Safety Talk

Complete Combustion and Carbon Monoxide

The efficient combustion of propane requires a ratio of 1 part propane to 24 parts air. If this ratio is off or equipment is not working properly, propane may not combust completely. Incomplete combustion can be dangerous. It is your job to understand how to detect incomplete combustion and respond swiftly.

SIGNS OF INCOMPLETE PROPANE COMBUSTION:

- ☑ **Excessive water vapor** — Can be harmful to appliances' venting systems.
- ☑ **Soot** — Potentially damaging to property.
- ☑ **Aldehydes** — Toxic gas detectable by a sharp, penetrating odor, a metallic mouth taste, or a burning sensation in the nose and eyes.

If any of these are present, follow your company's guidelines for action.

*Incomplete combustion may also result in the release of **carbon monoxide**.*

Some propane companies handle carbon monoxide detection, while others refer calls to the fire department. If your company does address these issues, use the following guidelines:

WHEN TO CHECK FOR CARBON MONOXIDE AT CUSTOMER LOCATIONS:

Carbon monoxide (CO) can be deadly. However, because CO is odorless and colorless, it can be difficult to detect. Check for CO if any of the following conditions exist:

- ☑ A customer complains of chronic headaches or nausea.
- ☑ Houseplants are dying.
- ☑ There is a chronic odor and the source or cause cannot be located.
- ☑ Excessive water vapor forms on cool surfaces in the house.
- ☑ The odor of aldehydes is present.

USING PORTABLE CO DETECTORS:

If your company provides portable CO detectors, it is important that you are trained in their use. Always follow manufacturer instructions. Keep in mind:

- ☑ Portable CO detectors should be at or close to room temperature before testing the air.
- ☑ Samples should not be taken if the air temperature is above 125°F. Thus, it may not always be possible to check flue gases directly without additional equipment.

PLACES TO CHECK FOR CARBON MONOXIDE:

Always test different areas in the house or building to determine the highest CO level. Tests for CO should occur:

- ☑ In the air at head height
- ☑ Near gas appliances
- ☑ Close to heating ducts
- ☑ Near appliance diverters and fire doors on appliances in basements or utility rooms

If an appliance is suspected as the source of CO, it may be turned off before your arrival. Take readings before it is restarted, 1–2 minutes after it is restarted, and 15 minutes after it has been on to ensure accurate CO detection.

Discussion Topics

1. While servicing a dryer, you notice soot around the dryer vent. How do you respond?
2. Your customer asks about carbon monoxide and ways he can protect his family. What safeguards do you recommend?

LEARNING ACTIVITY

Have participants stage a mock CO check at their building. Discuss where and how to test, and actions necessary if CO is detected.

Source: *Basic Principles and Practices of Propane* (PERC)

For more information about complete combustion and carbon monoxide, visit **propanesafety.com.**

PROPANE education & research COUNCIL

January 2018 Test
Complete Combustion and Carbon Monoxide

Name: _____ Date: _____

Instructions: Read and answer each of the following questions. When complete, grade the test and review incorrect answers so each employee is "armed" with the correct answers before they leave the training.

1. An odorless, highly toxic product of incomplete combustion is_____.
   a). ethyl mercaptan
   b). water vapor
   c). carbon dioxide
   d). carbon monoxide

2. _____ is a product of incomplete combustion that is toxic and gives off a strong odor.
   a). Soot
   b). Aldehyde
   c). Ethyl mercaptan
   d). Oxygen

3. The ideal combustion ratio for propane is _____.
   a). 1 part propane to 24 parts air
   b). 4% propane to 96% air
   c). insignificant since propane will burn with any combination of air
   d). A & B are both correct

4. If the odor of aldehydes is present, then carbon monoxide is almost definitely present.
   a). True
   b). False

5. Carbon monoxide is odorless and colorless and can be difficult to detect.
   a). True
   b). False

January 2018
Answers

1.D
2.B
3.D
4.A
5.A

MONTHLY SAFETY MEETING
MINUTES AND ATTENDANCE RECORD

Company Name: _____

City: _____ State: _____

Date: _____ Time Started: _____ Time Finished: _____

Instructed By: _____ Number Attending: _____

Subject Covered and Comments:

_____
_____
_____
_____
_____
_____
_____

By my signature below, I certify that I attended and participated in this Safety Meeting and I understand the material presented.

Employee Name (Please print)	Employee Signature	*License Expires	**Endorsements	***Physical Exam
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				

*Driver licenses may be for multiple years and require HazMat testing between license renewal periods. List expiration date.
**Check licenses for proper endorsements and re-testing. (HazMat) List endorsements in this column.
***Physical Examinations are good for 2 years from the original date of the exam or sooner by Physician's request. List original exam date in this column.

By my signature below, I hereby certify that the employees listed above have been trained in accordance with the applicable regulations and curriculum for this monthly safety meeting.

Instructor's Signature: _____ Date: _____