Solar Heating Inspector Prep

Free Practice Test — 30 Real Exam-Style Questions

with full answer key & explanations

Practice Questions

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

1. When inspecting a solar water heating system with potable water connections, which device is required to prevent backflow of heat transfer fluid into the potable water supply?

A. Flow meter
B. Check valve
C. Balancing valve
D. Backflow prevention device

2. During inspection of a solar water heating system, what is the primary purpose of a temperature and pressure relief valve on the storage tank?

A. To prevent solar fluid from entering the potable water system
B. To control the flow rate through the solar collectors
C. To prevent tank rupture by releasing water when temperature or pressure exceeds safe limits
D. To regulate the temperature of water delivered to fixtures

3. When inspecting a thermosiphon solar water heating system with potable water, what must an inspector verify about the temperature and pressure relief valve?

A. That it is located at the lowest point in the system
B. That it discharges to a safe location according to local code requirements
C. That it is rated for at least 50 psi higher than system pressure
D. That it is made of the same material as the tank

4. What type of heat exchanger is typically required when separating potable water from toxic heat transfer fluid in a solar water heating system?

A. Double-wall heat exchanger with visible leak path
B. Single-wall copper heat exchanger
C. Plate-type stainless steel heat exchanger
D. Coaxial heat exchanger with monitoring system

5. According to plumbing codes, what is the maximum temperature at which potable water should be delivered to fixtures in a solar water heating system?

A. 100°F (38°C)
B. 140°F (60°C)
C. 180°F (82°C)
D. 120°F (49°C)

6. When inspecting a solar water heating system's potable water connections, which valve should be present to allow maintenance of the solar system without shutting down the entire building's water supply?

A. Solenoid valves
B. Pressure reducing valves
C. Isolation valves
D. Needle valves

7. During inspection of a solar storage tank, what should be verified about the thermal expansion tank?

A. That it is installed on the hot water outlet of the tank
B. That it is properly sized and pre-charged to match incoming water pressure
C. That it is painted to match the tank color
D. That it is filled with the same heat transfer fluid as the solar loop

8. What is the purpose of a tempering valve in a solar water heating system?

A. To blend hot water with cold water to maintain a safe delivery temperature
B. To control the temperature of the heat transfer fluid
C. To prevent backflow of heated water into the cold water supply
D. To release pressure when the system overheats

9. When inspecting a vacuum relief valve on a solar water heating system, where should it typically be located?

A. Inside the storage tank
B. At the lowest point in the system
C. Adjacent to the pressure relief valve
D. At the highest point in the potable water system

10. What should an inspector verify about the labeling of piping in a solar water heating system?

A. That piping is color-coded to match the roof color
B. That all piping is labeled with the manufacturer's name
C. That piping is labeled to indicate contents, direction of flow, and temperatures
D. That piping has serial numbers matching the installation manual

11. When inspecting a solar storage tank with an integral heat exchanger, what must be verified regarding the potable water connections?

A. That the connections are made of copper only
B. That there is a test point to verify no cross-connection with heat transfer fluid
C. That the connections are at least 12 inches apart
D. That the connections are labeled in multiple languages

12. What type of valve must be installed on the cold water supply line to a solar storage tank?

A. Check valve
B. Ball valve
C. Gate valve
D. Needle valve

13. When inspecting the pressure relief valve on a solar storage tank, what is the most important factor to verify?

A. That it is connected to the building's drainage system
B. That it is made by the same manufacturer as the tank
C. That it was installed within the last year
D. That its pressure rating does not exceed the maximum working pressure of the tank

14. What must an inspector verify about drain valves on a solar water heating storage tank?

A. That they are connected to the building automation system
B. That they are electronically controlled
C. That they are accessible for maintenance and service
D. That they have lockable handles

15. In a solar water heating system, what should be verified about the potable water piping material?

A. That it matches the color of the solar collectors
B. That it is approved for potable water use and rated for the maximum system temperature
C. That it is all made from the same manufacturer
D. That it is at least Schedule 80 thickness

16. According to plumbing codes, what is required for a heat exchanger that separates potable water from a toxic heat transfer fluid in a solar heating system?

A. Double-wall construction with a visible leak path
B. Annual pressure testing
C. Electronic leak detection system
D. ASME certification only

17. When inspecting a solar water heating system with multiple storage tanks, what must be verified about the piping configuration?

A. That each tank has a separate pressure gauge
B. That all tanks are the same color
C. That tanks are arranged in increasing size order
D. That balancing valves are installed to ensure equal flow through all tanks

18. What should an inspector verify about the circulator pump in the potable water loop of a solar water heating system?

A. That it is made by the same manufacturer as the collectors
B. That it runs continuously
C. That it is approved for use in potable water systems
D. That it is manually controlled

19. When inspecting a solar water heating system's storage tank, what is required regarding insulation?

A. That the insulation is the same color as the tank
B. That it has proper insulation that meets code requirements for R-value
C. That the insulation is at least 1 inch thick regardless of type
D. That the insulation is made by the same manufacturer as the tank

20. During inspection of a solar water heating system, what must be verified about the temperature sensor wells on the storage tank?

A. That they are properly sealed to prevent leakage
B. That they are located on the north side of the tank
C. That they are connected to the building's fire alarm system
D. That they are made of plastic materials

21. Which solar heating system type is most appropriate for regions that experience frequent hard freezes?

A. Thermosiphon system
B. Direct recirculation system
C. Integral collector storage (ICS) system
D. Closed-loop antifreeze system

22. What is a primary advantage of a drainback solar heating system?

A. It requires no pumps or controls
B. It operates with the lowest initial installation cost
C. It provides fail-safe freeze protection without antifreeze
D. It offers the highest heat transfer efficiency in all conditions

23. When inspecting an integral collector storage (ICS) system, which characteristic would you expect to observe?

A. A pressurized glycol loop with heat exchanger
B. Storage tanks integrated within the collector assembly
C. A separate drainback reservoir
D. Multiple high-pressure pumps

24. What is the most important documentation an inspector should verify for a newly installed solar heating system?

A. System manuals and operation instructions
B. Manufacturer's advertising materials
C. Installer's personal credentials
D. Previous customer testimonials

25. What is the primary concern when evaluating collector orientation for a solar water heating system in the Northern Hemisphere?

A. Whether the collectors are accessible by ladder
B. Whether the collectors are visible from the street
C. Whether the collectors match the roof color
D. Whether the collectors face within 45 degrees of true south

26. Which solar heating application typically requires the largest collector area?

A. Pool heating during summer months
B. Domestic hot water only for a residence
C. Combined space and water heating for a residence
D. Hot tub heating for weekend use

27. When inspecting a solar pool heating system, which design feature would you expect to find that differs from domestic hot water systems?

A. Triple-glazed evacuated tube collectors
B. Unglazed collectors
C. Closed glycol loop with heat exchanger
D. Large expansion tank

28. Which shading issue would most significantly impact a solar heating system's performance?

A. Shading during 9am-3pm
B. Shading only during early morning (6am-8am)
C. Shading only during late afternoon (4pm-6pm)
D. Shading only during summer solstice

29. What overheat protection method is most commonly used in closed-loop glycol solar heating systems?

A. Collector shading devices
B. Manual draining of the system
C. Automatic system shutdown at night
D. Pressure relief valves

30. Which factor is most important when evaluating a thermosiphon system's installation?

A. Collectors mounted on adjustable brackets
B. Storage tank insulated with at least R-30 material
C. Storage tank positioned above the collectors
D. System painted with UV-resistant coating

Answer Key & Explanations

1. D — Backflow prevention device
A backflow prevention device is required by plumbing codes to prevent non-potable heat transfer fluid from contaminating the potable water supply in case of a pressure difference that could cause reverse flow.

2. C — To prevent tank rupture by releasing water when temperature or pressure exceeds safe limits
The temperature and pressure relief valve is a critical safety device that prevents excessive pressure or temperature buildup in the storage tank by releasing water when either parameter exceeds safe limits.

3. B — That it discharges to a safe location according to local code requirements
Code requirements specify that the T&P relief valve must discharge to an appropriate location where it won't cause property damage or create a scalding hazard to people.

4. A — Double-wall heat exchanger with visible leak path
Double-wall heat exchangers with a visible leak path between the walls provide an additional layer of protection against cross-contamination of potable water with toxic heat transfer fluid.

5. D — 120°F (49°C)
To prevent scalding, plumbing codes typically specify that water delivered to fixtures should not exceed 120°F (49°C), which is ensured by properly installed mixing valves.

6. C — Isolation valves
Isolation valves are required to allow service and maintenance of the solar heating system components without interrupting water service to the rest of the building.

7. B — That it is properly sized and pre-charged to match incoming water pressure
Thermal expansion tanks must be properly sized for the system volume and pre-charged to match the incoming water pressure to prevent pressure buildup when water is heated.

8. A — To blend hot water with cold water to maintain a safe delivery temperature
Tempering valves (also called mixing valves) blend hot water from the solar storage tank with cold water to deliver water at a safe temperature to fixtures, preventing scalding.

9. D — At the highest point in the potable water system
Vacuum relief valves should be installed at the highest point of the potable water system to prevent vacuum formation that could collapse piping or tanks during draining.

10. C — That piping is labeled to indicate contents, direction of flow, and temperatures
Proper labeling of pipes is required to identify the contents (potable vs. non-potable), direction of flow, and temperatures to ensure safe operation and maintenance.

11. B — That there is a test point to verify no cross-connection with heat transfer fluid
A cross-connection test point allows verification that there is no leakage from the heat transfer fluid circuit into the potable water circuit, which could contaminate drinking water.

12. A — Check valve
A check valve prevents thermosiphoning or backflow of heated water into the cold water supply, which could waste energy and potentially damage components not rated for high temperatures.

13. D — That its pressure rating does not exceed the maximum working pressure of the tank
The pressure relief valve must have a pressure rating that does not exceed the maximum working pressure of the tank to ensure it will release pressure before the tank could be damaged.

14. C — That they are accessible for maintenance and service
Drain valves must be accessible for maintenance and service to allow draining of the tank when necessary, which is a basic requirement for proper system maintenance.

15. B — That it is approved for potable water use and rated for the maximum system temperature
Piping materials must be approved for potable water use and rated for the maximum temperatures that will be experienced in the system to ensure safety and code compliance.

16. A — Double-wall construction with a visible leak path
Double-wall construction with a visible leak path between the walls is required by plumbing codes to ensure that any leak of toxic heat transfer fluid will be detected before it can contaminate the potable water.

17. D — That balancing valves are installed to ensure equal flow through all tanks
Proper balancing valves are required to ensure equal flow through multiple tanks, which prevents short-circuiting and ensures all tanks contribute to the system's performance.

18. C — That it is approved for use in potable water systems
Pumps in potable water systems must be specifically approved for potable water use to prevent contamination from materials not suitable for drinking water.

19. B — That it has proper insulation that meets code requirements for R-value
Storage tanks must be properly insulated to minimize heat loss, with insulation materials meeting code requirements for R-value and fire resistance.

20. A — That they are properly sealed to prevent leakage
Temperature sensor wells must be properly sealed to prevent water leakage while allowing accurate temperature measurement for system control.

21. D — Closed-loop antifreeze system
Closed-loop antifreeze systems use a non-freezing heat transfer fluid separated from potable water by a heat exchanger, making them ideal for cold climates with frequent hard freezes. This prevents system damage from freezing temperatures.

22. C — It provides fail-safe freeze protection without antifreeze
Drainback systems provide excellent freeze protection by automatically draining water from collectors when the system is not operating, eliminating the need for antifreeze and making them both efficient and reliable for freeze protection.

23. B — Storage tanks integrated within the collector assembly
Integral collector storage systems combine the solar collector and storage tank in one unit, with water stored directly in the collector assembly. This design is simple but offers limited freeze protection.

24. A — System manuals and operation instructions
System manuals and operation instructions are essential documentation that ensure proper use, maintenance, and troubleshooting of the system, which are critical for long-term functionality and durability.

25. D — Whether the collectors face within 45 degrees of true south
In the Northern Hemisphere, true south orientation (or close to it) maximizes solar energy collection throughout the year. Significant deviation reduces system performance and efficiency.

26. C — Combined space and water heating for a residence
Combined space and water heating applications require larger collector areas due to the higher heating demands, especially during winter when space heating needs are highest and solar availability may be lower.

27. B — Unglazed collectors
Solar pool heating systems typically use unglazed collectors because they're cost-effective for the lower temperatures needed for pool heating (usually only 10-15°F above ambient temperature).

28. A — Shading during 9am-3pm
Morning to mid-afternoon shading (9am-3pm) has the most significant impact on performance because this is when solar radiation is strongest and represents the primary collection period for most solar heating systems.

29. D — Pressure relief valves
Pressure relief valves are essential safety devices that prevent system damage by releasing excess pressure when fluid overheats and expands beyond safe limits.

30. C — Storage tank positioned above the collectors
Thermosiphon systems rely on natural convection, which requires the storage tank to be positioned above the collectors to function properly. If the tank is below or level with collectors, the system won't circulate.

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