



Operating Instructions  
 Aromatic Isocyanates Badge  
 For the detection of  
 Toluene Diisocyanate (TDI) and  
 Methylene Diphenyl Diisocyanate (MDI)  
 (Part Number: 382001)

**Introduction**

Based on the available toxicity data in animals and epidemiologic studies of humans, aromatic diisocyanates such as TDI and MDI are strong respiratory sensitizers.<sup>1</sup> Repeated exposures or a single large dose may cause sensitization. Chronic overexposure has also been reported to cause lung damage including fibrosis. OSHA and NIOSH exposure limit for TDI is 0.02 ppm (TWA), the OSHA exposure limit for MDI is 0.02 ppm (ceiling) and the NIOSH exposure limit for MDI is 0.005 ppm (TWA).

Aromatic diisocyanates, such as toluene diisocyanate (TDI) and methylene diphenyl diisocyanate (MDI), are commonly used to make various polymers such as polyurethanes. Polyurethanes have significant application in the manufacture of rigid and flexible foams. They are also used in the production of adhesives, elastomers and coatings. Polyurethane coatings are preferred in the automotive refinishing industry where high performance coatings are required.

<sup>1</sup> [www.epa.gov/dfe/pubs/auto/profile/toxicology1a.pdf](http://www.epa.gov/dfe/pubs/auto/profile/toxicology1a.pdf)

**Principle of Operation**

The SafeAir aromatic isocyanates badge is a monitoring system designed to indicate the presence of TDI and/or MDI at concentrations below the permissible exposure limit. The SafeAir aromatic isocyanates badge detects the presence of TDI and/or MDI 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 TDI and/or MDI react with a flat indicator layer.

**Physical Specifications:**

Dimensions	(74 ± 1 mm) x (41 ± 1 mm) x (1 mm)
Weight	1.5 g
Refrigerated shelf life	1 year
Color change	off-white to red

**Sampling Parameters:**

	<b>TDI</b>	<b>MDI</b>
Sensitivity (exposure dose):		
Badge	5 ppb·hr	3.5 ppb·hr
Badge with color comparator	5 – 140 ppb·hr	n/a
Minimum detectable limit (8 hours)	0.6 ppb	0.4 ppb
Maximum recommended sampling time	24 hours	24 hours
Minimum recommended sampling time	15 minutes	15 minutes
Relative humidity range	11% - 87%	11% - 87%
Face velocity range	10 – 100 cm/sec	10 – 100 cm/sec
Temperature range	60°F - 91°F	60°F - 91°F
Light effect – UV (direct sunlight)	not recommended >4hrs	not recommended >4hrs
Light effect – visible	no effect	no effect
Color stability	two weeks	two weeks

Known Interferences: Other aromatic diisocyanates and high concentrations of hydrazine

**Operating Instructions**

- 1) Prior to removing the badge from its protective pouch, allow the badge to warm to room temperature.
- 2) 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.
- 3) For area monitoring, attach the badge to a stand and mount in a centralized area with the front side exposed to the surrounding atmosphere.
- 4) The exclamation mark begins to appear within the triangle when TDI and/or MDI are present at the sensitivity level. Please note that the exclamation mark will appear on the front of the badge.
- 5) For higher resolution and wider range, a SafeAir TDI color comparator is available for use with this badge. To obtain the average concentration of TDI, divide the exposure dose (ppb·hr) by the exposure time in hours (hr).

**WARRANTY EXCLUSIONS AND LIMITATION OF LIABILITY**

IF THE USER DOES NOT ACCEPT THE FOLLOWING TERMS, THE USER SHOULD NOT USE THE SAFEAIR BADGES AND COLOR COMPARATORS.

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



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