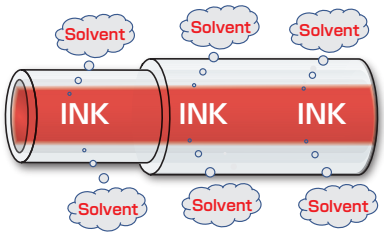
HAKKO CORPORATION

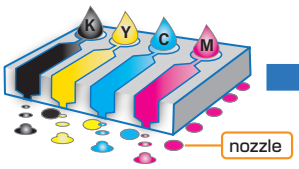
Introduction of Solvent-Based Ink Tubing: E-SJ and E-SBT (Solvent Barrier Test Data)

1 Features···Superior in Solvent Barrier

▶ Conventional (Existing) Tubing···



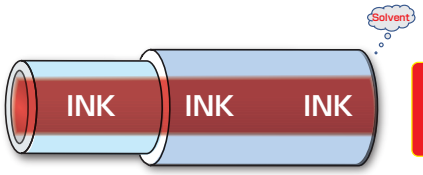
Solvent components of the inks volatilize.



Ink Quality becomes lower.
→Lower Quality of Printing Outputs

When stopped for a long time, Coming off from the nozzle
→Ink Output is not stable.

▶ HAKKO Barrier Tubing···



Reducing the volatilizing of ink components

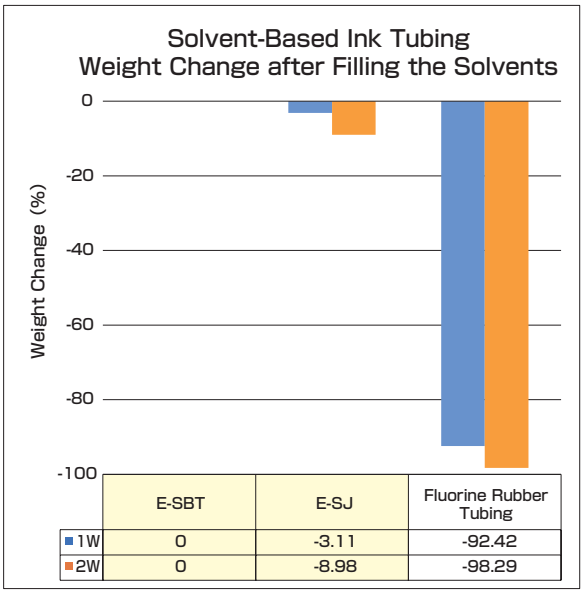
2 Solvent Barrier Test

Seal the solvent (Diethylene Glycol Diethyl Ether) in the tubing.
Then, leave the tubing under the condition of temperature (60℃) with sealing both ends.
Measure the weight (weight changes) of the ink tubing in 7 and 14 days.
※Except the weights of tubing and sealing items, we only measured the weight changes of the solvents.

3 Sample

- E-SBT-4×6
- E-SJ-4×6
- Fluorine Rubber Tubing

4 Results



	E-SBT	E-SJ	Fluorine Rubber Tubing
1W	0	-3.11	-92.42
2W	0	-8.98	-98.29

[image]

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Introduction of Ink-Jet Printer Tubing
(Slide Curvature Test Data)

1 Test Methods

Test Device : Slide Curvature Test Machine (Pictures Shown Below)

- Bending Radius: R = 100 (Inside Energy Chain)
- Test Machine Velocity : 810mm/sec
- Number of Attempts : 5 Million Times
- Test Temperature : Room Temperature (20～30℃)

It is expected to be used on the moving part of the ink-jet printer. → Check whether or not there are cracks after a certain period.

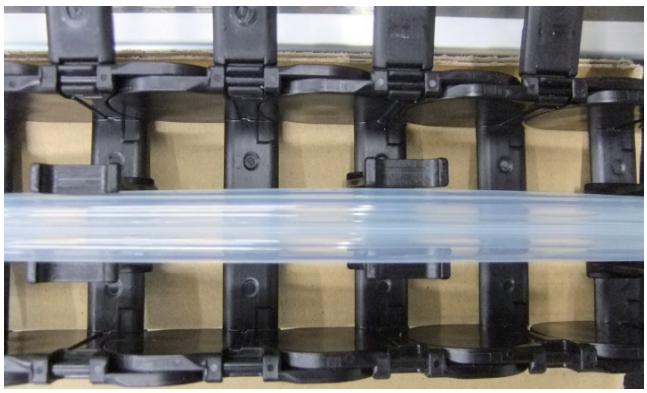
2 Sample

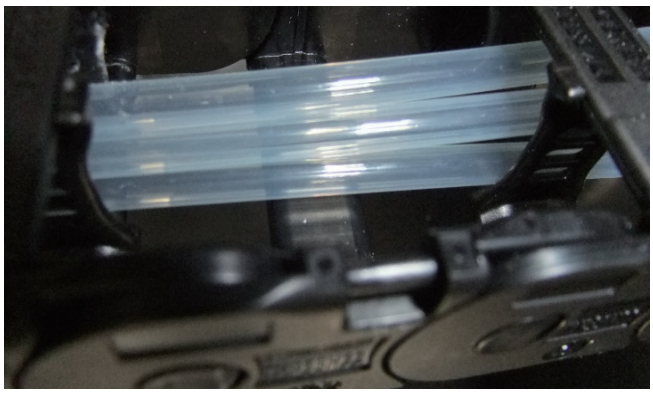
Olefin-Based (for Water-Based Inks) Tubing
- E-WBT-4×6

Fluorine-Based (for Solvent-Based Inks) Tubing
- E-SBT-4×6
- E-SJ-4×6

3 Results

No Cracks or Tears Found





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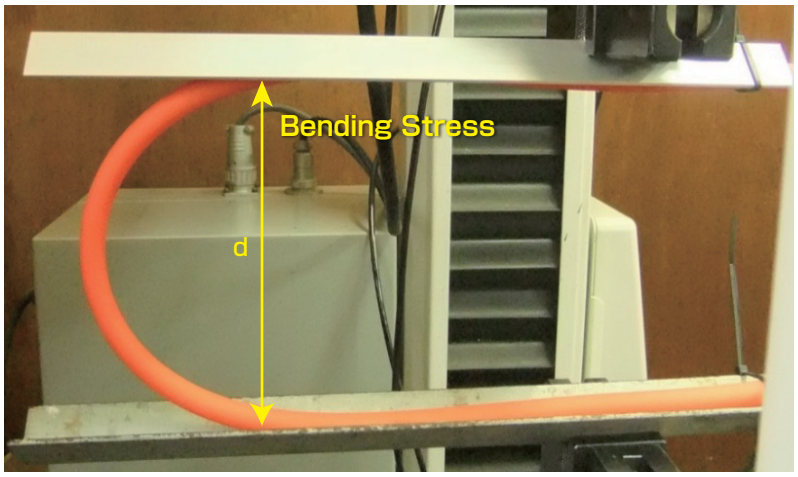
Introduction of Ink-Jet Printer Tubing (Flexibility Test Data)

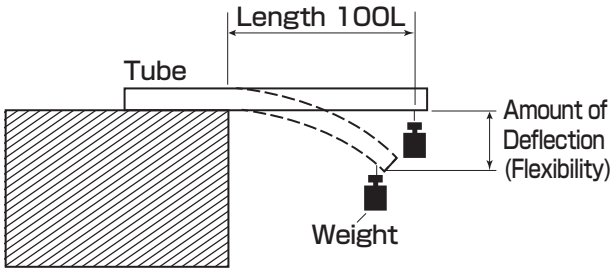
1 Test Methods

① Bending Stress Test



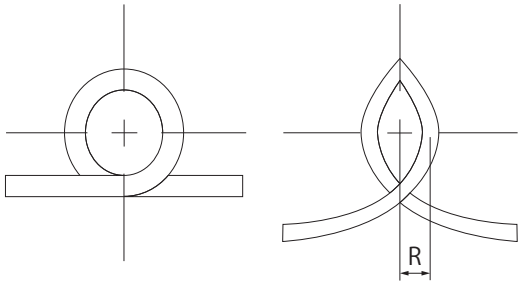
●The elastic force generated when the tube is bent into a U-shape as shown in the photograph is measured.
※ "d" = Distance : 60mm

② Amount of Deflection



A weight is attached to the tube, and the deflection generated by the weight is measured.
※Weight : 20g

③ Kink Resistance



The tube is made into a circle and both ends are pulled, and the radius (R) is measured when the hose is broken.

2 Results

Compared with tubes manufactured by other corporations, HAKKO tubes show higher bending stress and larger amount of deflection, enabling space-saving installation.

Olefin-Based (for Water-Based Inks) Tubing

Sample	Bending Stress (N/60mm)	Deflection (mm)	Bending Radius I.D. (mm)
E-WBT-4×6	1.4	15	12
E-KYT-4×6	0.75	45	12.5
Polyethylene Tube	2.16	13	14

Fluorine-Based (for Solvent-Based Inks) Tubing

Sample	Bending Stress (N/60mm)	Deflection (mm)	Bending Radius I.D. (mm)
E-SBT-4×6	1.5	14	11
E-SJ-4×6	1.25	17	11
E-PD-4×6	1.3	16	11
Fluorine Rubber Tubing	3	5	11

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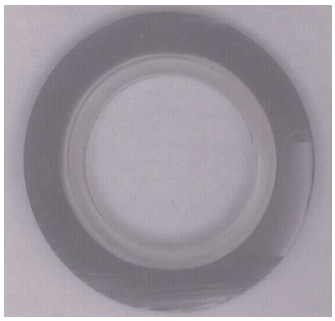
Introduction of Tube for UV-Curable Inks (Ultraviolet Penetration Data)

1 Feature…Superior in blocking the ultraviolet and visible light

Light Source such as UV light

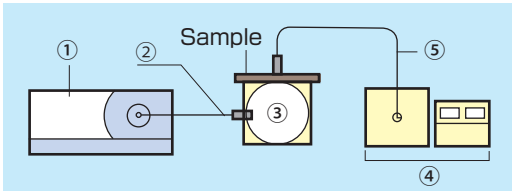


Block the light source
→Prevent the ink hardening and quality change

2 Ultraviolet Penetration Data

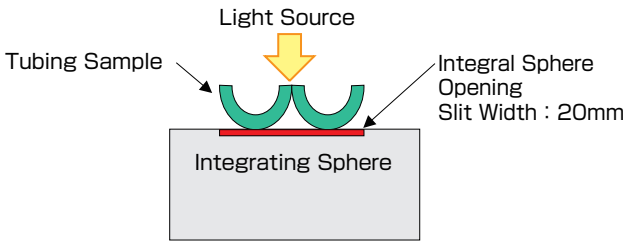
Test Device : Spectrophotometer UV3100PC (Shimazu, Ltd.)　Wavelength : 240nm~800nm

【Spectrophotometer Image】



Constitution
①MCPO Detector Body
②Receiving Fiber
③Integrating Sphere Unit
④Halogen Lamp
⑤Flooding Fiber

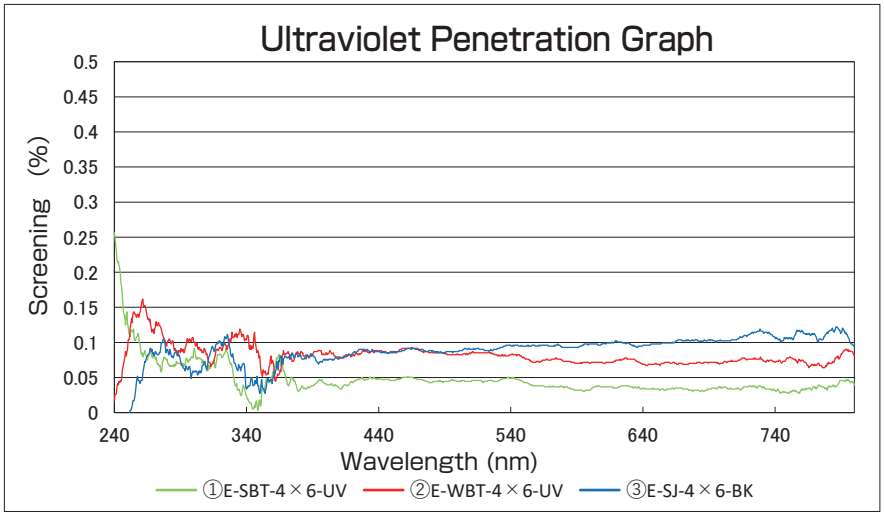
【Tube Sample Installation Image】



3 Sample

① Barrier Tubing Black for Solvent-Based Ink (E-SBT-4×6-UV)
② Barrier Tubing Black for Water-Based Ink (E-WBT-4×6-UV)
③ Flexible Fluorine (ETFE) Resin Tubing Black (E-SJ-4×6-BK)

4 Result



Ultraviolet Screening 99% or over

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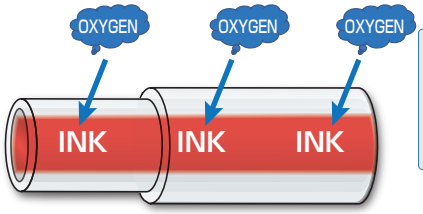
Barrier Tubing: Introduction of E-WBT and E-SBT (Gas Barrier Data)

1 Features…Superior in Gas Barrier

▶ Conventional (Existing) Tubing…

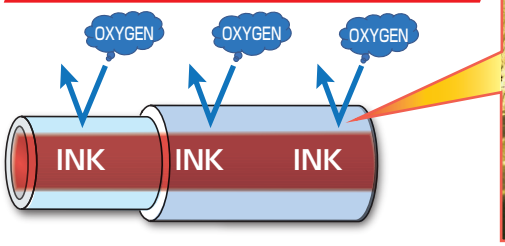


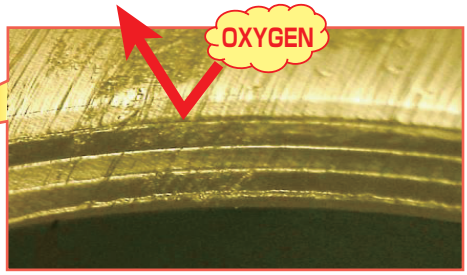
Gas (such as oxygen) will be penetrating into the tube, resulting in the bad effect to the ink.

Ink Quality becomes lower.
→Lower Quality of Printing Outputs

Coming off from the nozzle
→Ink Output is not stable.

▶ HAKKO Barrier Tubing…





Due to the barrier layer, outer gas such as oxygen will be shut down.
Outer gas cannot penetrate into the tube.

2 Gas Barrier Test

Seal the de-gas water into the tubing. Then, leave the tubing under the conditions of temperature (20℃ [68 F]) and humidity (50%) for 24 hours. Then, check the increasing amount of dissolved oxygen for each tubing.

3 Sample

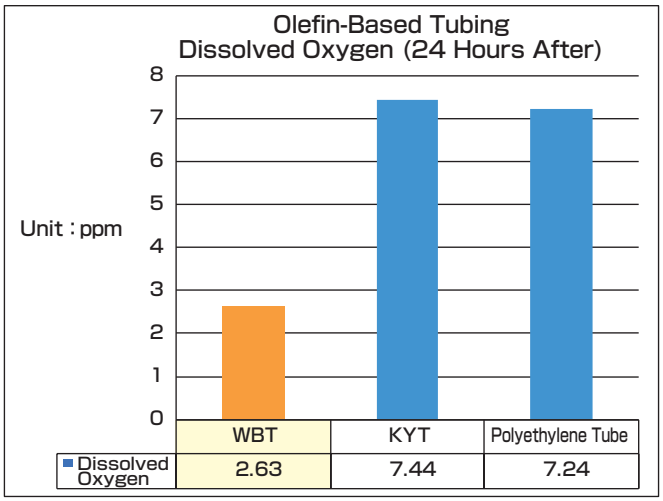
Olefin-Based (for Water-Based Ink) Tubing

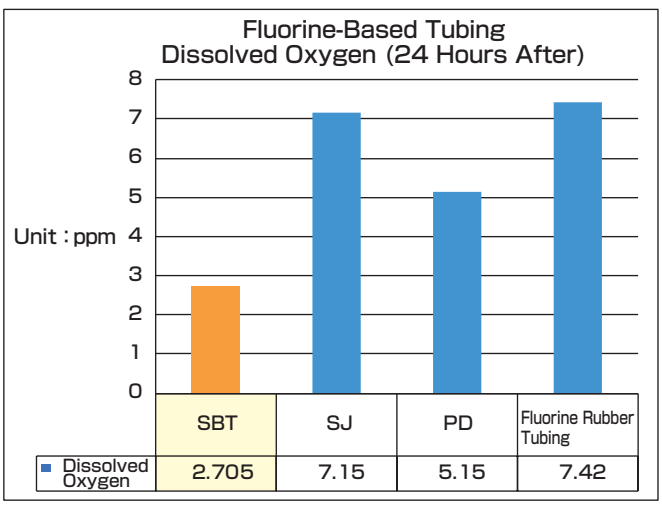
- E-WBT-4×6 Barrier Tubing for Water-Based Ink
- E-KYT-4×6
- Polyethylene Tube 4mm×6mm

Fluorine-Based (for Solvent-Based Ink) Tubing

- E-SBT-4×6 Barrier Tubing for Solvent-Based Ink
- E-SJ-4×6
- E-PD-4×6
- Fluorine Rubber Tubing

4 Results





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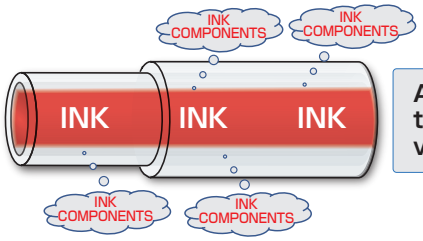
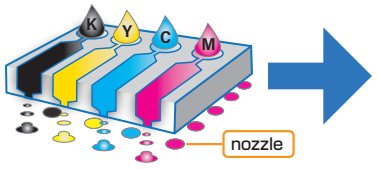
Introduction of E-SBT • E-WBT • E-SJ (Ink Barrier Test Data)

1 Features…Superior in Ink Barrier

▶ Conventional (Existing) Tubing…



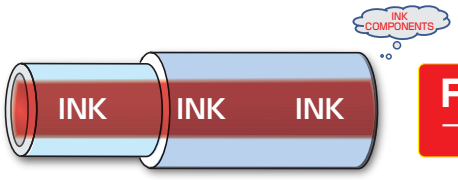
As time passes by, the ink components volatilize.



Ink Quality becomes lower.
→Lower Quality of Printing Outputs

When stopped for a long time, Coming off from the nozzle
→Ink Output is not stable.

▶ HAKKO Barrier Tubing…



Reducing the volatilizing of ink components →Keeping the ink quality fresh

2 Solvent Barrier Test

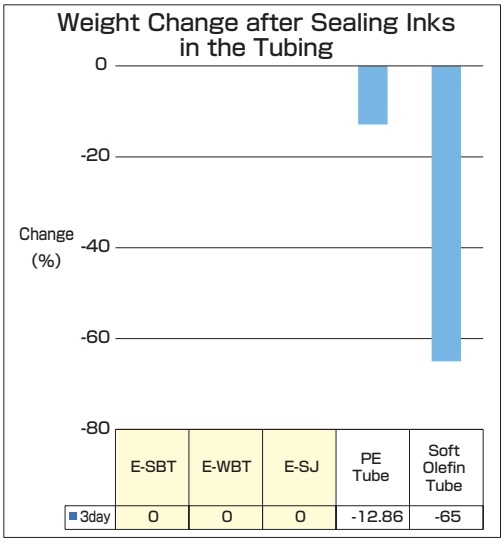
Seal the ink into the tubing. Then, leave the tubing under the condition of temperature (50℃) with sealing both ends. Then, measure the weight (weight changes) of the ink tubing in 3 days.
※Except the weights of tubing and sealing items, we only measured the weight changes of the solvents.

3 Sample

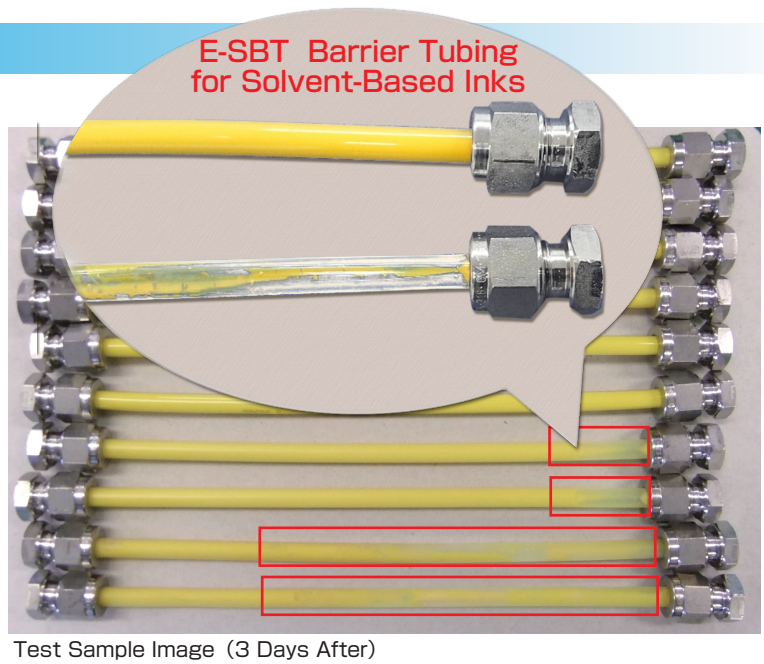
- Barrier Tubing for Solvent-Based Ink E-SBT
- Barrier Tubing for Wate-Based Ink E-WBT
- Flexible Fluorine (ETFE) Resin Tubing E-SJ
- Polyethylene Tube (Tube Commercially available)
- Soft Olefin Tube (Tube Commercially available)

※All tubing Sizes: I.D. 4.0mm×O.D. 6.0mm

4 Results



	E-SBT	E-WBT	E-SJ	PE Tube	Soft Olefin Tube
3day	0	0	0	-12.86	-65



Test Sample Image (3 Days After)
※Red part shows that the ink components volatilize.

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