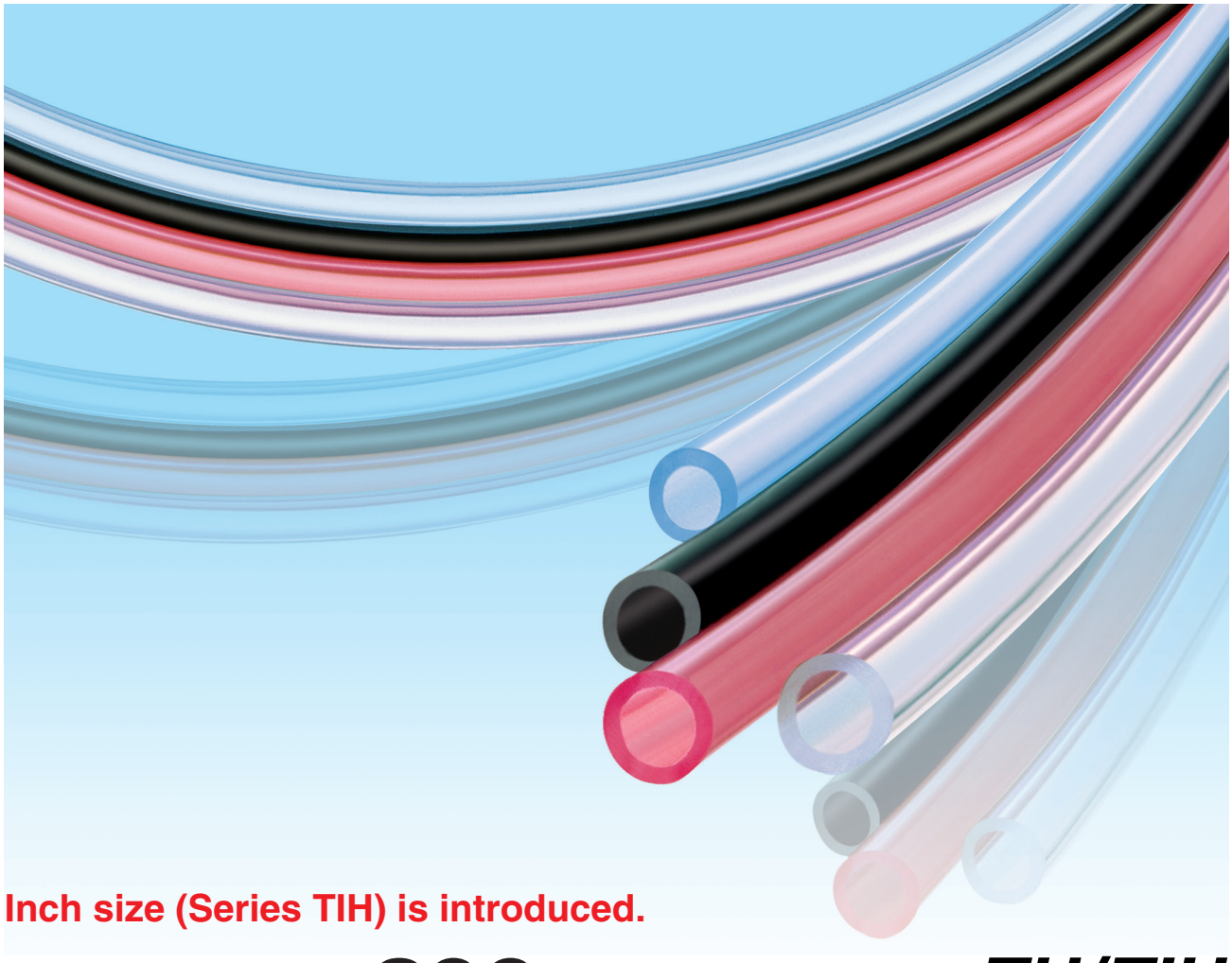
CAT.ES50-22B

SMC

FEP Tubing (Fluoropolymer)

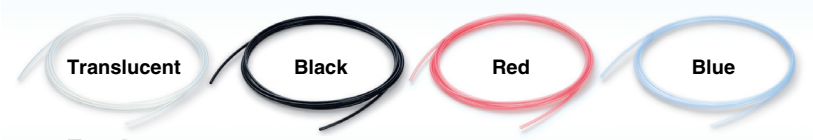


Inch size (Series TIH) is introduced.

Series TH/TIH

- **Heat resistance: 200°C**
  It changes according to the operating pressure.
  Refer to the graph of the max. operating pressures on page 1, 2.

- **4 Color variations**

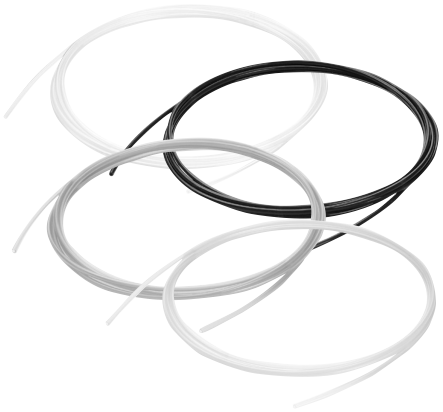


- **19 Size variations**
  Metric size: ø4 to ø12
  Inch size: 1/8" to 3/4" (ø3.18 to ø19.05)

- **Applications**
  General pneumatic piping
  (Food
  Semiconductor
  Medical care
  Automobile)

- **Certified to current Food Sanitation Legislation**
  (Ministry of Japanese Health and Safety, directive #370,1959)

FEP Tubing (Fluoropolymer)
Metric Size
Series TH



Series

●-20m roll □-100m roll

	Metric size							
Model	TH0402	TH0425	TH0604	TH0806	TH1075	TH1008	TH1209	TH1210
Tubing O.D. (mm)	4	4	6	8	10	10	12	12
Tubing I.D. (mm)	2	2.5	4	6	7.5	8	9	10

Color	Symbol
Translucent	N
Red (Translucent)	R
Blue (Translucent)	BU
Black (Opaque)	B

Inch nominal size: 5/32" | Inch nominal size: 5/16"

Specifications

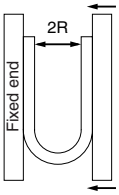
Fluid Note 4)	Air, Water Note 1), Inert gas							
Applicable fittings Note 2)	One-touch fittings: Series KQ, KJ Insert fittings: Series KF Fluoropolymer fittings: Series LQ Miniature fittings: Series M, MS (Hose nipple type)							
Max. operating pressure (MPa)	20°C	2.3	1.7	1.5	1	0.7	1	0.7
	100°C	0.85	0.6	0.55	0.4	0.25	0.4	0.25
	200°C	0.4	0.3	0.3	0.2	0.1	0.2	0.1
	Refer to below "Max. Operating Pressure."							
Min. bending radius (mm) Note 3)	15	20	35	60	95	100		130
Operating temperature	Air, Inert gas: -20 to 200°C Water: 0 to 100°C (No freezing)							
Material	FEP (Fluorinated Ethylene Propylene Resin)							

Note 1) When using a fluid in liquid form, the surge pressure must not exceed the maximum operating pressure. A surge pressure higher than the maximum operating pressure can cause breakage of the fittings, or rupture of the tubing. Furthermore, an abnormal temperature increase due to adiabatic compression can also result in ruptured tubing.

Note 2) Do not use in locations where the FEP tubing will move.
Be sure to operate under the maximum operating pressure conditions using the lower maximum operating specification of either the tubing or fittings.
After long term use or under high temperatures, some fittings leakage may occur due to material deterioration with age. Perform periodic inspections, and if any leakage is detected, replace with a new product immediately.
(Refer to maintenance part of "Tubing Precautions" on the Back page 2.)
Refer to Best Pneumatics catlog Vol. 15 for all other precautions.
For High Purity Fluoropolymer, refer to the precautions of CAT.ES70-17, "High Purity Fluoropolymer Fittings & Tubing."

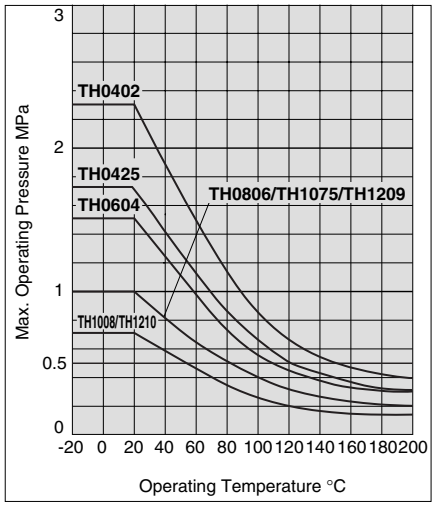
Note 3) Minimum bending radius is measured as shown left as representative values.
Allow extra length when piping since the tubing may crush if bent more than the min. bending radius.

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 5%.

Max. Operating Pressure



Note) The maximum operating pressure varies dependant on the I.D. bore size even if the O.D. is the same.

How to Order

Metric size

TH0604 N — 20

Indication of tubing model

Color indication

Symbol	Color
N	Translucent
R	Red (Translucent)
BU	Blue (Translucent)
B	Black (Opaque)

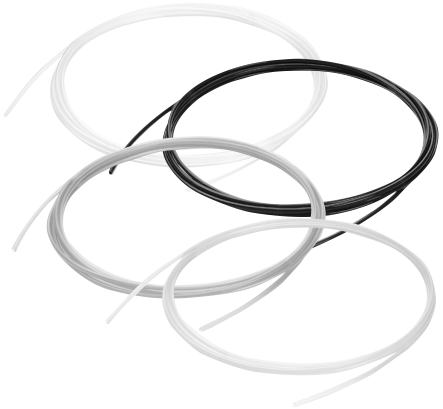
Length per roll

Symbol	Roll size
20	20m roll
100 Note)	100m roll

Note) 100m roll is available with translucent (color indication: N) only.

SMC

FEP Tubing (Fluoropolymer)
Inch Size
Series TIH

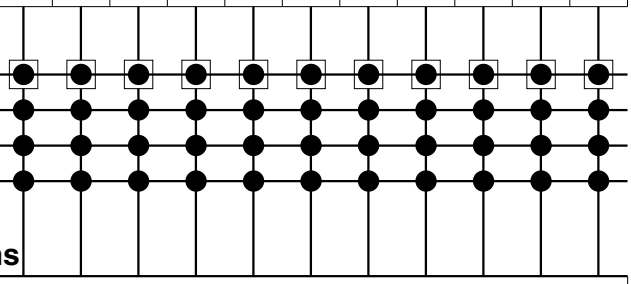


Series

●-50ft (16m) roll □-100ft (33m) roll

Model		Inch size									
		TIHA01	TIHB01	TIHC01	TIHA05	TIHB05	TIHA07	TIHB07	TIHA11	TIHB11	TIH13	TIH19
Tubing O.D.	inch	1/8"			3/16"		1/4"		3/8"		1/2"	3/4"
	mm	3.18			4.75		6.35		9.53		12.7	19.05
Tubing I.D.	inch	0.093"	0.086"	0.065"	0.137"	0.124" (1/8")	0.18"	0.156" (5/32")	0.275"	0.25" (1/4")	0.374" (3/8")	0.624" (5/8")
	mm	2.36	2.18	1.65	3.48	3.15	4.57	3.95	6.99	6.33	9.5	15.85

Color	Symbol
Translucent	N
Red (Translucent)	R
Blue (Translucent)	BU
Black (Opaque)	B



Specifications

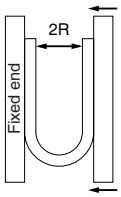
Fluid Note 4)		Air, Water Note 1), Inert gas									
Applicable fittings Note 2)		One-touch fittings: Series KQ, KJ Fluoropolymer fittings: Series LQ									
Max. operating pressure (MPa)	20°C	1		2.3	1	1.5	1	1.7	1	1.5	1	0.7
	100°C	0.4		0.85	0.4	0.55	0.4	0.6	0.4	0.55	0.4	0.25
	200°C	0.2		0.4	0.2	0.3	0.2	0.3	0.2	0.3	0.2	0.1
	Refer to below "Max. Operating Pressure."											
Min. bending radius (mm) Note 3)		25	20	10	35	25	55	35	85	60	95	220
Operating temperature		Air, Inert gas: -20 to 200°C Water: 0 to 100°C (No freezing)										
Material		FEP (Fluorinated Ethylene Propylene Resin)										

Note 1) When using a fluid in liquid form, the surge pressure must not exceed the maximum operating pressure. A surge pressure higher than the maximum operating pressure can cause breakage of the fittings, or rupture of the tubing. Furthermore, an abnormal temperature increase due to adiabatic compression can also result in ruptured tubing.

Note 2) Do not use in locations where the FEP tubing will move.
Be sure to operate under the maximum operating pressure conditions using the lower maximum operating specification of either the tubing or fittings.
After long term use or under high temperatures, some fittings leakage may occur due to material deterioration with age. Perform periodic inspections, and if any leakage is detected, replace with a new product immediately.
(Refer to maintenance part of "Tubing Precautions" on the Back page 2.)
Refer to Best Pneumatics catlog Vol. 15 for all other precautions.
For High Purity Fluoropolymer, refer to the precautions of CAT.ES70-17, "High Purity Fluoropolymer Fittings & Tubing."

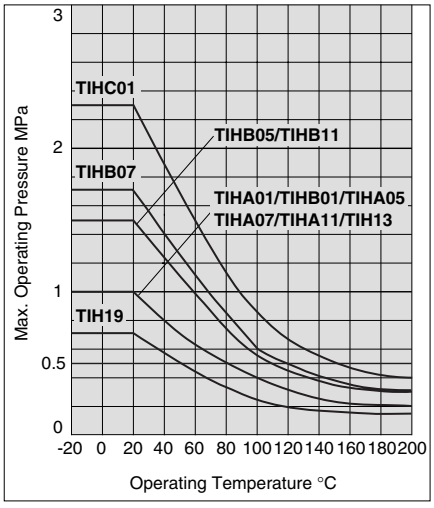
Note 3) Minimum bending radius is measured as shown left as representative values.
Allow extra length when piping since the tubing may crush if bent more than the min. bending radius.

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 5%.

Max. Operating Pressure



Note) The maximum operating pressure varies dependant on the I.D. bore size even if the O.D. is the same.

How to Order

Inch size

TIHA01 N — 16

Indication of tubing model

Color indication

Symbol	Color
N	Translucent
R	Red (Translucent)
BU	Blue (Translucent)
B	Black (Opaque)

Length per roll

Symbol	Roll size
16	50ft (16m) roll
33 Note)	100ft (33m) roll

Note) 100ft (33m) roll is available with translucent (color indication: N) only.

Chemical Resistance of the Fluoropolymer FEP Material

Chemicals in this table are inactive against FEP material Note 1), however physical properties may be effected by temperature or pressure change.
Please make sure that operating conditions do not cause problems since the use of FEP tubing under chemical environment is unsecured.

2-nitro-2-methyl propanol	Sodium hypochlorite	Dimethyl phthalate
2-nitrobutanol	Carbon tetrachloride	Hydrofluoric acid
Pentabasic benzamide	Dioxane	Naphthalene fluoride
N-butylamine	Cyclohexanone	Nitrobenzene fluoride
N-octadecanol	Cyclohexane	Furan
N-butyl acetate	Dimethyl ether	Hexachlorethane
O-cresol	Dimethylsulfoxide	Hexane
Di-isobutyl adipate	Dimethylformamide	Ethyl hexanoate
Acetophenone	Bromine	Phenylcarbinol
Acetone	Deionized water	Benzaldehyde
Alniline	Nitric acid	Benzonitrile
Abietic acid	Mercury	Borax
Sulfuric chloride	Ammonium hydroxide	Boric acid
Isooctane	Potassium hydroxide	Formic aldehyde (Formalin)
Liquid ammonia	Sodium hydroxide	Acrylic anhydride
Ethyl alcohol	Cetane	Acetic anhydride
Ethyl ether	Soap, detergent	Methacrylic acid
Ethylene glycol	Dibutyl sebacate	Allyl methacrylate
Ethylenediamine	Diethyl carbonate	Vinyl methacrylate
Zinc chloride	Tetrachloroethylene	Methyl alcohol
Aluminum chloride	Tetrahydrofuran	Methyl ethyl ketone
Ammonium chloride	Tetrabromoethane	Methylene chloride
Calcium chloride	Triethanolamine	Sulphuric acid
Sulfuric chloride	Trichloroethylene	Phosphoric acid
Iron chloride (III)	Trichloroacetic acid	Iron phosphate (III)
Benzoyl chloride	Toluene	Tri-n-butyl phosphate
Magnesium chloride	Naphtha	Tricresyl phosphate
Hydrochloric acid	Naphthalene	
Chlorine (absolute)	Naphthol	
Aqua regia	Lead	
Ozone	Carbon dioxide	
Hydrogen peroxide	Nitrogen dioxide	
Natrium peroxide	Nitrobenzene	
Gasoline	Nitromethane	
Permanganate	Perchloroethylene	
Formic acid	Perphloroxylene	
Xylene	Unsymmetrical dimethylhydrazine	
Chromic acid	Hydrazine	
Chlorosulfonic acid	Pinene	
Chloroform	Piperidine	
Paraffinum liquidum	Glacial acetic acid (Acetic acid)	
Allyl acetate	Pyridine	
Ethyl acetate	Phenol	
Potassium	Phthalic acid	
Butyl acetate	Dybutyl phthalate	

Note 1) “Inactive in chemistry terminology” means - not to cause any chemical reaction.
Reference cited: Teflon®, the fluoropolymer handbook, Manual for the chemical applications of Teflon®. Du Pond-Mitsui Fluorochemicals Co., Ltd.

Teflon® is a registered trademark for the fluoropolymer produced by E.I du Pond de Nemours & Company (Inc.) and Du Pond-Mitsui Fluorochemicals Co., Ltd.

Series TH/TIH
Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by a label of **"Caution", "Warning"** or **"Danger"**. To ensure safety, be sure to observe ISO 4414 Note 1), JIS B 8370 Note 2) and other safety practices.

⚠Caution : Operator error could result in injury or equipment damage.

⚠Warning : Operator error could result in serious injury or loss of life.

⚠Danger : In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1) ISO 4414: Pneumatic fluid power – General rules relating to systems
Note 2) JIS B 8370: Pneumatic system axiom

⚠ Warning

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

Since the products specified here are used in various operating conditions, their compatibility with the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements. The expected performance and safety assurance will be the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest catalog information with a view to giving due consideration to any possibility of equipment failure when configuring a system.

2. Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if handled incorrectly. Assembly, handling or maintenance of pneumatic systems should be performed by trained and experienced operators.

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

1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driven object have been confirmed.
2. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.
3. Before machinery/equipment is restarted, take measures to prevent shooting-out of cylinder piston rod, etc.

4. Contact SMC if the product is to be used in any of the following conditions:

1. Conditions and environments beyond the given specifications, or if product is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuit in press applications, or safety equipment.
3. An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

Series TH/TIH
Tubing Precautions

Be sure to read before handling. Refer to back page 1 for safety instructions.

Selection

⚠ Warning

1. Confirm the specifications.

The products appearing in this catalog are designed for use only in compressed air systems (including vacuum).

Do not use outside the specified ranges of pressure, temperature, etc., as this may cause damage or malfunction. (Refer to specifications.)

SMC cannot assure the product quality when fluids other than air, water and inert gas are used.

Consult with SMC for details.

2. In case of using the product for medical care

This product is designed for use with compressed air 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.

⚠ Caution

1. Do not use in locations where the connecting threads and tubing connection will slide or rotate. The connecting theads and tubing connection will come apart under these conditions.

   Use rotary type one-touch fittings (Series KS, KX) in cases where sliding or rotation will occur. Only air can be used as the operating fluid, when using rotary type one-touch fittings.
2. Use tubing at or above the minimum bending radius. Using below the minimum bending radius can cause breakage or flattening of the tubing.
3. Never use the tubing for anything flammable, explosive or toxic such as, gas, fuel gas, or cooling mediums, since the contents can penetrate outward.

Mounting

⚠ Caution

1. Before mounting confirm the model and size, etc. Also, confirm that there are no blemishes, nicks or cracks in the product.
2. When tubing is connected, consider factors such as changes in the tubing length due to pressure, and allow sufficient leeway.
3. Mount so that fittings and tubing are not subjected to twisting, pulling or moment loads. This can cause damage to fittings and flattening, bursting or disconnection of tubing, etc.
4. Mount so that tubing is not damaged due to tangling and abrasion. This can cause flattening, bursting or disconnection of tubing, etc.

Piping

⚠ Caution

1. Preparation before piping

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe. Not allowing chips of the piping thread or the seal material to go in.

Air Supply

⚠ Warning

1. Types of fluid

This product is designed for use with compressed air. Consult with SMC if a different fluid is to be used.

Consult with SMC regarding products for use with general purpose fluids, to confirm which fluids can be used.

2. When there is a large amount of drainage.

Compressed air containing a large amount of drainage can cause the malfunction of pneumatic equipment. An air dryer or Drain Catch should be installed upstream from filters.

3. Drain management

If air filter drains are not flushed regularly, the drainage will flow downstream leading to the malfunction of pneumatic equipment.

In cases where the management of drain flushing will be difficult, the use of filters with automatic drains is recommended.

For details on the quality of compressed air mentioned above, refer to SMC's "Best Pneumatics" catalog vol. 14.

Operating Environment

⚠ Warning

1. Do not operate in locations in an explosive atmosphere.
2. Do not operate in locations where vibration or impact occurs.
3. In locations near heat resources, block off radiant heat.

Maintenance

⚠ Caution

1. Check for the following during regular maintenance, and replace components as necessary.

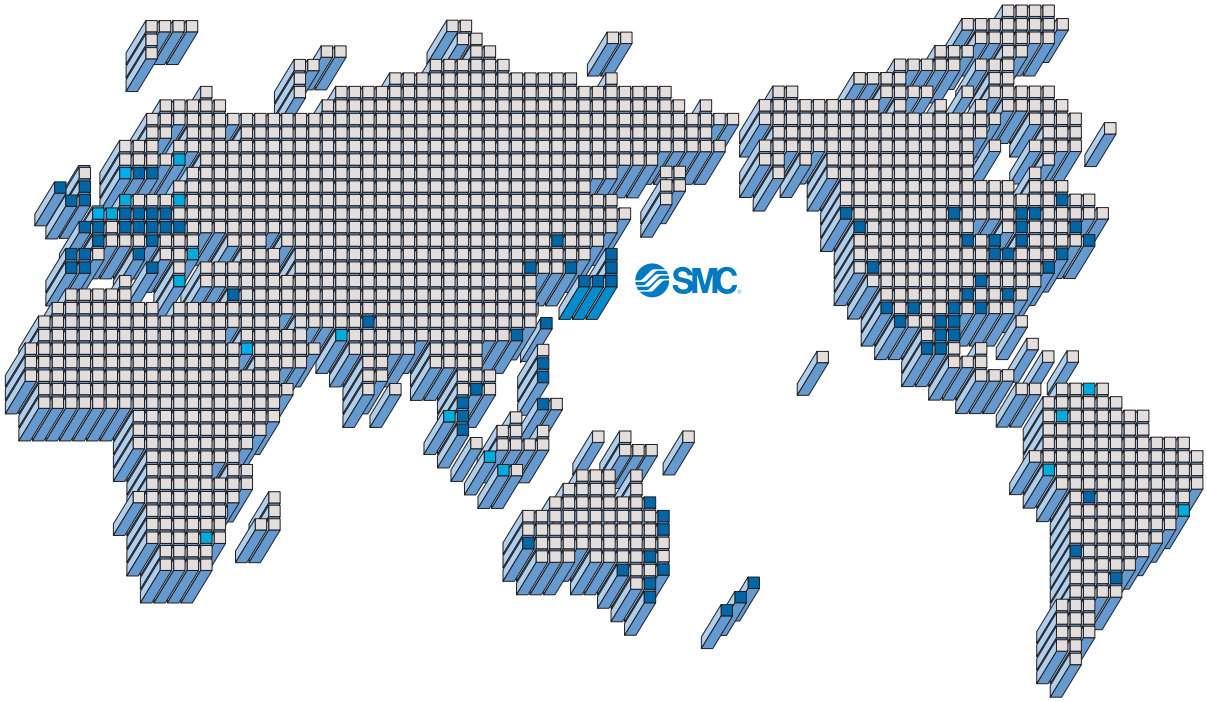
   a) Scratches, gouges, abrasion, corrosion

   b) Leakage

   c) Twisting, flattening or distortion of tubing

   d) Hardening, deterioration or softness of tubing
2. Do not repair or patch the replaced tubing or fittings for reuse.
3. When using insert or miniature fittings over a long period, some leakage may occur due to age deterioration of the materials. Perform periodic inspections, and if any leakage is detected, correct the problem by additional tightening. If tightening becomes ineffective, replace the fittings with a new product immediately.

SMC'S GLOBAL MANUFACTURING, DISTRIBUTION AND SERVICE NETWORK



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