APPLICATION NOTE

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Bacharach 0019-7600 Snifit Carbon Monoxide CO Monitor

Protection from Carbon Monoxide Dangers During HVAC Home Visits

The Bacharach Snifit®+ Carbon Monoxide monitor is used as a safety device to monitor ambient levels of carbon monoxide (CO) in the air. If dangerous CO levels are detected, the instrument will alarm to protect HVAC technicians, home energy auditors, gas utility workers or emergency response personnel during residential inspections. CO is an odorless, colorless and toxic gas which can be harmful or fatal to residents or visitors in a home without awareness of the danger. At lower exposure levels, CO causes mild effects which are often mistaken for the flu, including headaches, dizziness, disorientation, nausea and fatigue. CO exposure effects can vary greatly from person to person depending on age, overall health and the concentration and length of exposure.

CO is a non-corrosive gas that usually results from improper or inefficient combustion of natural gas or other fossil fuels such as heating oil, kerosene, wood or propane. Malfunctioning appliances or faulty venting are the major causes of carbon monoxide poisoning. In residential and commercial settings, carbon monoxide may be released from leaks in furnace and boiler exchangers and flues, or from improper ventilation of appliances.

Average CO levels in homes without gas stoves vary from 0.5 to 5 parts per million (ppm). CO levels near properly adjusted gas stoves range from 5 to 15 ppm and levels near poorly adjusted stoves may be 30 ppm or higher.

Excerpt from the BPI Technical Standards for the Building Analyst Professional:

> "Carbon monoxide levels in the ambient air around the technician must be monitored throughout all combustion safety tests. Diagnostic evaluations and inspections must be aborted if ambient CO concentrations greater than 35 ppm are recorded. CO producing appliances must be disabled and repaired before proceeding with additional diagnostics or inspections."
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> "If ambient CO levels exceed 35 ppm at any time, stop any testing and turn the combustion appliances off. Open all the exterior doors and windows. No one should enter the home until the CO levels drop below 35 ppm. The combustion appliance causing the increase in CO levels must be repaired by a qualified technician prior to completing the combustion appliance tests, unless the work scope calls for replacement of the appliance(s).

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PRODUCT BULLETIN

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Carbon Monoxide Testing

Test all spaces (including attached garages, crawlspaces, basements) containing combustion appliances for carbon monoxide using the following protocols:

1. CO testing of ambient air shall be performed continuously while performing a Worst Case Depressurization Test and/or under natural conditions (as required by paragraph 1.14).
2. Equipment used shall:
   - Be capable of measuring carbon monoxide (CO) levels from 0 to 2,000 ppm (parts per million)
   - Have a resolution of 1 ppm
   - Have an accuracy rate of + 5 ppm
   - Be calibrated annually by the manufacturer (or using manufacturer's instructions) and evidence of the calibration shall be submitted to the Rating Provider Quality Assurance Designee
3. Zero the carbon monoxide meter outside the building away from any combustion outlets or automobile traffic areas.
4. Take a measurement of CO levels within the home upon entering to establish a baseline. Do not measure near combustion appliances while they are operating. If ambient CO levels are higher than 35 ppm during normal appliance operation, turn off the appliance, ventilate the space, and evacuate the building. The building may be reentered once ambient CO levels have gone below 35 ppm."

The normal background level of CO in air is zero parts per million (ppm) however lingering carbon monoxide can accumulate in the human body over time, creating toxic levels of CO in the blood. This is especially true during the winter months with combustion appliances running in indoor spaces that have been sealed tightly to block out cold temperatures and wind. Any significant increase in this level over time may cause occupational health issues with homeowners and residents in this environment, resulting in CO-related symptoms or death.

The Bacharach Snifit®+ is compact, accurate, and simple-to-use - providing instant readings for ambient CO at levels between 0 - 2,000 ppm. The Snifit®+ has many features designed to protect all users from dangerous carbon monoxide, including:

- Pocket-sized, lightweight and wearable, monitor clips to clothing for continuous protection
- 2-Year Life – 2-Year warranty
- CO sensor - 0-2,000 ppm range in 1 ppm increments
- Simple, one-button activation for instant and constant protection
- User-selectable CO alarm setpoints - or defaults set to low/high industry standards of 35ppm/200 ppm
- Unmistakable audible, visual and vibrating alerts for low/high, STEL and TWA conditions

Key Contacts who need this monitor for personal protection:

Home Inspectors	Energy Auditors	HVAC Contractors
Facilities Managers	Gas Utility / Energy Company Personnel	Emergency Response Team Members

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Carbon Monoxide Action Levels
Standard for Action Levels

The following action levels have been defined as minimums for carbon monoxide analysts. Under no circumstances shall a CO analyst recognize less-stringent standards or ignore conditions in excess of the defined action levels. The action levels are considered net indoor ambient readings, that is indoor ambient minus outdoor ambient readings.

NORMAL **0 to 9 parts per million (ppm)**

No action required. This level is typical from outdoor sources, fumes from attached garages, heavy smoking, fireplace spillage and operation of unvented combustion appliances. With ambient conditions in this range, analysts may continue testing sequences.

MARGINAL **10 to 35 parts per million (ppm)**

This level could become problematic in some situations

Actions: Occupants should be advised of a potential health hazard to small children, elderly people and persons suffering from respiratory or heart problems. If the home has an attached garage, document CO levels in the garage. Accept this level as normal for unvented appliances but not for vented appliances. If unvented appliances are in operation, recommend additional ventilation in the areas of operation. With ambient conditions in this range, analysts may continue testing to locate the CO source.

EXCESSIVE **36 to 99 parts per million (ppm)**

Medical alert! Conditions must be mitigated.

Actions: Ask occupants to step outside and query them about health symptoms. Advise occupants to seek medical attention. If occupants exhibit any symptoms of CO poisoning, have someone drive them to a medical facility. Enter the building and open doors and windows to ventilate the structure. Turn off all combustion appliances until the CO level has been reduced to safe levels. If forced-air equipment is available, continuous operation of the air handler is recommended at this time. If the home has an attached garage, document CO levels in the garage. Test combustion appliances one at a time to determine the source of CO production. If an appliance is determined to be the source of CO production, it should be shut off and not used until a qualified technician with proper test equipment can service it.

DANGEROUS **100 to 200 parts per million (ppm)**

Medical alert. Emergency conditions exist.

Actions: Evacuate the building immediately and check occupants for health symptoms. Advise all occupants to seek medical attention. Occupants should have someone else drive them to a medical facility. If occupants exhibit symptoms of CO poisoning, emergency service personnel must be called. Evacuation is important, but analysts must not subject themselves to excessive conditions. Maximum exposure time is 15 minutes. Open all possible doors and windows quickly. If the home has an attached garage, document CO levels in the garage. Disable combustion appliance operation. Continually monitor indoor ambient levels while moving through the building. Once the atmosphere within the structure has returned to safe levels and the appliances have been turned back on, locate the source of CO production for corrective measures.

DANGEROUS **Greater than 200 parts per million (ppm)**

Medical alert. Emergency conditions exist.

Actions: Evacuate the building immediately and check occupants for health symptoms. Advise all occupants to seek medical attention. Occupants should have someone else drive them to a medical facility. If occupants exhibit symptoms of CO poisoning, emergency service personnel must be called. Evacuation is important, but analysts must not subject themselves to these conditions. Do not stay inside or reenter the building until conditions have dropped below 100 ppm. Open all possible doors and windows quickly without entering the structure. Call the local utility to shut off the gas supply (if applicable and necessary). If the home has an attached garage, document CO levels in the garage if possible to do so without being subjected to high levels of CO. Once the atmosphere within the structure has returned to safe levels, restore the fuel supply to appliances. Operate and test the appliances one at a time to determine the source of CO production.