

# NAFLON™ PFA-HG Tubing

The NAFLON PFA-HG Tubing is made from "Super PFA", a material with low levels of eluted fluorine ions. By allowing for control of the structure of PFA (miniaturization of spherulites), this tubing allows for further smoothing of the inner tubing surface. This tubing is perfect for use in the manufacture of semiconductors and liquid crystal products, where ultra-clean environments are required.

## Features

In addition to the features of our standard PFA Tubing:

- **Smoothness of the tubing inner surface is increased to  $R_t = 0.2\mu\text{m}$ .** ( $R_t$  is approximately equal to  $R_{\text{max}}$ , maximum height)
  - Reduced incidence of retained particles or chemicals
  - Reduced time required for cleaning
  - Reduced chemical absorption due to a lessening of tubing inner surface area
  - Improved transparency
  - Longer performance as an insulator
- **Uses a Super PFA material**
  - Reduction in eluted fluorine ions
  - Resistant to cracking under stress conditions such as exposure to SPM or fuming sulphuric acid

## Specifications

- Maximum usage temperature: Same as NAFLON PFA Tubing (Please refer to page 2).
- Maximum usage pressure: Same as Naflon PFA Tubing (Please refer to page 22).
- Minimum bending radius: Same as Naflon PFA Tubing (Please refer to page 9).

## Standard Dimensions

- Please refer to the NAFLON PFA-HG Tubing dimensions table on page 9.

## Other Features

- **Metallic ion elution** units: ( $\mu\text{g}$ )

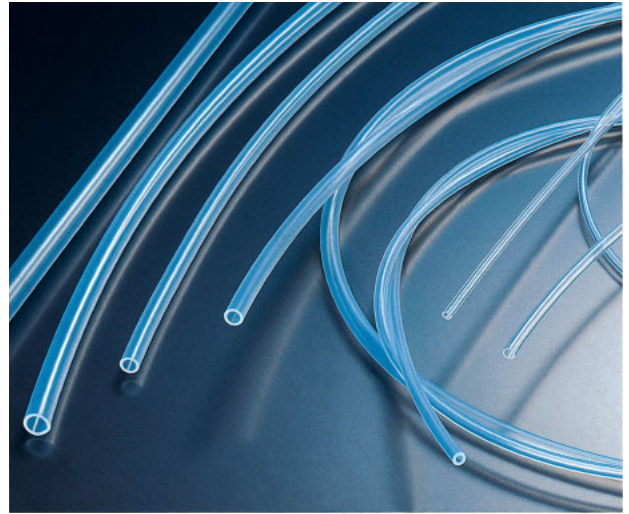
Element	Amount eluted
K	<0.02
Na	<0.01
Ca	<0.01
Al	<0.02
Cr	<0.01
Ni	<0.01
Fe	<0.02
Cu	<0.01

Measured by NICHIAS Corporation

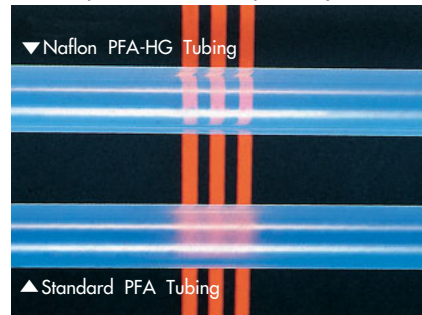
### Method of analysis:

- (1) A 1m section of the  $\phi 10 \times \phi 12$  Naflon PFA-HG Tubing to be tested was cut, the cut portion cleaned, and then the tubing was washed in water.
- (2) Approximately 70 ml (length: 900 mm) of hydrofluoric acid was added, and the test material was allowed to sit at room temperature for Six days.
- (3) At the conclusion of the test period, the elution liquid was allowed to evaporate. After nitric acid was added to the remaining liquid, the mixture was diluted with pure water, and frameless atomic absorption analysis was used to determine the amounts of each element contained in the elution liquid.

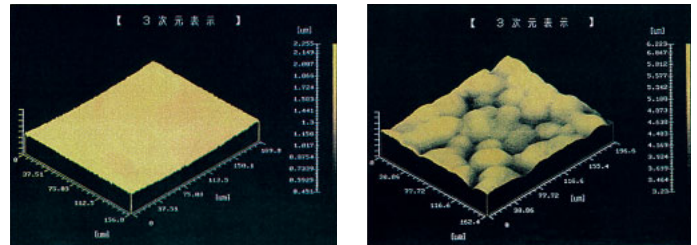
※ The values given above are intended as representative values, not standard values.



## Comparison of transparency



## Comparison of inner wall surface image



Naflon PFA-HG Tubing

Standard PFA Tubing

## Comparison of Inner Surface Roughness With PFA Tubing units: ( $\mu\text{m}$ )

	Units	Naflon PFA-HG Tubing	Competitor A	Competitor B	New PFA Tubing
Surface Roughness ( $R_t$ )	( $\mu\text{m}$ )	0.2	0.8	0.8	0.8

### Notes:

Measured by NICHIAS Corporation

- ※ The values given above are intended as representative values, not standard values.
- ※  $R_t \approx R_{\text{max}}$
- ※ Products from Competitor A and B are standard PFA Tubing.

## fluorine ions elution units: ppm

	NAFLON PFA-HG Tubing	Standard PFA Tubing
Elution concentration	0.3	0.4

Measured by NICHIAS Corporation

### Method of analysis:

- (1) A sample tubing (inner diameter of  $\phi 22.2 \times$  outer diameter of  $\phi 25.4$ ) was cut into pellets.
  - (2) The sample was immersed in an extraction liquid. After leaving it for 24 hours at room temperature, its fluorine ion concentration was measured using a F-ion measuring device [EXPANDABLE ION ANALYZER EA940, manufactured by Orion Research]. (Ion extraction liquid: Water + methanol + TISAB(II) [1 : 1 : 2], 20 ml).
- ※ The values given above are intended as representative values, not standard values.

## TOMBO® No.9003-PFA-HG/SG NAFLON™ PFA-HG/PFA-SG Tubing

### ● PFA-HG Tubing [ Metric size ]

Nominal Dimensions (mm)		Outer Diameter (mm)		Wall Thickness (mm)		Length (m)	
Inner Diameter × Outer Diameter	Standard Dimensions	Allowed Variance	Standard Dimensions	Allowed Variance	Standard Dimensions	Allowed Variance	
2× 3	3.0	±0.10	0.5	±0.05	10, 20, 50, 100, 200		+1% -0
2× 4	4.0		1.0	±0.06			
2.5× 4	4.0		0.75	±0.05			
3× 4	4.0		0.5	±0.05			
4× 6	6.0		1.0	±0.06			
5× 6	6.0		0.5	±0.05			
6× 8	8.0	±0.12	1.0	±0.06	10, 20, 50, 100		
8×10	10.0		1.0	±0.06			
10×12	12.0		1.0	±0.06			
12×14	14.0		1.0	±0.06			
16×19	19.0		1.5	±0.10			
22×25	25.0		±0.15	1.5			

※ Please enquire for information relating to delivery dates and availability.

### [ Inch Size ]

Nominal Dimensions (mm)		Outer Diameter (mm)		Wall Thickness (mm)		Length (m)		
Inner Diameter × Outer Diameter	Standard Dimensions	Allowed Variance	Standard Dimensions	Allowed Variance	Standard Dimensions	Allowed Variance		
1.59× 3.17	3.17	±0.10	0.79	±0.05	10, 20, 50, 100, 200		+1% -0	
2.17× 3.17	3.17		0.50	±0.05				
3.96× 6.35	6.35		1.20	±0.10				
4.35× 6.35	6.35		1.00	±0.06				
6.35× 9.52	9.52		1.59	±0.10				
7.52× 9.52	9.52		1.00	±0.06				
9.52×12.70	12.70	±0.12	1.59	±0.10	10, 20, 50, 100			
15.88×19.05	19.05		1.59	±0.10				
22.22×25.40	25.40		±0.15	1.59				±0.10
28.00×31.80	31.80		±0.25	1.90				±0.20
33.70×38.10	38.10			2.20				±0.20

※ Please enquire for information relating to delivery dates and availability.

### ● PFA-SG Tubing [ Metric size ]

Nominal Dimensions (mm)		Outer Diameter (mm)		Wall Thickness (mm)		Length (m)	
Inner Diameter × Outer Diameter	Standard Dimensions	Allowed Variance	Standard Dimensions	Allowed Variance	Standard Dimensions	Allowed Variance	
2× 4	4.0	±0.10	1.0		10, 50, 100	+1% -0	
4× 6	6.0		1.0				
6× 8	8.0	±0.12	1.0	±0.06			
8×10	10.0		1.0				
10×12	12.0		1.0				
16×19	19.0	±0.15	1.5	±0.10			
22×25	25.0		1.5				

※ Please enquire for information relating to delivery dates and availability.

### [ Inch Size ]

Nominal Dimensions (mm)		Outer Diameter (mm)		Wall Thickness (mm)		Length (m)	
Inner Diameter × Outer Diameter	Standard Dimensions	Allowed Variance	Standard Dimensions	Allowed Variance	Standard Dimensions	Allowed Variance	
2.17× 3.17	3.17	±0.10	0.50	±0.05	10, 50, 100	+1% -0	
4.35× 6.35	6.35		1.00	±0.06			
6.35× 9.52	9.52		1.59	±0.10			
7.52× 9.52	9.52	±0.12	1.00	±0.06			
9.52×12.70	12.70		1.59	±0.10			
15.88×19.05	19.05		1.59				
22.22×25.40	25.40	±0.15	1.59				

※ Please enquire for information relating to delivery dates and availability.