

API 570  
PREPARATORY COURSE

# QUESTION BANK

Copy for: *Michael S. Garland*  
*Al-Hoty Establishment*

**API 570 PRACTICE QUESTIONS  
(Closed Book)**

- 1) API 570 covers inspection, repair alteration, and re-rating procedures for metallic piping systems that \_\_\_\_\_.
  - a) Are being fabricated
  - b) Does not fall under ASTM B31.3
  - c) Have been in-service
  - d) Has not been tested
  
- 2) API 570 was developed for the petroleum refining and chemical process industries.
  - a) It shall be used for all piping systems.
  - b) It may be used, where practical, for any piping system.
  - c) It can be used, where necessary, for steam piping.
  - d) It may not be used unless agreed to by all parties.
  
- 3) API 570 \_\_\_\_\_ be used as a substitute for the original construction requirements governing a piping system before it is placed in-service.
  - a) Shall not
  - b) Should
  - c) May
  - d) Can
  
- 4) API 570 applies to piping systems for process fluids, hydrocarbons, and similar flammable or toxic fluid services. Which of the following services is not specifically applicable?
  - a) Raw, intermediate, and finished petroleum products
  - b) Water, steam condensate, boiler feed water
  - c) Raw, intermediate, and finished chemical products
  - d) Hydrogen, natural gas, fuel gas, and flare systems
  
- 5) Some of the classes of piping systems that are excluded or optional for coverage under API 570 are listed below. Which one is a mandatory included class?
  - a) Water
  - b) Catalyst lines
  - c) Steam
  - d) Boiler feed water

- 6) The \_\_\_\_\_ shall be responsible to the owner-user for determining that the requirements of API 570 for inspection, examination, and testing are met.
- a) Piping Engineer
  - b) Inspector
  - c) Repair Organisation
  - d) Operating Personnel
- 7) Who is responsible for the control of piping system inspection programs, inspection frequencies and maintenance of piping?
- a) Authorised Piping Inspector
  - b) Owner-user
  - c) Jurisdiction
  - d) Contractor
- 8) An authorised piping inspector shall have the following qualifications. Pick the one that does not belong in this list:
- a) Four years of experience inspecting in-service piping systems
  - b) High school education plus 3 years of experience in the design, construction, repair, operation, or inspection of piping systems
  - c) Two year certificate in engineering or technology plus 2 years of experience in the design, construction, repair, operation, or inspection of piping systems.
  - d) Degree in engineering plus one year experience in the design, construction, repair, operation, or inspection of piping systems.
- 9) Risk based inspections include which of the following:
- a) Likelihood assessment
  - b) Consequence analysis
  - c) Operating and inspection histories
  - d) All of the above
- 10) An RBI assessment can be used to alter the inspection strategy provided:
- a) The degradation methods are identified
  - b) The RBI is fully documented.
  - c) A third party conducts the RBI
  - d) Both A and B above

- 11) Which one of the following is not a specific type of an area of deterioration?
- a) Rectifier performance
  - b) Injection points
  - c) Deadlegs
  - d) Environmental cracking
- 12) Injection points subject to accelerated or localised corrosion may be treated as \_\_\_\_\_.
- a) The focal point of an inspection circuit
  - b) Separate inspection circuits
  - c) Piping that must be renewed on a regular schedule
  - d) Locations where corrosion inhibitors must be used
- 13) The recommended upstream limit of inspection of an injection point is a minimum of:
- a) 12 feet or 3 pipe lengths whichever is smaller
  - b) 12 inches or 3 pipe diameters whichever is smaller
  - c) 12 inches or 3 pipe diameters whichever is greater
  - d) 12 feet or 3 pipe lengths which is greater
- 14) The recommended downstream limit of inspection of an injection point is a minimum of
- a) Second change in flow direction past the injection point, or 25 feet beyond the first change in flow direction whichever is less
  - b) Second change in flow direction past the injection point, or 25 feet beyond the first change in flow direction whichever is greater
  - c) Second change in flow direction past the injection point, or 25 inches beyond the first change in flow direction whichever is less
  - d) Second change in flow direction past the injection point, or 25 inches beyond the first change in flow direction whichever is greater.
- 15) Select thickness measurement locations (TMLs) within injection point circuits subjected to localised corrosion according to the following guidelines. Select the one that **does not** belong.
- a) Establish TMLs on appropriate fittings within the injection point circuit.
  - b) Establish at least one TML at a location at least 25 feet beyond the downstream limit of the injection point.

- c) Establish TMLs on the pipe wall at location of expected pipe wall impingement or injected fluid.
  - d) Establish TMLs at both the upstream and downstream limits of the injection point circuit.
- 16) What are the preferred methods of inspecting injection points ?
- a) Radiography and / or ultrasonics
  - b) Hammer test and / or radiograph
  - c) Ultrasonics and / or liquid penetrant
  - d) Liquid penetrant and / or eddy current.
- 17) During periodic scheduled inspections, more extensive inspection should be applied to an area beginning \_\_\_\_\_ upstream of the injection nozzle and continuing for at least \_\_\_\_\_ pipe diameters downstream of the injection point.
- a) 10 inches, 20
  - b) 12 feet, 10
  - c) 12 inches, 10
  - d) 10 feet, 10
- 18) Why should deadlegs in piping be inspected?
- a) API 510 mandates the inspection of deadlegs
  - b) Acid products and debris build up in deadlegs
  - c) The corrosion rate in deadlegs can vary significantly from adjacent active piping.
  - d) Caustic products and debris build up in deadlegs.
- 19) Both the stagnant end and the connection to an active line of a deadleg should be monitored. In a hot piping system, why does the high point of a deadleg corrode and need to be inspected?
- a) Corrosion occurs due to directed currents set up in the deadleg
  - b) Erosion occurs due to convective currents set up in the deadleg.
  - c) Corrosion occurs due to convective currents set up in the deadleg
  - d) Erosion occurs due to directed currents set up in the deadleg
- 20) What is the best thing to do with deadlegs that are no longer in service?
- a) Ultrasonically inspect often
  - b) Radiograph often

- c) Inspect often
  - d) Remove them
- 21) What are the most common forms of corrosion under insulation (CUI).
- a) Localised corrosion of non-ferrous metals and chloride stress corrosion cracking of carbon steel.
  - b) Localised corrosion of chrome-moly steel and chloride stress corrosion cracking of ferritic stainless steel.
  - c) Localised corrosion of carbon steel and chloride stress corrosion cracking of austenitic stainless steel
  - d) Localised corrosion of nickel-silicon alloy and caustic stress corrosion of austenitic stainless steel
- 22) What climatic area may require a very active program for corrosion under insulation?
- a) Cooler northern continent locations.
  - b) Cooler drier, mid-continent locations
  - c) Warmer, marine locations
  - d) Warmer drier, desert locations
- 23) Certain areas and types of piping systems are potentially more susceptible to corrosion under insulation. Which of the items listed is not susceptible to CUI?
- a) Areas exposed to mist over-spray from cooling water towers.
  - b) Carbon steel piping systems that normally operate in-service above 250 degrees but are in intermittent service.
  - c) Deadlegs and attachments that protrude from insulated piping and operate at a different temperature than the temperature of the active line.
  - d) Carbon steel piping systems, operating between 250 degrees F and 600 degrees F.
- 24) What location is subject to corrosion under insulation and inspection contributes to it?
- a) Locations where pipe hangers and other supports exist.
  - b) Locations where insulator has been stripped to permit inspection of the piping.
  - c) Locations where insulation plugs have been removed to permit piping thickness measurements.
  - d) Locations where there is damaged or missing insulation jacketing.

- 25) Soil-to-air (S/A) interfaces for buried piping are a location where localised corrosion may take place. If the buried part is excavated for inspection, how deep should the excavation be to determine if there is hidden damage?
- a) 12 to 18 inches
  - b) 6 to 12 nches
  - c) 12 to 24 inches
  - d) 6 to 18 inches
- 26) At concrete-to-air and asphalt-to-air interfaces of buried piping without cathodic protection, the inspector look for evidence that the caulking or seal at the interface has deteriorated and allowed moisture ingress. If such a condition exists on piping systems over \_\_\_\_\_ years old, it may be necessary to inspect for corrosion beneath the surface before resealing the joint.
- a) 8
  - b) 5
  - c) 15
  - d) 10
- 27) An example of service-specific and localised corrosion is:-
- a) Corrosion under insulation in areas exposed to steam vents
  - b) Unanticipated acid or caustic carryover from processes into non-alloyed piping
  - c) Corrosion in deadlegs
  - d) Corrosion of underground piping at soil-to-air interface where it ingresses or egresses.
- 28) Erosion can be defined as:
- a) Galvanic corrosion of a material where uniform losses occur
  - b) Removal of surface material by action of numerous impacts of solid or liquid particles
  - c) Gradual loss of material by a corrosive medium acting uniformly on the material surface
  - d) Pitting on the surface of a material to the extent that a rough uniform loss occurs
- 29) A combination of corrosion and erosion results in significantly greater metal loss that can be expected from corrosion or erosion alone. This type of loss occurs at:
- a) High-velocity and high-turbulence areas

- b) Areas where condensation or exposure to wet hydrogen sulphide or carbonates occur
  - c) Surface-to-air interfaces of buried piping
  - d) Areas where gradual loss of material occurs because of a corrosive medium
- 30) Environmental cracking of austenite stainless steels is caused many times by:-
- a) Exposing areas to high-velocity and high-turbulence streams
  - b) Excessive cyclic stresses that are often very low
  - c) Exposure to chlorides from salt water, wash-up water, etc.
  - d) Creep of the material by long time exposure to high temperature and stress
- 31) When the inspector suspects or is advised that specific piping circuits may be susceptible to environmental cracking, the inspector should:
- a) Call in a piping engineer for consultation.
  - b) Investigate the history of the piping circuit.
  - c) Obtain advice from a Metallurgical Engineer.
  - d) Schedule supplemental inspections.
- 32) If environmental cracking is detected during internal inspection of pressure vessels, what should the inspector do?
- a) The inspector should designate appropriate piping spools upstream and downstream of the vessel to be inspected if piping is susceptible to environmental cracking.
  - b) The inspector should consult with a metallurgical engineer to determine extent of the problems
  - c) The inspector should review history of adjacent piping to determine if it has ever been affected.
  - d) The inspector should consult with a piping engineer to determine the extent of the problems.
- 33) If external or internal coatings or refractory liners on a piping circuit are in good condition, what should an inspector do?
- a) After inspection, select a portion of the liner for removal
  - b) The entire liner should be removed for inspection
  - c) Selected portions of the liner should be removed for inspection
  - d) After inspection, if any separation, breaks, holes or blisters are found, it may be necessary to remove portions of the lining to determine the condition under it.



- 34) What course of action should be followed if a coating of coke is found on the interior of a large pipe of a reactor on a Fluid Catalytic Cracking Unit?
- Determine whether such deposits have active corrosion beneath them. If corrosion is present, thorough inspection in selected areas may be required.
  - The coke deposits should be removed from the area for inspection.
  - The coke deposits may be ignored – the deposits will probably protect the line from corrosion.
  - Consult with a Process Engineer and a Metallurgist on the necessity of removing the coke deposits.
- 35) Fatigue cracking of piping systems may result from
- Embrittlement of the metal due to it operating below its transition temperature.
  - Erosion or corrosion / erosion that thin the piping where it cracks
  - Excessive cyclic stresses that are often well below the static yield strength of the material
  - Environmental cracking caused by stress corrosion due to the presence of caustic, amine, or other substance.
- 36) Where can fatigue cracking typically be first detected?
- At points of low-stress intensification such as reinforced nozzles
  - At points of high-stress intensification such as branch connections
  - At points where cyclic stresses are very low
  - At points where there are only bending or compressive stresses.
- 37) What are the preferred NDE methods for detecting fatigue cracking?
- Eddy current testing ultrasonic A-scan testing, and / or possibly hammer testing
  - Liquid penetrant testing, magnetic particle testing and / or possibly acoustic emission testing.
  - Visual testing, eddy current testing and / or possibly ultrasonic testing
  - Acoustic emission testing, hydro-testing, and / or possibly ultrasonic testing.

- 38) Creep is dependent on:
- a) Time, temperature, and stress
  - b) Material, product contained, and stress
  - c) Temperature, corrosive medium, and load
  - d) Time, product contained and load
- 39) An example of where creep cracking has been experienced in the industry is in the problems experienced with cracking of 1.25 % Chrome steels operating at temperatures above \_\_\_\_\_ °F.
- a) 500
  - b) 900
  - c) 1000
  - d) 1200
- 40) Brittle fracture can occur in carbon, low-alloy and other ferritic steels at or below \_\_\_\_\_.
- a) 140 degree
  - b) Ambient
  - c) 100 degree
  - d) 30 degree
- 41) Water and aqueous solutions in piping systems may freeze and cause failure because of the
- a) Expansion of these materials
  - b) Contraction of these materials
  - c) Construction of these materials
  - d) Decrease of these materials
- 42) Different types of inspection and surveillance are appropriate depending on the circumstances and the piping system. Pick the one that does not belong in the following list:-
- a) Internal and external visual inspection
  - b) Thickness measurement inspection
  - c) Vibrating piping inspection
  - d) Chemical analysis inspection
- 43) Internal visual inspections are \_\_\_\_\_ on piping unless it is a large diameter transfer line, duct, catalyst line or other large diameter piping system.
- a) The most effective inspection
  - b) The most useful means of inspection

- c) Not normally performed
  - d) The major means of inspection
- 44) Name an additional opportunity for a normal non-destructive internal inspection of piping.
- a) When the piping fails and the interior is revealed
  - b) When maintenance asks for an internal inspection
  - c) When piping flanges are disconnected
  - d) When a fire occurs and the pipe is in the fire
- 45) Why is thickness measurement inspection performed?
- a) To satisfy jurisdictional requirements
  - b) To determine the internal condition and remaining thickness of the piping components
  - c) To determine the external condition and amount of deposits inside the piping
  - d) To satisfy heat transfer requirements of the piping
- 46) Who performs a thickness measurement inspection?
- a) The operator or control man
  - b) The inspector or examiner
  - c) The maintenance workers or supervisor
  - d) The Jurisdiction or OSHA
- 47) When corrosion product build-up is noted during an external visual inspection at a pipe support contact area, lifting of such supports may be required for inspection. When doing this, care should be:
- a) Exercised if the piping is in-service
  - b) Used when determining the course of action
  - c) Practiced so as not to disturb the supports
  - d) Taken that a complete record of the problem is made
- 48) Qualified operating or maintenance personnel also may conduct external visual inspections when:
- a) Satisfactory to the owner-user
  - b) Acceptable to the inspector
  - c) Agreeable to the maintenance supervisor
  - d) Permissible to the operation supervisor
- 49) Who would normally report vibrating or swaying piping to engineering or inspection personnel?

- a) Operating personnel
  - b) Maintenance personnel
  - c) Jurisdictional personnel
  - d) OSHA personnel
- 50) Thermography is used to check for:
- a) Vibrating sections of the piping system
  - b) Detecting localised corrosion in the piping system
  - c) Abnormal thermal expansion of piping systems
  - d) Hot spots in refractory lined piping systems
- 51) Thickness measurement locations (TMLs) are specific \_\_\_\_\_ along the piping circuit where inspections are to be made
- a) Points
  - b) Areas
  - c) Items
  - d) Junctures
- 52) The minimum thickness at each TML can be located by:
- a) Electromagnetic techniques
  - b) Ultrasonic scanning or radiography
  - c) Hammer testing
  - d) MT and / or PT
- 53) Where appropriate, thickness measurements should include measurements at each of \_\_\_\_\_ on pipe and fittings:
- a) Two quadrants
  - b) Three locations
  - c) Four quadrants
  - d) Six points
- 54) Where should special attention be placed when taking thickness measurements of an elbow?
- a) The outlet end
  - b) The inlet end
  - c) The inside and outside radius
  - d) The sides
- 55) TMLs should be marked on inspection drawings and \_\_\_\_\_ to allow repetitive measurements

- a) On the inspectors notes
  - b) On a computer system
  - c) On the piping system
  - d) On maintenance department charts
- 56) What is taken into account by an experienced inspector when selecting TMLs?
- a) The amount of corrosion expected
  - b) The patterns of corrosion that would be expected
  - c) The number and the cost of reading the TMLs
  - d) Whether the TMLs are easily accessed
- 57) In theory, a piping circuit subject to perfectly uniform corrosion could be adequately monitored with \_\_\_\_\_ TMLs.
- a) 1
  - b) 2
  - c) 3
  - d) 4
- 58) More TMLs should be selected for piping systems with any of the following characteristics:
- a) Low potential for creating a safety or environmental emergency in the event of a leak.
  - b) More complexity in terms of fittings, branches, deadlegs, injection points, etc.
  - c) Relatively non-corrosive piping systems
  - d) Long, straight-run piping systems
- 59) Fewer TMLs can be selected for piping systems with any of the following characteristics:
- a) More complexity in terms of fittings, branches, deadlegs, injection points, etc.
  - b) Higher expected or experienced corrosion rates
  - c) Long, straight-run piping systems
  - d) Higher potential for localised corrosion
- 60) TMLs can be eliminated for piping systems with the following characteristics:
- a) Higher potential for creating a safety or environmental emergency in the event of a leak.
  - b) Low potential for creating a safety or environmental emergency in the event of a leak.

- c) Extremely low potential for creating a safety of environmental emergency in the event of a leak.
  - d) More complexity in terms of fittings, branches, deadlegs, injection points, etc.
- 61) What is usually the most accurate means for obtaining thickness measurements on installed pipe larger than NPS 1?
- a) MT
  - b) UT
  - c) PT
  - d) ET
- 62) What thickness measuring technique does not require the removal of some external piping insulation?
- a) AE
  - b) UT
  - c) ET
  - d) RT
- 63) When ultrasonic thickness measurements are taken above \_\_\_\_\_ degrees F, instruments, couplants, and procedures should be used that will result in accurate measurements at the higher temperature
- a) 150
  - b) 175
  - c) 200
  - d) 250
- 64) Typical digital thickness gages may have trouble measuring thickness less than \_\_\_\_\_ inches.
- a) 0.2188
  - b) 0.1875
  - c) 0.1562
  - d) 0.1250
- 65) When pressure testing of piping systems are conducted, they shall be performed in accordance with the requirements of:
- a) ASME B31.3
  - b) ASME B&PV Code, Section VIII
  - c) SA B16.5
  - d) API 510

- 66) If a lower pressure test (lower than prescribed by code) is used only for tightness of piping systems, the \_\_\_\_\_ may designate the pressure
- a) Owner-user
  - b) Inspector
  - c) Jurisdiction
  - d) Contractor
- 67) The preferred medium for a pressure test is \_\_\_\_\_:
- a) Steam
  - b) Air
  - c) Water
  - d) Hydrocarbon
- 68) If a non-toxic hydrocarbon (flammable) is used as the test medium, the liquid flash point shall be at least \_\_\_\_\_ °F or greater.
- a) 95
  - b) 100
  - c) 110
  - d) 120
- 69) Piping fabricated of or having components of 300 series stainless steel should be tested with \_\_\_\_\_.
- a) Water with a pH of 4
  - b) Water with a pH of 6
  - c) Water with a chloride content of less than 400 ppm chlorides
  - d) Steam condensates
- 70) For sensitised austenitic stainless steel, piping subject to polythionic stress corrosion cracking, consideration should be given to using \_\_\_\_\_ for pressure testing
- a) An acidic-water solution
  - b) An alkaline-water solution
  - c) A water with a pH of 5
  - d) A water with a pH of 4
- 71) When a pipe requires post weld heat treatment, when should the pressure test be performed?
- a) During heat treatment
  - b) Before any heat treatment

- c) After any heat treatment
  - d) No test is required
- 72) During a pressure test, where test pressure will exceed the set pressure of the safety relieve valve or valves on a piping system, the safety relief valve or valves should be \_\_\_\_\_ when carrying out the test.
- a) Altered by screwing down the adjusting screw
  - b) Reset to exceed the test pressure
  - c) Checked or tested
  - d) Removed or blanked
- 73) When using block valves to isolate a piping system for pressure test, what precaution should be taken?
- a) Do not use a globe valve during a test
  - b) Make sure the packing gland of the valve is tight
  - c) Do not exceed the permissible seat pressure of the valve
  - d) Check the bonnet bolts to make sure they are tight
- 74) Several methods may be used to verify that the correct alloy piping is in a system. Pick the incorrect method from the list below:
- a) Holography
  - b) Optical spectrographic analyser
  - c) X-ray fluorescent analyser
  - d) Chemical spot checking
- 75) Name a part of a piping system that thickness measurements are not normally routinely taken.
- a) Elbows
  - b) Expansion loops
  - c) Tees
  - d) Valves
- 76) If environmental cracking is found during in-service inspection of welds, who assesses the problem?
- a) Owner-user
  - b) Inspector
  - c) Piping Engineer
  - d) Metallurgist



- 77) If an inspector finds an imperfection in an original fabrication weld and analysis is required to assess the impact of the weld quality on piping integrity, which of the following may perform the analysis?
- a) An API 510 inspector, WPS inspector, A Pressure Vessel Engineer
  - b) An API 570 inspector, a CWI inspector, a piping engineer
  - c) An owner-user, a B31.3 inspector, an industrial engineer
  - d) A Jurisdictional representative, a API 574 inspector, a Chemical Engineer
- 78) According to API 570, some welds in a piping system that has been subjected to radiography according to ASME B31.3:
- a) Will meet random radiograph requirements and will perform satisfactorily in-service without a hydrotest
  - b) Will not meet random radiograph requirements, and will not perform satisfactorily in-service even though hydrotested.
  - c) Will meet random radiograph requirements, and will not perform satisfactorily in-service after a hydrotest
  - d) Will not meet random radiograph requirements, but will still perform satisfactorily in-service after being hydrotested.

- 79) How should fasteners and gaskets be examined to determine whether they meet the material specifications:
- a) All fasteners and gaskets should be checked to see if their markings are correct according to ASME and ASTM standards
  - b) A representative sample of the fasteners and gaskets should be checked to see if their markings are correct according to ASME and ASTM standards
  - c) Purchase records of all fasteners and gaskets should be checked to see if the fasteners and gaskets meet ASME and ASTM standards
  - d) A representative sample of the purchase records of fasteners and gaskets should be checked to see if the fasteners and gaskets meet ASME and ASTM standards.
- 80) When checking flange and valve bonnet bolts for corrosion, what type of NDT is usually used?
- a) RT
  - b) UT
  - c) VT
  - d) AE
- 81) What course of action is called for when an inspector finds a flange joint that has been clamped and pumped with sealant?
- a) Disassemble the flange joint; renew the fasteners and gaskets. The flanges may also require renewal or repair.
  - b) Renew all the fasteners and renew the gasket if leakage is still apparent.
  - c) Check for leakage at the bolts; if re-pumping is contemplated, affected fasteners should be renewed.
  - d) No action is required since the joint has been pumped with a sealant.
- 82) All process piping systems must be categorised into different classes. On what are the classifications selection based?
- a) Requirements of jurisdiction and the proximity of population areas
  - b) Potential safety and environmental effects should a leak occur
  - c) Liability to the owner-user and the requirements of the jurisdiction
  - d) Access to the systems for inspection and closeness to population areas

- 82) (A) Inspection strategy based on likelihood and consequence of failure is called:
- a) RBI
  - b) FFS
  - c) BIR
  - d) MSOS
- 82) (B) An RBI assessment can be used to \_\_\_\_\_ the inspection interval limits in Table 1 of API 570 **or** the extent of the inspection conducted:
- a) Increase
  - b) Decrease
  - c) Either a or b above
  - d) None of the above
- 82) (C) When an RBI assessment is used to increase or decrease inspection intervals, the assessment **shall** be conducted on Class 1 systems at a maximum interval of \_\_\_\_\_ years.
- a) 5
  - b) 10
  - c) 15
  - d) 3
- 83) Listed below are several examples of a CLASS 1 piping system. Which one does not belong?
- a) Anhydrous hydrogen chloride;
  - b) Hydrofluoric acid
  - c) Piping over or adjacent to water and piping over public thoroughways
  - d) Distillate and product lines to and from storage and loading
- 84) Of the three classification of piping systems, which includes the majority of unit processes and selected off-site piping?
- a) Class 3
  - b) Combination of classes 1 and 2
  - c) Class 1
  - d) Class 2
- 85) Class 3 piping is described as being in services:
- a) With the highest potential of resulting in an immediate emergency if a leak occurs.

- b) That are flammable but do not significantly vaporise when they leak and are not located in high-activity areas
  - c) That are not flammable and pose no significant risk to populated areas
  - d) That are not in classes 1 and 2.
- 86) Who establishes inspection interval for thickness measurements, external visual inspections and for internal and supplemental inspections?
- a) Piping engineer
  - b) Owner-user or the inspector
  - c) Chemical Engineer
  - d) Piping engineer and the jurisdiction
- 87) Thickness measurement inspection should be scheduled based on the calculation of not more than
- a) One half the remaining life determined from corrosion rates or the maximum interval of 5 years whichever is shorter.
  - b) One half the remaining life determined from corrosion rates or the maximum interval allowed by API 570 in Table 1, whichever is shorter
  - c) One fourth the remaining life determined from corrosion rates or the maximum interval of 10 years whichever is shorter.
  - d) One quarter the remaining life determined from corrosion rates or the maximum interval allowed by API 570 in Table 1, whichever is shorter.
- 88) For external inspections for potential corrosion under insulation (CUI) on Class 1 systems, the examination should include at least \_\_\_\_\_ percent of all suspect areas and \_\_\_\_\_ percent of all areas of damaged insulation.
- a) 50, 75
  - b) 50, 33
  - c) 75, 50
  - d) 25, 10
- 89) Piping systems that are known to have a remaining life of over \_\_\_\_\_ years or that are protected against external corrosion need not have insulation removed for the periodic external inspection.
- a) 10
  - b) 15
  - c) 5

- d) 20
- 90) For Class 3 piping systems, the examination for corrosion under insulation (CUI) should include at least \_\_\_\_\_ percent of all suspect areas.
- a) 50
  - b) 30
  - c) 10
  - d) 0
- 91) For Class 2 piping, the extent of CUI inspections on a system operating at – 45°F will be:
- a) 75% of damaged areas, 50% of suspect areas
  - b) 50% of suspect areas, 33% of damaged areas
  - c) 33% of damaged areas, 50% of suspect areas
  - d) None of the above
- 92) Small bore piping (SBP) that is Class I shall be inspected
- a) Where corrosion has been experienced
  - b) At the option of the inspector
  - c) To the same requirements as primary process piping
  - d) Only if it has dead legs
- 93) Inspection of small bore piping (SBP) that is secondary and auxiliary (associated with instruments and machinery) is
- a) Only required where corrosion has been experienced
  - b) Optional
  - c) Only if it has dead legs
  - d) Only if it is threaded
- 94) If an inspector finds threaded small bore piping (SBP) associated with machinery and subject to fatigue damage, he should:
- a) Plan periodically to assess it and consider it for possible renewal with a thicker wall or upgrade it to welded components.
  - b) Inspect it only if it is corroded and the class of service requires an inspection.
  - c) Call for dismantling the threaded joints for close inspection to determine if any cracks are in the roots of the threads.
  - d) Have all the threaded piping renewed at each inspection period.

- 95) An eight-inch diameter piping system is installed in December 1979. The installed thickness if measured as 0.34". The minimum thickness of the pipe is 0.20". It is inspected 12/83 and the thickness is found to be 0.32". An inspection 12/87 reveals a loss of 0.01" from the 12/85 inspection. During 12/89 the thickness was found to be 0.29". The last inspection was during 12/95 and the thickness was found to be 0.26". What is the long-term corrosion rate of this system?
- a) 0.005"/year
  - b) 0.0075"/year
  - c) 0.00375"/year
  - d) 0.0025"/year
- 96) Using the information in question 95, calculate the short-term corrosion rate:
- a) 0.005"/year
  - b) 0.0075"/year
  - c) 0.00375"/year
  - d) 0.0025"/year
- 97) Using the information in questions 95 and 96, determine the remaining life of the system:
- a) 18 years
  - b) 15 years
  - c) 12 years
  - d) 6 years
- 98) You have a new piping system that has just been installed. It is completely new and no information exists to establish a corrosion rate. Also, information is not available on a similar system. You decide to put the system in service and NDT it later to determine the corrosion rate. How long do you allow the system to stay in service before you take your first thickness readings?
- a) 1 month
  - b) 3 months
  - c) 6 months
  - d) 12 months
- 99) After an inspection interval is completed and if calculations indicate that an inaccurate rate of corrosion has been assumed in a piping system, how do you determine the corrosion rate for the next inspection period?

- a) Check the original calculations to find out what the error is in the original assumption.
  - b) Unless the corrosion rate is higher, the initial rates shall be used.
  - c) The corrosion rate shall be adjusted to agree with the actual rate found.
  - d) If the corrosion rate is higher than originally assumed, call in a corrosion specialist.
- 100) If a piping system is made up of unknown materials and computations must be made to determine the minimum thickness of the pipe, what can the inspector or the piping engineer do to establish the minimum thickness?
- a) The lowest grade material and joint efficiency in the applicable code may be assumed for calculations.
  - b) Samples must be taken from the piping and testing for maximum tensile stress and yield strength will determine the allowable stress to be used.
  - c) The piping made of the unknown material must be removed from service and current piping of known material must be installed.
  - d) The piping of unknown material may be subjected to a hydrostatic stress tests while having strain gages on it to determine its yield strength and thus allowable stress.
- 101) A piping engineer is designing a piping service with high potential consequences if a failure occurs, *i.e.*, a 350 psi natural gas line adjacent to a high density population area. What should he consider doing for unanticipated situations?
- a) Have all his calculations checked twice.
  - b) Increase the required minimum thickness.
  - c) Notify the owner-user and the jurisdiction.
  - d) Set up an emergency evacuation procedure.
- 102) When evaluating locally thinned areas, the surface of the weld includes \_\_\_\_\_ on either side of the weld or \_\_\_\_\_ times the minimum measured thickness on either side of the weld, whichever is greater.
- a) 0.5", 3
  - b) 1", 2
  - c) 2", 1
  - d) 1.5", 1.5

- 103) An inspector finds a thin area in a fabricated 24" diameter pipe. The thin area includes a longitudinal weld in the pipe and is 10 feet long and 2 foot circumferentially. Calculations show that with 0.85 joint factor, the pipe must be repaired, renewed, etc. or the pressure in the pipe must be lowered. The owner does not want to do any hot work on the pipe and he does not wish to lower the pressure. What other course could you follow?
- a) Write the results of the inspection up and leave it with the owner.
  - b) Radiograph the weld 100 % and increase the joint factor to one.
  - c) Insist that the weld be repaired or renewed or that the pressure be lowered.
  - d) Call in a regulator agency to force the owner to repair, renew, etc. the line.
- 104) Piping stress analysis is done during the system's original design. How can the inspector make use of stress analysis information?
- a) An inspector cannot use this information. It is only meaningful to a piping engineer.
  - b) It can be used to make sure the piping system was originally evaluated and designed correctly.
  - c) It can be used to concentrate inspection efforts at locations most prone to fatigue or creep damage, and to solve vibration problems.
  - d) The inspector should use this information to evaluate the need for conducting additional piping stress analysis.
- 105) You are inspecting a piping system. You find a significant loss of material (a major increase of corrosion rate) in gas oil piping (used as reboiler oil, temperature 500°F) on a Fluid Catalytic Cracking Unit. What is the best course of action for you to take?
- a) The losses may be reported to your supervisor for corrective response
  - b) The losses should be recorded and reported in your final report after the unit has started.
  - c) It shall be reported to the owner-user for appropriate action.
  - d) Replace excessively thin piping and note replacement in the final report after unit start-up.
- 106) The \_\_\_\_\_ shall maintain appropriate permanent and progressive records of each piping system covered by API 570.



- a) Inspector
  - b) Owner-user
  - c) Jurisdiction
  - d) Examiner
- 107) When making repairs and alterations to piping systems, the principles of \_\_\_\_\_ or the code to which the piping system was built shall be followed:
- a) ASME B31.3
  - b) API 570
  - c) API 574
  - d) ASME B&PV Code
- 108) Repair and alteration work must be done by a repair organisation as defined in API 570 and must be authorised by the \_\_\_\_\_ prior to its commencement:
- a) Jurisdiction
  - b) Inspector
  - c) Owner-user
  - d) Examiner
- 109) Authorisation for alteration work to a piping system may be given by the inspector after:
- a) Notifying the jurisdiction and getting their approval
  - b) Consulting API 570 and getting the approval of the owner-user
  - c) Consultation with and approval by a piping engineer
  - d) Discussing with and consent by an examiner
- 110) A repair procedure involving welding requires that the root pass of the weld be inspected before continuing the weld. A "hold" on the repair is required at this point. Who designates this "hold?"
- a) A metallurgist
  - b) The owner-user
  - c) An API 570 inspector
  - d) The welder supervisor
- 111) What type of repairs and procedures may the inspector give prior general authorisation to continue (provided the inspector is satisfied with the competency of the repair organisation)?
- a) Major repairs and minor procedures

- b) Limited or routine repairs and procedures
  - c) Alterations and re-ratings
  - d) Minor re-ratings and alterations
- 112) Who approves all proposed methods of design, execution, materials, welding procedures, examination and testing of in-service piping?
- a) The jurisdiction or the piping engineer as appropriate
  - b) The analyst and the operator as appropriate
  - c) The examiner and the piping programmer as appropriate
  - d) The inspector or the piping engineer as appropriate
- 113) Who must give approval for any on-stream welding?
- a) Owner-user
  - b) Jurisdiction
  - c) Examiner
  - d) Analyst
- 114) An inspector finds a crack in the parent metal of a pipe adjacent to a support lug. The pipe was being inspected after a 5 year run. Before repairing, he should:
- a) Notify the jurisdiction prior to the start of any repairs
  - b) Write a detailed procedure for the repair organisations use in repairing the crack
  - c) Consult with the piping engineer to identify and correct the cause of the crack.
  - d) Consult with a metallurgist prior to writing a procedure to repair the crack.
- 115) A full encirclement welded split sleeve designed by a piping engineer may be applied over a damaged or corroded area of a pipe. This is considered a temporary repair. When should a permanent repair be made?
- a) If the owner-user designates the welded split sleeve as permanent, it may remain.
  - b) A full encirclement welded split sleeve is permanent if okayed by the inspector.
  - c) A full encirclement welded split sleeve is considered a permanent repair.
  - d) A permanent repair must be made at the next available maintenance opportunity.

- 116) What type of defect, corrosion, pitting and / or discontinuity should not be repaired by a full encirclement welded split sleeve?
- a) A longitudinal ~~check~~ ~~CRACK~~
  - b) A circumferential crack
  - c) Pits that are one half through wall
  - d) General corrosion in the longitudinal direction.
- 117) If a repair area is localised (for example, pitting or pin-holes) and the specified minimum yield strength (SMYS) of the pipe is not more than \_\_\_\_\_ psi, a temporary repair may be made by fillet welding a properly designed plate patch over the pitted area:
- a) 30,000 psi
  - b) 55,000 psi
  - c) 40,000 psi
  - d) 36,000 psi
- 118) Insert patches (flush patches may be used to repair damaged or corroded areas of pipe if several requirements are met. One of these is that an insert patch (flush patch) may be of any shape but it shall have rounded corners with \_\_\_\_\_ minimum radii.
- a) 0.375"
  - b) 0.50"
  - c) 0.75"
  - d) 1"
- 119) An inspector finds a pin-hole leak in a weld during an on-stream inspection of a piping system. A permissible temporary repair is :-
- a) The use of plastic steel to seal off the leak
  - b) Driving a wooden plug into the hole
  - c) Screwing a self tapping screw into the hole
  - d) The installation of a properly designed and fabricated bolted leak clamp.
- 120) Temporary leak sealing and leak dissipating devices shall be removed and the pipe restored to original integrity:
- a) As soon as the piping system can be safely removed from service
  - b) At a turnaround or other appropriate time
  - c) When the leak seal and leak dissipating device ceases to work
  - d) As soon as possible – must be done on a safe, emergency shut-down basis

- 121) Which of the following is **NOT** an item for consideration by an inspector when a leak sealing fluid ("pumping") is used for a temporary leak seal repair:
- a) Consider the compatibility of the sealant with the leaking material
  - b) Consider the pumping pressure on the clamp (especially when re-pumping)
  - c) Consider the pressure testing of the piping in question
  - d) Consider the number of times the seal area is re-pumped
- 122) Any welding conducted on piping components in operation must be done in accordance with
- a) NFPA 704
  - b) API Standard 510
  - c) ASME B31.3
  - d) API Publication 2201
- 123) All repair and alteration welding to piping systems shall be done in accordance with the:
- a) Exact procedures of ASME B31.3 or to the code to which it was built
  - b) Standards of ASME B31.1 or the code to which it was built
  - c) Principles of ASME B31.3 or the code to which it was built
  - d) Ideals of ASME, NBIC, or API standards
- 124) Welders and welding procedures used in making piping repairs, etc. shall be qualified in accordance with:
- a) ASME B31.3 or the code to which the piping was built
  - b) NBIC or the system to which the piping was built
  - c) NACE or the method to which the piping was built
  - d) ASTM or the law to which the piping was built
- 125) The repair organisation responsible for welding shall maintain records of welding procedures and welder performance qualifications. These records shall be available to the inspector:
- a) At the end of the job
  - b) After the start of welding
  - c) Following the start of welding
  - d) Before the start of welding
- 126) Preheating to not less than \_\_\_\_\_ °F may be considered as an alternative to post weld heat treatment for alterations or repairs

of P-1, piping initially post weld heat treated as a code requirement (may not be used if the piping was post weld heat treated due to environmental cracking prevention).

- a) 150
- b) 200
- c) 300
- d) 350

127) When using local PWHT as a substitute for 360-degree banding on local repairs of PWHT'd piping, which of the following items is **NOT** considered.

- a) The application is reviewed, and a procedure is developed by the piping engineer
- b) The locally PWHT'd area of the pipe must be RT'd or UT'd
- c) A preheat of 300°F or higher is maintained while welding
- d) The PWHT is performed for code compliance and not for environmental cracking

128) Piping butt joints shall be:

- a) Double spiral fillet welds
- b) Single fillet lap welds
- c) Double fillet lap welds
- d) Full-penetration groove welds

129) When should piping components that need repair be replaced?

- a) When enough time remains on a turnaround to allow replacement
- b) When repair is likely to be inadequate
- c) When the cost of repair is as high as renewal
- d) When replacement is preferred by maintenance personnel

130) Fillet welded patches (lap patches) shall be designed by

- a) An engineer
- b) The inspector
- c) The piping engineer
- d) The repair organisation

131) Fillet welded lap patches (overlay patches) shall have:

- a) No membrane stresses
- b) Right-angle corners
- c) Rounded corners

- d) Burnished corners
- 132) Materials used in making welding repairs or alterations \_\_\_\_\_ be of known weldable quality:
- a) May
  - b) Shall
  - c) Should
  - d) Can
- 133) Acceptance of a welded repair or alteration shall include \_\_\_\_\_ in accordance with the applicable code and the owner-user's specification, unless otherwise specified in API 570.
- a) Nominal Pragmatic Sizing (NPS)
  - b) NBE
  - c) Safeguards
  - d) Nondestructive examination
- 134) After welding is completed on a repair or alteration, \_\_\_\_\_ in accordance with API 570 shall be performed if practical and deemed necessary by the inspector.
- a) NPS
  - b) Safety sanctions
  - c) BE
  - d) A pressure test
- 135) When are pressure tests normally required?
- a) Pressure tests are normally required after alterations and any repair
  - b) Pressure tests are normally required after alterations and major repairs
  - c) Pressure tests are normally required after major and minor repairs
  - d) Pressure tests are normally required only as specified by the owner-user
- 136) When a pressure test is not necessary or practical, what shall be utilised in lieu of a pressure test?
- a) NPS
  - b) Nondestructive examination
  - c) Vacuum visual examination
  - d) NBE

Substituting Appropriate NDE

137) ~~Special~~ procedures in place of a pressure test after an alteration or repair may be done only after consultation with :-

- a) The operations and the repair organisation
- b) The inspector and the piping engineer
- c) The jurisdiction
- d) The examiner and the inspector

~~137) Special procedure in place of a pressure test after an alteration or repair may be done only after consultation with :-~~

- ~~a) The operators and the repair organisation~~
- ~~b) The inspector and the piping engineer~~
- ~~c) The jurisdiction~~
- ~~d) The examiner and the inspector~~

138) When it is not practical to perform a pressure test of a final closure weld that joins a new or replacement section of piping to an existing system, several requirements shall be satisfied. Which of the following is **NOT** one of the requirements?

- a) The closure weld is a full-penetration fillet weld between a weld neck flange and standard piping component or straight sections of pipe of equal diameter and thickness, axially aligned, and or equivalent materials. For design cases up to Class 150 and 500°F, slip-on flanges are acceptable alternates.
- b) MT or PT shall be performed on the root pass and the completed butt weld. Fillet welds must have PT / MT on the completed weld.
- c) The new or replacement piping is pressure tested.
- d) Any final closure butt weld shall be of 100 % radiographic quality; or angle-beam UT may be used, provide the appropriate acceptance criteria is established.

139) Which of the following is **NOT** a requirement for re-rating a piping system by changing the temperature or the MAWP:

- a) The existing pressure relieving devices are still in place and set as they were originally
- b) Calculations are performed by the piping engineer or the inspector
- c) Piping flexibility is adequate for design temperature changes
- d) A decrease in minimum operating temperature is justified by impact test results, if required by the applicable code.

- 140) Why is the inspection<sup>ION</sup> of buried process piping (not regulated by DOT) different from other process piping inspection ?
- a) The insulating effect of the soil increases the possibility of more internal combustion
  - b) Internal corrosion has to be controlled by cathodic protection
  - c) Significant external deterioration can be caused by corrosive soil conditions
  - d) Internal corrosion must be controlled by internal coatings.
- 141) Indications of leaks in buried piping may include several indications. Which of the ones listed below is **NOT** one of the indications ?
- a) A change in the surface contour of the ground.
  - b) Water standing on the pipeline right-of-way
  - c) Discoloration of the soil
  - d) Notice odour
- 142) Corrosion cells can form on both bare and coated pipe where bare steel contacts the soil. How can these cells be detected ?
- a) Run an acoustic emission test on the piping
  - b) Visually survey the route of buried piping
  - c) The potential at the area of corrosion will be measurable different than other areas and a close-interval potential survey can detect the location of corrosion
  - d) Run an internal survey of the piping using a video camera
- 143) A pipe coating holiday survey is used to locate coating defects on coated pipes. It can be used on newly constructed pipe systems to ensure that the coating is intact and holiday-free. More often, it is used on buried pipe to:
- a) Show the measurable differences in electrical potential in corroded areas
  - b) Evaluate coating serviceability for buried piping that has been in-service for along time.
  - c) Determine the depth of the piping for resistivity testing
  - d) Evaluate the cathodic protection components of the underground pipe
- 144) Cathodically protected buried piping should be monitored \_\_\_\_\_ to assure adequate levels of protection:
- a) Regularly
  - b) Intermittently
  - c) Erratically



- d) Frequently
- 145) If an "intelligent pigging" system is used to inspect buried piping, what type of bends are usually required in the piping system ?
- a) Five diameter bends
  - b) 90 degree pipe ells
  - c) Ten diameter bends
  - d) Three diameter bends
- 146) How often should above-grade visual surveillance of a buried pipeline right-of-way be made?
- a) Once a month
  - b) Approximately 6 month intervals
  - c) Once a year
  - d) Once every 3 months
- 147) How often should poorly coated pipes with inconsistent cathodic protection potentials have a pipe-to-soil potential survey made ?
- a) Yearly
  - b) Every 2 years
  - c) Every 5 years
  - d) Every 7 years
- 148) On buried piping, what is the frequency of pipe coating holiday surveys?
- a) The frequency is governed by the leak test interval of the pipe
  - b) It is usually based on indications that other forms of corrosion control are ineffective.
  - c) Surveys are normally made every 5 years
  - d) Pipe coating holiday surveys are made when the pipe is excavated.
- 149) For a piping buried in lengths greater than \_\_\_\_\_ feet and not cathodically protected, evaluation of soil corrosivity should be performed at 5-year intervals.
- a) 50
  - b) 75
  - c) 100
  - d) 150
- 150) If buried piping is cathodically protected, the system should be monitored at intervals in accordance with Section 10 of NACE

RP0169 or Section 90 of API RP 651. API RP 651 specifies \_\_\_\_\_ interval.

- a) Annual
  - b) Biannual
  - c) Biennial
  - d) Treennial
- 151) Buried piping inspected periodically by excavation shall be inspected in lengths of \_\_\_\_\_ feet at one or more locations judged to be most susceptible to corrosion
- a) 2 to 4
  - b) 4 to 6
  - c) 6 to 8
  - d) 8 to 10
- 152) After excavation of buried piping, if inspection reveals damaged coating or corroded piping:
- a) The condition should be noted in the records and the inspection interval shortened
  - b) The complete piping system must be day-lighted (excavated) for repair or replacement.
  - c) The damaged coating or corroded piping must be repaired or replaced
  - d) Additional piping shall be excavated until the extent of the condition is identified.
- 153) If buried piping is contained inside a casing pipe, the casing should be:
- a) Capable of carrying the same pressure as the product pipe
  - b) Checked to see if its protective coating is intact and serviceable
  - c) Pressure tested to make sure it is serviceable
  - d) Inspected to determine if water and / or soil has entered the casing
- 154) An alternative or supplement to inspection of buried piping is leak testing with liquid at a pressure at least \_\_\_\_\_ % greater than the maximum operating pressure at intervals ½ the length of those shown in Table 9-1 of API 570 for piping **NOT** cathodically protected and at the same intervals as shown in Table 9-1 for cathodically protected piping.
- a) 5

- b) 10
- c) 25
- d) 50

155) The leak test for buried piping should be for a period of \_\_\_\_\_ hours.

- a) 4
- b) 8
- c) 12
- d) 24

156) The leak test for a 8" diameter buried piping system is 300 psi. After 7 hours, the pressure reacts 273 psi. What should the inspector do?

- a) Nothing is required. The loss of pressure is negligible and will not affect the test. The loss can be disregarded.
- b) The system should be re-pressurised to the original leak test pressure and the test should begin again.
- c) The test charts and the temperature should be reviewed to determine if any change in temperature caused the pressure drop.
- d) The piping should be visually inspected externally and / or inspected internally to find the leak and assess the extent of corrosion.

157) A buried piping system that is not cathodically protected has to have an inspection interval set. The soil resistivity is checked and found to be 3400 ohm/cm. As the inspector, what interval would you set?

- a) 2.5 years
- b) 7.5 years
- c) 5 years
- d) 10 years

158) Buried piping also may be surveyed for integrity by removing the line from service and performing a leak test. This inspection method typically involves pressurising the line with a \_\_\_\_\_, allowing time for the \_\_\_\_\_ to diffuse to the surface and surveying the buried line with a gas-specific detector to detect the \_\_\_\_\_

- a) Tracer gas (such as helium or sulphur hexafluoride)
- b) Light hydrocarbon (such as butane)
- c) Smoke type material (such as chemical smoke)
- d) Water vapour (such as steam)

- 159) Repairs to coating on buried piping may be tested using
- a) A low-voltage holiday detector
  - b) Light taps with an inspection hammer
  - c) A flaw indicator fluid
  - d) A high-voltage holiday detector
- 160) If buried piping leaks are clamped and reburied:
- a) No further action is required unless the piping leaks again
  - b) The date of installation shall be marked on the clamp for future identification
  - c) A record of the location and the date of installation shall be maintained
  - d) The clamped line shall be leak tested.
- 161) A 10" diameter piping system with 4" diameter and 6" diameter reinforced branch connections is to have changes made to it. Which of the following is considered an alteration?
- a) A new 1" diameter un-reinforced nipple is installed
  - b) A new 8" diameter reinforced branch connection is installed
  - c) A new 4" diameter reinforced branch connection is installed
  - d) A new 3" diameter reinforced branch connection is installed
- 162) Which of the following **would not** be classified as an applicable code to which a piping system was built?
- a) ASME B31.3
  - b) ASME B31.1
  - c) ASA B31.1-1955, Section 3
  - d) ASTM A-20
- 163) Which of the inspection agencies listed below is **NOT** an *Authorised Inspection Agency* as defined in API 570.
- a) Jurisdictional inspection organisation
  - b) Owner-user inspection organisation
  - c) ASTM inspection organisation
  - d) Independent inspection organisation
- 164) An *authorised piping inspector* is an employee of an authorised inspection agency who is qualified to perform the functions specified in API 570. Which individual listed below is **not** usually an *authorised piping inspector*.

- a) An owner-user inspector.
- b) A jurisdictional inspector
- c) An NDE examiner
- d) An insurance inspector

165) Which of the following qualifies as *auxiliary piping* ?

- a) Control valve manifolds
- b) Bypass lines around exchangers
- c) Pump seal oil lines
- d) Orifice runs

166) CUI stands for:

- a) Control unit inspector
- b) Corrosion under insulation
- c) Corrected unobtrusive inserts
- d) Corroded underground installation

167) Deadlegs legs of a piping system are:

- a) The upstream piping of control valve manifolds
- b) Supports attached to a pipeline that has no product in them
- c) The upstream part of an orifice runs
- d) Sections that normally have no significant flow

168) A defect is an imperfection of a type or magnitude exceeding the \_\_\_\_\_ criteria.

- a) Non-specific
- b) Imprecise
- c) General
- d) Acceptable

169) The design temperature of a piping system component is the temperature at which, under the coincident pressure, the \_\_\_\_\_ is required.

- a) Smallest thickness or highest component rating
- b) Greatest thickness or highest component rating
- c) Maximum thickness or lowest component rating
- d) Minimum thickness or minimum component rating

170) An examiner is a person who \_\_\_\_\_ the inspector

- a) Supplants
- b) Assists

- c) Supervises
  - d) Directs
- 171) Hold point is a point in the repair or alteration process beyond which work may not proceed until the \_\_\_\_\_ has been performed and documented
- a) PWHT required
  - b) Required inspection
  - c) RT required
  - d) Ultrasonic testing
- 172) What is an imperfection?
- a) It is a flaw or discontinuity noted during inspection that may be subject to acceptance.
  - b) It is a defect noted during inspection that is unacceptable.
  - c) It is a weld flaw noted during an inspection that may be subject to repair
  - d) It is a blemish that is only cosmetic and acceptable under all conditions.
- 173) \_\_\_\_\_ is a response or evidence resulting from the application of a non-destructive evaluation technique
- a) Indication
  - b) Imperfection
  - c) Breach
  - d) Division
- 174) What are points where chlorine is introduced in reformers, water is added in overhead systems, etc. called
- a) Primary process points
  - b) Level bridle points
  - c) Injection points
  - d) Test points
- 175) What is the loss of ductility and notch toughness in susceptible low-alloy steels such as 1.25 and 2.5 Cr., due to prolonged exposure to high-temperature service called?
- a) Creep
  - b) Temper embrittlement
  - c) Incipient melting
  - d) Graphitisation

- 176) Secondary process piping is small-bore (less than or equal to \_\_\_\_\_) process piping downstream of normally closed block valves.
- a) NPS 3/4
  - b) NPS 1
  - c) NPS 2
  - d) NPS 3
- 177) A test point is an area defined by a circle having a diameter not greater than \_\_\_\_\_ inches for a line diameter not exceeding 10 inches or not greater than \_\_\_\_\_ inches for larger lines.
- a) 3, 4
  - b) 2, 3
  - c) 1, 2
  - d) 3/4, 1
- 178) When making a repair utilising a welded full encirclement repair sleeve and the sleeve material is different from the pipe material, you should:
- a) Consult the piping engineer
  - b) Use a weld rod matching the higher strength material
  - c) Use a weld rod matching the lower strength material
  - d) Use an alloy weld rod such as Inco-A
- 179) What type of electrode should be used when welding a full encirclement repair sleeve?
- a) Low-hydrogen electrode
  - b) Low-phosphorous electrode
  - c) Low-chrome electrode
  - d) Low-nitrogen electrode
- 180) Which of the following welding electrodes is low-hydrogen ?
- a) E6010
  - b) E7016
  - c) E7011
  - d) E7014
- 181) When welding a small repair patch, the diameter of electrodes used should not exceed
- a) 1/8"
  - b) 3/16"
  - c) 5/32"
  - d) 1/4"

## ANSWER KEY

- |     |   |                  |       |   |                |
|-----|---|------------------|-------|---|----------------|
| 1.  | c | API 570, 1.1.1   | 49.   | a | API 570, 5.4.3 |
| 2.  | b | API 570, 1.1.2   | 50.   | d | API 570, 5.4.5 |
| 3.  | a | API 570, 1.1.3   | 51.   | b | API 570, 5.5.1 |
| 4.  | b | API 570, 1.2.1   | 52.   | b | API 570, 5.5.2 |
| 5.  | b | API 570, 1.2.1   | 53.   | c | API 570, 5.5.2 |
| 6.  | b | API 570, 4.3.4   | 54.   | c | API 570, 5.5.2 |
| 7.  | b | API 570, 4.1     | 55.   | c | API 570, 5.5.2 |
| 8.  | a | API 570, A.2.1   | 56.   | b | API 570, 5.5.3 |
| 9.  | d | API 570, 5.1     | 57.   | a | API 570, 5.5.3 |
| 10. | d | API 570, 5.1     | 58.   | b | API 570, 5.5.3 |
| 11. | a | API 570, 5.3     | 59.   | c | API 570, 5.5.3 |
| 12. | b | API 570, 5.3.1   | 60.   | c | API 570, 5.5.3 |
| 13. | c | API 570, 5.3.1   | 61.   | b | API 570, 5.6   |
| 14. | a | API 570, 5.3.1   | 62.   | d | API 570, 5.6   |
| 15. | b | API 570, 5.3.1   | 63.   | a | API 570, 5.6   |
| 16. | a | API 570, 5.3.1   | 64.   | d | API 570, 5.6   |
| 17. | c | API 570, 5.3.1   | 65.   | a | API 570, 5.7   |
| 18. | c | API 570, 5.3.2   | 66.   | a | API 570, 5.7   |
| 19. | c | API 570, 5.3.2   | 67.   | c | API 570, 5.7   |
| 20. | d | API 570, 5.3.2   | 68.   | d | API 570, 5.7   |
| 21. | c | API 570, 5.3.3   | 69.   | d | API 570, 5.7   |
| 22. | c | API 570, 5.3.3   | 70.   | b | API 570, 5.7   |
| 23. | d | API 570, 5.3.3.1 | 71.   | c | API 570, 5.7   |
| 24. | c | API 570, 5.3.3.2 | 72.   | d | API 570, 5.7   |
| 25. | b | API 570, 5.3.4   | 73.   | c | API 570, 5.7   |
| 26. | d | API 570, 5.3.4   | 74.   | a | API 570, 5.8   |
| 27. | b | API 570, 5.3.5   | 75.   | d | API 570, 5.9   |
| 28. | b | API 570, 5.3.6   | 76.   | c | API 570, 5.10  |
| 29. | a | API 570, 5.3.6   | 77.   | b | API 570, 5.10  |
| 30. | c | API 570, 5.3.7   | 78.   | d | API 570, 5.10  |
| 31. | d | API 570, 5.3.7   | 79.   | b | API 570, 5.11  |
| 32. | a | API 570, 5.3     | 80.   | c | API 570, 5.11  |
| 33. | d | API 570, 5.3.8   | 81.   | c | API 570, 5.11  |
| 34. | a | API 570, 5.3.8   | 82.   | b | API 570, 6.2   |
| 35. | c | API 570, 5.3.9   | 82(A) | a | API 570, 6.1   |
| 36. | b | API 570, 5.3.9   | 82(B) | c | API 570, 6.1   |
| 37. | b | API 570, 5.3.9   | 82(C) | a | API 570, 6.1   |
| 38. | a | API 570, 5.3.10  | 83.   | d | API 570, 6.1.1 |
| 39. | b | API 570, 5.3.10  | 84.   | d | API 570, 6.2   |
| 40. | b | API 570, 5.3.11  | 85.   | b | API 570, 6.2.3 |
| 41. | a | API 570, 5.3.12  | 86.   | b | API 570, 6.2   |
| 42. | d | API 570, 5.4     | 87.   | b | API 570, 6.2   |
| 43. | c | API 570, 5.4.1   | 88.   | a | API 570, 6.4   |
| 44. | c | API 570, 5.4.1   | 89.   | a | API 570, 6.3   |
| 45. | b | API 570, 5.4.2   | 90.   | c | API 570, 6.3   |
| 46. | b | API 570, 5.4.2   | 91.   | d | API 570, 6.4   |
| 47. | a | API 570, 5.4.3   | 92.   | c | API 570, 6.5.1 |
| 48. | b | API 570, 5.4.3   | 93.   | b | API 570, 6.5.2 |



94. a API 570, 6.6.3
95. a API 570, 7.1.1
96. a API 570, 7.1.1
97. c API 570, 7.1.1
98. b API 570, 7.1.2
99. c API 570, 7.1.3
100. a API 570, 7.2
101. b API 570, 7.3
102. b API 570, 7.4
103. b API 570, 7.4
104. c API 570, 7.5
105. c API 570, 7.6
106. b API 570, 7.6
107. a API 570, 8.1
108. b API 570, 8.1.1
109. c API 570, 8.1.1
110. c API 570, 8.1.1
111. b API 570, 8.1.1
112. d API 570, 8.1.2
113. a API 570, 8.1.2
114. c API 570, 8.1.2
115. d API 570, 8.1.3.1
116. a API 570, 8.1.3.1
117. c API 570, 8.1.3.1
118. d API 570, 8.1.3.2
119. d API 570, 8.1.4
120. b API 570, 8.1.4
121. c API 570, 8.1.4
122. d API 570, 8.2
123. c API 570, 8.2
124. a API 570, 8.2.1
125. d API 570, 8.2.1
126. c API 570, 8.2.2.1
127. b API 570, 8.2.2.1
128. d API 570, 8.2.3
129. b API 570, 8.2.3
130. c API 570, 8.2.3
131. c API 570, 8.2.3
132. b API 570, 8.2.4
133. d API 570, 8.2.5
134. d API 570, 8.2.6
135. b API 570, 8.2.6
136. b API 570, 8.2.6
137. b API 570, 8.2.6
138. a API 570, 8.2.6
139. a API 570, 8.3
140. c API 570, Section 9
141. b API 570, 9.1.1
142. c API 570, 9.1.2
143. b API 570, 9.1.3
144. a API 570, 9.1.5
145. a API 570, 9.1.6
146. b API 570, 9.2.1
147. c API 570, 9.2.2
148. b API 570, 9.2.3
149. c API 570, 9.2.4
150. a API 570, 9.2.5
151. c API 570, 9.2.6
152. d API 570, 9.2.6
153. d API 570, 9.2.6
154. b API 570, 9.2.7
155. b API 570, 9.2.7
156. d API 570, 9.2.7
157. d API 570, 9.2.7
158. a API 570, 9.2.7
159. d API 570, 9.3.1
160. c API 570, 9.3.2 & 9.4
161. b API 570, 3.1
162. d API 570, 3.3
163. c API 570, 3.4
164. c API 570, 3.5
165. c API 570, 3.6
166. b API 570, 3.8
167. d API 570, 3.9
168. d API 570, 3.10
169. b API 570, 3.11
170. b API 570, 3.12
171. b API 570, 3.13
172. a API 570, 3.14
173. a API 570, 3.15
174. c API 570, 3.16
175. b API 570, 3.44
176. c API 570, 3.40
177. b API 570, 3.46
178. a API 570, Appendix C
179. a API 570, Appendix C
180. b API 570, Appendix C
181. c API 570, Appendix C

**API 570 PRACTICE QUESTIONS  
(Closed Book)**

- 1) A 14" O.D. pipe has a corroded area on it. What is the maximum size of a small repair patch that may be used to cover the corroded area?
  - a) 3.5"
  - b) 7"
  - c) 6"
  - d) 6.5"
  
- 2) A NPS 4 Schedule 80 (0.337" wall) branch is welded into a NPS 12 Schedule 40 (0.406" wall) header. What size cover fillet weld ( $t_c$ ) is required over the full penetration groove weld" (Express answer to nearest hundredth)
  - a) 0.578"
  - b) 0.286"
  - c) 0.334"
  - d) 0.236"
  
- 3) A NPS 6 (6.625" od) seamless pipe made from ASTM A335 Grade P2 material operates at 800 psi and 600 degrees F. The conditions require that a corrosion allowance of 0.125" be maintained. Calculate the minimum required thickness for these conditions.
  - a) 0.294"
  - b) 0.343"
  - c) 0.631"
  - d) 0.524"
  
- 4) A NPS 14 (14.00" od) seamless pipe made from ASTM A106 Grade A material operates at 300 psi and 600 degrees F. The pipe must cross a small ditch and it must be capable of supporting itself without a visible sag. A piping engineer states that the pipe must be at least 0.375" to support itself and the liquid product. He also states that a 0.125" corrosion allowance must be included. Calculate the minimum required thickness for the pipe.
  - a) 0.778"
  - b) 0.567"
  - c) 0.642"
  - d) 0.600"

- 5) A 10' long carbon steel pipe is welded to a 10' 18-8 stainless pipe and is heated uniformly to 475 degrees F from 70 degrees F. Determine its total length after heating
- 20.067'
  - 20.156'
  - 20.234'
  - 20.095'
- 6) A blank is required between two NPS 10, 300 lb. class flanges. The maximum pressure in the system is 385 psi at 200 degrees F. A corrosion allowance of 0.175" is required. The inside diameter of the gasket surface is 9.25". The blank is ASTM A516 Grade 70 material with no weld joint. Calculate the pressure design thickness required for the blank
- 0.789"
  - 0.692"
  - 0.556"
  - 0.768"
- 7) A NPS 14 (14.00" od) seamless pipe made from ASTM A53 Grade B material operates at 600 psi 600 degrees F. Calculate the pressure design thickness for these conditions.
- P =
- 0.243"
  - 0.442"
  - 0.205"
  - 0.191"
- 8) A NPS 6 piping system is installed in December 1989. The installed thickness is measured at 0.719". The minimum thickness of the pipe is 0.456". It is inspected in December 1994 and the measured thickness is 0.608". An inspection in December 1995 reveals a 0.025" loss from the December 1994 inspection. During December 1996, the thickness was measured to be 0.571". What is the long-term corrosion rate of this system?
- 0.01996"/year
  - 0.02567"/year
  - 0.02114"/year
  - 0.03546"/year
- 9) Using the data in Question No. 8, calculate the short term corrosion rate in mils per year (M/P year)

- a) 0.0012 M/P year
  - b) 0.012 M/P year
  - c) 0.12 M/P year
  - d) 12 M/P year
- 10) Using the information in Questions No. 8 and No. 9, determine the remaining life of the system
- a) 18 years
  - b) 5.44 years
  - c) 1.2 years
  - d) 6 years
- 11) Using the information in Questions No. 10 and assuming an injection point in a Class 2 system with 7 years estimated until the next inspection what would the next interval be:
- a) 10 years
  - b) 5 years
  - c) 3 years
  - d) 2.72 years
- 12) A seamless NPS 10 pipe, ASTM A106 Grade B material operates at 750 psi and 700 degrees F maximum. Considering only pressure design thickness, what minimum thickness is required?
- a) 0.244"
  - b) 0.200"
  - c) 0.282"
  - d) 0.173"
- 13) A seamless NPS 16 pipe, ASTM A135 Grade A material operates at 550 psi and 600 degrees F maximum. The thickness of the pipe as determined by the last inspection is 0.40". The pipe has been in service for 8 years. The original thickness at installation was measured to be 0.844". Two years previous to the 0.40" measurement the thickness of the pipe was found to be 0.54". Determine the greatest corrosion rate, *i.e.*, short or long term in mils per year (M/P year).
- a) 55 M/P year
  - b) 70 M/P year
  - c) 0.70 M/P year
  - d) 700 M/P year

- 14) A seamless NPS 12 pipe, ASTM A106 Grade B material operates at 750 psi and 700 degrees F maximum. The thickness of the pipe as determined by the last inspection is 0.305". The pipe has been in service for 13 years. The original thickness at installation was measured to be 0.405". Two years previous to the 0.305" measurement the thickness of the pipe found to be 0.316". The next planned inspection is scheduled for 8 years. Using the appropriate corrosion rate determine what MAWP the pipe will withstand at the end of the next inspection period
- a) 720 psi
  - b) 499 psi
  - c) 611 psi
  - d) 550 psi
- 15) A seamless NPS 6, ASTM A106 Grade A pipe operates at 300 degrees F and 765 psi. The allowable stress is 16,000 psi. Using the Barlow equation, determine the required thickness for these conditions
- a) 0.446"
  - b) 0.332"
  - c) 0.231"
  - d) 0.158"
- 16) A seamless NPS 6, ASTM A106 Grade A pipe operates at 300 degrees F and 741 psi. The allowable stress is 16,000 psi. The owner-user specified that the pipe must have 0.125" for corrosion allowance. Using the Barlow equation, determine the required thickness for these conditions
- a) 0.295"
  - b) 0.195"
  - c) 0.325"
  - d) 0.392"
- 17) A NPS 4 Schedule 80 (0.337" wall) branch connection is welded into a NPS 6 Schedule 40 (0.280" wall). A 0.375" reinforcing pad is used around the branch connection. The fillet weld sizes are as required by the Code. The branch connection is inserted into the header. The material of the branch and header is ASTM A672 Grade B70. What thickness would be used to determine whether heat treatment of the connection is required? (Express answer to nearest hundredth.)
- a) 0.768"
  - b) 0.891"
  - c) 0.998"

- d) 0.567"
- 18) An inspector finds a thin area in the body of a NPS 6, 600 lb. gate valve body. The body is made from ASTM A216 WCB material. The system operates at 900 psi and 750 degrees F. Using a corrosion allowance of 0.125", what minimum required thickness must the valve body have to continue to safely operate? (Round to the nearest 3 decimals)
- a) 0.492"  
b) 0.617"  
c) 0.510"  
d) 0.345"
- 19) A seamless NPS 10 pipe, ASTM A106 Grade B material, operates at 750 psi and 700 degrees F (maximum). The thickness of the pipe as determined by the last inspection is 0.30". The pipe has been in service for 10 years. The original thickness (measured when installed) was 0.365". Two years previous to the 0.30" measurement the thickness of the pipe was measured to be 0.31". Determine the greatest corrosion rate i.e. short or long term
- a) 0.0050 inches per year  
b) 0.0065 inches per year  
c) 0.0100 inches per year  
d) 0.0130 inches per year
- 20) A seamless NPS 10 pipe, ASTM A106 Grade B material operates at 750 psi and 700 degrees F (maximum). The thickness of the pipe as determined by the last inspection is 0.30". The pipe has been in service for 10 years. The original thickness (measured when installed) was 0.365". Two years previous to the 0.30" measurement the thickness of the pipe was measured to be 0.365". Two years previous to the 0.30" measurement the thickness of the pipe was measured to be 0.31". The next planned inspection is scheduled for 7 years. Using the worst corrosion rate (short or long term) determine what pressure the pipe will withstand at the end of its next inspection period ?
- a) 920 psi  
b) 663 psi  
c) 811 psi  
d) 750 psi

## ANSWER KEY

1. b API 570, APP
2. d B31.3, 328.5.4(c)
3. a B31.3, 304.1.1
4. c B31.3, 304.1.1
5. a B31.3, Table C-1
6. b B31.3, 304.5.3
8. c API 570, 7.1.1
9. d API 570, 7.1.1
10. b API 570, 7.1.1
11. d API 570, 6.3
12. a B31.3, 304.1.1
13. b API 570, 7.1.1
14. b API 570, 7.2
15. d B31.3 304.1.1
16. c B31.3, 304.1.1
17. b B31.3, 331.1
18. b API 574, 9.2
19. b API 570, 7.1 and 7.2
20. b API 570, 7.1 and 7.2

**API 570 PRACTICE QUESTIONS  
(Closed Book)**

Note: Some questions in this section are true/false or essay type questions, instead of multiple choice. Historically, it has been shown that test questions on ASME V involve a good deal of theory that cannot adequately be explored through multiple choice questions (although multiple choice questions only will be on the test).

1. A film-side penetrometer can be used for:
  - a. Inaccessible welds (unable to hand place a source penetrometer)
  - b. All welds
  - c. All castings at any time
  - d. An alternative to a source-side wire penetrometer
  
2. A dark image of the "B" on a lighter background is:
  - a. Acceptable
  - b. Rejectable
  - c. Sometimes rejectable
  - d. None of the above
  
3. One of the procedural requirements for conducting PT is to address the processing details for :
  - a. Post-examination cleaning
  - b. Pre-examination cleaning
  - c. Apply the penetrant
  - d. All of the above
  
4. Non-aqueous developer may be applied to a wet surface.  
  
True or False (circle one)
  
5. The accuracy of a piece of magnetizing equipment that is equipped with an ammeter shall be verified :
  - a. Each year
  - b. Each two years
  - c. When possible
  - d. Every 6 months
  
6. When using fluorescent particles, the examiner shall be in a darkened area for at least \_\_\_\_\_ minutes prior to performing the examination.



- a. 7
- b. 10
- c. 9
- d. 1

7. A wire IQI shall be placed adjacent to the weld, with the wires parallel to the weld.

True or False (circle one)

8. Certification of contaminants shall be obtained for all PT materials used on:

- a. Carbon steels
- b. Ferritic stainless steels
- c. Austenitic stainless steels
- d. None of the above

9. Black light intensity shall be measured with a \_\_\_\_\_ when conducting fluorescent PT.

- a. Dark room meter
- b. Photo-meter
- c. Black light meter
- d. None of the above

10. The location markers required by ASME V are required to appear as radiographic images.

True or False (circle one)

11. D.C. yokers may be used for detecting subsurface discontinuities, per ASME V ?

True or False (circle one)

12. How many total liquid penetrant techniques are listed in ASME V?

- a. 4
- b. 6
- c. 2
- d. 1

13. Prior to examinations, each adjacent surface shall be cleaned within at least \_\_\_\_\_" of the area to be examined.

- a. 1
  - b. 1.5
  - c. 2
  - d. 3
14. Water washable penetrant shall be removed with a water spray not exceeding 60 psi and 100°F.
- True or False (circle one)
15. The maximum emulsification time shall be:
- a. 5 minutes
  - b. 10 minutes
  - c. 15 minutes
  - d. none of the above
16. Densitometers shall be calibrated by verification with a calibrated:
- a. Densitometer
  - b. Step Wedge Comparison Strip
  - c. Light Meter
  - d. Transmission monitor
17. When using a hydrophilic emulsifier versus a lipophilic emulsifier and intermediate step that must be taken is:
- a. Pre-flooding with emulsifier
  - b. Pre-cleaning with solvent
  - c. Pre-rinsing with water
  - d. Pre-washing with detergent
18. A welded part is to be radiographed and is 1" thick, with 1/8" reinforcement. What ASTM wire set IQI should be used on these radiographs if a source side technique is used:
- a. Set A
  - b. Set B
  - c. Set C
  - d. Set D
19. When a PT test cannot be conducted between 50°-125°F, what must be done, per ASME V?
- a. The procedure must be qualified.
  - b. The surface must be re-cleaned

- c. The test cannot be conducted
  - d. None of the above
20. All indications are to be evaluated in accordance with:
- a. ASME VIII
  - b. ASME V
  - c. The referencing Code section
  - d. The written procedure
21. The scope of the ASME Boiler and Pressure Vessel, Code, Section V includes:
- a. NDE acceptance criteria
  - b. How to perform NDE to achieve a desired result
  - c. Where to do NDE (i.e. what welds to examine )
  - d. Who can be the Authorised inspector.
22. UT equipment is calibrated?
- a. Before heat-treatment
  - b. After completing the examination
  - c. Prior to visual examination
  - d. Prior to PT examination
23. A penetrometer is used on a DWE/DWV. The penetrometer selection is based on:
- a. The single wall thickness and weld reinforcement
  - b. Both wall thicknesses
  - c. The single wall thickness for Sch 80 pipe
  - d. None of the above
24. A suitable means for applying penetrant.
- a. Dipping
  - b. Brushing
  - c. Spraying
  - d. Any or all of the above
25. What materials require the use of tested and certified liquid penetrants as to the contaminants in the penetrant?
- a. Nickel alloys
  - b. Austenitic stainless steel alloys
  - c. Ferritic / martensitic stainless steel
  - d. Both a and b, above

26. How shall indications be evaluated, i.e. acceptance standards for RT?
- To ASME V
  - To ASME VIII
  - To B31.3
  - To the referencing Code section
27. How shall Nondestructive Examination Personnel be qualified?
- To SNT-TC 1A
  - To CP-189
  - To referencing code requirements
  - To ACCP rules
28. Which NDE methods are considered "surface" methods?
- PT
  - RT
  - MT
  - Both A & C above
29. What designation is used to indicate the penetrameter is on the film side?
- A "F"
  - An "E"
  - A "D"
  - A "FS"
30. What is a shim used for?
- UT field adequacy
  - RT field direction
  - MT field strength and direction
  - MT field current applications
31. Why must the surface be closely observed during the application of the PT developer?
- To ensure proper coating application
  - To ensure excess penetrant removal
  - To allow proper characterization of discontinuities
  - To see the "groovy" lines form

32. Name one typical discontinuity detectable by the magnetic particle method.
- Lack of penetration
  - Interpass lack of fusion
  - Slag inclusions
  - Toe cracks
33. For a DWE/SWV RT Technique, a minimum of \_\_\_\_\_ exposures shall be made.
- 1
  - 2
  - 3
  - 4
34. When are location markers placed on the film side in SWV for curved surfaces?
- Concave side is toward the source
  - Source - to - material distance greater than IR
  - A cobalt source is used
  - Both a and b, above
35. What is the difference between an inspection and an examination per Section V of the ASME Code?
- Inspection performed AI
  - Examination performed by manufacturer's personnel
  - There is no difference between the two
  - Both a and b, above
36. Name one typical discontinuity detectable by the liquid penetrant method
- I.P. on an NPS 2 girth weld
  - I.F. at the root of an NPS 2 girth weld
  - HAZ surface cracks on a NPS 2 girth weld
  - Slag inclusions on a NPS 8 longitudinal weld
37. What is to be done to excess penetrant remaining on the surface after the specified penetration time has elapsed?
- It must be removed
  - It can remain on the part
  - It must be developed
  - It must be removed with water only

38. What must be done to ensure 100% coverage on any NDE method?
39. When surface irregularities may mask indications of unacceptable discontinuities, what is required?
40. List the type of discontinuities magnetic particle examination is effective in detecting.
41. What are the six penetrant techniques to be used?
42. What are the approved methods of indicating UT thickness measurements?
43. How is the "quality" of a radiograph evaluated?
44. Where are RT location markers placed, on the part or on the radiograph?
45. The IQI may be of what two types?
46. What is the critical hole in a hole type IQI?
47. What identify must also be included in the UT calibration records?
48. The IQI is normally placed on which side of a part?
49. A 4T hole on a 20 IQI has a diameter of:
50. List 4 types of blemishes not permitted on film.
51. When is a written radiographic procedure required by ASME V?
52. When should the developer be applied?
53. What type of discontinuity is the magnetic particle method most sensitive to?
54. What is the examination medium when using MT? What is the probing medium when using MT?
55. When must ultrasonic equipment be calibrated?
56. How many IQIs should appear on each radiograph, except for panoramic techniques?
57. Are intensifying screens permitted for radiography per ASME V?

58. What two radiographic techniques are noted as available for examinations?
59. How can compliance with a written radiographic procedure be demonstrated?
60. List the type of discontinuity liquid penetrant examination is effective in detecting.
61. What must be done when a penetrant is to be applied on parts beyond 50°F – 125°F?
62. The lifting power of yokes must be checked when?
63. How should welded butt-joints be prepared for radiograph?
64. In magnetic particle examination of a welded joint using yokes, is alternating current or direct current allowed?
65. A \_\_\_\_\_ is a device used to determine the image quality of radiograph
- a. A step wedge comparison film
  - b. A densitometer
  - c. An IQI
  - d. All of the above
  - e. None of the above
66. In accordance with Section V, write – type penetrameters:
- a. Can always be used
  - b. Can be used unless restricted by the referencing Code
  - c. Can never be used
  - d. Can be used only with Type 1 film
67. A. What is meant by “non –destructive examination” of a welded joint?
- B. Name four methods of non-destructive examination.
68. In a radiographic film of a weld, how are the following characteristics measured or judged?
- a. Film sensitivity or quality
  - b. Film density

69. What is radiography?
70. What is the minimum and maximum allowable density through the image of the penetrometer for radiographs made with:
- A 2000 kV tube?
  - Cobalt 60 (Co60)?
71. A single film technique was used to make a radiograph using a Cobalt-60 source. The minimum permitted density in the area of interest is:
- 4.0
  - 1.8
  - 2.0
  - 1.3
  - None of the above
72. Under ASME Code Section V, what upper and lower density limits are acceptable for viewing if the density through the body of the penetrometer is 2.7? Assume single film viewing.
73. What is the minimum number of IQI required for the following:
- A complete girth seam containing 30 radiographs shot with a single exposure?
  - Twelve radiographs on a longitudinal seam shot from the outside with a single exposure?
74. A radiograph is made using an X-ray source, and two films in each film holder. If the film is to be viewed separately the minimum permitted density would be:
- 4.0
  - 1.8
  - 2.0
  - 1.3
  - None of the above
75. A weld with a nominal thickness of 1.5 inch is to be radiographed using a film side penetrometer. The penetrometer designation should be: (Note: This is an open book question)
- 25
  - 30
  - 35
  - Both a and b are acceptable?



76. A) What are hole – type penetrameters and what are they used for?  
B) What are wire penetrameters and what are they used for?
77. In radiographing a butt welded joint of 1" thickness, on what side of the weld is the penetrameter normally placed?
78. What type of flaws may be detected by:  
A) Liquid Penetrant testing?  
B) Magnetic Particle testing?  
C) Radiographic examination?  
D) Ultrasonic examination?
79. What is a densitometer used to determine?
80. Name two radiation sources permitted for radiographic examination in ASME Boiler and Pressure Vessel Code.
81. When reviewing a radiograph, a dark image of the letter B can be seen on the film. Does this indicate an unacceptable radiograph?
82. Describe how liquid penetrant examination should be performed in order to detect discontinuities that are open to the surface, per Article 6 of ASME Code section V.
83. A) If IQIs are not placed on the source side, what rules apply?  
B) For materials being radiographed other than welds, where are the IQIs placed?
84. If the density through the IQI is 2.50, what would the maximum allowable density and minimum allowable density be through the weld represented by this un-shimmed IQI?
85. On a set of cassettes containing film for a seam just radiographed you notice the lead location markers (i.e. 1-2, 2-3 etc.) are taped to the cassettes. Would these radiographs be acceptable?

## Answer Key

- 1) a
- 2) a
- 3) d
- 4) False
- 5) a
- 6) 3
- 7) False
- 8) c
- 9) c
- 10) True
- 11) False
- 12) b
- 13) a
- 14) False
- 15) d
- 16) b
- 17) c
- 18) b
- 19) a
- 20) c
- 21) b
- 22) d
- 23) a
- 24) d
- 25) d
- 26) d
- 27) c
- 28) d
- 29) a
- 30) c
- 31) c
- 32) d
- 33) c
- 34) d
- 35) d
- 36) c
- 37) a
- 38) All examinations must overlap to ensure 100% coverage of the part
- 39) Grinding, machining, or other methods
- 40) Surface and slight subsurface indications
- 41) Color contrast or water washable
  - a. Water washable
  - b. Post – emulsifying
  - c. Solvent removable
42. CRT, Digital, or meter

43. Ability to see the prescribed hole or wire on the designated penetrometer and compliance with density requirements
44. On the part
45. Hole or wire types
46. 2T
47. Calibration block identity
48. Source side
49. 0.08"
50.
  - a) Fogging
  - b) Processing defects
  - c) Scratches, finger marks, etc.
  - d) False indications due to defective screens
51. Article 2 requires the use of a written procedure for RT in all cases, but T-150 overrides, which states procedures are only required when specified by the referencing code section (same as for UT,MT,PT and other NDE methods)
52. As soon as possible after penetrant removal. Not to exceed time in written procedure.
53. Surface discontinuities aligned perpendicular to the magnetic field.
54. Ferro magnetic particles, magnetic fields
55.
  - a) Beginning and end of each examination
  - b) When personnel are changed
  - c) Anytime malfunction is suspected
56. At least one on each radiograph
57. Yes, except when restricted by the referencing Code
58. Single wall and double wall
59. By compliance with density and penetrometer image on the production or technique radiographs
60. Surface discontinuities only
61. The procedure must be qualified using a quench - cracked aluminium block.
62. Prior to use within the last year or if the yoke has been damaged. Permanent magnet yokes checked daily.
63. The weld ripples or surface irregularities on both the inside (if accessible) and outside shall be removed by any suitable
64. Alternative current is used
65. c
66. a
67.
  - a) An examination of a welded joint that will disclose surface and sub-surface discontinuities without physical harm to the welded joint. Such examinations can be conducted by radiography, ultrasonics, liquid penetrant or magnetic particle testing.
  - b) - Radiographic Examination
    - Ultrasonic Examination
    - Magnetic Particle Examination
    - Liquid Penetrant Examination

68. a) IQI  
b) Densitometers or step-wedge comparison films.
69. A radiograph is a shadow picture produced by the passage of X-rays or gamma - rays through an object onto a film. When the rays pass through the object, part of the radiation penetrates the material and part is absorbed. The amount of radiation absorbed and the amount that penetrates are a function of the thickness of the material. Where a void or discontinuity exists, there is essentially less material to absorb the radiation. Therefore, more radiation will pass through this section and a dark spot corresponding to the projected position of the void will appear on the film.
70. a) 1.8 - 4.0 ( for any X-ray source )  
b) 2.0 - 4.0 ( for any gamma source)
71. e. The correct answer is -15% from the transmitted density through the body of the penetrometer
72. -15% = 2.295  
+30% = 3.510
73. a) Requires at least 3 IQIs spaced 120° apart.  
b) Requires at least 12 IQI, one on each film.
74. b
75. a
76. a) An IQI is a small strip of material, fabricated of radiographically similar material to the object being inspected, and having a thickness of approximately 2% of the object being radiographed. The IQI has three holes in it. The sizes of these holes are 1T, 2T and 4T where "T" is the thickness of the IQI. The 2T is designated as the essential hole, *i.e.*, the hole whose image must appear on the radiograph. IQI thickness and essential hole size requirements are listed in tables in Section V of the ASME Code.

The IQI is identified with a number made of lead that is attached to the IQI. This number indicates the thickness of the IQI in thousandths of an inch.

An IQI is used for evaluating radiographic technique in that it serves as an image quality indicator, proper technique should display the IQI image and the specified hole.

b) Wire type IQI use thin wires to ascertain sensitivity instead of holes. The ability to see the wire required by the Code indicates a quality radiograph.

77. The IQI should be placed the source side of the material being radiographed. However, where inaccessibility prevents this, the IQI may be placed on the film side of the material being radiographed provided a lead letter "F" at least as high as the identification number is placed adjacent to the IQI.
78. a) Surface discontinuities  
 b) Surface and slight sub-surface discontinuities  
 c) Surface and sub-surface discontinuities  
 d) Surface and sub-surface discontinuities
79. A densitometer ( or step wedge comparison film ) shall be used for judging film density requirements. Film density is a measure of overall darkening of the radiograph, which is directly related to the sensitivity, definition, and overall quality of the technique.
80. The two common radiographic sources in industrial use today are X-ray machines and artificially produced radioactive isotopes of certain metallic elements.
81. No.
82. The part is first thoroughly cleaned of oil, dirt, etc, then a liquid penetrant is applied to the surface to be examined and allowed to enter the discontinuities. All excess penetrant is then removed, the part is dried, and a developer is applied. The developer functions both as a blotter to absorb penetrant that has been trapped in discontinuities and as a contrasting background to enhance the visibility of penetrant indications. The dyes in penetrants are either color contrast (visible under white light) or fluorescent (visible under ultraviolet light)
83. a) The penetrometer should be placed on the source side of the material being radiographed. However, where inaccessibility prevents this, the penetrometer may be placed on the film side of the material being radiographed provided a lead letter "F" at least as high as the identification number is placed adjacent to the penetrometer.  
 b) For material other than weld a source side penetrometer shall be placed in the area of interest.
84. Minus 15% to plus 30% allowed  
 $2.5 + 30\% = 2.5 + 0.75 = 3.25$   
 $2.5 - 15\% = 2.5 - 0.4 = 2.125$
85. No. Location markers that are to appear on the radiographic film should be placed on the part being examined and not on the cassettes.

**ASME B16.5 PRACTICE QUESTIONS  
(Closed Book)**

1. ASME B 16.5 does not cover:
  - a. Class 150 flanges
  - b. Class 300 flanged fittings
  - c. Butt welded pipe caps
  - d. All of the above
  
2. The maximum hydrostatic test pressure permitted for a flange in a system hydrostatic test is:
  - a. Not required
  - b. Conducted at 1.5 x class rating @100°F
  - c. Conducted at 25 psi above class rating
  - d. Required only for welded flanges
  
3. "High strength" bolting is described as equivalent to:
  - a. ASTM A 193 B5
  - b. ASTM A 193 B7
  - c. ASTM 320 GR8
  - d. Any high carbon steel bolt
  
4. The pressure class ratings covered by ASME B16.5 are:
  - a. 150, 300, 400, 600, 900, 1500, 2500
  - b. 150, 300, 400, 450, 600, 900, 1500
  - c. 125, 150, 300, 400, 600, 900, 1500, 2500
  - d. 150, 300, 400, 600, 700, 900, 1000, 1500
  
5. The standard finish for raised face flanges per ASME B16.5 is:
  - a. 250 $\mu$  to 500  $\mu$  / inch
  - b. 125  $\mu$  to 250  $\mu$  / inch
  - c. 260 mm to 500 mm / inch
  - d. 250  $\mu$  / mm to 500  $\mu$  / mm
  
6. Socket weld and threaded flanges are not recommended for service beyond the following temperatures if thermal cycles are involved:
  - a. -20 - 650°F
  - b. -30 - 600°F
  - c. -50 - 500°F
  - d. -50 - 500°F

7. "Low strength bolting" is:
- $\leq 30$  KSI yield strength
  - $\geq 30$  KSI yield strength
  - $\geq 30$  KSI tensile strength
  - $\geq 100$  KSI yield strength
8. Ring joint sidewall surfaces (gasket groove) must not exceed \_\_\_\_\_ roughness.
- 50  $\mu$  / in
  - 63 $\mu$  / in
  - 100  $\mu$ /in
  - 63 mm / in
9. Which of the following items must be marked on all flanges or flanged fittings?
- Temperature
  - Actual working pressure
  - ASTM material specification
  - Hydrotest pressure
10. When used above \_\_\_\_\_ °F, class 150 flanges may develop leakage unless special precautions are taken regarding loads or thermal gradients.
- 150
  - 300
  - 600
  - 400
11. The three basic parts to a flanged joint are:
- Flanges, welds, gaskets
  - Flanges, bolts, nuts
  - Flanges, bolts, gaskets
  - Flanges, gaskets, threads
12. Class 600 flanged joints may develop leakage, unless special considerations for thermal gradients are applied at temperatures above \_\_\_\_\_ °F.
- 600
  - 800
  - 950

- d. 750
13. A Class 400 flanged fitting must be hydrotested at what pressure, if the 100<sup>o</sup>F rating is 800 psig?
- a. 1020 psig
  - b. 1200 psig
  - c. 1225 psig
  - d. Not required per ASME B 16.5
14. The maximum temperature for hydrotesting a fitting is:
- a. 12<sup>o</sup>F
  - b. 125<sup>o</sup>C
  - c. Per Construction Code requirements
  - d. Per Owner / User system requirements
15. The minimum duration for hydrotesting on NPS 12 fitting shall be:
- a. 2 min
  - b. 1 min
  - c. 3 min
  - d. No requirements to test fittings



## **ANSWER KEY**

1. c
2. b
3. b
4. a
5. b
6. c
7. a
8. b
9. c
10. d
11. c
12. d
13. b
14. a
15. c

**ASME B31.3 – PRACTICE QUESTIONS  
(Closed Book)**

1. The requirements of the latest edition of ASME Code Section B 31.3 and any subsequent Addenda:
  - a. Must be followed explicitly as soon as the latest edition is issued.
  - b. Are retroactive and all piping installed per earlier must be upgraded.
  - c. Are not retroactive & all piping installed per earlier additions need not be upgraded.
  - d. May be used without regard to the acceptability of Code revisions to the jurisdiction.
  
2. Clauses in the B 31 code are not necessarily numbered consecutively. Such discontinuities result from:
  - a. The age of the code and the number of changes that have been made.
  - b. Following a common outline, insofar as practical for all Code Sections.
  - c. No particular logic was followed in the original versions of the Code.
  - d. Practices followed by all Codes to make them difficult to reproduce.
  
3. Who has the responsibility of determining which Code Section is applicable to piping installations, i.e. B 31.1, B31.3 etc?
  - a. Owner
  - b. Inspector
  - c. Jurisdiction
  - d. Engineer
  
4. Who has the overall responsibility for compliance with ASME B31.3?
  - a. Inspector
  - b. Owner
  - c. Engineer
  - d. Jurisdiction
  
5. The intent of ASME B 31.3 is to set forth engineering requirements deemed necessary for \_\_\_\_\_ and \_\_\_\_\_ of piping installations.

- a. Structural design, fabrication
  - b. Safe design, construction
  - c. Adequate fabrication, execution
  - d. Permanant existence, longevity
6. ASME Code is not intended to apply to piping:
- a. In the chemical Industry
  - b. That has been placed in service
  - c. In the agonomy industry
  - d. In the space industry.
7. Compatibility of materials with the service and hazards from instability of contained fluids:
- a. Is covered extensively by ASME B 31.3
  - b. Are not within the scope of ASME B31.3
  - c. Is addressed on a limited basis by ASME B31.3
  - d. Is the main scope of ASME B31.3
8. ASME B31.3 applies to piping for all fluids except for which of the below?
- a. Tubes of fired heaters, plumbing and storm sewers
  - b. Raw, intermediate and finished chemicals
  - c. Petroleum products, fluidised solids and refrigerants
  - d. Gas, steam, air, and water
9. A pre-placed filter metal which is completely fused into the roof of a welded joint and becomes part of the weld is called:
- a. A depleted appendage
  - b. A pre-placed ligament
  - c. A consumable insert
  - d. A caulked joint
10. Define "face of weld".
- a. It is the longitudinal view of a weld that has been split down the middle for inspection.
  - b. It is the elevation view of a weld that has been cut out to show its cross section.
  - c. It is the concealed weld surface on the side opposite from which the welding was done.
  - d. It is the exposed surface of a weld on the side from which the welding was done.

11. Fluid service that is non-flammable, non-toxic, and not damaging to human tissue and its gauge pressure does not exceed 150 psi and the design temperature is from -20 degrees through 366°F is known as a category \_\_\_\_\_ fluid.
- a. D
  - b. C
  - c. M
  - d. N
12. A fluid service in which the potential for personnel exposure is judged to be significant and in which a single exposure to a very small quantity of a toxic fluid, caused by leakage, can produce serious irreversible harm to persons on breathing or bodily contact, even when prompt restorative measures are taken is known as a category \_\_\_\_\_ fluid.
- a. D
  - b. M
  - c. H
  - d. N
13. A fillet weld whose size is equal to the thickness of the thinner member joined is called:
- a. A butt fillet weld
  - b. A longitudinal fillet weld
  - c. A full fillet weld
  - d. A fillet welds with out backing.
14. The heating of metal to and holding at a suitable temperature and then cooling at a suitable rate for such purposes as; reducing hardness, improving machinability, facilitating cold working, producing a desired microstructure, or obtaining desired mechanical, physical, or other properties is known as:
- a. Annealing
  - b. Normalizing
  - c. Quenching
  - d. Stress - relieving
15. Piping joint that for the purpose of mechanical strength or leak resistance, or both, in which the mechanical strength is developed by threaded, grooved, rolled, flared, or flanged pipe ends; or by bolts, pins, toggles, or rings; and the leak resistance is developed by threads and compounds, gaskets, rolled ends, caulking, or machined and mated surfaces is known as a:

- a. Bonded joint
  - b. Mechanical joint
  - c. Fused joint
  - d. Juke joint
16. The term NPS 6 refers to:
- a. A pipe whose outside diameter is 6.625"
  - b. A pipe whose outside diameter is 6"
  - c. A pipe whose radius is 6"
  - d. A tube whose inside diameter is 6"
17. A pipe produced by piercing a billet followed by rolling or drawing, or both is a:
- a. Electric fusion welded pipe
  - b. Spiral welded pipe
  - c. Seamless pipe
  - d. ERW pipe
18. What is a "root opening"?
- a. It is the gaps between flanges left to facilitates the installation of gaskets.
  - b. It is the division between different rods accounting for different metallurgy.
  - c. It is the separation between members to be joined by welding, at the root of the joint.
  - d. It is the conjunction of members joined by bonding at the face of the joint.
19. A weld intended primarily to provide joint tightness against leakage in metallic piping is known as a:
- a. Fillet weld
  - b. Fissure weld
  - c. Seal weld
  - d. Caulking weld
20. A weld made to hold parts of weldment in proper alignment until the final welds are made is known as a:
- a. Face weld
  - b. Fissure weld
  - c. Seal weld
  - d. Tack weld

21. The junction between the face of a weld and the base metal is known as:
- Root of the weld
  - Face of the weld
  - Toe of the weld
  - Throat of the weld
22. The pressure in a piping system that is the pressure at the most severe condition of coincident internal or external pressure and temperature (minimum or maximum) expected during service ( except for allowances for occasional variations of pressure or temperature, or both, above operating levels which are characteristics of certain services) is known as:
- Excursion pressure
  - Test Pressure
  - Design pressure
  - Absolute pressure
23. Piping not protected by a pressure relieving device, or that can be isolated from a pressure relieving device, shall be designed for at least the:
- Usual pressure that is developed
  - Median pressure that is developed
  - Average pressure that can be developed
  - Highest pressure that can be developed.
24. What might happen to a piping system that has a gas or vapour in it (like steam) and it is allowed to cool significantly?
- Nothing will happen
  - The gas or vapour will form a liquid which will not affect the piping system.
  - The pressure in the piping system may reduce sufficiently to create a internal vacuum.
  - The pressure in the piping system may increase and create an over pressure.
25. What happens to a piping system with fluids in it and the fluids are heated with the system blocked?
- The internal pressure will decrease
  - The internal pressure will increase
  - There will be no change in the system
  - The external pressure will increase

26. \_\_\_\_\_ caused by external or internal conditions (including changes in flow rate, hydraulic shock, liquid or solid slugging, flashing, and geysering) shall be taken into account in the design of piping:
- Virtual kinetics
  - Abnormal potential
  - Normal dynamism
  - Impact forces
27. Loads on a piping system that include the weight of the medium transported or the medium used for test and snow loads or ice loads are examples of \_\_\_\_\_ loads.
- Dead
  - Live
  - Normal
  - Vortex
28. What can be caused by low operating temperatures, including the chilling effect of sudden loss of pressure on highly volatile fluids, or in alloy piping the failure to properly post weld heat treat after welding?
- Thermal restraint effect
  - Loss of ductility or reduced ductility
  - Increase in plasticity or deformation
  - Increase in toughness strength
29. Fillet welds may vary from convex to concave. The size of a fillet weld is based on the theoretical throat, which is \_\_\_\_\_ x the length.
- 0.707
  - 0.770
  - 1.414
  - 0.500
30. In spot radiography of circumferential butt welds, it is recommended that not less than one shot for each \_\_\_\_\_ welds for each welder / operator be completed.
- 5
  - 10
  - 20
  - 30

31. If a requirement is specified in the engineer design, but is not a code requirement, ASME B31.3 states that the requirement \_\_\_\_\_.
- May be ignored
  - May be optionally applied
  - Shall be implemented only if the inspector required it
  - Shall be considered a Code requirement
32. In the question  $t_m = 5 + c$ , pick the correct definition of the value "t".
- Minimum required thickness, including mechanical, corrosion, & erosion allowances.
  - Pressure design thickness, as calculated for internal pressure.
  - Pipe wall thickness (measured or minimum per purchase specification.)
  - Minimum design temperature of the pipe
33. When the service is erosive, if there is crevice corrosion present, or if cyclic loadings occur, slip-on flanges shall :
- Be bolted together with double nutted machine bolts
  - Be bolted together with machine bolts
  - Not be used
  - Be double welded
34. The use of slip-on flanges should be \_\_\_\_\_ where many large temperature cycles are expected particularly if the flanges are not insulated:
- Called for
  - Encouraged
  - Avoided
  - The first choice
35. Severe cyclic conditions require the use of:
- Slip - on flanges
  - Welding neck flanges
  - Socket weld flanges
  - Lap joint flanges
36. Bolting having not more than \_\_\_\_\_ ksi specified minimum yield strength shall not be used for flanged joints rated ASME B16.5 Class 400 and higher:



- a. 35
  - b. 30
  - c. 45
  - d. 40
37. Tapped holes for pressure retaining bolting in metallic piping components shall be of sufficient depth that the thread engagement will be at least \_\_\_\_\_ times the nominal thread diameter:
- a. 7/8
  - b. 3/4
  - c. 5/8
  - d. 1/2
38. What type backing rings shall not be used under severe cyclic conditions?
- a. Continuous backing rings
  - b. Split backign rings
  - c. Slip - on backing rings
  - d. Consumable backing rings
39. Socket welded joints should be avoided in any service where \_\_\_\_\_ or \_\_\_\_\_ occur.
- a. Crevice corrosion, severe erosion
  - b. Graphitic corrosion, continual fretting
  - c. Plut type dezincification, severe carburisation
  - d. Hydrogen attack, sensitisation
40. Socket welds larger than NPS \_\_\_\_\_ shall not be used under severe cyclic conditions.
- a. 3/4
  - b. 1
  - c. 1.5
  - d. 2
41. Which of the listed items is NOT a location where fillet welds are permissible?
- a. Weld of socket weld flange
  - b. Attach a weld neck flange
  - c. Weld of a slip-on flange
  - d. Attach a nozzle reinforcement pad.
42. What type weld is considered to furnish no strength and is only used to prevent leakage of threaded joints?

- a. Tack weld
  - b. Seal weld
  - c. Fillet weld
  - d. Built weld
43. Where flanges of different ratings are bolted together:
- a. The rating of the joint shall not exceed that of the higher rated flange.
  - b. They are not acceptable and one flange shall be changed where they both match.
  - c. The rating of the joint shall not exceed that of the lower rated flange.
  - d. The bolt diameter must be 1/8" less than that required for the lower rated flange
44. Where a metallic flange is bolted to a non-metallic flange.
- a. A ring joint type gasket is preferred
  - b. A spiral wound grafoil filled gasket is preferred.
  - c. A Full faced gasket is preferred
  - d. A Grayloc type gasket is preferred
45. What type of joint should not be used under severe cyclic conditions?
- a. Welded joints
  - b. Expanded joints
  - c. Flanged joints
  - d. Lap joints
46. Threaded joints should be avoided in any service where:
- a. Crevice corrosion, severe erosion, or cyclic loadings may occur
  - b. Graphitic corrosion, biological corrosion or static loadings may occur
  - c. Graphitisation, sensitisations, or longitudinal loadings may occur
  - d. Dezincification, hydrolysis, or hoop stress loadings may occur.
47. An inspector is checking threaded joints prior to seal welding them. What is an important item to check?
- a. Check and make sure all gasket surfaces are covered
  - b. Make sure that thread sealing compound has not been used
  - c. Check the longitudinal loading of the joint

- d. Make sure that the consumable insert to be used is made from the correct material
48. The intentional deformation of piping during assembly to produce a desired initial displacement and stress is known as:
- a. Hot spring
  - b. Cold spring
  - c. Post stress
  - d. Displacement
49. When fitting up a socket weld joint, the made end is welded in the female socket with:
- a. An approximate 1/32" gap at the base of the joint
  - b. No gap left at the base of the joint
  - c. An approximate 1/16" gap at the base of the joint
  - d. An approximate 1/8" gap at the base of the joint
50. A weld defect to be repaired shall be removed:
- a. To the satisfaction of the pipe fitter
  - b. To apparently good material
  - c. Until the defect can no longer be seen
  - d. To sound metal
51. What is acceptable as an alternate heat treatment for B31.3 piping?
- a. Synthesizing, forging or standardizing
  - b. Pre-heating, peening, or case hardening
  - c. Stress relieving , tempering or peening
  - d. Normalizing, normalizing and tempering or annealing
52. When an entire piping assembly to be heat treated cannot be fitted into the furnace, it is permissible to heat treat in more than one heat, provided there is at least \_\_\_\_\_ overlap between successive heats, and that parts of the assembly outside the furnace are protected from harmful temperature gradients.
- a. 6 inches
  - b. 1 foot
  - c. 2 feet
  - d. 3 feet
53. According to B31.3 inspection applies to functions performed:
- a. By a third party inspector or their delegates

- b. By the owner's inspector or the inspector's delegates
  - c. By a jurisdictional inspector or their delegates
  - d. By an ASME inspector or their delegates
54. Who is responsible for verifying that all required examinations and testing have been completed and to inspect the piping to the extent necessary to be satisfied that it conforms to all applicable examination requirements of the ASME B31.3 Code and of the engineering design?
- a. It is the owner's responsibility , exercised through his inspector
  - b. It is the API Examiner's responsibility
  - c. It is the jurisdiction's inspector's responsibility
  - d. It is the ASME inspector's responsibility
55. According to ASME B31.3 how much experience in the design, fabrication, or inspection of industrial pressure piping must a Piping inspector have?
- a. 10 years
  - b. 8 years
  - c. 6 years
  - d. 5 years
56. Prior to initial operation each piping installation, including components and workmanship shall be examined in accordance with ASME B31.3 , paragraph 341. When should examination of P-Numbers 3,4 and 5 materials be carried out?
- a. Examination shall be performed prior to any heat treatment
  - b. Examination shall be performed before heat treatment and after heat treatment
  - c. Examination shall be performed after completion of any heat treatment
  - d. Examination shall be performed on at least 5% of the fabrication after heat treatment
57. For normal fluid service, how much of the piping welds (circumferential and mitre groove welds)
- a. 3%
  - b. 10%
  - c. 5%
  - d. 33%
58. VT, MT, PT, UT and RT shall be performed as specified in the:
- a. ASME BPV Code, Section V

- b. ASME BPV Code, Section IX
  - c. ASME BPV Code, Section VIII
  - d. ASME BPV Code, Section I
59. The extent of radiography when considering longitudinal welds, the minimum requirement is inches of weld length:
- a. 12
  - b. 9
  - c. 6
  - d. 4
60. Which of the following examinations is NOT considered an in-process examination?
- a. Examination of joint preparation and cleanliness
  - b. Examination of appearance of the finished joint
  - c. Examination of material for toughness
61. What method of in-process examination is used unless additional methods are specified in the engineering design?
- a. MT
  - b. RT
  - c. UT
  - d. VT
62. What is the only category fluid service that may be subject to an initial in-service leak test?
- a. Category M
  - b. Category D
  - c. Category N
  - d. Category H

## ANSWER KEY

1. c ASME B31.3 INTRODUCTION
2. b ASME B31.3 INTRODUCTION
3. a ASME B31.3 INTRODUCTION
4. b ASME B31.3 300(b)(1)
5. b ASME B31.3 300 (c) (1)
6. b ASME B31.3 300 (c) (2)
7. b ASME B31.3 300 (c) (6)
8. a ASME B31.3 300.1.1 (b)
9. c ASME B31.3 300.2
10. d ASME B31.3 300.2
11. a ASME B31.3 300.2
12. b ASME B31.3 300.2
13. c ASME B31.3 300.2
14. a ASME B31.3 300.2
15. b ASME B31.3 300.2
16. a ASME B31.3 300.2
17. c ASME B31.3 300.2
18. c ASME B31.3 300.2
19. c ASME B31.3 300.2
20. d ASME B31.3 300.2
21. c ASME B31.3 300.2
22. c ASME B31.3 301.2 .1(a) & 302.2.4
23. d ASME B31.3 301.2.2(a)
24. c ASME B31.3 301.4.1
25. b ASME B31.3 301.4.2
26. d ASME B31.3 301.5.1
27. b ASME B31.3 301.6.1
28. b ASME B31.3 301.9
29. a ASME B31.3 Fig. 328.5.2A
30. c ASME B31.3 341.5.1
31. d ASME B31.3 300(c) (5)
32. b ASME B31.3 304.1.1(b)
33. d ASME B31.3 308.2.1(a)
34. c ASME B31.3, 308.2.1(b)
35. b ASME B31.3, 308.2.4
36. b ASME B31.3, 309.2.1
37. a ASME B31.3, 309.3
38. b ASME B31.3, 311.2.3(b)
39. a ASME B31.3, 311.2.4(a)
40. d ASME B31.3, 311.2.4
41. b ASME B31.3, 311.2.5(a)&(b)
42. b ASME B31.3 311.2.6
43. c ASME B31.3, 312.1
44. c ASME B31.3, 312.2
45. b ASME B31.3, 313
46. a ASME B31.3, 314(a)
47. b ASME B31.3, 314(b)
48. b ASME B31.3, 319.2.4
49. c ASME B31.3, 328.5(A)  
& Fig.328.5.2 B&C
50. d ASME B31.3, 328.6
51. d ASME B31.3, 331.2.1
52. b ASME B31.3, 331.2.5
53. b ASME B31.3, 340.1
54. a ASME B31.3, 340.2
55. a ASME B31.3, 340.4(b)
56. c ASME B31.3, 341.3.1(a)
57. c ASME B31.3, 341.3.1(b)(1)
58. a ASME B31.3, 344.2,344.3,  
344.4, 344.5,344.6
59. c ASME B31.3, 344.5.2
60. d ASME B31.3, 344.7.1
61. d ASME B31.3, 344.7.2
62. b ASME B31.3, 345.1(a),345.7

**API 570 PRACTICE QUESTIONS  
(Closed Book)**

1. The purpose of the WPS and PQR is to determine that:
  - A. The welder is qualified
  - B. The base metals are strong enough
  - C. The weldment has the desired properties
  - D. The skill of the welder
  
2. The WPS lists:
  - A. Non-essential variables
  - B. Essential variables
  - C. Ranges of 1 & 2 above
  - D. All of the above
  
3. The PQR must list:
  - A. essential variables
  - B. qualification test & examination results
  - C. supplementary essential variables (when notch toughness is required)
  
4. What is the earliest Edition of Section IX recognized by the current edition?
  - A. 1958
  - B. 1992
  - C. 1987
  - D. 1962
  
5. New Welding Procedure Specifications must meet the \_\_\_\_\_ Edition and Addenda of Section IX.
  - A. 1962
  - B. current
  - C. 1986
  - D. 1995
  
6. Each \_\_\_\_\_ shall conduct the tests required by Section IX to qualify the WPS's used during the construction, alteration, or repair.
  - A. Welder or welding operator

- B. Manufacturer or contractor
  - C. Inspector
  - D. All of the above
7. The records of procedure, welder and welding operator qualification must be available to the \_\_\_\_\_.
- A. Manufacturer
  - B. Welder
  - C. Authorised Inspector
  - D. Foreman
8. A welder qualifying with a groove weld in plate in the 4G position is qualified to weld groove welds in plate and pipe over 24"O.D. in at least the \_\_\_\_\_ positions.
- A. Vertical
  - B. Flat & horizontal
  - C. Flat & overhead
  - D. Horizontal
9. A welder qualifying with plate fillet welds in the 3F and 4F positions is qualified to weld groove welds in plate in the \_\_\_\_\_ positions.
- A. Flat only
  - B. Flat and horizontal
  - C. Flat and vertical
  - D. None of the above
10. A welder qualifying by making a groove weld on pipe with an O.D. of  $\frac{3}{4}$ " in the 5G position is qualified to weld groove welds in:
- A.  $\frac{1}{2}$ " O.D. Pipe in the overhead position
  - B. 6" O.D. Pipe in the vertical position
  - C.  $\frac{3}{4}$ " O.D. pipe in the horizontal position
  - D. None of the above
11. In general, qualification on groove welds also qualifies a welder to make:
- A. Stud welds
  - B. Overhand welds
  - C. Fillet welds



- D. All of the above
12. Charpy V-notch tests are performed to determine a weldment's
- A. Tensile strength
  - B. Ductility
  - C. Notch toughness
  - D. All of above
13. A welder making a groove weld using the SAW process on P1 materials may be qualified using radiography.
- A. True
  - B. False
14. When a tensile specimen breaks in the base metal outside of the weld or fusion line, the strength recorded may be at most \_\_\_\_\_ below the specified tensile and be accepted.
- A. 3.5%
  - B. 0.5%
  - C. 5%
  - D. All of the above
15. Guided-bend specimens shall have no open defects in the weld or heat effected zone exceeding \_\_\_\_\_ measured in any direction on the convex surface of the specimen after bending.
- A. 1/16"
  - B. 3/32"
  - C. 1/8"
  - D. None of the above
16. When using radiographs to qualify welder, the acceptance standards used are found in:
- A. ASME Section V
  - B. ASME Section IX
  - C. ASME Section VII
  - D. The referencing code
17. A WPS must describe:
- A. Essential variables

- B. Nonessential variables
  - C. Supplementary essential variable when required for notch toughness
  - D. All of the above
18. A PQR must describe:
- A. Nonessential variables
  - B. Essential variables
  - C. Results of Welder Qualification tests
  - D. Project description & NDE methods
19. The \_\_\_\_\_ must certify the PQR as accurate.
- A. Inspector
  - B. Manufacturer or contractor
  - C. Welder
  - D. All of the above
20. For the SMAW process \_\_\_\_\_ is an essential variables for the WPS.
- A. Groove design
  - B. Post Weld Heat Treatment
  - C. Root spacing
  - D. Method of cleaning
21. For the SAW process \_\_\_\_\_ is an essential variable for the WPS.
- A. Supplemental powdered filler metal (if used)
  - B. Filler metal diameter
  - C. Preheat maintenance
  - D. Addition or deletion of peening
22. The basic purpose of testing a welder is to establish the welder's \_\_\_\_\_.
- A. Knowledge of welding requirements
  - B. Ability to deposit sound weld metal
  - C. Mechanical ability to operate equipment
  - D. General attitude toward welding inspectors

23. The record of a welder's performance test is called a \_\_\_\_\_.
- A. PQR
  - B. WQR
  - C. WPS
  - D. WPQ
24. If a welder qualified with the SMAW process on Jan. 1, 1994 and last welded with SMAW on March 15, 1994, would he still be qualified on October 7, 1994?
- A. Yes
  - B. No.
25. A welder qualifying with a groove weld welded from both sides is qualified to weld \_\_\_\_\_.
- A. Without backing
  - B. With all base metals
  - C. With backing only
  - D. With P1 backing only
26. Immediate retests of welders' qualifications coupons:
- A. Must use the same method
  - B. May use any method
  - C. Are not allowed
  - D. Require Inspector approval
27. Welder performance qualification records must describe all the \_\_\_\_\_ variables specified.
- A. Essential & nonessential
  - B. Nonessential
  - C. Essential
  - D. Brazing
28. A welder depositing 1/2" of weld metal with the SMAW process is qualified to deposit up to \_\_\_\_\_ of weld metal.
- A. 8"
  - B. Max to be welded
  - C. 1"
  - D. 1/2"

29. "P" numbers are used to designate groups of:
- A. Electrodes
  - B. Flux
  - C. Base metals
  - D. Joints
30. A welder qualifying by welding P-No. 21 to P-No.21 is qualified to weld:
- A. P-1- P-11 to P-1 – P -11
  - B. P-8 – P8
  - C. P-21 – P-25 TO P-21-P-25
  - D. P21 to P21 only
31. Welding electrodes are grouped in Section IX by:
- A. AWS class
  - B. ASME specification
  - C. SFA
  - D. "F" number
32. Ferrous weld metal chemical composition may be designated using:
- A. "P" number
  - B. Welder I.D.
  - C. "A" number
  - D. Page number
33. For welder qualifications with the SMAW process \_\_\_\_\_ is an essential variable.
- A. Base metal thickness
  - B. Peening
  - C. P-number
  - D. Electrode diameter
34. Each welder must be assigned a(n):
- A. P number
  - B. Unique identifier
  - C. Hood & gloves

- D. Inspector
35. May a welder, qualified in the 2G position on ¼ inch thick plate, weld a 1 inch outside diameter pipe, ¼ inch thick in the horizontal position without re-qualification?
- A. Yes
  - B. No
  - C. Not enough information provided
  - D. Yes, provided pipe is carbon steel, P#1
36. What is the difference between gas metal arc-welding and gas tungsten arc-welding processes?
- A. GMAW uses a continuously fed fillet metal and GTAW a tungsten electrode
  - B. The SFA specification of the filler metal
  - C. The F-number of the filler metal
  - D. GTAW is run with gas; gas is optional with GMAW
37. A welder has been tested in the 6-G position, using as E-7018 F-4 electrode, on 6" Sch 160 (0.718" nom) SA 106B pipe. Is this welder qualified to weld a 2" 300# ANSI schedule 80 bore flange to a 2" Schedule 80 SA 106 B nozzle neck?
- A. Yes
  - B. No
  - C. Not enough information provided
  - D. Yes, provided a backing strip is provided in the 2" weld.
38. May a welder who qualified using a double-groove weld, make a single V-groove weld without backing?
- A. Yes
  - B. No
  - C. Not enough information provided
  - D. Yes, because backing is not an essential variable for a welder
39. May a GTAW welder be qualified by radiography, in lieu of bend tests? The test coupon will be P-22 material and the production welds will be P-22 also.

- A. Yes
  - B. No
  - C. Not enough information provided
  - D. Yes, provided the P-22 is welded with F-22 fillers
40. Who is responsible for qualification of welding procedures, welders and welding operators?
- A. The Inspector
  - B. The A.I.
  - C. The Shop Foreman
  - D. The Manufacturer of Contractor
41. A welding electrode has the marking E-6010. The "1" marking indicates:
- A. Flat position only
  - B. Horizontal position only
  - C. All positions
  - D. Only good for heat treated welds
42. May a FCAW welder qualified using UT, be used to weld in production?
- A. Yes, welder can be used
  - B. No welder cannot be used
  - C. Yes, if welder is using GMAW (Short Arc)
  - D. Yes, if welder is qualified with backing
43. A welder may deviate from the parameters specified in a WPS if they are a nonessential variable.
- True Or False (circle one)
44. What is the number of transverse guided bend tests required for Performance Qualification in a 6G position?
- A. 2
  - B. 4
  - C. 6
  - D. 3

45. What positions are necessary to qualify a welder for all position pipe welding?
- A. 3G and 4G
  - B. 2G and 5G
  - C. 3G and 1G
  - D. 4G and 5G
46. What ASME Code Section has welding electrode storage requirements?
- A. ASME IX
  - B. ASME VIII
  - C. ASME B31.1
  - D. ASME II Part C
47. A repair organization has a WPS which states it is qualified for P-8 to P-8 material welded with E308, E308L, E309, E316, electrodes (SMAW process). The PQR, supporting this WPS, states the weld test coupons were SA-240 Type 304L material, welded with E308 electrodes. Is the WPS properly qualified for the base material listed?
- A. Yes
  - B. No
  - C. Not enough information given
  - D. Yes, if properly heat treated
48. May a GMAW, short circuit transfer, welding procedure be qualified using real-time ultrasonics?
- A. Yes
  - B. No
  - C. Not enough information given
  - D. Yes, provided bend tests are done
49. Three arc-welding processes are:
- A. BMAW, SMAW, EFGAW
  - B. FCAW, SAW, ESW
  - C. SMAW, GTAW, PAW
  - D. PTAW, SLAW, PEAW

50. A welder was qualified with a P-1 test coupon using SMAW E 7018 electrodes. May the welder weld P-4 material using E8028 electrodes with backing in production? (Assume the P-4 procedure using E8028 electrodes has been qualified)
- A. Yes
  - B. No
  - C. Not enough information provided
  - D. None of the above

51. Is a welding procedure qualified under the 1965 ASME Code Section IX still applicable?
- A. Yes
  - B. No, must be re-qualified
  - C. Is only applicable for 1965 pressure vessels
  - D. Cannot be used for new construction – repairs only

52. What are the various positions in which a welder may qualify for plate groove welds?
- A. 1G
  - B. 3G
  - C. 4G
  - D. All of the above

53. You are reviewing a WPQ (QW-484) for a welder testing in the 6-G position, on SA-53 grade B pipe (TS-60,000 psi). The test results indicate the following:

No.1 Tensile developed 51,000 psi, broke in the weld  
No.2 Tensile developed 56,900 psi, broke in base metal  
No.1 Transverse root bend satisfactory  
No.2 Transverse face bend satisfactory

Will this test qualify the welder?

- A. Yes
- B. No
- C. Not enough information given
- D. Tension test is acceptable but No.1 is unacceptable



54. What are the primary classifications of guided-bend tests permitted by the Code?
- A. Side and Transverse
  - B. Face and Root
  - C. Transverse and Longitudinal
  - D. Side and Face
55. A welder qualified by welding in the 5G position is qualified for what position on plate?
- A. F,H,OH
  - B. F,V,OH
  - C. V,OH,SP
  - D. H,V,OH
56. Which of the following is a covered electrode?
- A. E6010
  - B. E7018
  - C. E9028
  - D. All of the above
57. Applicable essential variables must be documented on which of the following?
- A. The WPS
  - B. The PQR
  - C. The WPQ
  - D. All of the above
58. In performance qualification of pipe welds to ASME Section IX, which positions require more than two guided bend specimens for qualification?
- A. 5G and 6G
  - B. 2G and 4F
  - C. 4G and 5G
  - D. None of the above
59. Name two defects that would cause visual rejection of a welder's test pipe or plate?
- A. Porosity, underfill

- B. Lack of penetration/fusion
  - C. Slag, overlap
  - D. Any of the above
60. A variable that, when changed will cause a change in the mechanical properties of the weldment is called a:
- A. Essential variable
  - B. Non-essential variable
  - C. Supplementary essential variable
  - D. All of the above
61. The test that determines the ultimate strength of groove-weld joints is a:
- A. Notch Toughness Test
  - B. Tension Test
  - C. Fillet Weld Test
  - D. Guided-Bend Test
62. The procedure qualification test is used to determine:
- A. The skill of the welder
  - B. That the proposed production weldment is capable of having the required properties
  - C. The corrosion-resistance of the proposed weldment
  - D. None of the above
63. A change in a supplementary essential variable requires re-qualification, when notch-toughness is a consideration.
- True or False (circle one)
64. When using Macro-examination of fillet weld tests, the weld and the HAZ must not reveal cracks when magnified at:
- A. 5X
  - B. 2X
  - C. 10X
  - D. No magnification is required – visual examination is required, only

65. A non-essential variable may be changes without re-qualification because:
- A. Nobody cares about non-essential variables
  - B. The welder is allowed to change variables at his discretion
  - C. Non-essential variables do not affect the mechanical or notch-toughness properties
  - D. Non-essential variables cannot be changes without re-qualification
66. A WPS must only address essential and, if applicable, supplementary essential variables.
- True Or False (circle one)
67. The data recorded on a PQR (non-editorial) may be changed provided :
- A. The AI approves
  - B. The test data on a PQR is a record of what occurred and should never be changed. Only editorial information can be changed on a PQR.
  - C. The API 510 inspector approves
  - D. The date of the WPS is changed
68. Tension tests may be used in lieu of bend tests to qualify welders or welding operators.
- True or False (circle one)
69. A groove weld bend test reveals a linear indication on the face of the bend surface that measures exactly 1/8" long. No other indications are seen. Does this coupon pass or fail?
- A. Pass
  - B. Fail
70. Unless notch-toughness is a consideration, a qualification in any position qualifies a welding procedure for all positions.
- True Or False (circle one)

71. The purpose of a WPS and PQR is to determine if a welder has the skill necessary to make sound production welds.
- True Or False (circle one)
72. Welders can be qualified by radiograph when using P 6X materials?
- True Or False (circle one)
73. It is permissible to sub-contract welding of coupons as well as other work to prepare coupons.
- True Or False (circle one)
74. Variable QW 402.4 for SMAW procedure qualification is a \_\_\_\_\_ variable.
- A. Essential
  - B. Non-essential
  - C. Supplemental essential
  - D. None of the above
75. Variable QW 404.24 for SAW procedure qualification is an \_\_\_\_\_ variable.
- A. Essential
  - B. Non-Essential
  - C. Supplemental essential
  - D. None of the above
76. Each manufacturer must certify the PQR (by signature) indicating that the information given is true and correct.
- True Or False (circle one)
77. Welder variable QW-405.1 (for welder qualifying with the SMAW process) is a \_\_\_\_\_ variable.
- A. Essential
  - B. Non-essential
  - C. Supplemental essential
  - D. None of the above

78. The purpose of a WPS and PQR is to determine if a proposed weldment to be used in construction is capable of providing the required properties for the intended application.
- True Or False (circle one)
79. A qualification in a 4G position qualifies a welder for all groove weld positions.
- True Or False (circle one)
80. A WPS must address all applicable non-essential variables.
- True Or False (circle one)
81. Groove weld coupons shall be tested by macro-examination when qualifying a welding procedure.
- True Or False (circle one)
82. A welding procedure must be qualified with impact tests only when required by the applicable construction code, such as ASME VIII Div.1.
- True Or False (circle one)
83. A welder qualified to weld in the 2G position on pipe would have to be qualified in which of the additional positions to qualify for all position groove welding on pipe?
- A. 1G
  - B. 2G
  - C. 5G
  - D. 6G
  - E. All of the above
84. The maximum preheat temperature decrease allowed without re-qualification of a GMAW groove weld procedure is:
- A. 50°F
  - B. 100°F
  - C. 125°F
  - D. 150°F
  - E. None of the above

85. A welder is qualified to weld all thicknesses of material when:
- A. The test is any thickness above 3/8 inch
  - B. The test thickness was 1/2 inch
  - C. The test thickness was 3/4 inch or over
  - D. The test pipe wall thickness was 5/8 inch and nominal pipe size was over 1/2 inches
86. What is the maximum defect permitted on the convex surface of a welder qualification bend test after bending except for corner cracks and corrosion resistant weld overlay?
- A. 1/4 inch
  - B. 1/8 inch
  - C. 1/16 inch
  - D. 3/16 inch
  - E. No defects are allowed
87. What period of inactivity from a given welding process requires the welder to re-qualify in that process?
- A. 3 months
  - B. 6 months
  - C. 9 months
  - D. 12 months
  - E. As stated by the AI
88. Notch-toughness requirements are mandatory:
- A. For heat treated metals
  - B. For quenched and tempered metals
  - C. For hardened and tempered metals
  - D. For annealed and tempered metals
  - E. When specified as required by the referencing Code Section
89. A welder qualified for SMAW using an E7018 electrode is also qualified to weld with:
- A. E7015
  - B. E6011
  - C. E6010
  - D. E7024
  - E. All of the above

90. Macro examination of an etched fillet weld section for performance qualification is acceptable if the examination shows:
- A. Complete fusion and freedom from cracks, excepting linear indication not exceeding 1/32 inch at the root.
  - B. Concavity or convexity no greater than 1/16 inch
  - C. Not more than 1/8" difference in leg lengths
  - D. All of the above
  - E. Both B and C above
91. Each manufacturer or contractor is responsible for the welding or brazing done by his organization. Whenever these words are used in Section IX, they shall include:
- A. Designer or architect
  - B. Designer or installer
  - C. Architect or installer
  - D. Installer or assembler
  - E. Assembler or designer
92. For P-11 materials, weld grooves for thicknesses \_\_\_\_\_ shall be prepared by thermal processes, when such processes are to be employed during fabrication.
- A. Less than 5/8 inch
  - B. 5/8 inch
  - C. 1 inch
  - D. 1 1/4 inches
  - E. None of the above
93. A SWPs may be used in lieu of a manufacturer qualified WPS when:
- A. Approved by the Inspector's Supervisor
  - B. Allowed by ASME V
  - C. One test coupon is tension tested per Article V
  - D. Compliance to Article V and Appendix E of ASME IX is shown
94. A change in a non-essential variable requires recertification of the PQR

True Or False (circle one)

95. Reduced-section tensile test specimens conforming to QW-462.1 (b) may be used on all thicknesses of pipe having an outside diameter greater than:

- A. 2 inches
- B. 2 1/2 inches
- C. 3 inches
- D. 3 1/2 inches
- E. 4 inches

96. Groove weld test may be used for qualification of welders. Which of the following shall be used for evaluation?

- A. Only bend tests
- B. Only radiography
- C. Both radiography and bend tests
- D. Either bend tests or radiography
- E. None of the above

97. Under which of the following conditions can a welder be qualified during production work?

- A. A 6" length of the first production groove weld may be qualified by radiography
- B. A bend test coupon may be cut from the first 12" length of weld
- C. A macro examination may be taken from the first 3" of weld length
- D. None of the above

98. Two plate tensile test specimens have been tested and found to be acceptable. The characteristics of each specimen are as follows:

Specimen 1: Width of 0.752"; thickness of 0.875"; ultimate tensile value of 78,524 psi

Specimen 2: Width of 0.702"; thickness of 0.852"; ultimate tensile value of 77,654 psi

What is the ultimate load for each specimen that was reported on the laboratory report?



- A. 51,668 & 46,445
- B. 67,453 & 56,443
- C. 78,524 & 77,654
- D. None of the above

99. Which of the following welding processes are currently not permitted to be used with SWPs as referenced in Appendix E of ASME IX?

- A. GMAW
- B. SAW
- C. PAW
- D. All of the above

## ANSWER KEY

- |       |  |           |
|-------|--|-----------|
| 1. C  |  | 52. C     |
| 2. D  |  | 53. D     |
| 3. D  |  | 54. A     |
| 4. D  |  | 55. C     |
| 5. B  |  | 56. B     |
| 6. B  |  | 57. D     |
| 7. C  |  | 58. D     |
| 8. C  |  | 59. A     |
| 9. D  |  | 60. B     |
| 10. B |  | 61. A     |
| 11. C |  | 62. B     |
| 12. C |  | 63. True  |
| 13. A |  | 64. D     |
| 14. C |  | 65. C     |
| 15. C |  | 66. False |
| 16. B |  | 67. B     |
| 17. D |  | 68. False |
| 18. B |  | 69. Pass  |
| 19. B |  | 70. True  |
| 20. B |  | 71. False |
| 21. A |  | 72. False |
| 22. B |  | 73. False |
| 23. D |  | 74. B     |
| 24. B |  | 75. A     |
| 25. C |  | 76. True  |
| 26. A |  | 77. A     |
| 27. C |  | 78. True  |
| 28. C |  | 79. False |
| 29. C |  | 80. True  |
| 30. C |  | 81. False |
| 31. D |  | 82. True  |
| 32. C |  | 83. C     |
| 33. C |  | 84. B     |
| 34. B |  | 85. C     |
| 35. B |  | 86. B     |
| 36. A |  | 87. B     |
| 37. B |  | 88. E     |
| 38. B |  | 89. E     |
| 39. A |  | 90. D     |
| 40. D |  | 91. D     |
| 41. C |  | 92. A     |

- 42. B
- 43. B
- 44. A
- 45. B
- 46. D
- 47. B
- 48. B
- 49. C
- 50. A
- 51. A

- 93. D
- 94. False
- 95. C
- 96. D
- 97. A
- 98. A
- 99. D

**BASIC PIPING INSPECTION TERMINOLOGY  
& RP 574  
Practice Questions**

1. In the Barlow formula for determining pipe thickness, the term S stands for:
  - a. Internal design gage pressure of the pipe in psi.
  - b. Pressure design strength for internal pressure, in inches
  - c. Allowable unit stress at the design temperature, in psi
  - d. Maximum strain at the average operating temperature, in psi
  
2. At low pressures and temperatures, the thickness determined by the Barlow formula may be so small that the pipe would have \_\_\_\_\_ structural strength.
  - a. Adequate
  - b. Insufficient
  - c. Ample
  - d. Good
  
3. A seamless NPS 12, A-106 Grade A pipe operators at 300 degrees F and 941 psi. The allowable stress is 16000 psi. Using the Barlow Equation, determine the thickness required for these conditions.
  - a. 0.375"
  - b. 0.750"
  - c. 0.353"
  - d. 0.706"
  
4. A seamless NPS6, A-106 Grade A pipe operators at 300 degrees F and 941 psi. The allowable stress is 16000 psi. The owner-user specified that the pipe must have 0.1" allowed for corrosion allowance. Using the Barlow Equation, determine the thickness required for these conditions:
  - a. 0.295"
  - b. 0.195"
  - c. 0.277"
  - d. 0.706"

5. A seamless NPS 8, A-53 Grade B pipe operators at 700 degrees F and 700 psi. The allowable stress is 16500 psi. The pipe has been in service for 6 years. The original wall thickness of the pipe was 0.375". The pipe wall now measures 0.30". Considering no structural requirements, estimate how long the piping can continue to operate and not be below the minimum thickness.
- 4.68 years
  - 9.8 years
  - 0 years; pipe now below minimum
  - 10.42 years
6. An Inspector finds a thin area in the body of a NPS 8 (8.625" O.D.) 600# gate valve. The valve's body is made from ASTM A216 WCB material. The system operates at 700 psi and 750 degrees F. Using a corrosion allowance of 0.125", what thickness must be present in order to continue to safely operate? Round to nearest hundredth.
- 0.48"
  - 0.38"
  - 0.51"
  - 0.43"
7. If corrosion or erosion is anticipated for a valve, what should be done prior to installing the valve?
- Severance thickness determinations should be made when the valves are installed so that the fretting rate and metal ruination can be determined
  - Retirement thickness measurements should be made after installation so that the fatigue rate and metal loss can be determined
  - Reference thickness measurements should be made when the valves are installed so that the corrosion rate and metal loss can be determined
  - Retina measurements of the macula should be made when the iris' are installed so the optical rate and losses of perception can be determined
8. Which of the items listed below would NOT normally be contained in inspection records or piping?
- Original date of installation, the specifications and strength levels of the materials used.

- b. Original vessel hydrotest pressures and conditions that the tests were performed under
  - c. Original thickness measurements and the locations and dates of all subsequent readings
  - d. Calculated retirement thicknesses
9. Accurate records of a piping system make possible an evaluation of \_\_\_\_\_ on any piping, valve or fitting:
- a. Computerisation
  - b. Security and continuity
  - c. Cost and competency
  - d. Service life
10. You are working as an inspector. While reviewing a tabulation of thickness data on a section of piping in non-corrosive or very low corrosive service, you find the initial thickness reading of an inspection point to be 0.432" and marked nominal on a NPS 6 pipe. At the next inspection 12 months later you find a reading by ultrasonics of 0.378" at the same point. Twelve months later UT readings were taken and the thickness at the point was still 0.378". What would this mean to you?
- a. No measurement was taken originally, the nominal thickness was listed and the piping probably had an under-tolerance of 12.5".
  - b. There was an error made by the inspector at the installation or the inspector who UT'd the piping at the next inspection made an error.
  - c. The UT machine that the inspector used during the 12 month inspection after installation was defective and not reading correctly.
  - d. The pipe contractor or the installer put the wrong schedule piping in service.
11. You are working as an inspector. While reviewing a tabulation of thickness data on a section of piping, you find the letter "C" marked under a column headed by the word METHOD. What does the "C" indicate?
- a. The inspection temperature of the pipe was COLD.
  - b. The thickness measurement was made by an inspector with the I.D. OF "C"

- c. The thickness measurement was taken with calipers.
  - d. The thickness measurement was CONFIRMED by a second party.
12. Which of the following is not an important function of an accurate sketch?
- a. Assist in determining future locations that urgently require examinations
  - b. Identifying systems and circuits in terms of location, size, materials etc.
  - c. Serve as field data sheets
  - d. None of the above
13. As soon as possible after completing an inspection, the Inspector should:
- a. Review the inspection records and schedule the next inspection
  - b. Always require a hydrotest
  - c. Sign all RT records
  - d. Notify the Piping Engineer, so he can wake up and go home
14. The Wenner 4-Pin methods, the soil bar, and the soil box do not represent methods of determining:
- a. Holidays
  - b. Pipe-to-soil potentials
  - c. Cathodic protection acceptability
  - d. All of the above
15. The total resistivity for a Wenner 4-Pin test that utilizes pins spaced 2 feet apart and a 6 "R" factor is:
- a. 2298 ohm/cm
  - b. 3500 ohm/cm
  - c. 6000 ohm/cm
  - d. 8000 ohm/cm

16. Which of the following is not a consideration when using a soil bar?

- a. Using a standard prod bar
- b. Avoiding the addition of water
- c. Applying pressure on the soil bar after injection
- d. None of the above

17. Which of the following is a consideration when using a soil box:

- a. Depth of Pins less than 4% of spacing
- b. Ensuring the soil has dried out before testing
- c. Avoiding contamination of the sample during handling and storage
- d. All of the above



## ANSWER KEY

1. c API 574, 11.1
2. b API 574, 11.1
3. a API 574, 11.1
4. a API 574, 11.1
5. b API 574, 11.1
6. c API 574, 11.2
7. c API 574, 11.2
8. b API 574, 12.1
9. d API 574, 12.1
10. a API 574, 4.1.1
11. c API Figure 34
12. d API 574, 12.2
13. a API 574, 12.5
14. d API 574, 10.3.1
15. a API 574, 10.3.1.4
16. d API 574, 10.3.1.4
17. c API 574, 10.3.1.9

**ASME B 16.5  
PRACTICE QUESTIONS**

1. The maximum depth and radial projection of an imperfection (deeper than the bottom of the serration) on a NPS 14 raised face flange is:
  - a. 0.31"
  - b. 0.018"
  - c. 0.18"
  - d. 0.25"
  
2. On an NPS 24, 600 Class flange, the thickness of the flange (minimum) is:
  - a. 4 1/2"
  - b. 3.00"
  - c. 6.0"
  - d. 4.0"
  
3. The allowable pressure (in psig) on a 100<sup>0</sup>F, Class 150 8" flange made from A-182 Grade F2 material is:
  - a. 170
  - b. 290
  - c. 300
  - d. 400
  
4. If a Class 1500 flange is to be made from A-182 F347 stainless steel and will be used at 280 psig with a carbon content of 0.09%, at what maximum temperature can this flange be used?
  - a. 1000<sup>0</sup>F
  - b. 1300<sup>0</sup>F
  - c. 1180<sup>0</sup>F
  - d. 2000<sup>0</sup>F
  
5. What is the minimum wall thickness of a Class 900 fitting that is NPS 16?
  - a. 1.56"
  - b. 2.6"
  - c. 3.2"
  - d. 4.1"

6. What is the rated working pressure of a flanged fitting that is a 400 Class with a material stress value of 16,200 psi?
- a. 1000 psig
  - b. 1500 psig
  - c. 800 psig
  - d. 740 psig
7. What is the minimum wall thickness of a NPS 5 Class 1500 fitting?
- a. 0.091"
  - b. 0.91"
  - c. 1.00"
  - d. 1.15"
8. What is the maximum system hydrostatic test pressure required for a Class 300 flange that is made from Group 1.10 material?
- a. 1125 psig
  - b. 450 psig
  - c. 1000 psig
  - d. None of the above
9. A local area has been thinned on the wall thickness of a flanged fitting. The fitting is NPS 8 Class 400, and the local area has been thinned to 0.400". Is this corrosion acceptable per ASME B 16.5?
- a. Yes
  - b. No
  - c. Cannot be calculated from information given
  - d. Wall thicknesses may not be less than that shown in B16.5
10. In question No.9, what is the maximum circular area of sub-minimum thickness allowed, in square inches?
- a. 2.75
  - b. 0.74
  - c. 1.85
  - d. 0.431

11. From problem No.9 and No.10 above, if two areas of sub-minimum thickness are observed on the fitting, what is the minimum distance between the edges of these circles?
- 3.0"
  - 2.70"
  - 8.0"
  - 3.70"
12. What is the maximum system hydrostatic test pressure required for a Class 600 flange in a flanged joint made from Group 3.5 material?
- 2250 psi
  - 1500 psi
  - 1000 psi
  - None of the above
13. A local area has been thinned on the wall of a flanged fitting. The fitting is NPS 12 Class 900, and the local area has been thinned to 0.945". What is the minimum acceptable thickness for this thinned area per ASME B 16.5?
- 0.9375"
  - 1.250"
  - 1.750"
  - Cannot be calculated from information given
14. From the information in Question No.13, what is the maximum circular area of sub-minimum thickness allowed in square inches?
- 2.75"
  - 1.33"
  - 1.85"
  - 0.431"
15. Using the information in questions No.13, 14 , if two areas of sub-minimum thickness are observed on the fitting, what is the minimum distance between the edges of these circles?
- 3.0"
  - 2.70"
  - 6.52"
  - 4.70"

16. What would be the calculated thickness of a new NPS 14 flanged fitting with a 900 psi class designation?
- a. 0.830"
  - b. 1.28"
  - c. 1.112"
  - d. None of the above
17. A NPS flanged fitting is operating at a temperature of 650°F and has a pressure class rating of 600 psi. Using a stress value of 17,400 psi, what would be the maximum permitted rated working pressure?
- a. 2000 psi
  - b. 1193 psi
  - c. 1175 psi
  - d. 1500 psi

## ANSWER KEY

1. c
2. d
3. b
4. a
5. a
6. d
7. b
8. a
9. b
10. d
11. d
12. a
13. a
14. b
15. c
16. b
17. c

**ASME B 31.3  
PRACTICE QUESTIONS**

1. What is the minimum wall schedule that can be used in a male threaded joint in normal fluid service, carbon steel (notch-sensitive) and NPS 1.5 and smaller?
  - a. Sch 10
  - b. Sch 40
  - c. Sch 80
  - d. Sch 160
  
2. What is an example of a straight-threaded joint?
  - a. Threads (male) of threaded piping
  - b. Threads (female) on a threaded valve
  - c. An union comprising male and female ends joined with a threaded union nut
  - d. A joint used in instrument tubing
  
3. Determine the linear expansion (in/100ft) of a carbon steel pipe between 70°F. and 450°F.
  - a. 3.01" per 100 ft
  - b. 3.39" per 100 ft
  - c. 2.93" per 100 ft
  - d. 3.16" per 100 ft
  
4. A 20' long carbon steel pipe is heated uniformly to 450°F from 70°F. Determine its length after heating.
  - a. 20.052'
  - b. 20.263'
  - c. 20.210'
  - d. 20.250'
  
5. If 4 materials, carbon steel, 18Chr-8Ni, Monel, Aluminium are heated from 70 degrees F. to 550 degrees F., which one will expand more?
  - a. 18 Chr-8Ni
  - b. Monel
  - c. Aluminium
  - d. Carbon Steel
  
6. What is the modulus of elasticity of carbon steel material (carbon content  $\leq 0.3$ ) at 700°F?

- a. 25,500,000 psi
  - b. 25,300,000 psi
  - c. 26,700,000 psi
  - d. 29,500,000 psi
7. Poisson's ratio may be taken as \_\_\_\_\_ at all temperatures for all metals.
- a. 0.30
  - b. 0.31
  - c. 0.32
  - d. 0.33
8. Stop valves are allowed on the inlet and outlet side of a pressure-relieving device, provided:
- a. The valves are approved by the jurisdiction
  - b. They are approved by the inspector
  - c. They can be locked or sealed in both the open and closed position
  - d. The valves are non-rising stem valves
9. For a liquid thermal expansion relief device which protects only a blocked-in portion of a piping system, the set pressure shall not exceed the lesser of the system test pressure or \_\_\_\_\_% of design pressure.
- a. 105
  - b. 110
  - c. 115
  - d. 120
10. An ASTM A53 Grade B pipe with a maximum wall thickness of 0.75" is being considered for use in a cold service. What minimum temperature can it be used and not have an impact test?
- a. +20°F
  - b. +15°F
  - c. +10°F
  - d. 0°F
11. Each set of impact test specimens shall consist of \_\_\_\_\_ specimen bars.
- a. 2
  - b. 3
  - c. 4



- d. 5
12. A carbon steel ASTM A 53 Grade B material is being impact tested. What is the minimum energy requirement for this material (average for 3 specimens-fully deoxidized steel)?
- a. 7 ft-lbs
  - b. 10 ft-lbs
  - c. 13 ft-lbs
  - d. 15 ft-lbs
13. A thicker wall pipe is joined to a thinner wall pipe. The thicker pipe is taper bored to facilitate the fit up. What is the maximum slope of the taper bore?
- a. 15 degrees
  - b. 20 degrees
  - c. 25 degrees
  - d. 30 degrees
14. A NPS 2 schedule 80 (0.218" wall) is welded into a NPS 6 Schedule 40 (0.0.280" wall) header. What size cover fillet weld ( $t_c$ ) is required around the fully penetrated groove weld of the branch into the header? (Express answer to nearest hundredth)
- a. 0.15"
  - b. 0.20"
  - c. 0.22"
  - d. 0.25"
15. An NPS 8 schedule A NPS 8 Schedule 40 (0.322" wall), ASTM A 106 Grade B, is to be welded. The weather is clear. The sun is shining. The temperature is 30 degrees F. What preheat temperature, if any, is required.
- a. None
  - b. 25°F
  - c. 50°F
  - d. 175°F
16. The zone for preheat shall extend:
- a. At least ½" beyond each edge of the weld
  - b. At least 1" beyond each edge of the weld
  - c. Over only the weld itself
  - d. At a minimum 2" each side of the weld

17. An ASME A 106 Grade B, NPS 8, Schedule 40 (0.322" wall) pipe is to be welded to an ASME A335 Grade P9, NPS 8, Schedule 40 (0.322" wall) pipe. What preheat temperature is required?
- 50°F
  - 175°F
  - 300°F
  - 350°F
18. When components of a piping system are joined by welding, the thickness to be used in applying the heat treatment provisions of ASME B 31.3, Table 331.1.1 shall be:
- That of the thinner component measured at the joint, except for certain exclusions.
  - That of the thicker component measured at the joint, except for certain exclusions.
  - That of the average thickness of the two components, except for certain exclusions.
  - That of the thinner component measured in the thinner pipe except exclusions.
19. An NPS 4 Schedule 40 (0.237" wall) branch connection is welded into a NPS 6 Schedule 40 (0.0.280" wall) header. A ¼" reinforcing pad is used around the branch connection. The branch connection is inserted into the header. The material of the branch and the header is ASTM A 106 Grade B. What thickness would be used to determine whether heat treatment of this connection is required? (Express answer to nearest hundredth.)
- 0.80"
  - 0.77"
  - 0.70"
  - 0.60"
20. An ASME A335 Grade P9, NPS 8, Schedule 40(0.322" wall) pipe is to be welded to an ASME A335 Grade P9, NPS 8, Schedule 40 (0.322" wall) pipe. What Brinnell Hardness is required after post weld heat treatment?
- 200
  - 225
  - 241
  - 250

21. Where a hardness limit is specified in Table 331.1.1, at least \_\_\_\_\_% of welds, hot bends, and hot formed components in each furnace heat treated batch and 100% of those locally heat treated shall be tested.
- a. 5
  - b. 10
  - c. 15
  - d. 20
22. An ASME A335 Grade P11, NPS 8, Schedule 120 (0.718" wall) pipe is to be welded to an ASME A 335 Grade P9, NPS 8, Schedule 80 (0.500" wall ) pipe. What Brinnell Hardness number is required after post weld heat treatment?
- a. The Grade P11 material is the controls; thus, the Bhn number must be  $\leq 225$ .
  - b. The average of both material must give a Bhn number of  $\leq 233$ .
  - c. The grade P9 material only requires checking; its Bhn number must be  $\leq 241$ .
  - d. The grade P11 material must be  $\leq 225$  and the Grade p9 material must be  $\leq 241$ .
23. Flattening of a bend, the difference between maximum and minimum diameters at any cross section, shall not exceed \_\_\_\_\_ % on nominal outside diameter for internal pressure.
- a. 5
  - b. 8
  - c. 10
  - d. 12
24. Flattening of a bend, the difference between maximum and minimum diameters at any cross section, shall not exceed \_\_\_\_\_ % on nominal outside diameter for internal pressure.
- a. 2
  - b. 3
  - c. 5
  - d. 8
25. While assembling a piping system it is required to pull two pieces into alignment. This distorts one of the pieces (puts a bend into one of the pipe sections. The assembly is in a strain that the inspector

feels is detrimental to the equipment. What action should the inspector take?

- a. Since any distortion that introduces a strain is prohibited, the detail(s) should be removed and the problem corrected.
  - b. Since the pipe details fit up and there appears to be no problem, the system may be tested and if no leaks the Inspector can accept it.
  - c. As long as the system will fit together and the flanges and other connections will make connection, the Inspector may accept it.
  - d. If the system will not make connection the Inspector should require the problem to be corrected; however, if it connects without leaks, the Inspector may accept it.
26. Before bolting up flanged joints, the Inspector should check alignment to the design plane. It should be within \_\_\_\_\_in / ft or \_\_\_\_\_% measured across any diameter.
- a. 1/16, 0.5%
  - b. 1/8, 0.05%
  - c. 1/32, 0.05%
  - d. 1/64, 0.5%
27. Before bolting up flanged joints, the Inspector should check alignment of the flange bolt holes. They shall be aligned within \_\_\_\_\_ inch maximum offset.
- a. 1/32
  - b. 1/16
  - c. 1/8
  - d. 9/64
28. An Inspector, checking bolts on flanges, finds 3 bolts in a NPS 6, 300# class flange that will not meet ASME B31.3 bolt length specification. What did he find?
- a. The bolt only extended from the nut by 1/4"
  - b. The lack of engagement was 2 threads.
  - c. The lack of engagement was 1 thread
  - d. The bolt only extended from the nut by 3/8"
29. You find a flanged joint with two fibre gaskets used to make up the joint. What is the correct course of action for an Inspector?

- a. Remove the gaskets and replace them with two spiral wound grafoil filled gaskets
  - b. The joint is acceptable as is because the gaskets are fibre.
  - c. Two gaskets are unacceptable; have the joint repaired to take only one gasket
  - d. Remove the gaskets and replace them with two wrapper with grafoil tape
30. An Inspector finds incomplete penetration in a radiograph of a girth weld of normal fluid service piping. What can he accept or can he accept any incomplete penetration?
- a. If the incomplete penetration is 1/16" or less (or  $\leq$  0.2T w) deep, he may accept.
  - b. If the incomplete penetration is 1/32" or less (and  $\leq$  0.2T w) deep, he may accept
  - c. He may not accept the incomplete penetration
  - d. If the incomplete penetration is 1/32" or less (or  $\leq$  Tw) deep, he may accept
31. When spot or random examination reveals a defect, what should the Inspector do?
- a. Take one additional sample of the same kind used for the first examination. If it is acceptable, repair or replace the original defect and accept the job.
  - b. Take two additional samples of the same kind used for the first examination. If they are acceptable, repair or replace the original defect and accept the job.
  - c. Take two additional samples using a different inspection technique. If this is acceptable, repair or replace the original defect and accept the job.
  - d. Take 4 additional samples of the same kind used for the first examination. If they are acceptable, repair or replace the original defect and accept the job.
32. Prior to a hydrostatic test, a piping system may be subject to a preliminary test using air at no more than \_\_\_\_\_ psi gage to locate major leaks.
- a. 45
  - b. 35
  - c. 25
  - d. 15

33. What is the minimum time that a leak test must be maintained (all joints and connections shall be examined for leaks)?
- 60 minutes
  - 45 minutes
  - 30 minutes
  - 10 minutes
34. A NPS 10 ASTM A335 Grade P9 pipe was installed. It had to be changed by adding an NPS 6 ASTM A335 Grade P9 branch connection. The weld(s) were post weld heat-treated. When should this section of piping be leak tested or should it be leak tested?
- before and after the heat treatment
  - before the heat treatment
  - after the heat treatment
  - no test is required
35. If a non-toxic flammable liquid is used as a leak-testing medium, it must have:
- At least a flash point of 120<sup>0</sup>F
  - A boiling point of 150<sup>0</sup>F
  - A vapour point of 100<sup>0</sup>F
  - A staybolt viscosity of 120 at 122<sup>0</sup>F
36. Where the design temperature of the system is the same as the hydrostatic test temperature, the hydrostatic test pressure shall be not less than:
- That calculated according to B31.3
  - 1.1 times the design pressure
  - 1.25 times the operating pressure
  - 1.5 times the design pressure
37. Calculate the hydrostatic leak test at 70<sup>0</sup>F. required for a piping system with NPS 6 ASTM A 106 Grade B pipe that operates at a maximum of 600<sup>0</sup>F and 400 psi. Round to the nearest psi.
- 500 psi
  - 600 psi
  - 694 psi
  - 440 psi
38. Where the test pressure of piping exceeds the a vessels test pressure, and it is not considered practicable to isolate the piping from a vessel, the piping and the vessel may be tested together at

the vessel test pressure, provided the owner approves and the vessel test pressure is not less than \_\_\_\_\_% of the piping test pressure calculated by ASME B31.3, paragraph 345.4.2 (b).

- a. 67
  - b. 77
  - c. 85
  - d. 110
39. If a pneumatic leak test is used, the test pressure shall be \_\_\_\_\_% of design pressure.
- a. 50
  - b. 150
  - c. 125
  - d. 110
40. If it becomes necessary to use a "Sensitive Leak Test" method, the test pressure shall be at least the lesser of \_\_\_\_\_psi or \_\_\_\_\_% of the design pressure.
- a. 10,33
  - b. 15,25
  - c. 17,23
  - d. 20,20
41. Unless otherwise specified by the engineering design, the following records shall be retained for at least \_\_\_\_\_ years after the record is generated for the project: examination procedures, and examination personnel qualifications.
- a. 10
  - b. 8
  - c. 5
  - d. 2
42. What is the longitudinal weld joint factor,  $E_j$ , for API 5L ERW (Electric Resistance Welded) pipe?
- a. 1.00
  - b. 0.95
  - c. 0.85
  - d. 0.60
43. What is the casting quality factor,  $E_c$ , of a A216 carbon steel casting that is not upgraded per B31.3 paragraph 302.3.3 (c) and Table 302.3.3 (c)?

- a. 0.85
  - b. 0.80
  - c. 0.75
  - d. 0.60
44. A carbon steel pipe has  $\leq 0.3\%$  carbon in it. What is its Modulus of Elasticity at  $400^{\circ}\text{F}$ ?
- a. 30,000,000 psi
  - b. 31,900,000 psi
  - c. 29,000,000 psi
  - d. 27,700,000 psi
45. Double welded slip-on flanges should be \_\_\_\_\_ between the welds for fluid services that require leak testing of the inner fillet weld, or when fluid handled can diffuse into the enclosed space, resulting in possible failure.
- a. sanded
  - b. machined
  - c. scored
  - d. vented
46. If a relief valve has a stop valve at the inlet or outlet. Is it permissible to close either or both these valves while the equipment the relief valve is protecting is in service.
- a. It is not permissible to block off a relief valve while the equipment it is protecting is in operations.
  - b. It is permissible if an authorized person is present and this person can relieve the pressure by another means.
  - c. It is permissible to block off a relief valve while the equipment it is protecting is in a reduced operating mode, i.e. the operating pressure and/or temperature is reduced.
  - d. It is permissible to block off a relief valve only when the equipment it is protecting is not in operations.
47. Why would you not use cast iron material in the majority of cases in oil refinery or chemical plant applications?
- a. The possibility of embrittlement when handling strong caustic solutions.
  - b. Its lack of ductility and its sensitivity to thermal and mechanical shock restricts its use.



- c. The possibility of stress corrosion cracking when exposed to acids or wet H<sub>2</sub>S.
  - d. The possibility of stress corrosion cracking if exposed to chlorides in H<sub>2</sub>O > 50 ppm.
48. If you expose copper and copper alloys to ammonia, what would this possibly cause?
- a. embrittlement
  - b. stress corrosion cracking
  - c. hydrogen attack
  - d. sulphidation
49. You have a fluid that does not operate at high pressure. The fluid is not toxic. The fluid is not flammable. Exposure to the fluid will not cause damage to human tissue. The design gage pressure is 120 psi and the operating temperature is 100<sup>o</sup>F. The owner requires metal piping to be used and he does not designate the category. No cyclic problems will occur. What category fluid service would you design?
- a. Normal fluid service
  - b. Category D fluid service
  - c. Category M fluid service
  - d. High pressure fluid service
50. In elevated temperature service any condition of pressure and temperature under which the design conditions are not exceeded is known as the:
- a. Operating conditions
  - b. Design condition
  - c. Extent of the excursions
  - d. Service life
51. In elevated temperature service a condition under which pressure or temperature or both, exceed the design conditions is known as:
- a. A design condition
  - b. An operating condition
  - c. An excursion
  - d. A duration
52. In elevated temperature service a condition under which pressure or temperature or both, exceed the design conditions is known as:
- a. Estimated life
  - b. Service life

- c. Equivalent life
  - d. Excursion life
53. The Inspector finds that ERW (electric resistance weld) pipe is used in a piping system. What longitudinal joint factor ( $E_j$ ) would be used to calculate the required thickness for pressure?
- a. 0.85
  - b. 0.60
  - c. 0.80
  - d. 0.90
54. The joint factor cannot be increased by additional examination on which of the following longitudinal pipe joint:
- a. Electric fusion weld, single butt weld, straight or spiral, without filler metal
  - b. Electric fusion weld, double butt weld, straight or spiral
  - c. Electric fusing weld, single butt weld, straight or spiral with filler metal
  - d. Electric resistance weld, straight or spiral
55. A NPS 10 pipe made from ASTM A106 Grade B carbon steel is to be checked for minimum thickness ( $t_m$ ). The pipe operated at 900 degrees F. The existing thickness is 0.29". Determine the coefficient Y.
- a. 0.4
  - b. 0.5
  - c. 0.6
  - d. 0.7
56. A NPS 10 pipe made from ASTM A53 Grade B carbon steel is to be checked for thickness ( $t$ ). The pipe operates at 975 degrees F. The existing thickness is .29". Determine the coefficient Y.
- a. 0.4
  - b. 0.5
  - c. 0.6
  - d. 0.7
57. "S" is defined as the stress value for material from Table A-1 of ASME B31.3. Pick the value of "S" when the material is ASTM A335 Grade P9 and the temperature is 950°F.
- a. 11400 psi

- b. 10600 psi
  - c. 7400 psi
  - d. 20000 psi
58. An NPS 12 seamless pipe made from ASTM A-53 Grade B material operates at 600 psi and 600 degrees F. Calculate the pressure design thickness for these conditions.
- a. 0.218"
  - b. 0.442"
  - c. 0.205"
  - d. 0.191"
59. An NPS 12 (12.75" o.d.) seamless pipe made from ASTM A-53 Grade B material operates at 600 psi and 600 degrees F. The conditions require that a corrosion allowance of 0.125" be maintained. Calculate the minimum required thickness for these conditions.
- a. 0.218"
  - b. 0.346"
  - c. 0.330"
  - d. 0.436"
60. An NPS 4(4.5" o.d.) seamless pipe made from ASTM A-106 Grade A material operates at 300 psi and 400 degrees F. The pipe must cross a small ditch and it must be capable of supporting itself without any visible sag. A piping Engineer states that the pipe must be at least 0.25" thick just to support itself and the liquid product. He also states that a 0.10" corrosion allowance must be included. Calculate the thickness required for the pipe.
- a. 0.292"
  - b. 0.392"
  - c. 0.350"
  - d. 0.142"
61. A blank is required between two NPS 8,150 pound class flanges. The maximum pressure in the system is 285 psi at 100 degrees F. A corrosion allowance of 0.10" is required. The inside diameter of the gasket surface is 8.25". The blank is ASTM A-285 Grade C material. Calculate the thickness required for the blank.
- a. 0.545"
  - b. 0.584"
  - c. 0.530"
  - d. 0.552"

62. Which of the below may only be used for category D fluid service?
- ASTM A-333 Grade 6
  - API 5L Grade X46
  - ASTM A-106 Grade B
  - ASTM A-53 Grade F
63. What is the minimum thickness of a blank that is made from A516-60 material (seamless) and is 17.375" I.D.? The pressure is 630 psi at 600°F. Corrosive product will be on both sides of the blank, and the specified corrosion allowance is 1/8".
- 1.5"
  - 1.627"
  - 1.752"
  - 2.067"
64. Per B31.3, a piping designer must have \_\_\_\_\_ years of experience if she has a bachelor's degree in engineering?
- 5
  - 10
  - 15
  - Not specified
65. Using the given formula, calculate the design pressure of a 0.397" replacement pipe (measured thickness) with the following information:
- Material: A672 B70 Class 13
  - Pressure and temperature: 753 psi @ 300°F
  - Diameter: NPS 16
  - Corrosion allowance: 1/16"
- $$P = \frac{2SE(t-c)}{D}$$
- 1000 psi
  - 949 psi
  - 942 psi
  - 800 psi
66. What is the design pressure allowed on a replacement A-135-A ERW pipe that is NPS 6 (6.625"), and is installed in a system operating at 700°F? The pipe is Sch.80, and the engineering specifications require a 1/16" erosion allowance to be maintained.

$$P = \frac{2SE(t-c)}{D}$$

- a. 1596 psi
  - b. 1167 psi
  - c. 1367 psi
  - d. 1800 psi
67. What schedule of seamless pipe will be required if a seamless replacement piece is ordered for a piping circuit with the following conditions:
- i) Material : A-106 Grade B
  - ii) Pressure and temperature: 770 psi @ 800°F
  - iii) Diameter: NPS 18
  - iv) Corrosion allowance: 1/8"
- a. Sch. 40
  - b. Sch. 60
  - c. Sch. 80
  - d. Sch. 140
68. An A 381 Y 35 pipe is 1.0" thick and is installed in a system operating at 150 psi. A replacement pipe will be ordered, and will be the same material (not normalized or quenched/tempered). If the design minimum temperature is 400F and the nominal pressure stress is 10,000 psi, what temperature can this material be operated at without impact testing?
- a. +8°F
  - b. -8°F
  - c. 68°F
  - d. 20°F

## ANSWER KEY

1. c ASME B31.3, Table 314.2.1
2. c ASME B31.3, Table 314.2.2
3. d ASME B31.3, Table 319.3.1 (a) & Appendix
4. a ASME B31.3, Table 319.3.1 (a) & Appendix
5. c ASME B31.3, Table 319.3.1 (a) & Appendix
6. a ASME B31.3, Table 319.3.2 (a) & Appendix
7. a ASME B31.3, Table 319.3.3
8. c ASME B31.3, Table 322.6.1 (c) & Appendix
9. d ASME B31.3, Table 322.6.3 (b) (2)
10. b ASME B31.3, Table A-1 & Fig. 323.2.2
11. b ASME B31.3, 323.3.3
12. b ASME B31.3, 323.3.5, Table 323.3.5
13. d ASME B31.3, Fig. 328.4.3
14. a ASME B31.3, 328.5.4 (c) & Fig. 328.5.4D
15. c ASME B31.3, 330.1.1 & Table 330.1.1
16. b ASME B31.3, 330.1.4 and 323.2.2B
17. d ASME B31.3, 330.2.3 & Table 330.1.1
18. b ASME B31.3, 331.1.3
19. c ASME B31.3, 331.1.3 & Fig 328.5.4D
20. c ASME B31.3, Table 331.1.1
21. b ASME B31.3, 331.1.7(a)
22. d ASME B31.3, 331.1.7(b)
23. b ASME B31.3, 332.2.1
24. b ASME B31.3, 332.2.1
25. a ASME B31.3, 335.1.1(a)
26. a ASME B31.3, 335.1.1 (c)
27. c ASME B31.3, 335.1.1 (c)
28. b ASME B31.3, 335.2.3
29. c ASME B31.3, 335.2.4
30. b ASME B31.3, Table 341.3.2A
31. b ASME B31.3, 341.3.4
32. c ASME B31.3, 345.2.1 (c)
33. d ASME B31.3, 345.2.2(a)
34. c ASME B31.3, 345.2.2(b)
35. a ASME B31.3, 345.4.1
36. d ASME B31.3, 345.4.2 (a)
37. c ASME B31.3, 345.4.2 (b)
38. b ASME B31.3, 345.4.3 (b)
39. d ASME B31.3, 345.5.4
40. b ASME B31.3, 345.8(a)
41. c ASME B31.3, 346.3
42. c ASME B31.3, Table A-1B
43. b ASME B31.3, Table A-1A
44. d ASME B31.3, Table C-6

- 45. d ASME B31.3, F308.2
- 46. b ASME B31.3, F322.6
- 47. b ASME B31.3, F323.4(a)
- 48. b ASME B31.3, F323.4(f)(2)
- 49. a ASME B31.3, Figure M-300
- 50. a ASME B31.3, V300.1
- 51. c ASME B31.3, V300.1
- 52. b ASME B31.3, V300.1
- 53. a ASME B31.3, 302.3.4
- 54. d ASME B31.3, 302.2.4, Table 302.3.4; 314.2.1 (a)
- 55. a ASME B31.3, 304.1.1 (b), Table 304.1.1
- 56. c ASME B31.3, 304.1.1 (b), Table 304.1.1
- 57. b ASME B31.3, 304.1 (b)
- 58. a ASME B31.3, 304.1.2 (a)
- 59. b ASME B31.3, 304.1.2 (a)
- 60. b ASME B31.3, 304.1.2 (a)
- 61. a ASME B31.3, 304.5.3
- 62. d ASME B31.3, 305.2.1
- 63. c ASME B31.3, 304.5.3
- 64. b ASME B31.3, 301.1
- 65. c ASME B31.3 / API 570 Table 7-1
- 66. c ASME B31.3 / API 570 Table 7-1
- 67. c ASME B31.3, 304.1.2 / API 574 Table 1 & Table 3
- 68. d ASME B31.3, Appendix A, Fig. 323.2.2A

**API 570 PRACTICE QUESTIONS  
(CLOSED BOOK)**

1. API Recommended Practice 574, Inspection of Piping, Tubing Valves, and Fittings, does not cover.
  - a. Control valves.
  - b. Piping smaller than 2" NPS
  - c. Tubing smaller than 1.5" diameter
  - d. Fittings smaller than 2" NPS
  
2. The refining industry generally uses what type piping for severe service?
  - a. Brass
  - b. Cast
  - c. Seamless
  - d. Longitudinal seam welded
  
3. Piping made by rolling plates to size and welding the seams is larger than \_\_\_\_\_ inches outside diameter.
  - a. 10
  - b. 16
  - c. 14
  - d. 12
  
4. Steel and alloy piping are also manufactured to standard dimensions in nominal pipe sizes up to \_\_\_\_\_ inches.
  - a. 24
  - b. 36
  - c. 48
  - d. 50
  
5. Steel and alloy piping are also manufactured to standard thicknesses designated as schedules in nominal pipe sizes up to \_\_\_\_\_ inches.
  - a. 24
  - b. 36
  - c. 48
  - d. 50
  
6. The actual thickness of wrought piping may vary from its nominal thickness by a manufacturing under tolerance of as much as \_\_\_\_\_ percent.



- a. 12.5
  - b. 12.0
  - c. 10.0
  - d. 10.5
7. Cast piping has thickness tolerance of +\_\_\_inch and - \_\_\_inch.
- a. 1/16,0
  - b. 1/16, 1/16
  - c. 1/32, 1/32
  - d. 3/64, 0
8. For all nominal pipe sizes of \_\_\_ inches and smaller, the size refers to the nominal inside diameter.
- a. 10
  - b. 12
  - c. 14
  - d. 16
9. Under tolerance of welded pipe often used in refinery service is \_\_\_\_\_ inch.
- a. 0.125
  - b. 0.050
  - c. 0.010
  - d. 0.005
10. For what service is cast iron piping normally used?
- a. Non-hazardous service, such as lube oils.
  - b. Non-hazardous service, such as water.
  - c. Corrosive service, such as acids.
  - d. Non-corrosive service, such as low temperature caustic.
11. Tubing is generally seamless drawn, but it may be welded. Its stated size is its actual:
- a. Outside radius
  - b. Inside diameter
  - c. Outside diameter
  - d. Inside radius

12. There are many type valves. Which is incorrect valve type listed below?
- Style valve
  - Gate valve
  - Check valve
  - Globe valve
13. What type valve is normally used in a fully open or fully closed position?
- Gate
  - Globe
  - Slide
  - Plug
14. What type gate valves have body and port openings that are smaller than the valves' end opening.
- Borda tube gate valves
  - Reduced-port gate valves
  - Weir gate valves
  - Sluice gate valves
15. What type of gate valve should not be used as block valves associated with pressure relief devices?
- It is normally used as block valve
  - It is commonly used to regulate fluid flow
  - It is ordinarily used to measure pressure drop
  - It is frequently used in place of a slide valve.
16. What is a globe valve used for?
- Sluice gate valves
  - Weir gate valves
  - Borda tube gate valves
  - Reduced-port gate valves
17. A plug valve consists:
- Of a slide or slides that operate perpendicularly to the flow and move on rail guides to interrupt flow.
  - Of a ball with a hole in it that fits into the valve body and interrupts the flow of material.

- c. Of a circular gate that operates in and out in the body to interrupt flow.
  - d. Of a tapered or cylindrical truncated cone with a slot fitting into a correspondingly shaped seat.
18. What type of valve depends upon a spherical type gate has a hole in it and is rotated to open or close it?
- a. Diaphragm valve
  - b. Plug valve
  - c. Globe valve
  - d. Ball valve
19. What are check valves normally used for?
- a. They are generally used in erosive or high-temperature service.
  - b. They are used to automatically prevent backflow.
  - c. They are commonly used to regulate fluid flow.
  - d. They are used for conditions that require quick on/off or bubble tight service.
20. What are slide valves generally used for?
- a. They are used to automatically prevent backflow.
  - b. They are used for conditions that require quick on/off or bubbletight service.
  - c. They are generally used in erosive or high-temperature service.
  - d. They are commonly used to regulate fluid flow.
21. What type of joint listed below would you **NOT** used in a 300 psi pipe system?
- a. Lap-joint flanged
  - b. Welded
  - c. Bell-and-spigot
  - d. Weld-neck flanged
22. What type of pipe joint is generally limited to piping in non-critical service and has a nominal size of 2 inches or smaller?
- a. Flanged joint
  - b. Threaded joint
  - c. Socket-weld joint
  - d. Butt-welded joint

23. Socket welded joints are usually used in nominal pipe size of \_\_\_\_\_ or smaller.
- 4"
  - 3"
  - 2.5"
  - 2"
24. Which of the joints listed is the most common found in the petroleum industry?
- Compression joints
  - Butt-welded joints
  - Bell-and-spigot joints
  - Sleeve joints
25. The primary purpose of piping inspection is to:
- Satisfy the requirements of jurisdictional regulations.
  - Achieve at the lowest cost, piping that is reliable and has the desired quality.
  - Ensure plant safety and reliability; also achieve desired quality assurance.
  - Produce a piping system that meets minimum design and serviceability requirements.
26. Adequate inspection is a prerequisite for maintaining piping:
- In a leak free condition
  - Satisfactory to the owner-user
  - In a satisfactory operating condition
  - In a safe, operable condition
27. OSHA 1910.119 mandates that:
- Piping be inspected to a code or standard such as API 570.
  - Owner/user adopt API 570.
  - Water piping be inspected the same as chemical piping.
  - The owner/user immediately shut down corroded piping system.
28. Regularly requirements usually cover only those conditions that affect:
- Pollution
  - Operations

- c. Safety
  - d. Maintainance
29. The single most frequent reason for replacing piping is:
- a. An over-zealous Inspector
  - b. In-service cracking
  - c. H2S deterioration and erosion
  - d. Thinning due to corrosion
30. On piping that is operating, the key to effective monitoring of piping corrosion is identifying and establishing \_\_\_\_\_.
- a. L.O.L's
  - b. J.L.G's
  - c. T.M.L's
  - d. C.U.I's
31. You are asked to recommended a method for determining the thickness of a pipe that has 1.5" of insulation, with a vapour barrier, and aluminium jacketing on it. Problems can occur when tightening bolts to correct leaking flanges in-service. Which of the below is not one of these problems?
- a. Bolt interactions
  - b. Yielding due to overload
  - c. Flange deflection
  - d. None of the above
32. Which one of the following is not a factor for consideration when establishing corrosion-monitoring programs?
- a. Accessibility
  - b. Circuitisation
  - c. Transducer diameter
  - d. Risk classification
33. A greater loss in metal thickness will usually be observed near a restriction or change in direction in a pipe line. What usually causes this?
- a. The effects of turbulence or velocity
  - b. The effects of stagnation or fretting
  - c. The effects of corrosion or declination
  - d. The effects of oxidation or waning

34. What type of problem would you expect to find in catalyst, flue-gas, and slurry piping on a Fluid Catalytic Cracking Unit.
- Embrittlement
  - Cracking
  - Corrosion
  - Erosion
35. Stainless steel such as type 304 18 Chr.-8 Ni in the presence of temperature above 100° F. may crack because of the presence of:
- Nitrates
  - Sulphides
  - Chlorides
  - Dissolved oxygen
36. A 2" diameter line is injecting a product into an 8" diameter pipe. What type of deterioration would you expect to take place?
- Accelerated corrosion or erosion
  - Long term corrosion
  - Chloride cracking
  - Dissolved oxygen pitting.
37. An inspector is checking a piping system that has had problems with isolated corrosion at or near the welds of piping shoes. Without knowing what product is in the line, what would be the best answer below for the problem?
- The shoes are at high stress points and thus leaks occur.
  - The welds of the shoes to the pipe were too large.
  - The welds of the shoes to the pipe burned nearly through the pipe.
  - The shoes are acting as cooling fins and causing localized temperature differences.
38. What type of problem would you expect in piping containing Amine?
- Dissolved oxygen cracking
  - Stress corrosion cracking
  - Galvanic corrosion
  - Crevice corrosion
39. What area do you consider to be of most concern when inspecting a piping system?

- a. Underneath insulation on lines operating at temperatures above 200°F.
  - b. In a straight run pipe containing motor oil
  - c. At and/or downstream of a chemical injection point.
  - d. Underneath insulation on lines operating below 25°F.
40. Leaks in utility piping (water, steam etc.) are:
- a. Only of minor concern and may be disregarded.
  - b. Always dangerous but losses are negligible.
  - c. Seldom hazardous but they do result in losses.
  - d. Usually hazardous and losses result.
41. Where do many (maybe the majority) of leaks occur in pipelines?
- a. Straight runs of piping
  - b. Flanges or packing glands
  - c. Changes of direction of piping
  - d. Downstream of injection points
42. The prompt repair of \_\_\_\_\_ will often prevent serious corrosion or erosion of gasket surface or packing glands.
- a. Supports
  - b. Leaks
  - c. Guides
  - d. Welds
43. The deformation of a vessel wall in the vicinity of a pipe attachment; expansion joints that are not performing properly; a pipe dislodged from its support; etc are evidence of:
- a. Misalignment
  - b. Leaks
  - c. Weld problems
  - d. Drips
44. Spring hanger loading should be checked under:
- a. Elevated temperature conditions
  - b. Both cold and hot conditions
  - c. Sub-zero temperature conditions
  - d. Ambient temperature conditions

45. An inspector finds concrete fireproofing around a structural steel column with openings (cracks). The inspector suspects that water may be entering. What should the inspector do?
- The inspector should ask his supervisor what he should do.
  - All the fireproofing should be stripped from the column.
  - Enough fireproofing should be removed to determine the extent of the problem.
  - No action should be taken.
46. If a steel column in a pipe support rack is corroded. What should the inspector do?
- Have the corrosion products cleaned off and have the column painted
  - No action is required
  - Thickness measurements should be taken to determine whether enough metal is left to safely support the load.
  - Call a piping engineer.
47. How do you inspect non-destructively for loose or broken foundation bolts?
- Break out the concrete around the foundation bolt.
  - Hammer the bolts vertically with a hammer.
  - Lightly rap the bolts sideways with a hammer while holding a finger against the opposite side.
  - Radiograph the foundation.
48. If you find a slotted hole in a base-plate, what would this indicate to you?
- It indicates that the craftsman making the hole was not sure of its exact location.
  - It indicates that the base-plate may have been designed to accommodate expansion.
  - It indicates that the base-plate was possibly made to be used in multiple locations.
  - It indicates that the base-plate had two holes side by side punched in it by mistake.
49. As an inspector, you find a 6" diameter pipe line that is vibrating and swaying. What is one of the most important things you would check for and where would you check?
- Fireproofing on the supports should be checked for spalling and breaking.



- b. Welds should be inspected for cracks, particularly at points of restraint.
  - c. Base-plates of the pipe supports should be checked to see if the bolts are tight.
  - d. Valves in the system should be checked to insure they are not vibrating open/closed.
50. An insulated pipe shows evidence of defects in the jacketing covering the insulation. You suspect that water may be getting in through the defects. What you would do?
- a. Strip the pipe line complete to allow 100% inspection and renewal of the insulation.
  - b. If no discoloration is present to indicate corrosion (rust), no action is required
  - c. Strip enough insulation to determine the extent and severity of possible corrosion.
  - d. Strip at least 50% of the insulation from the pipe to allow examination.
51. While inspecting an underground pipe line right-of-way, you find a discolored spot on the ground near a road that crosses the right-of-way. Which of the items below would be the course you would follow?
- a. The inspector should make a note for the records and have the area checked at some future time for possible leakage.
  - b. It is not unusual to have discoloration on pipe line right-of-ways. If the discoloration is not wet and there is no evidence of leakage, no action is required.
  - c. The inspector picks up material from the discolored area. If it smells okay and no there is no reaction on the skin, the area should pose no problem.
  - d. The discoloration should be investigated as a possible spill. Soil or liquid samples should be checked to see if it is corrosive to the underground.
52. An increase in pump pressure at the pump accompanied by a decrease in flow in a pipe line downstream is an indication of \_\_\_\_\_.
- a. Leakage
  - b. A broken line
  - c. Effluence
  - d. Fouling

53. Ultrasonic instruments are widely used for thickness measurements and are used extensively by inspection organizations. If a transducer is not equipped with "high temperature" delay-line material, it can be damaged by temperatures over \_\_\_\_\_ °F.
- 150
  - 1000
  - 250
  - 300
54. What would you expect to happen if you were taking UT readings on piping that was operating higher than 200°F?
- The thickness readings could be at least 10% higher or lower.
  - The thickness readings would not be influenced.
  - The thickness readings could be about 1% to 5% higher depending on the temperature.
  - The thickness readings would be 15% higher or lower.
55. An insulated piping system needs to have its pipe wall thickness checked. The owner-user does not want holes cut in the insulation for UT measurements and they do not want to shut down. What would you do to obtain thickness readings?
- AE
  - MT
  - ET
  - RT
56. Reduction of strength of the metal in a pipe, scaling, bulging, metal deterioration or complete failure are all symptoms of:
- Excessive pressure
  - Low temperature
  - Excessive temperature
  - Blocked effluent
57. Points of probable external corrosion of underground piping can be located by a series of measurements of the:
- Electrical resistance of surrounding soil or by measurement of pipe-to-soil electrical potential
  - Wattage of the surrounding piping or by measurement of pipe-to-conduit electrical resistance.
  - Potential of the cathodic protection or by wattage of the pipe-to-soil electrical resistance.

- e. Volt-amps readings of the surrounding soil or by measurement of pipe-to-pipe electrical potential.
58. One of the most important things that an inspector must do before he actually goes out to make an inspection is:
- a. Make sure all electrical potentials have been checked and shut off where necessary to prevent contact.
  - b. Check all lines to just before the point they enter the unit limits to make sure only the unit lines are inspected.
  - c. Review the condition of transportation (cars, trucks, scooters, bicycles etc.) to make sure transportation is not interrupted.
  - d. Review the records of previous inspections and of inspections conducted during the current operating period.
59. When making a visual internal inspection of a pipe and fouling is found, what should the inspector do?
- a. Make a note to include in the records; another inspector at the next period may want to investigate further.
  - b. Check with the operators to see if it is causing problems, if no problems no further action is necessary.
  - c. Cleaning should be considered, also, the deposits should be checked to find their origin.
  - d. Have the line cleaned completely immediately, make a complete write up for records.
60. The locations on piping most susceptible to cracking are:
- a. Changes of directions
  - b. Welds
  - c. Straight runs
  - d. Flange bolts
61. When checking austentic materials for cracks using PT methods only liquid penetrants:
- a. With low or no nitrides should be used.
  - b. With low or no carbides should be used.
  - c. With high or medium chlorides should be used.
  - d. With low or no chlorides should be used.

62. What type of defect would you expect to find at the problem of a groove of a ring joint flange made from ASTM-347 Stainless Steel?
- pits
  - cracks
  - hydrogen blisters
  - fouling
63. Valves should be dismantled at specified intervals to permit examination of all internal parts. Body thickness should be measured at locations that were inaccessible before dismantling, particularly at:
- The disk seating surfaces
  - Flange where the bonnet is attached.
  - Locations that show evidence of corrosion or erosion.
  - Random locations throughout the valve.
64. Bodies of valves that operate in severe cyclic temperature service should be checked internally for:
- Erosion
  - Fouling
  - Cracks
  - Pitting
65. Gate valves should be measured for thickness between the seats, since serious deterioration may have occurred because of:
- Cracks
  - Turbulence
  - Fouling
  - Corrosion
66. Why is the area between the seats of a gate valve a weak location?
- Pitting can occur at this location while the valve is operating open.
  - Fouling can occur at this location where there is a possibility of high velocity.
  - The body of the valve is thinner in this location.
  - The wedging action of the disk when it seats causes strain in this area.

67. After a valve has been inspected, repaired, and reassembled, what should be done next?
- It should be plasited inside to prevent corrosion and returned for reinstallation.
  - It should be returned to the job for reinstallation
  - It should be painted and the inlet and outlet capped.
  - It should be tested to API 598 requirements.
68. In addition to checking the gasket surfaces of flanges for defects, and checking for corrosion and erosion, which of the following additional checks:
- The rating of the flanges must be checked to make sure that they are both class 150 and they both have the same number of bolt holes.
  - The bolts should be checked for proper specification, stretching and corrosion. The gasket must be of the proper type and material.
  - The flange bolt holes must match and at least one flange must be a class 15 or 30.
  - The bolts should be machine grade and brand-new. The gasket must be a minimum of a spiral wound grafoil filled.
69. A weld is being made in carbon steel piping carrying Amine (MEA). What should the inspector check in addition to insuring that the weld is proper and meets specification?
- The class of the piping, i.e. 150,300,600 etc should be verified.
  - Amine can cause environmental cracking; the weld should be checked for hardness.
  - Welds on the weld hangers should be made checked and the results recorded.
  - Check the seating surface and lightness of the joint by WFMT.
70. Welded joints in carbon steel and carbon-molybdenum steel exposed to elevated temperatures of 800<sup>0</sup> F or over may be subject to:
- Hydrogen attack
  - Graphitization
  - Environmental cracking
  - Graphitic corrosion

71. Which one of the listed is **not** a cause for a threaded joint leak?
- Use of the proper lubricant
  - Improper assembly or loose threads
  - Corrosion or poor fabrication
  - Cross threading or dirty threads at assembly
72. Why should a leaking threaded joint **not** be tightened while the system is in service under pressure?
- An undetected crack in a thread root might fail and cause a release of product.
  - Tightening may exacerbate the hardness of the threads and cause leaks.
  - The pressure on the gasket may be so great that it causes a failure and thus leaks.
  - Supports may fail if the threaded joint is lightened-tension on the supports.
73. What type of pipe joint must not be used without adequate axial restraint on the piping?
- Threaded joints
  - Flanged joints
  - Clamped joints
  - Welded joints
74. Which of the following is **not** a cause of misalignment?
- Inadequate provision for expansion or broken and/or defective anchors or guides.
  - Too many bolts in the flanges or bolts with the wrong material.
  - Excessive friction on sliding saddles or broken or corroded rollers.
  - Excessive operating temperatures or broken or improperly adjusted hangers.
75. Where excessive vibration or swaying was noted in a piping system during operation, an inspection should be made for points of \_\_\_\_\_ and \_\_\_\_\_ and for cracks in welds at locations that could not be inspected during operation.

- a. Graphitization, graphitic corrosion
  - b. Scaling, internal oxidation
  - c. Abrasion, external wear
  - d. Rusting, hydrogen blisters
76. Piping that has been in service or had hot spots of 800°F and above should be checked for creep or deformation with time under stress by:
- a. Using a transit to establish correct alignment and elevation or plumbness.
  - b. Measuring the outside diameter of the pipe and comparing established data for life.
  - c. Pressure testing the piping to ensure it is serviceable.
  - d. Examining the piping with acoustic emission equipment.
77. Special attention should be given to small connections such as vents, bleeders, any type of small nipple. One method for successfully checking the condition and the thickness of nipples is the use of:
- a. RT
  - b. AE
  - c. MT
  - d. PT
78. A pressure test for piping, in most cases is a:
- a. Leak test
  - b. Stress test
  - c. Ebullition test
  - d. Strength test
79. Any system being tested needs to be completely isolated to:
- a. Prevent the testing medium from the entering connecting lines.
  - b. Insure only the system in question is tested.
  - c. Minimize the amount of work by limiting the lines in the test.
  - d. Stop the testing medium from being contaminated with material from other lines.

80. If a pressure test is conducted with air or if excess air is trapped in a system that is being hydrostatically tested, a failure of the system will be:
- Less violent than in a totally liquid filled system because it does not expand as rapidly as a hydraulic medium.
  - Easy to manage because the air will prevent liquid from being spread over the area and possibly causing an environmental incident.
  - More violent than in a totally liquid filled system because of the expansion of the compressible medium.
  - Of little consequence since if the failure will be similar to air leaking from a nail hole in a motor car tire inner tube.
81. Which of the following materials **NOT** be commonly used for a pressure test?
- Water with or without an inhibitor, freezing-point depressant, or wetting agent.
  - Hydrogen, hydrogen sulphide, gasoline, liquid propane or weak hydrogen chloride.
  - Liquid products normally carried in the system, if they are not toxic or likely to cause a fire in the event of a leak or failure.
  - Steam, air, carbon dioxide, nitrogen, helium or another inert gas.
82. In which of the following systems would water be a questionable test medium?
- Gasoline reflux lines, propane piping, and butane systems.
  - Diesel fuel systems, gas oil systems, and kerosene systems.
  - Acid lines, cryogenic systems, and air drier systems.
  - Reboiler oil systems, boiler piping, and steam turbine lines.
83. What should be considered when testing carbon steel piping during cold weather or if cold fluids are used in the testing?
- The transition temperature of the steel should be considered to prevent brittle failure.



- b. The test medium may freeze if it escapes during test.
  - c. The transition temperature of the medium should be considered for brittle cracking.
  - d. The translation temperature of the test medium may freeze the test gages.
84. What is the preferred medium for a pneumatic test?
- a. A flammable gas
  - b. An inert gas.
  - c. Hydrogen gas
  - d. Propane gas
85. What type of piping usually has a pressure recorder attached in which a permanent record of the test is made?
- a. Boiler piping
  - b. Underground piping
  - c. Light hydrocarbon unit piping
  - d. Operating unit piping
86. Which of the following piping should **NOT** be hammer tested?
- a. Pipe made from steel on a Fluid Catalytic Cracking Unit.
  - b. Steel pipe and lines off a crude tower on a crude still.
  - c. Cast iron and stress-relieved lines in caustic and corrosive service.
  - d. ASTM A-106 Grade A pipe on a catalytic Reforming Unit.
87. New construction piping should meet the requirements of \_\_\_\_\_ as a minimum.
- a. API 571
  - b. ASTM A-53
  - c. ASME B-31.3
  - d. ASME Std 607

88. When ASME B31.3 cannot be followed because of its new construction orientation, which document should guide the Engineer/Inspector?
- API 574
  - API 575
  - ASME VIII
  - None of the above
89. A piping Engineer must be:
- A degreed Mechanical Engineer
  - Acceptable to the owner/user
  - Qualified as an API 570 Inspector
  - A single entity(i.e., cannot be more than one person)
90. Which of the following is not a re-rating?
- A "scab" patch causing a decrease in design pressure.
  - A de-rating for corrosion.
  - A change in materials to a lower stress value.
  - An increase in the MAWP of the system.
91. A "piping system" does not include which of the following items?
- Piping supports
  - Fittings
  - Dents
  - Valves
92. The boundary of a piping circuit should be sized:
- By the inspector.
  - To provide for accurate record-keeping and field inspection
  - To minimize TML's
  - To remove the threat of CUI
93. When using statistical methods to assess corrosion in piping, it is very important to \_\_\_\_\_.
- Properly select components to
  - Hydrotest all piping
  - Ensure an adequate number of TML's are placed.
  - Both a & c, above.

## ANSWER KEY

- |     |   |                  |     |   |                     |
|-----|---|------------------|-----|---|---------------------|
| 1.  | a | API 574, 1.1     | 49. | c | API574, 10.1.1.3    |
| 2.  | c | API 574,4.1      | 50. | b | API 574, 10.1.1.3   |
| 3.  | b | API 574,4.1      | 51. | b | API 574, 10.1.1.4   |
| 4.  | c | API 574,4.1      | 52. | c | API 574, 10.1.1.5   |
| 5.  | b | API 574,4.1      | 53. | b | API 574, 10.1.2.1   |
| 6.  | a | API 574,4.1      | 54. | c | API 574, 10.1.2.1   |
| 7.  | a | API 574,4.1      | 55. | d | API 574, 10.1.2.2   |
| 8.  | b | API 574,4.1      | 56. | c | API 574, 10.1.1.7   |
| 9.  | c | API 574,4.1      | 57. | a | API 574, 10.3.1.4   |
| 10. | b | API 574,4.1      | 58. | d | API 574, 12.5       |
| 11. | c | API 574,4.2      | 59. | c | API 574, 10.2.1.1   |
| 12. | a | API 574,4.3      | 60. | b | API 574, 10.2.1.2   |
| 13. | a | API 574,4.3.2    | 61. | d | API 574, 10.2.1.3   |
| 14. | b | API 574,4.3.2    | 62. | b | API 574, 10.2.1.4   |
| 15. | d | API 574,4.3.2    | 63. | c | API 574, 10.2.1.4   |
| 16. | b | API 574,4.3.3    | 64. | c | API 574, 10.2.1.4   |
| 17. | d | API 574,4.3.4    | 65. | b | API 574, 10.2.1.4   |
| 18. | d | API 574,4.3.5    | 66. | d | API 574, 10.2.1.4   |
| 19. | b | API 574,4.3.8    | 67. | d | API 574, 10.2.1.4   |
| 20. | c | API 574,4.3.9    | 68. | b | API 574, 10.2.1.5.1 |
| 21. | c | API 574,4.5      | 69. | b | API 574,10.2.1.5.2  |
| 22. | b | API 574,4.5.2    | 70. | b | API 574, 10.2.1.5.2 |
| 23. | d | API 574,4.5.3.1  | 71. | a | API 574, 10.2.1.5.3 |
| 24. | b | API 574,4.5.3.2  | 72. | a | API 574, 10.2.1.5.3 |
| 25. | c | API 574,5.1      | 73. | c | API 574, 10.2.1.5.4 |
| 26. | d | API 574,5.2      | 74. | b | API 574, 10.2.1.6   |
| 27. | a | API 574,5.2      | 75. | c | API 574, 10.2.1.7   |
| 28. | c | API 574,5.4      | 76. | b | API 574, 10.2.1.8   |
| 29. | d | API 574,6.2      | 77. | a | API 574, 10.2.2     |
| 30. | c | API 574,6.2      | 78. | a | API 574, 10.2.3     |
| 31. | b | API 574,10.1.2.2 | 79. | a | API 574, 10.2.3     |
| 32. | d | API 574,10.1.1.1 | 80. | c | API 574, 10.2.3     |
| 33. | d | API 574,10.1.1.1 | 81. | b | API 574, 10.2.3     |
| 34. | c | API 574,6.2      | 82. | c | API 574, 10.2.3     |
| 35. | a | API 574,6.2.2    | 83. | a | API 574, 10.2.3     |
| 36. | d | API 574,6.3.6    | 84. | b | API 574, 10.2.3     |
| 37. | c | API 574,6.3.7    | 85. | b | API 574, 10.2.3     |
| 38. | a | API 574,6.3.1    | 86. | c | API 574, 10.2.4     |
| 39. | d | API 574,6.3.5    | 87. | c | API 574, 10.4.1     |
| 40. | b | API 574,6.3.7    | 88. | d | API 574, 3.1        |
| 41. | c | API 574,6.3.1    | 89. | b | API 574, 3.19       |
| 42. | c | API 574,10.1.1.1 | 90. | c | API 574, 3.23       |
| 43. | b | API 574,10.1.1.1 | 91. | c | API 574, 3.20       |
| 44. | b | API 574,10.1.1.1 | 92. | b | API 574, 6.2.1      |
| 45. | a | API 574,10.1.1.2 | 93. | d | API 574, 6.2.1      |
| 46. | b | API 574,10.1.1.3 |     |   |                     |
| 47. | c | API 574,10.1.1.3 |     |   |                     |
| 48. | c | API 574,10.1.1.3 |     |   |                     |