BOMA Plant Operations Practice Test (Sample)

Study Guide

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Questions

1. Steam pressure gauges should have a range of:

A. The safety valve setting

B. 1.5 to 2 times the safety valve setting

C. 3 times the safety valve setting

D. 110% of the MAWP

2. Which condition is critical for a deaerator to operate effectively?

A. Low pressure

B. High temperature

C. Neutral pH

D. Continuous feedwater supply

3. What is the ideal state of water for a steam boiler in terms of purity?

A. Distilled water

B. Ground water

C. Tap water

D. Salt water

4. The _____ has water on one side and gasses of combustion on the other:

A. water surface

B. steam surface

C. fire side

D. heating surface

5. Why should heat be brought up slowly on a cold boiler?

A. To stop all expansion

B. To prevent steam generation

C. To control refractory contraction

D. To prevent thermal shock

6. What is the purpose of prepurging a boiler before ignition?

- **A. To remove unburned fuel**
- **B. To heat the boiler**
- **C. To check the fuel supply**
- **D. To adjust pressure levels**

7. When inspecting a boiler, main steam valves are:

- **A. Open**
- **B. Closed**
- **C. Depends on the boiler**
- **D. Closed, locked, and tagged**

8. To keep oil liquified we run this line with our fuel line:

- **A. supply line**
- **B. tracer line**
- **C. propane line**
- **D. diesel line**

9. How may fittings be attached to a high pressure boiler?

- **A. Threaded**
- **B. Certified welds**
- **C. Flanges**
- **D. Any of the above**

10. Which valve type is typically used for throttle and isolation applications in boiler systems?

- **A. Butterfly valve**
- **B. Ball valve**
- **C. Gate valve**
- **D. Check valve**

Answers

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

Explanations

1. Steam pressure gauges should have a range of:

A. The safety valve setting

B. 1.5 to 2 times the safety valve setting

C. 3 times the safety valve setting

D. 110% of the MAWP

The correct answer is that steam pressure gauges should have a range of 1.5 to 2 times the safety valve setting. This range ensures that the gauge can accurately measure and display the pressure within the system under various operating conditions, while also providing a safety margin. Having a gauge range that exceeds the safety valve setting by this factor allows for normal operating pressures to be clearly indicated and accommodates potential pressure fluctuations without risking a misleading reading close to the maximum pressure threshold. This is crucial for preventing equipment damage and ensuring the safe operation of the steam system. The safety operating principles in plant operations dictate that gauges must be capable of handling the pressures they might encounter, and this guideline helps in mitigating risks associated with gauge failure or inaccuracies.

2. Which condition is critical for a deaerator to operate effectively?

A. Low pressure

B. High temperature

C. Neutral pH

D. Continuous feedwater supply

For a deaerator to operate effectively, maintaining a high temperature is essential. The primary function of a deaerator is to remove dissolved gases, particularly oxygen and carbon dioxide, from the water used in boilers. When water is heated to higher temperatures, it has a greater capacity to release gases. As the temperature increases, the solubility of gases in water decreases, allowing for efficient removal through the deaeration process. In a typical deaerator system, the water is heated to temperatures that are often above 200°F (93°C). This heating process, which is facilitated by the use of steam, is critical as it ensures that the gases are effectively driven out of the solution. A high temperature not only enhances gas removal but also helps to prevent corrosion in the boiler system, which can occur when oxygen and carbon dioxide are present in the water. While other factors like continuous feedwater supply contribute to the operation of a deaerator, they are not as fundamentally critical as high temperature for the primary function of gas removal. Thus, the effectiveness of a deaerator hinges significantly on its ability to maintain high temperatures throughout its operation.

3. What is the ideal state of water for a steam boiler in terms of purity?

A. Distilled water

B. Ground water

C. Tap water

D. Salt water

The ideal state of water for a steam boiler is distilled water due to its high level of purity. Using distilled water ensures that it is free from impurities, minerals, and contaminants that could cause scaling, corrosion, or other operational issues within the boiler system. The absence of dissolved solids helps maintain the integrity of the boiler's internal components, enhances efficiency, and extends the lifespan of the equipment. Other types of water, such as groundwater, tap water, and salt water, may contain various minerals, bacteria, or salts that can lead to adverse effects on boiler operation. Groundwater often has dissolved minerals that can create scale buildup, while tap water may include chlorine and other additives that could contribute to corrosion. Salt water is particularly damaging as it can lead to severe corrosion and ultimately failure of the boiler components. Hence, distilled water is the most suitable choice for boiler operation, ensuring optimal performance and reliability.

4. The _____ has water on one side and gasses of combustion on the other:

A. water surface

B. steam surface

C. fire side

D. heating surface

The heating surface is the correct answer because it is defined as that part of a boiler or heat exchanger where heat is transferred from the hot gases of combustion to the water. On one side of the heating surface, water is present, while on the opposite side, the hot combustion gases flow. This setup allows for efficient heat exchange, facilitating the heating of water, which is a crucial step in steam generation. The other options do not accurately describe this specific component. The water surface typically refers to the level of water within a boiler and does not encompass the relationship with combustion gases. The steam surface describes where steam and water interact but does not specifically relate to the heat exchange process with combustion gases. The fire side usually refers to the area where the combustion occurs, which does not directly denote the interface combining water and combustion gases. Thus, the heating surface distinctly characterizes the area critical for heat transfer in heating systems.

5. Why should heat be brought up slowly on a cold boiler?

A. To stop all expansion

B. To prevent steam generation

C. To control refractory contraction

D. To prevent thermal shock

Bringing heat up slowly on a cold boiler is essential to prevent thermal shock. When a cold boiler is rapidly heated, the outer metal surfaces can expand much more quickly than the inner metal surfaces that are still cold. This differential expansion can create stresses in the material, leading to cracks or other forms of damage. By gradually increasing the temperature, the boiler components can expand uniformly, minimizing the risk of thermal stress and ensuring the integrity and safety of the boiler system. This practice is critical in maintaining equipment longevity and operational reliability.

6. What is the purpose of prepurging a boiler before ignition?

A. To remove unburned fuel

B. To heat the boiler

C. To check the fuel supply

D. To adjust pressure levels

The purpose of prepurging a boiler before ignition is primarily to remove unburned fuel from the combustion chamber. This step is crucial for ensuring safe and efficient operation of the boiler. By clearing out any residual combustible gases or vapors, prepurging helps prevent the risk of explosion or fire that could occur if these gases were to ignite upon the initial application of the ignition source. Prepurging typically involves the introduction of air into the combustion chamber to help displace any unburned fuel. This process not only enhances safety but also contributes to the efficiency of the combustion process once the boiler is ignited, promoting a cleaner burn and reducing emissions. While heating the boiler, checking the fuel supply, and adjusting pressure levels are important areas of boiler operation and management, they do not specifically relate to the initiation of combustion or the removal of potentially hazardous gases, which is the primary focus of prepurging.

7. When inspecting a boiler, main steam valves are:

A. Open

B. Closed

C. Depends on the boiler

D. Closed, locked, and tagged

When inspecting a boiler, the main steam valves should be closed, locked, and tagged to ensure safety and compliance with industry standards. This practice helps prevent accidental operation of the system while inspections or maintenance are being conducted. Closing the valves isolates the boiler from the steam distribution system, ensuring that no pressure hazards exist for the personnel involved in the inspection. Locking and tagging the valves further enhances safety by providing a clear communication system that indicates the boiler is out of service and cannot be operated until maintenance is completed and the locks are removed. This procedure is part of a larger safety protocol known as Lockout/Tagout (LOTO), which is critical in preventing accidental energization or start-up of equipment, which could lead to injury or safety incidents. The other choices do not reflect best practices for safety during boiler inspections. For example, having the valves open could expose personnel to dangerous conditions or steam release. Thus, ensuring the valves are securely closed, locked, and tagged is essential for a safe inspection process.

8. To keep oil liquified we run this line with our fuel line:

A. supply line

B. tracer line

C. propane line

D. diesel line

A tracer line is used in conjunction with a fuel line to maintain oil in a liquefied state. This method typically involves running warm fluid through the tracer line, which assists in preventing the oil from solidifying or thickening, especially in colder temperatures. The heated fluid in the tracer line transfers heat to the surrounding oil line, ensuring that the fuel remains in a workable, liquid form. This is particularly important in systems where oil viscosity can dramatically affect performance and flow, such as in heating systems or machinery where oil is used as a lubricant. The tracer line's purpose is critical in enhancing the efficiency and reliability of fuel delivery and overall plant operations.

9. How may fittings be attached to a high pressure boiler?

A. Threaded

B. Certified welds

C. Flanges

D. Any of the above

Fittings can indeed be attached to a high pressure boiler through various methods, and each method has its own specific applications and advantages. Threaded connections are commonly used for smaller pipes and fittings because they allow for a secure and tight joint. This method is often preferred in areas where easier disassembly might be required, as threaded fittings can be easily removed as needed for maintenance or repair. Certified welds provide a strong, permanent connection that is particularly beneficial for high-pressure systems. These welds must meet certain standards to ensure integrity and safety under high-pressure conditions. The use of certified welds is critical in maintaining the boiler's structural integrity, especially when subjected to the demanding stresses of high pressure. Flanges are another common method for attaching fittings to high pressure boilers. They allow for easy assembly and disassembly, which is very important for maintenance, while also providing a robust connection that can handle high pressure. Flanges can accommodate various types of fittings and piping configurations, making them versatile for different designs. Having the option of any of these methods allows for flexibility based on the specific requirements of the boiler system, including pressure ratings, maintenance needs, and design specifications. Thus, the correct answer encompasses all these techniques, affirming that fittings can be attached to

10. Which valve type is typically used for throttle and isolation applications in boiler systems?

A. Butterfly valve

B. Ball valve

C. Gate valve

D. Check valve

In boiler systems, the gate valve is typically chosen for throttle and isolation applications due to its design and functionality. Gate valves are constructed to provide a straight-line flow of fluid with minimal resistance and are primarily used in fully open or fully closed positions. This makes them ideal for isolation purposes, where a full shut-off is required, as they do not constrict flow when fully open. While gate valves are excellent for isolation, they are not designed for precise throttling; however, in many boiler systems, their robust nature and capability to handle high pressures and temperatures also make them suitable when throttling is occasionally needed. In situations where precise flow control is essential, other valve types, like globe valves, are often more appropriate. Nonetheless, for broader usage in boilers, particularly for complete isolation, the gate valve is the go-to choice. The other valve types serve different primary functions, such as butterfly valves, which are often used for throttling, or ball valves, which provide good on/off control but are not typically used for throttle applications due to their design, and check valves, which prevent backflow but are not intended for isolation in the way that gate valves are.