

**Technical Data  
Bulletin**

OH&amp;ESD

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**3M Organic Vapor Monitors**  
**3500/3510/3520/3530****Validation Protocol**

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<b>Background</b>	This is a summary of the protocol proposed by 3M for the validation of diffusion monitors as presented at the 1995 American Industrial Hygiene Conference & Exposition. This protocol covers all the parameters in the NIOSH, CEN, and proposed ANSI guidelines for the evaluation of diffusion monitor performance.
<b>Desorption Efficiency</b>	Four monitors are spiked at 1, 0.5, and 0.1 times the exposure limit (EL). Actual levels may vary slightly depending upon the EL and the analytical detection limit for the substance. Recoveries above 75% with the given desorption solvent indicate that the solvent may be appropriate for recovery of this analyte.
<b>Humidity</b>	The sampling rate is calculated for three monitors at 1 EL for 2, 4, 6, and 8 hours and relative humidities of 50 and 80% to determine if the uptake rate is linear to within 5%.
<b>Reverse Diffusion</b>	Twelve monitors are exposed to concentrations of 2 EL for 30 minutes. Six are capped and the remaining six are exposed to clean air for an additional 450 minutes. Measured mean concentrations of the two sets should be within 10% of each other.
<b>Accuracy</b>	Six badge replicates are used to determine the range of sampling times and concentrations under which the monitor will be accurate to within 25%. Commonly used concentrations and sampling times are 0.1, 1 and 2 EL; and 15, 240, and 480 minutes respectively.
<b>Storage</b>	The recovery coefficient is calculated after spiking 20 monitors, adding an equivalent amount of water that would be adsorbed at 80% relative humidity, and then storing the monitors at room temperature (23°C) and at

4°C for 0 to 3 weeks. The recovery coefficient should be within 10% of the initial recovery coefficient.

- Temperature** Six monitors are exposed at 10°C and 6 exposed at 40°C to determine if the sampling rate is within 10% of the sampling rate at 23°C. Refer to the Temperature Effects table in the Sampling and Analysis Guide for theoretical correction factors at different temperatures.
- Air Velocity** Monitors are placed parallel and perpendicular to air flows ranging from 3 ft/min to 400 ft/min to see if the sampling rate deviated by more than 5% relative to the published sampling rate. This depends on the air movement and the design of the monitor and not on the specific analyte. To accurately sample at any orientation, there must be a minimum air velocity of 25 ft/min.
- Interferences** The sampling rate for organic compounds on the organic vapor monitor is not affected by the presence of other solvents provided that the combined collected weights do not exceed the listed value of the single contaminant with the lowest capacity. Interferences in the analysis are avoided by proper choice of chromatographic conditions. If the presence of other compounds is suspected to cause a chemical reaction, then specific tests should be run to clarify the extent of the potential interference.
- Packaging Test** Packaging the monitors in a sealed can protects them from contamination during storage. The utility of the can has been shown by placing the cans in a toluene atmosphere (>400 ppm) for 16 hours and then analyzing the monitors. No contamination of the monitor occurred.