

API API-SIRE

Source Inspector Rotating Equipment

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Subjects

1. API SIRE Applications - Documentation Management & Record Keeping
2. API SIRE Foundations - Centrifugal Pump Inspection & NDE Standards
3. API SIRE Professional - Material Evaluation & Manufacturing Processes
4. API SIRE Expert - Advanced NDE Techniques & Defect Detection
5. API SIRE Mastery - Component Storage & Protective Coating Preservation

Topic: 1

API SIRE Applications - Documentation Management & Record Keeping

Question: 1

During a Factory Acceptance Test (FAT) for a centrifugal pump, it was observed that the pump was vibrating at higher amplitudes than specified. Upon investigation, it was determined that the misalignment between the motor and the pump was the cause. As a source inspector, what should be your next step to ensure the issue is resolved properly before acceptance?

- A. Recommend stopping the test and ask the vendor to realign the equipment.
- B. Document the issue and proceed with the test to analyze other parameters.
- C. Request recalibration of the vibration sensors.
- D. Approve the equipment as it is, since misalignment is a minor issue.
- E. Suggest replacing the motor with a new one immediately.
- F. Insist on proceeding with the test to check if the issue resolves itself.

Answer: A

Explanation:

As a source inspector, ensuring the equipment meets the specified performance criteria is crucial. Misalignment can lead to excessive wear and premature failure, making it imperative to address before proceeding with further testing. By recommending stopping the test and realigning the equipment, you ensure the issue is corrected, thus avoiding further complications. Documenting and addressing the problem also emphasizes the importance of adhering to quality standards and ensures the equipment operates within acceptable limits.

Question: 2

Which of the following strategies is most effective in minimizing erosion in rotating equipment used in slurry pumping applications?

- A. Reducing the slurry concentration
- B. Applying thermal insulation to the pump casing
- C. Installing vibration dampeners

- D. Increasing the rotational speed of the pump
- E. Using harder materials for the pump components
- F. Increasing the diameter of the impeller

Answer: E

Explanation:

Using harder materials for pump components is a highly effective strategy for minimizing erosion in slurry pumping applications. Harder materials can better withstand the abrasive action of solid particles in the slurry, reducing the rate of material loss and extending the lifespan of the components. While other strategies, such as reducing slurry concentration or changing operational parameters, can also help, selecting materials with higher hardness and wear resistance provides a direct solution to the problem of particle-induced erosion. This approach addresses the root cause by enhancing the component's ability to resist abrasive wear.

Question: 3

During a routine inspection closeout for a high-speed turbine, the source inspector notices that one of the components was replaced with an alternative part not originally specified in the design. This part has a slightly different specification but is claimed to be equivalent by the supplier. The inspector is required to document this deviation before finalizing the inspection report. What is the most appropriate action for the inspector to take to ensure compliance with the API SIRE guidelines?

- A. Document the deviation and proceed without further action.
- B. Accept the component if the supplier provides a verbal assurance.
- C. Ignore the discrepancy if the turbine passed the functional tests.
- D. Request and review a formal deviation approval from engineering.
- E. Reject the part immediately and request the original component.
- F. Replace the part if it is not visually identical to the original.

Answer: C

Explanation:

When faced with a deviation from the original specifications, the source inspector should adhere to the established protocols and ensure that any changes are formally approved. Requesting a formal deviation approval from engineering ensures that all parties are informed and that the substituted part meets the necessary criteria for performance and safety.

Question: 4

When conducting an inspection, maintaining impartiality is essential to avoid conflict of interest. The API SIRE code of ethics requires inspectors to prioritize over personal or professional relationships.

- A. Profit
- B. Personal advancement
- C. Safety and quality

- D. Client satisfaction
- E. Industry recognition
- F. Innovation

Answer: C

Explanation:

Prioritizing safety and quality above personal or professional relationships is fundamental to the role of an inspector. This focus ensures that inspections are conducted without bias, and that the outcomes reflect the true condition and safety of the equipment. By adhering to these principles, inspectors uphold the integrity of the inspection process and ensure compliance with industry standards. This approach not only protects the end-users but also reinforces the trust between the inspection body and the client, fostering a culture of quality and safety.

Question: 5

During the documentation review phase of a rotating equipment inspection, an inspector is responsible for verifying that all calibration certificates for measuring instruments used during manufacturing are current and valid.

- A. False
- B. True

Answer: B

Explanation:

During the documentation review phase, it is indeed the inspector's responsibility to verify that all calibration certificates for measuring instruments used during the manufacturing of rotating equipment are current and valid. Calibration certificates ensure that the instruments used for measurements during manufacturing are accurate and reliable, which is crucial for maintaining the quality and performance of the equipment. Ensuring the validity of these certificates helps confirm that the equipment has been manufactured to the required specifications and is safe for operation. This step is a vital part of the documentation review process, contributing to the overall integrity of the inspection.

Question: 6

When completing an inspection closeout, the source inspector must ensure that all discrepancies noted during the inspection are documented in the .

- A. Non-conformance Report (NCR)
- B. Inspection and Test Plan (ITP)
- C. Quality Assurance Plan (QAP)
- D. Purchase Order (PO)
- E. Engineering Change Notice (ECN)
- F. Material Test Report (MTR)

Answer: A

Explanation:

The Non-conformance Report (NCR) is the appropriate document for recording any discrepancies or deviations noted during an inspection. This report serves as a formal record of non-conformance issues and provides a basis for corrective actions. By documenting these issues in the NCR, the source inspector ensures that all parties are aware of any deviations and that appropriate measures can be taken to address them. This process is an essential part of the inspection closeout, facilitating traceability and accountability while ensuring compliance with the relevant standards and specifications.

Question: 7

When inspecting the fabrication and assembly of rotating equipment, which standard provides guidelines on the tolerances and clearances for components like bearings and seals?

API 612

- A. NACE MR0175
- B. ASME B31.3
- C. API 610
- D. ASTM A370
- E. ISO 9001

Answer: C

Explanation:

API 610 is the standard that provides comprehensive guidelines on the tolerances and clearances for components such as bearings and seals in centrifugal pumps, which are a common type of rotating equipment. This standard is crucial for ensuring the reliability and efficiency of pumps in petrochemical, chemical, and gas industry applications. built to withstand challenging operational conditions, providing safety and longevity in its service life.

Question: 8

During the final assembly of a centrifugal pump, a source inspector notices that the alignment check between the pump and the driver is not within the specified tolerance. The equipment was previously aligned, but some adjustments were necessary to accommodate thermal expansion. Considering the fabrication and assembly stages, what step should the inspector prioritize to ensure compliance with the alignment criteria before commissioning?

- A. Perform vibration analysis to detect imbalance issues.
- B. Reassess the foundation's structural integrity.
- C. Conduct a re-alignment check after the system reaches operating temperature.
- D. Add additional shims to correct misalignment.
- E. Increase the bolt torque to maintain alignment.
- F. Request a redesign of the coupling system.

Answer: C

Explanation:

Alignment checks are crucial for the optimal performance of rotating equipment. Thermal expansion can significantly affect alignment, which is why it is important to reassess alignment once the system reaches its operating temperature. While it may initially appear aligned at ambient temperature, changes due to heat can cause misalignment when operational. This ensures that the equipment operates smoothly and prolongs its lifespan. Other options, like increasing bolt torque or adding shims, do not directly address thermal expansion effects. Vibration analysis helps identify imbalances but doesn't correct alignment issues. Therefore, a re-alignment check at operating temperature is the priority.

Question: 9

In a failure modes and effects analysis (FMEA) for rotating equipment, the likelihood of a specific failure mode occurring is assessed through the parameter known as .

- A. Severity
- B. Detection
- C. Risk Priority Number
- D. Occurrence
- E. Impact
- F. Criticality

Answer: D

Explanation:

In FMEA, the likelihood of a failure mode is quantified using the "Occurrence" parameter. This parameter estimates how frequently a particular failure mode might happen based on historical data and expert judgment. It is an essential component of the Risk Priority Number (RPN) calculation, which also considers the severity of the failure's impact and the detectability of the failure mode. Understanding the occurrence prioritize helps which failure modes require more immediate attention or preventive measures, thereby enhancing the reliability of the equipment.

Question: 10

In a risk-based inspection framework for rotating equipment, the likelihood of failure and the consequence of failure are both equally important factors in determining inspection intervals.

- A. False
- B. True

Answer: B

Explanation:

In risk-based inspection (RBI) frameworks, both the likelihood of failure and the consequence of failure are crucial in determining inspection intervals. The likelihood of failure assesses how probable it is for equipment to fail based on its condition, operational environment, and maintenance history. The consequence of failure evaluates the potential impact of such a failure on safety, operations, and the environment. Balancing these two factors allows for a more targeted and efficient inspection plan, ensuring that resources are allocated optimally to manage risk effectively.

Question: 11

Which of the following actions would most likely be considered a conflict of interest for a source inspector of rotating equipment?

- A. Accepting a part-time job with a supplier whose equipment you inspect.
- B. Reporting safety violations observed during an inspection.
- C. Providing an unbiased report based on inspection findings.
- D. Declining a gift from a vendor post-inspection.
- E. Recusing yourself from an inspection due to a personal relationship with the vendor.
- F. Attending a vendor-sponsored training session on new equipment standards.

Answer: A

Explanation:

Accepting a part-time job with a supplier whose equipment you inspect creates a significant conflict of interest. This dual role can lead to bias in reporting and decision-making, as the inspector may have financial or professional incentives that could compromise their objectivity. Such situations undermine the trust in the inspection process and can lead to questions about the integrity and validity of the inspection results. The key to avoiding conflicts of interest is maintaining clear boundaries and ensuring that personal interests do not interfere with professional responsibilities.

Question: 12

You are tasked with reviewing the documentation for a centrifugal pump before conducting an inspection. During the review, you notice that the material test reports (MTRs) for the impeller are missing, and the heat treatment records indicate a discrepancy in the temperature range used. Additionally, the manufacturer's data report does not include the correct serial number for the components. Considering these issues, what should be your immediate course of action before proceeding with the inspection?

- A. Ignore the discrepancies if the equipment passed previous inspections.
- B. Proceeding with the inspection, documenting discrepancies in the inspection report.
- C. Cancel the inspection and report the issues to the client immediately.
- D. Conduct a physical inspection and address documentation issues later.
- E. Request the missing MTRs and verify the heat treatment records before continuing.
- F. Approve the pump conditionally, pending documentation corrections.

Answer: E

Explanation:

When documentation discrepancies such as missing MTRs and incorrect heat treatment records are identified, it is crucial to address these issues before proceeding with the inspection. Missing or incorrect documentation can indicate non-compliance with standards or potential issues with the equipment's material integrity and performance. By requesting the missing MTRs and verifying the heat treatment records, you ensure that all necessary documentation aligns with the technical specifications and that the rotating equipment meets the required standards. This step is essential for validating the equipment's suitability for service and ensuring safety and reliability before the inspection proceeds.

Question: 13

When conducting a heat treatment process on a high-strength alloy rotor, which factor is most critical to ensuring the desired outcome?

- A. The color of the oxide layer
- B. The alignment of the rotor
- C. The surface finish of the component
- D. Precise temperature control
- E. The use of an inert gas atmosphere
- F. The initial material hardness

Answer: B

Explanation:

Precise temperature control is paramount in the heat treatment of high-strength alloy rotors. The mechanical properties of these materials are highly sensitive to temperature fluctuations, and any deviation can lead to undesirable changes in the microstructure, affecting the strength and toughness of the rotor. Temperature control ensures that the material is heated uniformly, achieving the necessary transformations without causing thermal gradients that could lead to stress concentrations or defects. This precision is crucial for achieving consistent and predictable results, aligning the final material properties with the design specifications and ensuring the component's reliability in service.

Question: 14

Which of the following is the most important step in reducing the risk of bearing failure in rotating equipment?

- A. Regularly replacing bearings
- B. Increasing operational speed
- C. Installing larger bearings
- D. Implementing a robust lubrication management program
- E. Reducing operational load
- F. Using a higher viscosity lubricant

Answer: D

Explanation:

Implementing a robust lubrication management program is pivotal in preventing bearing failures in rotating equipment. Proper lubrication reduces friction and wear, dissipates heat, and prevents contamination from entering the bearings. Lubrication practices are a primary cause of premature bearing failures.

Question: 15

Which of the following best describes the role of a source inspector during a witness point inspection for rotating equipment?

- A. Perform a detailed dimensional analysis.
- B. Authorize continuation of work without further checks.
- C. Observe and ensure adherence to specified procedures.
- D. Conduct a final acceptance test.
- E. Directly manage the equipment installation process.
- F. Verify documentation accuracy and completeness.

Answer: C

Explanation:

During a witness point inspection, the role of a source inspector is to observe and ensure adherence to specified procedures. Although the inspector does not have the authority to halt the process, their presence and oversight are crucial for verifying that the work being done complies with the relevant standards and specifications. By observing the process, the inspector can identify any deviations from the procedures and ensure that corrective actions are taken if necessary. This oversight plays a vital role in maintaining quality and safety standards throughout the equipment's fabrication and assembly process.

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