

# Biomass Tubing

New

RoHS

**Tubing according to carbon neutrality**

**CO<sub>2</sub> reduction amount: Max. 18.7 kg**

\* Comparison with the TS Series (Tubing O.D. 12 mm; Tubing I.D. 9 mm), Soft Nylon Tubing, 100 meters roll

**Reduction in CO<sub>2</sub> and greenhouse gases by reducing the use of petroleum driven raw materials, resulting in a greater contribution towards decarbonization.**

## Variations

◎ : Superior ○ : Excellent △ : Good

Material	Polyurethane	Soft nylon	Nylon
Model	TU-X309	TS-X309	T-X309
CO <sub>2</sub> reduction amount*1	○	○	◎
Flexibility	◎	○	△
Withstand pressure	△	○	◎
Operating temperature range	-20 to 60°C		
Size	ø4 to ø12		
Color	3 colors	1 color	2 colors

\*1 Judgment of the CO<sub>2</sub> reduction was determined by the product's CO<sub>2</sub> reduction amount. The CO<sub>2</sub> reduction amount is compared with our standard product.

### What is a biomass tube?

Tubing produced from plant derived raw biomaterials such as castor seeds, etc.



**TU/TS/T-X309**

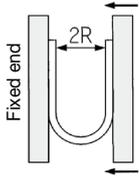


CAT.ES50-47A

# Biomass Polyurethane Tubing

RoHS

# TU-X309



At a temperature of 20°C, the tubing is bent into a U shape with one end fixed in position and the other end is gradually moved closer to the other end. The 2R measurement is made at the point where the tubing is abnormally bent or flattened.

## Model

● : 20 m roll

		Tubing size				
		Metric size				
Tubing O.D. [mm]		4	6	8	10	12
Tubing I.D. [mm]		2.5	4	5	6.5	8
Color	Symbol					
Black	B (Opaque)	●	●	●	●	●
White	W (Opaque)	●	●	●	●	●
Blue	BU (Translucent)	●	●	●	●	●

## ⚠ Precautions

Be sure to read this before handling. For the safety instructions and the fitting/tubing precautions, refer to the “Handling Precautions for SMC Products” and the “Operation Manual” found on the SMC website.

## Specifications

Fluid		Air, Water				
Max. operating pressure [MPa]	20°C	0.8				
	40°C	0.65				
	60°C	0.5				
Applicable fittings		One-touch fittings, Insert fittings, Miniature fittings				
Min. bending radius*1 [mm]		10	15	20	27	35
Operating temperature		-20 to +60°C, Water: 0 to 40°C (No freezing)				
Material		Bio-base polyurethane				

\*1 The values of the minimum bending radius are only representative values when measured as shown to the left. Assure that the tubing is used above the minimum bending radius.

## ⚠ Caution

- Applicable for general industrial water. Please consult with SMC if using for the other kind of fluid. Also, the surge pressure must not exceed the maximum operating pressure. If the surge pressure exceeds the maximum operating pressure, it will result in damage to fittings and tubes.
- Abnormal temperature rises caused by adiabatic compression may result in the tube bursting.

## How to Order

**TU 0604 B - 20 - X309**

● Polyurethane

● Biomass

● Size

● Length per roll

Symbol	O.D. x I.D.
0425	ø4 x ø2.5
0604	ø6 x ø4
0805	ø8 x ø5
1065	ø10 x ø6.5
1208	ø12 x ø8

Symbol	Length
20	20 m roll

● Color

Symbol	Color
B	Black (Opaque)
W	White (Opaque)
BU	Blue (Translucent)

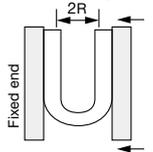
# Biomass Soft Nylon Tubing



# TS-X309



How to measure the minimum bending radius



At a temperature of 20°C, bend the tubing into a U shape. Fix one end and gradually move the other end closer. Measure 2R at the point where the outside diameter's rate of change is 10%.

## Model

● : 20 m roll

		Tubing size				
		Metric size				
<b>Tubing O.D. [mm]</b>		4	6	8	10	12
<b>Tubing I.D. [mm]</b>		2.5	4	6	7.5	9
<b>Color</b>	<b>Symbol</b>					
<b>White</b>	<b>W (Material color)</b>	●	●	●	●	●

## ⚠ Precautions

**Be sure to read this before handling. For the safety instructions and the fitting/tubing precautions, refer to the "Handling Precautions for SMC Products" and the "Operation Manual" found on the SMC website.**

## ⚠ Caution

- Abnormal temperature rises caused by adiabatic compression may result in the tube bursting.
- Please exercise caution when using this item in a clean room. There is a possibility of plasticizer and other materials precipitating on the tube surface and detracting from the cleanliness level of the room.

## Specifications

Fluid		Air				
<b>Max. operating pressure [MPa]</b>	20°C	2.0	1.7	1.3		
	40°C	1.4	1.2	0.9		
	60°C	1.0	0.85	0.65		
<b>Applicable fittings</b>		One-touch fittings, Insert fittings, Self-align fittings, Miniature fittings				
<b>Min. bending radius*1 [mm]</b>	<b>Recommended radius</b>	15	23	45	55	65
	<b>Tube close bend radius (Reference)</b>	12	17	34	42	50
<b>Operating temperature</b>		-20 to 60°C				
<b>Material</b>		Nylon 11				

\*1 The values of the minimum bending radius are only representative values when measured as shown to the left. Assure that the tubing is used above the minimum bending radius.  
 · The tubing will be abnormally bent when used under the minimum bending radius. Please refer to the tube close bend radius and assure that the tubing does not have an abnormal bend or becomes flattened when in use.  
 · Please use caution in that the values of the tube close bend radius are not guaranteed. The values shown here are only representative values when 2R was measured and tubing was abnormally bent or flattened at the value when measured as shown to the left.

## How to Order

### TS 0604 W - 20 - X309

Soft nylon ●

● Biomass

Size ●

Symbol	O.D. x I.D.
<b>0425</b>	ø4 x ø2.5
<b>0604</b>	ø6 x ø4
<b>0806</b>	ø8 x ø6
<b>1075</b>	ø10 x ø7.5
<b>1209</b>	ø12 x ø9

● Length per roll

Symbol	Length
<b>20</b>	20 m roll

Color ●

Symbol	Color
<b>W</b>	White (Material color)

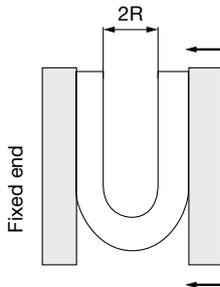
# Biomass Nylon Tubing

# T-X309

RoHS



How to measure the minimum bending radius



At a temperature of 20°C, bend the tubing into a U shape. Fix one end and gradually move the other end closer. Measure 2R at the point where the outside diameter's rate of change is 10%.

## ⚠ Precautions

**Be sure to read this before handling. For the safety instructions and the fitting/tubing precautions, refer to the "Handling Precautions for SMC Products" and the "Operation Manual" found on the SMC website.**

## ⚠ Caution

1. Abnormal temperature rises caused by adiabatic compression may result in the tube bursting.
2. Please exercise caution when using this item in a clean room. There is a possibility of plasticizer and other materials precipitating on the tube surface and detracting from the cleanliness level of the room.

## Model

● : 20 m roll

		Tubing size				
		Metric size				
Tubing O.D. [mm]		4	6	8	10	12
Tubing I.D. [mm]		2.5	4	6	7.5	9
Color	Symbol					
Black	B (Opaque)	●	●	●	●	●
White	W (Material color)	●	●	●	●	●

## Specifications

Fluid		Air				
Max. operating pressure [MPa]	20°C	3.3	3.0	2.0		
	40°C	2.3	2.1	1.4		
	60°C	1.65	1.5	1.0		
Applicable fittings		One-touch fittings, Insert fittings, Self-align fittings, Miniature fittings				
Min. bending radius*1 [mm]	Recommended radius	13	24	40	50	60
	Tube close bend radius (Reference)	10	18	30	40	45
Operating temperature		-20 to 60°C				
Material		Nylon 11				

- \*1 The values of the minimum bending radius are only representative values when measured as shown to the left. Assure that the tubing is used above the minimum bending radius.
- The tubing will be abnormally bent when used under the minimum bending radius. Please refer to the tube close bend radius and assure that the tubing does not have an abnormal bend or becomes flattened when in use.
  - Please use caution in that the values of the tube close bend radius are not guaranteed. The values shown here are only representative values when 2R was measured and tubing was abnormally bent or flattened at the value when measured as shown to the left.

## How to Order

**T 0604 B - 20 - X309**

Nylon ●

● Biomass

Size ●

Symbol	O.D. x I.D.
0425	ø4 x ø2.5
0604	ø6 x ø4
0806	ø8 x ø6
1075	ø10 x ø7.5
1209	ø12 x ø9

● Length per roll

Symbol	Length
20	20 m roll

Color ●

Symbol	Color
B	Black (Opaque)
W	White (Material color)

# Sustainability

We contribute to the sustainable growth and expansion of technological innovations through the manufacturing and sales of automatic control equipment.

## SMC's Sustainability

Top Message >

Group Code of Conduct >

Materiality and SDGs initiatives >

Sustainability Promotion Framework >

Sustainability / Integrated Report >



## Sustainable Management of CO<sub>2</sub>



### SMC's CO<sub>2</sub> Emission-Reducing Initiatives

#### Production process and product performance improvements with a focus on the environment

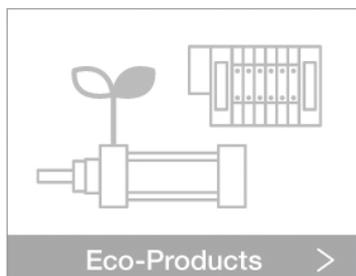
Over the past several years, SMC has continued to take on its social responsibility to seriously promote and support sustainability in order to minimize negative impacts to the environment.

SMC is always looking to develop newer and greener solutions with CO<sub>2</sub> reduction as a top priority as a leader in the field of pneumatics. One of the key components of our comprehensive approach is the designing of compact and lightweight products. Smaller, lighter products require less raw materials to make and less time to process. In addition, the products themselves use less energy.

All of these efforts contribute to reduced CO<sub>2</sub> emissions.

SMC's fully integrated technical, production, and sales departments are able to respond to the needs of our customers from around the world with a shared goal of finding new methods to effectively protect the environment.

**SMC's CO<sub>2</sub> emission-reducing initiatives also include the promotion of eco-friendly factories and products. In addition, SMC promotes the reduction of CO<sub>2</sub> emissions in our operations.**



## Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “**Caution**,” “**Warning**” or “**Danger**.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)\*1), and other safety regulations.

 **Danger :** **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

 **Warning:** **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

 **Caution:** **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

\*1) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components  
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components  
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements  
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots etc.

### Warning

#### 1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

#### 2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

#### 3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

#### 4. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not covered.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

### Caution

**We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing industries.**

**Use in non-manufacturing industries is not covered.**

Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.

The new Measurement Act prohibits use of any unit other than SI units in Japan.

### Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

#### Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.\*2)  
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided. This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

\*2) **Vacuum pads are excluded from this 1 year warranty.**

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.

Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

#### Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

## Safety Instructions

Be sure to read the “Handling Precautions for SMC Products” (M-E03-3) and “Operation Manual” before use.

**SMC Corporation**