CDC Mobile Water Supply Practice Test (Sample)

Study Guide

BY EXAMZIFY

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Questions

1. **An MWS apparatus is resupplying 1,000 gpm to a pumper 4 feet below. What is the required pump discharge pressure (PDP) given 50' of 5-inch hose?**

   A. 8 psi

   B. 10 psi

   C. 12 psi

   D. 15 psi

2. **Which formula is used to determine the pump discharge pressure (PDP) during a resupply operation?**

   A. PDP = Static Pressure + Friction Loss

   B. PDP = Required Intake Pressure + Total Pressure Loss

   C. PDP = Flow Rate + Friction Loss

   D. PDP = Intake Pressure - Friction Loss

3. **What does friction loss refer to?**

   A. The loss of water volume during pumping

   B. The amount of pressure lost through various fittings

   C. The increase in pressure when water flows through a valve

   D. The necessary pressure for hydrants to flow

4. **Bleeder valves are used for what specific purpose?**

   A. To release excess water

   B. To vent air from a dry supply line

   C. To control water temperature

   D. To measure water flow

5. **What are examples of man-made static water sources?**

   A. Cisterns, Irrigation Systems, Swimming Pools, Reservoirs

   B. Natural lakes and rivers

   C. Rainwater collection systems

   D. Groundwater wells

6. Which test confirms that pump controls are functioning correctly?

- **A. Vacuum test**
- **B. Pressure control test**
- **C. Pumping test**
- **D. Gauge test**

7. How does the Venturi effect influence water flow?

- **A. It causes an increase in pressure and velocity**
- **B. It decreases the velocity of the fluid**
- **C. It allows air to enter areas of lower pressure**
- **D. It stabilizes water temperature**

8. How is a static water source defined in firefighting operations?

- **A. Water that is pumped at high speeds**
- **B. Water supplies that are under pressure**
- **C. Water supplies not under pressure including natural and manmade sources**
- **D. Water that is chemically treated**

9. What unit is typically used to refer to water pressure?

- **A. Pounds per gallon**
- **B. Pounds per square inch (psi)**
- **C. Kilograms per square meter**
- **D. Liters per second**

10. What should be checked for wear and proper tension in the engine compartment?

- **A. Drive belts**
- **B. Brake pads**
- **C. Fuel pump**
- **D. Starter motor**

Answers

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

Explanations

1. **An MWS apparatus is resupplying 1,000 gpm to a pumper 4 feet below. What is the required pump discharge pressure (PDP) given 50' of 5-inch hose?**

   A. 8 psi

   B. 10 psi

   C. 12 psi

   D. 15 psi

To determine the required pump discharge pressure (PDP) when resupplying water to a pumper 4 feet below using 50 feet of 5-inch hose, it is essential to calculate the total pressure loss due to elevation and friction. First, for the vertical lift, the pressure decrease caused by the elevation difference needs to be considered. Since the pumper is located 4 feet below, this contributes a negative pressure of 4 psi (using the conversion that 1 foot of water equals approximately 0.433 psi; therefore, 4 feet is equivalent to 4 psi). Next, we need to calculate the friction loss in the 50 feet of 5-inch hose. For 5-inch hose, the friction loss is generally found from tables or empirical formulas. On average, the friction loss for a 1,000 gpm flow rate through 5-inch hose is about 1 psi per 100 feet. Thus, for 50 feet, the friction loss is approximately 0.5 psi. Now we add the elevation loss and friction loss together to find the total PDP. The needed PDP must not only counteract the elevation drop but also ensure sufficient pressure to maintain flow through the hose. So, we calculate

2. **Which formula is used to determine the pump discharge pressure (PDP) during a resupply operation?**

   A. PDP = Static Pressure + Friction Loss

   B. PDP = Required Intake Pressure + Total Pressure Loss

   C. PDP = Flow Rate + Friction Loss

   D. PDP = Intake Pressure - Friction Loss

The correct answer is based on understanding how to calculate pump discharge pressure (PDP) in a resupply operation. The formula PDP = Required Intake Pressure + Total Pressure Loss accurately reflects the components involved in determining discharge pressure. In this context, required intake pressure refers to the minimal pressure needed to draw water from the source. Total pressure loss is the cumulative effect of all friction losses that occur in the system due to the flow of water through hoses, fittings, and other components. This formula combines these two vital factors to provide an accurate representation of the pressure needed to ensure that water can be effectively supplied during operations. The other formulas provided do not correctly capture the relationship between intake pressure and the necessary adjustments to account for losses within the system, which is critical during resupply operations. Understanding these principles is essential for effectively managing water supply for various needs, ensuring operational efficiency and safety.

3. What does friction loss refer to?

A. The loss of water volume during pumping

B. The amount of pressure lost through various fittings

C. The increase in pressure when water flows through a valve

D. The necessary pressure for hydrants to flow

Friction loss refers specifically to the amount of pressure lost due to the resistance of water flow as it moves through pipes, hoses, and various fittings. This resistance occurs because of the interaction between the water and the internal surfaces of the piping system, which creates friction. As water flows, it encounters this friction, which leads to a reduction in pressure. This understanding is crucial for fire service operations and any scenario involving the transport of water, as it affects the efficiency and effectiveness of water supply systems. The other options misconstrue the concept of friction loss. The loss of water volume during pumping relates to flow rates rather than pressure dynamics. The increase in pressure when water flows through a valve is not indicative of friction but rather represents a change in conditions as the water encounters a constriction or an opening in the system. Lastly, the necessary pressure for hydrants to flow pertains to the operational requirements for hydraulic systems rather than the losses that occur as water moves through the infrastructure. Understanding friction loss is essential for effectively calculating the pressure needed at various points in a water supply system.

4. Bleeder valves are used for what specific purpose?

A. To release excess water

B. To vent air from a dry supply line

C. To control water temperature

D. To measure water flow

Bleeder valves serve a crucial purpose in maintaining the integrity and functionality of a dry supply line. They are specifically designed to vent air from these lines, ensuring that the system remains water-tight and effective for its intended use. In a dry supply line, the presence of air can create a number of issues, such as air locks or reduced flow efficiency. By venting air through bleeder valves, operators can facilitate a smoother operation, allowing water to flow freely when needed. This is critical in scenarios where water needs to be supplied quickly, such as during firefighting or emergency response situations. The other options, while they may pertain to water systems, do not specifically describe the function of bleeder valves. For instance, while releasing excess water might seem relevant, it is not the primary role of a bleeder valve. Control of water temperature and measurement of water flow pertain to different devices and systems entirely. Understanding the precise use of bleeder valves will aid in effectively managing mobile water supply systems.

5. What are examples of man-made static water sources?

A. Cisterns, Irrigation Systems, Swimming Pools, Reservoirs

B. Natural lakes and rivers

C. Rainwater collection systems

D. Groundwater wells

Man-made static water sources are human-engineered systems designed to collect, store, or manage water, which is crucial for various purposes including irrigation, recreation, and emergency supply. Cisterns are large containers that hold water, typically used for rainwater collection or as a domestic water supply. Irrigation systems are designed to deliver water to crops efficiently and often include reservoirs and storage areas that can hold large volumes of water. Swimming pools are specifically constructed to contain water for recreational purposes, while reservoirs are large artificial lakes created by damming rivers or using other methods to store water for public supply, irrigation, or hydroelectric power generation. While natural lakes, rivers, rainwater collection systems, and groundwater wells are essential water sources in various contexts, they do not fall under the category of static water sources that are entirely man-made. Natural lakes and rivers evolve through geological processes without direct human intervention. Rainwater collection systems, although involving human design, typically serve as a means to gather water from natural precipitation rather than being permanent static sources of water stored by construction. Groundwater wells tap into underground aquifers, which again are natural formations that store water created through processes not controlled by humans. Thus, the correct option encompasses several examples of human-made structures explicitly

6. Which test confirms that pump controls are functioning correctly?

A. Vacuum test

B. Pressure control test

C. Pumping test

D. Gauge test

The pressure control test is the correct choice for confirming that pump controls are functioning correctly. This test assesses the pump's ability to maintain the desired output pressure and verifies that the automatic controls respond accurately to changes in pressure. It provides valuable insights into the performance of the pump control system, including whether the control mechanisms correctly activate and regulate flow according to the set standards. In the context of mobile water supply, ensuring that pump controls are operational is crucial for maintaining efficient water distribution and delivery, especially under varying operational conditions. A successful pressure control test indicates that the system is capable of managing pressures effectively, ensuring both safety and efficiency in water supply operations. Other tests, while important for different reasons, do not specifically confirm the functionality of pump controls in the same direct manner. For instance, a vacuum test is used mainly to check for leaks in the system, while a pumping test evaluates the overall performance of the pump, including flow rates but not specifically the control systems. A gauge test might check the accuracy of pressure readings rather than the control function itself. Therefore, the pressure control test stands out as the method that directly assesses the operation of the pump's control mechanism.

7. How does the Venturi effect influence water flow?

A. It causes an increase in pressure and velocity

B. It decreases the velocity of the fluid

C. It allows air to enter areas of lower pressure

D. It stabilizes water temperature

The Venturi effect describes how fluid dynamics operate when a fluid flows through a constricted section of a pipe. As the fluid enters the narrower section, its velocity increases, which, according to Bernoulli's principle, leads to a drop in pressure in that region. Because of this pressure differential created by the increased velocity, the area of lower pressure can allow air or other gases to enter the system. This is why option C, stating that the Venturi effect allows air to enter areas of lower pressure, is the correct choice. Understanding the Venturi effect is critical in various applications, such as in carburetors and atomizers, where the principle is employed to mix air and fuel efficiently. Recognizing how changing pressure zones interact with air and water flow is essential for mastering fluid mechanics in practical scenarios, especially in mobile water supply systems where managing air intake can impact performance.

8. How is a static water source defined in firefighting operations?

A. Water that is pumped at high speeds

B. Water supplies that are under pressure

C. Water supplies not under pressure including natural and manmade sources

D. Water that is chemically treated

A static water source in firefighting operations refers to water supplies that are not under pressure, encompassing both natural and manmade sources. This definition is significant because static water sources often include lakes, ponds, rivers, reservoirs, and tanks, which are crucial for firefighting efforts, particularly in rural or remote areas where pressurized water systems may not be available. Understanding this definition is essential for firefighters as utilizing static water sources can impact the strategy and tactics used during firefighting operations. Firefighters may need to bring portable pumps or other equipment to draw water from these sources effectively, and the lack of pressure may require additional considerations for water movement and delivery to the fire scene. This definition excludes options that suggest high-speed pumping, pressurized supplies, or treated water. Each of those factors relates to water distribution systems or quality rather than the fundamental nature of the source itself. By recognizing how static water sources are defined, firefighters can prepare more effectively for various emergency situations relying on these essential resources.

9. What unit is typically used to refer to water pressure?

A. Pounds per gallon

B. Pounds per square inch (psi)

C. Kilograms per square meter

D. Liters per second

Water pressure is commonly measured in pounds per square inch (psi) because it quantifies the force exerted by water within a given area. Psi is a widely accepted unit in many engineering and technical fields, especially in hydraulics and water supply systems. This measurement allows for an understanding of how much pressure is exerted by water in pipes, tanks, and other systems, which is critical for proper design and safety considerations. In contrast, pounds per gallon refers to weight, not pressure, making it unsuitable for expressing pressure levels. Kilograms per square meter is another metric unit used to express pressure, but it is less common in practical applications involving water systems in places where psi is the standard. Liters per second measures flow rate, which is not a direct measurement of pressure but of volume flow, highlighting the difference in the types of units used for different purposes in water system dynamics.

10. What should be checked for wear and proper tension in the engine compartment?

A. Drive belts

B. Brake pads

C. Fuel pump

D. Starter motor

In the engine compartment, it is crucial to check the drive belts for wear and proper tension. Drive belts are responsible for transferring power from the engine to various components such as the alternator, water pump, and air conditioning compressor. Over time, these belts can become worn, frayed, or cracked, which can lead to reduced efficiency or failure of the components they drive. Proper tension is also vital; if the belt is too loose, it may slip or even come off, while a belt that is too tight can cause premature wear on both the belt and the pulleys it interacts with. Regularly inspecting the drive belts ensures that they function correctly, minimizing the risk of breakdowns and extensive repairs, which is essential for maintaining reliable vehicle operation. Other components mentioned, like brake pads, fuel pumps, and starter motors, while important, are not located in the engine compartment and have different maintenance concerns associated with them.