A repair of a vessel resulted in crack removal
- D) A vessel section has a new nozzle added

Answer: A ... (API 510, Para. 5.8.1.1) → Pressure Testing Requirements

178. When a code hydrostatic pressure test is required, the minimum test pressure should be in accordance with the rules of (which code):

- A) ASME Code of Construction applicable at the time of the pressure test
- B) The rating code or construction code used to determine MAWP
- C) The inspection code (API 510)
- D) None of these is correct

Answer: B ... (API 510, Para. 5.8.2.1) → Pressure Testing Requirements

179. If vessel stamp shows a 1997 construction date, and the vessel has not been rerated, then what is the minimum test pressure to be applied to satisfy API 510 code requirements?

- A) Test Pressure in psi = $1.3 \text{ MAWP} \times (S \text{ test temp} / S \text{ design temp})$
- B) Test Pressure in psi = $1.4 \text{ MAWP} \times (S \text{ test temp} / S \text{ design temp})$
- C) Test Pressure in psi = $1.5 \text{ MAWP} \times (S \text{ test temp} / S \text{ design temp})$
- D) The test pressure is left to the discretion of the Inspector

Answer: C ... (API 510, Para. 5.8.2.1) → Pressure Testing Requirements

180. After repairs are completed, a pressure test is to be applied. Vessel stamp construction date = 1997 and the vessel was rerated in 2011. Given: Vessel MAWP = 1,000 psi (2011) and the $S_{\text{test temp}}/S_{\text{design temp}}$ ratio = 1.1. What test pressure is to be applied to meet code?

- A) Test Pressure in psi = $1.5 \times 1000 \times 1.1 = 1650 \text{ psi}$
- B) Test Pressure in psi = $1.3 \times 1000 \times 1.1 = 1430 \text{ psi}$
- C) Test Pressure in psi = $1.4 \times 1000 \times 1.1 = 1540 \text{ psi}$
- D) Either A or B may be used, and it's up to the discretion of the Inspector

Answer: B ... (API 510, Para. 5.8.2.1) → Pressure Testing Requirements

API 510 Code (16 Closed Book Topics) → Topics # 2 & # 16

181. What API 510 temperature correction factor must be used to determine test pressure?

- A) S value at test temp $\div$ S value at design temp = correct factor = always greater than 1.0
- B) S value at design temp $\div$ S value at test temp = correct factor = always greater than 1.0
- C) S value at test temp $\div$ S value at design temp = correct factor = always at least 1.0
- D) S value at design temp $\div$ S value at test temp = correct factor = always at least 1.0

Answer: C ... (API 510, Para. 5.8.2.1) → Pressure Testing Requirements

182. What is the minimum test pressure for vessels that have been rerated using the design allowable stress published in the 1999 addendum or later of ASME Section VIII, Division I, as per Code Case 2290 or Code Case 2278?

- A) 130% of MAWP & corrected for temperature
- B) Always only at 130% of MAWP
- C) 150% of MAWP & corrected for temperature
- D) Always only at 150% of MAWP

Answer: A ... (API 510, Para. 5.8.2.1) → Pressure Testing Requirements

183. If vessel stamp shows a 2007 construction date, and the vessel has not been rerated, then what is the minimum test pressure to be applied to satisfy API 510 code requirements?

- A) The test pressure is left to the discretion of the Inspector
- B) Test Pressure in psi = $1.3 \text{ MAWP} \times (S_{\text{test temp}} / S_{\text{design temp}})$
- C) Test Pressure in psi = $1.4 \text{ MAWP} \times (S_{\text{test temp}} / S_{\text{design temp}})$
- D) Test Pressure in psi = $1.5 \text{ MAWP} \times (S_{\text{test temp}} / S_{\text{design temp}})$

Answer: B ... (API 510, Para. 5.8.2.1) → Pressure Testing Requirements

184. After major repairs in 2011 are completed, a pressure test is to be applied. Vessel stamp construction date = 1990 and vessel was never rerated. Given: Vessel MAWP = 100 psi and the $S_{\text{test temp}}/S_{\text{design temp}}$ ratio = 1.1. What test pressure is to be applied to meet code?

- A) The test pressure is left to the discretion of the Inspector
- B) Test Pressure in psi = $1.5 \times 100 \times 1.1 = 165$ psi
- C) Test Pressure in psi = $1.3 \times 100 \times 1.1 = 143$ psi
- D) Test Pressure in psi = $1.4 \times 100 \times 1.1 = 154$ psi

Answer: B ... (API 510, Para. 5.8.2.1) → Pressure Testing Requirements

185. When a non-code related pressure test is performed after repairs, the test pressure may be conducted at a pressure to be determined by:

- A) Owner/user
- B) Engineer
- C) Inspector
- D) API 510 code

Answer: A ... (API 510, Para. 5.8.2.2) → Pressure Testing Requirements

API 510 Code (16 Closed Book Topics) → Topics # 2 & # 16

186. Before applying a pressure test, appropriate precautions and procedures should be taken to assure the safety of personnel involved with a pressure test. Close visual inspection of pressure vessel components should not be performed until the vessel pressure is:

- A) At or below the MAWP
- A) At or below the MAOP
- C) Below the MAWP
- D) Below the MAOP

Answer: A ... (API 510, Para. 5.8.3.1) → Pressure Testing Requirements

187. When a pressure test is to be conducted and test pressure will exceed the set pressure of the existing pressure-relieving device(s), which of the following statements is NOT true regarding precautions to be taken prior to the pressure test?

- A) Pressure-relieving device(s) should be removed before the test is performed
- B) Test clamps used to hold down valve disks instead of removing pressure-relieving devices
- C) Applying additional load to the valve spring by turning the compression screw is allowed.
- D) Gauges incapable of withstanding the test pressure should be removed or blanked off.

Answer: C ... (API 510, Para. 5.8.3.2) → Pressure Testing Requirements → is Prohibited

188. Before applying a hydrostatic test to a vessel, what design items should be reviewed to assure that they are suitable for the hydrostatic load?

- A) Vessel supporting structure(s)
- B) Vessel supporting structure(s) and all of the Vessel appurtenances
- C) Vessel supporting structure(s) and the entire vessel's associated foundation
- D) Vessel supporting structure(s), associated foundation, and all appurtenances

Answer: C ... (API 510, Para. 5.8.4.1) → Pressure Testing Requirements → Tricky 😊

189. Hydrostatic pressure tests of equipment having components of Type 300 series stainless steel should be conducted with:

- A) Potable water or steam condensate
- B) Potable water or steam condensate having a chloride concentration of less than 50 ppm
- C) Potable water or steam condensate having a chloride concentration of less than 100 ppm
- D) Any fluid approved by Authorized Pressure Vessel Inspector & the owner/user's Engineer

Answer: B ... (API 510, Para. 5.8.4.2) → Pressure Testing Requirements

190. After the Hydrostatic pressure test of equipment having components of Type 300 series stainless steel, the vessel should be checked by the Inspector for all of the following EXCEPT:

- A) Inspector should verify that the vessel has been completely drained after the test
- B) Inspector should verify that the vessel has been completely dried after the test
- C) Inspector should verify a specified water quality (50 ppm chlorides) was used
- D) Inspector should verify that an approved lay-up procedure is then followed

Answer: D ... (API 510, Para. 5.8.4.2) → Pressure Testing Requirements

API 510 Code (16 Closed Book Topics) → Topics # 2 & # 16

191. Pneumatic testing (including combined hydro-pneumatic testing) may be used when hydrostatic testing is impracticable due to all of the following reasons EXCEPT:

- A) Costs associated with providing fresh water
- B) Limitations associated with supporting structures or foundation
- C) Desire to avoid or prevent water associated damage to refractory
- D) Other process reasons where water use would cause or have the potential to cause damage

Answer: A ... (API 510, Para. 5.8.5) → Pressure Testing Requirements

192. When pneumatic tests are used, the potential personnel and property risks of pneumatic testing (stored energy calculation) shall be considered by whom before the test:

- A) Inspector only
- B) Engineer only
- C) Inspector or Engineer
- D) Engineer & Owner/User Safety Organization

Answer: C ... (API 510, Para. 5.8.5) → Pressure Testing Requirements

193. As a minimum, per API 510, what inspection precautions shall be applied when performing any pneumatic test?

- A) Those precautions contained in the Owner/User Safety Organization's Procedures
- B) Those precautions contained in the ASME Code (ASME Boiler & Pressure Vessel Code)
- C) Those precautions contained in the API 510 Code (Covered in API 572 in detail)
- D) None of these are correct

Answer: B ... (API 510, Para. 5.8.5) → Pressure Testing Requirements

194. Which of these statements are NOT true regarding failures attributed to Brittle Fracture?

- A) Failures occur when equipment materials are exposed to temperatures that are below the transition temperature for a given material
- B) Failures occur when equipment is exposed to pressures greater than 20% of the required hydrostatic test pressure
- C) Most failures occur on the first application of a high stress level (first hydrotest or overload)
- D) Failures occur when testing low-alloy steels, especially 2-1/4 Cr-1Mo, because they may be prone to caustic embrittlement

Ans: D ... (510, Par. 5.8.5) → Pressure Testing → Brittle Fracture → Temper Embrittlement

195. What is the API 510 recommended minimum shell temperature to be maintained during a hydrostatic test assuming that a pressure vessel is exactly 2 inches thick?

- A) 30° F (17°C) above the material MDMT
- B) 30° F (17°C) above ambient metal temp
- C) 10° F (6°C) above the material MDMT
- D) 10° F (6°C) above ambient metal temp

Answer: C ... (API 510 Section/Para. 5.8.6.2 ... Be aware of 2 in & less rule = +10° F or +30° F)

Note: There is a conflict between ASME VIII, Div 1 Section UG-98 (30° F above MDMT for all)

API 510 Code (16 Closed Book Topics) → Topics # 2 & # 16

196. What is the API 510 recommended minimum metal temperature to be maintained during a hydrostatic test assuming that a pressure vessel is exactly 3 inches thick?

- A) 30°F (17°C) above the material MDMT
- B) 30°F (17°C) above ambient metal temp
- C) 10°F (6°C) above the material MDMT
- D) 10°F (6°C) above ambient metal temp

Answer: A ... (API 510, Para. 5.8.6.2 ... Brittle Fracture – Be aware of 2 in & less rule = +10° F)

Note: There is a conflict between ASME VIII, Div 1 Section UG-98 (30° F above MDMT for all)

197. What is API 510 recommended maximum metal temperature to be maintained during a hydrostatic test (assuming no other Brittle Fracture information indicates that a higher metal temperature is needed)?

- A) 30°F (17°C) above the material's MDMT
- B) 30°F (17°C) above ambient metal temp
- C) 120°F (50°C) is the maximum temperature
- D) There is no maximum limit in API 510

Answer: C ... (API 510 Section/Para. 5.8.6.2 ... Know the 120° F or 50°C rule!)

198. When a pressure test is not desired after a major repair or alteration, what must be done per API 510 rules to exempt the vessel from a pressure test?

- A) Tests are always required after major repairs or an alteration
- B) Tests may be waived ONLY if approved in writing by both owner/user and Engineer
- C) Tests may be waived ONLY if approved by both the Engineer and the Authorized Inspector
- D) Tests may be waived ONLY if proper NDE is done that is approved by an Engineer & Inspector

Answer: D ... (API 510 Section/Para. 5.8.7.1 ... Know the NDE in lieu of pressure test rules!)

199. Substituting NDE procedures for a pressure test after an alteration (taking a pressure test exemption) may be allowed by API 510 rules only after WHO approves the exemption?

- A) Owner user and Engineer (in writing)
- B) Engineer only (in writing)
- C) Engineer and Inspector
- D) None of these is correct

Answer: C ... (API 510 Section/Para. 5.8.7.1 ... Know the NDE in lieu of pressure test rules!)

200. Related to NDE in lieu of pressure testing, for cases where UT is substituted for radiographic inspection, the owner/user shall specify what type of examiners?

- A) Only a certified UT Shear wave examiner
- B) Only an industry-qualified UT shear wave examiner
- C) Any certified or qualified UT Shear Wave examiners
- D) UT may not be substituted for RT when RT is required by the code

Answer: B ... (API 510 Section/Para. 5.8.7.2 ... Know the NDE in lieu of pressure test rules!)

API 510 Code (16 Closed Book Topics) → Topic # 5

201. During repairs or alterations of pressure vessels, the inspector shall verify that all new materials (including carbon steel) are consistent with the specifications. At the discretion of owner/user or inspector, assessment can be done by all of the following methods EXCEPT:

- A) Using Optical fluorescence analyzers or x-ray spectrographic analyzers
- B) Using API 578 Positive Material Identification (PMI) Practices & Procedures
- C) Sampling a percentage of materials in critical situations
- D) 100% verification checks

Answer: A (API 510, Para. 5.9.1) ... Material Verification & Traceability

202. During repairs or alterations of pressure vessels, who shall verify that all new materials (including carbon steel) are consistent with the specifications?

- A) Owner/User
- B) PMI Examiner
- C) Inspector
- D) None of these

Answer: C (API 510, Para. 5.9.1) ... Material Verification & Traceability

203. Who shall determine the amount of material verification testing to be performed to verify that all new materials (including carbon steel) are consistent with the specifications?

- A) Owner/User only
- B) Owner/User or Engineer
- C) Engineer or Inspector
- D) Owner/User or Inspector

Answer: D (API 510, Para. 5.9.1) ... Material Verification & Traceability

204. Which API document provides guidance on Material Verification Requirements?

- A) API 577
- B) API 578
- C) API 579
- D) API 580

Answer: B (API 510, Para. 5.9.1) ... Material Verification & Traceability

205. If a pressure vessel component experiences accelerated corrosion or should fail because an incorrect material was inadvertently substituted for the specified material, inspector shall:

- A) Consider the need for further verification of existing materials
- B) Ensure that further verification of existing materials is performed
- C) Ensure that, as a minimum, a random sampling (verification) of existing materials is done
- D) Ensure that 100% verification of existing materials is performed

Answer: A (API 510, Para. 5.9.2) ... Material Verification & Traceability

API 510 Code (16 Closed Book Topics) → Topic # 5 & # 6

206. If a pressure vessel component experiences accelerated corrosion or should fail because an incorrect material was inadvertently substituted for the specified material, the extent of further verification will depend upon which of the following factors:

- A) Consequences of failure & probability of further material errors
- B) Consequences of failure & probability of failure
- C) Consequences of failure only
- D) Probability of failure only

Answer: A (API 510, Para. 5.9.2) ... Material Verification & Traceability → Topic # 5

207. Per API 510, inspection for weld quality is normally accomplished as a part of the requirements associated with all of the following EXCEPT:

- A) New construction of vessels (inspection is to assure that welds meet code of construction requirements just before they are placed into service)
- B) Reratings of Pressure vessels (weld inspection must be done & also meet API 510 rules)
- C) Repairs of welds on pressure vessels (weld inspection must be done & meet API 510 rules)
- D) Alterations of Pressure vessels (weld inspection must be done & also meet API 510 rules)

Ans: B (API 510, Par. 5.10.1) ... Insp of In-service welds → Weld insp not done with reratings

208. During in-service inspections of welds, the welds and weld heat-affected zones are often inspected for:

- A) Corrosion related damage only
- B) Service-induced cracking mechanisms only
- C) Corrosion related damage and/or service-induced cracking mechanisms
- D) Corrosion damage, service-induced cracking mechanisms, and metallurgical changes

Answer: C (API 510, Para. 5.10.1) ... Inspection of In-service welds & joints → Topic # 6

209. When preferential weld corrosion or cracking is noted by Inspection during inspection of in-service welds, what should be done relative to inspection of other welds in the vessel?

- A) Nothing additional, just report corrosion & cracking & have any necessary repairs performed
- B) Ensure that additional welds of the pressure vessel are also examined & repaired as needed
- C) Ensure that 100% of welds of the pressure vessel are also examined & repaired as needed
- D) None of these is correct per API 510

Answer: B (API 510, Para. 5.10.1) ... Inspection of In-service welds and joints → Topic # 6

210. Per API 510, which API document provides guidance on Weld Inspection?

- A) API 577
- B) API 578
- C) API 579
- D) API 580

Ans: A (510, 5.10.1) ... Insp of In-service welds/joints → Topic # 6 → Para. 8.1.6/& 577, 11.2

API 510 Code (16 Closed Book Topics) → Topics # 6 & # 2

211. If crack-like flaws are detected (using UT or RT techniques) while the pressure vessel is in operation, which of the following statements is NOT true per API 510?

- A) Further inspection may be used to assess the magnitude of the flaw
- B) Additional effort should be made to determine if flaws are from original welding
- C) Additional effort should be made to determine if flaws are caused by environmental cracking
- D) Any flaws and environmental cracking shall be assessed by the Inspector

Answer: D (API 510, Para. 5.10.2 & 5.10.3) ... Inspection of In-service welds & joints → Topic 6

212. Crack-like flaws and environmental cracking shall be assessed by the:

- A) Engineer in accordance with API 578 and/or the corrosion specialist
- B) Engineer in accordance with API 579 and/or the corrosion specialist
- C) Engineer in accordance with API 580 and/or the corrosion specialist
- D) None of these is correct, since Inspector shall also assess these results

Answer: B (API 510, Para. 5.10.2 & 5.10.3) ... Inspection of In-service welds & joints → Topic 6

213. Preferential weld corrosion shall be assessed by the:

- | | |
|--------------|-------------------------|
| A) Engineer | B) Corrosion Specialist |
| C) Inspector | D) Examiner |

Answer: C (API 510, Para. 5.10.3) ... Inspection of In-service welds and joints → Topic 6

214. Flanged joints and fasteners in caustic service should be examined for:

- A) Evidence of leakage, corrosion or environmental cracking
- B) Evidence of leakage and distortion from stress concentrations
- C) Evidence of leakage including deposits
- D) None of these is correct

Answer: A (API 510, Para. 5.11.1) ... Inspection of Flanged Joints → Topic 2

215. Accessible flange faces should be examined for distortion and to determine the:

- A) Condition of fasteners
- B) Condition of existing gaskets
- C) Condition of flange facing coatings
- D) Condition of gasket-seating surfaces

Answer: D (API 510, Para. 5.11.2) ... Inspection of Flanged Joints → Topic 2

API 510 Code (16 Closed Book Topics) → Topic # 2

216. If flanges are excessively bent or distorted, their markings and thicknesses should be:

- A) Recorded so that the correct materials can be used in the replacement
- B) Recorded and measured so that the correct materials can be used in the replacement
- C) Recorded and checked against engineering requirements before taking corrective action
- D) None of these is correct

Answer: C (API 510, Para. 5.11.2) ... Inspection of Flanged Joints → Topic 2

217. Flange fasteners should be examined for thread engagement and are considered to be acceptably engaged per API 510 rules if engagement is:

- A) Minus one, with lack of full engagement not more than one thread
- B) Zero, because the end of the fastener must be flush with the end of the nut
- C) Plus one, with at least one visible thread past the end of the nut
- D) None of these is correct

Answer: A (API 510, Para. 5.11.3) ... Inspection of Flanged Joints → Topic 2

218. The markings on a representative sample of newly installed fasteners and gaskets should be examined to determine:

- A) Whether the engagement and orientation is correct after tensioning
- B) Whether they meet the correct material specifications for the design
- C) Whether they have markings that are identifiable to applicable ASME and ASTM standards
- D) Whether they were really renewed instead of using the old materials requiring replacement

Answer: B (API 510, Para. 5.11.4) ... Inspection of Flanged Joints → Topic 2

219. Fastener markings should be identified by the applicable ASME and ASTM standards. Questionable fasteners should be:

- A) Renewed if the Inspector cannot find material certification records
- B) Renewed always without exception needing no verification testing
- C) Verified (to be the correct specification) or deemed traceable to reports
- D) Verified (to be the correct specification) or renewed

Answer: D (API 510, Para. 5.11.4) ... Inspection of Flanged Joints → Topic 2

220. Additional guidance on the inspection of flanged joints can be found in:

- A) ASME B16.5
- B) ASME B16.20
- C) ASME PCC-1
- D) ASME PCC-2

Answer: C (API 510, Para. 5.11.5) ... Inspection of Flanged Joints → Topic 2

API 510 Code (16 Closed Book Topics) → Topics # 10 & 2 (again)

221. To ensure vessel integrity, all pressure vessels and pressure-relieving devices shall be inspected at the intervals and frequencies provided in API 510 (what section)?

- A) API 510 Section 5
- B) API 510 Section 6
- C) API 510 Section 7
- D) API 510 Section 8

Answer: B (API 510, Para. 6.1.1) ... Inspection Interval General Rules → Topic 10

222. The appropriate inspection (External, Internal, etc) must provide information necessary to determine that all of the essential sections or components of the equipment are:

- A) Acceptable at the time of the inspection & in serviceable condition with adequate thickness
- B) Acceptable at the time of the inspection & may be serviceable for the inspection interval
- C) Acceptable at the time of the inspection & in serviceable condition only
- D) Safe to operate until the next scheduled inspection.

Answer: D (API 510, Para. 6.1.2) ... Inspection Interval General Rules → Topic 10

223. When an internal inspection is being planned, what common risk associated with operational shutdown and start-up that SHOULD always be evaluated?

- A) Possibility of increased corrosion from vessel surface exposure to solidified process deposits
- B) Possibility of increased oxidation due to exposure of vessel surfaces to air and moisture
- C) Possibility of increased corrosion due to exposure of vessel surfaces to air and moisture
- D) Possibility of conditions that may lead to an event causing Brittle Fracture

Answer: C (API 510, Para. 6.1.2) ... Inspection Interval General Rules → Topic 10

224. Per API 510, which of these statements is true regarding Vessel Installation Inspection?

- A) Pressure vessels shall be inspected by inspector at time of installation
- B) Pressure vessels should be inspected by inspector at time of installation
- C) Pressure vessels shall be inspected by inspector or other personnel at time of installation
- D) Pressure vessels should be inspected by inspector or other personnel at time of installation

Answer: A (API 510, Para. 6.2.1) ... Vessel Installation Inspection Rules → Topics 10 & 2

225. The purpose(s) of a Vessel Installation Inspection is to verify:

- A) Equipment is in good condition at the time of the inspection
- B) Equipment is in good condition and could operate until the next scheduled inspection
- C) Equipment is safe for operation based upon baseline thickness results for the equipment
- D) Equipment is safe for operation, and to initiate plant inspection records for the equipment

Answer: D (API 510, Para. 6.2.1) ... Vessel Installation Inspection Rules → Topics 10 & 2

API 510 Code (16 Closed Book Topics) → Topics # 10 & 2 (again)

226. The minimum Installation Inspection should include all of the following EXCEPT:

- A) Verify nameplate information is copied (or photographed) & placed into Equipment records
- B) Verify equipment is installed correctly, supports are adequate & secured, exterior equipment (ladders, etc) are secured, insulation is properly installed & connections are properly assembled
- C) Verify interior surfaces (including all nozzles and low points) of the vessel are clean and dry
- D) Verify pressure-relieving devices are correct per design with correct set pressure as installed

Ans: A (510, Par. 6.2.1) Vessel Install Insp → Topic 10 & 2 → Verify info against Mfg Data Sht

227. The minimum Installation Inspection should include all of the following EXCEPT:

- A) Verify equipment is installed correctly on foundations & all supports are adequate & secured
- B) Verify exterior equipment (ladders, etc) are secured & insulation system is properly installed
- C) Verify piping connections in the associated piping system are properly assembled
- D) Verify interior surfaces are clean & dry and pressure-relieving devices are correct per design

Ans: C (510, Par. 6.2.1) Vessel Install Insp → Topic 10 & 2 → Only connections to the vessel

228. Installation Inspections provide an opportunity for all of the following actions EXCEPT:

- A) Collect desired base line information on the pressure vessel to be used in future inspections
- B) Collect the initial thickness readings on the pressure vessel at any randomly selected TMLs
- C) Designate areas of the vessel's components for Condition Monitoring Locations (CMLs)
- D) Collect desired base line information & obtain initial thickness readings at designated CMLs

Answer: B (API 510, Para. 6.2.1) ... Vessel Installation Inspection Rules → Topics 10 & 2

229. Internal field inspection of new vessels (upon installation) is not required provided (IF):

- A) Inspector believes one is not necessary
- B) Engineer believes one is not necessary
- C) Owner/user believes one is not necessary
- D) None of these is correct

Ans: D ☺ (510, Par. 6.2.1) ... Vessel Install Insp → Topic 10 & 2 → Appropriate documentation, e.g. manufacturer's data reports, assures that a vessel complies with the specified designs.

230. Internal field inspection of new vessels (upon installation) is not required provided (IF):

- A) A Manufacturer's Data Report assures that a vessel complies with the specified designs
- B) The both the Inspector AND Engineer believe that one is not necessary
- C) The Inspector ONLY believes one is not necessary
- D) The Engineer ONLY believes one is not necessary

Ans: A ☺ (API 510, Para. 6.2.1) ... Vessel Install Insp → Topic 10 & 2 → # 228 & 229 = same Q

API 510 Code (16 Closed Book Topics) → Topics # 10 & 2 (again)

231. If the service conditions of a vessel are changed, the inspection intervals shall be:

- A) The same as the previous service until they can be established for the new service conditions
- B) The same as the previous service until the Inspector determines it necessary to change them
- C) Established for new service conditions in a manner deemed necessary by the Inspector
- D) Established for new service conditions (new process contents, pressure, or temperature)

Answer: D (API 510, Para. 6.2.2.1) ... Vessel Service Change Inspection Rules → Topics 10 & 2

232. Which of these statements is FALSE regarding the requirement for establishing new inspection intervals whenever a vessel service change occurs?

- A) If process content (water to oil) changes, then a new inspection interval shall be established
- B) If maximum operating pressure changes, then a new inspection interval shall be established
- C) If minimum operating pressure changes, then a new inspection interval shall be established
- D) If maximum (or min.) operating temps change, then a new insp interval shall be established

Answer: C (API 510, Para. 6.2.2.1) ... Vessel Service Change Inspection Rules → Topics 10 & 2

233. If both ownership & location of a vessel are changed, what are the API 510 inspection rules (regarding inspections and inspection intervals) before the vessel is reused?

- A) Vessel should be internally & externally inspected & new insp. intervals shall be established
- B) Vessel shall be internally & externally inspected & new insp. intervals shall be established
- C) Vessel may be exempt from Insp. by Data Reports & new Insp. intervals shall be established
- D) None of these is correct because new inspection intervals “should” be established

Answer: B (API 510, Para. 6.2.2.2) ... Vessel Service Change Inspection Rules → Topics 10 & 2

234. If both the ownership and the location of a vessel are changed, what shall be established for the new service?

- A) Allowable service conditions (Design parameters) and inspection intervals
- B) Only the allowable service conditions (Design parameters) need to be established
- C) Allowable service conditions (Design parameters), corrosion allowance & inspection intervals
- D) Only the inspection intervals need to be established per API 510

Answer: A (API 510, Para. 6.2.2.2) ... Vessel Service Change Inspection Rules → Topics 10 & 2

235. If Only ownership (not the location) of a vessel is changed (assume Company A bought the refinery from Company B), what is required before Company B assumes operation?

- A) Vessel should be internally & externally inspected & new insp. intervals shall be established
- B) Vessel shall be internally & externally inspected & new insp. intervals shall be established
- C) Vessel may be exempt from Insp. by Data Reports & new Insp. intervals shall be established
- D) Vessel is exempt from any inspections & existing intervals (from Company B) may be used

Answer: D (API 510, Para. 6.2.2.2) ... Vessel Service Change Inspection Rules → Topics 10 & 2

API 510 Code (16 Closed Book Topics) → Topic # 10

236. RBI assessments may be used to establish the appropriate inspection intervals for which types of inspections?

- A) RBI may be used for internal inspections only
- B) RBI may be used for internal or On-stream inspections only
- C) RBI may be used for internal, on-stream, and external inspections only
- D) None of these are correct. RBI may also be used for other types of inspections (CUI, etc)

Answer: C (API 510, Para. 6.3.1) ... Risk-Based Inspection Rules → Topic 10

237. RBI assessments may allow previously established inspection intervals to be exceeded. Which of the following statements are FALSE regarding these inspections and interval limits?

- A) Internal inspection maximum limits of 10 years or ½ Remaining Life (the lesser) may be exceeded
- B) On-Stream inspection maximum limits of 10 years or ½ Remaining Life (the lesser) may be exceeded
- C) External insp maximum limits of 5 years or Internal/On-stream interval (the lesser) may be exceeded
- D) External insp maximum limits of 5 years or ½ Remaining Life (the lesser) may be exceeded

Answer: D (API 510, Para. 6.3.1) ... Risk-Based Inspection Rules → Topic 10

238. When a RBI interval for the internal or on-stream inspection exceeds the 10-year limit, the RBI assessment shall be reviewed and approved by:

- A) Engineer and Corrosion Specialist
- B) Engineer and Inspector
- C) Owner/User and Engineer
- D) Engineer Only

Answer: B (API 510, Para. 6.3.2) ... Risk-Based Inspection Rules → Topic 10

239. If an RBI interval for the internal or on-stream inspection exceeds the 10-year limit, then the RBI assessment shall be reviewed and approved (how often)?

- A) At intervals NEVER exceeding 10 years (More often if warranted due to RBI considerations)
- B) At the end of the designated extended inspection interval (11 yrs, 12 yrs, 13 yrs, etc)
- C) At intervals not to exceed 20 years in any case
- D) None of these is correct

Answer: A (API 510, Para. 6.3.2) ... Risk-Based Inspection Rules → Topic 10

240. When a RBI assessment is used to extend the internal or on-stream inspection interval, the assessment should include which of the following?

- A) Fitness-for-service evaluation of the vessel along with a review of Maintenance Records
- B) Fitness-for-service evaluation of the vessel and a review of the inspection history
- C) Fitness-for-service evaluation of the vessel, and a review of the inspection history and the potential fouling of the vessel pressure-relieving device(s)
- D) Review of the inspection history and potential fouling of vessel's pressure-relieving device(s)

Answer: D (API 510, Para. 6.3.3) ... Risk-Based Inspection Rules → Topic 10

API 510 Code (16 Closed Book Topics) → Topic # 10

6.4 External Inspection

6.4.1 Unless justified by an RBI assessment, each aboveground vessel shall be given a visual external inspection at an interval that DOES NOT EXCEED THE LESSER OF FIVE YEARS or the required internal/on-stream inspection interval*

***Note: Internal or OSI maximum interval = lesser of 10 yrs or ½ RL**

6.4.2 External inspection intervals for vessels in non-continuous service are the same as for vessels in continuous service. → THIS RULE DOES NOT APPLY TO INTERNAL / ON-STREAM INSP WHERE ACTUAL OPERATING TIME IS USED (IN YRS APPLIES TO VESSELS PROPERLY IDLED USING NITROGEN PURGE, ETC)

It is preferred to perform this inspection while the vessel is in operation. The interval is established by the inspector or engineer in accordance with the owner/user's quality assurance system.

CRITICAL EXERCISE → Try these before going to Q # 241!

Determine External Insp Interval assuming a RL value (Solve for Internal or OSI interval first):

What is the maximum Ext insp interval (No RBI) allowed by the API 510 Code? Answer = Always 5 years

100 yr. RL → what is max Ext Insp. Interval → $100 \div 2 = 50$ → Use lesser of 50 or 5 → **5 yrs (rule applies)**

12+ yr. RL → what is max Ext Insp. Interval → $12 \div 2 = 6$ → Use lesser of 6 or 5 → **5 yrs (ext rule applies)**

10 yr. RL → what is max Ext Insp. Interval → $10 \div 2 = 5$ → Use lesser of 5 or 5 → **5 yrs (ext = I or OSI)**

9 yr. RL → what is max Ext Insp. Interval → $9 \div 2 = 4.5$ → Use lesser of 4.5 or 5 → **4.5 yrs (I or OSI)**

8 yr. RL → what is max Ext Insp. Interval → $8 \div 2 = 4$ → Use lesser of 4 or 5 → **4 yrs (I or OSI)**

7 yr. RL → what is max Ext Insp. Interval → $7 \div 2 = 3.5$ → Use lesser of 3.5 or 5 → **3.5 yrs (I or OSI)**

6 yr. RL → what is max Ext Insp. Interval → $6 \div 2 = 3$ → Use lesser of 3 or 5 → **3 years (I or OSI)**

5 yr. RL → what is max Ext Insp. Interval → $5 \div 2 = 2.5$ → Use less of 2.5 or 5 → **2.5 years (I or OSI)**

4 yr. RL → what is max Ext Insp. Interval → $4 \div 2 = 2$ → Use lesser of 2 or 5 → **2 years (I or OSI)**

The 4 year Rule ... Use maximum of 2 years or full RL ... now applies to Internal & OSI intervals

3 yr. RL → what is max Ext Insp. Interval → **3 → Use 2 max rule** → Use lesser of 2 or 5 → **2 years**

2 yr. RL → what is max Ext Insp. Interval → **2 → Use 2 max rule** → Use lesser of 2 or 5 → **2 years**

1.5 yr. RL → what is max Ext Insp. Interval → **1.5 → Use 1.5** → Use lesser of 1.5 or 5 → **1.5 yrs**

~~~~~END OF EXERCISE~~~~~

## **API 510 Code (16 Closed Book Topics) → Topic # 10**

**241. With no RBI, External vessel Inspection is required how often and preferred when?**

- A) Every five years, with the vessel in operation or out of operation, it doesn't matter
- B) Lesser of 5 yrs or required internal/on-stream inspection interval, vessel in operation
- C) Lesser of 5 yrs or required internal/on-stream inspection interval, vessel not in operation
- D) Lesser of 5 yrs or required internal/on-stream inspection interval, as the Inspector requests

**Answer: B (API 510, External Inspection Rules, Para. 6.4.1)**

**242. Who is responsible for establishing & how is an External Inspection interval established?**

- A) By Inspector in accordance with the owner/user's inspection plan
- B) By Engineer in accordance with the owner/user's quality plan
- C) By Inspector or engineer in accordance with the owner/user's inspection plan
- D) By Inspector or engineer in accordance with the owner/user's quality assurance system

**Answer: D (API 510, External Inspection Rules, Para. 6.4.1)**

**243. External inspection intervals for vessels in non-continuous service are:**

- A) The same as for vessels in continuous service
- B) Lesser than continuous service due to the greater chance for corrosion (especially CUI)
- C) Greater than continuous service since actual operating years always determines the interval
- D) None of these is correct per API 510 rules

**Answer: A (API 510, External Inspection Rules, Para. 6.4.1)**

**244. Assuming no RBI and the Internal Inspection Interval has been set at 8 years, what is the maximum external inspection interval allowed per API 510 rules?**

- A) Eight (8) years is the maximum inspection interval since it cannot exceed the Internal interval
- B) Five (5) years is the maximum inspection interval allowed by API 510 given these conditions
- C) Four (4) years is the maximum inspection interval allowed by API 510 given these conditions
- D) None of these is correct per API 510 rules

**Answer: B (API 510, External Inspection Rules, Para. 6.4.1)**

**245. Assuming no RBI and the Internal Inspection Interval has been set at 4 years, what is the maximum external inspection interval allowed per API 510 rules?**

- A) Five (5) years = maximum inspection interval allowed by API 510 rules
- B) Four (4) years = maximum inspection interval allowed by API 510 rules
- C) Two (2) years = maximum inspection interval allowed by API 510 rules
- D) None of these is correct per API 510 rules

**Answer: B (API 510, External Inspection Rules, Para. 6.4.1)**

## **API 510 Code (16 Closed Book Topics) → Topic # 10**

**246. Assuming no RBI assessment, the period between internal or on-stream inspections:**

- A) Shall not exceed 10 years or one half the remaining life of the vessel, whichever is greater
- B) Shall not exceed 10 years or one half the remaining life of the vessel, whichever is lesser
- C) Shall not exceed 10 years or the remaining life of the vessel, whichever is the greater
- D) Shall not exceed 10 years or the remaining life of the vessel, whichever is the lesser

**Answer: B (API 510, Internal & On-stream Inspection Rules, Para. 6.5.1.1)**

**247. When a pressure vessel remaining life is less than 4 years, the internal or on-stream inspection Interval may be:**

- A) Full remaining life (but less than 4 years)
- B) Full remaining life up to a maximum of 3 years
- C) Full remaining life up to a maximum of 2 years
- D) Only ½ of the vessel's remaining life in all cases where remaining life is less than 4 years

**Answer: C (API 510, Internal & On-stream Inspection Rules, Para. 6.5.1.1)**

**248. When a pressure vessel remaining life is 3.5 years, the internal or on-stream inspection Interval may be a maximum of:**

- A) Full remaining life (3.5 yrs in this case)
- B) A maximum of 3 years in this case
- C) A maximum of 2 years in this case
- D) Only ½ vessel remaining life (1.75 yrs this case)

**Answer: C (API 510, Internal & On-stream Inspection Rules, Para. 6.5.1.1)**

**249. When a pressure vessel remaining life is 1.5 years, the internal or on-stream inspection Interval may be a maximum of:**

- A) Full remaining life (1.5 years in this case)
- B) A maximum of 3 years in this case
- C) A maximum of 2 years in this case
- D) Only ½ of the vessel's remaining life (0.75 years in this case)

**Answer: A (API 510, Internal & On-stream Inspection Rules, Para. 6.5.1.1)**

**250. Who is responsible for establishing & how is an External Inspection interval established?**

- A) By Inspector in accordance with the owner/user's inspection plan
- B) By Engineer in accordance with the owner/user's quality plan
- C) By Inspector or engineer in accordance with the owner/user's inspection plan
- D) By Inspector or engineer in accordance with the owner/user's quality assurance system

**Answer: D (API 510, Internal & On-stream Inspection Rules, Para. 6.5.1.1)**

## API 510 Code (16 Closed Book Topics) → Topic # 10

251. For pressure vessels in non-continuous service, inspection intervals can be based on the number of years of actual service that the vessel operated, not calendar years, provided that all of the following precautions are taken (after the vessel is idled) EXCEPT:

- A) Isolated from all process fluids
- B) Placed under nitrogen purge
- C) Filled with non-corrosive hydrocarbons
- D) Completely drained & opened to dry out

Answer: D (API 510, Internal & On-stream Inspection Rules, Para. 6.5.1.2)

252. For a pressure vessel in **non-continuous service** (operates only 6 months in every year & placed under a nitrogen purge each time after being idled), what are the maximum possible internal & external inspection intervals (assume NO RBI & calculated remaining life = 30 yrs)?

- A) Internal inspection interval = 10 calendar yrs & external inspection interval = 5 calendar yrs
- B) Internal inspection interval = 15 calendar yrs & external inspection interval = 10 calendar yrs
- C) Internal inspection interval = 20 calendar yrs & external inspection interval = 5 calendar yrs
- D) Internal inspection interval = 30 calendar yrs & external inspection interval = 10 calendar yrs

Ans: C (API 510, Int. & On-stream Insp Rules, Par. 6.5.1.2) → Reason: In this case, 20 calendar years of operation is equal to 10 actual operation years! External interval ALWAYS = 5 years

253. For a pressure vessel in **non-continuous service** (operates only 4 months in every year & placed under a nitrogen purge each time after being idled), what are the maximum possible internal & external inspection intervals (assume NO RBI & calculated remaining life = 30 yrs)?

- A) Internal inspection interval = 10 calendar yrs & external inspection interval = 5 calendar yrs
- B) Internal inspection interval = 15 calendar yrs & external inspection interval = 10 calendar yrs
- C) Internal inspection interval = 20 calendar yrs & external inspection interval = 10 calendar yrs
- D) Internal inspection interval = 30 calendar yrs & external inspection interval = 5 calendar yrs

Ans: D (API 510, Int. & On-stream Insp Rules, Par. 6.5.1.2) → Reason: In this case, 30 calendar years of operation is equal to 10 actual operation years! External interval ALWAYS = 5 years

254. Alternative method of establishing required inspection intervals is to calculate projected MAWP of vessel components. Inspection intervals are within the maximum permitted as long as the projected MAWP of the limiting component is:

- A) Not less than the lower of a nameplate or rerated MAWP + applicable static head pressure
- B) Less than or = to the lower of nameplate or rerated MAWP + applicable static head pressure
- C) Not less than the lower of nameplate or rerated MAWP – applicable static head pressure
- D) Less than or = to the lower of nameplate or rerated MAWP – applicable static head pressure

Ans: A (API 510, Int. & On-stream Insp Rules, Par. 6.5.1.3) → Alternative MAWP calc method

255. Assuming no RBI, a maximum internal inspection interval using the MAWP method is:

- A) Determined by MAWP calcs
- B) 10 yrs
- C) 15 yrs
- D) 20 yrs

Ans: B (API 510, Int. & On-stream Insp Rules, Par. 6.5.1.3) → Alternative MAWP calc method

## **API 510 Code (16 Closed Book Topics) → Topic # 10**

**256. Who decides whether on-stream inspection may be substituted for internal inspection?**

- A) Owner/User
- B) Engineer
- C) Inspector
- D) None of these alone can decide

**Ans: C (API 510, Int. & On-stream Insp, Para. 6.5.2.1) → Know Inspector responsibilities**

**257. On-stream inspections may be substituted for internal inspections whenever Inspector approves the substitution and:**

- A) Whenever size or configuration makes internal inspection vessel entry physically impossible
- B) Whenever the general corrosion rate is less than 5 MPY (.005 inches or 0.125 mm per year)
- C) Whenever the vessel remaining life is greater than 10 years
- D) Whenever no questionable condition is found during the External Inspection

**Ans: A (510, Int. & On-stream Insp., Para. 6.5.2.1.b.1) → PHYSICALLY POSSIBLE 5 MPY RULE!**

**258. If vessel entry is physically possible, on-stream inspection may possibly be substituted for internal inspection if approved by Inspector & the vessel remaining life is known to be:**

- A) Greater than 5 years
- B) Greater than 10 years
- C) Greater than 20 years
- D) None of these are correct

**Ans: B (510, Int. & OSI (Insp.), Par. 6.5.2.1.b.2) → PHYSICALLY POSSIBLE > 10 YEAR RL RULE!**

**259. If vessel entry is physically possible, on-stream inspection may possibly be substituted for internal inspection if approved by Inspector & corrosive character of contents has been established by (how many) years of same or similar service:**

- A) At least 1 year
- B) At least 2 years
- C) At least 3 years
- D) At least 5 years

**Ans: D (510, Int. & OSI (Insp.), Par. 6.5.2.1.b.3) → PHYSICALLY POSSIBLE 5 YR Similar Service!**

**260. If vessel entry is physically possible, on-stream inspection may possibly be substituted for internal inspection if approved by Inspector and external inspection resulted in:**

- A) No questionable conditions found
- B) No corrosion or coating loss found
- C) No CUI conditions or pitting found
- D) None of these are correct

**Ans: A (510, Int. & OSI (Insp.), Par. 6.5.2.1.b.4) → Phys. Poss. No questionable conditions!**

## API 510 Code (16 Closed Book Topics) → Topic # 10

**261. If vessel entry is physically possible, on-stream inspection may possibly be substituted for internal inspection if approved by Inspector & vessel operating temperature does not:**

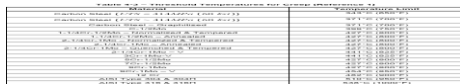
- A) Exceed the lower temperature limits for the creep-rupture range of the vessel material
- B) Exceed the upper temperature limits for the creep-rupture range of the vessel material
- C) Exceed temperature limits for the lower transformation range of a vessel material (1330°F)
- D) Exceed temperature limits for the upper transformation range of a vessel material (1600°F)

**Ans: A (510, Int. & OSI (Insp.), Par. 6.5.2.1.b.5) → Phys. Poss. Creep Range Temperature Rule!**

**262. If vessel entry is physically possible, on-stream inspection may possibly be substituted for internal inspection if approved by Inspector and a 70 ksi Carbon Steel vessel operating temperature does not exceed the lower temperature limits for creep-rupture range at:**

- A) 650°F (343°C)
- B) 700°F (371°C)
- C) 800°F (427°C)
- D) 850°F (454°C)

**Ans: B (510, Int. & OSI (Insp.), Par. 6.5.2.1.b.5) → Phys. Poss. Creep Range Temperature Rule!**



The image shows a portion of the API 571 Creep Tables, which are used to determine the maximum allowable temperatures for different materials based on their ultimate tensile strength and the type of service (e.g., creep-rupture, stress corrosion cracking).

... API 571 Creep Tables ... Edition # 2 comes into effect Sept. 2012

Note: For 60 ksi and less ultimate tensile strength CS materials, the correct answer = A

**263. If vessel entry is physically possible, on-stream inspection may possibly be substituted for internal inspection if approved by Inspector & the vessel is not subject to:**

- A) Stress Corrosion cracking or high temperature oxidation damage from the service
- B) Chloride Stress Corrosion cracking or Creep stress rupture damage from the service
- C) Environmental cracking or hydrogen damage from the fluid being handled
- D) Damage Mechanisms requiring the Inspector to consult the Corrosion Specialist

**Ans: C (510, Int. & OSI (Insp.), Par. 6.5.2.1.b.6) → Phys. Poss. Environmental Cracking & Hydrogen Damage Rules ... API 571, 4.5.1, 4.5.2, 4.5.3, 5.1.2.3, & 5.1.3.1 → 5 DMs!**

**264. If vessel entry is physically possible, on-stream inspection may possibly be substituted for internal inspection if approved by Inspector and the vessel does not have:**

- A) Internal coating (thin-film liner)
- B) Integrally bonded liner (SS or alloy weld overlays)
- C) Internal coating (thick-film liner)
- D) Non-integrally bonded liner (strip lining or plate lining)

**Ans: D (510, Int. & OSI (Insp.), Par. 6.5.2.1.b.7) → Phys. Poss. No strip lining or plate lining!**

**265. Assuming no RBI, If vessel entry is physically possible & all of the seven conditions allowing an on-stream inspection to be done in lieu of an internal inspection were not met, what must the Inspector do regarding scheduling of the next inspection to be performed?**

- A) Next inspection shall be internal
- B) Next inspection may be internal
- C) Next inspection shall be On-Stream
- D) Next inspection may be On-Stream

**Answer: A (510, Int. & OSI (Insp.), Par. 6.5.2.2) → Physically Possible → 7 Rules to allow OSI!**

## **API 510 Code (16 Closed Book Topics) → Topic # 10**

**266. Assuming RBI is done in lieu of using the seven conditions allowing an on-stream inspection in lieu of an internal inspection, what must the RBI assessment determine?**

- A) Considering past process conditions, the consequence and probability of failure is very low and effectiveness of On-Stream inspection techniques will be satisfactory for the given service
- B) Considering past process and likely future process conditions, Consequence & probability of failure and the associated risk is low & On-Stream inspection techniques used are effective
- C) Considering past process conditions, the associated risk is low and the effectiveness of the external NDE techniques for expected damage mechanisms is considered to be adequate
- D) Considering past process and likely future process conditions, the associated risk is low and the effectiveness of the external NDE techniques for expected damage mechanisms is adequate

**Answer: D (510, Int. & OSI (Insp.), Par. 6.5.2.2) → Physically Possible → Rules regarding RBI!**

**267. When a vessel has been internally inspected, results of that inspection can be used to:**

- A) Determine whether an on-stream inspection can be substituted for an internal inspection on a similar pressure vessel operating within the same or similar service and conditions
- B) Determine whether an on-stream inspection can be substituted for an internal inspection on an identical pressure vessel operating within the identical service and conditions
- C) Determine whether all other inspections on a similar pressure vessel operating within the same or similar service and conditions may be reduced in scope or eliminated
- D) None of these is correct regarding internal inspection results

**Answer: A (510, Int. & OSI (Insp.), Par. 6.5.2.3) → Rules regarding use of Internal Insp results!**

**268. When a vessel has been internally inspected, results of that inspection can be used to determine whether an on-stream inspection can be substituted for an internal inspection on:**

- A) Similar vessels operating within same plant
- B) Any pressure vessels operating within same plant
- C) Similar vessels operating within the same or similar service and conditions
- D) Any pressure vessels operating within the same or similar service and conditions

**Answer: C (510, Int. & OSI (Insp.), Par. 6.5.2.3) → Rules regarding use of Internal Insp results!**

**269. When on-stream inspections are done, the type of & extent of NDE should be specified:**

- A) In the owner/user Quality Manual
- B) In detailed NDE procedures used by examiners
- C) In the Inspection History Records
- D) In the Inspection Plan

**Answer: D (510, Int. & OSI (Insp.), Par. 6.5.2.4) → Rules regarding On-Stream Inspections!**

**270. On-stream inspections may include all of the following EXCEPT:**

- A) Digital UT thickness measurements
- B) Radiography (Panoramic techniques)
- C) Any other NDE to measure metal thickness
- D) Shear wave UT to assess weld integrity

**Answer: B (510, Int. & OSI (Insp.), Par. 6.5.2.4) → Rules regarding On-Stream Inspections!**

## **API 510 Code (16 Closed Book Topics) → Topics # 10 & # 11**

**271. For a large vessel having two or more zones of differing corrosion rates, which of these statements are FALSE regarding internal and On-stream inspection requirements?**

- A) Each zone must be treated independently when determining required inspection intervals
- B) Each zone may be treated independently when determining required inspection intervals
- C) Each zone may be treated independently when substituting internal for on-stream inspection
- D) Each zone shall be inspected based upon the interval required for that zone

**Answer: A (510, Int. & OSI (Insp.), Par. 6.5.2.4) → Rules regarding Multi-Zone vessels!**

**272. The API 510 code states that Pressure-relieving devices shall be tested and repaired by:**

- A) An owner/user organization experienced in valve maintenance
- B) A Repair organization experienced in valve maintenance
- C) Any owner / user organization approved Contractor
- D) Any approved Contractor holding an "R" Stamp

**Answer = B ... Reference: API 510, Para. 6.6 → Rules regarding insp & testing of PZVs**

**273. What document covers inspection, testing & maintenance of pressure-relieving devices?**

- A) ASME VIII, Division 1, Section UG
- B) API 572
- C) API 576
- D) API 577

**Answer = C ... Reference: API 510, Para. 6.6 → See API 576 Section 5 & 6 for many exam Qs**

**Must Know API 576 ... Ch. 5 (Causes of Improper Performance) & Ch. 6 (Inspection & Testing)**

**E-Library API 510 folder for Exam questions! API 576 has 2 handouts!**

**\*\*\* In the margin & underlined areas are those where exam Q's will be!**

**274. Spring failures are almost always caused by:**

- A) Corrosion that includes surface corrosion and stress corrosion cracking
- B) Stress related failure due to improper sizing/using substandard parts
- C) Mechanical failure due to excessive movement and vibration
- D) Excessive chattering and wire drawing

**Ans: A (510, 6.6.6 & 576, Para 5.1.1 & 5.3.2 & Fig 30) ... PZV Spring Failure Cause = Corrosion**

**275. (Example API 576 Q) ... The principal reason for inspecting a pressure relief device is to:**

- A) Determine if it is functioning properly (so it can provide protection to equipment/personnel)
- B) Prevent fouling and plugging from occurring that could render a valve inoperable
- C) Assure equipment (pressure vessel) safety by preventing Overpressurization
- D) Assure personnel safety

**Ans: A (API 510, Par. 6.6 → API 576 → Ch. 6, Para. 6.1.1 in entirety) API website Sample Q**

## **API 510 Code (16 Closed Book Topics) → Topics # 10 & # 11**

**276. Each repair organization shall have a fully documented:**

- A) Repair Plan as documented in Owner/User Organization Procedures
- B) Quality Assurance Plan as well as a Quality Assurance Manual
- C) Quality Control System along with a Quality Control Manual
- D) Quality Assurance system along with a Quality Assurance Manual

**Answer = C ... Reference: API 510, Para. 6.6.1.1 → Repair Org QC System & QC Manual**

**277. Minimum items to be in a repair organization's Quality Control Manual DO NOT include:**

- A) Title page, Revision log, Contents page, Statement of authority & responsibility
- B) Organization Chart, Scope of work, Drawings and specification controls
- C) Requirements for material and part control
- D) Repair and Test Plan

**Ans = D ... Reference: API 510, Para. 6.6.1.1.i → Repair & Inspection Program in QC Manual**

**278. Minimum items to be in a repair organization's Quality Control Manual DO NOT include:**

- A) General example of the valve repair nameplate
- B) Requirements for use of measurement & test gauges
- C) Requirements for welding, NDE, and also heat treatment
- B) Requirements for valve testing, setting, leak testing, and sealing

**Ans = B ... Ref: Par. 6.6.1.1.i → Reqmts Calibrating Measurement & Test Gauges in QC Manual**

**279. Minimum items to be in a repair organization's Quality Control Manual DO NOT include:**

- A) Requirements for updating and controlling copies of the quality control manual
- B) Sample forms (QC forms to be used during work and to control the work)
- C) Training and qualifications required for Inspection personnel
- D) Requirements for handling of non-conformances

**Ans = D ... Ref: API 510 Par. 6.6.1.1.i → Training & Quals for Repair Personnel in QC Manual**

**280. Each repair organization shall also have a fully documented training program that:**

- A) Shall ensure that repair personnel are qualified for all work tasks
- B) Shall ensure that repair personnel are certified to perform inspections
- C) Shall ensure that repair personnel are qualified within the scope of the repairs
- B) Shall ensure that repair personnel are well-trained and qualified for every given repair task

**Ans = C ... Ref: API 510 Par. 6.6.1.1.i → Training program requirements Repair Organizations**

## **API 510 Code (16 Closed Book Topics) → Topics # 10 & # 11**

**281. Pressure-relieving devices shall be tested and inspected at intervals that are:**

- A) Frequent enough to verify that valves perform reliably in the particular service conditions
- B) Frequent enough to meet service conditions and remain free of leaks and corrosion
- C) Frequent enough to verify that valves do not fail in given service conditions
- D) None of these are correct

**Answer: A (API 510, 6.6.2.2) PZV Rules for Inspection ... Intervals = Five years & 10 years**

**282. The inspection interval for all pressure-relieving devices is determined by (Who) in accordance with what system requirements?**

- A) Engineer or Qualified Individual (Owner/User Quality Assurance System)
- B) Inspector or Engineer (Owner/User Quality Assurance System)
- C) Either Inspector, Engineer, or Qualified Individual (Owner/User Quality Control System)
- D) Either Inspector, Engineer, or a Qualified Individual (Owner/User Quality Assurance System)

**Answer: D ... (API 510, 6.6.2.1) ... PZVs ... Rules for Inspection ... Intervals = Responsibilities**

**283. If a RBI assessment is not performed, what is the greatest possible time period allowed by API 510 between testing of pressure relieving devices?**

- A) 5 years (for all services)
- B) At intervals often enough to verify reliability
- C) 10 years (for non corrosive services)
- D) At every shutdown

**Ans: C ... (510, 6.6.2.2 ... PZV Rules for Insp ... Intervals = Five yrs & 10 yrs – 2 Rules to KNOW)**

**284. When a pressure-relieving device is found to be heavily fouled or stuck, which of the following statements are FALSE regarding API 510 requirements?**

- A) Inspection & testing intervals shall be reduced unless a review shows that the device will perform reliably at the current interval
- B) Inspection & testing intervals shall be reduced as deemed necessary by the Inspector
- C) Any review should try to determine the cause of the fouling (as applicable)
- D) Any review should try to determine the reasons for improper operation

**Answer: B (API 510, 6.6.2.3) ... PZVs ... Rules for Review ... Intervals = Stuck or Fouled Rule**

**285. When a pressure-relieving device is found to be heavily fouled or stuck, which of the following statements are TRUE regarding requirements for inspection and testing intervals?**

- A) They may be reduced if a review cannot show they will perform reliably at current intervals
- B) They may be reduced as deemed necessary by the Inspector performing the review
- C) They shall be reduced unless a review shows they will perform reliably at current intervals
- D) They shall be reduced as deemed necessary by the Inspector performing the review

**Answer: C (API 510, 6.6.2.3) ... PZVs ... Rules for Review ... Intervals = Stuck or Fouled Rule**

## **API 510 Code (16 Closed Book Topics) → Topic # 8**

**286. Corrosion rate for thinning damage mechanisms is determined by calculating the difference between two thickness readings (taken at the same location) and:**

- A) Divided by the time interval between the readings
- B) Multiplied by the time interval between the readings
- C) Added by the time interval between the readings
- D) Subtracted by the time interval between the readings

**Answer: A (API 510, Para. 7.1.1.1) Corrosion Rate Determination Rules**

**287. The determination of the corrosion rate may include thickness data collected at:**

- A) Only at one time
- B) Only at two different times
- C) More than two different times
- D) None of these is correct

**Answer: C (API 510, Para. 7.1.1.1) Corrosion Rate Determination Rules**

**288. Suitable use of short-term versus long-term corrosion rates shall be determined by the:**

- A) Engineer
- B) Inspector
- C) Corrosion Specialist
- D) Owner/User

**Answer: B (API 510, Para. 7.1.1.1) Corrosion Rate Determination Rules**

**289. Short-term corrosion rates are typically determined by using:**

- A) The most recent reading and one taken earlier in the life of the vessel (at same CML)
- B) Any two thickness readings taken on the vessel (at a known thickness location)
- C) Any two or more thickness readings taken on the vessel (at the same location or CML)
- D) The two most recent thickness readings taken on the vessel (at the same location or CML)

**Answer: D (API 510, Para. 7.1.1.1) Corrosion Rate Determination Rules**

**290. Long-term rates are typically determined by using:**

- A) The most recent reading and one taken earlier in the life of the vessel (at same CML)
- B) Any two thickness readings taken on the vessel (at a known thickness location)
- C) Any two or more thickness readings taken on the vessel (at the same location or CML)
- D) The two most recent thickness readings taken on the vessel (at the same location or CML)

**Answer: A (API 510, Para. 7.1.1.1) Corrosion Rate Determination Rules**

## API 510 Code (16 Closed Book Topics) → Topic # 8

**291. The use of two different corrosion rates helps to identify or distinguish:**

- A) Recent corrosion mechanisms from those acting over the long-term
- B) Long-term corrosion mechanisms from those acting over the long-term
- C) Recent corrosion mechanisms from those acting over the short-term
- D) None of these are correct

**Answer: A (API 510, Para. 7.1.1.1) Corrosion Rate Determination Rules**

**292. Long-term (LT) corrosion rates shall be calculated from which of these formulas?**

- A) Corr. rate (LT) =  $t_{\text{previous}} - t_{\text{actual}} \div \text{time between } t_{\text{previous}} \text{ \& } t_{\text{actual}} \text{ (in years)}$
- B) Corr. rate (LT) =  $t_{\text{initial}} - t_{\text{actual}} \div \text{time between } t_{\text{initial}} \text{ and } t_{\text{actual}} \text{ (in years)}$
- C) Corr. rate (LT) =  $t_{\text{actual}} - t_{\text{initial}} \div \text{time between } t_{\text{initial}} \text{ and } t_{\text{actual}} \text{ (in years)}$
- D) Corr. rate (LT) =  $t_{\text{actual}} - t_{\text{previous}} \div \text{time between } t_{\text{previous}} \text{ \& } t_{\text{actual}} \text{ (in years)}$

**Answer: B (API 510, Para. 7.1.1.1) Corrosion Rate Determination Rules**

**293. Short-term (ST) corrosion rates shall be calculated from which of these formulas?**

- A) Corr. rate (ST) =  $t_{\text{initial}} - t_{\text{actual}} \div \text{time between } t_{\text{initial}} \text{ and } t_{\text{actual}} \text{ (in years)}$
- B) Corr. rate (ST) =  $t_{\text{actual}} - t_{\text{previous}} \div \text{time between } t_{\text{previous}} \text{ \& } t_{\text{actual}} \text{ (in years)}$
- C) Corr. rate (ST) =  $t_{\text{previous}} - t_{\text{actual}} \div \text{time between } t_{\text{previous}} \text{ \& } t_{\text{actual}} \text{ (in years)}$
- D) Corr. rate (ST) =  $t_{\text{actual}} - t_{\text{initial}} \div \text{time between } t_{\text{initial}} \text{ and } t_{\text{actual}} \text{ (in years)}$

**Answer: C (API 510, Para. 7.1.1.1) Corrosion Rate Determination Rules**

**294. When calculating corrosion rates using API 510 formulas, which of the following statements is FALSE regarding the value for  $t_{\text{initial}}$ ?**

- A)  $t_{\text{initial}}$  = the initial thickness at the same CML as  $t_{\text{actual}}$  (for any given CML in inches or mm)
- B)  $t_{\text{initial}}$  may a first thickness measurement taken (new vessel) at a given CML (inches or mm)
- C)  $t_{\text{initial}}$  may be the thickness at the start of a new corrosion rate environment at a given CML
- D)  $t_{\text{initial}}$  = the initial thickness at a different CML from the one determining the lowest  $t_{\text{actual}}$

**Answer: D (API 510, Para. 7.1.1.1) Corrosion Rate Determination Rules**

**295. When calculating corrosion rates using API 510 formulas, which of the following statements is TRUE regarding the value for  $t_{\text{actual}}$ ?**

- A)  $t_{\text{actual}}$  = Actual thickness of a CML (inches or mm) measured during most recent inspection
- B)  $t_{\text{actual}}$  = Actual first thickness measurement taken at a given CML (in inches or mm)
- C)  $t_{\text{actual}}$  = Actual thickness at the start of a new corrosion rate environment at a given CML
- D)  $t_{\text{actual}}$  = Actual thickness at a different CML from the one determining the lowest reading

**Answer: A (API 510, Para. 7.1.1.1) Corrosion Rate Determination Rules**

## **API 510 Code (16 Closed Book Topics) → Topic # 8**

**296. When calculating corrosion rates using API 510 formulas, which of the following statements is FALSE regarding the value for  $t_{\text{previous}}$ ?**

- A)  $t_{\text{previous}}$  = previous thickness measured during the prior inspection
- B)  $t_{\text{previous}}$  is located in the same area (within a given CML) as the  $t_{\text{actual}}$
- C)  $t_{\text{previous}}$  is at the same measurement location as  $t_{\text{actual}}$  for a given CML (in inches or mm)
- D)  $t_{\text{previous}}$  = previous thickness measured at the start of a new corrosion rate environment

**Answer: D (API 510, Para. 7.1.1.1) Corrosion Rate Determination Rules**

**297. LT & ST Corrosion Rates should be compared (data assessment). When a significant difference exists between the two rates, WHO selects which rate is to be used and WHY?**

- A) Inspector (consults corrosion specialist) & selects a rate that best reflects current conditions
- B) Inspector (consults Engineer) & selects a rate that best reflects current conditions
- C) Corrosion Specialist alone selects a rate that best reflects current conditions
- D) Inspector alone selects a rate that best reflects current conditions

**Answer: A (API 510, Para. 7.1.1.2) Corrosion Rate Determination Rules**

**298. For a new vessel, which one of the following methods CANNOT be used to determine the vessel's probable corrosion rate?**

- A) Data collected by the owner/user on vessels operating in the same or similar service.
- B) On-stream determination (thickness measurements) after 1 month of service
- C) Estimated from published data on vessels in same or similar service.
- D) Estimated from the owner/user's experience.

**Answer: B (API 510, Para. 7.1.2) Corrosion Rate Determination Rules → 1,000 Hour Rule**

**299. For an existing vessel where service conditions are being changed, which one of the following methods CANNOT be used to determine the vessel's probable corrosion rate?**

- A) Data collected by the owner/user on other vessels operating in the same plant
- B) On-stream determination (thickness measurements) after 1,000 hours service
- C) Estimated from published data on vessels in same or similar service.
- D) Estimated from the owner/user's experience.

**Ans: A (510, Para. 7.1.2) Corrosion Rate Determination Rules → Same/Similar Service Rule**

**300. Once an initial corrosion rate has been determined using the rules of API 510 for a new vessel (or change of service for an existing vessel), which of these statements are true?**

- A) Remaining life & the inspection interval cannot both be estimated from this corrosion rate
- B) Only inspection intervals can be estimated from this corrosion rate
- C) Remaining life & the inspection interval can be estimated from this corrosion rate
- D) Remaining life & the inspection interval can be established ONLY after 1,000 hours service

**Answer: C (API 510, Para. 7.1.2) Corrosion Rate Determination Rules**

## **API 510 Code (16 Closed Book Topics) → Topics # 8 & # 9**

**301. Regarding initial corrosion rate determination for a new vessel, if a probable corrosion rate cannot be established from similar service, owner/user experience, or published data, an On-stream determination shall be made after what length of time per API 510 rules?**

- A) After approximately 500 service hours
- B) After approximately 1000 service hours
- C) After approximately 1500 service hours
- D) After 1 month of service as a minimum

**Answer: B (API 510, Para. 7.1.2) Corrosion Rate Determination Rules**

**302. Regarding initial corrosion rate determination for a new vessel, if a probable corrosion rate cannot be used from similar service, owner/user experience, or Industry published data, an On-stream determination shall be made using what methods per API 510 rules?**

- A) Suitable corrosion monitoring devices or actual thickness measurements of the vessel only
- B) Use of corrosion coupons or alternatively, if approved by Engineer, thickness measurements
- C) Actual thickness measurements of the vessel only at given CMLs established by the Inspector
- D) None of these meets API 510 rules

**Answer: A (API 510, Para. 7.1.2) Corrosion Rate Determination Rules**

**303. After an initial corrosion rate is used for a new vessel (or change of service vessel), what must be done to “establish” a corrosion rate for a vessel (Assume published data was used)?**

- A) Nothing, since API 510 rules do not require any additional action to establish a corrosion rate
- B) Nothing, because corrosion rate is already known (published data) & is therefore established
- C) Additional determinations shall be made at appropriate intervals until the rate is established
- D) None of these meets API 510 rules

**Answer: C (API 510, Para. 7.1.2) Corrosion Rate Determination Rules**

**304. After an initial corrosion rate (Using similar service) is used with a new vessel, and it is later determined that an inaccurate corrosion rate was assumed, what must be done?**

- A) Another 1,000 service hour thickness determination must be made in order to establish rates
- B) Nothing, as long as corrosion rates are not greater than an original same/similar service rate
- C) Nothing, as long as the corrosion rates are never greater than 0.005 inches per year (5 MPY)
- D) Corrosion rates in remaining life calculations shall be changed to their actual corrosion rates

**Answer: D (API 510, Para. 7.1.2) Corrosion Rate Determination Rules**

**305. Remaining life of a vessel (in years) shall be calculated from which of these formulas?**

- A) Remaining life =  $t_{\text{initial}} - t_{\text{required}} \div \text{corrosion rate}$
- B) Remaining life =  $t_{\text{actual}} - t_{\text{required}} \div \text{corrosion rate}$
- C) Remaining life =  $t_{\text{previous}} - t_{\text{required}} \div \text{corrosion rate}$
- D) None of these is correct

**Answer: B (API 510, Para. 7.2.1) Remaining Life Determination Rules**

## **API 510 Code (16 Closed Book Topics) → Topic # 9 = RL Calcs**

**306. Remaining life of a vessel (in years) shall be calculated from which of these formulas?**

- A) Remaining life =  $t_{\text{initial}} - t_{\text{required}} \div \text{corrosion rate}$
- B) Remaining life =  $t_{\text{actual}} - t_{\text{required}} \div \text{corrosion rate}$
- C) Remaining life =  $t_{\text{previous}} - t_{\text{required}} \div \text{corrosion rate}$
- D) None of these is correct

**Answer: B (API 510, Para. 7.2.1) Remaining Life Determination Rules**

**307. When calculating Remaining Life using the API 510 formula, which of these statements is TRUE regarding the value for  $t_{\text{actual}}$ ?**

- A)  $t_{\text{actual}}$  = Actual first thickness measurement taken at a given CML (in inches or mm)
- B)  $t_{\text{actual}}$  = Actual thickness at the start of a new corrosion rate environment at a given CML
- C)  $t_{\text{actual}}$  = Actual thickness of a CML (inch/mm) measured during the most recent inspection
- D)  $t_{\text{actual}}$  = Actual thickness at a different CML from the one determining the lowest readings

**Answer: C (API 510, Para. 7.2.1) Remaining Life Determination Rules**

**308. When calculating Remaining Life using the API 510 formula, which of these statements is FALSE regarding the value for  $t_{\text{required}}$ ?**

- A) Required thickness (inch/mm) at the same CML or component as the  $t_{\text{actual}}$  measurement
- B) Computed by pressure design formula and excludes corrosion allowance & Mfg. tolerances
- C) Computed by structural design formula and excludes corrosion allowance & Mfg tolerances
- D) Computed by either pressure or structural design formulas and includes corrosion allowance

**Answer: D (API 510, Para. 7.2.1) Remaining Life Determination Rules**

**309. Statistical analysis may be used in the corrosion rate and remaining life calculations for pressure vessel sections, and may be applied for the assessment of (which of these):**

- A) Substituting an internal inspection for OSI or for determining the internal inspection interval
- B) Substituting an internal inspection for OSI & determining an On-stream inspection interval
- C) Determining the internal inspection interval only
- D) Substituting an internal inspection for OSI only

**Answer: A (API 510, Para. 7.2.2) Remaining Life Determination Rules**

**310. When statistical analysis is used for Corrosion Rate and Remaining Life Calcs, it may not be applicable to vessels with:**

- A) Random Localized corrosion
- B) Random Generalized corrosion
- C) Random but significant localized corrosion
- D) Random but significant generalized corrosion

**Answer: C (API 510, Para. 7.2.2) Remaining Life Determination Rules**

## **API 510 Code (16 Closed Book Topics) MAWP Calcs = Also Open Book**

**311. When applying Maximum Allowable Working Pressure (MAWP) Calcs to determine the continued use of a pressure vessel in the corroded condition, MAWP shall be based upon:**

- A) Calcs as per original ASME Code edition that the vessel was built to
- B) Calcs as per latest applicable ASME Code edition that the vessel was built to
- C) Calcs as per latest applicable ASME Code edition or construction code a vessel was built to
- D) Calcs as per original ASME Code edition or construction code that the vessel was built to

**Answer: C ... (API 510, Para. 7.3.1) MAWP Determination Rules**

**312. When applying Maximum Allowable Working Pressure (MAWP) Calcs to determine the continued use of a pressure vessel in the corroded condition, MAWP calculation results shall:**

- A) Be equal to or less than original MAWP unless a rerating is to be performed as per API 510
- B) Not be greater than original MAWP unless a rerating is to be performed as per API 510
- C) Be greater than original MAWP unless a rerating is to be performed as per API 510
- D) None of these are correct

**Answer: B (API 510, Para. 7.3.1) MAWP Determination Rules**

**313. When applying MAWP Calcs to determine the continued use of a pressure vessel in the corroded service condition, MAWP calculation values to be used for thickness SHALL be how much (before the next inspection date):**

- A)  $t = \text{Actual inspection thickness} - 2 \times \text{estimated corrosion loss}$
- B)  $t = \text{Actual inspection thickness} - \text{estimated corrosion loss} + \text{corrosion allowance}$
- C)  $t = \text{Actual inspection thickness} - 2 \times \text{estimated corrosion loss} + \text{corrosion allowance}$
- D)  $t = \text{Actual inspection thickness} - 2 \times \text{estimated corrosion loss} - \text{corrosion allowance}$

**Answer: A (API 510, Para. 7.3.3) MAWP Determination Rules**

**314. When applying MAWP Calcs to determine the continued use of a pressure vessel in the corroded service condition, MAWP code calculation values used to determine value  $t$  SHALL be done per which of these formulas in accordance with API 510 rules?**

- A) MAWP Code Calc Value  $t = t_{\text{actual}} - (\text{Corr. rate} \times \text{Insp Interval in years}) + \text{any CA}$
- B) MAWP Code Calc Value  $t = t_{\text{actual}} - 2 (\text{Corr. rate} \times \text{Insp Interval in years}) - \text{any CA}$
- C) MAWP Code Calc Value  $t = t_{\text{actual}} - 2 (\text{Corr. rate} \times \text{Insp Interval in years}) + \text{any CA}$
- D) MAWP Code Calc Value  $t = t_{\text{actual}} - 2 (\text{Corr. rate} \times \text{Insp Interval in years})$

**Answer: D (API 510, Para. 7.3.3) MAWP Determination Rules**

**315. Regarding MAWP Calcs and  $t$  actual determinations, if actual thickness determined by inspection is greater than a thickness reported in Material Test or Manufacturer Data Report, it must be confirmed by multiple thickness measurements using a procedure approved by:**

- A) Inspector
- B) Engineer
- C) Engineer & Inspector
- D) None of these

**Answer: A (API 510, Para. 7.3.4) MAWP Determination Rules**

## **API 510 Code (16 Closed Book Topics) FFS Analysis Corroded Regions = also OB**

**316. The purpose for a fitness for service analysis of a corroded region in a pressure vessel is to consider API 510 rules for evaluating corrosion and pitting at any inspection in order to:**

- A) Determine and adjust the actual thickness & maximum corrosion rate for any part of a vessel
- B) Determine the minimum thickness and remaining corrosion allowance for the vessel
- C) Determine the remaining thickness of a vessel and adjust it accordingly
- D) Determine the remaining life of a vessel and adjust it accordingly

**Answer: A (API 510, Para. 7.4.1) FFS Analysis of Corroded Regions**

**317. When evaluating a locally thinned area, wall thicknesses may be averaged over a length not exceeding (Assume vessel ID is greater than 60 inches or 150cm):**

- A) The lesser of  $\frac{1}{2}$  vessel diameter or 20 in. (50 cm)
- B) The lesser of  $\frac{1}{3}$  vessel diameter or 40 in. (100 cm)
- C) The lesser of  $\frac{1}{2}$  vessel diameter or 40 in. (100 cm)
- D) The lesser of  $\frac{1}{3}$  vessel diameter or 20 in. (50 cm)

**Answer: B (API 510, Para. 7.4.2.1) FFS Analysis of Corroded Regions**

**318. When evaluating a locally thinned area, wall thicknesses may be averaged over a length not exceeding (Assume vessel ID is less than or equal to 60 inches or 150cm):**

- A) The lesser of  $\frac{1}{2}$  vessel diameter or 40 in. (100 cm)
- B) The lesser of  $\frac{1}{3}$  vessel diameter or 40 in. (100 cm)
- C) The lesser of  $\frac{1}{2}$  vessel diameter or 20 in. (50 cm)
- D) The lesser of  $\frac{1}{3}$  vessel diameter or 20 in. (50 cm)

**Answer: C (API 510, Para. 7.4.2.1) FFS Analysis of Corroded Regions**

**319. When evaluating a locally thinned area and averaging corrosion over a length defined by API 510 rules (based on vessel ID), how must these “averaging” thickness readings be spaced?**

- A) Readings shall be taken anywhere & shall be as many as deemed necessary by the inspector
- B) Readings shall be taken along a straight line using at least 5 measurements (as a minimum)
- C) Readings shall be taken along a straight line and there is no minimum number required
- D) Readings shall be taken along a straight line & equally spaced (as selected by Inspector)

**Answer: D (API 510, Para. 7.4.2.2) FFS Analysis of Corroded Regions**

**320. When evaluating a locally thinned area and averaging corrosion over a length defined by API 510 rules (based on vessel ID) and longitudinal stresses govern, thickness readings are:**

- A) Taken in any orientation deemed necessary by Inspector (longitudinal, circumferential)
- B) Taken along a circumferential length (in an arc)
- C) Taken along a longitudinal length
- D) None of these are correct

**Answer: B (API 510, Para. 7.4.2.3) FFS Analysis of Corroded Regions**

### **API 510 Code (16 Closed Book Topics) FFS Analysis Corroded Regions = also OB**

**321. When evaluating a locally thinned area and averaging corrosion over a length defined by API 510 rules (based on vessel ID) and circumferential stresses govern, thickness readings are:**

- A) Taken in any orientation deemed necessary by Inspector (longitudinal, circumferential)
- B) Taken along a circumferential length (in an arc)
- C) Taken along a longitudinal length
- D) None of these are correct

**Answer: C (API 510, Para. 7.4.2.3) FFS Analysis of Corroded Regions**

**322. When evaluating a locally thinned area and averaging corrosion over a length defined by API 510 rules (based on vessel ID) and this is near a nozzle, the designated length SHALL not:**

- A) Extend within an area of a nozzle by at least 20 in (50cm) or 40 in (100cm) based on vessel ID
- B) Extend within the limits of the reinforcement as defined in the construction code
- C) Extend within the area covered by the reinforcement element
- D) None of these are correct

**Answer: B (API 510, Para. 7.4.2.4) FFS Analysis of Corroded Regions**

**323. When performing remaining life calcs, the lowest average of any length (in any number of lines selected by the Inspector where equally spaced readings were taken) in the corroded area is to be substituted for calculation value:**

- A)  $t_{\text{actual}}$
- B)  $t_{\text{required}}$
- C)  $t_{\text{initial}}$
- D) None of these

**Answer: A (API 510, Para. 7.4.2.5) FFS Analysis of Corroded Regions**

**324. During the evaluation of pitting in a corroded region of a vessel, widely scattered pits may be ignored as long as all of the following are true EXCEPT:**

- A) Sum of pit dimensions (deeper than CA) along any straight 8-in (20-cm) line is  $\leq 2$  in (5 cm)
- B) Total pitted area (deeper than CA) does not exceed 7 in<sup>2</sup> (45cm<sup>2</sup>) in 8-in (20-cm) diam. circle
- C) Remaining thickness below a pit is greater than one-half the required thickness
- D) Any pitting deemed by the Inspector to be ignored (deeper than the CA)

**Ans: D (API 510, Par. 7.4.3) FFS Analysis of Corroded Regions ... Widely Scattered Pits 3 Rules**

**325. During the evaluation of pitting in a corroded region of a vessel, widely scattered pits may be ignored if which of the following are true:**

- A) Sum of pit dimensions (deeper than CA) along any straight 8-in (20-cm) line is  $\leq 2$  in (5 cm)
- B) Sum of pit dimensions (deeper than CA) along any straight 8-in (20-cm) line is  $\geq 2$  in (5 cm)
- C) Sum of pit dimensions (no deeper than CA) on any straight 8-in (20-cm) line is  $\leq 2$  in (5 cm)
- D) Sum of pit dimensions (no deeper than CA) on any straight 8-in (20-cm) line is  $\geq 2$  in (5 cm)

**Answer: A (API 510, Para. 7.4.3) FFS Analysis of Corroded Regions ... Widely Scattered Pits**

## **API 510 Code (16 Closed Book Topics) FFS Analysis Corroded Regions = also OB**

**326. During the evaluation of pitting in a corroded region of a vessel, widely scattered pits may be ignored if which of the following are true:**

- A) Total pitted area (deeper than CA)  $\leq 8 \text{ in}^2$  (45cm<sup>2</sup>) in any 7-in (20-cm) diameter circle
- B) Total pitted area (deeper than CA)  $\geq 8 \text{ in}^2$  (45cm<sup>2</sup>) in any 7-in (20-cm) diameter circle
- C) Total pitted area (deeper than CA)  $\leq 7 \text{ in}^2$  (45cm<sup>2</sup>) in any 8-in (20-cm) diameter circle
- D) Total pitted area (deeper than CA)  $\geq 7 \text{ in}^2$  (45cm<sup>2</sup>) in any 8-in (20-cm) diameter circle

**Answer: C (API 510, Para. 7.4.3) FFS Analysis of Corroded Regions ... Widely Scattered Pits**

**327. During the evaluation of pitting in a corroded region of a vessel, widely scattered pits may be ignored if which of the following are true:**

- A) Remaining thickness below a pit is greater than  $\frac{1}{2}$  of t required
- B) Remaining thickness below a pit is greater than or equal to  $\frac{1}{2}$  of t required
- C) Remaining thickness below a pit is greater than  $\frac{1}{2}$  of t required (less the CA)
- D) Remaining thickness below a pit is greater than or equal to  $\frac{1}{2}$  of t required (less the CA)

**Answer: A (API 510, Para. 7.4.3) FFS Analysis of Corroded Regions ... Widely Scattered Pits**

**328. Regarding Evaluation Methods for Thinning, when API 579 design by analysis methods are used to evaluate blend ground areas (after defect removal), it is important to ensure that:**

- A) Blend ground areas are not located in the immediate area of an existing pressure vessel weld
- B) There are no sharp corners in blend ground areas (to minimize stress concentration effects)
- C) That remaining wall thickness below a blend ground area is greater than or = to  $\frac{1}{2}$  t required
- D) That remaining wall thickness below a blend ground area is greater than  $\frac{1}{2}$  t required

**Answer: B (API 510, Para. 7.4.4.1) FFS Analysis of Corroded Regions ... Blend Ground Areas**

**329. Regarding Evaluation Methods for Thinning, when using ASME Sect. VIII, Div. 2, App 4 values for determination of stress using the 2/3 stress rule, who shall perform this analysis?**

- A) Manufacturer of the vessel
- B) Inspector and Engineer
- C) Manufacturer of the vessel and Engineer
- D) Engineer only

**Answer: D (API 510, Para. 7.4.4.2) FFS Analysis of Corroded Regions ... Div 2 ... 2/3 Stress Rule**

**330. Regarding evaluation of corroded regions and joint efficiency adjustments for areas near corroded welds, when the vessel surface AWAY FROM A WELD is corroded & joint efficiency is less than 1.0, an independent calc using an appropriate weld joint factor (typically = 1.0) can be made. For this calculation, the surface at a weld includes (what distance)?**

- A) 1 inch on either side of a weld (measured from toe) regardless of thickness
- B) 2 inches on either side of a weld (measured from toe) regardless of thickness
- C) 1 inch (OR  $2 \times t$  required) on either side of a weld (measured from toe), use greater value
- D) 2 inches (OR  $2 \times t$  required) on either side of a weld (measured from toe), use greater value

**Ans: C (API 510, Par. 7.4.5) FFS Analysis of Corroded Regions ... Joint Efficiency Adjustments**

**Note: "A" would be correct if  $\rightarrow$  ... 1 inch minimum on either side of weld (measured from toe)**

## **API 510 Code (16 Closed Book Topics) FFS Analysis & Evaluations = also OB**

**331. Regarding Fitness for Service Analysis of Corroded areas in heads (assume an ellipsoidal head is corroded in the knuckle region), the  $t$  required can be determined by using the Construction Code formula for:**

- A) Torispherical head thickness
- B) Ellipsoidal head thickness
- C) Hemispherical head thickness
- D) None of these

**Answer: B (API 510, Par. 7.4.6.1) FFS Analysis of Corroded Regions ... Corroded Areas in Heads**

**332. Regarding Fitness for Service Analysis of Corroded areas in heads (assume an ellipsoidal head is corroded in the central portion of a head), the  $t$  required can be determined by using the Construction Code formula for:**

- A) Ellipsoidal head thickness
- B) Torispherical head thickness
- C) Toriconical head thickness
- D) Hemispherical head thickness

**Answer: D (API 510, Par. 7.4.6.1) FFS Analysis of Corroded Regions ... Corroded Areas in Heads**

**333. Fitness-for-service evaluations, such as those documented in API 579, may be used for the evaluation of specific damage types that include all of the following EXCEPT:**

- A) To evaluate metal loss where the remaining wall is less than  $t$  required
- B) To evaluate blisters and laminations and crack-like flaws
- C) To evaluate weld misalignment and shell distortions
- D) To evaluate the effects of fire damage

**Ans: A (API 510, Par. 7.5.a/b/c/d/etc) FFS Evaluation API 579 → RW less than the Corr Allow!**

**334. When Inspectors are working on code calculations (Required Thickness Determinations), they must know which of the following statements is TRUE regarding rules for  $t$  required.**

- A) Required thickness shall be based on pressure considerations using the appropriate design formula and code allowable stress values
- B) Required thickness shall be based on pressure and structural considerations using appropriate design formulas and code allowable stress values
- C) Required thickness shall be based on pressure, mechanical, and structural considerations using the appropriate design formulas and code allowable stress values
- D) Required thickness shall be based on pressure, mechanical and structural considerations using any design formulas and stress values

**Ans: C (API 510, Par. 7.6)  $t$  required Determinations → Must know!**

**335. For services with high potential consequences if failure were to occur, the engineer should consider increasing WHAT VALUE to provide for unanticipated/unknown loadings, undiscovered metal loss, or resistance to normal abuse?**

- A)  $t$  required
- B)  $t$  structural
- C)  $t$  initial
- D) Corrosion Allowance

**Ans: A (API 510, Par. 7.6)  $t$  required determinations → Must know!**

**API 510 Code (16 Closed Bk Topic) Eval. of Equip (Min. Documentation) = & OB**

**336. For a vessel built in 1970 having no nameplate and minimal design documentation, which of these steps may NOT be used to properly verify operating integrity?**

- A) Define design parameters, prepare drawings & perform insp. to determine vessel condition
- B) Perform design calculations based upon the applicable construction codes & standards used
- C) Attach nameplate showing MAWP & Temperature, minimum allowable temperature & date
- D) Perform pressure test as soon as practical (per the current applicable code of construction)

**Ans: D ... (510, Par. 7.7) Evaluation of existing Equip (Minimal documentation) → Must know!**

**337. For a pressure vessel constructed in 1970 having no nameplate and minimal design and construction documentation, which of the following is a correct action to be taken for calcs?**

- A) Use allowable stress values of the 1999 Addenda (based on current design factors)
- B) Use allowable stress values from Code Case 2290 (based on current design factors)
- C) Use allowable stress values of the current ASME Code (based on design factor of 3.5)
- D) None of these is the correct action to take

**Ans: D ... (510, Par. 7.7) Evaluation of existing Equip (Minimal documentation) → Must know!**

**338. ASME Code Sect. VIII, Div I, Par UG-10(c) provides guidance on evaluation of unidentified materials and requires what actions to properly identify materials used in pressure vessels?**

- A) Cutting a sample and doing a chemical composition analysis
- B) Cutting a sample and doing a chemical composition analysis and performing mechanical tests
- C) Performing Positive Material Identification testing and performing limited mechanical testing
- D) None of these are correct

**Ans: B ... (510, Par. 7.7 & UG-10c) Eval existing Equip (Minimal documentation) → Open Book!**

**339. Alternative to ASME Code Sect. VIII, Div I, Par UG-10(c) (requiring cut samples, chemical composition analysis and mechanical tests), it is allowed to ASSUME an "S" value (allowable stress value used for calculations) for an unknown P-No 1 material specification using:**

- A) Stress Values for SA-283 Gr. A
- B) Stress Values for SA-283 Gr. B
- C) Stress Values for SA-283 Gr. C
- D) Stress Values for SA-285 Gr. C

**Ans: C ... (Par. 7.7.3) Evaluation of existing Equip (Minimal documentation) → Must know!**

**340. For a pressure vessel constructed in 1970 having no nameplate and minimal design and construction documentation, using unknown materials made of alloys or nonferrous material, what may be used to determine material type (to determining allowable stress values)?**

- A) X-ray fluorescence (XRF) analysis
- B) Chemical composition testing
- C) Optical fluorescence analysis
- D) None of these

**Ans: A ... (Par. 7.7.3) Evaluation of existing Equip (Minimal documentation) → Must know!**

## **API 510 Code (16 Closed Bk Topic) Eval. of Equip (Min. Documentation) = & OB**

**341. For vessels with minimal or no design or construction information and the extent of radiography originally performed is not known, what must be done per API 510 to determine Value E for calculations in order to assure vessel integrity?**

- A) Use 0.7 joint factor (butt welds) or perform radiography if a higher joint factor is required
- B) Use 1.0 joint factor (butt welds) only after performing full radiography on all vessel welds
- C) Use 0.85 joint factor (butt welds) only after performing spot radiography on all vessel welds
- D) Use 0.70 joint factor (butt welds) only after performing spot radiography on all vessel welds

**Ans: A ... (Par. 7.7.3) Evaluation of existing Equip (Minimal documentation) → Must know!**

**342. What may be required after performing radiography on welds in a vessel with minimal or no design and construction documentation and the extent of radiography originally done was not known (in order to determine value E for calcs)?**

- A) Nothing is required because RT results may be ignored & value E always assumed to be 0.70
- B) Nothing is required because RT results may be ignored & value E always assumed to be 1.00
- C) RT findings may result in the need for a fitness-for-service evaluation and significant repairs
- D) RT findings may result in the need for a fitness-for-service evaluation

**Ans: C ... (Par. 7.7.3) Evaluation of existing Equip (Minimal documentation) → Must know!**

**343. As part of the process for verifying vessel integrity when minimal/no design documents exist for a vessel, a nameplate or stamp must be attached to the vessel showing:**

- A) MAWP and temperature, minimum allowable temp, test pressure, extent of RT, and date
- B) MAWP and temperature, minimum allowable temperature, test pressure, and date
- C) MAWP and temperature, minimum allowable temperature, and date
- D) None of these is correct per API 510 rules

**Ans: C ... (Par. 7.7.3) Evaluation of existing Equip (Minimal documentation) → Must know!**

**344. As part of the process for verifying vessel integrity when minimal/no design documents exist for a vessel, a pressure test must be performed as soon as practical as required by:**

- A) The latest edition of the applicable construction code & standards used for the vessel
- B) The applicable code of construction used for the design calculations
- C) Any code deemed acceptable by both the Engineer and Inspector
- D) None of these is correct

**Ans: B ... (Par. 7.7.3) Evaluation of existing Equip (Minimal documentation) → Must know!**

**345. As part of the process for verifying vessel integrity for a vessel when minimal/no design documents exist for a vessel, Do not use allowable stress values of the current ASME Code (based on design factor of 3.5) for vessels designed to an edition or addendum of the ASME Code earlier than the (Assume No earlier Code Case was used):**

- A) 1996 Addenda
- B) 1997 Addenda
- C) 1998 Addenda
- D) 1999 Addenda

**Ans: D ... (Par. 7.7.3) Evaluation of existing Equip (Minimal documentation) → Must know!**

## **API 510 Code (16 Closed Book Topics) Topic # 13**

**346. What are required record types to be kept and for what equipment per API 510 rules?**

- A) Inspection and maintenance history records for pressure vessels & pressure relieving devices
- B) Permanent and progressive records for pressure vessels and pressure relieving devices
- C) Inspection and maintenance history records for pressure vessels only
- D) Inspection history records for all pressure vessels only

**Answer: B ... (API 510, Para. 7.8.1) Topic 13 Inspection Records & Reports)**

**347. Who is required to maintain permanent and progressive records & reports per API 510?**

- A) Inspector
- B) Inspection Organization
- C) Owner/User
- D) Owner/User and Inspection Organization

**Answer: C (API 510, Para. 7.8.1) Topic 13 Inspection Records & Reports)**

**348. For how long must permanent records be maintained per API 510?**

- A) Throughout the service life of each pressure vessel and pressure-relieving device
- B) For at least 5 years after the equipment is taken out of service
- C) For the time period stated in the Quality Assurance Manual
- D) None of these are correct

**Answer: A (API 510, Para. 7.8.1) Topic 13 Inspection Records & Reports)**

**349. Progressive records must be regularly updated and include new information pertinent to all of the following items except:**

- A) Personnel Safety history with the equipment
- B) Operational history of the equipment
- C) Inspection history of the equipment
- D) Maintenance history of the equipment

**Answer: A (API 510, Para. 7.8.1) Topic 13 Inspection Records & Reports)**

**350. According to API 510 rules, Pressure vessel and pressure-relieving device records SHALL contain all of the following types of information pertinent to mechanical integrity EXCEPT:**

- A) Construction & design information & any applicable repair, alteration & rerating information
- B) Inspection History records including reports & data for each type of inspection conducted
- C) Fitness-for-service assessment documentation as described in detail in API 579
- D) Maintenance History records including any process upsets or unusual events

**Answer: D (API 510, Para. 7.8.2) Topic 13 Inspection Records & Reports) Para. 7.8.3 states maintenance history records SHOULD (not shall) be available to the Inspector)**

## **API 510 Code (16 Closed Book Topics) Topic # 14**

**351. All repairs and alterations shall be performed by any of the following EXCEPT:**

- A) An owner or user of pressure vessels who repairs his own equipment
- B) A holder of a valid R-stamp issued and authorized by the ASME Organization
- C) Contractor whose qualifications are acceptable to the pressure-vessel owner or user
- D) Holder of valid ASME Certificate of Authorization for use of ASME Code symbol U-stamp

**Answer: B ... (Para. 8.1) Topic 14 Repairs & Alterations → Repair Org ... R-Stamp = Nat. Board**

**352. All repairs and alterations shall be performed by ... (this is on every API 510 examination) a repair organization ... in accordance with the principles of any of the following EXCEPT:**

- A) Applicable ASME code
- B) Applicable construction code
- C) Applicable repair code
- D) API 510 code

**Answer: D ... (Para. 8.1) Topic 14 Repairs & Alterations → Repair Org ... 510 = inspection code**

**353. Repairs to pressure-relieving devices should follow the guidelines given by:**

- A) API 510
- B) API 520
- C) API 576
- D) Manufacturer of pressure-relieving device

**Answer: C ... (Para. 8.1) Topic 14 Repairs & Alterations → Repair Org ... PZV = API 576**

**354. ALL Repair & Alteration work must ALWAYS be authorized by (Whom) BEFORE work is started by:**

- A) ENGINEER authorizes the work BEFORE the work is started by a REPAIR ORGANIZATION
- B) INSPECTOR authorizes the work BEFORE the work is started by a REPAIR ORGANIZATION
- C) OWNER/USER authorizes the work BEFORE the work is started by a REPAIR ORGANIZATION
- D) None of these are correct

**Answer: B ... (Para. 8.1.1) Topic 14 Repair & Alteration → Authorization of Repair/Alteration**

**355. Authorization for alterations to pressure vessels that comply with ASME Section VIII, Divisions 1 and 2, and for repairs to pressure vessels that comply with ASME Section VIII, Division 2, may not be given until:**

- A) INSPECTOR ALWAYS authorizes the work and ENGINEER shall also authorize the work
- B) OWNER/USER ALWAYS authorizes the work and ENGINEER shall also authorize the work
- C) ENGINEER authorizes the work and OWNER/USER ALWAYS shall also authorize the work
- D) ENGINEER ALWAYS authorizes the work for ALL repairs and alterations

**Answer: A ... (Para. 8.1.1) Topic 14 Repairs & Alterations → Authorize Repairs/Alterations**

## API 510 Code (16 Closed Book Topics) Topic # 14

**356. During authorization of repairs/alterations, inspector will designate conditions where work may not proceed until an inspection or NDE is performed and documented. These are:**

- A) Condition Monitoring Points
- B) Inspection points
- C) Examination Points
- D) Hold Points

**Answer: D ... (Para. 8.1.1) Topic 14 Repairs & Alterations → Authorize Repairs/Alterations**

**357. The inspector may give prior general authorization for limited or routine repairs on a specific vessel IF any of the following conditions exist EXCEPT:**

- A) Repairs include grinding on existing welds (spatter removal) prior to installing a new coating
- B) Inspector is satisfied with the competency of the repair organization
- C) Repairs are welding overlay of pitting on a PWHT'd vessel
- D) Repairs are the kind that will not require a pressure test

**Answer: C ... (Para. 8.1.1) Topic 14 Repairs & Alterations → Authorize Repairs/Alterations**

**358. API authorized inspectors may give prior authorization for routine repairs not involving:**

- A) Pressure tests
- B) Radiography
- C) Pneumatic testing
- D) Final visual inspections

**Answer: A (API 510 Section/Para. 8.1.1 ... Make sure you know the “routine repair” rule)**

**359. Before any REPAIR OR ALTERATION is performed, all proposed methods of design, execution, materials, welding procedures, NDE & testing SHALL be approved by:**

- A) BOTH ENGINEER & INSPECTOR approve all of these items before any repair or alteration
- B) INSPECTOR always approves all of these items before any repair or alteration
- C) ENGINEER always approves all of these items before any repair or alteration
- D) Owner/User approves all of these items before any repair or alteration

**Ans: B ... (Para. 8.1.2.1) Topic 14 → Approve Repair/Alteration design/material/WPS/NDE etc**

**360. Before any ALTERATION is performed, all proposed methods of design, execution, materials, welding procedures, NDE & testing SHALL be approved by WHOM:**

- A) INSPECTOR & ENGINEER both must approve all of these items before any alteration
- B) INSPECTOR only approves all of these items before any alteration
- C) ENGINEER only approves all of these items before any alteration
- D) Owner/User approves all of these items before any alteration

**Ans: A ... (Para. 8.1.2.1) Topic 14 → Approve Repair/Alteration design/material/WPS/NDE etc**

## **API 510 Code (16 Closed Book Topics) Topic # 14**

**361. Part of the APPROVAL process for repairs or alterations is that the inspector may establish hold points to be implemented (when):**

- A) Before the work begins
- B) During the work execution
- C) After the work is finished
- D) At any time before, during or after work

**Answer: B ... (Para. 8.1.2.1) Topic 14 Repairs & Alterations → Approval of Repair/Alteration**

**362. The inspector shall approve all specified repair and alteration work at designated hold points and after completion of the work in accordance with the approved:**

- A) Quality Assurance Plan
- B) Quality Control Plan
- C) Repair Plan
- D) Inspection Plan

**Answer: C ... (Para. 8.1.2.2) Topic 14 Repairs & Alterations → Approval of Repair/Alteration**

**363. New vessel nozzles, connections, or replacement parts must meet design requirements for the:**

- A) Design code
- B) Inspection code
- C) Construction code
- D) Applicable construction code

**Answer: D ... (Para. 8.1.3) Topic 14 Repairs & Alterations → Design of Repairs/Alterations**

**364. The design of replacement parts and new nozzles shall employ a stress value that is (what) and who shall approve the addition of all new nozzles?**

- A) Same allowable stress criteria used for vessel design & Engineer approves all new nozzles
- B) Allowable stress criteria used in latest edition of code & Engineer approves all new nozzles
- C) Any allowable stress criteria the engineer wants to use & Engineer approves all new nozzles
- D) None of these is correct

**Answer: A ... (Para. 8.1.3) Topic 14 Repairs & Alterations → Design of Repair/Alteration**

**365. The material used in making repairs or alterations shall conform to the:**

- A) Design code
- B) Inspection code
- C) Construction code
- D) Applicable construction code

**Answer: D ... (Para. 8.1.4) Topic 14 Repair & Alteration → Material Rules on Repair/Alteration**

## **API 510 Code (16 Closed Book Topics) Topic # 14**

**366. Material markings, material control practices and material test reports (MTRs) provided to owner/user must comply with the:**

- A) Design code
- B) Inspection code
- C) Construction code
- D) Applicable construction code

**Answer: D ... (Para. 8.1.4) Topic 14 Repair & Alteration → Material Rules on Repair/Alteration**

**367. Materials used for welded repairs and alterations shall be:**

- A) Of known weldable quality and compatible with the original material
- B) Of the same tensile strength and stress values as the original material
- C) The same or greater tensile strength/stress values as the original material
- D) Considered weldable with differing chemical composition value as the original material

**Answer: A ... (Para. 8.1.4) Topic 14 Repair & Alteration → Material Rules on Repair/Alteration**

**368. Carbon or alloy steel with carbon content over what percentage shall not be welded.**

- A) 0.25%
- B) 0.30%
- C) 0.35%
- D) 0.40%

**Answer: C ... (Para. 8.1.4) Topic 14 Repair & Alteration → Material Rules on Repair/Alteration**

**369. Repairs to defects found in pressure vessel components may be made by several techniques often dependent upon all of the following conditions EXCEPT for:**

- A) The design requirements of the pressure vessel
- B) The amount of cost associated with repair
- C) The size and nature of the defect
- D) The materials of construction

**Answer: B ... (Para. 8.1.5) Topic 14 Repairs & Alterations → Defect Repairs (Repair/Alteration)**

**370. How may repair techniques be classified depending upon their design and conformance to the applicable construction code?**

- A) Repairs may be classified as permanent or temporary repairs
- B) Repairs may be classified as major or minor repairs
- C) Repairs may be classified as routine or non-routine
- D) None of these is correct

**Answer: A ... (Para. 8.1.5) Topic 14 Repairs & Alterations → Defect Repairs (Repair/Alteration)**

## **API 510 Code (16 Closed Book Topics) Topic # 14**

**371. Documentation of temporary repairs should include all of these items EXCEPT:**

- A) Inspection Plans detailing the change of a temporary repair into a permanent repair
- B) Details of any analyses performed and requirements for future inspections
- C) Location of temporary repairs and specific details about the repair
- D) Due date for installing the permanent repair

**Answer: A ... (API 510, Para. 8.1.5.1.1) Temporary Repair Rules**

**372. Regarding Temporary Repair Documentation, Inspection Plans SHALL include (what):**

- A) Taking thickness readings ASAP in the immediate area adjacent to the temporary repair
- B) Performing NDE after repair ASAP in the immediate area adjacent to a temporary repair
- C) Monitoring the integrity of the temporary repair until permanent repairs are completed
- D) None of these are correct

**Answer: C ... (API 510, Para. 8.1.5.1.1) Temporary Repair Rules**

**373. Temporary repairs may remain in place for a longer period of time (exceeding the planned date for the permanent repair) only if evaluated, documented and approved by:**

- A) Inspector and Engineer, and with Owner/User approval also
- B) Inspector and Engineer
- C) Inspector only
- D) Engineer only

**Answer: B ... (API 510, Para. 8.1.5.1.1) Temporary Repair Rules**

**374. If evaluated, approved & documented by the engineer and inspector, temporary repairs may remain in place (exceeding the planned date for permanent repair) for how long?**

- A) For a maximum period of 5 years to be documented in inspection plans
- B) Permanently because they can be considered permanent by an evaluation
- C) For a period not exceeding the maximum internal/On-stream inspection interval
- D) For a "longer period of time" than the planned date for the permanent repair installation

**Answer: D ... (API 510, Para. 8.1.5.1.1) Temporary Repair Rules**

**375. Temporary repairs should be removed & replaced with suitable permanent repairs (when):**

- A) At next available maintenance opportunity
- B) Within 5 years maximum as per API 510
- C) At next planned Equipment shutdown
- D) Within 10 years as per API 510

**Answer: A ... (API 510, Para. 8.1.5.1.1) Temporary Repair Rules**

## **API 510 Code (16 Closed Book Topics) Topic # 14**

**376. Without special analysis, Fillet-welded patches may be used to make temporary repairs to all of these noted conditions below EXCEPT for:**

- A) Damaged areas of pressure vessel components
- B) Corroded areas of pressure vessel components
- C) Cracked areas of pressure vessel components
- D) Eroded areas of pressure vessel components

**Answer: C ... (API 510, Para. 8.1.5.1.2.1) Temporary Repair Rules ... Fillet-welded Patches**

**377. Fillet-welded patches may not be placed over existing cracks unless:**

- A) Engineer determines cracks will not be expected to propagate from under a patch
- B) Corrosion Specialist determines cracks will not be expected to propagate from under a patch
- C) Inspector & Engineer determine cracks will not be expected to propagate from under a patch
- D) Inspector & Corrosion Specialist determine cracks will not be expected to propagate from under a patch

**Answer: A ... (API 510, Para. 8.1.5.1.2.1) Temporary Repair Rules ... Fillet-welded Patches**

**378. Temporary repairs using fillet-welded patches shall be approved by:**

- A) Inspector and Engineer and Owner/User
- B) Inspector & Engineer only
- C) Inspector, Engineer & Repair Org having a valid R stamp
- D) Engineer only

**Answer: B ... (API 510, Para. 8.1.5.1.2.1) Temporary Repair Rules ... Fillet-welded Patches**

**379. Fillet-welded patches require special design consideration especially related to:**

- A) Stress Values
- B) Temperature
- C) Corrosion Allowance
- D) Weld joint efficiency

**Answer: D ... (API 510, Para. 8.1.5.1.2.2) Temporary Repair Rules ... Fillet-welded Patches**

**380. Fillet-welded patches may be applied to the internal or external surfaces of shells, heads, and headers provided that, in the judgment of the engineer, which of the following is true:**

- A) Patches provide a design safety equivalency to applicable code designed reinforced openings
- B) Strain in patches results in fillet-weld stresses that exceed allowable stresses for such welds
- C) Fillet-welded patches are designed to absorb a portion of the membrane strain of the parts
- D) Allowable membrane stress is exceeded in the vessel parts or the patches

**Answer: A ... (API 510, Para. 8.1.5.1.2.2) Temporary Repair Rules ... Design Considerations**

**API 510 Code (16 Closed Book Topics) Topic # 14**

**381. A fillet-welded patch shall not be installed:**

- A) On top of an existing fillet-welded patch
- B) On top of an existing fillet-welded patch, unless approved by the Inspector
- C) On top of an existing fillet-welded patch, unless approved by the Engineer
- D) On top of an existing fillet-welded patch, unless approved by the Inspector and Engineer

**Answer: A ... (API 510, Para. 8.1.5.1.2.3) Temporary Repair Rules ... Lap Patch Spacing Rules**

**382. When installing a fillet-welded patch adjacent to an existing fillet-welded patch, the distance between the toes of the fillet weld shall not be less than:**

- A) 2 x the square root of (vessel inside radius x actual vessel wall thickness under the patch)
- B) 4 x the square root of (vessel inside radius x actual vessel wall thickness under the patch)
- C) 2 x the square root of (vessel inside radius x nominal vessel wall thickness under the patch)
- D) 4 x the square root of (vessel inside radius x nominal vessel wall thickness under the patch)

**Answer: B ... (API 510, Para. 8.1.5.1.2.3) Temporary Repair Rules ... Lap Patch Spacing Rules**

**383. Regarding the spacing between lap patches using the API 510 required distance formula,  $D = 4 \times \text{the square root of (vessel inside radius x actual vessel wall thickness under the patch)}$ , what does the distance refer to?**

- A) D = Minimum distance between the ends of patch plates, excluding the fillet welds
- B) D = Maximum distance between the ends of patch plates, excluding the fillet welds
- C) D = Minimum distance between toes of fillet welds of adjacent fillet welds (inches or mm)
- D) D = Maximum distance between toes of fillet welds of adjacent fillet welds (inches or mm)

**Answer: C ... (API 510, Para. 8.1.5.1.2.3) Temporary Repair Rules ... Lap Patch Spacing Rules**

**384. (OPEN BOOK & Closed) ... What is the minimum spacing (toe to toe of adjacent welds) for a vessel with an ID of 60 inches (1500 mm) & a corroded thickness of 1 inch (25.4 mm)?**

- A)  $4 \times \text{sq. root of (vessel ID radius x actual vessel wall thickness under patch)} = 15 \text{ in. (381 mm)}$
- B)  $4 \times \text{sq. root of (vessel ID radius x actual vessel wall thickness under patch)} = 22 \text{ in. (559 mm)}$
- C)  $4 \times \text{sq. root of (vessel ID radius x actual vessel wall thickness under patch)} = 27 \text{ in. (686 mm)}$
- D)  $4 \times \text{sq. root of (vessel ID radius x actual vessel wall thickness under patch)} = 31 \text{ in. (781 mm)}$

**Answer: D ... (API 510, Para. 8.1.5.1.2.3) Temporary Repair Rules ... Lap Patch Spacing Rules**

**Work Shown:  $D = 4 \times \text{sq. root of (60 x 1)} = 4 \times \text{sq. root of 60} = 4 \times 7.75 = 31 \text{ inches or 155 mm}$**

**385. Fillet-welded patch plates shall have rounded corners with a minimum radius of:**

- A) There is no minimum radius because rounded corners are not required for lap patches
- B) The minimum required radius =  $\frac{1}{2}$  inch (13mm)
- C) The minimum required radius = 1 in. (25 mm)
- D) The minimum required radius = 2 in. (50 mm)

**Answer: C ... (API 510, Para. 8.1.5.1.2.4) Temporary Repair Rules ... Lap Patch Spacing Rules**

**API 510 Code (16 Closed Book Topics) Topic # 14**

**386. A full encirclement lap band repair may be considered if the design is approved and documented by:**

- A) Inspector and Engineer and Owner/User (must also approve in writing)
- B) Inspector and Engineer
- C) Inspector
- D) Engineer

**Answer: B ... (API 510, Para. 8.1.5.1.3) Temporary Repair Rules ... Lap Band Repair Rules**

**387. A full encirclement lap band repair may be considered if all the following requirements are met EXCEPT:**

- A) The repair is covering a crack in the vessel shell
- B) The band is designed to contain the full vessel design pressure
- C) The design is approved and documented by the engineer and inspector
- D) All longitudinal seams in the repair band are full penetration butt welds of code quality

**Answer: A ... (API 510, Para. 8.1.5.1.3) Temporary Repair Rules ... Lap Band Repair Rules**

**388. Which of the following statements are FALSE regarding use of Non-Penetrating Nozzles (including pipe caps attached as nozzles) using the appropriate code methods of attachment?**

- A) Nozzle material shall be suitable for contact with contained fluid at design conditions
- B) They may be used as permanent repairs (excluding cracks) with appropriate code design
- C) They may be used as permanent repairs (including cracks) with the appropriate code design
- D) Damage mechanism causing the repair is considered along with future inspection monitoring

**Answer: C ... (API 510, Para. 8.1.5.1.4) Temporary Repair Rules ... Unusual Nozzle Repair Rules**

**389. Typical permanent repair techniques include all of the following EXCEPT:**

- A) Excavating a defect & contour blend-grinding as per API 579 requirements
- B) Excavating a defect & repair welding the excavation & weld overlay of corroded areas
- C) Replacing a section or the component containing the defect
- D) Adding strip or plate lining to the exterior surface.

**Answer: D ... (API 510, Para. 8.1.5.2.1) Permanent Repair Rules ... Technique Rules**

**390. Who must be consulted before repair of a crack at a discontinuity where stress concentrations may be serious?**

- A) Both the Engineer & Inspector
- B) R Stamp Holder or Vessel Manufacturer
- C) Inspector
- D) Engineer

**Answer: D ... (API 510, Para. 8.1.5.2.1) Permanent Repair Rules ... Technique Rules**

**API 510 Code (16 Closed Book Topics) Topic # 14**

**391. Typical permanent repair techniques include all of the following EXCEPT:**

- A) Excavating a defect and contour blend-grinding per API 579
- B) Excavating a defect and repair welding the excavation
- C) Replacing an entire section or component containing defects
- D) Lap Band and Weld overlays of corroded areas

**Answer: D (API 510, Para. 8.1.5.2.1) Permanent Repair Rules**

**392. Insert (flush) patches may be used if all of the following requirements are met EXCEPT:**

- A) Has full-penetration groove welds & is RT examined and approved per applicable code only
- B) Has full-penetration groove welds & is Shear Wave UT'd & approved per applicable code only
- C) Patch corners not extending to existing long/horizontal welds have a 25mm minimum radius
- D) Weld proximity to existing welds (weld spacing) was reviewed and approved by the engineer

**Ans: B ... (510, Para. 8.1.5.2.1) Permanent Repair Rules ... Insert Plate Special UT Rules apply**

**393. Insert (flush) patch permanent repairs may use Ultrasonic shear wave exams substituted for RT. Regarding the use of insert (flush) patches, which of these is a FALSE statement?**

- A) All NDE (including UT Shear Wave) procedures are to be approved by the Inspector
- B) An industry-qualified UT Shear Wave Examiner is to be used on the flush-patch repair
- C) Weld proximity to existing welds (weld spacing) was reviewed and approved by the Inspector
- D) Patch corners not extending to existing long/horizontal welds have a 25 mm minimum radius

**Ans: C ... (510, Para. 8.1.5.2.1) Permanent Repair Rules ... Insert Plate Special UT Rules apply**

**394. Regarding Filler Metal Strength for Overlays and Repairs to Existing Welds, the filler metal used for weld repairs SHOULD have a minimum specified tensile strength that is:**

- A) Equal to or greater than a minimum specified tensile strength of a base metal
- B) Greater than the minimum specified tensile strength of the base metal
- C) Equal to the minimum specified tensile strength of a base metal
- D) Any of these depending upon calcs to determine strength

**Ans: A ... (510, Par. 8.1.5.3.1) Permanent Repair Rules ... Filler Metal Strength Rules for Repair**

**395. If a filler metal to be used will have a minimum specified tensile strength lower than the minimum specified tensile strength of a base metal, All of these items must be true EXCEPT:**

- A) Filler and base metal chemistry shall be compatible regarding weldability & service damage
- B) Repair thickness shall not be more than 50% of base metal required thickness, excluding CA
- C) Repair weld thickness shall be increased by the ratio of the differing min. tensile strengths
- D) Repair weld thickness shall be decreased by the ratio of the differing min. tensile strengths

**Ans: D ... (510, Par. 8.1.5.3.2) Permanent Repair Rules ... Filler Metal Strength Rules for Repair**

**API 510 Code (16 Closed Book Topics) Topic # 14**

**396. If a filler metal used will have a minimum specified tensile strength lower than that of a base metal repaired, both filler metal and base metal chemistry shall be compatible regarding weldability and service damage, and all of these must be true EXCEPT:**

- A) Repair thickness shall not be more than 75% of base metal required thickness, excluding CA
- B) Repair weld thickness shall be increased by a ratio of the differing minimum tensile strengths
- C) Increased repair thickness shall have rounded corners and a 3:1 taper blend into base metal
- D) Repairs shall be made with a minimum of two passes.

**Ans: A ... (510, Par. 8.1.5.3.2) Permanent Repairs ... Filler Metal Strength Rules → 50% Rule**

**397. If a filler metal used will have a minimum specified tensile strength lower than that of a base metal repaired, both filler metal and base metal chemistry shall be compatible regarding weldability and service damage, and all of these must be true EXCEPT:**

- A) Repair thickness shall not be more than 50% of base metal required thickness, excluding CA
- B) Repair weld thickness shall be increased by a ratio of the differing minimum tensile strengths
- C) Increased repair thickness shall have rounded corners and a 4:1 taper blend into base metal
- D) Repairs shall be made with a minimum of two passes.

**Ans: C ... (510, Par. 8.1.5.3.2) Permanent Repairs ... Filler Metal Strength Rule → 3:1 taper rule**

**398. If a filler metal used will have a minimum specified tensile strength lower than that of a base metal repaired, both filler metal and base metal chemistry shall be compatible regarding weldability and service damage, and all of these must be true EXCEPT:**

- A) Repair thickness shall not be more than 50% of base metal required thickness, excluding CA
- B) Repair weld thickness shall be increased by a ratio of the differing minimum tensile strengths
- C) Increased repair thickness shall have rounded corners and a 3:1 taper blend into base metal
- D) Repairs shall be made with a minimum of one pass

**Ans: D ... (510, Par. 8.1.5.3.2) Permanent Repair - Filler Metal Strength → 2 pass minimum rule**

**399. Regarding repairs to SS Weld Overlay and Cladding, the repair procedure(s) to restore removed, corroded, or missing clad or overlay areas shall be first reviewed and approved by:**

- A) Inspector, Engineer and Owner/User
- B) Inspector and Engineer
- C) Inspector
- D) Engineer

**Ans: B ... (510, Par. 8.1.5.4.1) Permanent Repair – SS Weld Overlays & Cladding Rules**

**400. Important factors that may affect repair plans for SS Weld Overlays are all these EXCEPT:**

- A) Deterioration of base metal properties by Chloride SCC of Chromium-Molybdenum alloys
- B) Minimum pressurization temperatures and a need for future periodic examinations
- C) Stress level, base material P-number, and service environment
- D) Possible previously dissolved hydrogen and type of lining

**Ans: A ... (510, Par. 8.1.5.4.2) Permanent Repair – SS Weld Overlays → Temper Embrittlement**

**API 510 Code (16 Closed Book Topics) Topic # 14**

**401. Regarding developing a SS Weld Overlay repair plan for equipment exposed to atomic hydrogen migration in the base metal, all of these important factors must be considered by the engineer EXCEPT:**

- A) Hardening of base metal due to welding, grinding, or arc gouging
- B) PWHT to increase hardness and restore mechanical properties
- C) Outgassing the base metal (removal of Hydrogen)
- D) Preheat and interpass temperature control

**Ans: B ... (Par. 8.1.5.4.3) Perm. Rep, SS Weld Overlay, H<sup>2</sup> Migration, PWHT= decrease hardness**

**402. How shall SS Weld Overlay repairs be monitored and inspected and what NDE applies?**

- A) Repair shall be Inspector monitored. PT exam is after a repair cools down to ambient temps
- B) Repair may be Examiner monitored & PT'd only after a repair cools down to ambient temps
- C) Repair may be inspector or examiner monitored & PT'd only after it cools to ambient temps
- D) None of these is correct per API 510

**Ans: A ... (Par. 8.1.5.4.3) Perm. Rep, SS Weld Overlay, Inspector monitors work & PT exams**

**403. Regarding repairs to vessels constructed with P-3, P-4, or P-5 base materials that have been overlay welded with SS, which of these following statements about NDE exams is False?**

- A) In addition to PT exams on weld overlays, base metal in repair areas should be UT examined
- B) UT shear-wave exams for cracking are to be done as per ASME Sect. V, Art. 4 requirements
- C) UT shear-wave exams are best done after at least a 48 hour delay after repairs are done
- D) UT shear-wave exams are best delayed when alloys can be affected by delayed cracking

**Ans: C ... (Par. 8.1.5.4.4) Perm. Rep, Low Alloy repairs, UT exams = 24 HR delayed cracking**

**404. Regarding on-stream welds & Hot Taps on existing ASME Code constructed vessels, which of these statements is FALSE?**

- A) All repair and alteration welding shall be as per the applicable requirements of ASME Code
- B) Information regarding Oil & Gas Industry welding guidelines may be found in API 582
- C) When making On-stream welds or Hot Taps, inspectors can refer to API 2201
- D) For guidance on welding procedure review refer to API 578

**Ans: D ... (510, Par. 8.1.6.1 & 2) Welding & Hot Tapping – API 577 for WPS review**

**405. Which of these statements is FALSE regarding Repair Organization roles during welding?**

- A) They shall use welders and welding procedures qualified in accordance with ASME IX code
- B) They shall maintain records of qualified WPSs & welding performance qualifications (WPQs)
- C) Welders must weld within the ranges for which they are qualified on their WPSs
- D) These records shall be available to the inspector before the start of welding

**Ans: C ... (Par. 8.1.6.2) Welding & Hot Tapping & WPS & WPQ – WPQs not WPSs**

**API 510 Code (16 Closed Book Topics) Topic # 14**

**406. The repair organization shall maintain records of its qualified welding procedures and its welding performance qualifications. What is the responsibility of the repair organization to the Inspector regarding these records?**

- A) Records shall be available to the inspector at the start of welding
- B) Records shall be available to the inspector prior to the start of welding
- C) Records shall be available to the inspector any time after the start of welding
- D) Records shall be available to the inspector within 1 week after the start of welding

**Ans: B ... (510, Par. 8.1.6.2.2) Welding & Hot Tapping & WPS & WPQ before welding**

**407. Preheat temperature used in making welding repairs shall be in accordance with the:**

- A) Applicable code & qualified welding procedure with any exceptions approved by Engineer
- B) Applicable code & qualified welding procedure with any exceptions approved by Inspector
- C) Applicable code & qualified welding procedure with any exceptions approved by Owner/User
- D) Value on the code qualified welding procedure with any exceptions approved by Inspector

**Ans: A ... (510, Par. 8.1.6.3) Welding & Hot Tapping → Preheat Rules Weld Repairs**

**408. Regarding Preheat temps used in welding repairs, what is the Inspector's responsibility after making sure that qualified welding procedures are available/used by qualified welders?**

- A) Inspector should assure the WPS minimum preheat temperature is known to all welders
- B) Inspector should assure the WPS minimum preheat temperature is used before tack welding
- C) Inspector should assure the WPS minimum preheat temp for repairs is measured/maintained
- D) None of these is correct

**Ans: C ... (510, Par. 8.1.6.3) Welding & Hot Tapping → Preheat Rules for Weld Repairs**

**409. Regarding preheat temps used in making welding repairs, they shall be in accordance with the applicable code & qualified welding procedure, and the inspector should assure that:**

- A) Welder's supervisor knows the required preheat values
- B) He approves any exceptions to preheat rules established in procedure
- C) Welders know what the minimum preheat temperature requirements
- D) The minimum preheat temperature is always measured & maintained

**Ans: D ... (510, Par. 8.1.6.3) Welding & Hot Tapping → Preheat Rules for Weld Repairs**

**410. PWHT of vessel repairs or alterations may be made using any of the following EXCEPT:**

- A) The applicable construction code
- B) The relevant requirements of the ASME code
- C) API 510 approved alternative Controlled Deposition Welding Method
- D) API 510 approved alternative Preheat Method when Notch Toughness tests are not required

**Ans: D ... (510, Par. 8.1.6.4) Welding & Hot Tapping → PWHT Rules for Weld Repairs**

**API 510 Code (16 Closed Book Topics) Topic # 14**

**411. Regarding PWHT, LOCAL PWHT MAY be substituted for 360-degree banding on local repairs on all materials, provided that the following precaution is taken regarding preheating:**

- A) Preheat of 250°F (121°C) or higher, as specified in WPS, is maintained during welding
- B) Preheat of 300°F (150°C) or higher, as specified in WPS, is maintained during welding
- C) Preheat of 350°F (177°C) or higher, as specified in WPS, is maintained during welding
- D) Preheat of 400°F (204°C) or higher, as specified in WPS, is maintained during welding

**Answer: B ... (API 510, Para. 8.1.6.4.1) Welding & Hot Tapping →PWHT Rules for Weld Repairs**

**412. When PWHT is performed for environmental-assisted cracking resistance, LOCAL PWHT MAY be substituted for 360-degree banding on local repairs on all materials, provided that:**

- A) Local PWHT may NEVER be substituted for 360° banding to prevent environmental cracking
- B) Local PWHT temp is maintained for a distance not less than 2 x base metal t (from weld toe)
- C) A preheat of 300°F (150°C) or higher, as specified in the WPS, is maintained during welding
- D) A metallurgical review shall be conducted to assess whether the procedure is acceptable

**Answer: D ... (API 510, Para. 8.1.6.4.1) Welding & Hot Tapping →PWHT Rules for Weld Repairs**

**413. Regarding PWHT, LOCAL PWHT MAY be substituted for 360-degree banding on local repairs on all materials, provided that the local PWHT temp is maintained for a distance not less than two times base metal thickness (from weld toe) using how many thermocouples?**

- A) Suitable # of TCs shall be used (at least 4)
- B) Suitable # of TCs shall be used (at least 3)
- C) Suitable # of TCs shall be used (at least 2)
- D) Suitable # of TCs shall be used (at least 1)

**Answer: C ... (API 510, Para. 8.1.6.4.1) Welding & Hot Tapping →PWHT Rules for Weld Repairs**

**414. Preheat & Controlled Deposition Welding may be used in lieu of PWHT where PWHT is:**

- A) Inadvisable or mechanically unnecessary
- B) Not required by the applicable code
- C) Not recommended by Inspector
- D) Not recommended by Engineer

**Answer: A ... (API 510, Para. 8.1.6.4.2.1.1) Welding & Hot Tapping →PWHT Alternative Rules**

**415. Prior to using any alternative method for PWHT such as Preheat & Controlled Deposition Welding methods, which of the following statements are NOT true?**

- A) Metallurgical review by engineer considers any susceptibility to SCC & weld location stresses
- B) Metallurgical review by engineer must assure an alternative is suitable for the application
- C) Metallurgical review by engineer considers any susceptibility to HTHA, creep, and others
- D) Metallurgical review by engineer considers reasons to avoid costs of equipment PWHT

**Ans: D ... (Par. 8.1.6.4.2.1.1) Welding & Hot Tap→PWHT Alternative→ Original reason PWHT**

**API 510 Code (16 Closed Book Topics) Topic # 14**

**416. Which of the following statements is FALSE regarding the Preheating Method (Notch Toughness Testing Not Required), when it is to be performed in lieu of PWHT?**

- A) Materials shall be limited to P-No. 3, Group 1 and 2 (excl. Mn-Mo steels in Gr. 2)
- B) All Welding shall be limited to the SMAW, GMAW, and GTAW processes
- C) Materials shall be limited to P-No. 1, Group 1, 2, and 3
- D) Materials shall be limited to P-No. 8, Group 1 and 2

**Ans: D ... (Par. 8.1.6.4.2.2.1) Welding & Hot Tap →PWHT Alternative → Preheating Method**

**417. Which of the following is correct regarding the Preheating Method temperature to be maintained, when preheating is used as an alternative in lieu of PWHT?**

- A) Preheat of 250°F (121°C) or higher, as specified in WPS, is maintained during welding
- B) Preheat of 300°F (150°C) or higher, as specified in WPS, is maintained during welding
- C) Preheat of 350°F (177°C) or higher, as specified in WPS, is maintained during welding
- D) Preheat of 400°F (204°C) or higher, as specified in WPS, is maintained during welding

**Ans: B ... (Par. 8.1.6.4.2.2.2) Welding & Hot Tap →PWHT Alternative → Preheating Method**

**418. Which of the following statements is FALSE regarding the Preheating Method, when it is to be performed as an alternative in lieu of PWHT?**

- A) Weld area shall be preheated/maintained at minimum temp of 300°F (150°C) during welding
- B) Each side of a weld for 4 in. or 4 x depth of repair weld (use greater) is kept at 300°F (150°C)
- C) Notch toughness testing is required when using this preheat method in lieu of PWHT
- D) Maximum interpass temperature shall not exceed 600°F (315°C)

**Ans: C ... (Par. 8.1.6.4.2.2.2) Welding & Hot Tap →PWHT Alternative → Preheating Method**

**419. Which of the following statements is FALSE regarding the Preheating Method distance and temperature to be maintained, when preheating is used an alternative in lieu of PWHT?**

- A) Each side of weld for 4 inches or 4 x depth of repair weld (use greater) is kept at 300°F/150°C
- B) Each side of weld for 4 inches (as a minimum) is kept at 350°F/177°C as a minimum temp
- C) Each side of weld for 2 inches or 2 x depth of repair weld (use greater) is kept at 300°F/150°C
- D) Each side of weld for 2 inches (as a minimum) is kept at 350°F (177°C) as a minimum temp

**Ans: A ... (Par. 8.1.6.4.2.2.2) Welding & Hot Tap →PWHT Alternative → Preheating Method**

**420. Which of the following is correct regarding the Preheating Method temperatures to be maintained as specified in a WPS, when preheating is used as an alternative in lieu of PWHT?**

- A) Preheat of 300°F (150°C) or higher, with interpass temperatures not exceeding 500°F (260°C)
- B) Preheat of 300°F (150°C) or higher, with interpass temperatures not exceeding 600°F (315°C)
- C) Preheat of 350°F (177°C) or higher, with interpass temperatures not exceeding 650°F (343°C)
- D) Preheat of 350°F (177°C) or higher, with interpass temperatures not exceeding 650°F (343°C)

**Ans: B ... (Par. 8.1.6.4.2.2.2) Welding & Hot Tap →PWHT Alternative → Preheating Method**

**API 510 Code (16 Closed Book Topics) Topic # 14**

**421. Which of the following statements is FALSE regarding the Controlled-deposition Welding Method, when it is to be performed in lieu of PWHT?**

- A) Materials shall be limited to P-No. 1, P-No. 3, and P-No. 4 steels
- B) Welding shall be limited to the SMAW, GMAW, and GTAW processes
- C) A weld procedure specification shall be developed and qualified for each application
- D) Notch toughness tests are not needed if impact tests are req'd by original construction code

**Ans: D ... (Par. 8.1.6.4.2.3) Welding→PWHT Alternative→Controlled Deposition→ Are needed**

**422. Which of the following statements is FALSE regarding minimum content of Controlled Deposition Welding WPSs, if controlled deposition welding is to be done in lieu of PWHT?**

- A) WPS shall be developed & qualified only for first application of controlled deposition welding
- B) WPS shall define preheat temperature & interpass temperature & also post-heating temps
- C) WPS Qualification thickness for test plates & repair grooves shall be as per API 510 Table 8-1
- D) PQR Test material shall be the same material specification as original material under repair

**Ans: A ... (Par. 8.1.6.4.2.3) Welding→PWHT Alternative→ Controll-Deposit→ Each application**

**423. Which of the following statements is FALSE regarding minimum content of Controlled Deposition Welding WPSs, if controlled deposition welding is to be done in lieu of PWHT?**

- A) WPS shall be developed & qualified for each application of controlled deposition welding
- B) WPS shall define only minimum preheat temperatures & maximum interpass temperatures
- C) If special hardness limits are needed for corrosion resistance, a PQR shall incl. hardness tests
- D) PQR Test material shall be the same material specification as original material under repair

**Ans: B ... (Par. 8.1.6.4.2.3) Welding→PWHT Alternative→ Controll-Deposit→ Post Weld Bake**

**424. Which of the following statements is FALSE regarding additional content of Controlled Deposition Welding WPSs, if controlled deposition welding is to be done in lieu of PWHT?**

- A) WPS shall include technique (temper-bead or half-bead) that was also be used in the PQR
- B) WPS shall include minimum preheat temperature & maximum interpass temperature limits
- C) WPS shall include minimum weld heat input value for each layer that must not be exceeded
- D) WPS shall include all applicable supplementary essential variables of ASME IX Code QW-250

**Ans: C ... (Par. 8.1.6.4.2.3)Weld→PWHT Alternative→ ControlDeposit→ Maximum Heat Input**

**425. Which of the following statements is FALSE regarding additional content of Controlled Deposition Welding WPSs regarding Hydrogen Bake Out (Post Heating), if controlled deposition welding is to be done in lieu of PWHT?**

- A) SMAW welds are post-heated after welding & before cooling below preheat minimum temps
- B) SMAW weld post-heat temps are 500°F ± 50°F (260°C ± 30°C) for minimum period of 2 hours
- C) SMAW weld post-heat assists out-gassing diffusion of weld metal hydrogen (from welding)
- D) SMAW welds use electrodes of supplemental diffusible-hydrogen designators of H4 or lower

**Ans: D ... (Par. 8.1.6.4.2.3) Weld→ PWHT Alternative → Controlled Deposition → H8 or lower**

**API 510 Code (16 Closed Book Topics) Topic # 14**

**426. Which of the following electrodes may eliminate the need for Hydrogen Bake-out post-weld treatments (SMAW process), if controlled deposition welding is done in lieu of PWHT?**

- A) E7018-H8
- B) E7018-H6
- C) E7018-H4
- D) E7018-H1

**Ans: C ... (Par. 8.1.6.4.2.3) Welding → PWHT Alternative → Controlled-Dep ... H4 Designation**

**427. What must be done when using the temper bead technique (SMAW process) after the finished repair has finally cooled down to ambient temperature, if controlled deposition welding is done in lieu of PWHT?**

- A) The final temper bead reinforcement layer shall be removed & made flush with base metal
- B) The final temper bead reinforcement layer shall be examined (hold point) by an examiner
- C) The final temper bead reinforcement layer shall receive a hardness test by an examiner
- D) None of these are API 510 requirements

**Ans: A ... (Par. 8.1.6.4.2.3) Welding → PWHT Alternative → Controlled-Dep ... Flush ground**

**428. Which API document provides guidance on NDE of weld joints and weldments?**

- A) API 572
- B) API 577
- C) API 578
- D) API 582

**Ans: B ... (API 510, Par. 8.1.7.1) Welding → NDE of Welds ... Rules ...**

**429. Regarding the NDE of weld repairs and areas that have been excavated and rewelded, which of the following statements is FALSE?**

- A) Prior to welding repairs, the area prepared for welding after excavation is examined using either the MT or PT examination technique to determine that no defects exist or remain there
- B) MT or PT exams are especially important after removing cracks and other harmful defects
- C) After welding repair is done, it shall be examined again by NDE in repair specs to determine that no defects exist using acceptance standards acceptable to Inspector or an applicable code
- D) Repair welds required to be originally radiographed also require either MT or PT examination

**Ans: D ... (510, Par. 8.1.7.1/2/3) Welding → NDE of Welds → RT Accessible? No → MT or PT**

**430. Regarding repairs, where use of NDE techniques specified by the construction code is not possible or practical, what must be done and who must approve this?**

- A) Alternative NDE techniques may be used if approved by engineer & inspector & owner/user
- B) Alternative NDE techniques may be used if approved by engineer and inspector
- C) Alternative NDE techniques may be used if approved by engineer
- D) Alternative NDE techniques may be used if approved by inspector

**Ans: B ... (Par. 8.1.7.3) Welding → NDE of Welds → Alternative NDE → Engineer & Inspector**

**API 510 Code (16 Closed Book Topics) Topic # 14 & 15 (Rerating)**

**431. Acceptance criteria for welded repairs or alterations should be in accordance with:**

- A) The applicable sections of the ASME Code or another applicable vessel rating code
- B) The applicable inspection plan for the vessel under repair approved by Inspector
- C) The applicable repair plan agreed upon before the start of repair work
- D) None of these (API 510 Code Rules apply)

**Ans: A ... (510 Par. 8.1.7.3) Welding → NDE of Welds → Acceptance Criteria → ASME Code**

**432. Regarding Weld Inspection of repairs when it is determined that Vessels repaired or altered may be subject to Brittle Fracture, which of the following statements are FALSE?**

- A) For vessels constructed of materials that may be subject to brittle fracture, appropriate inspection should be considered after welded repairs or alterations
- B) Flaws, notches, or other stress risers found could initiate a brittle fracture in pressure tests
- C) MT and other effective surface NDE methods should be considered for susceptible vessels
- D) Inspection techniques should be selected to detect critical flaws as determined by examiner

**Ans: D ... (510 Par. 8.1.7.3) Welding → NDE → Brittle Fracture → Detect critical flaws 579 FFS**

**433. Rerating of a pressure vessel may involve all of the following except:**

- A) Changing its design temperature
- B) Changing its minimum metal design temp
- C) Changing its service
- D) Changing its MAWP

**Answer: C (API 510, Para. 8.2.1) Topic 15 Begins ... Rerating of a Pressure Vessel ... Rules!**

**434. Rerating a pressure vessel by changing its design temperature, minimum metal design temperature, or its maximum allowable working pressure may be done only after all of the following requirements have been met EXCEPT:**

- A) Rerating shall be performed in accordance with requirements of a vessel's construction code
- B) Previous insp. records verify a pressure vessel is satisfactory for proposed service conditions
- C) Calcs performed by an experienced owner/user design engineer justify the vessel's rerating
- D) Calcs using appropriate formulas (latest edition of applicable construction code) by an experienced owner/user design engineer justify the vessel's rerating

**Answer: B (API 510, Para. 8.2.1) Topic 15 Begins ... Rerating Vessel ... Current Insp records!**

**435. To justify rerating, Current Inspection Records must show all of the following EXCEPT:**

- A) Verify that the pressure vessel is satisfactory for the proposed service conditions
- B) Verify that the corrosion allowance provided is appropriate for proposed service conditions
- C) Verify that an increase in allowable working pressure or design temperature is justified and based on thickness data obtained from a recent internal or on-stream inspection
- C) Verify that an increase in allowable working pressure or design temperature is justified and based on thickness data obtained from any recent external inspection

**Answer: D (API 510, Para. 8.2.1) Topic 15 Begins ... Rerating Vessel ... Current Insp records!**

**API 510 Code (16 Closed Book Topics) Topic # 15 (Rerating) & 16 (Pressure tests after)**

**436. Rerating a pressure vessel by changing its design temperature, minimum metal design temperature, or its maximum allowable working pressure may be done only after all of the following requirements have been met EXCEPT:**

- A) Rerating shall be performed in accordance with requirements of a vessel's construction code
- B) Current inspection records verify a vessel is satisfactory for proposed new service conditions
- C) Calcs performed by an experienced owner/user design engineer justify the vessel's rerating
- D) The rerating is acceptable to the Inspector

**Answer: D (API 510, Para. 8.2.1) Topic 15 Begins ... Rerating Vessel ... Acceptable to Engineer!**

**437. To justify rerating, an increase in allowable working pressure or design temperature shall be based on thickness data obtained from:**

- A) Past Inspection records
- B) External Inspection results including thickness measurements
- C) Recent internal or on-stream inspection results including thickness measurements
- D) None of these are correct

**Answer: C (API 510, Para. 8.2.1) Topic 15 Begins ... Rerating Vessel ... Internal or On-stream!**

**438. To justify rerating, which of these is NOT required relative to pressure testing?**

- A) Vessel shall be pressure tested using applicable testing formula (of code used for rerating)
- B) Vessel has been tested to a pressure  $\leq$  the test pressure required (of code used for rerating)
- C) Vessel has been tested to a pressure  $\geq$  the test pressure required (of code used for rerating)
- D) Vessel has been tested to a pressure  $<$  the test pressure required (of code used for rerating)

**Answer: B (API 510, Para. 8.2.1) Topic 15 Begins ... Rerating Vessel ... Previous pressure test**

**439. To justify rerating, which of these is required relative to pressure testing?**

- A) Vessel shall be NDE examined as usual during regular inspection intervals
- B) Vessel shall receive thickness measurements as part of an external inspection
- C) Vessel shall receive thickness measurements as part of an internal/On-stream inspection
- D) Vessel integrity was confirmed by special approved NDE techniques in lieu of a pressure test

**Answer: D (API 510, Para. 8.2.1) Topic 15 Begins ... Rerating Vessel ... NDE in lieu of press tests**

**440. The pressure vessel rerating will be considered complete when the inspector witnesses:**

- A) Attachment of an additional nameplate or stamp showing the rerate code parameters used
- B) Calculations for the rerating as per code and verifies them as being correct
- C) Engineering Rerating Report and signs off on the Inspection line
- D) None of these is correct

**Answer: A (API 510, Para. 8.2.1) Topic 15 Begins ... Rerating Vessel ... Add Nameplate or stamp**

# 10 Bonus Questions for API 510

**441. The most common forms of CUI are localized corrosion of carbon steel and:**

- A) Chloride stress corrosion cracking of austenitic stainless steels
- B) Polythionic acid corrosion of stainless steels
- C) Stress corrosion of stainless steels
- D) None of the above attack stainless steels

**Answer: A (API 572, Section 8.2.1)**

**442. A pressure vessel should be maintained according to the requirements of the code:**

- A) According to the latest code requirements
- B) According to the owner-user specifications
- C) Under which it was designed and constructed
- D) None of these

**Answer: C (API 572, Section 5)**

**443. Inspector measured undercut on a girth weld during the repair to an ASME Section VIII, Div. I Carbon Steel vessel (Stamped RT 1) and it was found to be 1/32 inch (1mm) in depth maximum. Shell base metal is 2 inches thick and having PWHT. Inspector shall:**

- A) Reject the weld because no undercut is allowed on any vessel welds requiring PWHT
- B) Reject the weld because undercut will affect RTFI interpretation & request surface grinding
- C) Accept the weld because undercut is within ASME Section VIII, Div. I code allowed tolerance
- D) Consult with the Vessel (Welding) Engineer

**Answer: C (ASME VIII, Div 1, UW-35.b.2)**

**444. When reviewing RT film, a darkened perfectly straight line can be seen in the very center of the root pass (lightest area). The length of the line is about 75mm long. It is likely which type of discontinuity?**

- A) Incomplete penetration
- B) Incomplete fusion
- C) Wormhole porosity
- D) Crack

**Ans: A (API 577 Illustration for IP, Note 2)**

**445. If white salts are found at cracks in a vessel, what is the likely damage mechanism?**

- A) Caustic embrittlement
- B) Hydrogen blistering
- C) Chloride stress corrosion cracking
- D) Amine stress corrosion cracking

**Answer: A (API 572 Section/Para. 10.3.13 Third paragraph)**

# 10 Bonus Questions for API 510

**446. The rules for impact testing of carbon steel in Section VIII, Div. 1, Carbon steel vessel materials require what kind(s) of impact tests?**

- A) Brinnell & Rockwell
- B) Izod & Charpy V-notch
- C) Charpy V-notch
- D) Brinnell

**Answer: C (ASME IX, QW-170)**

**447. What is the minimum length of a spot radiograph as per ASME Section VIII, Division 1?**

- A) Per the minimum dimension given in the Inspection Plan or approved RT procedure
- B) 6 inches
- C) 12 inches
- D) None of these

**Answer: B (ASME VIII, Div I, UW-52.c → 6 inches) → Could be on Closed Book exam also)**

Spot Radiography Rules → UW-52

*(c) Standards for Spot Radiographic Examination.* Spot examination by radiography shall be made in accordance with the technique prescribed in UW-51(a). The minimum length of spot radiograph shall be 6 in.

**448. What is the maximum length of a rounded indication when spot radiography has been specified for a given pressure vessel as per ASME Section VIII, Division 1?**

- A) Per the approved RT procedure
- B) 6 mm
- C) 12 mm
- D) None of these are correct

**Ans: D (ASME VIII, Div I, UW-52.c.3 → Rounded indications are not a factor → No limit exists)**

Spot Radiography Rules → UW-52

*(c) Standards for Spot Radiographic Examination.* Spot examination by radiography shall be made in accordance with the technique prescribed in UW-51(a). The minimum length of spot radiograph shall be 6 in. Spot radiographs may be retained or be discarded by the Manufacturer after acceptance of the vessel by the Inspector. Acceptability of welds examined by spot radiography shall be judged by the following standards:

(3) Rounded indications are not a factor in the acceptability of welds not required to be fully radiographed.

**449. Exam Question: To be considered valid by an Inspector, PQRs must be certified by:**

- A) Mechanical tests per ASME IX
- B) A corresponding and supporting WPS
- C) Approved Test Lab Signature & date
- D) The owner user inspection organization

**Ans: C ... (API 510 Body of Knowledge Part 2 (Notes) 2010 Edition/2011 exams → Must know)**

**450. Designated areas on pressure vessels where periodic exams are conducted are called:**

- A) Inspection points
- B) Survey points
- C) TMLs
- D) CMLs

**Ans: D (API 510 definitions for Condition Monitoring Locations)**

## **API 576 (Chapter 5 & 6) Exam Questions (API 510, Section 6.6)**

**Questions 272 to 285 cover API 510, Section 6.6 → The API 510 to 576 Pathway**

**Must Know API 576 ... Ch. 5 (Causes of Improper Performance) & Ch. 6 (Inspection & Testing)  
E-Library API 510 folder for Exam questions! API 576 has 2 handouts!  
\*\*\* In the margin & underlined areas are those where exam Q's will be!**

**451. (Same as # 274 ... repeated for effect). Spring failures are almost always caused by:**

- A) Corrosion that includes surface corrosion and stress corrosion cracking
- B) Stress related failure due to improper sizing/using substandard parts
- C) Mechanical failure due to excessive movement and vibration
- D) Excessive chattering and wire drawing

**Ans: A (510, 6.6.6 & 576, Para 5.1.1 & 5.3.2 & Fig 30) ... PZV Spring Failure Cause = Corrosion**

**452. Which of the following may be installed on the inlet or outlet of a pressure-relief valve to provide added corrosion protection of the valve internals?**

- A) Orifice plates limiting or restricting flow to and from relief valves to reduce hammering
- B) Isolation valves that utilize the “double block and bleed” designs to prevent corrosion
- C) In-line screens & filters that trap debris and prevent deposition at internal surfaces
- D) Rupture disk devices that protect the relief valve against system fluids

**Answer: D (576, Para 5.1.3) ... Rupture discs that protect PZVs against system fluid corrosion**

**453. Which of these is not a cause of damaged relief valve seats in refinery service?**

- A) Careless handling during maintenance (bumping, dropping, jarring, or scratching valve parts)
- B) Undersized relief valves that close abruptly resulting in disc/nozzle seating surface damage
- C) Corrosion and foreign particles (mill scale, weld spatter/slag, dirt, etc) entering valve inlets
- D) Improper or lengthy piping to valve inlets or line obstructions that cause valve chattering

**Ans: B (576, Para 5.2.2.g) ... Severe oversizing causes abrupt closing/damage**

**454. A rapid cycle of opening and closing subjecting relief valve seating surfaces to severe hammering that sometimes damages the seating surfaces beyond repair is called:**

- A) Hammer
- B) Vibration-induced fatigue
- C) Chatter
- D) Wire drawing

**Answer: C (API 576, Para 5.2.2.c) ... Chatter**

**455. Leakage past relief valve seating surfaces causing seat damage by erosion is called:**

- A) Hammer
- B) Leak-by or wicking
- C) Chatter
- D) Wire drawing

**Answer: D (API 576, Para 5.2.2.e) ... Wire drawing is erosion/leakage across seating surfaces!**

## **API 576 (Chapter 5 & 6) Exam Questions (API 510, Section 6.6)**

**Questions 272 to 285 cover API 510, Section 6.6 → The API 510 to 576 Pathway**

**456. Which of these statements are NOT true regarding the causes of failed springs in refinery relief valves?**

- A) Springs often weaken and fail due to the use of improper materials in high-temp service
- B) Surface corrosion and stress corrosion cracking are the most common type of failure
- C) Hydrogen sulfide (H<sup>2</sup>S) frequently causes corrosion fatigue failure of springs
- D) Failed springs are almost always caused by corrosion

**Ans: D (576, Sect 5.3.1/2/3/4) ... H<sup>2</sup>S causes spring stress corrosion cracking (NACE MR0175)**

**457. When selecting the appropriate spring material, which of these factors are NOT the most important for materials to prevent Stress Corrosion Cracking (SCC) in refinery relief valves?**

- A) Material strength
- B) Hardness
- C) Ductility
- D) Heat treatment

**Answer: C (API 576, Sect 5.3.4) ... Page 30 below Figure 30 and the broken spring**

**458. During relief valve testing using air or bottled nitrogen, what does the inspector carefully listen for to determine that the “set pressure” has been reached?**

- A) A distinct pop only must always be the determining factor
- B) An audible leak (hissing noise) followed by a distinct pop
- C) An audible leak (hissing noise) is the determining factor
- D) None of these are correct

**Answer: B (API 576, Sect 5.4.3) ... A is arguably correct ... Understand the term blowdown**

**459. When testing relief valves, the relief valve term “blowdown” refers to the:**

- A) Difference between set pressure and test or “pop” pressure
- B) Difference between set and reseating pressure
- C) Test or “Pop” pressure
- D) Reseating pressure

**Answer: B (API 576, Sect 5.4.6) ... See also valve adjusting rings to control the blowdown**

**460. A term used related to sticking of the disk in a relief valve when foreign particles in the guiding surfaces tend to roll the metal up (tearing the metal) is called:**

- A) Galling
- B) Chattering
- C) Hammering
- D) Wire drawing

**Answer: A (API 576, Sect 5.5.2) ... Galling is a huge problem causing malfunctions in guiding Surfaces and the correct lubricant selection plays an important role in the proper operation**

## **API 576 (Chapter 5 & 6) Exam Questions (API 510, Sect. 6.6 Pathway)**

**461. Rough handling of a relief valve can cause of the following problems except:**

- A) Lifting levers may be damaged
- B) A change in the set pressure can result
- C) Internal or external leakage can occur when the valve is in service
- D) The valve may become frozen in service and fail to perform its function

**Answer: D (API 576, Sect 5.8.1) ... Corrosion causes the valve to become frozen and function**

**462. Rough handling can occur when:**

- A) During shipment only
- B) During shipment or maintenance
- C) During shipment or maintenance or installation
- D) During shipment or maintenance or installation or operation

**Answer: C (API 576, Sect 5.8.1) ... Easy question ... D is there to fool you 😊**

**463. Pressure relief valves should be shipped (transported) in what manner?**

- A) On pallets (packaged and secured to prevent damage)
- B) In an upright position (to assure correct spring function)
- C) In crates (packaged like the delicate instruments that they are)
- D) Individually wrapped to secure the valve and prevent damage/corrosion

**Answer: B (API 576, Sect 5.8.1 & 5.8.4.2)**

**464. Which of these provides seat loading to keep the pressure-relief valve tightly closed?**

- A) Blowdown
- B) Cold differential test pressure (CDTP)
- C) Proper capacity design = trouble-free operation
- D) Differential between operating and set pressures

**Answer: D (API 576, Sect 5.8.1) ... blowdown = difference between set and reseating pressure**

**465. (Same as # 275 ... repeated) The principal reason for inspecting a pressure relief device is:**

- A) To determine if it is functioning properly (so it can provide protection to equip/personnel)
- B) To prevent fouling and plugging from occurring that could render a valve inoperable
- C) To assure equipment (pressure vessel) safety by preventing Overpressurization
- D) To assure personnel safety

**Ans: A (API 510, Par. 6.6 → API 576 → Ch. 6, Para. 6.1.1 in entirety) API website Sample Q**

**WARNING:** STUDY HIGHLIGHTED SECTION 6 (API 576) → MORE

**QUESTIONS COMING IN 2013 → END OF API 576 STUDY QUESTIONS**

# Begin API 577 Study questions (Chapter 4)

*Note: No Definition Questions in here but you can expect them*

## Exercise 4 (API 577 Welding Inspection – 35 Q&A)

**1. Welding inspection is a critical part of an overall:**

- A) Weld inspection plan
- B) Weld quality assurance program
- C) Quality assurance plan
- D) Inspection program

**Answer: B ... Reference: Section 4.1 → Welding Inspection (General)**

**2. Welding Inspection includes much more than just the non-destructive examination of the completed weld. Many other issues are important & they include all of these below except:**

- A) Review of specs & welding procedures
- B) Review of joint design
- C) Review of cleaning procedures
- D) Review of Material Verification Program

**Answer: D ... Reference: Section 4.1 → Welding Inspection (General)**

**3. Welding inspection activities can be separated into three stages corresponding to the welding work process and include all of the following except:**

- A) Prior to welding
- B) During welding
- C) During audits after weld inspections
- D) Upon completion of welding

**Answer: C ... Reference: Section 4.1 → Welding Inspection (General)**

**4. What is the most important stage of welding to assure that welding problems are avoided and changes and corrections necessary are made?**

- A) In the planning and preparation stage before any welding on job begins
- B) Just immediately before the planned start of welding on a new job
- C) During the welding of initial production joints
- D) Either during welding or immediately after

**Answer: A ... Reference: Section 4.2 → Tasks prior to Welding**

**5. Prior to welding, a review of drawings, standards, codes, and specifications is done to:**

- A) Understand the requirements for the welding and identify any inconsistencies
- B) Ensure that the welder understands the specification and is qualified
- C) Ensure that the drawings meet the specifications
- D) None of these are correct per API 577

**Answer: A ... Reference: Section 4.2.1 → Drawings, Codes & Standards**

## **Exercise 4 (API 577 Welding Inspection – 35 Q&A)**

**6. Which of the following are NOT Quality Control items to assess prior to welding?**

- A) Welding symbols, weld sizes, weld joint designs, & weld dimensions are clearly specified
- B) Weld maps identify welding procedure specification (WPS) used for specific weld joints
- C) Dimensions are detailed and any potential for distortion has been addressed
- D) Welding consumables specified are the ones being used in the welding

**Answer: D ... Reference: Section 4.2.1.1 → QC Items to Assess Prior to Welding**

**7. Which of the following are NOT Quality Control items to assess prior to welding?**

- A) Proper handling of consumables, if any, has been identified
- B) Weather protection and wind break requirements have been defined.
- C) Mechanical properties are identified & required testing has been performed
- D) Base material requirements have been specified (regarding impact tested materials)

**Answer: C ... Reference: Section 4.2.1.1 → QC Items to Assess Prior to Welding**

**8. Which of the following are NOT Quality Control items to assess prior to welding?**

- A) Pressure testing requirements, if any, clearly specified
- B) Inspection hold-points/NDE requirements met by Contractor
- C) Preheat requirements and acceptable preheat methods defined
- D) Post-weld heat treatment (PWHT) requirements and acceptable PWHT method defined

**Answer: B ... Reference: Section 4.2.1.1 → QC Items to Assess Prior to Welding**

**9. Which of the following are NOT potential inspector actions to be taken regarding Quality Control item assessment prior to welding?**

- A) Identify and clarify missing details in progress reports
- B) Highlight potential weld problems not addressed in the design
- C) Identify and clarify inconsistencies with standards, codes & specification requirements
- D) Identify and clarify missing weld sizes, dimensions, tests & any additional requirements

**Ans: A ... Ref: Sect. 4.2.1.2 → QC Items to Assess Prior to Welding – Potential Insp Action**

**10. Inspectors shall review requirements for the weldment with the personnel involved with executing the work (prior to work) and this can include all of the following entities except:**

- A) Design engineer
- B) Welding engineer
- C) Welding organization
- D) Project Management organization

**Answer: D ... Ref: Sect. 4.2.2 → Welding Inspection – weldment requirements → Insp Org!**

## **Exercise 4 (API 577 Welding Inspection – 35 Q&A)**

**11. Inspectors shall review requirements for the weldments (prior to work) and this can include all of the following QC items to assess except:**

- A) Competency of inspection organization to supervise work process
- B) Competency of welding organization to perform welding activities per Codes/STDs/Specs
- C) Roles/responsibilities of engineers/welding org & inspectors is defined/appropriate for work
- D) Independence of inspection organization from production organization is clear/demonstrated

**Answer: A ... Ref: Sect. 4.2.2.1 → Weldment Requirements → QC Items to Assess!**

**12. Inspectors reviewing requirements for the weldments (prior to work) and finding that Potential Inspector action is required regarding QC items should take action as follows:**

- A) Make a log entry on the matter and await welding results
- B) Document the deficiencies thoroughly and await welding results
- C) Highlight deficiencies and concerns with the organizations to appropriate personnel
- D) Highlight deficiencies/concerns to the appropriate personnel and demand corrective actions

**Answer: C ... Ref: Sect. 4.2.2.2 → Weldment Requirements → Potential Inspector Action!**

**13. Inspectors shall review welding procedures (WPS) & qualification records (WPQs) prior to work to assure that:**

- A) All procedures & qualification records are completed
- B) All procedures & qualification records are completed and acceptable for work
- C) All procedures & qualification records are completed and signed by the Engineer
- D) None of the above are correct

**Answer: B ... Ref: Sect. 4.2.3 → Procedures & Qualification Records!**

**14. Inspectors reviewing welding procedures & qualification records (prior to work) should assess all of the following Quality Control items except:**

- A) Welder performance qualifications (WPQ) meet requirements for the PQR
- B) Welder performance qualifications (WPQ) meet requirements for the WPS
- C) WPS are properly qualified/meet applicable codes, STDs & specs for work
- D) Procedure qualification records (PQR) are properly performed & support WPS

**Ans: A ... Ref: Sect. 4.2.3.1 → Procedures & Qualification Records → QC Items to Assess!**

**15. Inspectors reviewing welding procedures & qualification records (prior to work) and finding that Potential Inspector action is required regarding QC items should take all of the following actions EXCEPT:**

- A) Obtain acceptable WPS(s) and PQR(s) for the work
- B) Qualify WPS(s) where required and witness qualification effort
- C) Qualify or re-qualify welders as required & witness a percentage of welder qualifications
- D) Qualify WPQs where required and any PQRs needed & witness a % of welder qualifications

**Answer: D ... Ref: Sect. 4.2.3.2 → Procedures/Qual records → potential inspector action!**

## **Exercise 4 (API 577 Welding Inspection – 35 Q&A)**

**16. Inspectors shall review NDE Information prior to work to assure that:**

- A) Confirm the NDE procedure(s) from inspection organization are acceptable for the work
- B) Confirm the NDE examiner(s) from inspection organization are acceptable for the work
- C) Confirm the NDE equipment from inspection organization is acceptable for the work
- D) Confirm the NDE examiner(s) are certified to ASNT SNT TC-189 standard

**Answer: D ... Ref: Sect. 4.2.4 → NDE Information!**

**17. Inspectors reviewing NDE Information (prior to work) should assess all of the following Quality Control items except:**

- A) NDE examiners are properly certified for the NDE technique
- B) Condition of the equipment is acceptable
- C) NDE procedures are current and accurate
- D) Calibration of NDE equipment is current

**Answer: B ... Ref: Sect. 4.2.4.1 → NDE Information → QC Items to Assess!**

**18. Inspectors reviewing NDE Information (prior to work) and finding that Potential Inspector action is required regarding QC items should take which of these actions?**

- A) Identify & correct deficiencies in certifications & procedures & obtain calibrated equipment
- B) Identify & correct deficiencies in certifications & procedures
- C) Identify & correct deficiencies in certifications
- D) None of these are correct

**Answer: A ... Ref: Sect. 4.2.4.2 → NDE Information → Potential Inspector Action!**

**19. Inspectors shall check Welding equipment & Instruments prior to work to:**

- A) Confirm Welding equipment & Instruments operate properly and are in good condition
- B) Confirm Welding equipment & Instruments operate properly and are calibrated
- C) Confirm Welding equipment & Instruments operate properly
- D) Confirm Welding equipment & Instruments are calibrated

**Answer: B ... Ref: Sect. 4.2.5 → Welding equipment & Instruments**

**20. Inspectors checking welding equipment & instruments prior to work should assess all of the following Quality Control items except:**

- A) Welding machine calibration is current
- B) Instruments (ammeters, voltmeters, contact pyrometers) have current calibrations
- C) Welding cabinets for large quantity storage of hermetically sealed containers exists on job
- D) Welding consumable storage ovens operate (automatic heat control, visible temp indication)

**Answer: C ... Ref: Sect. 4.2.5.1 → Welding Equip & Instruments → QC Items to Assess!**

## **Exercise 4 (API 577 Welding Inspection – 35 Q&A)**

**21. Inspectors checking welding equipment & instruments (prior to work) and finding that Potential Inspector action is required regarding QC items should ensure which of these actions is taken?**

- A) Calibrate equipment and instruments and reject any defective equipment and instruments
- B) Calibrate equipment and instruments and replace any defective equipment and instruments
- C) Recalibrate equipment and instruments and replace any defective equipment and instruments
- D) None of these are correct

**Answer: C ... Ref: Sec. 4.2.5.2 → welding equip & instrument → Potential inspector action**

**22. Inspectors shall check Heat Treatment & Pressure Testing procedures/associated equipment prior to work to in order to:**

- A) Confirm Heat Treatment & Pressure testing procedures/associated equipment are acceptable
- B) Confirm Heat Treatment & Pressure testing associated equipment is acceptable
- C) Confirm Heat Treatment & Pressure testing procedures are acceptable
- D) None of these are correct

**Answer: A ... Ref: Sect. 4.2.6 → Heat Treatment & Pressure Testing**

**23. Inspectors checking Heat Treatment & Pressure Testing procedures/associated equipment prior to work should assess all of the following Quality Control items except:**

- A) Heat treatment procedure is available & appropriate & equipment calibrations are current
- B) Pressure testing equipment & gauges calibrated & meet appropriate test requirements
- C) Pressure testing procedures are available and detail the testing requirements
- D) Trained personnel to perform activities have been approved for the work

**Answer: D ... Ref: Sect. 4.2.6.1 → Heat Treat & Press Testing → QC Items to Assess!**

**24. Inspectors checking Heat Treatment & Pressure Testing procedures/associated equipment (prior to work) and finding that Potential Inspector action is required regarding QC items should ensure which of these actions is taken?**

- A) Obtain calibrated equipment & identify & correct deficiencies in equipment & procedures
- B) Obtain calibrated equipment & identify & correct deficiencies in procedures
- C) Obtain calibrated equipment & identify & correct deficiencies in equipment
- D) None of these are correct

**Answer: B ... Ref: Sec. 4.2.6.2 → Heat Treat & Press Testing → Potential Inspector Action**

**25. Inspectors shall check all Materials (for welding) prior to work to in order to ensure all of the following except:**

- A) Ensure all filler metals, base materials, and backing ring materials are properly identified
- B) Ensure all filler metals, base materials, and backing ring materials are properly marked
- C) Ensure material traceability is maintained as per mandatory API 578 requirements
- D) Ensure PMI is performed (if required) to verify the material composition

**Answer: C ... Ref: Sect. 4.2.7 → Materials**

## **Exercise 4 (API 577 Welding Inspection – 35 Q&A)**

**26. Inspectors checking Materials prior to work should assess all of the following Quality Control items except:**

- A) Material test certifications are available & items properly marked (incl. back-up rings if used)
- B) Electrode marking/bare wire flag tags/identification on wire spools as-specified
- C) Filler material markings are visible and known to the welding organization
- D) Base metal markings are traceable to a material certification

**Answer: C ... Ref: Sect. 4.2.7.1 → Matls → QC Items to Assess → Filler matl to be traceable**

**27. Inspectors checking Materials prior to work should assess all of the following Quality Control items except:**

- A) Paint striping color code meets requirements of PFI-ES-22
- B) Recording of filler and base metal traceability information is performed
- C) Base metal stampings are low stress and not detrimental to the component
- D) PMI records supplement material traceability/confirm material of construction

**Answer: A ... Ref: Sect. 4.2.7.1 → Matls → QC Items → Color Code = Correct for material**

**28. Inspectors checking Materials (prior to work) and finding that Potential Inspector action is required regarding QC items should ensure which of these actions is taken?**

- A) Reject/quarantine non-traceable or improperly marked materials or inappropriate materials
- B) Have quarantined non-traceable or improperly marked materials or inappropriate materials
- C) Do not approve non-traceable or improperly marked materials or inappropriate materials
- D) Reject non-traceable or improperly marked materials and reject inappropriate materials

**Answer: D ... Ref: Sect. 4.2.7.2 → Materials → Potential Inspector Action**

**29. Welding inspection during welding operations should include audit parameters to verify welding is performed to procedures and such tasks may include all of these except:**

- A) Quality Assurance (QA & QC umbrella is established with the welding organization)
- B) Unacceptable workmanship (Addressed and such work is quarantined when found)
- C) Weldment examinations (include physical checks, visual exams, in-process NDE)
- D) Welding parameters and techniques (are supported by WPS and WPQ)

**Ans: B ... Ref: Sect. 4.3 (all) → TASKS DURING WELDING → Audit Parameters /3 tasks**

**30. Final tasks upon completion of the weldment and work should include those that assure final weld quality before placing the weldment in service & they include all of these except:**

- A) Document Audit (Perform final audit of Insp dossier to identify inaccuracies/incomplete info)
- B) Appearance & finish (Verify post-weld acceptance, appearance & finishing of welded joints)
- C) NDE review (Verify NDE is performed at selected locations & review examiner's findings)
- D) Identify non-conformances and defects and take immediate corrective actions

**Answer: D ... Ref: Sect. 4.4 (all) → TASKS UPON COMPLETION OF WELDING ...**

*Correct is Document Audit, Appearance & finish, NDE review, PWHT, Pressure Testing ...  
Non-conformances and defects should be addressed AT ANY TIME during welding inspection*

## Exercise 4 (API 577 Welding Inspection – 35 Q&A)

**31. Final tasks upon completion of the weldment and work should include those that assure final weld quality before placing the weldment in service & they include all of these except:**

- A) Document Audit (Perform final audit of Insp dossier to identify inaccuracies/incomplete info)
- B) Appearance & finish (Verify post-weld acceptance, appearance & finishing of welded joints)
- C) NDE review (Verify NDE is performed at selected locations & review examiner's findings)
- D) PWHT (Verify PWHT is performed to the procedure and produces acceptable results)
- E) Pressure Testing (Verify Pressure Test is performed to the procedure)
- F) All are incorrect ... Time for smoke break because I never do it right

**Answer: F ... Ref: Sect. 4.4 (all) → TASKS UPON COMPLETION OF WELDING ...**

**32. If defects or non-conformances (Inspector has work issues) to specification are found by the Inspector, this should be handled when and in what manner (Identify False statement):**

- A) Inspector takes actions on these issues at any time during the welding inspection
- B) Inspector takes actions on these issues after his welding inspections by report issuance
- C) Inspector takes steps to ensure correction of the issues before welding proceeds further
- D) Inspector brings issues to attention of those responsible before welding proceeds further

**Answer: B ... Ref: Sect. 4.5 → NON-CONFORMANCES AND DEFECTS**

**33. Which of these statements are false regarding NDE Examiner Certifications?**

- A) ASME V may require examiners be qualified in accordance with ASNT SNT-TC-1A
- B) ASME V may require examiners be qualified in accordance with ANSI/ASNT CP-189
- C) ASNT SNT-TC-1A & CP-189 are mandatory whenever ASME V code applies to welding
- D) ASNT SNT-TC-1A & CP-189 are guidelines & STDs for certification of NDE insp personnel

**Answer: C ... Ref: Sect. 4.6 → NDE Examiner Certifications**

**34. Which of these statements are false regarding Safety Precautions for Welding?**

- A) The arc is a source of both visible and infrared light, but not ultraviolet light.
- B) Eye protection using proper filters and proper clothing to cover the skin should be used
- C) Proper ventilation is necessary to remove air-borne particulates that include vaporized metal
- D) In areas of inadequate ventilation (confined space), filtered breathing protection may be req'd

**Answer: A ... Ref: Sec. 4.7 → Safety Precaution → Ultraviolet light may cause severe burn**

**35. Which of these statements are false regarding Safety Precautions for Welding?**

- A) Welding can produce sparks and other airborne debris that can burn the eyes
- B) Ventilation practices in confined spaces should be carefully reviewed before work begins
- C) Appropriate precautions around welding include eye protection/proper clothing to cover skin
- D) Use of gas-shielded processes in confined spaces can create a nitrogen-deficient environment

**Answer: D ... Ref: Sect. 4.7 → Safety Precautions**

## Exercise 5 (API 577 Welding Processes – 15 Q&A)

**Tip: There are welding process questions in some exams like this easy example from the API website → From the 10 sample exam questions from the API website**

Correct Answer: 3

J. In a certain arc welding process, coalescence of metals is produced by an arc between a tungsten electrode and the work, and shielding is obtained from a gas or gas mixture. Both pressure and filler metal may or may not be used. This process is called:

1. FCAW.
2. GMAW.
3. GTAW.
4. SAW.

API 577, Para 5.3 → easy one

**Be ready for similar Qs about GMAW (solid wire) ... FCAW (hollow flux-filled core wire), etc ... Know the basics of each welding process**

and the weld pool. It employs the heat of the arc, coming from the tip of a consumable covered electrode, to melt the base metal. Shielding is provided from the decomposition of the electrode covering, without the application of pressure and with filler metal from the electrode. Either alternating current (ac) or direct current (dc) may be employed, depending on the welding power supply and the electrode selected. A

Which one? See API 577 Para. 5.2 → SMAW

**See Q&A # 2 on the next page ... This is another way that API can ask this question!!!**

GMAW is an arc welding process that uses an arc between continuous filler metal electrode and the weld pool. The process is used with shielding from an externally supplied gas and without the application of pressure. GMAW may be operated in semiautomatic, machine, or automatic modes. It

→ Continuous filler metal

FCAW is an arc welding process that uses an arc between continuous tubular filler metal electrode and the weld pool. The process is used with shielding gas evolved from a flux contained within the tubular electrode, with or without additional shielding from an externally supplied gas, and without the application of pressure. Normally a semiautomatic process contained within a tubular electrode

→ Continuous filler metal and flux

**ENJOY MY 15 Q&A → Next page ☺**

## Exercise 5 (API 577 Welding Processes – 15 Q&A)

**1. The inspector should understand the basic arc welding processes most frequently used in the fabrication and repair of refinery and chemical process equipment. These processes include all of the following except:**

- A) Shielded metal arc welding (SMAW) and gas tungsten arc welding (GTAW)
- B) Submerged arc welding (SAW) and Gas metal arc welding (GMAW)
- C) Cored flux arc welding (CFAW)
- D) Stud arc welding (SW)

**Answer: C ... Ref: Sect. 5.1 → Welding Processes → General**

**2. Which of these statements regarding SMAW is False?**

- A) SMAW uses arc heat (coming from tip of consumable covered electrode) to melt base metal
- B) SMAW shielding is provided from the decomposition of the electrode covering
- C) SMAW is the most widely used of the various arc welding processes
- D) SMAW uses an arc between a bare electrode and the weld pool.

**Ans: D ... Ref: Sect. 5.2 → SMAW Process → SMAW → See SAMPLE Q (API WEBSITE)**

**3. Which of these statements regarding SMAW is False?**

- A) SMAW uses either ac or dc, depending on welding power supply & electrode selected
- B) SMAW power supply that is preferred is the CV or constant-voltage power supply
- C) SMAW is performed without the application of pressure
- D) SMAW is always a manual welding process

**Answer: B ... Ref: Sect. 5.2 → Welding Processes → SMAW**

**4. Depending on the type of SMAW electrode being used, the covering performs all of the following functions EXCEPT:**

- A) Establishes the mechanical properties and characteristics of the electrode
- B) Provides slag blanket to protect hot weld metal from air & enhances mechanical properties
- C) Provides a means of adding alloying elements to change weld metal mechanical properties
- D) Provides gas to shield arc/prevent excessive atmospheric contamination of molten filler metal

**Ans: A ... Sect. 5.2.1 → SMAW Electrode Covering → establishes electrical characteristics**

**5. Some commonly accepted advantages of the SMAW process include all of these except:**

- A) Equipment is relatively simple/inexpensive/portable & can be used in areas of limited access
- B) SMAW process is less sensitive to wind and draft than other welding processes
- C) SMAW process is suitable for most of the commonly used metals and alloys
- D) SMAW process allows for excellent control of root pass penetration

**Ans: D ... Sect. 5.2.2 → Welding Processes → Advantages of SMAW ... D is an advantage of the GTAW Process ... Watch out for questions like this on the real API 577 exam!**

## Exercise 5 (API 577 Welding Processes – 15 Q&A)

**6. Limitations associated with the SMAW process include all of the following EXCEPT:**

- A) Slag must be removed before depositing a weld bead adjacent to a previously deposited bead
- B) Slag must be removed before depositing a weld bead onto a previously deposited weld bead
- C) Deposition rates are lower than for all other processes (GTAW, GMAW, FCAW, SAW)
- D) Slag must be removed at stops and starts

**Answer: C ... Sec. 5.2.3 → Welding Processes → SMAW Limitations ... such as GMAW is correct ... not accepted over GTAW Process ... Watch out for questions like this on exam!**

**7. Which of these statements regarding GTAW is False?**

- A) GTAW DCEN welding offers advantages of deeper penetration and faster welding speeds
- B) GTAW uses an arc between a consumable tungsten electrode and the weld pool
- C) GTAW is used with a shielding gas & without the application of pressure
- D) GTAW can be used with or without the addition of filler metal

**Answer: B ... Ref: Sect. 5.3 → Welding Processes → GTAW → Non-consumable tungsten**

**8. Some commonly accepted advantages of the GTAW process include all of these except:**

- A) Can be used with or without filler metal, dependent on the application
- B) Allows for excellent control of root pass weld penetration
- C) Produces high purity welds, generally free from defects
- D) No post-weld cleaning is required

**Ans: D ... Sect. 5.3.1 → Welding Processes → Advantages of GTAW ... Very little cleaning**

**9. Limitations associated with the GTAW process include all of the following EXCEPT:**

- A) The welding equipment is more complex, more costly, and less portable than that for SMAW
- B) Deposition rates = lower than rates possible with consumable electrode arc welding processes
- C) GTAW has a low tolerance for contaminants on filler or base metals
- D) Difficult to shield the weld zone properly in drafty environments

**Answer: A ... Sec. 5.3.2 → Processes → Limitations of GTAW → A = GMAW limitation ☺**

**10. Which of these statements regarding GMAW is False?**

- A) GMAW uses shielding from externally supplied gas and without the application of pressure
- B) GMAW uses an arc between continuous filler metal electrode and the weld pool
- C) GMAW uses CC power supply & either short circuiting/globular/spray method
- D) GMAW may be operated in semiautomatic, machine, or automatic modes only

**Answer: C ... Ref: Sect. 5.4 → Welding Processes → GMAW → C = CV power supply used**

## Exercise 5 (API 577 Welding Processes – 15 Q&A)

**11. Which of these statements regarding GMAW-S (Short-circuiting transfer) is not true?**

- A) It creates fast freezing weld pool best suited for joining thin sections/out-of position/root pass
- B) It covers lowest range of welding currents/electrode diameters associated GMAW processes
- C) Due to fast-freezing nature of this process, the potential for lack of sidewall fusion exists
- D) It results in a highly directed stream of discrete drops accelerated by arc forces

**Answer: D ... Sect. 5.4.1 → Welding Processes → D = GMAW Spray transfer characteristic**

**12. Some commonly accepted advantages of the GMAW process include all of these except:**

- A) Minimal post-weld cleaning is required due to absence of slag
- B) Deposition rates are significantly higher than those with SMAW
- C) Allows for the excellent control of the root pass weld penetration
- D) Only consumable electrode process used to weld most commercial metals/alloys

**Answer: C ... Sect. 5.4.4 → Processes → GMAW Advantages → C = GTAW Advantage**

**13. Limitations associated with the GMAW process include all of the following EXCEPT:**

- A) GMAW has a low tolerance for contaminants on filler metals or base metals
- B) The welding arc should be protected from air drafts that will disperse the shielding gas
- C) When using the GMAW-S process, the weld is more susceptible to lack of adequate fusion
- D) The welding equipment is more complex, more costly, and less portable than that for SMAW

**Answer: A ... Sect. 5.4.5 → Processes → Limitations of GMAW → A = GTAW Limitation**

**14. Some commonly accepted advantages of the FCAW process include all of these except:**

- A) Shielding is produced at the weld surface (more tolerant of stronger air currents than GMAW)
- B) Only consumable electrode process that can be used to weld most commercial metals/alloys
- C) Slag that supports and shapes the weld bead and flux that provides metallurgical benefits
- D) High deposition and productivity rates than other processes such as SMAW

**Answer: B ... Sect. 5.5.1 → Processes → FCAW Advantages → A = GMAW Advantage**

**15. Limitations associated with the FCAW process include all of the following EXCEPT:**

- A) The welding equipment is more complex, more costly, and less portable than that for SMAW
- B) Self-shielding FCAW generates large volumes of welding fumes/requires exhaust equipment
- C) Backing material is required for root pass welding & slag requires removal between passes
- D) FCAW process is limited to shop applications and the flat and horizontal positions

**Ans: D ... Sect. 5.5.2 → Processes → Limitations of FCAW → D = SAW limitation (flat)**

## Exercise 6 (API 577 Welding Processes – 15 Q&A)

**1. Qualified welding procedures detail the steps necessary to make a specific weld and generally consist of all of the following except:**

- A) Details of weld mechanical properties
- B) Welding process variables
- C) Details of the weld joint
- D) A written description

**Answer: A ... Ref: Sect. 6.1 → Procedures → General → A = Test data (given in the PQR)**

**2. As a minimum, welding procedures qualified to ASME Sect IX are required by all of the following examples where Codes are employed except:**

- A) Construction codes used in fabrication of new equipment & piping (refinery, chemical plant)
- B) Construction codes used in fabrication of new equipment & piping (water treatment plants)
- C) API 510 inspection code (repair welding)
- D) API 570 inspection code (repair welding)

**Answer: B ... Ref: Sect. 6.1 → Procedures → General → B = Tricky ... Scope Section 1**

**3. Regarding ASME Code requirements, the WPS provides direction to:**

- A) The Inspector overseeing the production welding
- B) The Engineer overseeing the production welding
- C) The welder while making production welds
- D) None of these

**Answer: C ... Ref: Sect. 6.1 → Procedures → General**

**4. The PQR is all of the following except:**

- A) Record of welding data used to weld a test coupon
- B) Record of welding variables used to weld a test coupon
- C) Record of test results used to qualify the welding procedure
- D) Record of the welding parameters to be used in the production welds

**Answer: D ... Ref: Sect. 6.1 → Procedures → General → D = WPS is this ... Not the PQR!**

**5. The purpose of the PQR is to establish the:**

- A) Properties of the weldment
- B) Suitability of the weldment
- C) Record for weldment construction
- D) None of these are correct per API 577

**Answer: A ... Ref: Sect. 6.1 → Procedures → General**

## **Exercise 6 (API 577 Welding Processes – 15 Q&A)**

**6. The purpose of the WPQ is to:**

- A) Establish welder is capable of welding
- B) Establish welder is capable of making a quality weld
- C) Establish welder is capable of making a quality weld using the WPS
- D) Establish welder is capable of making a quality weld using the WPS & the PQR

**Answer: A ... Ref: Sect. 6.1 → Procedures → General**

**7. ASME Section IX requires “WHO” to develop welding procedures?**

- A) Each owner/user Engineering Organization
- B) Each owner/user of the equipment
- C) Each manufacturer & contractor
- D) Each Inspection Organization

**Answer: C ... Ref: Sect. 6.2 → Procedures → WPS Section**

**8. Completed WPS for a welding process addresses:**

- A) All essential variables in a given WPS for a given process.
- B) All essential and nonessential variables in a given WPS for a given process.
- C) All essential variables (Including supplemental essential variables if notch toughness is reqd)
- D) All essential & nonessential variables (supp. essential variables only if notch toughness reqd)

**Answer: D ... Ref: Sect. 6.2 → Procedures → WPS Section**

**9. Essential variables affect mechanical properties of the weld. If they are changed beyond what the reference code paragraph allows for the process, the WPS:**

- A) May be used at the Inspector's discretion
- B) Must be re-qualified (new PQR employed)
- C) May be used as the mechanical properties of the weld will not be affected
- D) May either be re-qualified (new PQR employed) or used at the Inspector's discretion

**Answer: B ... Ref: Sect. 6.2 → Procedures → WPS Section**

**10. When nonessential variables are changed on the WPS, what must be done?**

- A) May be used at the Inspector's discretion
- B) Must be re-qualified (new PQR employed)
- C) May be changed of the WPS and then used
- D) May either be re-qualified (new PQR employed) or used at the Inspector's discretion

**Answer: C ... Ref: Sect. 6.2 → Procedures → WPS Section**

## Exercise 6 (API 577 Welding Processes – 15 Q&A)

**11. Which of these statements are False regarding Supplementary essential variables?**

- A) They are associated with weld strength & ductility
- B) They apply when they are specified by the end user
- C) They are treated as essential variables when they apply
- D) They apply whenever notch toughness testing is required

**Answer: A ... Ref: Sect. 6.2 → Procedures → WPS Section**

**12. The PQR shall record all of the following items except:**

- A) Manufacturer's certification of accuracy in the qualification of a WPS
- B) The nonessential variables used to weld a test coupon
- C) The essential variables used to weld a test coupon
- D) Coupon test results

**Answer: B ... Ref: Sect. 6.3 → Procedures → PQR Section**

**13. Which of these statements are false regarding Mechanical Tests associated with a PQR?**

- A) Mechanical tests are required to qualify a WPS to demonstrate the properties of the weldment
- B) Guided bend tests determine the degree of soundness and ductility of a groove weld
- C) Notch toughness tests determine both the strength and toughness of a groove weld
- D) Tension tests determine the ultimate strength of a groove weld

**Answer: C ... Ref: Sect. 6.3 → Procedures → PQR Section**

**14. Which of these statements is False regarding PQRs?**

- A) PQR format is not fixed, provided it addresses all essential variables
- B) If any test specimen fails, the test coupon fails and a new coupon will be required
- C) PQR should accompany WPS and be available for review by Inspector upon request
- D) One PQR may support several WPSs but one WPS may be qualified by only one PQR

**Ans: D ... Sect. 6.3 → Procedures → PQRs → 1 WPS may be qualified by more than one PQR**

**15. Which of these statements is false regarding review of a WPS & PQR per API 577?**

- A) Inspectors shall review the WPS & PQR to verify they are acceptable for welding to be done
- B) Initial step verifies WPS completion & Section IX/construction/repair code issues addressed
- C) 2<sup>nd</sup> step verifies PQR completion & Section IX/construction/repair code issues addressed
- D) 3<sup>rd</sup> step confirms WPS essential variable values properly support range specified in PQR

**Answer: D ... Ref: Sec. 6.4 → Reviewing WPS & PQR ... 3<sup>rd</sup> Step reversed ... PQR → WPS**

## **Exercise 7 (API 577 Welding Materials – 10 Q&A)**

**1. Base metals are assigned P-numbers in ASME Section IX to:**

- A) Reduce the number of welding procedure qualifications required
- B) Reduce the number of welding procedure specifications required
- C) Reduce the number of welder performance qualifications required
- D) Reduce number of welding procedure and performance qualifications

**Answer: A ... Ref: Section 7.2 → Materials → P-Numbers**

**2. For ferrous base metals having specified impact test requirements, what types of numbers are assigned by ASME IX Code?**

- A) P-numbers are assigned only
- B) S-Numbers are assigned as a subgroup of the P-Numbers
- C) Group numbers within P-numbers are assigned (P-No 1, Group 1, 2, 3, etc)
- D) Group numbers within P-numbers are assigned (P-No 1, Group A, B, C, etc)

**Answer: C ... Ref: Section 7.2 → Materials → P-Numbers**

**3. P-Number assignments are based on all of the following comparable base metal characteristics except:**

- A) Composition
- B) Weldability
- C) Mechanical properties
- D) Welding Process types

**Answer: D ... Ref: Section 7.2 → Materials → P-Numbers**

**4. Electrodes and welding rods are assigned F-numbers to:**

- A) Reduce only the number of welder performance qualifications required
- B) Reduce number of welding procedure and performance qualifications
- C) Reduce the number of welding procedure qualifications required
- D) Reduce the number of welding procedure specifications required

**Answer: B ... Ref: Section 7.3 → Materials → F-Numbers**

**5. F-number groupings are based essentially on their usability characteristics, which fundamentally determine:**

- A) The chemical composition of the electrode only
- B) The chemical composition of the electrode and the weldability
- C) The ability of welders to make satisfactory welds using similar composition filler metals
- D) The ability of welders to make satisfactory welds using a given process and given filler metal

**Answer: D ... Ref: Section 7.3 → Materials → F-Numbers**

## **Exercise 7 (API 577 Welding Materials – 10 Q&A)**

**6. Regarding F-Numbers, those welders qualified using a single filler metal (assume E-7018 Electrode having F-4 designation without backing) are qualified to weld with:**

- A) All electrodes having any F-number designation
- B) All electrodes having the same F-4 designation only
- C) All electrodes having F-4 designation and all F-1, F-2, & F-3 electrodes
- D) All electrodes having F-4 designation and all F-1, F-2, & F-3 electrodes (with backing limits)

**Answer: D ... Ref: Section 7.3 → Materials → F-Numbers**

**7. An AWS classification number identifies:**

- A) All consumables listed within ASME IX
- B) Specific consumables listed within ASME IX
- C) Electrodes and welding rods specified in ASME II, Section C
- D) None of these

**Answer: C ... Ref: Section 7.4 → Materials → AWS Classification Numbers**

**8. Steel & Steel alloy filler metals are grouped in ASME IX according to A-numbers to:**

- A) Reduce the number of welding procedure qualifications required
- B) Reduce the number of welding procedure specifications required
- C) Reduce the number of welder performance qualifications required
- D) Reduce number of welding procedure and performance qualifications

**Answer: A ... Ref: Section 7.5 → Materials → A-Numbers**

**9. The A-number grouping in ASME Section IX, Table QW-442 is based on the:**

- A) Chemical composition of the deposited weld metal and the base metal
- B) Chemical composition of the deposited weld metal
- C) Tensile strength of filler metal and base metal
- D) Chemical composition of the base metal

**Answer: B ... Ref: Section 7.5 → Materials → A-Numbers**

**10. Which of these statements are false regarding consumable storage and handling?**

- A) Covered electrodes exposed to moisture become unstable due to moisture pickup by coatings
- B) Moisture is a hydrogen source & open consumables should be stored in warm holding ovens
- C) Low-hydrogen electrodes should be stored together with other types of electrodes in ovens
- D) Low-hydrogen & stainless steel electrodes are particularly susceptible to moisture pickup

**Answer: C ... Ref: Section 7.7 → Materials → Consumable Storage & Handling**

## Exercise 8 (API 577 Welder Qualification – 10 Q&A)

**1. Welder performance qualification is to establish:**

- A) Welder's ability to deposit sound weld metal
- B) Welder's general level of welding skills
- C) Welder's general welding abilities
- D) None of these are correct

**Answer: A ... Ref: Section 8.1 → Welder Qualification → General**

**2. The welder qualification is limited by the:**

- A) Process variables
- C) Welding position and diameter
- B) Essential variables given for each process
- D) None of these are correct

**Answer: C ... Ref: Section 8.1 → Welder Qualification → General**

**3. A welder may be qualified by all of the following except:**

- A) Initial production welding only
- B) Bend tests of a test coupon only
- C) Radiography of a test coupon only
- D) Both RT of a test coupon and bend tests needed

**Answer: D ... Ref: Section 8.1 → Welder Qualification → General →**

**3a ... Trick question: How many bend tests required when qualifying a welder in 5g or 6g position? In 2g & 5g position? (Was on 2011/2012 exams) → Section 8.2 (in API 577) & also in Table QW-452.1 Note 1 → Expect question on your exam → Know how to find answer)**

**Answer (QW-452.1 Note 1): 4 bend tests (5G or 6G) ... 6 bend tests (if both 2G and 5G used)**

**4. The performance qualification test coupon is to be welded according to the qualified WPS, and the welding is to be supervised and controlled by:**

- A) Owner/user of the facility
- B) The employer of the welder
- C) The manufacturer or fabricator
- D) None of these are correct per API 577

**Answer: B ... Ref: Section 8.2 → Welder Qualification → WPQ**

**5. A change in any essential variable listed for the welding process requires the welder to re-qualify for that process. QW-352 through QW-357 in ASME Section IX, list the essential variables and referencing code paragraphs for different welding processes. The variable groups addressed include which of the following:**

- A) Joints, base & filler metals, positions, gas, and electrical characteristics
- B) Joints, base & filler metals, positions, diameters, gas, and electrical characteristics
- C) Joints, base & filler metals, positions, diameters, thickness, gas, and electrical characteristics
- D) None of the above is correct per ASME IX

**Answer: B ... Ref: Section 8.2 → Welder Qualification → WPQ**

## Exercise 8 (API 577 Welder Qualification – 10 Q&A)

**6. If radiographic exam is used for qualification of a welder or welding operator, the minimum length of coupon to be examined is any of the following items EXCEPT:**

- A) 3 feet (0.91 meters) for welding operators (ASME IX Rule)
- B) 6 inches (152.4 mm) minimum in any case (ASME IX Rule)
- C) The entire circumference for their first three production joints (ASME B31.3 Case)
- D) The entire weld circumference for pipe coupons (Typically Size 2 NPS & Size 8 NPS used)

**Answer: C ... Ref: Section 8.2 → Welder Qualification → WPQ**

**7. Welder performance qualification expires if a welding process is not used during a:**

- A) 3-month period
- B) Six-month period
- C) Nine-month period
- D) Twelve-month period

**Answer: B ... Ref: Section 8.2 → Welder Qualification → WPQ**

**8. Welder's qualification can be revoked if:**

- A) There is reason to question their ability to make welds (NDE results indicate repairs, etc)
- B) They violate their WPS more than once (includes high repair rates)
- C) They violate their WPS repeatedly (includes high repair rates)
- D) None of the above is correct per API 577

**Answer: A ... Ref: Section 8.2 → Welder Qualification → WPQ**

**9. What document can be used to verify welder's qualifications are current?**

- A) Welder WPS log
- B) Quality Control log
- C) Welder Performance Qualification Report
- D) Welder's log or Continuity report (ASME IX QW-484, NMA B)

**Answer: D ... Ref: Section 8.2 → Welder Qualification → WPQ**

**10. Prior to any welding, inspectors should review the welders' WPQ to:**

- A) Verify they are qualified to perform welding given its position & process
- B) Verify they are qualified to perform welding given its position, thickness and process
- C) Verify they are qualified to perform welding given its position, diameter and thickness
- D) Verify they are qualified to perform welding given its position/diam./thickness/process

**Answer: A ... Ref: Section 8.3.1 → Welder Qualification → Reviewing a WPQ**

## **Exercise 9 (API 577 NDE – 50 Q&A)**

**1. Lack of fusion (Per API 577, Table 6) can be corrected by (Practical Solution Column):**

- A) Proper heat input & proper welding technique
- B) Reduce travel speed and control arc length
- C) Proper heat input & proper joint design
- D) None of these are correct

**Answer: A ... Ref: Section 9.1 → NDE → Discontinuities (Table 6)**

**2. Undercut (Per API 577, Table 6) can be corrected by (Practical Solution Column):**

- A) Proper heat input & proper welding technique
- B) Reduce travel speed and control arc length
- C) Proper heat input & proper joint design
- D) Reduce travel speed

**Answer: D ... Ref: Section 9.1 → NDE → Discontinuities (Table 6)**

**3. Incomplete penetration (Per API 577, Table 6) can be corrected by (Practical Sol. Col):**

- A) Proper heat input & proper welding technique
- B) Reduce travel speed and control arc length
- C) Proper heat input & proper joint design
- D) None of these are correct

**Answer: C ... Ref: Section 9.1 → NDE → Discontinuities (Table 6)**

**4. During welding inspection, the inspector may need to verify the conformance of the base material and filler metal chemistries with the selected or specified alloyed materials. This may include reviewing all of the following EXCEPT:**

- A) Reviewing stamps or markings on the components
- B) Performing visual material checks
- C) The certified mill test report
- D) Requiring PMI testing

**Answer: B ... Ref: Section 9.2 → NDE → Materials Identification**

**5. It is the responsibility of the owner/user to establish a written material verification program indicating the extent and type of PMI to be conducted. Guidelines for material control and verification are outlined in:**

- A) API RP 572
- B) API RP 574
- C) API RP 577
- D) API RP 578

**Answer: D ... Ref: Section 9.1 → NDE → Materials Identification**

## Exercise 9 (API 577 NDE – 50 Q&A)

**6. Standards (ASME Section V Article 9) specify lighting levels of (how much) foot candles (lux) at the examination surface?**

- A) 1000 foot candles (10000 lux)
- B) 100 foot candles (1000 lux)
- C) 10 foot candles (100 lux)
- D) None of these is correct

**Answer: D ... Ref: Sect. 9.3.2.1 → NDE → VT → Optical Aids**

**7. Direct visual examination is conducted when access is sufficient to place the eye:**

- A) Within 6 in–24 in (150–600 mm) of exam surface & at an angle not less than 20° to surface
- B) Within 6 in–12 in (150–300 mm) of exam surface & at an angle not less than 20° to surface
- C) Within 12in-24 in (300-600 mm) of exam surface & at an angle not less than 20° to surface
- D) None of these is correct

**Answer: D ... Ref: Sect. 9.3.2.3 → NDE → VT → Weld exam Devices ... A = 30° to surface**



**8. In the illustration above, what is the weld size?**

- A) Just below ½ inch (12.7mm)
- B) Right at ½ inch (12.7 mm)
- C) Slightly above ½ inch (12.7mm)
- D) None of these is correct

**Answer: B ... Ref: Sect. 9.3.2.3.C & Fig 17/18 → NDE → VT → Weld exam Devices**

**9. In the illustration above, what is the name of the gauge being used?**

- A) Bridge Cam Gauge (GAL)
- B) Fillet Weld Gauge
- C) Weld Size Gauge
- D) None of these is correct

**Answer: B ... Ref: Sect. 9.3.2.3.C & Fig 17/18 → NDE → VT → Weld exam Devices**

**10. In the illustration above, what is the actual throat measurement (throat size)?**

- A) 12.7 mm
- B) 12.7 mm x .707 = 9 mm
- C) Cannot be determined by the above
- D) None of these is correct

**Answer: B ... Ref: Sect. 9.3.2.3.C & Fig 17/18 → NDE → VT → Weld exam Devices**

## Exercise 9 (API 577 NDE – 50 Q&A)

**11. Magnetic particle examination is effective in:**

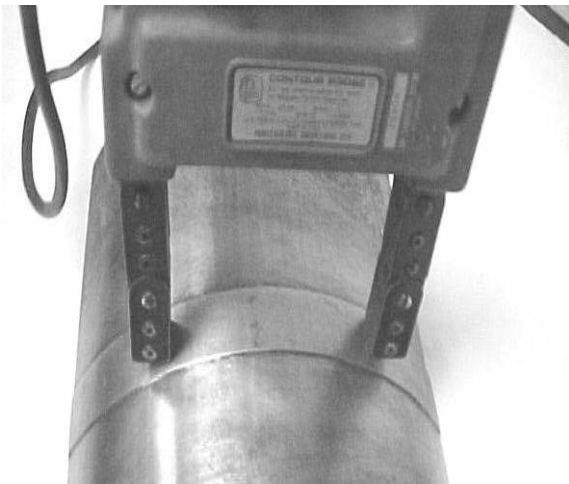
- A) Locating surface discontinuities of ferromagnetic materials
- B) Locating surface or near surface discontinuities of ferromagnetic materials
- C) Locating surface or near surface discontinuities of ferromagnetic and paramagnetic materials
- D) None of these are correct

**Answer: B ... Ref: Sect. 9.4.1 → NDE → MT → General**

**12. Which of the following statements is false regarding proper MT practice?**

- A) Particles used during the exam can be either dry or wet
- B) Best results are achieved when the lines of flux are perpendicular to the discontinuity
- C) If exam is performed with black light, color of particles should contrast with exam surface
- D) Two inspections are performed, one parallel to weld & one across (perpendicular to the weld)

**Answer: C ... Ref: Sec. 9.4.1 → NDE → MT → General → If performed in normal lighting**



**FIGURE 25**



**FIGURE 26**

**13. Figure 25 above (left) will detect which of these following discontinuities listed below?**

- A) Discontinuities transverse to the weld and located on the surface or slightly sub-surface only
- B) Discontinuities parallel to the weld and located on the surface or slightly sub-surface only
- C) Discontinuities transverse to the weld and located on the surface only
- D) Discontinuities parallel to the weld and located on the surface only

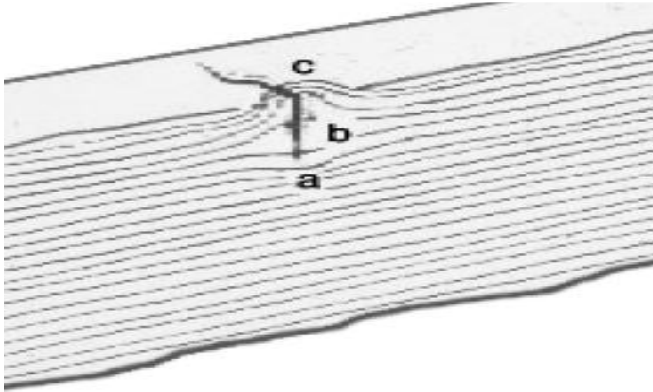
**Answer: A ... Ref: Sec. 9.4.1 & Fig. 25 → NDE → MT → General**

**14. Figure 26 above (right) will detect which of these following discontinuities listed below?**

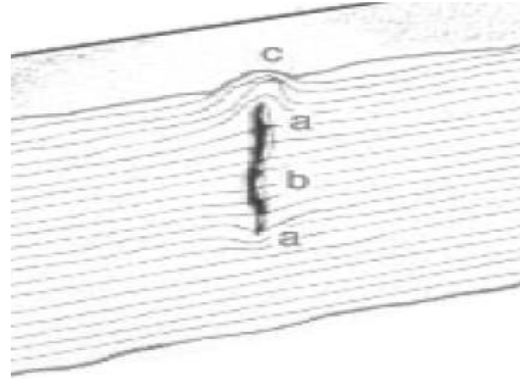
- A) Discontinuities transverse to the weld and located on the surface or slightly sub-surface only
- B) Discontinuities parallel to the weld and located on the surface or slightly sub-surface only
- C) Discontinuities transverse to the weld and located on the surface only
- D) Discontinuities parallel to the weld and located on the surface only

**Answer: B ... Ref: Sec. 9.4.1 & Fig. 25 → NDE → MT → General**

## Exercise 9 (API 577 NDE – 50 Q&A)



**FIGURE 21**



**FIGURE 22**

**15. Which of the statements below is FALSE regarding Figure 21 above (left)?**

- A) Ferromagnetic particles applied to magnetized surface are attracted to magnetic field breaks
- B) Figure 21 shows the disruption to the magnetic field caused by a defect open to the surface
- C) Ferromagnetic particles will be drawn to the break in the flux field shown in Figure 21
- D) Pattern of particles attracted in Fig. 21 will be less sharp & less distinct than Fig. 22

**Answer: D ... Ref: Sec. 9.4.1 & Fig. 21 → NDE → MT → General**

**16. Which of the statements below is FALSE regarding Figure 22 above (right)?**

- A) Ferromagnetic particles applied to magnetized surface are attracted to magnetic field breaks
- B) Ferromagnetic particles will be drawn to the break in the flux field shown in Figure 22
- C) Pattern of particles attracted in Fig. 22 will be more sharp and distinct than Fig. 21
- D) Figure 22 shows disruption to a magnetic field caused by a sub-surface defect

**Answer: C ... Ref: Sec. 9.4.1 & Fig. 21 → NDE → MT → General**

**17. Which of the following statements are false regarding ACFM technique?**

- A) It can work in a range of different materials and through coatings of varying thickness
- B) This technique is ideal for inspecting complex geometries such as nozzles & ring-grooves
- C) It is electromagnetic non-contacting and is able to detect and size surface breaking defects
- D) It requires extensive surface preparation & can be used at elevated temps up to 600°F (315°C)

**Answer: D ... Ref: Sect. 9.5 → NDE → ACFM**

**18. Which of these statements is false regarding the PT technique?**

- A) It is commonly employed on austenitic SS where MT exams are not possible
- B) It is capable of detecting surface-connecting discontinuities in nonferrous alloys only
- C) It can be used to examine weld joint surfaces/individual weld pass checks/completed welds
- D) Material certs on amounts of contaminants (chlorine, sulfur, and halogens) are to be checked

**Answer: B ... Ref: Sect. 9.6 → NDE → PT**

## **Exercise 9 (API 577 NDE – 50 Q&A)**

**19. A limitation of PT is that standard penetrant systems are limited to a maximum of:**

- A) 125°F (52°C)
- B) 120°F (49°C)
- C) 150°F (65°C)
- D) None of these are correct, because the limit can be exceeded

**Answer: A ... Ref: Sect. 9.6 → NDE → PT**

**20. Which of these statements are NOT true regarding techniques used in PT exam?**

- A) Liquid in any discontinuity bleeds out to stain the powder coating
- B) Test surface is cleaned & coated with a liquid that seeks surface-connected discontinuities
- C) After excess surface liquid is removed, a solvent-based developer is normally crush applied
- D) The greater the bleed out to surface opening ratio, the greater the volume of the discontinuity

**Answer: C ... Ref: Sect. 9.6 → NDE → PT → Normally spray applied**

**21. Regarding PT exam evaluation, an indication of depth is possible if the Inspector:**

- A) No indication of depth is possible because PT = Surface Exam Method (not volumetric exam)
- B) Observes and then compares the indication bleed out to the opening size visible at the surface
- C) Observes indication opening size visible at the surface and then estimates approximate depth
- D) Observes the indication bleed out at the surface and then estimates the approximate depth

**Answer: D ... Ref: Sect. 9.6 → NDE → PT → Shallow tight indications = light bleed out**

**22. General penetrant TECHNIQUES approved for use include which of the following?**

- A) Color contrast penetrant technique and the fluorescent penetrant technique
- B) Solvent removable technique, Water washable technique, & Post emulsifiable technique
- C) Solvent removable technique, Water washable technique, & Solvent emulsifiable technique
- D) Solvent removable technique, Water emulsifiable technique & Solvent emulsifiable technique

**Answer: A ... Ref: Sect. 9.6.1 → NDE → Liquid PT Techniques**

**23. General penetrant SYSTEMS approved for use include which of the following?**

- A) Color contrast penetrant technique and the fluorescent penetrant technique
- B) Solvent removable technique, Water washable technique, & Post emulsifiable technique
- C) Solvent removable technique, Water washable technique, & Solvent emulsifiable technique
- D) Solvent removable technique, Water emulsifiable technique & Solvent emulsifiable technique

**Answer: B ... Ref: Sect. 9.6.1 → NDE → Liquid PT Techniques**

## **Exercise 9 (API 577 NDE – 50 Q&A)**

**24. For added sensitivity, which of the following PT techniques may be used to detect fine linear type indications?**

- A) Fluorescent penetrant (Used in exams in darkened areas with filtered black light)
- B) Color Contrast Solvent Removable Visible Dye Penetrant (Technique)
- C) Color Contrast Post emulsifiable Visible Dye Penetrant (Technique)
- D) Color Contrast Water washable Visible Dye Penetrant (Technique)

**Answer: A ... Ref: Sect. 9.6.1 → NDE → Liquid PT Techniques**

**25. Which of these statements are NOT true regarding Eddy Current inspection?**

- A) Its magnetic fields & material discontinuities alter induced fields/show them on unit's display
- B) As with MT, ET is most sensitive (finds the defect) if a current is parallel to the discontinuity
- C) It can measure thickness of protective, nonconductive surface coatings & cladding thickness
- D) It detects surface & subsurface discontinuities (tubing, pipe) & is limited in weld inspection

**Answer: B ... Ref: Sect. 9.7 → NDE → ET Technique → B ... If current is perpendicular**

**26. Which of these statements are NOT true regarding Radiographic Testing (RT) method?**

- A) It uses the change in absorption of radiation by solid metal and in areas of a discontinuity
- B) It is a volumetric exam method capable of examining entire specimen, not just the surface
- C) Radiation sent reacts with film & permanent image is captured & processed into latent image
- D) Some methods are available that use electronics to create a digital image & are called filmless

**Answer: C ... Ref: Sect. 9.8.1 → NDE → RT General ... Latent image is first captured → then it is processed into a permanent image**

**27. Which of these statements are NOT true regarding Radiographic Testing (RT) methods and examiners?**

- A) RT indications display a different density in contrast to a normal background image of a weld
- B) NDT examiner interprets/evaluates the film for differences in absorption/transmission results
- C) Radiographers ensure film is exposed by primary radiation source (not backscatter radiation)
- D) Film examiners (interpret/evaluate/report) should be certified ASNT Level I as a minimum

**Answer: D ... Ref: Sect. 9.8.1 → NDE → RT General ... Level II as a minimum**

**28. The exposure and processing of a radiograph is considered acceptable when it meets the required quality features in terms of:**

- A) Density
- B) Sensitivity
- C) Sensitivity and density
- D) Sensitivity, density and film quality

**Answer: C ... Ref: Sect. 9.8.1 → NDE → RT General**

## Exercise 9 (API 577 NDE – 50 Q&A)

**29. Which of these statements is NOT true regarding Image Quality Indicators (IQIs)?**

- A) STDs for industrial RT require one or more IQIs used to determine required sensitivity is met
- B) IQI was previously called a penetrameter and this term is still being used in most of the codes
- C) To assess sensitivity, a required hole or wire (code specified) must be visible on finished film
- D) IQIs (penetrameter) are tools used in industrial radiography to establish the film quality levels

**Answer: B ... Ref: Sect. 9.8.2 → NDE → RT → IQI ... Penetrameter no longer being used**

**30. Which of these statements is NOT true regarding Wire-Type IQIs?**

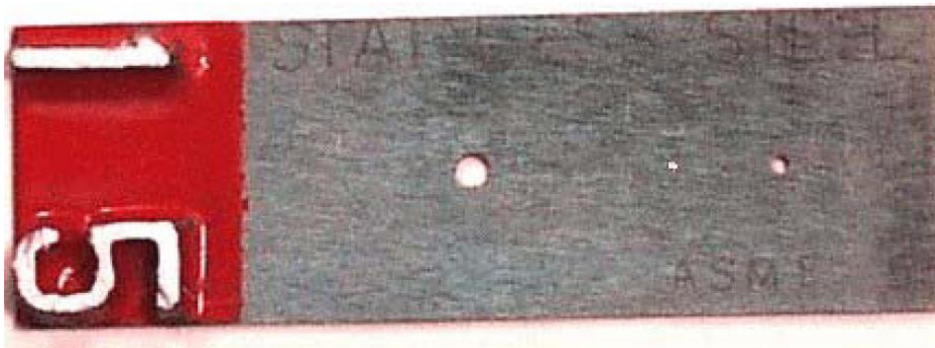
- A) Wire to be visible (standard specified) on an acceptable radiograph is called a sensitive wire
- B) Diameter of smallest visible wire (lighter-white image) indicates sensitivity of radiograph
- C) They are placed on and perpendicular to the weld prior to the exposure of a radiograph
- D) They are constructed of an array of six paralleled wires of specified diameters

**Answer: A ... Ref: Sect. 9.8.2 → NDE → RT ... The “essential” wire must always be visible**

**31. Which of these statements is NOT true regarding Hole-Type IQIs?**

- A) They are sheets of metal (known thickness) with specified diameter holes drilled or punched
- B) An indication of film sensitivity = IQI thickness & diameter of smallest visible hole on film
- C) Their thickness is generally specified at 2 – 4 % of thickness of object being radiographed
- D) Holes in the IQI are projected on a radiograph as lighter (white or lighter) spots

**Answer: D ... Ref: Sect. 9.8.2 → NDE → RT → Projected as dark or gray spots**



**... Figure 29**

**32. Diameter of holes in hole-type IQIs are a multiple of the thickness of a sheet. Common hole diameters are HOW MANY times the thickness of the IQI shown in Fig. 29?**

- A) 2% and 4% holes in sheet metal strip having an actual thickness of 15 mm
- B) 1%, 2% & 4% holes in sheet metal strip having an actual thickness of 15 mm
- C) 2% and 4% holes in sheet metal strip having an actual thickness of 15 mils (.015 inches)
- D) 1%, 2% & 4% holes in sheet metal strip having an actual thickness of 15 mils (.015 inches)

**Answer: D ... Ref: Sect. 9.8.2 → NDE → RT → IQIs → Projected as dark or gray spots**

## **Exercise 9 (API 577 NDE – 50 Q&A)**

**33. IQIs (penetrameters) are selected based on which of the following values:**

- A) Thickness of the base material
- B) Thickness of the base material and the code designation taken from table
- C) Thickness of the base material plus any code allowed weld reinforcement
- D) None of these is correct

**Answer: C ... Ref: Sect. 9.8.2 → NDE → RT → IQIs**

**34. Which of the following statements are NOT true regarding IQIs & their placement?**

- A) Wire-type IQIs are most often placed perpendicular to weld center line
- B) Hole-type IQIs are placed next to weld always on a shim where T = the weld build-up
- C) Hole that is required to be visible on an acceptable radiograph is called the essential hole
- D) Hole-type IQIs are placed next to weld on a base metal or on a shim (with T = weld build-up)

**Answer: B ... Ref: Sect. 9.8.2 → NDE → RT → IQIs**

**35. Which of the following statements are NOT true regarding RT film?**

- A) Film must be long & wide enough to cover 25 mm on consecutive circumferential exposures
- B) Film must be long & wide enough to cover 19 mm coverage on either side of the weld
- C) Film should be stored in a cool, dry, clean area away from the exposure area
- D) Radiographic film Class I or II or III film are acceptable for use

**Answer: D ... Ref: Sect. 9.8.3 → NDE → RT → Film rules → Only class I or II is OK**

**36. Which of the following statements is TRUE regarding RT film source selection?**

- A) X-ray machines must also be used in addition to sources with decaying radioisotopes
- B) For weld inspection, radioactive isotopes of Iridium 192 or Cobalt 60 are typically used
- C) Iridium 192 is normally used for RT on steel (thickness = 1.5 – 7.0 in. or 38 mm – 178 mm)
- D) Cobalt 60 is normally used for RT on steel (thickness = 0.25 – 3.0 in. or 6.3 mm – 76.2 mm)

**Answer: B ... Ref: Sect. 9.8.4 → NDE → RT → Film Source selection**

**37. Which of the following statements is NOT TRUE regarding RT film processing?**

- A) Normal developing time is ten to twelve minutes at 68°F (20°C)
- B) When temps are higher or lower than 20°C, developing time is to be adjusted
- C) Exposed film can either be hand-processed, or examiner may use an automatic processor
- D) Chemicals used to process/develop/fix/rinse film are required to be changed on a regular basis

**Answer: A ... Ref: Sect. 9.8.5 → NDE → RT → Film Processing ... Five to eight minutes**

## Exercise 9 (API 577 NDE – 50 Q&A)

**38. Which of the following statements is TRUE regarding RT surface preparation?**

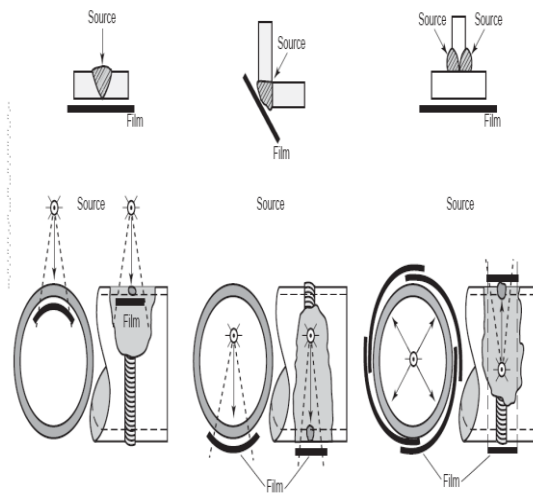
- A) Surface conditions (visual) that can mask a defect should be remedied after the exposure
- B) Weld ripples shall be removed so that RT images are not confused with any discontinuities
- C) Weld ripples should be removed so that RT images are not confused with any discontinuities
- D) Weld ripples should be removed to an extent so RT images are not confused with any defects

**Answer: C ... Ref: Sect. 9.8.6 → NDE → RT → Surface Preparation**

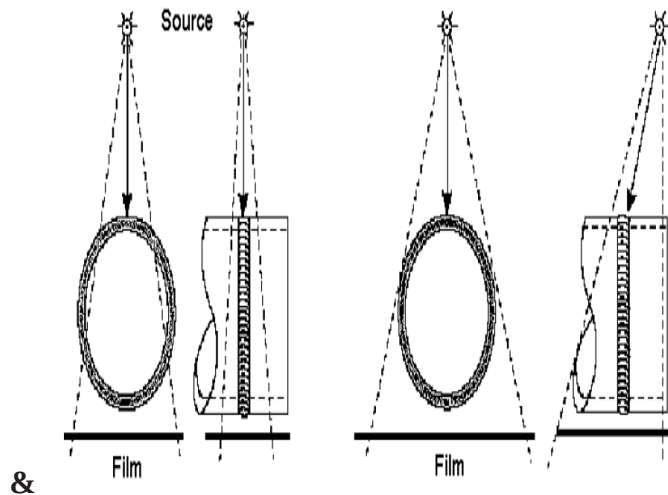
**39. Which of the following statements is False regarding RT film identification (ID) on all radiographs?**

- A) ID information should be plainly & permanently produced
- B) Location markers will also appear on the film identifying the area of coverage
- C) ID information shall be traceable to contract/manufacturer/date/component/weld or part #s
- D) ID information will not obscure any area of interest (to prevent to proper film identification)

**Answer: D ... Ref: Sect. 9.8.7 → NDE → RT ID → To prevent proper film interpretation**



**Figure 31**



**Figure 32**

**40. Which of these statements is FALSE regarding the most effective RT Technique that can be used?**

- A) Most effective technique = double-wall exposure (film contacts surface opposite source)
- B) Most effective technique = single-wall exposure (film contacts surface opposite source)
- C) Most effective technique = double-wall exposure (film contacts surface nearest source)
- D) Most effective technique = single-wall exposure (film contacts surface nearest source)

**Answer: B ... Ref: Sect. 9.8.8 → NDE → RT Techniques → Single wall exposure (Fig 31)**

## **Exercise 9 (API 577 NDE – 50 Q&A)**

**41. Which of these statements is FALSE regarding RT Techniques to be used?**

- A) Radiography is not sensitive to the orientation of tight planar discontinuities
- B) Technique should be chosen based on ability to produce images of suspected discontinuities
- C) Nature, location, and orientation should always be a major factor in establishing a technique
- D) Tight planar discontinuity at an angle to a radiation source may be difficult/impossible to see

**Ans: A ... Ref: Sect. 9.8.8 → NDE → RT Techniques → extremely sensitive to orientation**

**42. Which of these RT Techniques should be used whenever practical?**

- A) Double-wall exposure where radiation passes through two walls of the material or weld
- B) Single-wall exposure where the radiation passes through only one wall of material or weld
- C) Single-wall viewing where radiation passes through 2 walls (weld & film sidewall viewed)
- D) Double-wall viewing where radiation passes through 2 walls (weld & film sidewall viewed)

**Answer: B ... Ref: Sect. 9.8.8.1 → NDE → RT Techniques → Single wall exposure (Fig 31)**

**43. When the single wall viewing technique is used (radiation passes through two walls) and only the weld (material) on the film sidewall is viewed for acceptance, what is the minimum number of exposures that should be taken (assume RT for circumferential welds)?**

- A) Minimum of one exposure is possible using the panoramic technique
- B) Minimum of two exposures is possible using the superimposed technique
- C) Minimum of four exposures taken at 90° to each other should be made as a general rule
- D) Minimum of three exposures taken at 120° to each other should be made as a general rule

**Answer: D ... Ref: Sect. 9.8.8.2 → NDE → RT Techniques → Single wall viewing**

**44. Which of these statements is FALSE regarding the RT double-wall techniques?**

- A) When not practical to use a single wall technique, double-wall techniques should be used
- B) Double-wall technique is OK for material/welds in components 4 in. or less (nominal OD)
- C) Double-wall elliptical shot (complete weld coverage required) = 2 exposures 90° apart OK
- D) Double-wall superimposed shot (complete weld coverage reqd) = 3 exposures 120° apart OK

**Ans: B ... Ref: Sect. 9.8.8.3 → NDE → Double wall techniques → 3.5 inch NPS & Less Rule**

**45. Which of these statements is FALSE regarding the evaluation of Radiographs?**

- A) The final step in the radiographic process is the evaluation of the radiograph
- B) Lack of fusion is typically narrow and linear and it tends to be straighter than a crack.
- C) Interpreters should know different welding processes & discontinuities associated by process
- D) Rounded indication (porosity/slag) will be less apparent than indication from crack or LOF

**Answer: D ... Ref: Sect. 9.8.9 & RT Figures → NDE → RT → Evaluation of Radiographs  
It will be MORE apparent ... not less apparent!**

**Exercise 9 (API 577 NDE – 50 Q&A)**

**WARNING**

**INCOMPLETE = EXERCISE 9 & 10 &  
APPENDIXES**

**See HIGHLIGHTED API 577**

**BE SURE TO STUDY HIGHLIGHTED AREAS &  
APPENDIXES IN THE BACK OF API 577**

**FOR CHAPTERS 10 & 11 & APPENDIXES**

**WATCH OUT FOR TABLE IN END OF  
SECTION 9 HAVING DEFINITIONS**

**More 577 Questions will be added in 2013**

**SEE STUDY GUIDE PART II (WELDING)  
STUDY PRACTICE EXAM Qs IN THERE**

**End API 577 Q&A**

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### EXTRA Q'S

**1. Which of the following is an example of a limited or routine repairs per API 510 code?**

- A) Repairs include grinding on existing welds to determine depth of environmental cracking
- B) Repairs on dissimilar weld overlay performed by competent maintenance organization
- C) Repairs are welding overlay of pitting on a non-PWHT'd vessel
- D) Repairs are the kind that will require a pressure test

**Answer: C ... (Para. 8.1.1) Topic 14 Repairs & Alterations → Authorize Repairs/Alterations**