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



2557 Production Rd.  
Virginia Beach, VA 23454  
Phone: (757) 431-2260 Fax: (757) 216-6209  
E-mail: [customerservice@morphtec.com](mailto:customerservice@morphtec.com)

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## Operating Instructions For Chlorine & Chlorine Dioxide Monitor (Part Number: 382003)

### 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:	
Chlorine	yellow to orange
Chlorine Dioxide	off-white to gray

#### Sampling Parameters:

	Chlorine	Chlorine Dioxide
Exposure level	0.18 ppm·hr	0.2 ppm·hr
Minimum detectable limit (8 hours)	0.025 ppm	0.025 ppm
Maximum recommended sampling time	10 hours	10 hours
Minimum recommended sampling time	15 minutes	15 minutes
Relative humidity range	25% - 90%	25% - 90%
Face velocity range	10 – 150 cm/sec	10 – 150 cm/sec
Temperature range	50°F - 104°F	50°F - 104°F
Light effect – UV (direct sunlight)	no effect for 16 hr	no effect for 10 hr
Light effect – visible	no effect	no effect
Color stability	4 weeks	4 weeks

#### Applications:

The SafeAir chlorine & chlorine dioxide badge may be used for personnel or area monitoring for exposure times ranging from 15 minutes to 10 hours.

#### Cross Interferences:

**Chlorine:** Bromine and iodine react with approximately the same sensitivity. Hydrogen chloride at concentrations above 1 ppm impairs the performance of the chlorine side of the chlorine & chlorine dioxide badge.

**Chlorine Dioxide:** Nitrogen dioxide and high concentrations of ozone are known interferences.

No other interferences are known.

## Introduction

Chlorine is a greenish-yellow gas with a pungent, irritating odor. Generally, chlorine is a potent respiratory system irritant. Mild exposures to chlorine cause burning of eyes, nose and mouth. Exposure to concentrations as high as 1000 ppm is likely to be fatal after a few deep breaths. The OSHA exposure limit for chlorine is 1 ppm (ceiling), whereas the NIOSH exposure limit is 0.5 ppm (ceiling).

Chlorine is an important chemical commodity widely used in the production of safe drinking water. It is also extensively used in the production of paper products, dyestuffs, textiles, petroleum products, chlorinated solvents, etc.

Chlorine dioxide is a yellow to reddish-yellow gas with an unpleasant odor similar to chlorine and suggestive of nitric acid. Exposure may be highly irritating to the skin and mucous membranes of the respiratory tract and may cause pulmonary edema (abnormal fluid build up in the lungs). OSHA and NIOSH exposure limit for chlorine dioxide is 0.1 ppm (TWA).

Chlorine dioxide is used in the purification of water, the tanning and detanning of leather and the bleaching of cellulose, flour, leather, fats and textiles, as well as in the paper and pulp industry.

## Principle of Operation

The SafeAir chlorine & chlorine dioxide badge is a monitoring system designed to indicate the presence of chlorine and/or chlorine dioxide at concentrations below the permissible exposure limit. The SafeAir chlorine & chlorine dioxide badge detects the presence of chlorine and/or chlorine dioxide by forming a color change in the shape of an exclamation mark inside the triangle. This indication is produced by a color-forming reaction, which occurs when the contaminant(s) react with a flat indicator layer. The SafeAir chlorine & chlorine dioxide badge is a dual-purpose badge. The color change may appear on the front and/or the backside of the badge depending upon the level of exposure of the two contaminants.

## 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 activation label before monitoring.
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 exclamation mark appears within the triangle when chlorine and/or chlorine dioxide are present. Please note that the exclamation mark will appear underneath the printed exposure dose (sensitivity).
7. To obtain the average concentration, divide the exposure dose (ppm-hr) by the exposure time in hours (hr).

## Storage

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

## Benefits

1. Accurate Detection: The SafeAir chlorine & chlorine dioxide badge is designed to react selectively with chlorine and/or chlorine 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 Dioxide	Hydrides	Phosgene
Carbon Monoxide	Hydrogen Chloride	Sulfur Dioxide
Chlorine	Hydrogen Sulfide	UDMH
2. SafeAir Color Comparators:

Arsine <sup>1</sup>	Hydrazine	Phosphine <sup>1</sup>
Carbon Dioxide	Hydrogen Chloride	TDI <sup>4</sup>
Chlorine	MMH <sup>3</sup>	UDMH
Chloroformates <sup>2</sup>	Phosgene	
Diborane <sup>1</sup>	Phosgene ext. range	

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

<sup>1</sup> To be used with the SafeAir hydrides badges

<sup>2</sup> To be used with the SafeAir phosgene badges

<sup>3</sup> To be used with the SafeAir hydrazine dual level badges

<sup>4</sup> To be used with the SafeAir aromatic isocyanates badges

