

API AUTHORIZED PIPING INSPECTOR
PREPARATION COURSE FOR CERTIFICATION EXAMINATION
FINAL EXAMINATION #2

CODEWEST
HOUSTON, TEXAS

NAME _____

DATE _____

COMPANY _____

AUTHORED BY:
T. SCHINDLER

API 570
FINAL EXAMINATION #2

OPEN BOOK QUESTIONS (1-44)

1. An Inspector finds a class 250 cast iron flange bolted to a class 300 steel flange. What group of gasket material should be used?

- a. Ib
- b. IIIa
- c. IIa
- d. Ia

2. A NPS 10 seamless pipe operates at 725 psi and 675⁰ F. maximum. The pipe is made from ASTM A53 Grade B material. What allowable stress would you use to determine the pipe's minimum thickness for pressure design?

- a. 16750 psi
- b. 17000 psi
- c. 16500 psi
- d. 20000 psi

3. A NPS 20 piping system was designed to operate at 550 psi and 400⁰ F with a 0.1" corrosion allowance. The pipe was originally installed with 0.593" thick wall made from ASTM A53 Grade B material. The allowable stress is 20000 psi. The pipe is seamless. The current thickness measured is 0.42" . If the corrosion allowance of 0.1" is maintained, what MAWP is the pipe acceptable for now? Round to the nearest psi.

- a. 933 psi
- b. 840 psi
- c. 640 psi
- d. 704 psi

4. Direct visual examination may usually be made when access is sufficient to place the eye within _____ of the surface to be examined and at an angle not less than _____ to the surface to be examined.

- a. 12 inches, 45 degrees
- b. 18 inches, 15 degrees
- c. 24 inches, 30 degrees
- d. 30 inches, 20 degrees

5. A NPS 6 (6.625" o.d.) reflux piping system of a depropanizer tower operates at 275 psi and 200⁰ F. The pipe material is ASTM A53 Grade B seamless. The pipe thickness when installed in 1980 was 0.375". During an inspection in 1990 the thickness of the pipe measured 0.300" . In 1996 the thickness was measured and found to be 0.25". What is the remaining life of this system? Round the answer to the nearest full year.

- a. 27 years
- b. 25 years
- c. 28 years
- d. 23 years

6. What is the allowable stress for an ASTM A312 Grade TP304L that is to operate at a service temperature of 1250⁰ F?
- a. 3200 psi
 - b. 2600 psi
 - c. 2100 psi
 - d. 1700 psi
7. A forged flange marked ASTM A182 Grade F1 Class 300 is found in the plant. The Inspector finds the operating temperature is 500 degrees F. What operating pressure is permissible with this flange?
- a. 620 psi
 - b. 500 psi
 - c. 665 psi
 - d. 300 psi
8. A seamless pipe is NPS 14, ASTM A53 Grade B material and operates at 775 psi and a maximum of 750⁰ F. For pressure design, what minimum thickness is required?
- a. 0.50"
 - b. 0.41"
 - c. 0.43"
 - d. 0.46"
9. An ASTM A135 Grade A NPS 6 electric resistance welded (ERW) pipe is to be used in a refinery for hydrocarbon service. It operates at 300 psi and 125 degrees F. What joint factor, (E_j) would you use in determining the required thickness for this pressure.
- a. 0.60
 - b. 0.80
 - c. 0.85
 - d. 1.00
10. An ASTM A-53 Grade B NPS 12 pipe operates at 700 psi and 750⁰ F. A blank fabricated from ASTM A-285 Grade C plate is to be used for testing and later for operations. The blank is to be used with ANSI Class 600 flanges. What thickness blank will be required? The corrosion allowance required is 0.10". The I.D. of the gaskets is 12.75". Round the answer to the nearest hundredth.
- a. 1.51"
 - b. 1.23"
 - c. 1.31"
 - d. 1.43"
11. A NPS 14 pipe with a wall thickness of 1.25" will have a section 3' long cut out and replaced. The pipe material is ASTM A-53 Grade B. What preheat will be recommended on the butt welds, assuming an ambient temperature above 32°F?
- a. None
 - b. 100 degrees
 - c. 175 degrees
 - d. 50 degrees

12. A NPS 12 pipe with a wall thickness of 1.125" has to be shortened and preheat is required. Ambient temperature is above 32°F. A section is cut out and the pipe rewelded. The pipe material is ASTM A-53 Grade B. The welder asks how far from the weld must the preheat temperature be maintained? What would you tell the welder?

- a. No preheat is recommended for this thickness carbon steel material.
- b. Maintain the preheat at least the width of the weld.
- c. Maintain the preheat at least 1" beyond each edge of the weld.
- d. Maintain the preheat at least 1' beyond each edge of the weld.

13. A NPS 10 ASTM A335 Grade P9 pipe with a wall thickness of 0.625" has a section cut out for installation of weld neck flanges for a spool section. What temperature should be used for post weld heat treatment of the butt welds?

- a. 1100-1200 degrees F.
- b. 1100-1325 degrees F.
- c. 1350-1450 degrees F.
- d. 1300-1400 degrees F.

14. When conducting MT, each piece of magnetizing equipment used with an ammeter shall be calibrated at least _____, or whenever the equipment has been subjected to major repair, overhaul or damage.

- a. monthly
- b. quarterly
- c. twice a year
- d. once a year

15. What is the recommended minimum thickness of steel for which the radioactive isotope Iridium 192 should be used?

- a. 1.50"
- b. 0.65"
- c. 1.30"
- d. 0.75"

16. A NPS 6 piping system, reflux line system of a depropanizer tower, operates at 275 psi and 200⁰ F. The pipe material is ASTM A53 Grade B. The pipe thickness when installed in 1980 was 0.375". During an inspection in 1996 the thickness of the pipe measured 0.25". What is the corrosion rate of the pipe in this system?

- a. 0.0078 in/yr
- b. 0.078 in/yr
- c. 0.0078 ft/yr
- d. 0.078 cm/yr

17. The design pressure of 9" tubing is 650 psig @ 400°F. The thickness is measured at .540" in 1990 and .480" in 1995. The material is A-106 GR B and the O.D. is measured at exactly 9". If the corrosion rate is estimated to be uniform and continue in the coming years, what is the MAWP of the pipe if the next planned inspection is 10 years from 1995?

- a. 1066 psig
- b. 106 psig
- c. .508 psig
- d. 1600 psig

18. An owner wants to use a carbon steel pipe (ASTM A106 Grade B) in a piping system that now has ASTM A335 Grade P11 at 850 degrees F. The owner states that the product is not corrosive and that the pressure is low enough to prevent over stressing the system if it was carbon steel. Which of the reasons listed would you cite as allowing its use or not allowing its use?

- a. Conversion of carbides to graphite may occur after prolonged exposure to temperatures over 800⁰ F.
- b. For use under B31.3, radiography shall be performed on all welds after heat treatment.
- c. This material when used below 900 degrees F. shall be impact tested if the carbon content is above 0.30%.
- d. This steel may develop embrittlement after service at approximately 800 degrees F. and higher temperatures.

19. Low strength bolts are made from material having not more than _____ ksi minimum yield strength.

- a. 3
- b. 30
- c. 3000
- d. 30000

20. A 2T hole diameter penetrameter is to be located on the source side of a 48" diameter pipe that has been welded. The wall thickness is 0.625". Select the hole type designation and the hole diameter of the penetrameter.

- a. 17 & 0.013"
- b. 20 & 0.040"
- c. 25 & 0.020"
- d. 30 & 0.040"

21. Single film technique was used to make a radiograph using a cobalt 60 source. The minimum permitted density in the area of interest is:

- a. 1.8
- b. 2.0
- c. 2.8
- d. 3.0

22. A NPS 18 piping system operates at 550 psi and 400⁰ F. The pipe is 0.5" wall made from ASTM A53 Grade B seamless material. The pipe was installed in 1991. The allowable stress is 20000 psi. The pipe is seamless. The thickness measured in 1996 is 0.42" . The next planned inspection is in the year 2001. Calculate the MAWP in the year 2001 for this pipe. Round answer to the nearest whole number.

- a. 756 psi
- b. 933 psi
- c. 578 psi
- d. 650 psi

23. An 8" diameter X 0.50 thick round lap patch is to be installed as a repair to a 16" diameter pipe. The small repair patch is to be installed over several isolated pits. What is the largest size electrode that can be used?

- a. 5/32"
- b. 1/4"
- c. 5/16"
- d. 7/32"

24. Screen height linearity evaluation shall be performed:

- a. at the beginning of each period of use or every 4 months, whichever is less.
- b. at the beginning of each period of extended use or every 3 months, whichever is less.
- c. at the beginning of each period of extended use or every 6 months, whichever is less.
- d. at the beginning & end of each use period or every 2 months, whichever is less.

25. What is the allowable stress for an ASTM A312 Grade TP304L that is to operate at a service temperature of 1275⁰ F?

- a. 2600 psi
- b. 2350 psi
- c. 2100 psi
- d. 1850 psi

26. As a standard technique, the temperature of the penetrant and the surface of the part to be processed by PT shall not be below _____ nor above _____ throughout the examination period.

- a. 50⁰ F, 125⁰ F
- b. 55⁰ F, 100⁰ F
- c. 70⁰ F, 150⁰ F
- d. 60⁰ F, 125⁰ F

27. What is the hydrostatic test pressure of a ASTM A105 carbon steel class 400 forged flanged fitting?

- a. 1450 psi
- b. 1485 psi
- c. 1500 psi
- d. 1510 psi

28. Which of the following is an essential variable of a SMAW WPS?

- a. Change in the F number.
- b. Change in the root spacing.
- c. Change in the diameter of the electrode.
- d. Change in the groove design.

29. Personnel performing visual examination (VT) shall have an annual vision test to assure natural or corrected near distance acuity such that they are capable of reading:

- a. standard U-1 letters on standard Hunter test type charts for near vision.
- b. standard G-1 numerals on standard Jaeger test type charts for far vision.
- c. standard J-1 letters on standard Jaeger test type charts for near vision.
- d. standard T-1 letters on standard hunter test type charts for far vision.

30. You are asked to set the inspection interval for a cathodically protected buried pipe line. The soil resistivity(ohm-cm) is checked and found to be 8300 ohm-cm. What would be the interval?

- a. 2 years
- b. 5 years
- c. 10 years
- d. 15 years

31. You are asked to check a 6" i.d. piping system that is made from ASTM A-106 Grade B material. The system operates at 400 psi and 500 degrees F. The piping engineer has a note on the records that a thickness of 0.15" must be maintained for structural reasons and a corrosion allowance of 0.125" must also be maintained. What thickness of pipe would you use? Round the answer to the nearest thousandth of an inch.

- a. 0.258"
- b. 0.275"
- c. 0.345"
- d. 0.358"

32. You have an E7018 electrode. What F number is it?

- a. 1
- b. 4
- c. 5
- d. 6

33. What marking is not required on a B16.5 flange? Note: The marking may be included, but if it is, the pressure rating shall be stamped next to it.

- a. size
- b. designation
- c. temperature
- d. rating class

34. A NPS 12 (12.75 o.d.) gate valve made from ASTM A216 Grade WCB material was rolled out for inspection. An area of the valve body was found by the inspector to be thinning. The maximum operating pressure of the valve is 275 psi at 200 degrees F. The casting factor, E_C , is 0.8. The owner-operator requires the Inspector to maintain a 0.125" corrosion allowance. What is the minimum thickness for the valve body? Round answer off to the nearest hundredth.

- a. 0.15"
- b. 0.28"
- c. 0.24"
- d. 0.31"

QUESTIONS # 35 - 44 APPLY TO WPS #11 AND PQR #14 (ATTACHED)

35. The joint design shown on the WPS is:

- a. qualified, with no deficiencies noted
- b. not qualified, because the root opening is not shown on the PQR
- c. not qualified, because too many passes are shown from that qualified
- d. none of the above

36. The deposited weld metal thickness range shown on the WPS is:

- a. acceptable as shown
- b. beyond the range allowed by the Code
- c. is a non-essential variable, so it doesn't need to be checked
- d. should be 1.1 x the actual weld metal deposited

37. The allowable P # range shown on the WPS should be:
- P-3 to P2, P1
 - P4 to P1 only
 - P3 to P3 only
 - P3 to P3, or P1
38. The A #'s shown on the WPS are:
- unacceptable - A2 cannot be used
 - acceptable - A1 can be used or A2 can be used
 - unacceptable - A3 should be shown
 - acceptable if the weld will be PWHT'd after completion
39. The gas shielding qualified on the PQR:
- should not be shown - FCAW is run without gas only
 - is acceptable; however, the range allowed on the WPS is not qualified by that shown on the PQR
 - is unacceptable - FCAW cannot be run with pure CO2
 - is acceptable and the range on the WPS is acceptable
40. To be acceptable to ASME IX the WPS should:
- not show the PWHT indicated
 - increase the PWHT to 1500°F minimum
 - require PWHT at the temperature shown but change the time range to "2 hours per inch minimum"
 - have a PWHT acceptable to ASME VIII
41. The tension test specimen results shown in the PQR are:
- unacceptable - both are below allowable tensile strength
 - T #1 is unacceptable T #2 is acceptable
 - both tension tests are acceptable per Code
 - tension tests are not required for procedure qualification
42. The bend tests shown on the PQR:
- do not meet the Code - they are the wrong type
 - do not meet the Code - they are the wrong size
 - do not meet the Code - they are insufficient in number
 - meet all Code requirements
43. The PQR is unacceptable because:
- it has not been certified
 - fillet weld tests are not shown
 - the welder was the QC Mgr's son
 - the date does not match that on the WPS
44. The WPS, as shown, could not be used for repair/alteration welding because:
- the preheat range on the WPS is not qualified by that shown on the PQR
 - the base metal thickness range shown is not qualified by that shown on the PQR
 - the filler metal size (wire diameter) shown is not qualified by that shown on the PQR
 - both a and b, above

QW-482 SUGGESTED FORMAT FOR WELDING PROCEDURE SPECIFICATION (WPS)
 (See QW-200.1, Section IX, ASME Boiler & Pressure Vessel Code)

Company Name: XYZ COMPANY By: JOE BLOW
 Welding Procedure Spec. No.: 11 Date: 8-31-92 Supporting PQR No. (s): 16
 Revision No.: 0 Date: _____
 Welding Process(s): FCAW-SPRAY ARC TRANSFER Type(s): SEMI-AUTOMATIC
 (Automatic, Manual, Machine, or Semi-Auto)

JOINTS (QW-402)

Details

Joint Design: DOUBLE VEE GROOVE, ONLY
 Backing: (Yes) X (No) _____
 Backing Material: (Type): WELD METAL ONLY
 (Refer to both backing & retainers)

- X Metal • Nonfusing Metal
- Nonmetallic • Other



ROOT OPENING - 1/16" - 1/8"
 GROOVE ANGLE - 60° - 70°

Sketches, Production Drawings, Weld Symbols or Written Description should show the general arrangement of the parts to be welded. Where applicable, the root spacing and the details of weld groove may be specified.

(At the option of the Mfr., Sketches may be attached to illustrate joint design, weld layers, and the bead sequence, e.g. for notch toughness procedures, for multiple process procedures, etc.)

***BASE METALS (QW-403)**

P-No. 3 Group No. 1 to P-No. P4, 3, 1 Group No. 1
 OR
 Specification type and grade _____
 to Specification type and grade _____
 OR
 Chem. Analysis and Mech. Prop. _____
 to Chem. Analysis and Mech. Prop. _____
 Thickness range:
 Base Metal: Groove: 1/16" - 1" Fillet: ALL
 Pipe Dia. Range: Groove: ALL Fillet: ALL
 Other: NO PASS GREATER THAN 1/2" THICK

*** FILLER METALS (QW-404)**

Spec. No. (SFA):	<u>SFA 5.29</u>	_____	_____
AWS No. (Class):	<u>E81T1 (1,2,3,4)</u>	_____	_____
Filler Metal F-No.:	<u>6</u>	_____	_____
Chem. Comp. - A No.:	<u>1 OR 2</u>	_____	_____
Size of Filler Metals:	<u>ALL</u>	_____	_____
Weld Metal			
Thickness range:			
Groove:	<u>1.5" MAX.</u>	_____	_____
Fillet:	<u>ALL</u>	_____	_____
Electrode-Flux (Class):	_____	_____	_____
Flux Trade Name:	_____	_____	_____
Consumable Insert:	_____	_____	_____
Other:	<u>NO SUPP. FILLERS OR POWDERS TO BE USED</u>	_____	_____

* Each base metal-filler metal combination should be recorded individually.

QW-482 (Back)

WPS No.: _____ Rev. No.: _____

POSITIONS (QW-405) Position(s) of Groove: <u>ALL</u> Welding Progression: Up <u>X</u> Down _____ Positions(s) of Fillet <u>ALL</u>	POSTWELD HEAT TREATMENT (QW-407) Temperature Range <u>1150 - 1200°F</u> Time Range <u>1 HR PER INCH, 15 MIN. MINIMUM</u>																
PREHEAT (QW-406) Preheat Temp.Min.: <u>200° MINIMUM</u> Interpass Temp. Max.: <u>650° MAXIMUM</u> Preheat Maint.: <u>NONE</u> (Continuous or special heating where applicable should be recorded.)	GAS ((QW-408) Percent Composition <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:33%;"></td> <td style="width:33%; text-align: center;">Gas(es)</td> <td style="width:33%; text-align: center;">(Mixture)</td> <td style="width:33%; text-align: center;">Flow Rate</td> </tr> <tr> <td>Shielding</td> <td><u>ARGON/CO2</u></td> <td><u>75%-25%</u></td> <td><u>10-20 CFH</u></td> </tr> <tr> <td>Trailing:</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>Backing:</td> <td><u>CO2</u></td> <td><u>100%</u></td> <td><u>5-10 CFH</u></td> </tr> </table>		Gas(es)	(Mixture)	Flow Rate	Shielding	<u>ARGON/CO2</u>	<u>75%-25%</u>	<u>10-20 CFH</u>	Trailing:	_____	_____	_____	Backing:	<u>CO2</u>	<u>100%</u>	<u>5-10 CFH</u>
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Trailing:	_____	_____	_____														
Backing:	<u>CO2</u>	<u>100%</u>	<u>5-10 CFH</u>														

ELECTRICAL CHARACTERISTICS (QW-409)

Current AC or DC DC Polarity REVERSE
 Amps Range 100-150 Volts (Range) 18-25

(Amps and volts range should be recorded for each electrode size, position, and thickness, etc. This information may be listed in a tabular form similar to that shown below.)

Tungsten Electrode Size and Type _____
 (Pure Tungsten, 2% Thoriated, etc.)

Mode of metal Transfer for GMAW SPRAY ARC TRANSFER ONLY
 (Spray arc, short circuiting arc, etc.)

Electrode Wire feed speed range _____

TECHNIQUE (QW-410)

String or Weave Bead BOTH

Orifice or Gas Cup Size 1/4" - 1/2"

Initial and Interpass Cleaning (Brushing, Grinding, etc.) BRUSH AND GRIND BY USING MANUALMETHODS

Method of Back Gouging CARBON ARC

Oscillation NONE

Contact Tube to Work Distance 1/4" - 1/2"

Multiple or Single Pass (per side) MULTIPASS

Multiple or Single Electrodes SINGLE

Travel Speed (Range) 12-20 IPM

Peening NONE ALLOWED

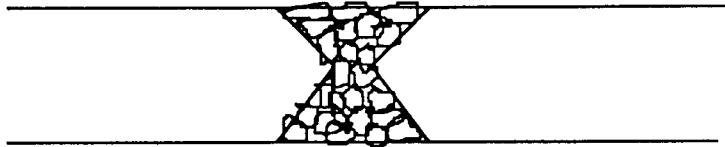
Other _____

Weld Layer(s)	Process	Class	Filler Metal		Current		Travel Speed Range	Other (e.g., Remarks, Comments, Hot Wire Addition, Technique, Torch Angle, Etc.)
			Dia.	Type Polar.	Amp Range	Volt Range		
<u>ALL</u>	<u>FCAW</u>	<u>E71T1</u>	<u>ALL</u>	<u>DC/REV</u>	<u>100-150</u>	<u>18-25</u>	<u>12-20 IPM</u>	

QW-483 SUGGESTED FORMAT FOR PROCEDURE QUALIFICATION RECORDS (PQR)
 (See QW-200.2, Section IX, ASME Boiler and Pressure vessel Code)
 Record Actual Conditions Used to Weld Test Coupon

Company Name: XYZ COMPANY
 Procedure Qualification Record No.: 14 Date: 8-31-92
 WPS No.: 11
 Welding Process(s): FCAW (TUBULAR)
 Types (Manual, Automatic, Semi-Auto.): SEMI-AUTOMATIC SPRAY TRANSFER

JOINTS (QW-402)



Groove Design of Test Coupon
 (For combination qualifications, the deposited weld metal thickness shall be recorded for each filler metal or process used.)

<p>BASE METALS (QW-403) Material Spec.: <u>SA 302</u> Type or Grade: <u>GRADE B</u> P-No.: <u>3</u> to P-No.: <u>3</u> Thickness of Test Coupon: <u>1/2" THICK</u> Diameter of Test Coupon: <u>N/A - PLATE</u> Other: _____ NO PASS GREATER THAN 1/8" THICK</p>	<p>POSTWELD HEAT TREATMENT (QW-407) Temperature: <u>NONE USED</u> Time: _____ Other: _____</p>																				
<p>FILLER METALS (QW-404) SFA Specification: <u>SFA - 5.29</u> AWS Classification: <u>E71T1-4</u> Filler Metal F No.: <u>6</u> Weld metal Analysis No. <u>A2(80,000 TENSILE)</u> Size of Filler metal: <u>1/8"</u> Other: <u>NO SUPPLEMENTAL FILLERS OR POWDERS USED.</u> Weld Metal Thickness: <u>1/2" THICK</u></p>	<p>GAS (QW-408)</p> <table border="1"> <thead> <tr> <th></th> <th colspan="2">Percent Composition</th> <th>Flow Rate</th> </tr> <tr> <th></th> <th>Gas(es)</th> <th>(Mixture)</th> <th></th> </tr> </thead> <tbody> <tr> <td>Shielding:</td> <td><u>CO2</u></td> <td><u>100%</u></td> <td><u>12-15 CFH</u></td> </tr> <tr> <td>Trailing:</td> <td><u>NONE</u></td> <td></td> <td></td> </tr> <tr> <td>Backing:</td> <td><u>NONE</u></td> <td></td> <td></td> </tr> </tbody> </table>		Percent Composition		Flow Rate		Gas(es)	(Mixture)		Shielding:	<u>CO2</u>	<u>100%</u>	<u>12-15 CFH</u>	Trailing:	<u>NONE</u>			Backing:	<u>NONE</u>		
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Trailing:	<u>NONE</u>																				
Backing:	<u>NONE</u>																				
<p>POSITION (QW-405) Position of Groove: <u>FLAT</u> Weld Progression (Uphill, Downhill): <u>N/A</u> Other: _____</p>	<p>ELECTRICAL CHARACTERISTICS (QW-409) Current: <u>DIRECT</u> Polarity: <u>REVERSE</u> Amps.: <u>130</u> Volts: <u>24</u> Tungsten Electrode Size: _____ Other: _____</p>																				
<p>PREHEAT (QW-406) Preheat Temp.: <u>400°F</u> Interpass temp.: _____ Other: _____</p>	<p>TECHNIQUE (QW-410) Travel Speed: <u>15 IPM</u> String or Weave Bead: <u>WEAVE</u> Oscillation: <u>NONE</u> Multipass or Single Pass (per side): <u>MULTIPASS</u> Single or Multiple Electrodes: <u>SINGLE</u> Other: _____</p>																				

QW-483 (Back)

PQR No.: 14

Tensile Test (QW-150)

Specimen No.	Width	Thickness	Area	Ultimate Total Load Lb.	Ultimate Unit Stress psi	Type of Failure & Location
T-1	.720	.485	.349	26,700	76,504	DF-BASE METAL
T-2	.700	.490	.343	27,500	80,174	DF-BASE METAL

Guided Bend Tests (QW-160)

Type and Figure No.	Result
SIDE BEND #1 - QW-462.2	POROSITY - (3/16" DIA.) - ACCEPTABLE
SIDE BEND #2 - QW-462.2	CORNER POROSITY - 1/8" DIAM. - ACCEPTABLE

Toughness Tests (QW-170)

Specimen No.	Notch Location	Specimen Size	Test Temp.	Impact Values			Drop Weight Break (Y/N)
				Ft. Lbs.	% Shear	Mils	

Comments: _____

Fillet Weld Test (QW-180)

Result — Satisfactory: Yes: _____ No: _____ Penetration Into Parent Metal: Yes: _____ No: _____

Macro — Results: _____

Other Tests

Type of Test: _____

Deposit Analysis: _____

Other: _____

Welder's Name: JOE BLOW JR. Clock No.: A Stamp No.: 1

Tests conducted by: BILLS TEST LAB Laboratory Test No.: 123

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Manufacturer: XYZ COMPANY

Date: 8/31/92

By: JOE BLOW SR.

CLOSED BOOK QUESTIONS (45 - 150)

45. What is considered "the surface at a weld" in considering locally thinned areas for calculations to determine the allowable working pressure of a pipe.?

- a. A minimum of 2" of parent metal on either side of the weld.
- b. The lesser of 1" of parent metal or twice the measured thk. on either side of the weld.
- c. The greater of 1" of parent metal or twice the measured thk. on either side of the weld.
- d. A maximum of 1" of parent metal on either side of the weld.

46. Improper preheat and/or postweld heat treatment of low alloy steel welds (for example, 9 Chrome-1 Moly material) often results in:

- a. oxidation of the material and loss of strength.
- b. excessive softening of the material and loss of strength.
- c. cracks from excessive hardness.
- d. Graphitization of the material and loss of strength.

47. If you have a threaded pipe joint that is leaking in-service, you should:

- a. not tighten it because of a possible crack in a thread root may lead to failure.
- b. tighten it immediately to stop the leak.
- c. note the leak for record purposes and have it repaired at the next shut-down.
- d. hammer test it to make sure that it is not thin.

48. When you have a pipe in high-temperature service, i.e. temperatures above _____ degrees F., you measure the outside diameter of the piping to check for creep.

- a. 700
- b. 600
- c. 800
- d. 500

49. Injection points should be checked a minimum of _____ upstream of the injection point, whichever is greater.

- a. 10" or 2 pipe diameters
- b. 12" or 3 pipe diameters
- c. 18" or 3 pipe diameters
- d. 24" or 4 pipe diameters

50. Injection points should be checked downstream of the injection point:

- a. to the first change in direction or 25' beyond the injection point.
- b. to the third change in flow direction or 30' beyond the second change in flow direction, whichever is less.
- c. to the second change in flow direction or 25' beyond the first change in flow direction, whichever is less.
- d. to the second change in flow direction or 20' beyond the first change in flow direction, whichever is less.

51. 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 classified as _____ Fluid Service.

- a. Category D
- b. Category M
- c. Normal
- d. High Pressure

52. What is the "face of a weld"?

- a. It is the cross section of a weld as it would appear if the weld was cut axially.
- b. It is the cross section of a weld as seen if cut across the groove.
- c. It is the exposed surface of a weld on the side opposite from which welding was done.
- d. It is the exposed surface of a weld on the side from which welding was done.

53. What is classified as small-bore piping (SBP)?

- a. Piping that is less than or equal to NPS 2.
- b. Piping that is less than or equal to NPS 2.25.
- c. Piping that is less than or equal to NPS 2.5
- d. Piping that is less than or equal to NPS 2.75

54. The loss of ductility and notch toughness in susceptible low-alloy steels, such as 1.25 Chrome and 2.25 Chrome, due to prolonged exposure to high temperature service (700⁰ F to 1070⁰ F) is known as:

- a. Hydrogen embrittlement.
- b. Temper embrittlement.
- c. Caustic embrittlement.
- d. 885 embrittlement.

55. What is secondary process piping?

- a. Small-bore (\leq to NPS 3/4) process piping downstream of any pump.
- b. Small-bore (\leq to NPS 1) sample piping on any process pipe.
- c. Small-bore (\leq to NPS 1.5) process piping past normally closed globe valves.
- d. Small-bore (\leq to NPS 2) process piping downstream of normally closed block valves.

56. RBI utilizes evaluation of the _____ pertaining to failures.

- a. Consequence
- b. Destruction modeling
- c. Existing conditions
- d. Evaluation plan

57. Which of the below is NOT an authorized inspection agency?

- a. The inspection organization of the jurisdiction in which the piping system is used.
- b. The inspection organization of an insurance company that writes insurance for piping.
- c. An inspection organization of ASME that follows piping systems.
- d. An independent inspection organization employed by the owner or user of piping.

58. API 570 was developed for the petroleum refining and chemical process industries:

- a. and may not be used for any other piping system.
- b. but may be used, where practical, for any piping system.
- c. but it may be used in the design and construction of new piping systems.
- d. and may be used for piping systems only in the United States.

59. For a new piping system and piping systems for which service conditions are being changed, one way of determining the probable rate of corrosion is to measure the thickness of the pipe after no more than _____ of service by using nondestructive thickness measurements of the piping system.

- a. 1 year
- b. 6 months
- c. 3 months
- d. 1 month

60. A close-interval pipe-to-soil potential survey should be made on buried cathodically protected piping to verify that the piping has a protective potential throughout its length. For poorly coated pipes where cathodic protection potentials are inconsistent, the survey may be conducted at _____ intervals for verification of continuous corrosion control.

- a. 2-year
- b. 5-year
- c. 8-year
- d. 10-year

61. When checking piping that has coatings or if coatings of underground piping are repaired, the integrity of the coating may be tested using a high-voltage holiday detector. The detector voltage shall be:

- a. set to the maximum in order to detect the smallest of defects.
- b. adjusted to the appropriate value for the coating material thickness.
- c. set to the minimum in order to not damage the coating.
- d. adjusted to an average between the maximum and the minimum voltage.

62. Preplaced filler metal which is completely fused into the root of the joint and becomes part of the weld is known as a:

- a. solvent cemented joint.
- b. bonded weldment.
- c. consumable insert.
- d. a backing ring.

63. Which of the listed items are NOT considered "piping" as defined by B31.3?

- a. pipe support structures
- b. pipe mixers
- c. relief valves off pipes
- d. gate valves

64. Bolts should extend completely through their nuts. Any which fail to do so are considered acceptably engaged if the lack of complete engagement is not more than:

- a. two threads.
- b. 1/4".
- c. one thread.
- d. 1/2 the depth of the bolt.

65. An owner asks an Inspector if insulated small vents, bleeders, etc. under 1" diameter can be checked for thickness, thread contact, corrosion, and weld quality while the systems are in operation and without stripping insulation. If you were the inspector, which of the methods listed below would you pick?

- a. UT
- b. RT
- c. AE
- d. ET

66. The actual thickness of welded pipe used in refinery service may vary from its nominal thickness by a manufacturing tolerance of:

- a. +0.01 inch
- b. -0.01 inch
- c. ± 0.01 inch
- d. $\pm 0.01\%$

67. Which of the following piping systems are excluded or optional under the provisions of API 570?

- a. raw, intermediate, and finished petroleum products piping
- b. piping carrying raw, intermediate, and finished chemical products.
- c. hydrogen, natural gas, fuel gas, and flare system piping.
- d. internal piping or tubing of fired heaters.

68. An owner has had a piping system recently designed, fabricated, and installed according to ASME B31.3. The system has never been placed in service. The owner requests that you accept additional piping that is being added to the system before start up. What is your course of action as an Inspector?

- a. Agree to inspect and test the new piping as long as it complies with API 570.
- b. Agree to inspect and test the new piping as long as it complies with B31.3.
- c. Refuse to have anything to do with adding the piping.
- d. Refuse to have anything to do with the piping unless API 570 is used.

69. If a "pig" is used for cleaning a pipe or if an "intelligent pig" is used for checking for defects or thickness, the pipe must be free of restrictions and the bends should be ____ diameter formed bends rather than 90 degree weld ells for facilitation of the pigging operation.

- a. two
- b. three
- c. four
- d. five

70. Carbon, low-alloy and other ferritic steels may be susceptible to brittle failure at or below ambient temperatures. Brittle fracture usually is not a concern with:

- a. low alloy steels (especially 2.25 Chr-1 Mo.
- b. thick-wall piping.
- c. relatively thin-wall piping.
- d. ferritic stainless steels.

71. Pressure tests on piping are normally required:

- a. after the unit starts up.
- b. when the operator requests one.
- c. after alterations and major repairs.
- d. when the maintenance crew requests one.

72. What type gate valve should not be used as block valves associated with pressure relief devices?

- a. copious wedge gate valves.
- b. magnum ported gate valves.
- c. full ported wedge gate valves.
- d. Venturi-type gate valves.

73. A welder has not welded in the last seven months. He is qualified for _____ month(s).

- a. 3
- b. 0
- c. 12
- d. 9

74. The term NPS 10 indicates:

- a. A pipe that has an inside diameter of 10" and an O.D. depending upon wall thickness.
- b. A pipe that has an outside diameter of 10" and an I.D. depending upon wall thickness.
- c. A pipe that has an outside diameter of 10.75" and a nominal inside diameter of 10".
- d. A pipe that has an outside diameter of 10.625" and an inside diameter of 10".

75. A pipe is to be hot tapped. The piping engineer has used ASME B31.3 and designed the hot tap nozzle and the related welds. According to API 570 what other publication should be followed when making the weld to the in-service pipe?

- a. API Publication 2201
- b. API Standard 510
- c. API Standard 653
- d. API Publication 920

76. When an Inspector knows or is advised that environmental cracking may be a problem in a particular piping circuit, what types of inspections would be most effective?

- a. Hammer test, VT, EMAT
- b. ET, VT, AE
- c. WFMT, PT, UT(shear wave)
- d. Hydrotest, UT (straight beam), Magnetic Flux Leakage

77. The corrosiveness of the soils (considering buried piping) can be determined by a measurement of the soil:

- a. resistivity.
- b. erosivity.
- c. susceptibility.
- d. impenetrability.

78. What is creep cracking dependent upon?

- a. time, temperature, and stress.
- b. pressure, intensity, newness.
- c. relaxation, cycles, out of roundness.
- d. fatigue, corrosion, parameters.

79. While inspecting a control valve manifold located at grade, you notice that the control valve and the associated piping is supported by open ended trunnions (dummy pipe) welded to the 90° weld ells and subsequently held up by jackscrews. What type problem would you suspect to have with the weld ells combined with the open ended trunnions?

- a. thermal expansion problems at the jackscrews
- b. external corrosion on the pipe inside the trunnions
- c. fretting from vibration
- d. general physical damage

80. In the equation $\epsilon = \frac{PD}{2SE}$, what does the term "S" stand for?

- a. strain value for a pipe under hoop stress.
- b. unit efficacy in inches per inch.
- c. elongation strain in inches per inch of a pipe under temperature strain.
- d. allowable unit stress at the design temperature in pounds per square inch (psi).

81. Deviations from specifications or standards for materials, tolerances, or workmanship in the repair, alteration, and rerating of a piping system:

- a. is not allowed.
- b. should be done only after evaluations as to safety, strength, corrosion resistance, and serviceability and the change is properly recorded.
- c. may be made if the owner-user approves and the change is properly recorded.
- d. can be made if the maintenance and safety department allow.

82. Hot spots on pipe can be detected by several methods. Which of the methods listed below is NOT a method of detection.

- a. visually--see a red glow.
- b. use of temperature indication crayons on suspected areas
- c. use of a ultrasonic testing instrument.
- d. use a infrared temperature indicating instrument.

83. During periodic scheduled inspections of injection point circuit 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, 5
- b. 12 inches, 10
- c. 15 inches, 3
- d. 12 inches, 3

84. Chloride stress corrosion cracking (SCC) of austenitic stainless steels due to moisture and chlorides; polythionic acid SCC of sensitized austenitic alloy steels due to exposure to sulfide, moisture condensation or oxygen; Caustic SCC (caustic embrittlement); Amine SCC; and Hydrogen induced cracking are all examples of:

- a. erosion and corrosion/erosion
- b. environmental cracking.
- c. creep cracking.
- d. brittle fracture.

85. Before starting inspection, inspection personnel should:
- secure all the valves on the operating lines to be inspected.
 - procure TML's from the operating personnel.
 - go to the safety group for permission to work in the vicinity.
 - obtain permission to work in the vicinity from operating personnel.
86. If an insert patch (flush patch) with full-penetration groove welds is used as a permanent repair for a pipe in a class 1 or 2 piping system, what NDE procedure would you require?
- spot radiograph welds or UT welds 100%--NDE procedures approved by Inspector.
 - radiograph welds 100% or UT welds 100%--NDE procedures approved by Inspector.
 - random radiograph welds or MT welds 100%--NDE procedures approved by Inspector.
 - radiograph welds at corners & at one horizontal & one vertical weld--Inspector approve.
87. Discoloration of the soil, softening of paving asphalt, pool formation, bubbling water, puddles, freezing of the ground, odor are all:
- indications of soil impermeability in the area.
 - indications of a oil well that has not been capped.
 - indications of poor road or parking lot paving preparations.
 - indications of a leak in buried piping.
88. A WPS shall be requalified whenever a change is required for welding outside the ranges allowed by ASME Section IX in one or more of the _____ listed for the welding process(es) addressed in the WPS.
- non-essential variables
 - essential variables
 - supplementary variables
 - testing variables
89. What is the minimum radius of the corners of a small square or rectangular repair welded patch used to make a temporary repair to a pipe?
- 1/2 inch
 - 1 inch
 - 1.5 inches
 - 2 inches
90. A welding electrode that ends as follows, EXX16, or EXX18, are _____ electrodes.
- high-carbon
 - low-chloride
 - low-hydrogen
 - high-silicon
91. As an Inspector you should inspect the connection between the stem and the disk of a gate valve to:
- ensure that the disk will not detach from the stem during operation.
 - affirm that the ball check is can operate successfully.
 - assure that free rotation of the swing gate can take place.
 - affirm that the plug can operate freely and that no obstruction are present.

92. Who establishes the piping inspection intervals for thickness measurements and external visual inspection and, where applicable, for internal and supplemental inspections?

- a. NBIC or ASME
- b. safety department or operations
- c. maintenance supervisor
- d. owner-user or the inspector

93. Services that are flammable but do not significantly vaporize when they leak and are not located in high-activity areas are classified as:

- a. Class 3
- b. Class 2
- c. Class 1
- d. Normal

94. Most brittle fractures of carbon, low-alloy, or other ferritic steels occur:

- a. when the operators start the system after it has been hydrotested.
- b. during the second hydrotest or first year of service.
- c. after the steels have been in service for a long time.
- d. during the first hydrotest or service overload.

95. Reclaimed pipe and other piping components may be used, provided they are:

- a. weldable carbon steel and meet the requirements of B31.1.
- b. properly identified and otherwise meet the requirements of B31.3.
- c. not threaded and they otherwise meet the requirements of API Publ. 2201.
- d. weldable austenitic steel and meet the requirements of AISI 4140.

96. Inspection of secondary, auxiliary SBP associated with instruments and machinery is:

- a. optional.
- b. required.
- c. mandatory.
- d. necessary.

97. In reviewing machinery that is subject to vibrations, an Inspector finds several threaded connections on small connections to compressors and pumps. What should he do?

- a. He should review records and assess the piping for possible renewal with a thicker wall or for up-grading to welded components.
- b. He should immediately write work orders to have the threaded piping renewed with welded components.
- c. He should inspect the piping as normal and renew or replace any piping where he finds problems and make a record of his actions.
- d. He should check the piping using dye penetrant to find any possible cracks and increase the frequency of inspection of the piping.

98. When conducting an external inspection for process piping, which of the following is NOT an item you would check for vibration problems?

- a. excessive overhung weight
- b. soil-to-air interface
- c. threaded connections
- d. inadequate support

99. An Inspector starts an external inspection by checking under pipe support bolted clamps, looking at paint deterioration on pipes, examining soil-to-air interfaces of pipe, and examining areas where vents and bleeders protrude through insulation. What is he looking for?

- a. internal corrosion
- b. vibration problems
- c. external corrosion
- d. misalignment

100. For CUI inspections on Class 3 systems, the examination should include at least _____ percent of all suspect areas and _____ percent of all areas of damaged insulation.

- a. 75, 50
- b. 25, 10
- c. 10, 100
- d. 10, 25

101. To achieve the most accurate projection for the next inspection of TML's:

- a. only the thickness measurements of the earliest renewal date piping is needed.
- b. a representative number of thickness measurements must be obtained.
- c. the maximum number of thickness measurements should be obtained.
- d. a representative minimum readings of the earliest renewal date piping is needed.

102. Piping systems that are known to have a remaining life of _____ years or that are protected against external corrosion, need not have insulation removed for the periodic external inspection. The condition of the insulating system or the outer jacketing should be observed periodically by operating or other personnel.

- a. 20
- b. 15
- c. 10
- d. 8

103. During a pressure test of a piping system, the new test pump continues to pump over a long period of time with a very slow increase in pressure in the system being pressured. What would you diagnose as the possible problem?

- a. A smaller pump should be used because of the possible high pressure.
- b. The pump is undersized and a larger pump should be obtained.
- c. A leak in the system exists or too much air may be trapped in the system.
- d. Blinds in the system are bulging and preventing the pressure from rising.

104. What is the axis of a weld?

- a. A line through the center of the weld, parallel with the sides of the weld.
- b. A line drawn parallel with the base of the material.
- c. A line through the center of the weld, perpendicular with the weld.
- d. A line drawn from the base to the cap of a weld.

105. Primary process piping is normally greater than:

- a. NPS 2
- b. NPS 2.5
- c. NPS 3
- d. NPS 3.5

106. API 570, Table 1, has a recommended maximum thickness measurement inspection interval of 3 years. What Class piping is this interval for?

- a. Class 1
- b. Class 2
- c. Injection points
- d. Class 3

107. A piping system installed in a cold box in which the atmosphere is purged with an inert gas would probably have a remaining life of over _____ years.

- a. 50
- b. 10
- c. 25
- d. 15

108. What thickness technique would you recommend for measuring thickness of NPS 3/4 pipe?

- a. UT
- b. RT
- c. ET
- d. Mechanical

109. More TML's are normally selected for piping systems with all but one of the following characteristics. Which characteristic does not belong?

- a. Higher potential for creating a safety or environmental emergency if a failure occurs.
- b. Long, straight-run piping systems.
- c. Higher expected or experienced corrosion rates.
- d. Higher potential for localized corrosion.

110. A rectangular plaque with small holes made of material radiographically similar to that of the object being radiographed or a set of small diameter wires, also made of material radiographically similar to that of the object being radiographed that is used to check the image quality of the radiograph is known as:

- a. semblance location markers (SLM's).
- b. figure storage systems (FSS's)
- c. image quality indicators (IQI's).
- d. icon optical shims (IOS's).

111. Thickness measurements may be obtained when the piping system is in or out of operation and they may be obtained by:

- a. an Engineer or Technician
- b. a Contractor or Pipe Fitter
- c. a Unit Operator or Maintenance Technician, if properly trained and qualified
- d. a Operator or Safety Man.

112. Examples of piping that internal visual inspections can be conducted on are:

- a. lines smaller than NPS 12.
- b. transfer lines between exchanger & process towers, also between heaters & towers.
- c. large-diameter lines, ducts, catalyst lines, etc.
- d. under ground gas piping, steam lines, fuel gas lines, etc.

113. Which of the following is not a type of inspection or surveillance conducted by an API 570 Inspector?

- a. Internal and external visual inspection.
- b. Replication inspection for SCC.
- c. Thickness measurement inspection.
- d. Vibrating piping and supplemental inspection.

114. Thickness measurements using ultrasonic thickness instruments are usually used on piping that is larger than:

- a. NPS 1/4
- b. NPS 1/2
- c. NPS 3/4
- d. NPS 1

115. When an inspector checks downstream of control valves (especially when flashing is occurring) downstream of orifices, downstream of pump discharges, at any point of flow direction change, he is checking for:

- a. erosion and corrosion/erosion
- b. environmental cracking
- c. fatigue cracking
- d. creep cracking

116. A welder that welds a circumferential groove butt weld on a pipe with its axis inclined at 45 degrees to the horizontal and welds without rotating the pipe is welding in the _____ position.

- a. 1G
- b. 6G
- c. 2G
- d. 5G

117. Appropriate _____ shall be taken before any piping system is opened and before some types of external inspection are performed.

- a. equipment checks
- b. review procedures
- c. safety precautions
- d. operation procedures

118. Which of the items listed below is not considered qualifications for an API Authorized Piping Inspector?

- a. Degree in Engineering plus 1 yr in design, operation or inspection of piping systems.
- b. Two yr technical college degree plus 2 yrs experience in design, inspection, & repair of piping systems.
- c. High school education plus 3 yrs experience in design, inspection, of piping systems.
- d. Five yrs experience maintaining (repair/const) and operating in-service piping systems.

119. A welder may be qualified by visually and mechanically examining welds made in test coupons. Alternately, a welder may be qualified by:

- a. radiographing a 6 inch length of the welders first production weld.
- b. visual examination and ultrasonic testing of the weld test coupons
- c. magnetic particle testing and ultrasonic testing of the weld test coupons.
- d. eddy current testing and visual inspection of the first production weld.

120. At temperatures in the creep range, what could happen if the flange bolts and gaskets gradually relax?

- a. The bolt loads will increase & possible failure may result.
- b. The flanges may bend because of the temperature.
- c. The bolt loads will reduce & leakage could occur.
- d. The bolt loads will increase, causing the gasket to be crushed.

121. The corrosion rate in deadlegs can vary significantly from adjacent active piping. The inspector should monitor wall thickness on selected deadlegs, including:

- a. downstream of the deadleg at least 2 feet or the first change of direction.
- b. upstream of the deadleg at least 2 feet or the first upstream change of direction .
- c. blind flange or valve that blocks off the deadleg.
- d. both the stagnant end and the connection to an active line.

122. In the equation $t = \frac{PD}{2SE}$, what does the term "D" stand for?

- a. outside diameter of the pipe, in inches (millimeters).
- b. inside diameter of the pipe, in inches (millimeters).
- c. inside diameter of the gasket for a raised or flat face flange in inches (millimeters).
- d. average diameter of the pipe in inches (millimeters).

123. Socket welding and threaded flanges are not recommended for service above _____ degrees F. or below -50 degrees F.

- a. 600
- b. 800
- c. 500
- d. 700

124. In accordance with the ASME Code, Section V, intensifying screens used in direct contact with radiographic film in order to reduce exposure time can:

- a. can never be used.
- b. can always be used.
- c. be used unless restricted by the referencing code.
- d. can be used only with type 1 film.

125. Flanged joints using low strength carbon steel bolts shall not be used above _____ degrees F or below -20 degrees F.

- a. 300
- b. 500
- c. 200
- d. 400

126. Why do you control the raising of the hydro-test pressure in a piping system hydro-test?

- a. Slowly rising pressure gives the Inspector time to look the system over.
- b. You do not want to over tax the pump being used in the pressure test.
- c. A sudden rise in pressure may cause shock, resulting in failure of the equipment or piping.
- d. Controlling the pressure rise allows a uniform recording of the test to be made.

127. Low strength bolts shall only be used in class _____ and class _____ joints.
- 250, 400
 - 150, 300
 - 300, 400
 - 400, 600
128. What ASTM grade of carbon steel pipe may corrode at higher rates in high temperature sulfidic environments?
- A-106 Grade B
 - A-53 Grade A
 - A-556 Grade B2
 - A-210 Grade A-1
129. A flanged joint is composed of three separate and independent, although interrelated components. What are these components?
- flange face, bolt holes, and hub
 - flange, gasket, and bolts
 - raised face, ring joint, and lapped joint
 - slip-on, fillet welds, and hub
130. A new piping system normally requires a hydrostatic test after completion of construction. This test is to:
- satisfy the owners requirements.
 - stress the system to insure structural integrity.
 - insure tightness.
 - cover any thing that might have been missed during construction.
131. For spot radiography of girth and miter welds, NPS 2.5 and less, the exposure shall be:
- a single elliptical exposure encompassing the entire weld.
 - the lesser of 25% of the inside circumference or 6 inches.
 - the minimum of 6 inches of weld length.
 - the lesser of 10% of the inside circumference or 4 inches.
132. If piping is being installed with "cold spring" designed into it, and the contractor starts to heat it to fit it up, what would you do as the Inspector on the job?
- Stop the work--heating must not be used to close gaps of piping with cold spring.
 - Allow the work to continue--heating to close the gap will do no harm.
 - Ask the construction foreman to sign a statement that he approved the heating.
 - If you find nothing in the job specs, allow the work to continue.
133. When making a hardness test on piping welds, the hardness limit applies to:
- the heat affected zone only.
 - the weld only.
 - the weld and to the heat affected zone.
 - the pipe at least 1" from the weld.

134. An injection point inspection circuit includes a recommended upstream limit from the injection point, the greater of _____ inches or _____ pipe diameters and a recommended downstream limit of the _____ change of flow direction past the injection point, or _____ feet beyond the _____ change in flow direction, whichever is less.

- a. 15, 4, first, 20, third
- b. 10, 3, second, 30, first
- c. 12, 2, third, 25, second
- d. 12, 3, second, 25, first

135. If buried piping is uncoated, the Inspector should inspect at the soil-to-air interface and the piping should be excavated _____ deep to assess the potential for hidden damage.

- a. 3" to 9"
- b. 6" to 8"
- c. 6" to 12"
- d. 4" to 10"

136. When water or other aqueous solutions in a piping system freeze: the consequences may be:

- a. The pipe may fail because of the expansion of the material when it freezes.
- b. Nothing, the materials will occupy less space when it freezes.
- c. Piping should be designed to take the stresses; hence nothing should happen.
- d. System should be flexible enough to with stand the freezing, nothing will happen.

137. RBI assessments are used to better define:

- a. optimal inspection frequencies.
- b. extent of inspection coverage.
- c. both a and b above.
- d. the jurisdictional compliance issues surrounding the piping.

138. Cast iron shall not be used above ground within process unit limits in hydrocarbon or other flammable fluid service at temperatures above _____ degrees F. nor at gage pressures above _____ psi.

- a. 500, 300
- b. 400, 200
- c. 300, 150
- d. 200, 400

139. Hammer testing of piping, valves, and fittings is a method of extending the scope of measurement to detect the presence of unexpected thin sections. Which of the listed items may safely be hammer tested?

- a. cast iron and stress-relieved lines in caustic and corrosive service.
- b. carbon steel lines in low or non-corrosive service.
- c. copper tubing, brass piping, or other piping made from soft materials.
- d. glass, cement or other internally coated (lined) pipe.

140. Pipe flanges and flanged fittings of ASME B16.5 are obtainable in classes 150, 400, 600, _____, 1500 and 2500.

- a. 800
- b. 1000
- c. 700
- d. 900

141. Service-specific corrosion may occur in carbon steel piping when the sulfur content in the oil is greater than 0.5% by weight and the temperature is _____ or higher

- a. 350⁰ F
- b. 450⁰ F
- c. 150⁰ F
- d. 250⁰ F

142. Vibrations, hydraulic hammer, pressure fluctuations, and frequent thermal changes, in piping may cause piping to suffer from:

- a. environmental cracking.
- b. creep cracking.
- c. fatigue cracking.
- d. erosion cracking.

143. Fatigue cracking can typically be first detected at points of high-stress intensification such as:

- a. horizontal straight runs of piping.
- b. branch connections or sharp changes of direction.
- c. vertical straight runs of piping.
- d. properly designed expansion loops.

144. The maximum internal pressure permitted in the piping system for continued operation at the most severe condition of the coincident internal or external pressure and temperature (minimum or maximum) expected during service is known as:

- a. maximum relief valve pressure (MRVP)
- b. maximum allowable operating pressure (MAOP)
- c. maximum allowable working pressure (MAWP)
- d. maximum jurisdictional pressure allowed (MJPA)

145. If a backing ring is used in a weld joint where the resulting crevice is detrimental (e.g., subject to corrosion, vibration, or severe cyclic conditions),:

- a. mechanical or other interlocks shall be provided to prevent separation.
- b. it should have a maximum tensile stress of at least 10% higher than the weld metal.
- c. the joint should be radiographed to insure full penetration.
- d. it should be removed and the internal joint face ground smooth.

146. When will the performance qualifications of a welder or welding operator for a expire?

- a. When he has not welded with a process during a period of 3 months or more.
- b. When he has not welded with a process during a period of 6 months or more.
- c. When he has not welded with a process during a period of 1 month or more.
- d. When he has not welded with a process during a period of 12 months or more.

147. ASME Standard B16.5 covers pressure-temperature ratings, materials, tolerances, marking, testing and methods of designating openings for flanges and flanged fittings NPS ____ through NPS _____.

- a. 1/4, 30
- b. 1/2, 24
- c. 3/4, 28
- d. 1/8, 26

148. Piping in a refinery that in normal active service cannot be valved off or, if it were valved off, would significantly affect unit operability is known as:

- a. secondary operating piping.
- b. primary process piping.
- c. secondary process piping.
- d. large-bore piping.

149. All repair and alteration work must be authorized by the _____ prior to its commencement.

- a. operators
- b. jurisdiction
- c. owner-user
- d. Inspector.

150. A permanent repair of a defect in a pipe can be made by:

- a. fastening an expanded split sleeve over the defect, bolting a lap patch over the defect, or clamping a weld cap over the problem area.
- b. installing a properly designed and fabricated bolted leak clamp over the defect, or use a commercial leak sealing company to fabricate a device to seal off the defect..
- c. affixing a full circumferential welded split sleeve over the defect, a lap patch less than 1/2 the diameter of the pipe over the defect, or a weld cap over the corroded area.
- d. prepare a welded groove that removes the defect and restore the corroded area with weld metal, or cut out a cylindrical section and replace it in full.

CODEWEST API-570 ANSWER SHEET FOR FINAL EXAMINATION #2

FILL IN THE BLOCK TO THE RIGHT OF THE CORRECT ANSWER

OPEN BOOK ANSWERS

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| 2. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 52. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 104. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 3. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 53. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 105. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 4. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 54. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 106. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 5. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 55. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 107. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 6. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 56. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 108. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 7. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 57. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 109. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 8. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 58. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 110. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
| 9. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 59. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 111. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
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| 11. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 61. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 113. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
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| 17. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 67. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> | 119. | A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> |
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API 570 FINAL # 2
ANSWER KEY

1. d, B16.5, 5.3.4(c)
2. a, B31.3, Table A-1
3. c, 570, Table 2
4. c, Sec V, T-952
5. b, 570, 5.1.1
6. b, B31.3, Table A-1
7. a, B16.5, Table 1A and Table 2
8. b, B31.3, 304.1.2
9. c, B31.3, Table A 1B & Table 302.3.4
10. d, B31.3, 304.5.3
11. c, B31.3, 330 & Table 330.1.1
12. c, B31.3, 330.1.4
13. d, B31.3, 331.1.1
14. d, Sec V, T-761
15. d, Sec V, T-272.2
16. a, 570, 5.1.1
17. a, 570, Table 2
18. a, B31.3, Tab A-1
19. b, B16.5, 5.3.3
20. b, Sec V, T233, T276 & Tab T233.1/276
21. b, Sec V, T-282.1
22. c, 570, Table 2
23. a, 570, D-2
24. b, Sec V, T-532
25. b, B31.3, Tab A-1
26. a, Sec V, T-652
27. c, B16.5, 8.3T1A-2
28. a, IX, QW253/400
29. c, Sec V, T-942
30. c, 570, Table 3
31. c, B31.3, 304.1
32. b, Sec IX, QW432
33. c, B16.5, 4.1.5
34. b, 574, 11.2
35. a, ASME IX
36. b, ASME IX
37. d, ASME IX
38. b, ASME IX
39. b, ASME IX
40. a, ASME IX
41. c, ASME IX
42. c, ASME IX
43. a, ASME IX
44. d, ASME IX
45. c, 570, 5.4
46. c, 574, 10.2.1.5.2
47. a, 574, 10.2.1.5.3
48. c, 574, 10.2.1.8
49. b, 570, 3.3.1
50. c, 570, 3.3.1
51. b, B31.3, 300.2
52. d, B31.3, 300.2
53. a, 570, Apdx A
54. b, 570, Apdx A
55. d, 570, Apdx A
56. a, 570, 3.1
57. c, 570, Apdx A
58. b, 570, 1.1.1.2
59. c, 570, 5.1.2
60. b, 570, 7.2.2
61. b, 570, 7.3.1
62. c, B31.3, 300.2
63. a, B31.3, 300.2
64. c, B31.3, 335.2.3
65. b, 574, 10.1.2.2
66. b, 574, 4.1
67. d, 570, 1.1.2
68. b, 570, 1.1.1.3
69. d, 570, 7.1.6
70. c, 570, 3.3.11
71. c, 570, 6.2.6
72. d, 574, 4.3.2
73. b, Sec IX, QW-322.1
74. c, 574, 4.1.1
75. a, 570, 6.2
76. c, 570, 3.3.7
77. a, 570, 7.1.4
78. a, 570, 3.3.10
79. b, 574, 10.1.1.5
80. d, 574, 11.1
81. b, 574, 10.4.3
82. c, 574, 10.1.1.7
83. b, 570, 3.3.1
84. b, 570, 3.3.7
85. d, 570, 3.7
86. b, 570, 6.1.3.2
87. d, 570, 7.1.1
88. b, Sec IX QW-351
89. b, 570, Apndx D-2
90. c, 570, Apndx D-1
91. a, 574, 10.2.1.4
92. d, 570, 4.3
93. a, 570, 4.2.3
94. d, 570, 3.3.11
95. b, B31.3, 323.1.4
96. a, 570, 4.6.2
97. a, 570, 4.6.3
98. b, 570, Apndx E
99. c, 570, Apndx E
100. d, 570, 4.4
101. c, 570, 4.5
102. c, 570, 4.4
103. c, 574, 10.2.3
104. a, Sec IX, QW-461
105. a, 570, Apndx A
106. c, 570, Table 1
107. b, 570, 4.4
108. b, 570, 3.6
109. b, 570, 3.5.3.2
110. c, Sec V, V-230
111. c, 570, 3.4.2
112. c, 570, 3.4.1
113. b, 570, 3.4
114. d, 570, 3.6
115. a, 570, 3.3.6
116. b, Sec IX, QW-122.4
117. c, 570, 3.2
118. d, 570, 2.2
119. a, Sec IX QW-304.1
120. c, B16.5, 2.4.2
121. d, 570, 3.3.2
122. a, 574, 11.1
123. c, B16.5, 2.4.1
124. c, Sec V, T-232
125. d, B16.5, 5.3.3
126. c, 574, 10.2.3
127. b, B16.5, 5.3.3
128. b, 570, 3.3.5
129. b, B16.5, 2.2
130. c, B31.3, 345.1
131. a, B31.3, 344.5.2(c)1
132. a, B31.3, 335.1.1(b)
133. c, B31.3, 331.1.7
134. d, 570, 3.3.1
135. c, 570, 3.3.4
136. a, 570, 3.3.12
137. c, B31.3, 311.2.5
138. c, B31.3, 323.4.2
139. b, 574, 10.2.4
140. d, B16.5, 1.1
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142. c, 570, 3.3.9
143. b, 570, 3.3.9
144. c, 570, Apndx A
145. d, B31.3, 311.2.3
146. b, Sec IX QW322.1
147. b, B16.5, 1.1
148. b, 570, Apndx A
149. d, 570, 6.1.1
150. d, 570, 6.1.3.2