Gas Heat ESCO Practice Exam (Sample)

Study Guide

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Questions

1. What does a two-stage gas valve allow for in a furnace?

A. It allows for increased power consumption

B. It permits operation at two different heat output levels

C. It enables automatic shutoff during maintenance

D. It facilitates connection to multiple thermostats

2. Which of the following is a typical AFUE rating for a condensing furnace?

A. 70%

B. 80%

C. 90%

D. 95%

3. What should the inlet pressure be to the manifold of a natural gas furnace?

A. 1-3 in WC

B. 2-4 in WC

C. 3-5 in WC

D. 5-7 in WC

4. The EMT type of conduit is recommended for which type of usage?

A. Both indoor and outdoor

B. Indoor only

C. Outdoor only

D. Wet areas

5. How many threads should be cut on a 1/2" and 3/4" black iron pipe for fitting a natural gas furnace?

A. 8-10

B. 11-13

C. 14-16

D. 5-7

6. The reason for a crossover on a gas burner is to:

A. lower combustion temperature

B. maintain constant gas flow

C. maximise fuel efficiency

D. provide smooth lighting on all burners

7. What is a common material used for duct insulation?

A. Fiberglass

B. Wood

C. Plastic

D. Metal

8. If the pilot assembly orifice of a spark ignition furnace is completely clogged, what should the technician do?

A. Clean it

B. Replace it

C. Repair it

D. Adjust it

9. A technician observes the burner flames wavering in one corner shortly after starting up a 5-year-old natural gas furnace. What is the most likely cause?

A. A faulty heat exchanger

B. Improper gas pressure

C. Dirty burners

D. Clogged air filter

10. What is the specific gravity of LP gas?

A. 0.5 - 1.0

B. 1.0 - 1.5

C. 1.5 - 2.0

D. 2.0 - 2.5

Answers

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

Explanations

1. What does a two-stage gas valve allow for in a furnace?

A. It allows for increased power consumption

B. It permits operation at two different heat output levels

C. It enables automatic shutoff during maintenance

D. It facilitates connection to multiple thermostats

A two-stage gas valve plays a crucial role in optimizing the performance and efficiency of a furnace. This component allows the furnace to operate at two different heat output levels, which significantly enhances comfort and energy efficiency in a heating system. During normal operation, the furnace can use the lower heat output setting for milder temperature conditions, thus conserving fuel and reducing wear and tear on the system. When more heat is required due to colder temperatures, the valve switches to the higher output setting, delivering the necessary heat more quickly. This two-stage operation not only helps maintain a more consistent indoor temperature, avoiding the frequent cycling on and off that can occur with single-stage systems, but it also helps with energy savings by not forcing the system to operate at maximum capacity all the time. By utilizing the appropriate heat output as needed, the two-stage gas valve contributes to a more efficient and effective heating environment.

2. Which of the following is a typical AFUE rating for a condensing furnace?

A. 70%

B. 80%

C. 90%

D. 95%

The typical Annual Fuel Utilization Efficiency (AFUE) rating for a condensing furnace is generally high, often exceeding 90%. This is because condensing furnaces are designed to reclaim heat that would otherwise be lost through the exhaust, achieving greater energy efficiency. When considering this context, an AFUE rating of 95% is quite common for high-efficiency condensing furnaces, indicating that 95% of the fuel's energy is utilized for heating. This high efficiency is a significant advantage of condensing technology, making it more environmentally friendly and cost-effective over time. Lower AFUE ratings like 70% or 80% are more characteristic of standard atmospheric or non-condensing furnaces, which do not have the enhanced technology that condensing furnaces employ. Therefore, understanding the importance of AFUE ratings in evaluating furnace efficiency reveals that high ratings are a critical feature of condensing models, reinforcing why 95% is a typical value for such products.

3. What should the inlet pressure be to the manifold of a natural gas furnace?

A. 1-3 in WC

B. 2-4 in WC

C. 3-5 in WC

D. 5-7 in WC

The correct answer is A. 1-3 in WC. Inlet pressure to the manifold of a natural gas furnace should typically be within the range of 1-3 inches of water column (WC). This range ensures that the gas flow is at an appropriate pressure level for efficient and safe operation of the furnace. Options B, C, and D provide higher pressure ranges, which could lead to an over-supply of gas to the furnace, potentially causing damage or safety hazards. It is important to maintain the correct inlet pressure to ensure the furnace operates effectively and safely.

4. The EMT type of conduit is recommended for which type of usage?

A. Both indoor and outdoor

B. Indoor only

C. Outdoor only

D. Wet areas

The correct choice indicates that EMT, or Electrical Metallic Tubing, is primarily suited for indoor applications. EMT is a lightweight, thin-walled conduit commonly used for protecting electrical wiring in dry environments. Its composition allows for ease of installation and, while it can offer some protection against physical damage, it is not specifically designed to withstand the harsh conditions often encountered outdoors, such as exposure to moisture and extreme temperatures. While EMT may technically be used outdoors in protected environments, it is not generally recommended for direct exposure to the elements or in areas with significant moisture, which is why it is not the best choice for outdoor or wet area installations. Ultimately, EMT serves best in indoor settings where it can offer effective and compliant solutions for wiring protection without the additional challenges posed by outdoor elements.

5. How many threads should be cut on a 1/2" and 3/4" black iron pipe for fitting a natural gas furnace?

A. 8-10

B. 11-13

C. 14-16

D. 5-7

The correct answer for the number of threads to cut on a 1/2" and 3/4" black iron pipe when fitting a natural gas furnace is typically in the range of 11-13 threads. For fittings in natural gas applications, particularly with black iron pipe, it is important to ensure that enough threads are cut to allow for a secure and leak-free connection. This is critical for both safety and functionality, as gas leaks can be hazardous. The recommended amount of threads ensures that there is sufficient engagement with the fitting to create a tight seal. While it is necessary to follow specific guidelines and codes regarding pipe threading, fewer threads might not provide enough engagement for a secure connection, while excessively threading could run the risk of damaging the fitting or the pipe itself. Therefore, aiming for 11-13 threads is generally accepted to ensure proper assembly for a gas furnace installation.

6. The reason for a crossover on a gas burner is to:

A. lower combustion temperature

B. maintain constant gas flow

C. maximise fuel efficiency

D. provide smooth lighting on all burners

The rationale behind a crossover on a gas burner is to provide smooth lighting on all burners. This feature ensures that when one burner is lit, the flame can safely ignite adjacent burners, creating a more consistent and reliable ignition across the entire system. This smooth lighting is crucial in preventing potential issues such as delayed ignitions or uneven flame distribution, which could lead to operational inefficiencies or safety hazards. Maintaining constant gas flow, lowering combustion temperature, and maximizing fuel efficiency, while important aspects of burner operation, do not specifically address the primary function of a crossover. The crossover technique primarily focuses on optimizing the ignition process, ensuring each burner operates effectively right from the start.

7. What is a common material used for duct insulation?

A. Fiberglass

B. Wood

C. Plastic

D. Metal

Fiberglass is a widely used material for duct insulation due to its excellent thermal resistance and sound-deadening qualities. It provides an effective barrier against heat loss or gain in heating and cooling systems, contributing to improved energy efficiency. Fiberglass insulation is lightweight, non-combustible, and available in various forms, including batts, blankets, and loose-fill, making it versatile for different applications within HVAC systems. Additionally, it helps reduce noise transmission through ductwork, contributing to a more comfortable indoor environment. Overall, fiberglass insulation is favored for its combination of thermal efficiency, cost-effectiveness, and ease of installation in ductwork applications.

8. If the pilot assembly orifice of a spark ignition furnace is completely clogged, what should the technician do?

A. Clean it

B. Replace it

C. Repair it

D. Adjust it

If the pilot assembly orifice of a spark ignition furnace is completely clogged, the technician should replace it. Cleaning the orifice might not be effective if it is completely blocked, and attempting to repair or adjust it may not resolve the issue. By replacing the clogged orifice, the technician can ensure proper ignition and efficient operation of the furnace.

9. A technician observes the burner flames wavering in one corner shortly after starting up a 5-year-old natural gas furnace. What is the most likely cause?

A. A faulty heat exchanger

B. Improper gas pressure

C. Dirty burners

D. Clogged air filter

This is likely caused by a faulty heat exchanger that poses a potential safety hazard. A faulty heat exchanger can cause the flames to waver, as well as produce carbon monoxide. Improper gas pressure, dirty burners, and a clogged air filter can also cause issues with the flame, but they are not considered as likely as a faulty heat exchanger in a 5-year-old furnace. It is important to address this issue promptly to ensure the safety and efficiency of the furnace.

10. What is the specific gravity of LP gas?

A. 0.5 - 1.0

B. 1.0 - 1.5

C. 1.5 - 2.0

D. 2.0 - 2.5

LP gas, also known as liquefied petroleum gas, typically consists of propane or butane. The specific gravity of LP gas generally falls in the range of 0.5 to 1.0. This range is indicative of the density of LP gas compared to the density of air (1.0). A specific gravity of less than 1 indicates that LP gas is lighter than air, which is important to consider for safety reasons as it can easily disperse and dissipate in the atmosphere. The correct answer is A because it accurately reflects the specific gravity range typical for LP gas.