

API-510 Practice Exam #5 Closed Book Questions

1. Material used in making repairs or alterations shall conform to the:
 - a) Applicable construction Code
 - b) ASME Code.
 - c) AWS standards.
 - d) ASTM standards.
2. Which of the following correctly states the steps that would most likely be performed during external inspection of a pressure vessel that is completely insulated and operates at 450°F (232°C)?
 - a) No examination of insulation is necessary due to high operating temperature.
 - b) Visual examination is necessary only if the vessel has not operated continuously.
 - c) Visual external inspection of insulation is normally sufficient.
 - d) The inspection would include visual inspection of insulation, removal of insulation at low spots or where moisture can collect, and thermography of hard-to-reach areas.
3. If a vessel's largest nozzle is a reinforced NPS 10 (DN 250) nozzle, then an alteration is adding a/an:
 - a) reinforced nozzle of any size less than NPS 10 (DN 250).
 - b) nozzle that does not require reinforcement.
 - c) NPS 10 (DN 250) reinforced nozzle.
 - d) NPS 12 (DN 300) reinforced nozzle.
4. The ASME Code recommends that welding not be performed when the base metal temperature is lower than:
 - a) 0°F (-18°C).
 - b) 10°F (-12°C).
 - c) 32°F (0°C).
 - d) 60°F (16°C).
5. When a nozzle is inspected and evidence of distortion is found, all weld seams in the:
 - a) shell in the area of the nozzle should be examined for deformation.
 - b) nozzle and shell in the area of the nozzle should be examined for cracks.
 - c) nozzle and shell in the area of the nozzle should be examined for deformation.
 - d) nozzle should be examined for cracks.
6. A vessel has a single corrosion rate of 0.012 inch per year (0.305 mm/year). The minimum vessel required thickness for both the shell and the heads is 0.6875 inch (17.5 mm). The actual thickness of the head is 0.9375 inch (23.8 mm) and the shell is 1.10 inch (27.9 mm). What is the vessels remaining life?
 - a) 7.5 years
 - b) 10.5 years
 - c) 21 years
 - d) 30 years

7. A pressure vessel currently in operation has an established corrosion rate of 0.001 inch per year (0.025 mm/year) and no history of localized corrosion. One corrosion monitoring location (CML) is established on each head and on one nozzle in the bottom head. Engineering has approved a change of service, expecting a corrosion rate of 0.010 inch per year (0.254 mm/year) and that the new service will promote localized corrosion in the bottom third of the vessel. An authorized pressure vessel inspector considering adjusting the number and location of CMLs should:
 - a) increase the number of CMLs for the bottom head, shell, and nozzles in the area where localized corrosion is expected to occur.
 - b) increase the number of CMLs only in the spot where localized corrosion is expected to occur.
 - c) increase the number of CMLs after the next scheduled internal inspection based on the new service conditions.
 - d) do nothing; the number of CMLs satisfies the requirements of the API 510 Code.
8. During an internal inspection, which of the following nondestructive examination (NDE) techniques would be most sensitive for detecting the internal deterioration on a carbon steel vessel that is in caustic service at a pressure of 50 psig (0.345 MPa) and 150°F (66°C) that has not been stress-relieved?
 - a) Digital ultrasonic testing
 - b) Radiographic testing
 - c) Wet fluorescent magnetic-particle testing
 - d) Dye-penetrant testing
9. The ability of a metal to absorb energy and deform plastically before fracturing is known as:
 - a) ductile-to-brittle transition.
 - b) plasticity.
 - c) tensile strength.
 - d) toughness.
10. For in-service vessels where a conflict exists between the ASME Code and the API 510 Code, the:
 - a) ASME Code takes precedence.
 - b) API 510 Code takes precedence.
 - c) applicable code, as determined by the owner/user of the pressure vessel, takes precedence.
 - d) applicable code, as determined by the authorized pressure vessel inspector, takes precedence.

11. For a large vessel with two or more zones of differing corrosion rates:
 - a) the complete vessel may be treated as a single zone, using the average corrosion rate of all sections.
 - b) each zone may be treated independently regarding the interval between inspections.
 - c) the complete vessel space must be inspected using the inspection interval for the section with the highest corrosion rate.
 - d) each zone must be inspected using the shortest inspection interval required among all of the sections.

12. A 50-foot-tall (15420-mm-tall) water-filled pressure vessel has an MAWP of 275 psi (1.90 MPa). What pressure must the bottom head of the vessel be designed for? (1 foot of water = 0.433 psi (1000 mm of water = 0.00978 MPa)]
 - a) 253 psi (1.74 MPa)
 - b) 275 psi (1.90 MPa)
 - c) 297 psi (2.05 MPa)
 - d) 358 psi (2.47 MPa)

13. Engineering is considering using a carbon-steel, un-insulated pressure vessel that has been in storage for several years. Inspection records indicate that the vessel has experienced no corrosion, but that it had been involved in a fire shortly before it was taken out of service. Which of the following inspection methods, besides visual, should the inspector use to determine the condition of the vessel?
 - a) Ultrasonic shear wave
 - b) Magnetic particle and eddy current Hardness testing
 - c) Hardness test
 - d) Dye-penetrant and hammer testing

14. Which tests are always used in qualifying a groove-weld procedure?
 - a) Tension and Charpy
 - b) Tension and bend
 - c) Radiographic and bend
 - d) Radiographic and ultrasonic

15. A vessel put into service today is susceptible to carbon dioxide corrosion, since the carbon dioxide in the process may dissolve in the water to form carbonic acid. Where would be the best place to locate the corrosion monitoring locations (CMLs)?
 - a) At the bottom and top heads
 - b) Throughout the vessel, as the mechanism is unpredictable
 - c) At areas of anticipated water wetting and weld seams for preferential corrosion
 - d) At the gas/liquid interface

16. Calculations by the original manufacturer or an owner/user engineer shall be completed before:
- a) thickness measurements are evaluated.
 - b) re-rating the vessel.
 - c) acceptance of welding procedures and welder qualification.
 - d) repairing a portion of the vessel due to corrosion.
17. A low energy value on a test for notch toughness indicates that a metal is:
- a) ductile.
 - b) elastic.
 - c) brittle.
 - d) low strength.
18. A vessel is inspected after 5 years of service, and the thinnest part of the shell is found to be 1.410 inches (35.8 mm). If the original thickness was 1.5625 inches (39.7 mm) and the minimum required thickness is 1.232 inches (31.3 mm), what thickness of material is available for the remaining corrosion allowance?
- a) 0.028 inch (.711 mm)
 - b) 0.077 inch (2.0 mm)
 - c) 0.178 inch (4.5 mm)
 - d) 0.206 inch (5.2 mm)
19. Which of the following is most important to document when performing risk-based inspection assessments?
- a) Deficiencies or recommendations for repair for continued service until repairs are completed
 - b) Repairing, altering, and re-rating information
 - c) Construction and design, along with operating and inspection history
 - d) All factors contributing to the likelihood and consequences of a failure
20. Which of the following is most likely to result from improper heat treating?
- a) Low residual stress
 - b) Lack of penetration
 - c) High residual stress
 - d) Weld shrinkage
21. When long-term and short-term corrosion rates are different, the remaining life should be determined:
- a) at the discretion of the inspector.
 - b) using the rate that reflects the current process conditions.
 - c) using the rate that gives the shortest remaining life.
 - d) using the rate that gives the longest inspection interval.

22. An inspection plan for pressure vessels operating at elevated temperatures shall be prepared in consultation with a/an:
- a) safety engineer.
 - b) pressure-vessel engineer.
 - c) corrosion specialist.
 - d) pressure-vessel inspector experienced in vessels operating at elevated temperatures.
23. A pressure vessel has been in non-continuous service for 15 years. During this time, it has been filled three times for 2 years at a time; then internally inspected. The last internal inspection determined that the vessel had 9 years of remaining life. The next inspection is due:
- a) before 4.5 years of actual service.
 - b) before 5 years of actual service.
 - c) before 9 years of actual service.
 - d) before a maximum of 10 years of actual service.
24. In the development of an inspection plan for corrosion under insulation, the first step is to:
- a) perform a visual inspection and look for wet insulation.
 - b) create a structured and systematic approach utilizing prediction/analysis tools.
 - c) de-lag all suspected insulation.
 - d) de-lag only equipment operating between 212°F and 250°F (100°C and 121°C).
25. In re-rating a pressure vessel, the re-rating is considered complete when:
- a) the inspector witnesses the attachment of an additional nameplate or stamping.
 - b) all re-rating calculations are reviewed and approved by the API-authorized pressure vessel inspector.
 - c) the pressure vessel engineer performing the re-rating oversees the attachment of an additional re-rating nameplate to the vessel.
 - d) an additional nameplate is attached to the vessel wall by welding, and the re-rating record is approved by the vessel owner/user.
26. When performing a weld repair on a section of stainless-steel weld overlay on a carbon-steel vessel in hydrogen service, which of the following is most important?
- a) Magnetic-particle testing of the overlay
 - b) Brinell hardness testing of the overlay
 - c) Out-gassing of the base metal
 - d) Impact testing of the base metal

27. All of the following are types of corrosion except:
- a) wet H₂S cracking.
 - b) cavitation.
 - c) dezincification.
 - d) biological attack.
28. A welder has qualified in the 1G position with a groove weld in plate. The position he is qualified to weld in is:
- a) horizontal.
 - b) flat.
 - c) overhead.
 - d) vertical.
29. When dial-type indicating pressure gauges are used during a vessel hydrostatic test, the maximum gauge range shall not exceed:
- a) 1 ½ times the test pressure.
 - b) 2 ½ times the test pressure.
 - c) 3 times the test pressure.
 - d) 4 times the test pressure.
30. During radiographic examination of a weld, the wire type IQI shall be placed:
- a) adjacent to the weld so that the length of the wire is perpendicular to the weld.
 - b) adjacent to the weld so that the length of the wire is parallel to the weld.
 - c) on the weld so that the length of the wire is perpendicular to the weld.
 - d) on the weld so that the length of the wire is parallel to the weld.
31. Tests conducted to qualify a welding procedure are documented by the procedure qualification record (PQR). Responsibility for these tests rest with:
- a) the organization performing the welding.
 - b) the plate manufacturer or supplier.
 - c) an independent testing laboratory.
 - d) the owner/operator.
32. A vessel has been in service for 8 years, the original shell thickness was 1.5 inches (38.1 mm) and the vessel was 100% radiographed at construction. If the required shell thickness is 1.125 inches (28.6 mm), and the measured thickness after 8 years of service is 1.250 inches (31.8 mm), what is the remaining life of this vessel?
- a) 2 years
 - b) 4 years
 - c) 0.4 years
 - d) 0.2 years

33. When warranted by process, equipment, or consequence changes, a risk-based inspection (RBI) assessment shall be reviewed and approved at intervals not to exceed a maximum of:
- a) 3 years.
 - b) 5 years.
 - c) 10 years.
 - d) 15 years.

34. Inspection records contain the following information for a particular corrosion monitoring location:

Thickness	Year of Operation
0.625 inch (15.9 mm)	0 (New)
0.575 inch (14.6 mm)	5
0.550 inch (13.9 mm)	10 (Current)

What is the short-term corrosion rate for the location?

- a) 0.0025 inch per year (0.07 mm/year)
 - b) 0.0050 inch per year (0.13 mm/year)
 - c) 0.0075 inch per year (0.19 mm/year)
 - d) 0.0100 inch per year (0.25 mm/year)
35. What is the cause for rejection of a radiograph due to a “B” image on a film?
- a) Any “B” image
 - b) No image
 - c) A light “B” image
 - d) A dark “B” image
36. If solid particles are suspected to be in a process flowing through a pressure vessel nozzle, the inspector should check for:
- a) localized erosion.
 - b) general pitting.
 - c) general corrosion.
 - d) localized pitting.
37. If a vessel’s service conditions are changed, the corrosion rate shall be determined by:
- a) the owner/user’s metallurgist.
 - b) on-stream corrosion data gathered after 4 weeks of continuous service.
 - c) on-stream corrosion data gathered after 6 weeks of continuous service.
 - d) on-stream corrosion data gathered after 12 weeks of continuous service.

38. For pressure vessels in non-continuous service, the maximum internal or on-stream inspection interval shall be:
- a) 5 years, because of the potential of corrosion.
 - b) the 10 years of actual service.
 - c) 10 calendar years from the last inspection.
 - d) the half-life of the calendar time since the last inspection.
39. A crack in a vessel at the cone-to-cylinder juncture can be repaired with approval by the inspector, provided that:
- a) the weld is fully radiographed.
 - b) the weld is postweld heat-treated.
 - c) the weld is postweld heat-treated and fully examined radiographically.
 - d) an engineer is consulted.
40. Statistical data analysis may not be applicable to vessels with:
- a) significant numbers of corrosion monitoring locations (CMLs) that were not measured.
 - b) random but significant localized corrosion.
 - c) variations in general corrosion rates.
 - d) fewer than 10 years of remaining life.
41. Pressure vessels shall be inspected at the time of installation. The purpose of this inspection is to:
- a) verify the equipment is safe for operation and to initiate plant inspection records.
 - b) verify the estimated remaining life of the vessel and establish the long term corrosion rate
 - c) verify the equipment was built in accordance with all the requirements of API-510
 - d) verify the equipment was built in accordance with the applicable edition and addenda of ASME Section VIII, Division 1
42. Above what pressure is a vessel considered to be in the scope of the API 510 Code?
- a) 2.5psi
 - b) 5psi
 - c) 10psi
 - d) 15psi
43. Which of the following nondestructive examination (NDE) methods is most likely to detect a subsurface flaw in a pressure vessel?
- a) Ultrasonic
 - b) Magnetic-particle
 - c) Dye-penetrant
 - d) Eddy-current

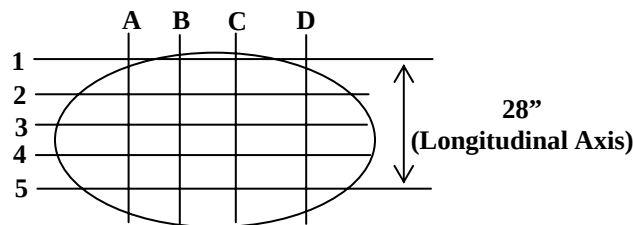
44. The potential for galvanic corrosion will increase when:
- a) insulating dissimilar metals.
 - b) using a relatively large volume of anodic material.
 - c) applying a coating to both metals.
 - d) combining metals from opposite ends of the galvanic series.
45. According to API-510, inspection for corrosion under insulation shall be considered for externally insulated carbon and low alloy steel vessels that operate between:
- a) 32°F (0°C) and 250°F (120°C).
 - b) 140°F (60°C) and 400°F (205°C).
 - c) 10°F (-12°C) and 350°F (175°C).
 - d) -20°F (-29°C) and 200°F (93°C).
46. What type of pressure-relief valve has a main relieving valve controlled by a self-actuated auxiliary pressure-relief valve?
- a) Conventional safety-relief valve
 - b) Rupture disk
 - c) Pilot-operated safety-relief valve
 - d) Balanced safety-relief valve
47. During an external inspection of a pressure vessel, particular attention should be given to:
- a) the immediate area around the vessel to ensure no unauthorized objects are in the vicinity
 - b) the welds used to attach components for cracking or other defects
 - c) the impact barriers to ensure they will protect the vessel from vehicles.
 - d) the grounding straps and lightning rods.
48. All of the following are suitable for determining the thickness of a part except:
- a) an ultrasonic shear wave.
 - b) profile radiography.
 - c) an ultrasonic straight beam.
 - d) an ultrasonic "A" scan.
49. Which of the following is not required during an internal inspection of a horizontal vessel?
- a) All persons working around the vessel should be informed of the work inside the vessel.
 - b) All persons inside the vessel should be informed before any work starts on the outside of the vessel.
 - c) All persons inside the vessel must be in a harness with a safety line to the manway.
 - d) A safety guard should be posted outside the vessel at the manway closest to the work going on in the vessel.

50. Which of the following is responsible for maintaining the records of qualified welding procedure specifications (WPSs) and procedure qualification records (PQRs) used in conducting repairs and alterations?
- a) The owner/user inspection organization
 - b) The engineer
 - c) The inspector
 - d) The repair organization
51. Materials used for replacement during the repair or alteration of a pressure vessel should be identified with markings. Which of the following also requires a material test report?
- a) Seamless pipe
 - b) Welded pipe
 - c) Forged manway cover
 - d) Plate
52. When must a pressure test be performed on a pressure vessel that has been in service?
- a) Whenever the vessel has been opened for internal inspection
 - b) When the inspector deems it necessary
 - c) After any repair or alteration is performed
 - d) Only if the vessel is rerated to a higher pressure
53. Which of the following terms refers to breaks in nonmetallic linings or coatings?
- a) Bulges
 - b) Holidays
 - c) Disbonding
 - d) Laminations
54. The next inspection interval for vessels in corrosive service should be determined by calculating the remaining life of:
- a) the shell and heads.
 - b) the internal components.
 - c) all nozzles.
 - d) the limiting component.
55. According to the API 510 Code, how many thickness measurements should be taken on a pressure vessel during internal or on-stream inspections?
- a) A representative number that will satisfy the requirements for an internal or on-stream inspection
 - b) At least one on each nozzle, and two on each head and shell section
 - c) At least one adjacent to each girth weld
 - d) Four points on the shell, one on each head, and one on all major nozzles

56. If corrosion is suspected underneath refractory linings, the refractory can be removed to allow further inspection or:
- ultrasonic thickness scanning may be made from external metal surfaces.
 - profile radiography of the metal surface is required.
 - hammer testing may be used to indicate the metal thickness accurately.
 - a thorough visual inspection is considered sufficient.
57. In calculating the remaining life of a pressure vessel shell, what are the definitions of t_{required} and t_{actual} per API-510?
- t_{required} = the required thickness at the same CML or component as t_{actual}
 t_{actual} = the actual thickness of a CML at the time of inspection
 - t_{required} = the required thickness at the same CML or component as t_{actual} plus corrosion allowance
 t_{actual} = the actual thickness of a CML at the time of inspection plus corrosion allowance
 - t_{required} = the required thickness of the shell, plus the corrosion allowance
 t_{actual} = the thickness measured at the time of inspection
 - t_{required} = the required thickness of the shell, plus the corrosion allowance
 t_{actual} = the thickness measured during a previous inspection
58. The grooves of carbon-steel ring-joint flanges should be checked for cracks due to:
- low-temperature operation.
 - stress corrosion cracking.
 - excessive bolt tightening.
 - high-temperature operation.
59. The external inspection interval of buried vessels shall be based on:
- corrosion rate information.
 - inspection interval of another vessel in the same area.
 - Buried vessels do not require external inspection
 - the recommendations of the repair organization.
60. Preliminary pressure-vessel inspection reveals loose internal parts that may fall and corroded or broken internal ladders and platforms. The loose and damaged parts:
- should be evaluated by a licensed professional engineer to determine if they need repair,
 - should be evaluated by the inspector to determine if they need repair.
 - must be evaluated by an engineer to determine if they need repair.
 - must be repaired or removed before a more detailed inspection may proceed.

61. The frequency that pressure relieving devices must be tested and inspected is based on:
- a) the ASME Code as it applies to relief devices.
 - b) the inspection frequency of the equipment to which it is attached.
 - c) the operating experience of the device.
 - d) a 5-year maximum frequency set by the API 510 Code.
62. According to the API 510 Code, a pressure-relief device repair organization must have:
- a) a quality control system.
 - b) state-certified repair personnel.
 - c) a national board VR stamp.
 - d) a state-approved test facility.
63. Safety valves are used in:
- a) any service with back pressure.
 - b) air and steam service.
 - c) liquid and vapor service.
 - d) liquid service.
64. According to API-510, who normally performs external inspections of vessels?
- a) The lead operator of the unit.
 - b) The repair organization.
 - c) An inspector.
 - d) Since it is just an external inspection, and does not require any experience, anyone may perform it.
65. A re-rating is proposed for a pressure vessel. Which of the following steps is always required for the re-rating by the API 510 Code?
- a) The performance of calculations by a the manufacturer or an owner/user engineer
 - b) Consultation and approval from a professional engineer
 - c) The performance of a pressure test
 - d) A thorough internal inspection
66. When performing vessel repairs, which of the following does *not* qualify as an API 510 repair organization?
- a) Owner/user shop
 - b) Contractor chosen by the owner/user
 - c) ASME U stamp holder
 - d) ASME S stamp holder

67. A crack is found in the shell of a heat exchanger. The crack will be repaired by grinding it out, preparing a V-shaped groove, and filling the groove with weld metal. Which of the following persons must authorize the repair?
- The process operations supervisor
 - The inspector
 - The welding supervisor
 - An engineer experienced in pressure vessel design and repair
68. A generally corroded area is found in the wall of a 84 inch diameter pressure vessel. The corroded area is scanned and thicknesses are measured in the following grid pattern:



Thickness readings (inches) for the two thinnest areas are:

Line A	Line C
1 = 0.51 (13.0mm)	1 = 0.50 (12.7mm)
2 = 0.38 (9.7mm)	2 = 0.35 (8.9mm)
3 = 0.29 (7.4mm)	3 = 0.31 (7.9mm)
4 = 0.25 (6.4mm)	4 = 0.31 (7.9mm)
5 = 0.48 (12.2mm)	5 = 0.50 (12.7mm)

Which average thickness should be used in evaluating the vessel's pressure rating?

- 0.307 inch (7.8mm)
 - 0.368 inch (9.3mm)
 - 0.382 inch (9.7mm)
 - 0.394 inch (10.0mm)
69. The temperature at which the failure of steel changes from ductile to brittle is called the:
- incipient fracture temperature.
 - transition temperature.
 - hardening temperature.
 - sensitization temperature.
70. A minimal number of corrosion monitoring locations (CMLs) is acceptable if:
- the vessel is due to be replaced shortly.
 - internal rather than on-stream inspections are scheduled.
 - the vessel surface is not easily accessible because it is insulated.
 - the established corrosion rate is low and not localized.

71. The major factor(s) for determining the degree of surface preparation required for an internal visual inspection is/are:
- a) the material of construction.
 - b) the type and location of the deterioration expected.
 - c) the process fluid.
 - d) normal operating temperature and pressure.
72. Three pressure gauges are installed for convenience in the hydrostatic testing of a pressure vessel that is 125 feet (38,100 mm) in overall length. The first is at the top of the vessel. The second is 45 feet (13,716 mm) from the top and reads 169.5 psig (1.168 MPa). The third is 100 feet (30,480 mm) from the top and reads 193.5 psig (1.334 MPa). What is the pressure at the top? [1 foot of water = 0.433 psi (1000 mm of water = 0.00978 MPa)]
- a) 140 psig (0.96 MPa)
 - b) 150 psig (1.03 MPa)
 - c) 189 psig (1.30 MPa)
 - d) 204 psig (1.40 MPa)
73. In June 1983 the shell on a new pressure vessel, with a required shell thickness of 0.421 inch (10.69 mm) measured 0.625 inch (15.88 mm). In June 1999, the vessel changed service. From June 1983 to June 1999, the vessel shell experienced a corrosion rate of 0.002 inch per year (0.051 mm/yr). Inspection in December 2004 revealed the shell thickness to be 0.56 inch (14.22 mm). What is the estimated remaining life for this vessel?
- a) 11.5 years
 - b) 16 years
 - c) 23 years
 - d) 32 years
74. A locally corroded area is found on an exchanger shell during operation. It is decided to install a fillet weld patch as a temporary repair until the next scheduled unit shutdown. This repair must be approved by a/an:
- a) engineer.
 - b) inspector.
 - c) inspector and engineer.
 - d) authorized inspector and the maintenance manager.
75. The inspector may give prior general authorization for limited or routine repairs that do not require:
- a) final acceptance inspection.
 - b) radiography.
 - c) pressure tests.
 - d) ultrasonic testing.

76. The springs in pressure-relief valves typically fail due to:
- a) tensile overload.
 - b) creep.
 - c) erosion.
 - d) corrosion.
77. Which of the following activities requires the approval of the pressure vessel engineer?
- a) Allowing temporary repairs to be left in place for a longer period of time
 - b) Installation of a flush patch
 - c) Weld overlay on corroded areas of the vessel
 - d) Verification of completed repairs
78. According to the API 510 Code, an alteration includes:
- a) the addition of nozzles not requiring reinforcement or re-rating.
 - b) any comparable or duplicate replacement.
 - c) any design change affecting the pressure-containing capability of a pressure vessel.
 - d) the addition of any reinforced nozzle equal to or less than the size of existing reinforced nozzles.
79. Which of the following heads will normally require the *greatest* wall thickness for the same design conditions?
- a) Hemispherical head
 - b) Dished torispherical head
 - c) Flat head
 - d) 2:1 elliptical head
80. An inspector notices that an operating vessel has a gauge glass assembly that is vibrating. Before recommending corrective actions, the inspector should:
- a) issue a detailed report of the location with a recommendation for repairs.
 - b) research the inspection records of the vessel for previous corrosion.
 - c) determine the materials used in the fabrication of the gauge glass.
 - d) consult with a qualified engineer.
81. Electrodes or fluxes that have become wet should be:
- a) discarded and not used for any welding.
 - b) heated in electrical ovens for 2 hours at 250°F (121.1°C).
 - c) used only after thorough drying for controlled times and temperatures.
 - d) used only for applications where moisture in the flux is not a factor.

82. A WPS provides:

- a) direction to the welder while making production welds.
- b) a record of the welding data and variables used to make production welds.
- c) specific requirements related to the service of the equipment.
- d) a list of which welding variables are essential and/or nonessential.

83. Local postweld heat treatment (PWHT) can be used in lieu of a 360° banding on a local repair when the:

- a) application is reviewed and a procedure is developed an engineer experienced in the appropriate engineering specialties.
- b) preheat of 350°F (177°C) is maintained for the course of welding and the weld is inspected by magnetic-particle examination.
- c) decay of thermal gradient during PWHT is less than 200°F (110°C) per foot.
- d) application is reviewed and a procedure is developed by the API-authorized pressure vessel inspector.

QUESTIONS 84 AND 85 REFER
TO THE FOLLOWING INFORMATION:

After being in service for 5 years, a 14-foot (4267-mm) (seam-to-seam) vertical vessel has a measured thickness of 0.82 inch (20.8 mm) over the entire length of the cylindrical shell. The measured inside diameter is 38.13 inches (968.5 mm). The material of construction was originally 0.875 inch (22.2 mm) thick with an allowable stress of 17,500 psi (120.6 MPa), was fully radiographed, and was designed for a pressure of 600 psi (4.13 MPa), including static head.

84. What is the vessel's corrosion rate?

- a) 0.011 inch per year (0.28 mm/year)
- b) 0.164 inch per year (4.2 mm/year)
- c) 0.055 inch per year (1.40 mm/year)
- d) 0.175 inch per year (4.44 mm/year)

85. Assuming a corrosion rate of 0.018 inch per year (0.4572mm per year) and a required thickness of 0.545 inch (13.8 mm), what is the interval for the next internal inspection?

- a) 7.6 years
- b) 9.1 years
- c) 10 years
- d) 15.2 years

86. When RBI assessments are used to set inspection intervals for pressure vessels that are subject to changes in process operations:

- a) the vessel shall have a complete internal inspection performed in addition to the RBI assessment.
- b) the RBI assessment shall be updated after each inspection.
- c) may not be allowed to operate without approval of an inspector.
- d) may not be allowed to operate without consultation with, and approval of, an engineer

87. Pressure vessel records shall contain four different types of vessel information pertinent to its mechanical integrity. Which of the following is not required?
- a) Construction and design information
 - b) Operating and inspection history
 - c) National Board registration
 - d) Repair, alteration, and re-rating information
88. Measurements from an inspection reveal an actual metal thickness of 0.613" (15.6 mm) on a piece which has a calculated minimum thickness of 0.410" (10.4 mm). If the corrosion rate is 0.005" per year (0.13 mm/yr), the next inspection should be scheduled within:
- a) 2 years
 - b) 5 years
 - c) 10 years.
 - d) 20 years.
89. A commonly used welding method is shielded metal arc welding (SMAW). Which of the following definitions best describes SMAW?
- a) An automatic process using a tungsten electrode, gas shielding, and a consumable filler metal
 - b) An automatic process using a consumable metal electrode and adding a shielding flux
 - c) A manual process using a consumable metal electrode and gas shielding
 - d) A manual process using a consumable metal electrode covered with flux
90. To minimize the risk of brittle fracture during pressure testing of a vessel less than 1.375 inches thick, API Standard 510 states that the vessel should be maintained at a minimum of how many degrees above the minimum design metal temperature?
- a) 10°F (6°C)
 - b) 30°F (17°C)
 - c) 70°F (39°C)
 - d) 120°F (67°C)
91. Lap-joint flanges should be checked for:
- a) grooving of the raised face.
 - b) corrosion between the flange and the pipe.
 - c) bolt-hole centerline alignment.
 - d) fillet weld strength.
92. A pressure test for pressure vessels is applied at the discretion of the API-authorized inspector, but it is normally required after a/an:
- a) alteration.
 - b) repair.
 - c) extended downtime.
 - d) leak.

93. After a repair weld is completed, it shall be examined using acceptance standards acceptable to the inspector or the:
- a) AWS Code
 - b) ASME Code
 - c) ASNT Code
 - d) Applicable construction code
94. In a tension test conducted to qualify a weld procedure, if the specimen breaks in the base metal outside the weld, the test shall be accepted, provided that:
- a) the strength is not more than 10% below the specified minimum tensile strength of the base metal.
 - b) the strength is not more than 5% below the specified minimum tensile strength of the base metal.
 - c) there are no cracks in the weld metal larger than 1/16 inch (1.6 mm).
 - d) there are no cracks in the weld metal larger than 1/8 inch (3.2 mm).
95. A pilot-operated safety-relief valve is best suited when the:
- a) fluid is dirty.
 - b) fluid is viscous.
 - c) fluid is high-pressure steam or gas.
 - d) operating pressure is close to the set pressure.
96. Inspection records should be maintained:
- a) for 5 years.
 - b) for the service life of the vessel.
 - c) until an authorized inspector deems them unnecessary.
 - d) for 5 years after the vessel is retired.
97. Which of the following statements is correct with regard to the welder's qualifications for a minor pressure vessel repair requested by an owner/operator?
- a) The welder must be qualified for the applicable process by the employer.
 - b) A welder who is an employee of the owner/operator need not be formally qualified.
 - c) The welder must be qualified by an ASME-Code shop, and be current in the process used for the repair.
 - d) The welder may use any qualified procedures that are in accordance with the ASME Code, Section IX.