CWEA Mechanical Technologist II Practice Test (Sample)

Study Guide

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Questions

1. What must be done to any worn spacers, shafts, bearings, or housings?

A. Refurbished

B. Repaired

C. Replaced

D. Adjusted

2. Rubber safety blankets should be tested how often for safety compliance?

A. Every 6 months

B. Every year

C. Every 12 months

D. Every 18 months

3. Applications that require chemicals to be metered or pumped under high pressure necessitate what type of pump?

A. Multi-stage pumps

B. Centrifugal pumps

C. Positive displacement pumps

D. Diaphragm pumps

4. What happens to the motor's amperage draw when the discharge valve on an electric motor driven centrifugal pump is closed during pumping?

A. It will increase

B. It will remain the same

C. It will decrease

D. It will fluctuate

5. What is dry ice primarily used for in a pump shop?

A. To cool liquids quickly

B. To freeze pump wear rings to ease installation

C. To clean equipment surfaces

D. To enhance lubrication of components

6. Systems designed for handling greases, heavy mastics, cement, and concrete are referred to as what?

A. Liquid pumping systems

B. Solids pumping systems

C. Viscous fluid systems

D. Heavy-duty systems

7. How does CAL-OSHA define a confined space?

A. A space with unrestricted entry and exit

B. A space designed for permanent human occupation

C. A space with limited entry or exit, suitable for work

D. A space that is above ground level

8. What is the best method to remove glazing from a squeaking drive belt?

A. Replace the belt

B. Use a solvent spray

C. Apply a lubricant

D. Use chalk as an abrasive

9. Which type of misalignment occurs when shafts are parallel but not on the same axis?

A. Angular misalignment

B. Offset misalignment

C. Radial misalignment

D. Vertical misalignment

10. How often should pumps generally be greased to ensure proper operation?

A. Once a month

B. Every six months

C. Every three months

D. Every year

Answers

1. C
2. C
3. C
4. C
5. B
6. B
7. C
8. D
9. B
10. C

Explanations

1. What must be done to any worn spacers, shafts, bearings, or housings?

A. Refurbished

B. Repaired

C. Replaced

D. Adjusted

When dealing with worn spacers, shafts, bearings, or housings, the most effective and reliable course of action is to replace these components. Over time and with use, mechanical parts can degrade due to factors such as wear and tear, stress, and environmental conditions. Replacing worn components ensures that the machinery operates optimally and maintains reliability. It also helps in preventing further damage to interconnected parts which could lead to larger system failures, downtime, or costly repairs down the line. The integrity and performance of mechanical systems are heavily reliant on the condition of these components, thus making replacement crucial when wear is evident. While refurbishment, repair, and adjustment may sometimes be options depending on the specific context and severity of the wear, they do not always restore the part to its original effectiveness, which can lead to riskier operational conditions. Therefore, replacement is the best practice for ensuring long-term functionality and safety in mechanical systems.

2. Rubber safety blankets should be tested how often for safety compliance?

A. Every 6 months

B. Every year

C. Every 12 months

D. Every 18 months

Rubber safety blankets, which are essential for insulation and protection against electrical hazards in various environments, must be regularly tested to ensure they are safe for use. The correct answer indicates that testing should occur every 12 months. This annual testing is crucial because it allows for the detection of any wear, damage, or degradation that may have occurred over the year, ensuring that the blankets continue to provide adequate protection. The rationale for the 12-month interval is based on industry standards and best practices, which are designed to mitigate risks over time. Regular testing is vital in maintaining compliance with safety regulations, helping to prevent electrical accidents that could result from using compromised insulation equipment. This proactive approach helps organizations ensure a safe working environment and complies with safety protocols, thereby reducing liability and enhancing personnel safety. In contrast, the other suggested intervals don't align with the common standards in the industry for such equipment, which prioritize a rigorous annual assessment to maximize safety and reliability.

3. Applications that require chemicals to be metered or pumped under high pressure necessitate what type of pump?

A. Multi-stage pumps

B. Centrifugal pumps

C. Positive displacement pumps

D. Diaphragm pumps

In applications that involve metering or pumping chemicals under high pressure, positive displacement pumps are the most suitable choice. These pumps operate by trapping a fixed volume of fluid and then forcing it into the discharge pipe, which allows for precise control over the flow rate and pressure of the fluid. The design of positive displacement pumps enables them to create high pressure, which is essential for applications that require the transfer of viscous fluids or chemicals that need to be pumped securely and efficiently. This is particularly important in settings where the fluid being moved is under high resistance or requires an accurate amount to be delivered at a specific pressure. In contrast, other types of pumps, such as centrifugal pumps, do not inherently generate high pressure as their working principle is based on the kinetic energy provided by a rotating impeller. While they can be used in many fluid transport applications, they are not ideal for scenarios where high pressure and precise metering are required. Multi-stage pumps can increase pressure but may not offer the same level of control over the flow rate as positive displacement pumps. Diaphragm pumps, like positive displacement pumps, can also handle high pressure, but their design may limit their use with certain chemical types compared to the broader applicability of positive displacement pumps. Thus, in

4. What happens to the motor's amperage draw when the discharge valve on an electric motor driven centrifugal pump is closed during pumping?

A. It will increase

B. It will remain the same

C. It will decrease

D. It will fluctuate

When the discharge valve on an electric motor-driven centrifugal pump is closed during operation, the system experiences a change in flow conditions. Specifically, as the discharge valve closes, the resistance to flow increases, leading to a significant reduction in the pump's ability to move water. Centrifugal pumps operate under the principle that they convert mechanical energy into hydraulic energy. As the load on the pump increases (which occurs when the discharge valve is opened) and the flow rate decreases (when the valve is closed), the impeller does not have to do as much work against the flow of liquid. Consequently, the pump can reach its shut-off head, a condition where no flow output is possible; this situation occurs at maximum pressure but zero flow rate. In this scenario, since the flow is significantly restricted or ceases altogether, the pump motor corresponds by drawing less current, which results in a decrease in amperage. Thus, a closed discharge valve leads to reduced resistance and less power required from the motor, causing the amperage draw to decrease.

5. What is dry ice primarily used for in a pump shop?

A. To cool liquids quickly

B. To freeze pump wear rings to ease installation

C. To clean equipment surfaces

D. To enhance lubrication of components

Dry ice, which is solid carbon dioxide, is primarily used in a pump shop for the purpose of freezing pump wear rings to ease installation. When dry ice is applied to the wear rings, it causes them to contract slightly due to the extreme cold, making it easier to install them onto the pump components. This technique helps in achieving a proper fit without damaging the components, ensuring that they can operate effectively once installed. In contrast, other common uses of dry ice, like cooling liquids quickly or cleaning equipment surfaces, are not as directly applicable to pump shop operations, where the focus is on assembly and maintenance of mechanical systems. Additionally, enhancing lubrication of components is not a function of dry ice; lubrication typically involves oils or greases that reduce friction and wear in mechanical systems rather than utilizing temperature changes from substances like dry ice.

6. Systems designed for handling greases, heavy mastics, cement, and concrete are referred to as what?

A. Liquid pumping systems

B. Solids pumping systems

C. Viscous fluid systems

D. Heavy-duty systems

Systems designed for handling greases, heavy mastics, cement, and concrete are accurately referred to as solids pumping systems because these materials often exhibit characteristics of solids, especially when they are in a dense or mixed state. When dealing with such substances, it's essential to consider their unique flow properties, which can differ significantly from standard liquids. Solids pumping systems are specifically engineered to transport these types of challenging materials through pipelines and equipment designed to handle higher viscosity and density, requiring robust mechanical components that can withstand the abrasion and wear associated with moving these heavy and often gritty substances. While viscous fluid systems might seem relevant, as they focus on the movement of fluids with high viscosity, they typically do not encompass the full range of challenges presented by the solid-like characteristics of materials such as concrete and cement. Heavy-duty systems imply robust machinery but do not explicitly address the specific nature of the materials being transported. Liquid pumping systems, on the other hand, primarily deal with traditional liquids and are not designed for the challenges presented by solids or semi-solids like greases and cement.

7. How does CAL-OSHA define a confined space?

A. A space with unrestricted entry and exit

B. A space designed for permanent human occupation

C. A space with limited entry or exit, suitable for work

D. A space that is above ground level

The definition of a confined space provided by CAL-OSHA is focused on the conditions that distinguish it from other types of spaces. A confined space is characterized by having limited or restricted means of entry and exit, even though it may be large enough to enter and perform work. This restriction can lead to potential hazards, such as difficulty in evacuating if an emergency arises or accumulation of hazardous atmospheres. In contrast, spaces with unrestricted entry and exit, or those designed specifically for permanent human occupation, do not fall under the confined space category since the limitations in access and potential hazards that define confined spaces are absent. Additionally, the location in relation to ground level is not a defining factor; a confined space could exist at any elevation. Thus, it's the limited entry or exit that primarily qualifies a space as confined, making the provided answer accurate and aligned with CAL-OSHA's criteria.

8. What is the best method to remove glazing from a squeaking drive belt?

A. Replace the belt

B. Use a solvent spray

C. Apply a lubricant

D. Use chalk as an abrasive

Using chalk as an abrasive is a practical method to remove glazing from a squeaking drive belt. When a belt is subjected to excessive wear, heat, or improper tension, it can develop a glossy, hardened surface known as glazing. This condition can lead to slipping and increased noise. Applying chalk to the belt creates a slight abrasive effect, which can help to dull the hard surface of the glazing. This surface roughening can improve the belt's grip on the pulleys, reducing squeaking and restoring proper function. Chalk is also a dry material that does not introduce oil or solvents which might cause further slipping or damage to the belt's surface. In contrast, replacing the belt may be necessary if it is excessively worn or damaged, but if the glazing is the only issue, it may not be the most cost-effective or immediate solution. Using a solvent spray could dissolve or soften debris but may worsen the glazing. Applying lubricant is counterproductive because it could exacerbate slipping problems rather than resolve them.

9. Which type of misalignment occurs when shafts are parallel but not on the same axis?

A. Angular misalignment

B. Offset misalignment

C. Radial misalignment

D. Vertical misalignment

Offset misalignment occurs when two shafts are parallel to each other but not aligned along the same axis, leading to a lateral displacement between the two. This type of misalignment can create additional stresses on bearings and couplings and can lead to increased wear and potential failure if not addressed. Understanding offset misalignment is crucial for ensuring proper alignment in various mechanical systems to maintain efficiency and reliability. In contrast, angular misalignment refers to a situation where the shafts are not parallel because they are at an angle to each other. Radial misalignment, on the other hand, involves the shafts being out of alignment in a vertical or sideways manner but still on the same axial line, which differs from the offset condition. Vertical misalignment specifically pertains to the vertical alignment of shafts, regardless of whether they are parallel, which does not describe this scenario accurately.

10. How often should pumps generally be greased to ensure proper operation?

A. Once a month

B. Every six months

C. Every three months

D. Every year

Pumps should generally be greased every three months to maintain optimal performance and prevent premature wear. Regular greasing is crucial because it ensures that the bearings and other moving parts are adequately lubricated, reducing friction and heat generation. This lubrication helps in extending the lifespan of the pump and contributes to its efficiency during operation. Greasing every three months strikes a balance between sufficient maintenance and practical scheduling, allowing technicians to keep an ongoing check on the pump's condition without overwhelming service intervals. While some pumps may have specific greasing requirements based on manufacturer recommendations or operating conditions, the three-month interval is a widely accepted standard in many industrial applications.