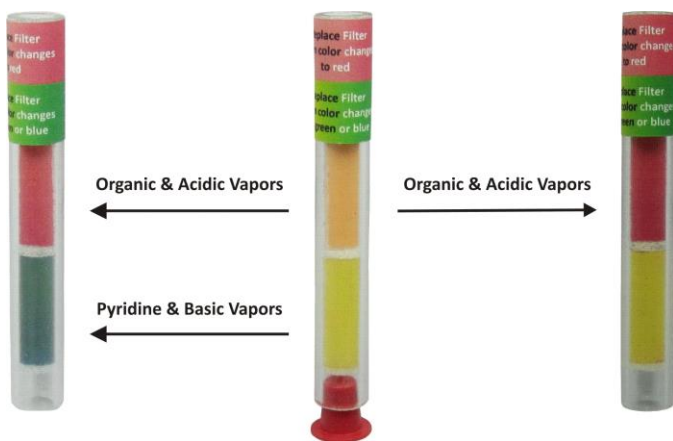


Filter Breakthrough Indicator (BTI LFF) Total Organics (PN: 146-0000)



Manual



1. Application

The Breakthrough Indicator (PN: 133) is qualitative (yes/no) colorimetric indicator for the exhaustion and end-of-service life of low-flow filters. The indicator is designed to provide real-time indication of the breakthrough of organic solvents, including:

1. Acetone
2. Acetonitrile
3. Acidic (i.e. HFIP Trifluoroacetic acid Trichloroacetic Acid)
4. Aliphatic hydrocarbons (i.e. hexane)
5. Aromatic Hydrocarbons (i.e. benzene, toluene and xylenes)
6. Basic (i.e. Pyridine)
7. Chlorinated hydrocarbons (i.e. carbon tetrachloride, chloroform and dichloromethane (methylene chloride))
8. Ethanol
9. Ethyl Acetate
10. Gasoline
11. HFIP Hexafluoroisopropanol
12. Methanol
13. Naphtha
14. Phenol
15. Sulfolane
16. THF (Tetrahydrofuran)

2. Specifications

2.1. Overall Specification

- | | |
|------------------------------|--|
| a. Weight: | 4.4g (0.16oz) |
| b. Dimensions: | 79mm (3.1in), diameter: 10mm(0.39in) |
| c. Operating temperature: | 4°C to 40°C (39°F to 104°F) |
| d. Operating humidity: | 5% RH to 85%RH |
| e. Minimum detectable limit: | 4ppm•min at 30 cm/sec face velocity |
| f. Color change: | Aliphatic hydrocarbons; orange to light red
Other organics; orange to dark red
Phenol and acidic vapors; orange to red
Pyridine and basic vapors, yellow to green to blue |
| g. Storage temperature: | 4°C to 25°C, (39°F to 77°F) |
| h. Shelf life: | 1 year at 4°C to 25°C, (39°F to 77°F) |
| 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 breakthrough indicator sticker 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.

Solvent (10% in Water)	Breakthrough Indication Time	
	First Noticeable Color (min)	Final Color (min)
Acetone	10	10
Acetonitrile	10	30
Benzene	2	5
Carbon tetrachloride	10	30
Chloroform	12	30
Dichloromethane (methylene chloride))	5	15
Ethanol	10	30
Ethyl Acetate	2	5
Gasoline	14	60
Hexane	7	15
HFIP Hexafluoroisopropanol	1	4
Methanol	2	5
Naphtha	10	30
Phenol	20	6 hours
Pyridine	10	30
Sulfolane	8	17
THF (Tetrahydrofuran)	10	20
Toluene	2	8
Trifluoroacetic acid	4	30
Xylenes	14	60

3. Operating Instructions

- Ensure that packaging pouch is intact.
- Open packaging pouch by tearing off the top part from one of side notches.
- Remove one Breakthrough Indicator from packaging pouch, reseal pouch.
- Remove the $\frac{3}{8}$ " plug from the filter outlet lid.
- Remove the protective red plug to activate the breakthrough indicator.**
- Attach Breakthrough Indicator into the $\frac{3}{8}$ " filter outlet lid (adapter might be needed, please contact us for further information).



Caution: Only hand-tie indicator into filter outlet

- Replace filter when the Breakthrough Indicator changes color, See color changes above (2.1. f).