**WARRANTY EXCLUSIONS AND LIMITATION OF LIABILITY**

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Warning: Keep out of reach of children, if ingested seek medical attention immediately.

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SAFEAIR® SYSTEM

# Operating Instructions For Carbon Dioxide Monitor (Part Number: 382017)

## Technical Summary

**Physical Specifications:**

| | |
|---|---|
| Dimensions | (74 ± 1 mm) x (41 ± 1 mm) x (1 mm) |
| Weight | 1.5 g |
| Refrigerated shelf life | 1 year |
| Color change | olive green to burnt orange |

**Sampling Parameters:**

| | |
|---|---|
| Exposure level | |
| Badge | 8,000 ppm·hr, |
| Badge with color comparator | 1,800 - 80,000 ppm·hr |
| Minimum detectable limit (8 hours) | 1,000 ppm |
| Maximum recommended sampling time | 10 hours |
| Minimum recommended sampling time | 15 minutes |
| Relative humidity range | 10% - 83% |
| Face velocity range | 5 - 168 cm/sec |
| Temperature range | 50℉ - 95℉ |
| Mean coefficient of variation | ±8.49 |
| Bias at ambient conditions | -2.67% |
| Light effect – UV (direct sunlight) | not recommended |
| Light effect – visible | no effect |
| Color stability | 2 days |

**Applications:**

The SafeAir carbon dioxide badge may be used for personnel or area monitoring for exposure times ranging from 15 minutes to 10 hours. For higher resolution, the SafeAir carbon dioxide badge may be used with the SafeAir carbon dioxide color comparator (part number: 383009).

**Cross Interferences:**

The SafeAir carbon dioxide badge was treated in atmospheres containing at least two times the OSHA PEL for the following substances: alcohols, aromatic hydrocarbons, halogenated hydrocarbons, aldehydes, carbon monoxide, ammonia and hydrogen chloride. These substances showed no effect on the performance of the SafeAir carbon dioxide badge. No other interferences are known.

## Introduction

Carbon dioxide is a colorless gas. It may be sold in cylinders as a compressed, liquefied gas. Man-made sources of carbon dioxide come mainly from the burning of various fossil fuels for power generation and transport use**.** Potential health effects from long term and/or high concentration exposure to carbon dioxide include nasal and respiratory tract irritation, central nervous system effects, dizziness, drowsiness, blurred vision, fatigue, nausea, headache, loss of reflexes, seizures, loss of consciousness, coma, respiratory arrest and sudden death. This may also cause irregular heart rhythm. Repeated or prolonged exposure may cause behavioral changes.

The OSHA exposure limit for carbon dioxide is 5000 ppm (TWA). The NIOSH exposure limit for carbon dioxide is 30000 ppm (STEL) and 5000 ppm (TWA) 10 hours.

## Principle of Operation

The SafeAir carbon dioxide badge is a monitoring system designed to indicate the presence of carbon dioxide at concentrations below the permissible exposure limit. The SafeAir carbon dioxide badge detects the presence of carbon dioxide by forming a color change in the shape of a triangle inside an olive green frame. This indication is produced by a color-forming reaction, which occurs when carbon dioxide reacts with a flat indicator layer.

## Operating Instructions

1. Remove the pouch from the refrigerator and allow it to warm to room temperature.
2. Remove the badge from its protective pouch.
3. Remove color standard from its pouch and attach together with the badge to the clip. The color standard should hang on the back of the badge with the color side facing away from the badge
4. For personnel monitoring, attach the badge near the user's breathing zone (i.e. the collar) with the front side exposed to the surrounding atmosphere.
5. For area monitoring, attach the badge to a stand and mount in a centralized area with the front side exposed to the surrounding atmosphere.
6. The color change will appear inside the triangle on the side facing the body.
7. At the end of the exposure period, ***return the badge to its original pouch and let stand for 1 hour at room temperature to allow complete development of color. Retain the color standard.***
8. When the color change matches the attached color standard, the dose is 8000 ppm·hr.
9. To obtain the average concentration, divide the exposure dose (ppm·hr) by the exposure time in hours (hr).

## Storage

The SafeAir carbon dioxide badge should be refrigerated in its sealed bag at all times.

## Benefits

1. Accurate Detection: The SafeAir carbon dioxide badge is designed to react selectively with carbon dioxide with minimum interference from other substances.
2. Applications: The SafeAir badge may be used for personnel screening and for area monitoring or area mapping.
3. Ease of Use: The SafeAir badge is a direct-read device that gives immediate, on-site results.

### Other Available Monitors

1. SafeAir Badges:

| | | |
|---|---|---|
| Ammonia | Dimethyl Amine | Mercury |
| Aniline | Formaldehyde | Nitrogen Dioxide |
| Aromatic Isocyanates | Hydrazine | Ozone |
| Carbon Monoxide | Hydrides | Phosgene |
| Chlorine | Hydrogen Chloride | Sulfur Dioxide |
| Chlorine/Chlorine Dioxide | Hydrogen Sulfide | UDMH |

2. SafeAir Color Comparators:

| | | |
|---|---|---|
| Arsine[1] | Hydrogen Chlorine | TDI[4] |
| Chlorine | MMH[3] | UDMH |
| Chloroformates[2] | Phosgene | |
| Diborane[1] | Phosgene ext. range | |
| Hydrazine | Phosphine[1] | |

If you require SafeAir monitors for a chemical hazard not listed, please contact Morphix Technologies® for a free compound consultation at (800) 808-2234.

[1] To be used with the SafeAir hydrides badges
[2] To be used with the SafeAir phosgene badges
[3] To be used with the SafeAir hydrazine dual level badges
[4] To be used with the SafeAir aromatic isocyanates badges