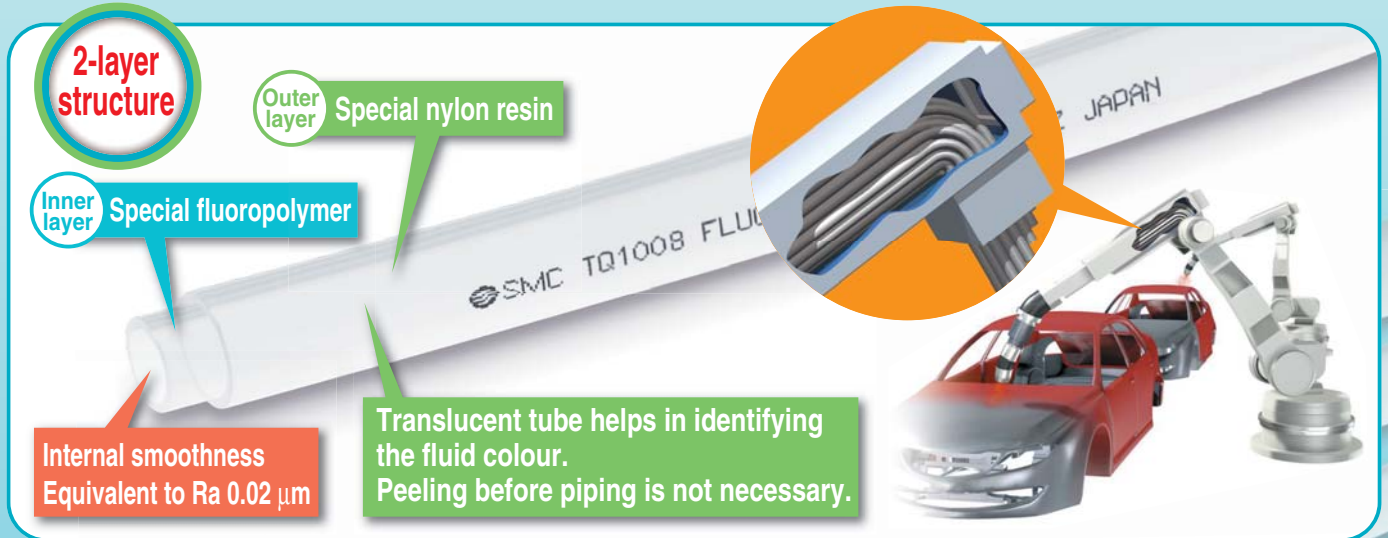


2-Layer Soft Fluoropolymer Tubing New

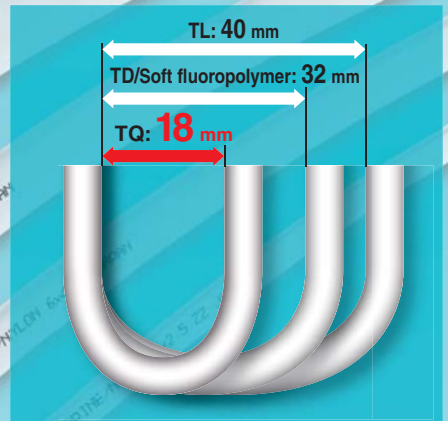
RoHS

Abrasion resistant tube for fluids such as solvents



Flexibility Improved by up to **55%*1**
 Minimum bending radius (Refraction value)
 TQ: **9 mm** ← TL: **20 mm**
 (Fluoropolymer Tubing, Super PFA)

*1. Compared with SMC Fluoropolymer Tubing/TL (ø6 x ø4)



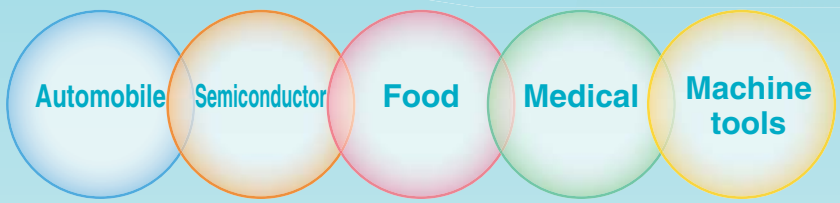
Wearing of outer layer tube Reduced to **1/30**
 TQ: **1 mg*2** ← TL: **30 mg*2**
 (Fluoropolymer Tubing)

*2. Based on friction test of tubes

Light weight Weight reduced by approximately **44%*3**

*3. 2-Layer Soft Fluoropolymer Tubing (TQ): 26.5 g/m
 Fluoropolymer Tubing (TL): 47 g/m (ø8 x ø6)

Applications



Series Variations

Designation	TQ0425	TQ0604	TQ0806	TQ1008	TQ1209
O.D. [mm]	4	6	8	10	12
I.D. [mm]	2.5	4	6	8	9
20 m roll	●	●	●	●	●
100 m roll	●	●	●	●	●

Series TQ

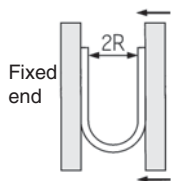


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2-Layer Soft Fluoropolymer Tubing Series TQ



How to measure the minimum bending radius



Bend the tube into a U shape at a temperature of 20°C. Fix one end and bend the loop gradually at 100 mm/min. Measure 2R when the tube breaks or is crushed.

How to Order

TQ0425 - 20

Tubing designation

Length per roll

Symbol	Length
20	20 m
100	100 m

Specifications

Designation	TQ0425	TQ0604	TQ0806	TQ1008	TQ1209
O.D. [mm]	4	6	8	10	12
I.D. [mm]	2.5	4	6	8	9
Roll	20 m	●	●	●	●
	100 m	●	●	●	●
Colour ^{Note 1)}	Translucent (Material colour)				
Fluid ^{Note 2)}	Air, Water, Inert gas, Solvent				
Applicable fittings ^{Note 3)}	Insert fittings KF, KFG2, VCK series Miniature fittings M, MS series (Hose nipple type) Fluoropolymer fittings LQ1, LQ3 series ^{Note 6)}				
Max. operating pressure [MPa] ^{Note 4)}	2.0	1.9	1.5	1.1	1.2
Min. bending radius (refraction value) ^{Note 5)} [mm]	4	9	26	42	37
Fluid temperature (fixed usage)	Air, Inert gas: -20 to 100°C, Water, Solvent: 0 to 70°C (No freezing)				
Material	Inner layer: Special fluoropolymer, Outer layer: Special nylon resin				

Note 1) There may be plasticizer (white powder) deposits on the external surface of the tube. Please be careful when the tube is used in clean rooms. Otherwise, the clean level may decrease.

Note 2) When solvent is used, make sure to test in the same environment as the actual operating environment, and confirm that no problem will occur in the operating conditions. The standard value of the Applicable Fluid List below is the reference value based on the test result performed under specific conditions.

The product can be physically affected by temperature, pressure, chemical density, etc, causing permeation or swelling, and this may cause some problems.

Note 3) Perform periodic maintenance inspections. If leakage continues to occur after tightening, replace the tube with a new one. (Refer to Maintenance in the Specific Product Precautions on page 2.)

When the tube rotates, perform a test to make sure no problem occur in the actual operating conditions.

When the product is used with motion for a long time, or at a high temperature, the tubes may have leakage due to deterioration of the materials.

Note 4) Observe the lesser value of the maximum operating pressure between the tubing and fitting. 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 tubes and fittings. Furthermore, abnormal temperature rise caused by adiabatic compression may result in the tube bursting.

Note 5) Minimum bend radius (refraction value) is not guaranteed. The value of 2R in the left figure is measured with a bent or flattened tube.

Note 6) For the installation of fluoropolymer fitting LQ1 and LQ3, please contact SMC.

Applicable Fluid List

Fluid in the list below are chemically inert ^{Note 1)}, to tubing material. Possible physical effects may occur such as penetration and swelling due to temperature, pressure and chemical density. To use tubing in a solvent environment, tests should be performed with the same environment to ensure no problem occurs with operating environment.

Chemical	Inner layer	Outer layer	Chemical	Inner layer	Outer layer
	Special fluoropolymer	Special nylon resin		Special fluoropolymer	Special nylon resin
Hydrochloric acid	○	△	Citric acid	○	△
Sulfuric acid	○	△	Stearic acid	○	△
Nitric acid	○	×	Formic acid	○	△
Caustic soda	○	△	Ethyl acetate	○	○
Caustic potash	○	△	Butyl acetate	○	△
Ammonium hydroxide	○	○	Methyl alcohol	○	○
Hydrogen peroxide	○	△	Ethyl alcohol	○	○
Water	○	○	Butyl alcohol	○	○
Phenol	○	×	Isopropyl alcohol	○	○
Benzene	○	△	Cellosolve	△	△
Toluene	○	△	Hexane	○	△
Xylene	○	△	Cyclohexane	○	△
Carbon tetrachloride	○	×	Mineral oil ASTM No.3	○	○
Acetone	○	△	Naphtha	○	○
Methyl ethyl ketone	○	△			

Note 1) "Chemically inert" means - not to cause any chemical reaction.

Note 2) Criteria: ○ Applicable, △ Not recommended, × Inapplicable

Note 3) Applicable Fluid List shows the reference value based on test results performed under specific conditions. Application for products is not guaranteed.

Note 4) Applicable Fluid List is for tube materials. For use in environments containing solvents, please contact SMC.

Max. Operating Pressure

Unit: MPa

Temperature (°C)	TQ0425	TQ0604	TQ0806	TQ1008	TQ1209
-20 to 20	2.0	1.9	1.5	1.1	1.2
30	1.7	1.6	1.2	0.9	1.0
40	1.4	1.4	1.0	0.8	0.9
50	1.2	1.1	0.8	0.6	0.8
60	1.1	1.0	0.7	0.5	0.7
70	1.0	0.9	0.6	0.4	0.6
80	0.9	0.8	0.5	0.4	0.5
90	0.8	0.7	0.4	0.3	0.4
100	0.7	0.6	0.4	0.3	0.3



Series TQ

Specific Product Precautions

Be sure to read before handling. Be sure to read before handling. Refer to back cover for Safety Instructions and "Handling Precautions for SMC Products" (M-E03-3) for Fittings and Tubing Precautions

Selection

⚠ Warning

1. Check the specifications.

Give careful consideration to operating conditions such as the application, fluid and environment, and use within the operating ranges specified in this catalogue. Tube may burst or lead to operation failure if operating conditions are out of the specification range. The specifications of the catalogue are designed assuming the product is used with the fixed conditions.

2. When using the product for medical care

This product is designed for use with compressed fluid system applications for medical care purposes. Do not use in contact with human bodily fluids, body tissues or transfer applications to a human living body.

3. Maintenance

Perform periodic maintenance inspections, securing enough space for maintenance.

4. Countermeasures for static electricity

Since static electricity may be generated depending on the fluid being used, implement suitable countermeasures.

⚠ Caution

1. When toxic solvent is used, make sure to test in the same environment as the actual operating environment, and confirm that no problem will occur in the operating conditions.

2. When the joint of the tube or fitting rotates, make sure to test it in the same environment as the actual operating environment, and confirm that no problems will occur in the operating conditions.

3. The surge pressure must not exceed the maximum operating pressure.

4. There may be plasticizer (white powder) deposits on the external surface of the tube. Please be careful when the tube is used in clean rooms. Otherwise, the clean level may decrease.

5. If fittings of brands other than SMC are used, be sure to confirm that no problem will occur with the operating conditions.

6. Trademark, product number, the material of inner/outer layer, O.D. x I.D. size, production lot number, and country of origin are printed in 500 mm intervals on the outer surface of the tube. Printed letters may be erased depending on fluid.

Mounting

⚠ Caution

1. Check the model number, size, etc. before installing. Check tubing for damage, gouges, cracks, etc.

2. Before piping, perform air blow (flushing) or cleaning to remove any dust, etc. from the piping.

3. There may be plasticizer (white powder) deposits on the surface of the tube, but there is no impact on performance.

4. Cut the tube perpendicularly using a tube cutter.

If the tube is cut incorrectly, fluid can leak or the tube can fall out as a result.

5. When connecting tubing, allow a sufficient margin considering the change of tube diameter and length due to pressure.

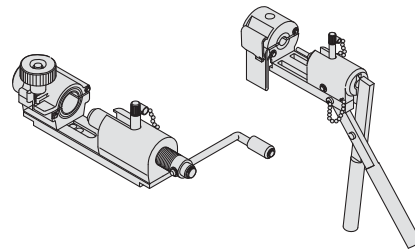
6. Do not apply unnecessary forces such as twisting, pulling, moment loads on fittings or tubing. It may cause leakage, the fitting to fracture or the tube to be crushed, burst or fall off.

Mounting

⚠ Caution

7. Mount so that tubing is not damaged due to tangling and abrasion. This can cause flattening, bursting or disconnection of tubing, etc. If the LQ1 or LQ3 fitting is used, connect the tube with the specialised tool.

Refer to the pamphlet "High-Purity Fluoropolymer Fittings HYPER FITTING/Series LQ1, 2 Work Procedure Instructions" (M-E05-1) or "High Purity Fluoropolymer Fittings Hyper Fitting / Flare Type Series LQ3 Fitting Procedure" (M-E06-4) for connecting tubing and special tools.



Operating Environment

⚠ Warning

1. Do not use in locations having an explosive atmosphere.

2. When vibration or impact is applied, make sure to test in the same environment as the actual operating environment, and confirm that no problem will occur in the operating conditions.

3. In locations near heat sources, block off radiated heat.

Maintenance

⚠ Caution

1. Check the following after the initial installation and for each periodic inspection. If any problem is confirmed, replace the tube with a new product or reconsider the customer's operating conditions.

- a) Cracks, gouges, wearing, corrosion
- b) Leakage, penetration, dissolution
- c) Twists or crushing of tubing
- d) Hardening, deterioration, softening of tubing

* There may be plasticizer (white powder) deposits on the surface of the tube, but there is no impact on performance.

2. The two layers of the tube are completely bonded. If separation is confirmed between them, replace the tube with a new one or reconsider the customer's operating conditions.




3. If the tube and the fitting are removed or replaced, eliminate the residual fluid with air or water.

4. When using insert, miniature or fluoropolymer fittings over a long period, some leakage may occur due to age deterioration of the materials. If any leakage is detected, correct the problem by additional tightening. If tightening becomes ineffective, replace the fittings with a new product immediately.

5. Do not repair or patch the replaced tubing or fittings for reuse.

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.

-  **Caution:** **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
-  **Warning:** **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
-  **Danger:** **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

- *1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines.
(Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots - Safety.
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 catalogue 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. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.**
 1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
 2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalogue.
 3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
 4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

Caution

- 1. The product is provided for use in manufacturing industries.**
The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

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 catalogue 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 “Handling Precautions for SMC Products” (M-E03-3) before using.

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