



API-571 Practice Questions

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Question 1

Question Type: MultipleChoice

(What nondestructive examination (NDE) technique requires the least amount of surface preparation to locate wet HS damage mechanisms?)

Options:

- A- ACFM
- B- SWUT
- C- WFMT
- D- LPT

Answer:

B

Explanation:

Comprehensive and Detailed Explanation From Exact Extract:

Wet HS damage mechanisms include hydrogen blistering, hydrogen-induced cracking (HIC), stepwise cracking (SWC), and stress-oriented hydrogen-induced cracking (SOHIC). These mechanisms are primarily internal and subsurface, as described in API RP 571.

Shear Wave Ultrasonic Testing (SWUT) is specifically highlighted in API RP 571 as a preferred screening and detection method for wet HS damage because it can detect subsurface planar defects with minimal surface preparation. Typically, only basic coupling and access are required.

Why the other options are incorrect:

Option A (ACFM) is a surface crack detection technique and requires relatively clean surfaces; it is not suitable for subsurface hydrogen damage.

Option C (WFMT -- Wet Fluorescent Magnetic Particle Testing) requires extensive surface preparation, coating removal, and direct access to the surface, and only detects surface-breaking flaws.

Option D (LPT -- Liquid Penetrant Testing) also requires clean, bare metal surfaces and cannot detect subsurface damage.

API RP 571 explicitly notes that ultrasonic techniques, particularly shear wave UT, are widely used for detecting internal hydrogen-related cracking with minimal disruption and surface preparation, making it the most effective choice for wet HS damage screening.

Referenced Documents (Study Basis):

API RP 571 -- Section on Wet HS Damage (HIC, SOHIC, Blistering)

API Corrosion and Materials Inspection Study Guide

Question 2

Question Type: MultipleChoice

(For hydrogen embrittlement, the amount of hydrogen necessary for a measurable effect on the mechanical properties varies with the alloy's strength, microstructure, and:)

Options:

- A- Modulus of elasticity
- B- Coefficient of thermal conductivity
- C- Melting point
- D- Heat treatment

Answer:

D

Explanation:

Per API RP 571, susceptibility to hydrogen embrittlement is strongly influenced by:

Material strength level

Microstructure

Heat treatment condition

Heat treatment determines:

Dislocation density

Trap sites for hydrogen

Residual stress state

The modulus of elasticity does not significantly affect hydrogen embrittlement susceptibility, making Option A incorrect.

Referenced Documents (Study Basis):

API RP 571 -- Section on Hydrogen Embrittlement

Question 3

Question Type: MultipleChoice

Which of the following statements about high-temperature hydrogen attack is most accurate?

Options:

- A- Acoustic emission testing is not a proven method for the detection of high-temperature hydrogen attack damage.
- B- High-temperature hydrogen attack will most often be associated with the formation of surface blisters.
- C- High-temperature hydrogen attack damage is most often limited to welds and heat-affected zones.
- D- 300 series stainless steels are also susceptible to high-temperature hydrogen attack at conditions normally seen in refinery units.

Answer:

A

Explanation:

API RP 571 on HTHA states:

"Acoustic emission testing is not currently a proven or reliable method for identifying HTHA in refinery components."

"HTHA typically occurs internally, not as surface blisters, and is not limited to welds. Austenitic (300 series) stainless steels are generally resistant at normal refinery conditions."

(Reference: API RP 571, Section 4.2.1.3 -- High Temperature Hydrogen Attack)

Thus, option A is the most accurate statement.

Question 4

Question Type: MultipleChoice

At Which option best temperatures would the highest atmospheric corrosion rates be expected?

Options:

- A- 175F (79C)
- B- 200F (93C)
- C- 250F (120C)
- D- 275F (135C)

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Answer:

A

Explanation:

API RP 571 under Atmospheric Corrosion notes:

"The highest corrosion rates are typically observed between 80F and 120F (27C--49C), particularly when relative humidity is high and surfaces are wet from condensation or rain."

"At higher temperatures, surface dryness generally reduces corrosion activity despite increased reaction kinetics."

(Reference: API RP 571, Section 4.3.1.3 -- Atmospheric Corrosion)

Thus, among the listed temperatures, 175F is closest to the upper end of the most active corrosion window, making option A the most accurate answer.

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Question 5

Question Type: MultipleChoice

Internal galvanic corrosion in piping near the joint of two dissimilar metals is best detected by external:

Options:

- A- Liquid-penetrant testing
- B- Metallographic examination
- C- Eddy-current testing
- D- Ultrasonic thickness testing

Answer:

D

Explanation:

API RP 571 states under Galvanic Corrosion:

"Because galvanic corrosion usually manifests as thinning of the more anodic metal, ultrasonic thickness measurements taken near dissimilar metal joints are an effective way to detect this type of internal corrosion."

"Surface NDE techniques like liquid penetrant or magnetic particle testing are not effective for detecting wall loss."

Thus, option D (ultrasonic thickness testing) is correct.

Question 6

Question Type: MultipleChoice

(Resistance to oxidation of steel is best provided by alloying with:)

Options:

- A- Molybdenum
- B- Chromium
- C- Nickel
- D- Manganese

Answer:

B

Explanation:

Comprehensive and Detailed Explanation From Exact Extract:

According to API RP 571, chromium is the most effective alloying element for improving oxidation resistance in steels.

Chromium:

Forms a stable, adherent chromium oxide (CrO) scale

Greatly reduces oxidation rates at elevated temperatures

Is the basis for oxidation-resistant alloys and stainless steels

Other alloying elements may provide secondary benefits, but chromium is the primary contributor to oxidation resistance.

Referenced Documents (Study Basis):

API RP 571 -- Section on Oxidation and High-Temperature Corrosion

Question 7

Question Type: MultipleChoice

The primary cause of ammonium chloride corrosion is the formation of salts:

Options:

- A- That may precipitate from high-temperature streams as they are cooled
- B- During water washing operations in streams containing traces of chlorides
- C- That may deposit when water evaporates to dry-out conditions as streams are heated
- D- When steam is injected into streams containing traces of chlorides

Answer:

A

Explanation:

API RP 571 under Ammonium Chloride Corrosion details:

"The corrosion results from the deposition of ammonium chloride salts from high-temperature process streams as they cool."

"This typically occurs in crude unit overheads or other systems where salts condense out as the stream temperature drops below their dew point."

"Corrosion becomes especially aggressive when the salts are wetted by condensation."

(Reference: API RP 571, Section 4.3.3.1 -- Ammonium Chloride Corrosion)

Therefore, option A is technically accurate and supported.



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