

API 572 Study Guide

Practice Questions

This study aid will help you learn the content of **API 572, Inspection of Pressure Vessels**. There will be about 10 questions from API 572 on the API 510 exam. We do NOT spend time in class on this publication. So you become familiar with this content in your personal study sessions. Here's some suggestion on working with this Study Guide.

1. Make a copy - Always have a fresh copy when you repeat any guide or homework.
2. Don't eat this "Elephant" at one time. **The questions in this Study Guide are in the same order as the content written in API 572.** So ... read a few pages in API 572 and then answer the questions associated with those pages. Always put a MARK by the questions that you have to GUESS.
3. Check your answers. The Answer Key is provided in the back of this guide with API 572 references.
4. For questions that you either MISS or GUESS, look up the answer in API 572.
5. If you have more time, repeat the process; Read a few more pages and Answer a few more questions.
6. **Don't overlook short periods of time.** Even 15 minutes is enough time to "eat through" 5-10 pages of API 572 and complete the associated questions.
7. **Note! Questions that are YELLOW are considered Open Book Questions.**

How many times should you do this Study Guide? **Keep repeating this Guide until you can score 80+%!!!** And then ... occasionally repeat to maintain your peak score.

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Chapter 3 (pg 1-5)

1. An alteration is defined as:
 - a) a physical change.
 - b) restoring the vessel to original conditions.
 - c) restoring the vessel to a safe suitable condition.
 - d) changing either the design pressure or design temperature.

2. An examination point is circular area with a diameter **not** greater than:
 - a) 0.5 inch.
 - b) 1.0 inch.
 - c) 2.0 inches.
 - d) 3.0 inches.

3. The MAWP of a vessel is the maximum pressure permitted:
 - a) anywhere on a vessel.
 - b) at top of the vessel.
 - c) at the mid-point of the vessel.
 - d) at the bottom of the vessel.

4. A repair is defined as:
 - a) a physical change.
 - b) restoring the vessel to original conditions.
 - c) restoring the vessel to a safe suitable condition.
 - d) changing either the design pressure or design temperature.

5. Temper embrittlement can occur in:
 - a) carbon steels.
 - b) low alloy steels.
 - c) carbon or low alloy steels.
 - d) austenitic stainless steels.

6. Temper embrittlement occurs in some materials with:
 - a) short-term exposures above 650°F.
 - b) long-term exposures above 650°F.
 - c) short-term exposures above 1100°F.
 - d) long-term exposures above 1100°F.

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Chapter 4 (pg 6-14)

1. Most pressure vessels codes do not apply to vessels with internal or external pressure that is less than:
 - a) 5 psig.
 - b) 15 psig.
 - c) 25 psig.
 - d) 50 psig.

2. Many vessels with external pressure are:
 - a) jacketed.
 - b) accumulators.
 - c) reactors.
 - d) regenerators.

3. Vessel shell rings are normally made by:
 - a) rolling plate at ambient temperatures.
 - b) rolling plate at elevated temperatures.
 - c) rolling plate at either elevated or ambient temperatures.
 - d) forging.
 - e) casting and machining.

4. When fabricating a vessel shell, which fabrication method does not result in a longitudinal shell weld?
 - a) Extruding
 - b) Hot forging
 - c) Multi-layer
 - d) Rolling

5. Shells constructed with multi-layers (a number of thin cylindrical sections) are normally used for vessels having:
 - a) high design pressures.
 - b) high design temperatures.
 - c) exotic materials.
 - d) a small diameter.

6. Which the most common material used to make pressure vessels?
 - a) Carbon steel
 - b) Chrome
 - c) Ferritic stainless steel
 - d) Nickle alloys

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7. Which of the following materials is seldom used to make a pressure vessel but is common in heat exchanger tubes?
 - a) Aluminum alloys
 - b) Copper alloys
 - c) Magnesium alloys
 - d) Zinc alloys

8. Cooling water tubes are often made of steel or:
 - a) aluminum alloys.
 - b) austenitic stainless steel.
 - c) copper alloys.
 - d) zinc alloys.

9. Titanium tubes are often found in which of the following processes?
 - a) Crude oil above 650 °F.
 - b) Erosive services
 - c) Processes subject to HTHA
 - d) Seawater

10. What is the primary purpose for installing a metallic liner on the inside of a vessel?
 - a) Decrease friction and improve fluid flow
 - b) Improve heat transfer
 - c) Minimize the effort to clean vessel at next outage
 - d) Resist corrosion

11. When are pressure vessel shells & heads normally made from a solid alloy material? (one without cladding)
 - a) In corrosive service
 - b) Service where high product purity is needed
 - c) High operating temperatures
 - d) High operating pressures
 - e) Either high operating temperatures or high operating pressures

12. Which of the following is not a way metallic liners are attached to the base metal?
 - a) Explosion bonded
 - b) Rolled with based metal
 - c) Pressurized
 - d) Welding

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13. Refractory is often attached to a vessel shell with:
- a) cement adhesive.
 - b) hex mesh.
 - c) rebar.
 - d) stainless steel tabs.
14. What are two primary reasons for the use of non-metallic liners?
- a) Resist erosion, and insulate to reduce shell temperature
 - b) Insulate to reduce shell temperature, and resist thermal expansion
 - c) Resist corrosion, and resist thermal expansion
 - d) Resist stress corrosion cracking, and insulate to reduce shell temperature
 - e) Beautify the facility, and improve rate of heat transfer
15. Non-metallic vessels are sometimes used in:
- a) corrosive services.
 - b) high-temperature services.
 - c) high-pressure services.
 - d) low-temperature services.
16. Which of the following non-metallic materials is sometimes used to build vessels in corrosive services?
- a) CPVC
 - b) FRP
 - c) PVC
 - d) Refractory
17. A vessel that operates with a vacuum will often have:
- a) hemispherical heads.
 - b) internal braces.
 - c) refractory lining.
 - d) stiffening rings.
18. An optionally part of an exchanger that is used to protect the tubes at the inlet nozzle is called a(n):
- a) baffle.
 - b) demister mat.
 - c) impingement plate.
 - d) strip lining.

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19. The vessel fabrication code called the "API/ASME Code for Unfired Pressure Vessels" was discontinued in:
- a) 1939.
 - b) 1956.
 - c) 1973.
 - d) 1980.
20. Most pressure vessels in USA refineries are constructed to:
- a) API/ASME Code.
 - b) ASME B&PV Code Section VIII - Div 1.
 - c) ASME B&PV Code Section VIII - Div 2.
 - d) ASME B&PV Code Section VIII - Div 3.
21. Many high-pressure vessels are constructed to:
- a) API/ASME Code.
 - b) ASME B&PV Code Section VIII - Div 1.
 - c) ASME B&PV Code Section VIII - Div 2.
 - d) ASME B&PV Code Section VIII - Div 3.
 - e) TEMA.
22. ASME Section VIII - Division 3 provides alternative rules for vessels with pressures generally above:
- a) 15 psig.
 - b) 150 psig.
 - c) 3000 psig.
 - d) 10,000 psig.
23. What codes are used when constructing a heat exchanger that is used in the petrochemical industry?
- a) API 660, ASME Section VIII, and TEMA
 - b) API 530, ASME Section VIII, and TEMA
 - c) API 660, API 560, and TEMA
 - d) API 530, API 661, and ASME Section VIII
24. What codes are used when constructing an air-cooler that is used in the petrochemical industry?
- a) API 660, ASME Section VIII, and TEMA
 - b) API 661, ASME Section VIII, and TEMA
 - c) API 660, API 661, and TEMA
 - d) API 660, API 661, and ASME Section VIII

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25. All manufacturers that build vessels to ASME Section VIII must have:
- a) an API 510 inspector on staff.
 - b) access to an AWS inspector.
 - c) a quality-control system.
 - d) a machine capable of making dished heads.
26. The ASME vessel manufacturer stamps the vessel with the appropriate code symbol. What is the meaning of this Code Stamp?
- a) All applicable requirements of the ASME Code have been met
 - b) All requirements of the U-Section in the ASME Code have been met
 - c) Vessel has been hydrotested
 - d) Vessel has been radiographed
 - e) Vessel wall is of uniform thickness

Chapter 5 (pg 15-16)

1. Which of the following is **not** a reason to inspect a pressure vessel?
- a) Determine the rate of damage
 - b) Determine the type of damage
 - c) Minimize potential for equipment failure
 - d) Reduce the number of unplanned outages
 - e) Provide individuals great jobs with unbelievable wages!
2. Per OSHA 1910, refineries should follow:
- a) EIEIO.
 - b) PSIPE.
 - c) RAGAGEP.
 - d) WWJD.
3. Per OSHA 1910, RAGAGEP means:
- a) Recognized and Generally Accepted Good Engineering Practice.
 - b) Regionally Accepted Guidelines and Good Engineering Principles.
 - c) Recognized ASME Guidelines and/or Geographic Exceptional Practices.
 - d) Risk Acceptable Guidelines and/or General Equipment Publications.

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Chapter 6 (pg 17-19)

1. Which of the following is **not** a part of an inspection plan?
 - a) How to inspect
 - b) When to inspect
 - c) Where to inspect
 - d) Who should inspect

2. The inspector selects appropriate NDE method(s) for an inspection. What is the most important factor to consider when determining which NDE method(s) to use?
 - a) Anticipated damage mechanism(s)
 - b) Cost of NDE method
 - c) Original construction code's NDE requirements
 - d) Portability of NDE method

3. Integrity Operating Windows (IOWs) should be established for all vessels in accordance with:
 - a) API 583.
 - b) API 584.
 - c) API 651.
 - d) API 652.
 - e) API 2201.

4. Pressure vessel inspection intervals should be reviewed after:
 - a) construction code changes.
 - b) personnel changes.
 - c) process changes.
 - d) NDE technology changes.

5. What should happen when the operating conditions of a vessel go outside the limits of the IOWs?
 - a) Follow appropriate pre-defined actions
 - b) Only note the exceedance in the equipment records
 - c) Just note the exceedance in the equipment records if the next outage is within 2 yrs
 - d) Shut the vessel down and open for Internal Inspection

6. The two primary factors of risk are:
 - a) consequence of failure & probability of failure.
 - b) consequence of failure & location of failure.
 - c) location of failure and volume of the process released.
 - d) volume of the process released & probability of failure.

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7. Who chooses to use RBI methodologies?
 - a) Authorized Inspector
 - b) Engineer experienced in pressure vessel technologies
 - c) Jurisdiction
 - d) Owner/User

8. Which document provides guidance on performing RBI assessments?
 - a) API 576
 - b) API 578
 - c) API 579
 - d) API 580

Chapter 7 (pg 19-20)

1. Which of the following often sets the run length of an operating unit?
 - a) API 579
 - b) ASME B&PV Section XII
 - c) Electric motors
 - d) Fouling of equipment
 - e) Industry norms

2. Baseline thickness readings should be obtained:
 - a) by an ASNT Level 2 or 3 UT technician.
 - b) by an API QUTE technician.
 - c) prior to the vessel being placed in service.
 - d) within the first 5 years of the vessel's operation.

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Chapter 8 (pg 21-24)

1. Which NDE method(s) may cause problems in a confined space by displacing breathing air?
 - a) AUT
 - b) MT
 - c) PT
 - d) RT
 - e) AUT or RT
 - f) MT or PT

2. Which document should be followed when using breathing air in a confined space?
 - a) API 578
 - b) API 2201
 - c) API 2217A
 - d) ASME PCC-1

3. When using breathing air in a confined space which of the following is correct?
 - a) Breathing air should be provided from 2 independent sources
 - b) Breathing air couplings should meet OSHA 2017 regulations
 - c) Maximum duration to use breathing air is 30 minutes per hour
 - d) Breathing air must have at least 30% Oxygen

4. Vessels are often cleaned with a high-pressure water blast? What is the typical pressure used for this water blast?
 - a) 1000 - 2000 psig
 - b) 2000 - 8000 psig
 - c) 8000 - 20,000 psig
 - d) 20,000 - 40,000 psig

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Chapter 9 - Sections 9.1 & 9.2 (pg 24-26)

1. Prior to inspecting a vessel, the inspector should become familiar with the vessel's:
 - a) operating conditions.
 - b) relief valve.
 - c) RT Factor.
 - d) year of construction.

2. Prior to inspecting a vessel, which of the following does **not** need to be reviewed by the inspector?
 - a) Abnormal operating conditions during the last run
 - b) Construction and welding details of the vessel
 - c) Names of the last 3 inspectors who inspected this vessel
 - d) Operating conditions

3. An external inspection is being conducted on an insulated vessel. How much insulation should be removed to check the vessel's external surface condition?
 - a) A minimum of 10% of the insulation should be removed.
 - b) A small area of insulation should be removed on each shell course & each head.
 - c) One small area of insulation should be removed in the most suspect area.
 - d) Insulation removal is not required unless there is a reason to suspect that corrosion is occurring under the insulation.

4. Additional information concerning inspecting for CUI can be found in:
 - a) API 578.
 - b) API 583.
 - c) API 2201.
 - d) ASME B16.47.

5. Which of the following applies when coke deposits are found in a vessel?
 - a) It is still important to determine the vessel's thickness under the deposit.
 - b) Coke deposits are always an effective barrier to internal corrosion.
 - c) Coke deposits always increase the vessel's corrosion rate.
 - d) Coke deposits must always be removed.

6. Prior to the internal inspection, vessel internals:
 - a) must all be removed.
 - b) never need to be removed.
 - c) do not need to be removed if the vessel wall is clad with alloy.
 - d) do not need to be removed if deterioration is not expected behind the component.

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7. The primary means of obtaining vessel thickness measurements is by:
- a) RT.
 - b) UT.
 - c) RT or UT.
 - d) RT, UT or Eddy Current.
8. Concerning an examination point for thickness, which of the following is correct?
- a) Only one reading should be taken.
 - b) Multiple readings must be taken.
 - c) Always record the lowest reading.
 - d) Always record the average reading.
 - e) The average reading can be recorded.
9. Magnetic flux scanning techniques can be used to detect wall loss on vessels:
- a) made from any material.
 - b) with any wall thicknesses.
 - c) made from austenitic stainless steel.
 - d) with a wall thickness up to up to 0.5" thick.
10. A vessel is subject to uniform corrosion. What is the minimum number of thickness measurements required?
- a) One
 - b) Two
 - c) One on each major design section
 - d) Two on each major design section
11. The number of thickness measurement locations should progressively increase with:
- a) the age of the equipment.
 - b) higher expected corrosion rates.
 - c) increased alloy.
 - d) when using inexperienced UT technicians.
12. A vessel is subjected to localized corrosion. Which of the following is correct?
- a) Increase the number of measurement locations.
 - b) Do not use Spot UT, use alternative NDE methods.
 - c) Either increase the number of measurement locations or use alternative NDE methods.
 - d) The measurement locations and NDE method(s) should be specified by the Authorized Inspector.

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13. After an inspection, what are the two most important factors that need to be understood?
- a) Corrosion Rate & the Material Grade
 - b) Corrosion Rate & the Retirement Thickness of the parts
 - c) Construction Code and the Code Safety Factor
 - d) Codes Safety Factor and the Type of Material
14. Pertaining to the vessel's retirement thickness, which of the following is true?
- a) Retirement thickness must be determined by a professional engineer.
 - b) Retirement thickness must be determined by the formulas from the original construction code.
 - c) Retirement thickness must be determined by the formulas from the current construction code.
 - d) Retirement thicknesses will probably be different for different vessel parts.
15. Extra metal in a vessel wall may have been used by the designer to provide:
- a) ladder clip reinforcement.
 - b) lifting lug reinforcement.
 - c) nozzle reinforcement.
 - d) transition reinforcement.
16. ASME B&PV Section VIII does **not** provide a formula to calculate the retirement thickness of:
- a) conical shell sections.
 - b) cylindrical shells nozzles.
 - c) heads.
 - d) internal trays.
17. ASME B&PV Section VIII does provide a formula to calculate the retirement thickness of:
- a) 2:1 elliptical heads.
 - b) baffles.
 - c) ladders.
 - d) platforms.
18. The minimum thickness of a metallic lining on a vessel shell:
- a) is 0.030".
 - b) is 0.100".
 - c) is calculated per Section VIII.
 - d) has no set value.

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Chapter 9 - Section 9.3 (pg 27-35)

1. The vessel's external inspection should start by first inspecting the:
 - a) anchor bolts.
 - b) electrical ground components.
 - c) insulation.
 - d) ladders, stairs and platforms.

2. Which of the following is true concerning the inspection of ladders and platforms?
 - a) This inspection relies heavily on UT & RT.
 - b) The inspector should be recognized by the Structural Steel Product Council (SSPC).
 - c) The inspector does not have to be an API Authorized Inspector.
 - d) The inspector should be an API Authorized Inspector.

3. Ladders and platforms should be inspected:
 - a) only with a visual examination.
 - b) by visual examination and UT.
 - c) by visual examination and RT.
 - d) by visual examination and hammer-testing.

4. Tightness of bolts can be checked by:
 - a) hammer-tapping.
 - b) UT.
 - c) visual examination.
 - d) looking for nuts on the ground using *API's certified Squirrely Inspectors*.

5. Worn stair treads:
 - a) can be slippery.
 - b) can be a tripping hazard.
 - c) are usually repaired with alloy materials.
 - d) are usually repaired with non-metallic materials.

6. Small depressions on platforms are of concern since these can:
 - a) collect and hold water, potentially causing accelerated corrosion.
 - b) create a tripping hazard.
 - c) create flexing that could cause a fatigue failure.
 - d) be rather ugly and prevent your facility from achieving *API's Petrochemical Facility of the Year* award.

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7. Where is a common place for corrosion on ladders?
- a) Ladder cage
 - b) Where rungs fit into the side rails
 - c) Rungs
 - d) Side rails
8. What type of corrosion often occurs at bolts & nuts?
- a) Crevice corrosion
 - b) Galling
 - c) Liquid metal embrittlement
 - d) Sulfidation
9. Crevice corrosion is **not** common at which of the following?
- a) Between exchange shell & cradle support
 - b) Repad-to-shell welds
 - c) Where stair treads slip into support members
 - d) Under anchor bolt nuts
10. Which of the following does **not** cause cracking in concrete foundations?
- a) Concrete corrosion
 - b) Corrosion of rebar
 - c) Excessive heat
 - d) Freezing of entrapped moisture
 - e) Uneven settlement
11. Small hair-like cracks in concrete foundations:
- a) should always be caulked.
 - b) should always be repaired with a cement material similar to the original material.
 - c) should be further examined by hammer-testing.
 - d) are usually not a serious concern.
12. Small hair-like cracks in concrete foundations can be a problem if the crack:
- a) is deeper than $\frac{1}{2}$ ".
 - b) is longer than 3".
 - c) extends 20% through the foundation.
 - d) extends to the foundation's rebar.

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13. Major cracking is found in a concrete foundation. Vessel settlement is checked and is determined to **not** be a contributing factor. What is the probable cause?
- a) Fatigue
 - b) High Temperature
 - c) Fatigue or High Temperature
 - d) Fatigue or Poor Materials
14. Vessel settlement measurements are:
- a) routinely taken at each internal vessel inspection.
 - b) never required.
 - c) scheduled based on the rate and seriousness of the settlement.
 - d) normally scheduled based on jurisdictional requirements.
15. What examination method is normally used to examine in-service anchor bolts?
- a) Eddy current
 - b) Hammer-testing
 - c) Radiography
 - d) Scrapping with a scrapper or wire brush
16. A distorted anchor bolt is usually the result of:
- a) serious foundation settlement.
 - b) selecting the wrong material for the anchor bolt.
 - c) using an anchor bolt of insufficient diameter.
 - d) using an anchor bolt of insufficient length.
17. Corroded anchor bolts can also be checked using:
- a) acoustic emission.
 - b) eddy current.
 - c) radiography.
 - d) UT.
18. What is one of the best ways to prevent external corrosion on structural steel?
- a) Fireproofing
 - b) Galvanizing
 - c) Insulation
 - d) Painting
19. Buckling of support columns can be checked with:
- a) 1-foot level.
 - b) plumb line.
 - c) tape measure.
 - d) thermography.

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20. To check for distortion of a vessel skirt, take diameter measurements of the skirt every:
- a) 10 feet.
 - b) 45 degrees.
 - c) 60 degrees.
 - d) 90 degrees.
21. The inside of a vessel skirt may be subject to corrosion from condensed moisture if the temperature in the skirt is:
- a) > 50 °F.
 - b) < 50 °F.
 - c) > 100 °F.
 - d) < 100 °F.
22. Floating ends of exchangers should be free to allow for:
- a) alignment.
 - b) facilitate ease in maintenance activities.
 - c) sideways movement.
 - d) thermal growth.
23. During operation, air coolers tubes will buckle if:
- a) cooler fan is not balanced.
 - b) shipping pins are not removed.
 - c) operating pressure exceeds design pressure.
 - d) operating temperature exceeds design temperature.
24. What is a good way to check for disbonded fireproofing?
- a) Hammer-testing with light taps
 - b) Thermography
 - c) UT
 - d) Visual examination
 - e) Sledge hammer-testing with a 25 lb. sledge hammer
25. A bulge in fireproofing can be caused by:
- a) corrosion of the steel.
 - b) excessive thickness of fireproofing.
 - c) less than needed thickness of fireproofing.
 - d) excessive heat.

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26. Guy wires supporting tall vessels should be examined using:
- acoustic emission.
 - profile RT.
 - ring gauge.
 - UT.
 - visual examination.
27. Guy wires supporting tall vessels should be occasionally lubricated to:
- ensure freedom of movement.
 - keep birds from landing on wires.
 - minimize corrosion.
 - facilitate a way for rapid descent from the top of the vessel. (and we mean RAPID!)
28. At the end of a guy wire, the wire wraps, making an 180° bend and is held together by clips. The spacing between the clips should be at least:
- 3" apart.
 - 6" apart.
 - 3 wire diameters apart.
 - 6 wire diameters apart.
29. At the end of a guy wire, the wire wraps, makes an 180° bend and is held together by clips. The minimum number of clips is:
- 3.
 - 6.
 - based on wire diameter.
 - based on wire length.
30. Which of the following would be most affected if a vessel foundation experiences excessive settlement?
- Manways
 - Nozzles with attached piping
 - Relief devices
 - Stiffener rings
31. What should be done if shell distortion is found at a nozzle?
- Check for cracking on all welds associated with this nozzle and any adjacent shell welds
 - Check the hardness of the nozzle welds
 - Check thickness by taking close- grid UT readings on the nozzle and shell in the distorted area
 - Only note the distortion in your inspection report

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32. Catalytic reformer vessels may have creep damage if the operating temperature is:
- a) > 800°F.
 - b) > 900°F.
 - c) > 1000°F.
 - d) > 1100°F.
33. Creep damage may be detected using:
- a) MT.
 - b) profile RT.
 - c) replication.
 - d) ring gauging the vessel.
34. Weep holes on repads:
- a) should remain open.
 - b) are needed only to air-test the repad during construction.
 - c) should be at least 1/2" in diameter.
 - d) should be plugged with a threaded metal plug.
35. Vessel grounding connections are primarily needed to provide a path for electrical current from:
- a) a lighting strike or a welding machine.
 - b) a lighting strike or static electricity.
 - c) a welding machine or an electrical short.
 - d) an electrical short or static electricity.
36. Vessel grounding connections should be inspected by:
- a) measuring the resistance.
 - b) visual inspection.
 - c) measuring the resistance and visual inspection.
 - d) measuring the resistance or visual inspection.
37. Recommended resistance-to-ground for a vessel grounding system should **not** exceed:
- a) 5 ohms.
 - b) 25 ohms.
 - c) 100 ohms.
 - d) 250 ohms.
38. The maximum resistance-to-ground for a vessel grounding system must **not** exceed:
- a) 5 ohms.
 - b) 25 ohms.
 - c) 100 ohms.
 - d) 250 ohms.

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39. Vessel sight glasses and other auxiliary equipment should be checked for:
- a) expansion.
 - b) HTHA.
 - c) sulfidation.
 - d) vibration.
40. Vibrating level bridles may cause:
- a) fatigue.
 - b) localized corrosion.
 - c) pitting.
 - d) stress corrosion cracking.
41. Which of the following coating failures is easily missed during a visual examination?
- a) Blisters
 - b) Film lifting
 - c) Holidays
 - d) Rusting
42. Where are the two most likely areas for paint failures?
- a) Nozzles and crevices
 - b) Top heads and nozzles
 - c) Top heads and crevices
 - d) Weld seams and crevices
 - e) Weld seams and nozzles
43. CUI is a concern for insulated carbon steel vessels that operate between:
- a) 0 to 100 °F.
 - b) 10 to 350 °F.
 - c) 25 to 250 °F.
 - d) 140 to 400 °F.
44. CUI is a concern for insulated low-alloy steel vessels that operate between:
- a) 0 to 100 °F.
 - b) 10 to 350 °F.
 - c) 25 to 250 °F.
 - d) 140 to 400 °F.
45. CUI is a concern for insulated austenitic stainless steel vessels that operate between:
- a) 0 to 100 °F.
 - b) 10 to 350 °F.
 - c) 25 to 250 °F.
 - d) 140 to 400 °F.

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46. CUI is an inspection concern for insulated vessels that operate at 500 °F and:
- a) are in intermittent service.
 - b) are made of austenitic stainless steel.
 - c) are made of low chromes.
 - d) have poorly maintained insulation.
47. Which of the following insulated vessels is most likely to experience CUI?
- a) CS vessel operating at 600 °F. but is in an intermittent service
 - b) CS vessel operating continuously at 375 °F.
 - c) CS vessel operating continuously at -20 °F.
 - d) CS vessel operating at cyclic temperatures ranging between 375-600 °F.
 - e) SS vessel operating continuously at 100 °F.
48. What two on-stream NDE techniques may be able to locate moist insulation?
- a) Real-time RT and Thermography
 - b) Real-time RT and MFL
 - c) Neutron back scatter and Thermography
 - d) Neutron back scatter and MFL
 - e) Neutron back scatter and Real-time RT
 - f) Thermography and MFL
49. Which of the following tools/techniques should **not** be used during the external inspection of a vessel having a process containing 5% H₂S?
- a) Hammer testing
 - b) MT
 - c) RT
 - d) UT
50. The degree of surface preparation needed for an external inspection depends on the:
- a) type of deterioration expected.
 - b) extent of deterioration expected.
 - c) type and extent of deterioration expected.
 - d) amount of overtime the inspector needs!
51. If a vessel does **not** have a "thickness history", the inspector should consider getting thickness readings at what locations?
- a) One on each shell ring and one on each head
 - b) One on the four quadrants of the shell and the four quadrants of both heads
 - c) One on the four quadrants of each shell ring and the four quadrants of both heads
 - d) No where! "No news is good news."

API 572 Study Guide

Practice Questions

52. A vessel operates in a cyclic temperature service. The vessel support-to-vessel welds should be checked using MT or PT to check for:
- a) fatigue cracking.
 - b) HTHA.
 - c) polytheonic cracking.
 - d) stress corrosion cracking.
53. Which of the following is **not** a significant factor in atmosphere corrosion?
- a) Chemical vapors
 - b) Humidity
 - c) Metal surface temperature
 - d) Vessel's operating pressure
54. In a caustic storage vessel, caustic embrittlement is least likely at:
- a) areas of high stress.
 - b) heating coil connections.
 - c) internal baffles or vortex breakers.
 - d) nozzles.
55. Caustic embrittlement is most likely to occur at areas of:
- a) high stress.
 - b) high pressure.
 - c) low temperature.
 - d) either high stress or high pressure.
56. Caustic embrittlement is most likely to occur at areas:
- a) that are thick (over 2.0").
 - b) that are thin (less than 0.250").
 - c) higher temperature.
 - d) either thick or high temperature.
57. Caustic that seeps through a crack will often leave a:
- a) brown residue.
 - b) white salt deposit.
 - c) yellow sticky deposit.
 - d) black hard residue.

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Practice Questions

58. A vessel contains an acidic corrosion product. The areas directly below the liquid level are likely to be subject to:
- a) caustic cracking.
 - b) graphitization.
 - c) HTHA.
 - d) hydrogen blistering.
 - e) temper embrittlement.
59. Blisters on a vessel shell can be easily detected with:
- a) RT.
 - b) UT.
 - c) a visual exam using a flashlight beam perpendicular to the shell.
 - d) a visual exam using a flashlight beam parallel to the shell.
60. Small blisters can be easily detected by:
- a) feeling the surface with your fingers.
 - b) hammer testing.
 - c) magnetic flux leakage.
 - d) penetrant testing.
61. Where is soil-to-air corrosion usually most severe?
- a) From ground level to a several inches below ground level
 - b) From ground level to a 24 inches below ground level
 - c) From 12 to 36 inches below ground level
 - d) From 24 to 60 inches below ground level
62. **Tough question!** The temperature of a hot-spot on a refractory lined vessel should be periodically checked. Which of the following is **not** an acceptable method for checking the temperature?
- a) Portable thermocouple
 - b) Thermography (infrared imaging camera)
 - c) Temperature indicating crayons
 - d) Place your hand on surface for exactly 1 second. Calculate the vessel temperature based on the depth of the 3rd degree burns on your hand.
63. A hot-spot has developed on a refractory lined carbon steel vessel. During the next internal inspection the wall at the hot-spot should be metallurgically examined whenever the metal temperature for an extended period of time has exceeded:
- a) 450 °F.
 - b) 750 °F.
 - c) 850 °F.
 - d) 1100 °F.

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Practice Questions

64. Metallurgical damage at a hot-spot can be checked using:
- a) a boat sample.
 - b) replication.
 - c) thermography (infrared imaging camera).
 - d) either a boat sample or replication.
 - e) either replication or thermography.

Chapter 9 - Section 9.4 (pg 36-48)

1. Austenitic stainless steels are particularly susceptible to:
- a) chloride corrosion and polythionic stress corrosion cracking.
 - b) chloride corrosion and sulfidation corrosion.
 - c) chloride corrosion and vanadium cracking.
 - d) polythionic stress corrosion cracking and sulfidation corrosion.
 - e) polythionic stress corrosion cracking and vanadium cracking.
 - f) sulfidation corrosion and vanadium cracking.
2. Vessels are often cleaned with a high-pressure water blast? What is the typical pressure used for this water blast?
- a) 1000 - 2000 psig
 - b) 2000 - 8000 psig
 - c) 8000 - 12,000 psig
 - d) 12,000 - 25,000 psig
3. Normal vessel cleaning methods, like steam cleaning, usually are adequate to meet the inspector's needs for an internal inspection. Extra cleaning such as abrasive-grit or water blasting may be required when inspecting for:
- a) localized thin areas.
 - b) deep pitting.
 - c) stress corrosion cracking.
 - d) thermal fatigue cracking.
4. An internal inspection will be performed on a vessel. What is the initial step to be performed?
- a) Collect all necessary inspection tools
 - b) Check the vessel permitting requirements
 - c) Collect the necessary personnel protective equipment
 - d) Read the previous inspection reports

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Practice Questions

5. Sulfidation is a common concern at the:
 - a) top of the crude unit's fractionating column.
 - b) bottom of the crude unit's fractionating column.
 - c) top of a hydrotreater reactor.
 - d) bottom of a hydrotreater reactor.

6. High temperature sulfur corrosion (sulfidation) tends to appear as:
 - a) cracking.
 - b) pitting.
 - c) localized wall loss.
 - d) uniform wall loss.

7. The upper shell and top head of a distillation towers are sometimes subject to:
 - a) chloride attack.
 - b) galling.
 - c) liquid metal embrittlement.
 - d) temper-embrittlement.

8. Equipment in a wet hydrogen sulfide or cyanide environments may experience:
 - a) cracking in the base metal.
 - b) cracking in the welds and heat affected zones.
 - c) extensive pitting.
 - d) localized thinned area.

9. Sludge settles on a vessel's bottom head, what corrosion mechanism is likely to occur?
 - a) Concentration cell corrosion
 - b) Dealloying
 - c) Sludgification
 - d) Stress corrosion cracking
 - e) Uniform corrosion

10. If steam is injected into a vessel, a likely place for corrosion is on the:
 - a) inlet nozzle.
 - b) vessel wall directly below the nozzle.
 - c) vessel wall opposite the nozzle.
 - d) vessel's anchor bolts. (*once again proving it is difficult to come up with 3 wrong answers!*)

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Practice Questions

11. When a reboiler is used with a tower (fractionating column), a common place for corrosion is:
- a) the inlet to the reboiler.
 - b) top head of the tower.
 - c) at the tower where the hot process returns.
 - d) at the tower where the cold process returns.
12. What is a common cause of corrosion associated with reboilers?
- a) Deposits in the process cause oxygen pitting
 - b) Hot process decomposes to form acids
 - c) Hot process decomposes to form polytheonic caustic
 - d) Increased velocity of returning process causes erosion
13. Most cracking occurs:
- a) in carbon steel materials.
 - b) in bottom heads.
 - c) at fillet welds.
 - d) at welds and heat affected zones.
14. Areas opposite inlet nozzles may be subject to:
- a) chloride cracking.
 - b) concentration cell corrosion.
 - c) erosion.
 - d) random pitting.
15. Exchangers in cooling water service have the highest corrosion rates where the:
- a) ph is the highest.
 - b) velocity is the highest.
 - c) velocity is the lowest.
 - d) water temperature is the highest.
16. Which of these exchanger components would have a higher expected corrosion rate?
- a) The gasket surface of a CS channel that has a zinc overlaid CS tubesheet
 - b) The gasket surface of a carbon steel channel that has a brass tubesheet
 - c) On a brass tubesheet that has a carbon steel channel
 - d) On a SS tubesheet that has a carbon steel channel
17. In a vessel, where are cracks most likely to occur?
- a) Sharp changes in size
 - b) Sharp changes in shape
 - c) Near weld seams
 - d) All the above

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Practice Questions

18. In an exchanger, accelerated corrosion is most likely in the:
- a) tube inlets.
 - b) lower tubes.
 - c) middle tubes.
 - d) upper tubes.
19. An impingement plate is installed on an exchanger bundle at the inlet nozzle. What area is most susceptible to corrosion?
- a) Exchanger shell near the impingement plate
 - b) Tubesheet
 - c) Tubes near the impingement plate
 - d) Inlet nozzle
20. Prior to inspecting a vessel, which of the following does the inspector **not** need to understand?
- a) The purpose of the vessel
 - b) The function of any internal components
 - c) The function of each nozzle
 - d) The Operation Manager's inner feelings
21. To ensure that degradation is not missed, what inspection practice is recommended?
- a) Take a recording device to minimize need to write
 - b) Start at one end and work to the other end
 - c) Take photos of entire vessel
 - d) Have a flashlight that provides 25 foot-candles of light at a distance of 12"
22. What is the minimum number of UT examination points suggested for a small vessel that has slight deterioration?
- a) One
 - b) One on each head and one on the shell
 - c) One on each head and one on each shell course
 - d) Four on each head and four on each shell course
23. What is a simple way to estimate the depth of a pit?
- a) Scratch the area with your finger nail
 - b) Extend the lead of a mechanical pencil
 - c) Rub the area with your fingers
 - d) Rub the area with a coin

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Practice Questions

24. Why is wet fluorescent magnetic particle testing often used to detect certain types of cracking?
- a) Easier to perform than other types of MT
 - b) Requires less effort to qualify the NDE examiner as compared to dry MT
 - c) It's a more sensitive technique as compared to dry MT
 - d) Equipment used for the exam is less expensive than for other MT exams
25. Vessels containing amines are subject to:
- a) oxygen pitting
 - b) oxidation.
 - c) cracking.
 - d) caustic embrittlement.
 - e) dew point corrosion.
26. Which of the following NDE methods is not good for surface breaking cracks?
- a) ACFM
 - b) ET
 - c) Profile RT
 - d) UT Flaw Detection
27. Deaerators used for boiler feed-water are subject to:
- a) pitting.
 - b) localized thinned areas.
 - c) uniform corrosion.
 - d) cracking.
 - e) dealloying.
28. What is the recommended way to find deaerator cracking?
- a) MT or PT
 - b) RT
 - c) UT
 - d) WFMP
29. Erosion is characterized by:
- a) build-up of corrosion product.
 - b) deep pits.
 - c) smooth surface with bright appearance.
 - d) rough surface with dark appearance.

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Practice Questions

30. Often corrosion will occur on an exchanger shell at the location of the bundle baffles. An easy way to find this corrosion is by:
- spot UT.
 - visual examination.
 - eddy current testing.
 - shining a flashlight beam parallel to the shell.
31. Areas directly above the liquid level in vessels containing acidic components may be subject to:
- caustic embrittlement.
 - hydrogen blistering.
 - graphitization.
 - creep.
 - fatigue.
 - dealloying.
32. How can small hydrogen blisters be easily found?
- Feel metal surface with your fingers
 - Visual examination
 - Hammer-testing
 - Spot UT readings
33. What is another way that can be used to find hydrogen blisters?
- Hold a flashlight perpendicular to the shell
 - Hold a flashlight parallel to the shell
 - RT
 - WFMP
34. Existing exchanger shells sometimes get out-of-round making it difficult to reinsert the bundle. What is a common cause of an exchanger shell's out-of-roundness?
- Over pressure
 - Elevated temperature
 - Metal fatigue
 - Creep
 - Welding repairs to the shell
 - Meteor strike
35. When HTHA occurs, what actually is happening in the steel?
- Atomic hydrogen bonds with carbon
 - Atomic hydrogen bonds with chrome
 - Atomic hydrogen bonds with iron
 - Atomic hydrogen forms molecular hydrogen in grain boundaries

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Practice Questions

36. HTHA causes:
- a) blisters.
 - b) blisters and fissures.
 - c) decarburization and fissures.
 - d) decarburization and fatigue cracking.
37. Inspecting tray supports and baffles is usually accomplished using:
- a) Hammer Testing.
 - b) Hammer Testing and UT.
 - c) Hammer Testing and Visual.
 - d) UT.
 - e) UT and Visual.
38. Damaged column trays normally:
- a) affect the efficiency of the column operation.
 - b) affect the strength of the column.
 - c) affect the efficiency of the column operation and the strength of the column.
 - d) have no significant impact.
39. Normally tower (column) trays are inspected using:
- a) only a visual examination.
 - b) visual examination and UT.
 - c) visual examination and some type of crack detection NDE method.
 - d) visual examination, UT and some type of crack detection NDE method.
40. Vessel internal piping should be:
- a) constructed to ASME B31.1.
 - b) inspected to API 570.
 - c) inspected using visual examination.
 - d) examined with UT at specific CMLs.
41. Process deposits are a significant concern inside:
- a) air cooler nozzles.
 - b) exchanger outlet nozzles.
 - c) reflux nozzles.
 - d) relief device inlet nozzles.
42. A primary concern in heavy-wall hydroprocessing reactors is:
- a) cracking in circumferential welds.
 - b) cracking in nozzle attachment welds.
 - c) grooving in nozzles.
 - d) pitting in the vapor space.

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Practice Questions

43. Which of the following steels is most likely to crack?
- a) Steels with a tensile strength lower than 70,000 psi
 - b) Steels with a yield strength above 20,000 psi.
 - c) Coarse-grain steels
 - d) Fine-grain steels
44. Which of the following services does **not** promote cracking in the equipment?
- a) Amine
 - b) Ammonia
 - c) Caustic
 - d) Sulfuric Acid
 - e) Wet H₂S
45. A very effective means to find surface cracks is by using:
- a) MFL.
 - b) red dye PT.
 - c) dry particle MT.
 - d) wet fluorescent particle MT.
46. The grooves on an existing ring-joint flange should be checked for:
- a) cracking from excessive bolt tightening.
 - b) cracking from mechanical fatigue.
 - c) cracking from thermal fatigue.
 - d) erosion.
47. Ring-joint grooves on existing stainless steel flanges should be checked for:
- a) stress corrosion cracking.
 - b) temper embrittlement.
 - c) dealloying.
 - d) corrosion fatigue.
48. Existing Van Stone flanges should be checked for:
- a) chloride cracking.
 - b) creep.
 - c) crevice corrosion.
 - d) graphitization.
49. The primary purpose of metallic linings is to prevent:
- a) corrosion.
 - b) erosion.
 - c) corrosion or erosion.
 - d) thermal growth.

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Practice Questions

50. Loose or cracked metallic linings can be found using:
- a) light taps with a hammer.
 - b) visual inspection.
 - c) MT.
 - d) acoustic emission.
51. A vessel is clad with a SS liner. A SS corrosion tab, perpendicular to the shell, is added to help determine if the liner is corroding. Ten years later, it's found that the tab's corrosion rate is 0.002 ipy. What is estimated corrosion rate of the SS liner?
- a) Unknown
 - b) 0.001 ipy
 - c) 0.002 ipy
 - d) 0.004 ipy
52. Bulged metallic linings are often the indication of a:
- a) low quality inspection during installation.
 - b) poor installation.
 - c) leaking liner.
 - d) leaking liner or differential thermal expansion.
53. Whenever there are indications that a metallic liner has leaked, it is important to determine the:
- a) thickness of the liner.
 - b) displacement of the bulged area.
 - c) condition of the base metal under the liner.
 - d) the identification of the welder who previously installed the liner.
54. What type of weld metal overlay is often used for hydrotreater reactors?
- a) Low chromes
 - b) High chromes
 - c) Austenitic stainless steel
 - d) Stabilized austenitic stainless steel
 - e) High nickel alloys
55. What are the two primary purposes for refractory linings?
- a) Corrosion Resistance & Minimize Thermal Growth
 - b) Corrosion Resistance & Insulation
 - c) Low Cost Installation & Minimize Thermal Growth
 - d) Low Cost Installation & Corrosion Resistance
 - e) Insulation & Minimize Thermal Growth
 - f) Insulation & Low Cost Installation

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Practice Questions

56. A break or void in a paint coating is called a:
- a) blister.
 - b) film lift off.
 - c) holiday.
 - d) voids.
 - e) lamination.
57. A common tool used to find breaks in a non-metallic lining is:
- a) acoustic emission.
 - b) eddy current.
 - c) MFL (magnetic flux leakage).
 - d) spark testing.
58. Spark testing is being performed on a coating. What happens if the voltage on the spark tester exceeds the dielectric strength of the coating?
- a) Coating will become magnetic
 - b) Strength of the coating bond increases
 - c) A hole is "blown" in the coating
 - d) Coating will crack
 - e) Creates a nuclear chain reaction that will destroy the entire universe
59. Which type of vessel is very susceptible to damage and very costly to repair? (assume all the following vessels are the same size)
- a) Glass Lined
 - b) High Nickel Alloy
 - c) Refractory Lined
 - d) Rubber Lined
60. What is a common tool that is used to inspect refractory?
- a) Digital UT
 - b) Light Hammer Tapping
 - c) Hardness Tester
 - d) Pit Gauge
61. When a refractory lining cracks, what is a common problem that can occur to the base metal?
- a) Dew point corrosion
 - b) Dealloying
 - c) Excessive thermal stress
 - d) Brittle failure

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Practice Questions

62. A vessel has an internal refractory lining. Which of the following is correct?
- a) This inspection should be performed by an ACI (American Concrete Institute) Level 2 inspector.
 - b) Some refractory must be removed to check condition of the base metal.
 - c) Refractory never needs to be removed to check condition of the base metal.
 - d) Refractory does not need to be removed to check condition of the base metal if the lining appears in good condition.
63. What is a common way to check the base metal condition under a deteriorated lining?
- a) From the external surface, Spot UT in areas of concern
 - b) From the external surface, UT scan areas of concern
 - c) Profile RT areas of concern
 - d) Remove 100% of all the refractory
64. What tool is useful for finding deteriorated refractory lining while the vessel is in service?
- a) Acoustic Emission
 - b) Eddy Current Testing
 - c) Thermography
 - d) UT Scan
65. During the internal inspection a large vessel, the inspector finds that the bottom third of the vessel has a 4" layer of coke deposit. Which of the following is correct?
- a) Must determine if base metal under deposit is corroding.
 - b) The deposit does not need to be removed, since the deposit will always protect the base metal.
 - c) All of the deposit must be removed to determine base metal condition.
 - d) Some of the deposit must be removed and sent to a lab to determine its chemical composition.

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Practice Questions

Chapter 9 - Section 9.5 thru 9.7 (pg 49-53)

1. What method is often used to detect metallurgical changes to the base metal?
 - a) Bend tests
 - b) Flash radiography
 - c) Metallography
 - d) Impact tests
 - e) Tension tests

2. What method is often used to detect carburization and decarburization?
 - a) Bend tests
 - b) Hardness testing
 - c) Impact tests
 - d) Metallography

3. In which of the following situations is hammer testing typically used today?
 - a) Check tightness of bolts
 - b) Locate thin wall sections
 - c) Find cracks in metallic linings
 - d) Find cracks in vessel heads and shell

4. It is recommended to not hammer test:
 - a) vessels that are pressurized.
 - b) stainless steel vessels.
 - c) refractory lined vessels.
 - d) vessels with SS cladding.

5. Which of the following is not a purpose for a pressure test?
 - a) Validate vessel MDMT
 - b) Assure equipment tightness
 - c) Assure equipment integrity
 - d) Redistribute stresses at discontinuities

6. A pressure test would probably not be required after which of the following repairs?
 - a) Install a 3' x 4' insert plate in the shell
 - b) Weld overlay a 5' x 4' corroded area in the shell
 - c) Replace the vessel's top head
 - d) Add a 16 NPS nozzle in the top head

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Practice Questions

7. Acoustic emission testing is especially useful on:
- a) heat exchangers.
 - b) large vessels.
 - c) vessels where internal inspections are difficult to perform.
 - d) vessels with simplistic design.
8. A pneumatic pressure test is performed on a large vessel. What is one way to determine the location of remote leaks?
- a) Block-in the vessel and see if the pressure drops
 - b) UT leak detector
 - c) Binoculars
 - d) Thermography
9. A vessel is being vacuum tested. What is one negative aspect of a vacuum test?
- a) Location of leak is not easily identified
 - b) There are additional safety precautions as compared to a hydrotest
 - c) Creating the vacuum requires expensive equipment
 - d) The vacuum must be held for 24 hours
10. What is major safety concern when performing a pneumatic test?
- a) Compressed air when released creates a fireball
 - b) Compressed gases when released expand at a very high velocity
 - c) Compressed air reacts extremely fast with steel to create rapid thinning
 - d) Compressed gases when released form a toxic cloud
11. A vessel is going to be pneumatically tested. It is important to establish a safety perimeter. Guidance for establishing a safety perimeter can be found in:
- a) ASME B&PV Section VIII
 - b) ASME PCC-2
 - c) ASME B16.47
 - d) API 579
 - e) API 2201
12. A pressure test is conducted after an alteration on a vessel that has a shell thickness of 2.5". The minimum metal temperature allowed during this pressure test is:
- a) 10°F.
 - b) 30°F.
 - c) 60°F.
 - d) 10°F. above the vessel MDMT.
 - e) 30°F. above the vessel MDMT.

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Practice Questions

13. A pressure test is conducted after a repair on a vessel that has a shell thickness of 1.25". The minimum metal temperature allowed during this pressure test is:
- a) 10°F.
 - b) 30°F.
 - c) 60°F.
 - d) 10°F. above the vessel MDMT.
 - e) 30°F. above the vessel MDMT.
14. What is the most important concern when hydrotesting a large in-service vessel?
- a) Assure the water used has less than 50 ppm of particulates
 - b) Assure foundation & supports are adequate for the weight of the hydrotest
 - c) Provide multiple calibrated pressure gauges
 - d) Rope off an area equal to 1000 sq. ft. for every 1' of vessel height
15. During a turnaround, many temporary isolation blinds are installed. What is one significant potential problem with these isolation blinds?
- a) The blind material is usually incompatible with the process.
 - b) Most Owner/User lose track of the location of these blinds.
 - c) Most Owner/User lose track of the supporting Mill Certs for these blinds.
 - d) The blind thickness is usually not adequate to support a pressure test.
16. When performing a pneumatic pressure test of a vessel, the requirements of which code should be followed?
- a) ASME B&PV Section I
 - b) ASME B&PV Section V
 - c) ASME B&PV Section VIII
 - d) ASME B31.3
 - e) API 579
 - f) API 2201
17. A shell-side pressure test is being performed on an exchanger with a floating head bundle. The bundle is in the shell and the channel cover is removed. This test will show overall bundle integrity and can be used to specifically locate which of the following leaks?
- a) Stationary tubesheet roll leaks
 - b) Floating head tubesheet roll leaks
 - c) Floating head gasket leak.
 - d) Leaking tubes
 - e) The exact location of any leak cannot be determined with this test

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Practice Questions

18. A tube-side pressure test is being performed on a floating head exchanger bundle. The bundle is in the shell. Piping connected to a bottom shell nozzle is removed. This test will show bundle integrity and can be used to locate which of the following leaks?
- Stationary tubesheet roll leaks
 - Floating head tubesheet roll leaks
 - Leaking tubes
 - The exact location of any leak cannot be determined with this test
19. During pressure test of a bundle, a leaking tube is discovered. The other tubes are acceptable for a future operational run. The leaking tube is normally:
- replaced in kind.
 - replaced with improved metallurgy.
 - plugged.
 - removed.
 - rerolled.
20. How many tubes in a bundle can be plugged?
- None
 - 5%
 - 10%
 - 25%
 - As many as needed, as long as it doesn't impact the bundle's ability to transfer adequate heat energy.
21. What is a good practice when plugging an exchanger bundle tube?
- Prior to plugging, pierce the tube to prevent pressure buildup
 - Always seal weld the plug
 - Never plug more than 10% of the tubes
 - Plugs should be installed in accordance with ASME PCC-3
22. Before applying a high-pressure hydrotest to an exchanger's shell-side, be sure to:
- connect a PRV to prevent excessive pressure.
 - have multiple pressure gauges connected for the test.
 - assure that all tubes have been seal-welded at the tubesheet.
 - determine whether the tubesheet is thick enough for the pressure.
23. After an exchanger hydrotest, the water is drained. But some residual water can't be drained. What may need to be done?
- Nothing, a little residual water will not cause a problem.
 - Heat the equipment to 500°F to boil off the water.
 - Add corrosion inhibitors to prevent microbiological corrosion.
 - Add corrosion inhibitors to prevent oxidation.

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Practice Questions

24. During repairs & alterations to vessels, who is responsible to establish the requirements for an appropriate PMI program?
- a) Authorized Inspector
 - b) Engineer
 - c) Owner/User
 - d) Repair Organization
25. What document is useful in setting the requirements for a PMI program?
- a) API 578
 - b) API 2015
 - c) API 2201
 - d) ASME PCC-1
26. What document provides information on the corrosive effect of residual elements on carbon steel in HF acid service?
- a) API 530
 - b) API 583
 - c) API 652
 - d) API 751

Chapter 10 (pg 53-56)

1. A vessel is structurally sound, but due to corrosion it is no longer thick enough for the designed conditions. The vessel:
- a) can be derated.
 - b) must be repaired.
 - c) must be retired.
 - d) must be repaired or retired.
2. Which document provides guidelines on evaluation different forms of degradation?
- a) API 579
 - b) API 583
 - c) API 2201
 - d) ASME FFS-26
3. A vessel's U-1 form indicates that the new shell thickness is 0.500" and the specified corrosion allowance is 0.125". Which of the following is true?
- a) The minimum required thickness of this shell is 0.375".
 - b) The minimum required thickness of this shell may be less than 0.375".
 - c) The minimum required thickness of this shell may be greater than 0.375".
 - d) The minimum required thickness must be calculated by a professional engineer.

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Practice Questions

4. If a jurisdiction requires a vessel repair to meet the National Board Inspection Code, what stamp must the Repair Organization possess?
- a) A
 - b) U
 - c) UV
 - d) R
 - e) VR
5. A vessel's shell thickness is 2.000". The corrosion allowance is 0.250". During an inspection, the wonderful, talented, API inspector (who attended an MSTs class) discovers in a longitudinal weld, a 24" long crack that is 0.150" deep. Which of the following is true?
- a) The crack must be removed.
 - b) The crack does not have to be removed since it does not go through the corrosion allowance.
 - c) If the crack is removed, the area ground must be rewelded.
 - d) If the crack is removed, the area ground out does not have to welded.
6. A vessel repair is completed. A pressure test:
- a) must always be performed.
 - b) must be performed if the inspector believes one is necessary.
 - c) is normally not performed.
 - d) that is conducted is done at a pressure of 1.5 MAWP.
7. After a vessel alteration, a pressure test is:
- a) normally required.
 - b) rarely required.
 - c) normally not required.
 - d) conducted at a pressure of 1.3 MAWP.
8. When removing a crack in a vessel using flame or arc gouging:
- a) care must be taken to prevent the crack from growing.
 - b) the craftsman must be qualified in accordance with ASME B&PV Section IX.
 - c) the base metal should only be a P1 or P-3 material.
 - d) the crack length cannot be greater than allowed in API 579.
9. A deep crack in a vessel shell weld will be removed and then re-welded. Which of the following is true?
- a) A pressure test must be done after repairs are completed.
 - b) The area should be beveled to about a 37.5 degree angle.
 - c) Welders can be qualified to AWS D1.1.
 - d) Either MT or PT should be performed prior to welding.

API 572 Study Guide

Practice Questions

10. A crack in a vessel is removed. The groove:
- must always be welded with weld metal of the same metallurgy as the base.
 - should be welded with weld metal of a higher alloy than the base metal.
 - should be welded with weld metal of the same tensile strength as the base.
 - should be filled with weld metal of a higher tensile strength than the base.
 - can be left unfilled provided adequate wall thickness remains and edges are blended.
11. Stairway treads that have been worn smooth:
- can be roughened by placing weld beads on the worn surface.
 - should always be replaced.
 - are acceptable provided the tread thickness is adequate.
 - should be repaired with epoxy based materials.

Note! Per the API 510 Body of Knowledge **Annex A & C** are **NOT** included in the API Exam.

Annex B (pg 74-130)

1. Towers are used to either: fractionate, strip out a gas or liquid, or enrich a gas or liquid. These terms are collectively called:
- catalyzation.
 - chemical reactions.
 - mass transfer.
 - reformation.
2. Liquid levels on trays are maintained by:
- downcomers.
 - reflux limiters.
 - tray caps.
 - weirs.
3. The vapor seal on trays are maintained by:
- downcomers.
 - reflux limiters.
 - tray caps.
 - weirs.

API 572 Study Guide

Practice Questions

4. In a fractionating column, what rises through a bubble cap?
 - a) Catalyst
 - b) High Density Liquids
 - c) Low Density Liquids
 - d) Vapors

5. In a fractionating column, the liquid at the top of the column comes from:
 - a) reclamation.
 - b) reflux.
 - c) reformation.
 - d) stratification.

6. Liquid-to-liquid extraction is done to recover a solvent or raffinate in a process called:
 - a) Distillation Stripping.
 - b) Fractionation.
 - c) Liquid Washing.
 - d) Polymerization.

7. Which of the following parts is "missing" in a single-flow sieve tray?
 - a) Downcomers
 - b) Tray Ring
 - c) Valve Caps
 - d) Wiers

8. Which of the following parts is "missing" in a dual-flow sieve tray?
 - a) Downcomers
 - b) Tray Perforations
 - c) Tray Ring

9. Dual-flow sieve trays are often used in which type of process?
 - a) Amine Service
 - b) Potential for Heavy Fouling
 - c) Only Light Hydrocarbons
 - d) Very Clean Services

10. Which of the following is **not** an advantage of a valve tray vs. a sieve tray?
 - a) Less expensive
 - b) Operate over a wider range of operating flow rates
 - c) Pressure profile across column is easier to maintain
 - d) Valve Caps are able to close

API 572 Study Guide

Practice Questions

11. Which of the following is not an advantage of a Bubble Cap tray?
- a) Good fouling resistance
 - b) Good at low liquid flow rates and high variations in vapor flow rates
 - c) Least costly tray type
 - d) No moving parts
12. Which of the following is the primary advantage of Floating Valves?
- a) Easier to inspect than Bubble Caps
 - b) Easier to crawl over than Bubble Caps!!!
 - c) High efficiency over a small Operating Range
 - d) High efficiency over a large Operating Range
13. What way can Floating Valve trays be designed to offer a greater Operating Range?
- a) Use trays with different hole sizes
 - b) Use trays with different hole shapes
 - c) Use trays with caps of different weights
 - d) Use trays with caps of different heights
14. Which of the following is the primary advantage of using Tray Packing?
- a) Can handle large liquid volumes with low pressure drop
 - b) Can handle large vapor volumes with low pressure drop
 - c) Less expensive
 - d) Much easier to inspect
15. Random packing comes in sizes from:
- a) 0.5" to 1.0" in diameter.
 - b) 0.5" to 3.0" in diameter.
 - c) 1.0" to 6.0" in diameter.
 - d) 2.0" to 6.0" in diameter.
16. Random packing:
- a) usually creates a high pressure drop.
 - b) has a low to medium efficiency.
 - c) is not as useful for large diameter columns with low liquid flow rates.
 - d) comes in one shape, 2.0" ceramic pall rings.
17. Structured packing is made from:
- a) corrugated metal.
 - b) bags of random packing.
 - c) blocks of plastic chevrons.
 - d) cylindrical carbon rings.

API 572 Study Guide

Practice Questions

18. When working on very large columns:
- a) for safety concerns, two inspectors should work together.
 - b) for working efficiency, two inspectors should work together.
 - c) 1.0" to 6.0".
 - d) 2.0" to 6.0".
19. Often the inspector inside a column does **not** have visual contact with the entry attendant. At most facilities how is this addressed?
- a) Horn signals
 - b) Inspector should "pop-out" every 15 minutes.
 - c) Radios
 - d) Tap the Morse Code "SOS" on the wall with your hammer if in trouble. "dot-dot-dot, dash-dash-dash, dot-dot-dot"
20. Which of the following is **not** a significant safety concern while inside a column?
- a) Upset trays makes climbing dangerous
 - b) Release of gases that is underneath debris
 - c) Sharp edges on tray hardware
 - d) Determining whether to get a Rib-eye, or a Prime Rib tonight
21. Fireproofing should be checked for CUF (corrosion under fireproofing) if the fireproofing is bulged or if there is a crack over:
- a) 0.125" wide.
 - b) 0.250" wide.
 - c) 3" long.
 - d) 12" long.
22. Which of the following is **not** a significant reason for a preliminary internal, "the dirty inspection", of the inside a column?
- a) Chance to PT or MT any discovered cracks
 - b) Chance to see if liners are cracked or bulged
 - c) Determine if additional cleaning is required
 - d) Chance to detect significant unexpected damage to column
23. What is a typical problem that can occur as a result of improper installation of a demister mat?
- a) Galvanic corrosion
 - b) Impingement
 - c) Stress Corrosion Cracking
 - d) Uniform corrosion

API 572 Study Guide

Practice Questions

24. In a column, a couple of the top head nozzles have either no flow or very low flow. What problem might occur in the nozzles?
- a) Galvanic corrosion
 - b) Impingement
 - c) Naphthenic acid corrosion
 - d) Precipitation of corrosive liquids
25. Chimney trays need to be checked for cracks due to:
- a) cyclic loads.
 - b) liquid embrittlement.
 - c) sulfide stress corrosion cracking.
 - d) thermal fatigue.
26. Ensuring tightness of box distributor hardware is most commonly done by:
- a) lift testing.
 - b) rattling the hardware.
 - c) torque testing.
 - d) UT.
27. When hammer testing distributor hardware it is best to hit the:
- a) bolt head.
 - b) nut.
 - c) threads.
 - d) washer.
28. Why does API 572 recommend striking the washer instead of the nut when hammer testing distributor hardware? (*Yes, I know this gives away the previous answer !!!*)
- a) Ensure you don't miss and damage the threads.
 - b) Might crack the bolt since it is relatively small diameter.
 - c) Might loosen the nut, since these have low torque values.
 - d) No good, reason. Some engineer is just trying to make your life more difficult.
29. What is a common way to check whether "random tower packing" is too thin?
- a) Measure with a micrometer
 - b) Measure with a UT
 - c) Try to bend using both hands
 - d) Try to distort by using your thumb and finger

API 572 Study Guide

Practice Questions

30. When inspecting metal packing be sure to:
- a) be equipped with fresh air.
 - b) bring your UT meter.
 - c) use a small ball peen hammer.
 - d) wear gloves.
31. When doing an internal inspection, vortex breaker welds should be tested using:
- a) angle beam UT.
 - b) hammer testing.
 - c) rattling of the vortex breaker.
 - d) only visual inspection.
32. Attachment welds of strip lining:
- a) will never crack if the correct alloy is selected.
 - b) might crack due to differences in thermal expansion of base and liner.
 - c) might crack due to expansion of trapped gases behind liner.
 - d) might crack due to mechanical fatigue.
33. When strip lining is installed, the welds are inspected:
- a) only with UT.
 - b) only with UT & PMI equipment.
 - c) using a pressure test of 5 psig.
 - d) using a pressure test of 15 psig.
34. A carbon steel nozzle is internally lined with a SS plate. Which of the following is correct?
- a) A hole shall be drilled in the carbon steel nozzle and left unplugged.
 - b) A hole shall be drilled in the carbon steel nozzle for a 15 psig air test. After the test, the hole should be plugged.
 - c) A hole shall be drilled in the SS liner for a 15 psig air test. After the test, the hole should be plugged.
 - d) The strip liner weld should be oriented on the top of the nozzle.
35. Clad lining refers to:
- a) alloy material being explosion bonded to a base metal.
 - b) full sections of alloy plate that are fillet-welded and plug-welded to a base metal.
 - c) strips of alloy plate that are fillet-welded and plug-welded to a base metal.
 - d) a base-metal that has been overlaid with an alloy weld metal.

API 572 Study Guide

Practice Questions

36. An inspector has gained a basic understanding of how a tower (column) works and what each section does. Which of the following is a benefit for this inspector?
- a) Understand what damage mechanisms might occur.
 - b) Predict where specific damage mechanisms will occur.
 - c) Better able to select specific types of NDE needed during an inspection.
 - d) Gives the inspector a better future. The more you know, the more you make.
 - e) All of the above
37. As a general rule, where is corrosion in a column normally located?
- a) Upper half
 - b) Bottom half
 - c) Upper third or bottom third
 - d) Mid-section & top head
38. In a tower's reflux area, where is corrosion most anticipated?
- a) One to three trays above the reflux inlet
 - b) One to three trays below the reflux inlet
 - c) Five to ten trays above the reflux inlet
 - d) Five to ten trays below the reflux inlet
39. In tower trays, what does the term "Key-holing" mean?
- a) Removing the tray manways for inspection & maintenance
 - b) Fretting of the tray holes caused by valve tray movement
 - c) Cutting a sample out for a metallurgical inspection
 - d) Procedure used to installed tray valves in the trays
40. Fixed valve trays are:
- a) the most common types of trays.
 - b) trays that are welded to the tray ring.
 - c) require a lot of maintenance.
 - d) always open.
41. Bubble cap trays are:
- a) easy to inspect.
 - b) extremely durable.
 - c) easy to crawl across during an inspection.
 - d) easy to clean.

API 572 Study Guide

Practice Questions

42. Tray decks made of 410 SS at high temperature may:
- a) become embrittled.
 - b) corrode rapidly.
 - c) keyhole rapidly.
 - d) fail due to HTHA.
43. Trays operating at maximum conditions may crack at stress points due to:
- a) galvanic corrosion.
 - b) high temperature oxidation.
 - c) naphthenic acid.
 - d) vibration.
44. Which of the following is **not** a common tray hardware issue?
- a) Galling of stainless steel hardware
 - b) Loosening of nuts
 - c) Mismatched materials (like CS nut on SS bolt)
 - d) Short bolts
45. The torque value for 3/8" tray hardware is typically:
- a) 10-14 ft-lbs.
 - b) 18-22 ft-lbs.
 - c) 22-30 ft-lbs.
 - d) 25-50 ft-lbs.
46. The torque value for 1/2" tray hardware is typically:
- a) 10-14 ft-lbs.
 - b) 18-22 ft-lbs.
 - c) 22-30 ft-lbs.
 - d) 25-50 ft-lbs.
47. The top of tray rings a common area for aggressive corrosion. Why?
- a) Often made of a lower alloy.
 - b) Cavitation often occurs in this area.
 - c) It's a stagnant area where process debris collects.
 - d) This is a high velocity area.
48. What is a good technique for finding shell surface corrosion above the top tray or below the bottom tray?
- a) Finger scanning
 - b) Keyholing.
 - c) Shadowing
 - d) Spot UT

API 572 Study Guide – Answers & References

Chapter 3

1. A **3.1.1**
2. D **3.1.11**
3. B **3.1.20**
4. C **3.1.27**
5. B **3.1.31**
6. B **3.1.31**

Chapter 4

1. B **4.1**
2. A **4.1**
3. C **4.2**
4. B **4.2**
5. A **4.2**
6. A **4.3**
7. B **4.3**
8. C **4.3**
9. D **4.3**
10. D **4.3**
11. E **4.3**
12. C **4.3**
13. B **4.3**
14. A **4.3**
15. A **4.3**
16. B **4.3**
17. D **4.4**
18. C **4.4**
19. B **4.6**
20. B **4.6**
21. C **4.6**
22. D **4.6**
23. A **4.6 & Bibliography @ Back**
24. B **4.6 & Bibliography @ Back**
25. C **4.6**
26. A **4.6**

Chapter 5

1. E **5.1-3**
2. C **5.4**
3. A **5.4**

Chapter 6

1. D **6.1**
2. A **6.2**
3. B **6.3**
4. C **6.4**
5. A **6.4**
6. A **6.5**
7. D **6.5**
8. D **6.5**

Chapter 7

1. D **7.1**
2. C **7.1**

Chapter 8

1. F **8.1.1**
2. C **8.1.2**
3. A **8.1.2**
4. C **8.2** conflict w/ 9.4.2 - pg 36

Chapter 9 (9.1 & 9.2)

1. A **9.1**
2. C **9.1**
3. D **9.1**
4. B **9.1**
5. A **9.1**
6. D **9.1**
7. B **9.2.1**
8. E **9.2.1**
9. D **9.2.1**
10. C **9.2.1**
11. B **9.2.1**
12. C **9.2.1**
13. B **9.2.2**
14. D **9.2.2**
15. C **9.2.2**
16. D **9.2.2**
17. A **9.2.2**
18. D **9.2.2**

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Chapter 9 (9.3)

1. D **9.3.2**
2. C **9.3.2**
3. D **9.3.2**
4. A **9.3.2**
5. A **9.3.2**
6. A **9.3.2**
7. B **9.3.2**
8. A **9.3.2**
9. B **9.3.2/3**
10. A **9.3.3**
11. D **9.3.3**
12. D **9.3.3**
13. D **9.3.3**
14. C **9.3.3**
15. B **9.3.4**
16. A **9.3.4**
17. D **9.3.4**
18. B **9.3.6**
19. B **9.3.6**
20. C **9.3.6**
21. D **9.3.6**
22. D **9.3.6**
23. B **9.3.6**
24. A **9.3.6**
25. A **9.3.6**
26. E **9.3.8**
27. C **9.3.8**
28. D **9.3.8**
29. C **9.3.8**
30. B **9.3.9**
31. A **9.3.9**
32. B **9.3.9**
33. C **9.3.9**
34. A **9.3.9**
35. B **9.3.10**
36. C **9.3.10**
37. A **9.3.10**
38. B **9.3.10**
39. D **9.3.11**
40. A **9.3.11**
41. B **9.3.12**
42. D **9.3.12**
43. B **9.3.12**

44. B **9.3.12**
45. D **9.3.12** conflict w/ 510 5.5.6.1.b
46. A **9.3.12**
47. A **9.3.12**
48. C **9.3.12**
49. A **9.3.13**
50. C **9.3.13**
51. C **9.3.13**
52. A **9.3.13**
53. D **9.3.14**
54. C **9.3.14**
55. A **9.3.14**
56. C **9.3.14**
57. B **9.3.14**
58. D **9.3.14**
59. D **9.3.14**
60. A **9.3.14**
61. A **9.3.14**
62. D **9.3.14**
63. B **9.3.14**
64. D **9.3.14**

Chapter 9 (9.4)

1. A **9.4.1**
2. C **9.4.2** conflict w/ 8.2 - pg 24
3. C **9.4.2**
4. D **9.4.3**
5. B **9.4.3**
6. D **9.4.3**
7. A **9.4.3**
8. B **9.4.3**
9. A **9.4.3**
10. C **9.4.3**
11. C **9.4.3**
12. B **9.4.3**
13. D **9.4.3**
14. C **9.4.3**
15. D **9.4.3**
16. B **9.4.3**
17. D **9.4.3**
18. A **9.4.3**
19. A **9.4.3**
20. D **9.4.4**
21. B **9.4.4**

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- 22. C 9.4.4.1
- 23. B 9.4.4.1
- 24. C 9.4.4.2
- 25. C 9.4.4.2
- 26. C 9.4.4.2
- 27. D 9.4.4.2
- 28. D 9.4.4.2
- 29. C 9.4.4.3
- 30. D 9.4.4.3
- 31. B 9.4.4.4
- 32. A 9.4.4.4
- 33. B 9.4.4.4
- 34. E 9.4.4.5
- 35. A 9.4.4.6
- 36. C 9.4.4.6
- 37. C 9.4.5.1
- 38. A 9.4.5.2
- 39. A 9.4.5.2
- 40. C 9.4.5.3
- 41. D 9.4.5.4
- 42. B 9.4.5.5.d
- 43. C 9.4.5.5
- 44. D 9.4.5.5
- 45. D 9.4.5.5
- 46. A 9.4.6
- 47. A 9.4.6
- 48. C 9.4.6
- 49. C 9.4.7
- 50. A 9.4.7
- 51. B 9.4.7
- 52. D 9.4.7
- 53. C 9.4.7
- 54. D 9.4.7
- 55. B 9.4.8
- 56. C 9.4.8
- 57. D 9.4.8
- 58. C 9.4.8
- 59. A 9.4.8
- 60. B 9.4.8
- 61. A 9.4.8
- 62. D 9.4.9
- 63. B 9.4.9
- 64. C 9.4.9
- 65. A 9.4.9

Chapter 9 (9.5-7)

- 1. C 9.6
- 2. B 9.6
- 3. A 9.7.1.a
- 4. A 9.7.1
- 5. A 9.7.2
- 6. B 9.7.2
- 7. C 9.7.2
- 8. B 9.7.2
- 9. A 9.7.2
- 10. B 9.7.2
- 11. B 9.7.2
- 12. E 9.7.2
- 13. D 9.7.2
- 14. B 9.7.2
- 15. D 9.7.2
- 16. C 9.7.2
- 17. A 9.7.3
- 18. D 9.7.3
- 19. C 9.7.3
- 20. E 9.7.3
- 21. A 9.7.3
- 22. D 9.7.3
- 23. C 9.7.3
- 24. C 9.7.4
- 25. A 9.7.4
- 26. D 9.7.4

Chapter 10

- 1. A 10.1.1
- 2. A 10.2
- 3. B 10.3
- 4. D 10.5.1
- 5. D 10.5.1
- 6. B 10.5.2
- 7. A 10.5.2
- 8. A 10.5.2
- 9. D 10.5.2
- 10. E 10.5.2
- 11. A 10.6

API 572 Study Guide – Answers & References

Annex B

- | | | | | | |
|-----|---|-------------|-----|---|-------------|
| 1. | C | B.1 | 43. | D | B.4.6.2.2.3 |
| 2. | D | B.1 | 44. | D | B.4.6.2.2.3 |
| 3. | A | B.1 | 45. | A | B.4.6.2.2.3 |
| 4. | D | B.1 | 46. | B | B.4.6.2.2.3 |
| 5. | B | B.1 | 47. | C | B.4.6.2.2.4 |
| 6. | A | B.1 | 48. | C | B.4.6.3 |
| 7. | C | B.2.3 | | | |
| 8. | A | B.2.3 | | | |
| 9. | B | B.2.3 | | | |
| 10. | A | B.2.4 | | | |
| 11. | C | B.2.5 | | | |
| 12. | D | B.2.6 | | | |
| 13. | C | B.2.6 | | | |
| 14. | A | B.3.1 | | | |
| 15. | B | B.3.2 | | | |
| 16. | C | B.3.2 | | | |
| 17. | A | B.3.3 | | | |
| 18. | A | B.4.2 | | | |
| 19. | C | B.4.2.b | | | |
| 20. | D | B.4.2 | | | |
| 21. | B | B.4.3 | | | |
| 22. | A | B.4.4 | | | |
| 23. | B | B.4.5.2 | | | |
| 24. | D | B.4.5.2 | | | |
| 25. | A | B.4.5.2 | | | |
| 26. | B | B.4.5.2 | | | |
| 27. | D | B.4.5.2 | | | |
| 28. | C | B.4.5.2 | | | |
| 29. | D | B.4.5.2 | | | |
| 30. | D | B.4.5.2 | | | |
| 31. | B | B.4.5.2 | | | |
| 32. | C | B.4.5.4 | | | |
| 33. | C | B.4.5.4 | | | |
| 34. | A | B.4.5.4 | | | |
| 35. | A | B.4.5.4 | | | |
| 36. | E | B.4.6.2.1 | | | |
| 37. | C | B.4.6.2.1 | | | |
| 38. | D | B.4.6.2.1.b | | | |
| 39. | B | B.4.6.2.2 | | | |
| 40. | D | B.4.6.2.2.1 | | | |
| 41. | B | B.4.6.2.2.2 | | | |
| 42. | A | B.4.6.2.2.3 | | | |

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