

# Gas Furnace Certification Practice Exam (Sample)

## Study Guide



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**SAMPLE**

## **Questions**

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- 1. What safety device is commonly used to prevent gas leaks in a furnace?**
  - A. Flame sensor**
  - B. Gas leak detector**
  - C. Thermostat**
  - D. Draft inducer**
- 2. In the event of a working limit switch, what is the likely system behavior?**
  - A. The furnace operates efficiently and safely**
  - B. The furnace frequently shuts off**
  - C. The furnace produces excess noise**
  - D. The furnace does not produce heat**
- 3. What is air mixed with natural gas in the burner called?**
  - A. Secondary air**
  - B. Primary air**
  - C. Combustion air**
  - D. Fuel air**
- 4. What does the pressure switch do in a gas furnace?**
  - A. Regulates gas supply**
  - B. Controls the blower speed**
  - C. Ensures sufficient airflow before operation**
  - D. Measures indoor temperature**
- 5. What is the approximate R-value for one inch of duct wrap insulation used on round metal ducts?**
  - A. R= 1.0**
  - B. R= 2.0**
  - C. R= 3.0**
  - D. R= 4.0**

- 6. What must a technician check before replacing a gas furnace?**
- A. Existing ductwork and gas supply lines**
  - B. Thermostat compatibility**
  - C. Age of the furnace**
  - D. Brand of the replacement unit**
- 7. What describes how a bi-metal fan switch operates a blower motor in a gas furnace?**
- A. On-Off**
  - B. Temp on-Temp off**
  - C. Continuous operation**
  - D. Manual override only**
- 8. What indicates that a furnace's limit switch may be malfunctioning?**
- A. If the system continuously overheats**
  - B. If the thermostat is set too high**
  - C. If the pilot light is blue**
  - D. If the furnace operates quietly**
- 9. What aspect of gas piping must be considered to avoid combustion issues?**
- A. Material quality**
  - B. Piping direction**
  - C. Pressure drop**
  - D. Piping color**
- 10. What indicator shows a gas furnace is operating efficiently?**
- A. A consistently maintained AFUE rating**
  - B. High gas pressure readings**
  - C. Low ambient temperature in the furnace**
  - D. Frequent cycling on and off**

## **Answers**

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

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## **Explanations**

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**1. What safety device is commonly used to prevent gas leaks in a furnace?**

- A. Flame sensor**
- B. Gas leak detector**
- C. Thermostat**
- D. Draft inducer**

The gas leak detector is a critical safety device utilized to prevent gas leaks in a furnace. This device continuously monitors the surroundings for any signs of gas leaks, which can be very dangerous and lead to hazards such as explosions or asphyxiation. When the detector senses gas, it typically triggers an alarm to alert occupants and may initiate safety measures such as shutting off the gas supply, thereby preventing further risk. The importance of a gas leak detector cannot be overstated, as it provides a proactive measure for ensuring safety in environments where gas appliances are used. Regular maintenance and testing of gas leak detectors are essential to ensure they are functioning properly and can effectively perform their safety functions when needed.

**2. In the event of a working limit switch, what is the likely system behavior?**

- A. The furnace operates efficiently and safely**
- B. The furnace frequently shuts off**
- C. The furnace produces excess noise**
- D. The furnace does not produce heat**

When a working limit switch is functioning properly, it plays a critical role in ensuring that the gas furnace operates within safe temperature ranges. The limit switch monitors the internal temperature of the furnace and shuts off the burner if the temperature exceeds a predetermined limit. This safety feature is vital for preventing overheating, which could lead to system damage or a fire. When the limit switch is operational, it allows the furnace to maintain a balance between heating effectiveness and safety. Therefore, the furnace can operate efficiently, providing heat when needed while also ensuring that it does not exceed safe operating temperatures. This results in optimal performance and peace of mind for the user, knowing that the system is designed to operate safely. In contrast, if the limit switch were malfunctioning, it might lead to frequent shutdowns, excessive noise from the furnace due to unregulated operations, or even a situation where no heat is produced at all. These scenarios indicate issues that the limit switch is designed to prevent, thus highlighting the importance of a working limit switch in promoting both efficiency and safety in furnace operation.

### 3. What is air mixed with natural gas in the burner called?

- A. Secondary air
- B. Primary air**
- C. Combustion air
- D. Fuel air

The correct term for air mixed with natural gas in the burner is referred to as primary air. In the context of gas burners, primary air is the air that is mixed with the fuel (natural gas, in this case) before it enters the combustion zone. This mixture is crucial for the efficiency and effectiveness of the combustion process. The proper mix of primary air and fuel leads to optimal combustion, ensuring that the gas burns completely and efficiently, minimizing emissions and maximizing heat output. Understanding the role of primary air is fundamental for technicians working with gas furnaces because any variation in the air-to-fuel ratio can result in incomplete combustion, leading to potential safety hazards as well as a drop in system performance.

### 4. What does the pressure switch do in a gas furnace?

- A. Regulates gas supply
- B. Controls the blower speed
- C. Ensures sufficient airflow before operation**
- D. Measures indoor temperature

The pressure switch in a gas furnace plays a critical role in safety and operational efficiency by ensuring that there is sufficient airflow before the furnace's burners are ignited. This component detects whether the exhaust gases are being expelled properly through the venting system, which is essential to prevent the accumulation of dangerous gases like carbon monoxide within the furnace. When the furnace begins to operate, the pressure switch verifies that a proper airflow is present, indicating that the venting system is clear and functional. If adequate airflow is not detected, the pressure switch will not allow the ignition system to activate, thereby preventing potential hazards associated with insufficient venting. This crucial safety feature effectively protects both the equipment and the occupants of the space it heats.

### 5. What is the approximate R-value for one inch of duct wrap insulation used on round metal ducts?

- A. R= 1.0
- B. R= 2.0
- C. R= 3.0**
- D. R= 4.0

The R-value measures the thermal resistance of insulation, indicating how well it can prevent heat transfer. For duct wrap insulation specifically used on round metal ducts, an R-value of approximately 3.0 per inch of thickness is standard. This R-value reflects the effectiveness of the insulation in reducing heat loss or gain as air moves through the ducts. It is essential for maintaining the efficiency of heating and cooling systems in buildings since proper insulation helps to ensure that conditioned air is delivered without significant energy loss. In contrast, the other values do not accurately represent the typical performance of duct wrap insulation. Lower R-values would indicate less thermal resistance, which is not characteristic of standard duct wrap materials designed to provide effective insulation.

**6. What must a technician check before replacing a gas furnace?**

**A. Existing ductwork and gas supply lines**

**B. Thermostat compatibility**

**C. Age of the furnace**

**D. Brand of the replacement unit**

Before replacing a gas furnace, it is crucial for a technician to check the existing ductwork and gas supply lines. This assessment is important because the ductwork must be able to accommodate the airflow requirements of the new furnace. If the ductwork is incorrectly sized or in poor condition, it can lead to inefficient heating, increased energy costs, and compromised comfort levels in the building. Additionally, verifying the condition and adequacy of the gas supply lines ensures that the new furnace will operate safely and efficiently. Insufficient gas supply can lead to improper combustion, reduced efficiency, and potential safety hazards. Ensuring that both the ductwork and gas supply lines are suitable is a fundamental step in the replacement process to guarantee that the new furnace will function effectively and reliably in the existing system. Other considerations, such as thermostat compatibility, age of the furnace, and brand of the replacement unit, are also relevant when replacing a furnace but are secondary to ensuring that the infrastructure (ductwork and gas lines) is properly set up to support the new equipment installed.

**7. What describes how a bi-metal fan switch operates a blower motor in a gas furnace?**

**A. On-Off**

**B. Temp on-Temp off**

**C. Continuous operation**

**D. Manual override only**

The bi-metal fan switch in a gas furnace is designed to control the operation of the blower motor based on temperature changes. When the furnace heats up, the bi-metal strip in the fan switch bends due to the increase in temperature. This bending action is what triggers the switch to turn the blower motor on, circulating heated air throughout the home. Once the temperature reaches a predetermined level—indicating that the heat exchanger has cooled to a safe temperature—the switch then activates again to turn off the blower motor. This operation allows the fan to run only when there is enough heat to distribute effectively, which is why the correct description of its operation is "temperature on-temperature off." This method ensures efficient heating and prevents the furnace from blowing cool air once the heating cycle is completed. In contrast, other options do not accurately describe the operational mechanics of the bi-metal fan switch: an on-off mechanism does not account for temperature variances, continuous operation would not allow the fan to turn off when the furnace cools, and a manual override only reference suggests that the system is not capable of automatic temperature-based control, which is a key feature of the bi-metal switch functionality.

**8. What indicates that a furnace's limit switch may be malfunctioning?**

**A. If the system continuously overheats**

**B. If the thermostat is set too high**

**C. If the pilot light is blue**

**D. If the furnace operates quietly**

A furnace's limit switch is a critical safety device designed to monitor the temperature within the furnace's heat exchanger. If the limit switch is functioning properly, it will open and turn off the burner if the temperature exceeds a predetermined threshold, preventing overheating and potential damage or hazards. When the system continuously overheats, it suggests that the limit switch may not be responding appropriately, either due to a mechanical failure or an electrical issue. This failure could prevent the furnace from shutting off the burners when it reaches an unsafe operating temperature, leading to an unsafe situation where the furnace can overheat. The other options do not indicate a fault with the limit switch. A thermostat set too high isn't necessarily an indication of a malfunction; it merely requests more heat, and as long as the limit switch operates correctly, the system should manage the temperature safely. A blue pilot light typically signifies proper combustion and functioning of the ignition system, while a quiet furnace isn't a definitive indicator of limit switch performance; it could be normal operation if the system is running efficiently.

**9. What aspect of gas piping must be considered to avoid combustion issues?**

**A. Material quality**

**B. Piping direction**

**C. Pressure drop**

**D. Piping color**

Pressure drop is a critical consideration in gas piping systems to avoid combustion issues. Ensuring that the gas delivery system maintains the appropriate pressure is vital for efficient combustion in gas appliances. If there is too much pressure drop in the piping system, it can lead to insufficient gas supply to the burner. This can result in incomplete combustion, producing carbon monoxide and other harmful emissions, or may cause the appliance to shut off due to low pressure. Moreover, pressure drop can affect the overall performance of the appliance, potentially leading to system malfunctions, increased emissions, and inefficient heating. Proper sizing of gas piping, minimizing bends and fittings that may increase resistance, and maintaining adequate pressure levels across the system are essential to ensure optimal operation of gas appliances and to mitigate the risk of combustion issues.

**10. What indicator shows a gas furnace is operating efficiently?**

- A. A consistently maintained AFUE rating**
- B. High gas pressure readings**
- C. Low ambient temperature in the furnace**
- D. Frequent cycling on and off**

A consistently maintained AFUE (Annual Fuel Utilization Efficiency) rating is a key indicator of a gas furnace operating efficiently. The AFUE rating measures the percentage of fuel that is converted into usable heat over the course of a year. A higher AFUE rating indicates that a greater proportion of the fuel is being used effectively, leading to lower energy costs and less environmental impact. Efficient gas furnaces typically have an AFUE rating of 90% or higher, meaning they convert 90% or more of the fuel into heating energy. Monitoring and maintaining this rating ensures that the furnace is functioning properly and optimally, allowing for effective heating with minimal waste. Regular maintenance and inspection can help sustain the AFUE rating over time, ensuring that the furnace remains efficient throughout its operation. In contrast, indicators like high gas pressure readings, low ambient temperature in the furnace, or frequent cycling on and off do not directly relate to operational efficiency. High gas pressure could lead to safety issues or improper combustion, while frequent cycling can suggest a problem with sizing or settings rather than efficiency. Low ambient temperatures might be indicative of a problem with the furnace or an inefficient heat exchange process, rather than an indication of high efficiency.