

This unit is designed to monitor breathing air for carbon monoxide contamination from a compressed air source. The air flows through the sampling hose and into the monitor where a small amount (~0.5 lpm) is diverted through a preset internal regulator and flow restrictor. This delivers a continuous flow of sample air to the sensor chamber. The monitor will analyze the air and display the CO concentration on the face of the monitor in parts-per million (ppm).

The Green LED located on the outside of the COHP will illuminate during normal operation when the CO level is below the CO alarm point (10 ppm US and 5 ppm International). If the CO level rises above the alarm set point, the Red LED on the outside of the COHP will illuminate and an audible alarm will sound.

The unit is available housed a protective polycarbonate case that can be carried or mounted on the wall. All system lights and alarms are located on the outside of the polycarbonate case. Grade-D air must be supplied to the system and must be free of oil and water to prevent contamination of the sensor. The monitor can operate on 115 VAC or 12 volts DC.

Function Modes

The knob on the front of the COM10 or COM5 monitor sets the functions for the CO monitor and can be switched to RUN, TEST and CAL.


RUN mode is the operation/detection mode. The monitor must be in the RUN mode to monitor the supplied breathing air. Supplied air must be turned on and flowing to the instrument while in this mode. When the supplied air is off or interrupted while the monitor is in the RUN mode, the low flow alarm will sound and LF will be displayed on the monitor until the supplied air is turned on.

TEST mode allow for bump testing of the sensor or for silencing of the low flow alarm when supplied air is shut off. To perform a bump test, place the monitor in the TEST model and flow the calibration gas into the center of the knob. The reading on the monitor should be 10 +/- 1 if applying CO gas. The reading on the monitor should be zero or 1 if applying the zero gas. In the test mode, the supplied air will not be monitored and there is no need to turn the supplied air off when entering this mode. Unit must be zeroed after a bump test is performed.

CAL is the calibration and zero calibration mode. When the monitor is switched to CAL, the supplied air will not be flowing to the sensor and there is no need to shut off the supplied air. When in the CAL mode, (AC) AutoCal® will be displayed. Pressing the On/Off button once while in this mode will change the display to (AO) AutoZero. For calibration and zeroing instruction, see the Calibration section.

F1 (fault) is indicated on the display when the knob is not positioned securely in one of these three modes.

 indicates that the system requires a re-calibration

 indicates a low battery

COHP Specs

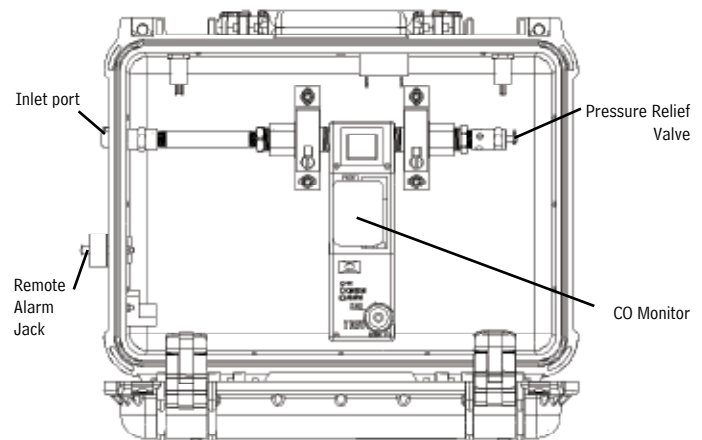
Case Size:17" W x 13"H x 7"D
 Weight: 11 lbs
 Case:Pelican®
 Monitor Display:2 digit LCD
 Sensor Type:Electrochemical; Carbon Monoxide
 Detectable Range:0-99 ppm
 Power:110/220VAC 50/60Hz or 12 volts DC backup
 Operating Temperature:-4° to 120°F (- 20° to 48.89°C)
 Operating Pressure:.....5 psi - 120 psi
 Calibration:Manual CO and Zero - Auto-Cal - no manual adjustments required
 Humidity Range:0-100%
 Alarm Setting:10 ppm (5 ppm International)
 Shielding:.....Internal RFI/EMI coating on Monitor
 Normal Operation:Green LED/Light
 Alarm Signals:
 High CORed LED Light
 High COAudible alarm (90dB)
 Low BatteryAmber light (Blinking)
 Low BatteryAudible alarm (chirp)
 Low FlowAudible alarm (90dB)

Warranty:Two years on sensor and monitor



CAB15 (15 cfm) Description

Description	Part Number
Carbon Monoxide Monitor	COM10 or COM5
Remote Alarm Jack	
Inlet Fitting- Coulder Coupler	
Pressure Relief Valve	41PRV
Sampling Connector Kit	COHPKIT
Includes:	
3/8" x 1/4" Adaptor	
Colder Coupler	
Tee fitting	
Reinforced Sampling tube with Colder plugs – 5 ft. length	



Set Up

Secure a Grade-D air source with pressure under 150 psig. Using the fittings included in the COHPKIT, connect the COHP monitor to the air source.

Connecting to the 41 Series Airline Filter

The 41P2 comes with two outlet ports on the regulator, one 3/8" and one 1/4" female pipe thread. To connect the COHP sampling hose to the 41P2, screw the Colder coupler into the 1/4" port on the filter. This is the point at which the sampling hose will connect. Also included in the kit is an adaptor which will allow for the use of the 3/8" port if necessary.

The 41P6 comes with 6 outlet ports on top of the filter. Each of these ports is 3/8" female pipe thread. To connect the COHP sampling hose to the 41P6, thread the 3/8" x 1/4" adaptor into one port on the filter. Then thread the Colder coupler into the adaptor. This is the point at which the sampling hose will connect.

Attach the other end of the sampling hose to case via the Colder coupler connection on the side of the COHP (Figure 1).

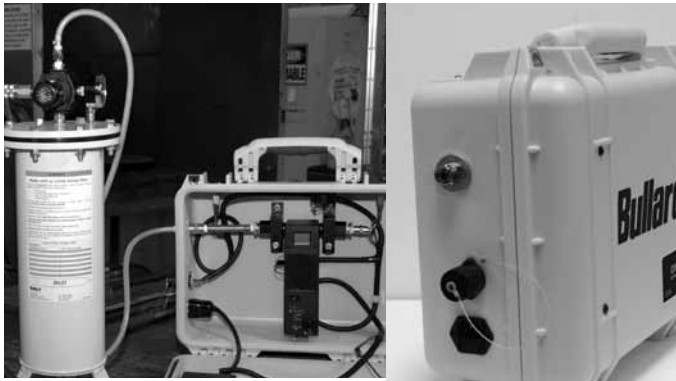


Fig. 1

Monitor Operation

Connect the AC cord to the power inlet on the side of the COHP and then plug the cord into the AC power source.

NOTE:

This unit may be operated using DC power – 8 ea. AA batteries if no AC power is available. See Optional DC Power Supply information

Flip the switch on the Control Box to ON position (Figure 2).



Fig. 2

Ensure the knob on the CO Monitor is rotated to the TEST position. This will prevent the Low Flow alarm from sounding during start up if no air is flowing.

Push the ON button located behind the front cover of the CO Monitor (Figure 3).

Wait for the 60 second countdown shown on the CO Monitor display screen.

Calibrate the CO Monitor if necessary. See Calibration Instructions.

Connect the RA remote alarm assembly (optional) to the remote alarm jack.

With air flowing, turn knob to RUN.

NOTE:

The knob must be in RUN position for active monitoring of the CO in the air supply.

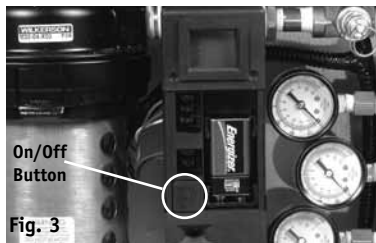


Fig. 3

Shutdown

The monitor can be left "ON" continuously when being operated on 115VAC. If operating on the optional AA battery backup power, it is recommended that the control box and the monitor be turned off when not in use to reserve battery power.

1) Turn off the main air supply to the monitor.

2) Turn monitor OFF at the ON/OFF switch located behind the front cover of the CO Monitor. You will hear three short beeps to let you know the monitor is OFF.

3) Turn the control box switch to the OFF position.

Zero-Point and Calibration Process

NOTE:

It is recommended that the Clean Air box be under pressure with no air going through the outlet fitting when performing zero point adjustment or calibration.

NOTE:

If monitor has been relocated to a different working area and ambient temperatures change, allow the unit to stabilize for 15-20 minutes prior to Zero Point adjustment and calibration.

Zero-Point Adjustment

Zero calibration should be performed before calibrating the monitor with CO gas. Bullard recommends using impurity free test gas to re-zero and whenever the zero-point has drifted.

Zero Adjustment Procedure

Remove the front cover of the CO Monitor

Push the ON button. The unit will beep and begin a 60 second countdown.

Rotate the knob located on the front of the CO Monitor the CAL position.

"AC" will appear on the display.

Press and hold the ON/OFF button until the unit beeps.

"AO" will appear on the display.

Attach the calibration valve to the Zero gas cylinder

Insert the calibration connector fitting into the center of the knob on the front of the monitor.

Open the cylinder valve fully. The flow rate is preset so there is no need to adjust it.

The red LED will continue to blink for 90 seconds during which the Zero Adjustment process will take place.

Watch for the green LED to begin blinking. This indicates a successful zero.

With the Zero air still flowing, turn the knob to TEST. The reading should be Co 0 or Co 1. If any other reading is displayed, repeat the Zero Point Adjustment.

Close the cylinder valve completely and remove the calibration connector fitting from the center of the knob.

With the incoming air flowing, turn the knob to RUN.

NOTE:

Knob must be in the RUN position for active monitoring of CO in the air supply

Calibration Instructions

The COM5 and COM10 are Auto-Cal instruments. All calibration adjustments are made by the microprocessor.

Monitor calibration should be performed monthly or whenever the reading may be questionable. A calibration schedule should be maintained for future reference. To obtain an accurate calibration, we recommend the use of Bullard calibration kits.

Calibration Procedure

Remove the front cover of the CO Monitor, and if necessary, push the ON button.

Rotate the knob located on the front of the monitor to the CAL position.

"AC" will appear on the display.

Attach the regulator to the calibration gas cylinder (10 ppm CO required).

Insert the calibration connector fitting into the center of the knob.

Open the cylinder valve fully. The flow rate is preset and there is no need to adjust it.

The Red LED on the front of the monitor will continue to blink for 90 seconds during which the calibration process will take place.

Watch for the green LED to blink. This indicates a successful calibration.

With the 10ppm gas still flowing, turn the knob to TEST. The reading should be Co 10 +/-1. If any other reading is displayed in the test mode, repeat both the Zero Point adjustment and CO calibration.

Close the regulator on the CO gas cylinder completely and remove the calibration connector fitting from the center of the knob.

Rotate the knob to the RUN position.

COHP CO Monitor User Instructions

NOTE:
Typical calibration takes approximately 90 seconds. If unit will not calibrate within 3 minutes, repeat the calibration steps with compressed air turned off. If the problem persists, contact Bullard's Customer Service Department at 1-877-BULLARD (285-5273).

NOTE:
Cam valve switch must be in RUN position for active monitoring of CO in the air supply.

Battery Replacement

A 9-volt battery is installed under the front panel cover to provide power to the CO monitor. This monitor may also run solely on AC power if the COHP attached to an AC power supply.

To replace the 9-volt battery, remove the panel cover from the front of the CO monitor. Lift it off from either the left or right side. If a 9-volt battery is being used to power the monitor and the battery power becomes too low, the monitor will indicate low battery (LB) on the display to indicate it is time to change the battery (Figure 4).

Optional DC Power Supply



Fig. 4

The COHP may be operated using 8 AA batteries to provide power to the external lights and alarm and the CO Monitor. During DC operation, the unit will operate continuously for 80 hours. Alarm status and duration can affect length of operation when using the DC backup power supply. Lights located on the box will indicate whether the box is being operated on AC or DC power. If the COHP being operated with backup DC power (8 AA batteries),

the amber light on the top of the box will burn steady. If the battery power for the box falls below the required voltage, the amber light on the top of the box will flash indicating it is time to change the batteries. There will also be an audible alert in the form of short, intermittent beeps that will serve as notification that the batteries are low. The battery compartment is located on the interior surface of the COHP case (Figure 5).

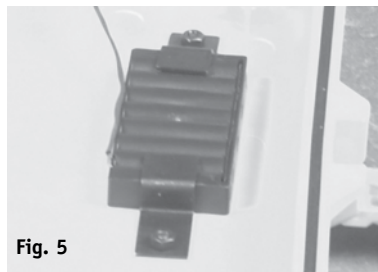


Fig. 5

Sensor Replacement

ATTENTION

Before installing a replacement sensor, verify that you have the correct sensor. The CABRS is the replacement sensor for all COM10 or COM5 monitors with serial numbers with a suffix "A," and serial numbers with NO suffix. The CABRS2 is the replacement sensor for all COM10 or COM5 monitors with serial numbers with a suffix "B." Also, the monitors that require the CABRS2 will have an extra board to which the sensor mounts. See photos below to view the two sensors.



CABRS



CABRS2
(red top)

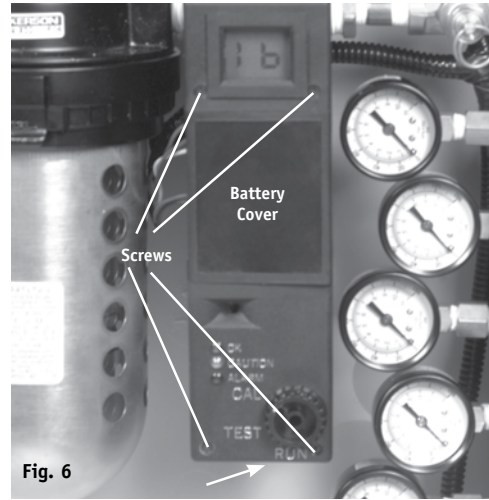


Fig. 6

The sensor is easily accessible by removing the front of the housing from the COM5 or COM10 monitor.

To gain access to the sensor, remove the four screws on the front of the CO monitor only. After removing the four screws, gently pry the front of the housing off from the bottom of the housing.

WARNING

Removing the front of the housing by prying at the top will result in damage to the housing. This damage is not covered under warranty.

Gently pull out the old sensor.

Remove the shorting clip cover from the new sensor.

Align pins and gently push the new sensor into the sockets.

Replace the front cover of the monitor when the sensor replacement is complete. Ensure LED lights are aligned with housing before securing the front cover with screws.

After replacing the sensor, allow the instrument to warm up for at least 30 minutes. The new sensor must be zeroed and calibrated before first use. See Zero-Point Adjustment and Calibration Instructions.

One Year Limited Warranty

Bullard warrants to the original purchaser that the CO Monitor will be free of defects in material and workmanship under normal use and service for a period of one (1) year from the date of purchase. Bullard's obligation under this warranty is limited to repairing or replacing, at its option, articles that are returned within the warranty period and that are, after examination, shown to Bullard's satisfaction to be defective, subject to the following limitations.

- CO Monitor must be returned to the Bullard factory with shipping charges prepaid.
- CO Monitor must not be altered from its original factory configuration.
- CO Monitor must not have been misused, subjected to negligent use, or damaged in transport.
- The date of purchase is within the one year warranty period. (A copy of the purchaser's original invoice showing the date of purchase is required to validate warranty coverage.)

In no event shall Bullard be responsible for damages for loss of use or other indirect, incidental, consequential or special costs, expenses or damages incurred by the purchaser, notwithstanding that Bullard has been advised of the possibility of such damages.

ANY IMPLIED WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO ONE (1) YEAR FROM THE DATE OF PURCHASE OF THIS PRODUCT.

Some states do not allow the exclusion or limitation of incidental or consequential damages, or allow limitations on how long an implied warranty lasts, so the above limitations or exclusion may not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from state to state.



Return Authorization

The following steps must be completed before Bullard will accept any returned goods. Please read carefully.

Follow the steps outlined below to return goods to Bullard for repair or replacement under warranty or for paid repairs:

1. Contact Bullard Customer Service by telephone or in writing at:

Bullard
 1898 Safety Way
 Cynthiana, KY 41031-9303
 Toll-Free: 877-BULLARD (285-5273)
 Phone: 859-234-6611

In your correspondence or conversation with Customer Service, describe the problem as completely as possible. For your convenience, the representative will try to help you correct the problem over the phone.

2. Verify with your representative that the product should be returned to Bullard. Customer Service will provide you with written permission and a return authorization number.
3. Before returning the product, decontaminate and clean it to remove any hazardous materials which may have settled on the product during use. Laws and/or regulations prohibit the shipment of hazardous or contaminated materials. Products suspected to be contaminated will be professionally discarded at the customer's expense.
4. Ship returned products, including those under warranty, with all transportation charges pre-paid. Bullard cannot accept returned goods on a freight collect basis.
5. Returned products will be inspected upon return to the Bullard facility. Bullard Customer Service will telephone you with a quote for required repair work which is not covered by warranty. If the cost of repairs exceeds stated quote by more than 20%, your representative will call you for authorization to complete repairs.

CO Monitor Troubleshooting Guide

Monitor will not calibrate at 10 ppm.	<ol style="list-style-type: none"> 1. Prior to performing a calibration, allow the temperature of the monitor to stabilize to the environment in which it will be used for several minutes. 2. The Clean Air Box should be under pressure with air flowing to the box with no air going through the outlet couplers (i.e. under static pressure). 3. Perform a zero point adjustment using impurity-free air. 4. If the instrument zeroes, perform a calibration using 10 ppm CO. 5. Verify that the calibration gas is 10 ppm and the gas cylinder is not empty. (Gauges are available.) 6. If the instrument will not calibrate, remove the air supply and repeat both the zero point adjustment and the 10 ppm CO calibration. 7. If the instrument will not calibrate, replace the sensor and repeat both the zero point adjustment and the 10 ppm CO calibration.
Monitor will not successfully complete a zero point adjustment.	<ul style="list-style-type: none"> • Wait 5 minutes and repeat steps 1-4 above.
Monitor displays a (-0) reading or rc.	<ul style="list-style-type: none"> • Wait 5 minutes and repeat steps 1-6 above.
Monitor zeroes during the zero point adjustment and the reading elevates after returning to the RUN mode.	<ol style="list-style-type: none"> A. Allow unit to stabilize in the run mode for 5 minutes. B. Repeat steps 1-6 above. C. If the unit will not calibrate, the supply air may be contaminated. D. Check the supply air for CO level.
Monitor will not turn ON.	<ul style="list-style-type: none"> • Verify that the ON/OFF button under the front cover of the monitor has been pressed to activate the monitor • Check AC power supply <ol style="list-style-type: none"> 1. Confirm the ON/OFF switch on the control box is in the ON position 2. Confirm AC power cord is connected to working outlet (Portable) 3. Confirm unit is wired correctly (Panel mount) • Using Battery back up <ol style="list-style-type: none"> 1. Confirm the AA batteries are good – replace if needed • Using 9V battery installed in monitor <ol style="list-style-type: none"> 1. Verify that the battery is good – replace if needed • If the power supply is good and the monitor will not power up, return it to the factory for repair or replacement.
Monitor does not display flashing green light after calibration or a partial display appears on the monitor screen.	<ul style="list-style-type: none"> • With the monitor ON and the unit on battery power only, remove and reinstall the 9 volt battery. • Repeat steps 1-6 above.
Monitor does not turn OFF.	<ul style="list-style-type: none"> • Monitor must be in the RUN or TEST mode.
Monitor displays an (F1) reading.	<ul style="list-style-type: none"> • The rotary cam switch is not locked in the CAL, TEST or RUN position. • Turn the switch knob slightly until it is in the correct position. <p>NOTE</p> <ol style="list-style-type: none"> 1. AC appears on the display if attempting to go to CAL mode. 2. CO and an alternating number appears on the display if the unit is in the TEST mode. 3. A number (PPM content of CO in the compressed air) appears on the display if attempting to go to the RUN mode.
Monitor displays (8.88, 2F or 9E) with flashing lights.	<ul style="list-style-type: none"> • This can occur when the ON / OFF button is pushed while the monitor is in the fault mode with F1 showing on the display. • Continue to push the ON / OFF button until F1 is shown on the display. • Turn the switch knob slightly to lock the monitor into the CAL, TEST or RUN mode.
Monitor shuts down after 60 second countdown.	<ul style="list-style-type: none"> • Check power supply. • Verify that the battery is good. • If the power supply is good and the monitor will not power up, return it to the factory for repair or replacement.
Monitor displays "lb".	<p>This indicates a low battery condition and the 9V battery in the CO monitor should be replaced.</p>
Yellow caution LED flashes.	<ul style="list-style-type: none"> • This is normal for TEST mode and no action is necessary. • If the unit is not in TEST mode, then it may indicate a low battery condition. Replace the 9V battery in the CO monitor.

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OSHA Regulations for Breathing Air and Bullard 41P Series Filters

OSHA regulations on respiratory protection require that employers have the obligation to ensure that “compressed breathing air shall meet at least the requirements for Grade D breathing air as described in ANSI / Compressed Gas Association Commodity Specification for Air, G-7.1-1989.” (29 CFR 1910.134 (i) (1) (ii)). This specification addresses oxygen content, condensed hydrocarbon content, carbon monoxide content, carbon dioxide content and odor.

OSHA regulations also require that the “employer shall ensure that compressors used to supply breathing air to respirators are constructed and situated so as to prevent entry of contaminated air into the air-supply system.” (29 CFR 1910.134(i))

OSHA regulations go on to say “suitable air purifying sorbent beds and filters shall be used to further insure breathing air quality”.

The Bullard 41P Series filters are designed to achieve this end by removing condensed hydrocarbons (oil mist), which is by far the most important particulate component of compressed breathing air that needs to be removed. The Bullard 41P Series filters are designed to reduce the condensed hydrocarbon level well below the OSHA and Grade D air limit of 5.0 milligrams per cubic meter of air.

Since OSHA requires that the air intake be situated so as to prevent entry of contaminants such as particulates, there should not be any other particulates in the breathing air to begin with. The only particulates that normally can be present in compressed breathing air are condensed hydrocarbons. Therefore, any airline filter, such as the Bullard 41P Series filters, should be capable of filtering compressed breathing air so that it contains an amount of condensed hydrocarbons that is below the OSHA and CGA limit of 5.0 milligram per cubic meter under normal conditions of use.

The Bullard 41P Series filters are capable of processing up to 75 cubic feet of air per minute (100 CFM for the 41A unit), and will filter the air to meet the particulate requirement of OSHA and ANSI / CGA G7.1-1989 for breathing air used for respirators under prescribed conditions of use.

The Bullard 41P Series filters are not capable of removing carbon monoxide and other toxic gases. OSHA requires that for oil-lubricated compressors the employer “shall use a high temperature alarm, or carbon monoxide alarm, or both, to monitor CO levels”.

The Bullard 41P Series filters – are also not capable of monitoring CO levels, however, Bullard has available the COHP CO monitor which - when used with Bullard 41P Series filters – does provide appropriate monitoring for carbon monoxide.

Additionally, Bullard has available a complete range of Clean Air Box filtration equipment with CO monitoring integrated as part of the filtration unit for effective compliance to CO monitoring requirements.

If you would like any further information on Bullard 41P Series filters or other air quality products, or if you have any questions concerning the use of the Bullard 41P Series filters, please contact Bullard’s Customer Service Department at 1-877-BULLARD or via e-mail at info@bullard.com.

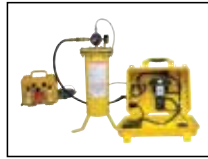
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Personal CO Monitors vs. Centralized CO Monitoring



Regulatory Implications:

Does a personal CO monitor (such as the one below) mounted inside a blast respirator meet OSHA requirements?

Regulations:

29 CFR 1910.134 is the OSHA standard for respiratory protection.

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=12716&p_table=standards

1910.134(i)(7) For oil-lubricated compressors, the employer shall use a high-temperature or carbon monoxide alarm, or both, to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply shall be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm.

The language of the OSHA standard is clear that a high-temperature or carbon monoxide alarm must be used with an oil-lubricated compressor. However, it does not specify the type of alarm.

1910.134(i)(1)(ii) Compressed breathing air shall meet at least the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989, to include:

- Oxygen content (v/v) of 19.5-23.5%;
- Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less;
- Carbon monoxide (CO) content of 10 ppm or less;
- Carbon dioxide content of 1,000 ppm or less; and
- Lack of noticeable odor.

A personal monitor does not provide any filtration to help meet the other Grade D requirements of compressed breathing air outlined above. Bullard Clean Air Box Systems and 41 Series with COHP systems help meet all the Grade D requirements.

Is the Clemco CMS3 NIOSH Approved?

The CMS3 is on the NIOSH approval label for the Clemco blast helmet. NIOSH has explained that the approval indicates the monitor did not negatively affect the respirator performance when in the helmet. The NIOSH approval is not an approval of the CMS3 as a CO monitor or an indication of its performance capabilities.

Practical Implications:

How many workers are on the job site?

- The more workers on the site the less cost effective and more of an administrative burden the personal monitors become.
 - Every monitor must be calibrated.
 - Every monitor has a sensor that will ultimately need to be replaced.
 - Every monitor has a battery that will have to be replaced/recharged.
- With centralized monitoring, such as from a CAB or COHP, only one monitor needs to be calibrated and maintained.

Is there a need for a remote alarm?

- Many job sites have sound levels nearing 120 dB. Remote alarms can signal someone in the supervisor's office of an alarm condition when it is too loud for the operator in the work area to hear, with a personal monitor this is not an option.

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