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Practice Questions

Try all 30 first, then check the answer key at the back.

1. Which step should be performed first when commissioning a newly installed solar heating system?

A. Program the controller settings
B. Conduct a customer walk-through
C. Activate the circulation pump
D. Pressure test the system for leaks

2. What is the primary purpose of verifying flow rates during solar heating system commissioning?

A. To determine warranty eligibility
B. To set the controller's clock
C. To ensure proper heat transfer from collectors to storage
D. To calculate the customer's utility bill

3. When programming a differential temperature controller during commissioning, what is the typical collector-to-tank temperature differential setting to activate the pump?

A. 30-40°F
B. 8-10°F
C. 1-2°F
D. 20-25°F

4. Which document should be completed and provided to the customer during the final walk-through of a newly commissioned solar heating system?

A. System owner's manual with operation instructions
B. Installer's personal resume
C. Manufacturing facility blueprint
D. Local climate data records

5. What should an installer check when verifying sensor placement during system commissioning?

A. Sensor color coding only
B. Manufacturing date of the sensors
C. Brand name visibility
D. Proper contact with the surface and secure attachment

6. During commissioning, what is the purpose of running the circulation pump manually?

A. To increase system pressure temporarily
B. To test the backup electric heating element
C. To verify proper pump operation and system circulation
D. To drain the system completely

7. What information should be recorded on the system commissioning report?

A. Local weather forecast for the next month
B. Flow rates, pressure readings, temperature differentials, and controller settings
C. Customer's annual income
D. Installer's personal contact information only

8. When should the heat transfer fluid pH be tested during the commissioning process?

A. After filling the system but before final operation
B. Only during annual maintenance
C. Only if the system overheats
D. Only during winter months

9. What should an installer demonstrate to the customer during the final walk-through of a solar heating system?

A. How to reinstall the entire system
B. How to manufacture replacement parts
C. How to reprogram the manufacturer's software
D. Controller operation, maintenance procedures, and emergency shutdown

10. What is the purpose of checking the antifreeze concentration during system commissioning in cold climates?

A. To increase system pressure
B. To change the fluid color for identification
C. To ensure freeze protection to the specified temperature
D. To improve system efficiency only

11. Which safety feature should be verified during the commissioning of a pressurized glycol solar heating system?

A. Roof access ladder stability
B. Pressure relief valve operation
C. Window positions in the building
D. Homeowner's insurance policy

12. What should be checked when verifying controller operation during system commissioning?

A. Sensor readings, differential settings, and pump activation
B. Controller color and appearance
C. Manufacturing location only
D. Controller weight and dimensions

13. When commissioning a solar water heating system, how can an installer verify that the collector loop is free of air?

A. By measuring the water tank temperature only
B. By checking the color of the solar collectors
C. By measuring the building's electricity usage
D. By monitoring pressure gauge stability during operation

14. What documentation should be submitted to local authorities after commissioning a solar heating system?

A. Installer's personal logbook
B. Manufacturing quality control reports
C. Completed permit documents and inspection request forms
D. Customer satisfaction survey

15. When is the appropriate time to remove warning tags and labels during the commissioning process?

A. Before the customer arrives for walkthrough
B. After all testing is complete and the system is fully operational
C. Immediately upon installation
D. Before pressure testing begins

16. What is a critical check when commissioning a drain-back solar heating system?

A. Verify complete drainage of collectors when the pump stops
B. Check roof color for heat absorption
C. Measure homeowner's water usage patterns
D. Test household electrical voltage

17. During the final walk-through with the customer, what information should be provided regarding system maintenance?

A. Names of other customers with similar systems
B. The installer's personal vacation schedule
C. Local weather patterns for the past decade
D. A maintenance schedule with specific tasks and their frequency

18. What should be verified about system labeling during commissioning?

A. All labels use fluorescent colors only
B. Labels include the installer's home address
C. Required labels for system identification, fluid type, and emergency procedures are permanently affixed and visible
D. Labels are in multiple languages even if not required

19. What test should be performed to verify the high-limit function of a solar controller during commissioning?

A. Replace the controller with a different model
B. Artificially increase the temperature sensor reading to verify pump deactivation
C. Disconnect the power to see if backup batteries work
D. Paint the controller a different color

20. What performance verification should be documented during the commissioning of a solar water heating system?

A. Temperature rise in the storage tank during sunny conditions
B. Number of occupants in the building
C. Local electricity grid fluctuations
D. Customer's previous utility bills

21. What is the primary purpose of pressure testing a solar heating system during installation?

A. To verify the pump is sized correctly
B. To calibrate temperature sensors
C. To test the controller functionality
D. To identify leaks in the piping system

22. When mounting solar collectors on a sloped roof, what is the minimum recommended distance between the collector and the roof edge?

A. 5 feet
B. 8 feet
C. 3 feet
D. 1 foot

23. Which type of insulation is best suited for solar loop piping that reaches temperatures above 250°F?

A. Cellular polyethylene
B. High-temperature mineral wool insulation
C. Standard foam pipe insulation
D. Fiberglass batts

24. When installing an expansion tank in a glycol-based solar heating system, where should it be positioned?

A. On the cold return line
B. At the highest point in the system
C. Directly after the collectors
D. Immediately before the pump

25. What is the recommended method for securing solar collector mounting hardware to a shingle roof?

A. Adhesive mounting pads
B. J-hooks attached to gutters
C. Ballasted mounting only
D. Lag screws driven into roof rafters

26. What personal protective equipment (PPE) is most critical when working with glycol-based heat transfer fluids?

A. Hearing protection
B. Respiratory protection
C. Chemical-resistant gloves and eye protection
D. Steel-toed boots

27. When connecting copper piping in a solar loop, which joining method offers the most reliable high-temperature performance?

A. Compression fittings
B. Silver soldering (brazing)
C. Push-to-connect fittings
D. Standard soft solder

28. What is the proper sequence for filling a closed-loop solar heating system?

A. Close the system, create a vacuum, introduce heat transfer fluid, pressurize
B. Open all valves, add fluid, close valves, pressurize
C. Pressurize the system, add fluid, release pressure, close valves
D. Add fluid at the highest point, open all air vents, close system

29. What safety device must be installed on a closed-loop solar heating system to protect against excessive pressure?

A. Flow check valve
B. Mixing valve
C. Vacuum breaker
D. Pressure relief valve

30. When installing a solar storage tank, what should be verified before connection to the solar loop?

A. The manufacturing date
B. The tank's color coding
C. The tank's pressure rating
D. The tank's warranty period

Answer Key & Explanations

1. D — Pressure test the system for leaks
Pressure testing the system is the first critical step in commissioning to ensure there are no leaks before introducing the heat transfer fluid and operating the system.

2. C — To ensure proper heat transfer from collectors to storage
Verifying flow rates ensures proper heat transfer from the collectors to the storage tank, which is essential for system efficiency and performance.

3. B — 8-10°F
A differential of 8-10°F is typically used to activate the pump, providing enough temperature difference to ensure efficient heat transfer while preventing short cycling.

4. A — System owner's manual with operation instructions
The system owner's manual contains essential information about operation, maintenance, and troubleshooting that the customer needs to properly use and maintain their solar heating system.

5. D — Proper contact with the surface and secure attachment
Proper contact and secure attachment ensure accurate temperature readings, which are critical for system control and performance monitoring.

6. C — To verify proper pump operation and system circulation
Running the pump manually allows the installer to check for proper operation, unusual noises, vibration, leaks, and ensures the fluid is circulating correctly through the entire system.

7. B — Flow rates, pressure readings, temperature differentials, and controller settings
Flow rates, pressure readings, temperature differentials, and controller settings are all critical data points that document the system's initial performance parameters for future reference and troubleshooting.

8. A — After filling the system but before final operation
Testing the pH after the system is filled but before final operation ensures the fluid meets specifications and provides a baseline measurement for future maintenance checks.

9. D — Controller operation, maintenance procedures, and emergency shutdown
Demonstrating controller operation, maintenance procedures, and emergency shutdown provides the customer with essential knowledge to properly operate and maintain their system.

10. C — To ensure freeze protection to the specified temperature
Checking antifreeze concentration ensures freeze protection to the specified temperature, preventing system damage during cold weather operation.

11. B — Pressure relief valve operation
Pressure relief valve operation is critical to verify during commissioning as it protects the system from potentially dangerous over-pressure conditions.

12. A — Sensor readings, differential settings, and pump activation
Sensor readings, differential settings, and pump activation are all critical controller functions that ensure the system operates efficiently and safely.

13. D — By monitoring pressure gauge stability during operation
Monitoring pressure gauge stability indicates that air has been properly purged from the system, which is essential for efficient heat transfer and pump operation.

14. C — Completed permit documents and inspection request forms
Completed permit documents and inspection request forms are typically required by local authorities to verify code compliance and close out the permitting process.

15. B — After all testing is complete and the system is fully operational
Warning tags and labels should only be removed after all testing is complete and the system is fully operational to ensure safety throughout the commissioning process.

16. A — Verify complete drainage of collectors when the pump stops
Verifying complete drainage when the pump stops is essential for drain-back systems to prevent freezing damage during cold weather.

17. D — A maintenance schedule with specific tasks and their frequency
A maintenance schedule with specific tasks and their frequency gives customers clear guidance on how to properly maintain their system for optimal performance and longevity.

18. C — Required labels for system identification, fluid type, and emergency procedures are permanently affixed and visible
Required labels for system identification, fluid type, and emergency procedures must be permanently affixed and visible for safety and maintenance purposes.

19. B — Artificially increase the temperature sensor reading to verify pump deactivation
Artificially increasing the temperature sensor reading tests whether the high-limit function properly deactivates the pump to prevent overheating.

20. A — Temperature rise in the storage tank during sunny conditions
Documenting temperature rise in the storage tank during sunny conditions provides evidence of proper system operation and heat transfer.

21. D — To identify leaks in the piping system
Pressure testing is performed to identify and fix any leaks in the system before filling it with the heat transfer fluid. This ensures the system's integrity and prevents costly leaks after commissioning.

22. C — 3 feet
A minimum of 3 feet clearance from roof edges is recommended for safety during installation and maintenance, as well as to comply with most building codes and wind load considerations.

23. B — High-temperature mineral wool insulation
High-temperature mineral wool insulation is designed to withstand temperatures above 250°F without degrading, making it ideal for solar loop piping that can reach high stagnation temperatures.

24. A — On the cold return line
The expansion tank should be installed on the cold return line where temperatures are lower to protect the tank's diaphragm from high temperatures that could cause premature failure.

25. D — Lag screws driven into roof rafters
Lag screws driven into roof rafters provide the strongest and most secure attachment for solar collectors, ensuring they can withstand high winds and weather conditions.

26. C — Chemical-resistant gloves and eye protection
Chemical-resistant gloves and eye protection are essential when handling glycol-based heat transfer fluids to prevent skin irritation and potential eye damage from splashes.

27. B — Silver soldering (brazing)
Silver soldering (brazing) creates joints that can withstand the high temperatures experienced in solar heating systems, providing more reliability than standard soft solder or compression fittings.

28. A — Close the system, create a vacuum, introduce heat transfer fluid, pressurize
The proper sequence is to close the system, create a vacuum, introduce heat transfer fluid, and pressurize the system. This eliminates air pockets that could reduce system efficiency and cause pump cavitation.

29. D — Pressure relief valve
A pressure relief valve is a critical safety component that releases pressure if it exceeds safe levels, protecting the system from potential rupture or damage due to excessive pressure buildup.

30. C — The tank's pressure rating
The tank's pressure rating must be verified to ensure it can safely handle the maximum pressure that may occur in the solar heating system, preventing potential tank failure.

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