Total Organic Vapors Breakthrough Indicator Sticker (BTIS) (PN: 111-0000)

1. Application

The TOV Breakthrough Indicator Sticker (PN:111-0000) is qualitative (yes/no) colorimetric indicator for the end-of-service life of filters. The indicator is designed to provide real-time indication of the breakthrough of organic vapors, including:
1. Acetone, 2. Acetonitrile, 3. Acids (i.e. Acetic acid, Hydrochloric acid, Trifloroacetic acid Trichloroacetic Acid), 4. Acrylonitrile, 5. Aliphatic hydrocarbons (i.e. hexane), 6. Aromatic hydrocarbons (i.e. benzene, toluene and xylenes), 7. Chlorinated hydrocarbons (i.e. carbon tetrachloride, chloroform and dichloromethane (methylene chloride), 8. Ethanol, 9. Ethyl Acetate, 10. Ethyl acrylate, 11. Ethyl ether, 12. Forane 13. Gasoline, 14. HFIP (Hexafluoroisopropanol), 15. Methanol, 16 Methyl acrylate, 17. Naphtha, 19. Phenol, 20. Sulfolane, 21. THF (Tetrahydrofuran).

2. Specifications

2.1. Overall Specification

a. Weight:	0.4g (0.02oz)
b. Dimensions:	2.8mm (0.11in),ϕ: 31.8mm (1.25in)
c. Operating temperature:	4oC to 32oC (39oF to 89.6oF)
d. Operating humidity:	5% RH to 85%RH
e. Minimum detectable limit:	See performance specifications (2.2.)
f. Color change:	Orange to red or deep red
g. Storage temperature:	4oC to 25oC, (39oF to 77°F)
h. Shelf life:	1 year at 4oC to 25oC, (39oF to 77oF)
i. Service life:	1 year

2.2. Performance Specification

To determine the sensitivity of the breakthrough indicator, a solution/mixture of 10% solvent in water was bubbled with ambient air at a flow rate of 5cc/min. The BTIS was exposed to the airflow until a color change was observed. The elapsed time to observe the first noticeable and the final colors for the respective organic solvent is depicted in the table below.

2.3. Cross interferences and limitations

Basic vapors in high concentrations impair the performance of the organic vapors breakthrough indicator. The indicator does not respond to gaseous aliphatic hydrocarbons (i.e. methane, ethane, propane and butane), aldehydes (i.e. formaldehyde) or basic organic vapors (i.e. pyridine and aliphatic amines). No other interferences or limitations are known.

3. Operating Instructions

a. Ensure that packaging pouch is intact.
b. Open packaging pouch by tearing off the top part from one of side notches
c. Remove the sticker from the packaging pouch.
d. Peel off the protective liner to expose the bottom adhesive (Figure 1).
e. Hold the sticker from the edges and place it on center clean area of the filter's outlet with the reading area (glossy surface) of the sticker facing up (Figure 2).
e. Press firmly to adhere the sticker to the filter's outlet (Figure 3).
f. Replace filter when the reading area of the BTIS changes color to red.

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Solvent (10% in Water)	Breakthrough Indication Time	
	First Noticeable Color (min)	Final Color
Acetic acid	6	14
Acetone	10	26
Acetonitrile	10	30
Acrylonitrile	7	42
Benzene	2	5
Carbon tetrachloride	10	30
Chloroform	12	30
Dichloromethane	5	15
Ethanol	10	30
Ethyl Acetate	2	5
Ethyl acrylate	7	39
Ethyl ether	>1	5
Forane (isoflurane, 1-Chloro-2,2,2-trifluoroethyl difluoromethyl ether)	>1	4
Gasoline	14	60
Hexane	7	15
HFIP (Hexafluoroisopropanol)	1	4
Hydrochloric acid	> 1	4
Methanol	2	5
Methyl acrylate	4	36
Naphtha	10	30
Phenol	20	6 hours
Sulfolane	8	17
THF (Tetrahydrofuran)	10	20
Toluene	2	8
Trifloroacetic acid	4	30
Xylenes	14	60

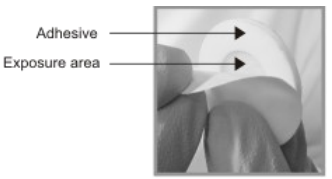


Figure 1

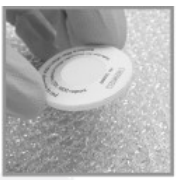


Figure 2

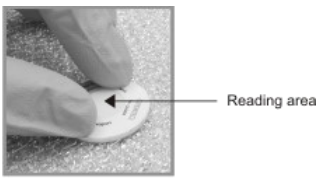
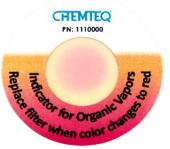


Figure 3

Filter is Good



Replace Filter

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