
Q536 - Electrical, Electronic, & Control Engineering

1. A salinity indicator system such as that used to measure the salt content of potable water systems and boiler feed and condensate systems uses what technology?

- a salinity cell that senses the pH of water
- a salinity cell that senses the brine density of water
- **a salinity cell that senses the electrical conductivity of water**
- a salinity cell that senses the optical refraction of water

Note:
Salinity indicator systems measure electrical conductivity to determine salt content. Dissolved salts increase the water's ability to conduct electricity, and a salinity cell directly measures this conductivity to provide a salinity reading.

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2. When the control handle is in the "off" position, what is the status of the solenoid actuated brake of an electric winch?

- de-energized and the brake is released
- energized and the brake is released
- energized and the brake is set by a spring
- **de-energized and the brake is set by a spring**

Note:
When the control handle is off, the solenoid is de-energized, and the spring sets the brake.

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3. In the event of a power failure during cargo loading operations, the movement of an electric powered cargo winch will be stopped by what means?

- the weight of the load on the boom
- **a spring set brake**
- a hand-operated band brake
- a manual override switch

Note:
Electric cargo winches utilize a spring-set brake that automatically engages upon power loss, ensuring a fail-safe stopping mechanism.

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4. As part of a routine maintenance program for deck machinery motor controllers, what should be done?

- **inspect electrical wiring for evidence of corrosion or discoloration at connections**
- remove covers exposed to the weather and drain water each week
- remove motor covers and ventilate as weather permits
- Check drum switch contact pressure every three months

Note:
Routine maintenance of deck machinery motor controllers requires inspecting wiring and connections for corrosion or discoloration to identify and address potential electrical failures.

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5. If deck machinery is expected to be idle for an extended period of time, what should be done?

- have electrical safety gloves available in case of electrical shock before running
- perform a 'high pot' test to determine the condition of the insulation
- water wash the motor and controller to remove any salt that may interfere with smooth operation
- **energize space heaters to prevent the condensation of moisture**

Note:
To prevent damage from moisture condensation, energize space heaters when deck machinery is idle for an extended period.

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6. Which of the following conditions will occur if the brake solenoid coil burns out on a cargo winch with an electrical brake?

- **The brake will be set by spring force.**
- The motor will over speed and burn up.
- The load suspended from the cargo boom will fall.
- Nothing will happen; the winch will continue to operate as usual.

Note:
A burned-out solenoid coil prevents brake release, causing the spring force to engage the brake and secure the load. This fail-safe design ensures the load remains stationary in the event of electrical failure.

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7. If a spring-set electric solenoid-released brake on a winch fails to hold a load properly when the solenoid is de-energized, what must be done?

- The solenoid coil must be replaced as it is faulty.
- **The brakes linings must be checked for wear and adjusted or replaced accordingly.**
- The spring must be replaced as it has lost its compression force.
- The brake drum must be checked for wear and replaced as needed.

Note:
A solenoid-released brake failing to hold a load when the solenoid is de-energized indicates a problem with the brake linings. These linings should be inspected, adjusted, or replaced to restore proper friction and holding power.

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8. In an impressed current cathodic hull protection system, what statement is true concerning the composition and arrangement of the anodes?

- The protective anodes are made of zinc and are electrically insulated from the hull.
- **The protective anodes are made of lead or platinized titanium and are electrically insulated from the hull.**
- The protective anodes are made of lead or platinized titanium and are electrically bonded to the hull.
- The protective anodes are made of zinc and are electrically bonded to the hull.

Note:
In an impressed current cathodic protection system, anodes are inert materials like lead or platinized titanium and are electrically insulated from the hull to ensure current flows through seawater.

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9. While monitoring an impressed current cathodic hull protection system, which of the following measurements should remain constant in a properly operating electronically regulated system?

- **Reference electrode voltage**
- Control amplifier output voltage
- Individual anode currents
- Total anode current

Note:
In an electronically regulated impressed current cathodic protection system, the reference electrode voltage remains constant as the system maintains a consistent hull potential by adjusting current and output voltage.

10. In monitoring an impressed current cathodic hull protection system, it is important to ensure that the propeller screw receives the same cathodic protection as the hull. What should be checked?

- Ensure adequate individual anode current to the anode closest to the propulsion shafting as it passes through the hull.
- **Ensure adequate grounding carbon brush pressure on the rotating shaft by checking associated current.**
- No checks are necessary since the propeller screw is bronze and needs no protection.
- Nothing can be done short of checking the propeller screw at drydock availabilities.

Note:
The propeller receives impressed current cathodic protection through a functioning shaft grounding brush, which should be verified by checking its pressure and associated current.