

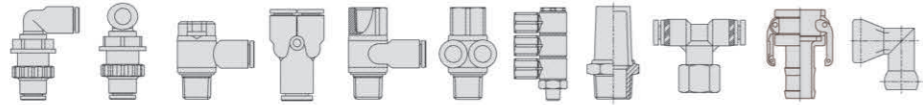
Sang-A



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SANG-A PNEUMATIC

- | ONE-TOUCH FITTINGS ----- 
- | COMPACT ONE-TOUCH FITTINGS ----- 
- | SPEED CONTROLLERS ----- 
- | METAL BODY SPEED CONTROLLERS ----- 
- | ROTARY JOINTS ----- 
- | STOP FITTINGS ----- 
- | CHECK VALVES ----- 
- | BALL VALVES ----- 
- | MAIN BLOCKS ----- 
- | HAND VALVES / HAND SLIDE VALVES ----- 
- | INSERT FITTINGS ----- 
- | TWO-TOUCH FITTINGS ----- 
- | SILENCERS ----- 
- | AIR GUN ----- 
- | TUBE SERIES ----- 
- | HOSE BAND ----- 
- | AUTO ACE COUPLER ----- 
- | ACE COUPLER ----- 
- | COMPACT ACE COUPLER ----- 
- | MINOR COUPLER ----- 
- | HP COUPLER ----- 
- | MOLD COUPLER ----- 
- | CAM-LOCK COUPLER ----- 
- | ADJUSTABLE COOLANT NOZZLE ----- 



[SANG-A PNEUMATIC]

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ABOUT SANG-A

Creative and challenging! Into the future with high technology - SANG-A will leap into leading company through management innovation and challenge.

- 1980 1980. 07 Established 'Daewoo Polymer Co.'
- 1989. 05 Changed the company name to 'Sang-A Pneumatic Co., Ltd.'

- 1990 1993. 10 Opened Seong-Seo Plant(Dalseo wolamdong)
- 1995. 11 Awarded 'US\$1 million export monument'
- 1996. 03 Converted to Incorporation of Sang-A Pneumatic Co., Ltd. (Capital u\$3 Millions)
- 08 Designated as 'A Potential Advanced Technology Enterprise' by SMBA.
- 1997. 04 Moved head office to Deagu Dalseo wolamdong
- 05 Registration of a utility model (couplings for piping / 0269779)
- 1998. 07 Designated as 'An Advanced Technology Enterprise' by SMBA.
- 09 Awarded excellent world capital goods
- 11 Awarded a Price for 'Superior Quality Products' from Ministry of Commerce

- 2000 2000. 11 Awarded a Prize for 'New Technology Utilization' from Ministry of Commerce
- 12 Awarded a grand prize Midium & Small Enterprise CEO
- 2001. 05 Designated as 'Promising Midium & Small Enterprise' by SMBA
- 11 Awarded 'US\$5 million export monument'
- 2002. 01 Eastablished 2nd Plant in Seong Seo for Plastic business.
- 01 Established Sang-A Tech Co., Ltd. for Die casting business. (Seo-Gu Jungli-Dong)
- 04 Selected 'World Class Capital Goods'
- 04 Opened Shanghai Sang-A Pneumatic Co., Ltd.
- 01 Established 'Daymorrow Co., Ltd.'
- 06 Established 3rd plant in Waegwan
- 07 Registered patent tubes and tube couple rings lock claw coupling /10-1602768) 2 other cases
- 11 Awarded 'Iron Tower Medal'
- 12 Obtain certification of 'Worldwide First Class Goods'
- 2007. 03 Designated technology Innovation company
- 2010. 01 Obtained ISO 9001/14001 (K01720-QE)
- 02 Recognized research institute Korea Occupational Safety and Technology Association
- 07 Selected Star Company Daegu 2010
- 2012. 07 Moved Seongso 5th industrial complex
- 2013. 07 Excellent selection of Star Enterprise



[Explanation according to function]



One-Touch Fitting

- One touch air connector used in pneumatic piping.
- Easy connection/disconnection of tube by one touch only.
- Various models and sizes.



Compact One -Touch Fitting

- Miniature one-touch air connector used in pneumatic piping.
- 40% smaller volume ratio and 20% smaller O.D. ratio in comparison to the conventional type.
- Used easily in confined spaces.



Speed Controllers

- Precisely permit the optimal rate of airflow for the smooth cylinder movement of a driving device.
- Uni-directional airflow is available for either exhaust or inlet flow control method.
- Connection of the pipe is not limited, given the rotating structure of the main body.
- Needle is equipped with a stopping-apparatus, allowing it to function perfectly.



Metal Body Speed Controllers

- Valve used for controlling the operation speed of a driving device.
- Using the pipe which connected to actuator .
- Easy speed control, permit constant speed in low flow area.



Rotary Joint

- Used for swiveling and swinging connections.
- Used in rotating parts ranging from 500~1500rpm.
- Built in bearing accommodates the rotation and swiving of pneumatic connections.



Stop Fitting

- The double-passage mechanism prevent the airflow upon the tubing disconnection.
- The complete prevention of airflow upon the tubing disconnection provides safety when repairing pneumatic equipments.
- Used at laboratory or for instructing pneumatic connections.



Check Valve

- Used for the directional checking of air.
- Minimum pressure is 0.1kgf/cm²; Keeps 1.42PSI in vacuum.



Ball Valve

- Used for the control air supply in the opened and closed positions.
- PPS resin body construction allows air & water applications.



Main Block

- Used for assembling of various types of manifold blocks for concentrated branching.
- Min Blocks provide comparable flow rates to steel piping



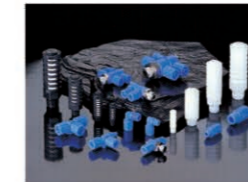
Hand Valve / Hand Slide Valve

- Used for turning air pressure on and off for pneumatic devices.
- Three-way valve which allows the discharge of residual pressure of machine to preserve the life of the machine, and also allowing repairs to be made.



Insert Fitting

- Screw-type fitting for multi-purpose.
- Tightening the screws of the tube method can be used in a way permanently .
- Resistance to mechanical vibration and vacuum performance .
- Compared with plastic material is suitable for high-temperature heat-resistant specifications .



Two -Touch Fitting

- Nut-tightened air connector used for pneumatic piping.
- Higher tightening capabilities of two-touch connections allow use in rocking and impact parts.



Silencers

- Used for suppressing the noise of air release.
- Made of plastic: lightweight and increased life span.
- Compact size allows for installation in narrow spaces.



Air Gun

- Light-weight and impact-resistant plastic material.
- Various nozzle sizes make easy cleaning of machinery and goods.
- Easy control of air release.



Hose Band

- Used for joints and leak-proof hose.
- It is made of Stainless Steel (SUS304) Corrosion-resistant , heat-resistant, strong surface is clean permanently
- The whole band is polished twice, it does not damage hose .
- It is very safety no leak at high temperature, high pressure.



Fluid Coupler

- Uni-directional shut-off coupler with an automatic shut-off valve built in the socket.
- Various material and shape for multi- purpose.
- Easy to link plug and socket



Cam-Lock Coupler

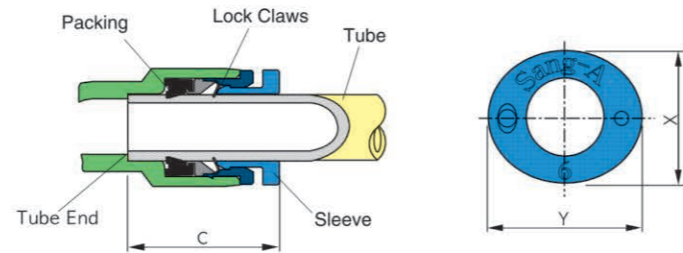
- Liquids, vapors, gases , powders, air leaks , such as the contents can be transported safely .
- Various products for various transport properties (acid, alkali, high temperature, low temperature, food, etc.), you can select the most suitable products.



Adjustable Coolant Nozzle

- Easy control of angle , length and diameter of the nozzle.
- Can be applied widely for a variety of chemical .
- Chemical , impact, heat resistance is excellent.

[Basic Construction of Fitting]



When installing the tube into the one-touch fitting, use the tube cutter to make a straight 90 degree cut. Tube should be pushed into the fitting completely past the packing, allowing the lock claws to fully retain the tube in place. If this is not done, leakage may occur. For removal of the tube, press the sleeve to recess the lock claws, then pull out the tube.

▶ Depth of Assembling tube with Fitting

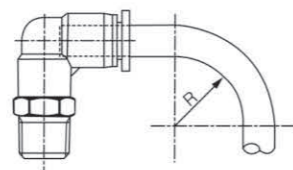
Tube Size	Standard Type						Compact Type		
	Ø4	Ø6	Ø8	Ø10	Ø12	Ø16	Ø3	Ø4	Ø6
C	16.0	17.0	18.5	21.0	22.5	25	9.6	11.5	12.5

Tube Size	Standard Type						Compact Type		
	Ø5/32	Ø3/16	Ø1/4	Ø5/16	Ø3/8	Ø1/2	Ø1/8	Ø5/32	Ø1/4
C	15.5	17	17.2	18.5	21	22.5	9.2	11.3	11.3

▶ Depth of Assembling tube with Fitting

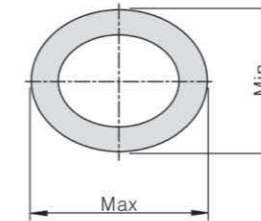
Tube Size	Standard Type						Compact Type		
	Ø4	Ø6	Ø8	Ø10	Ø12	Ø16	Ø3	Ø4	Ø6
X	10	12	14	17	21	24	6	8	10
Y	12	14	16	19	23	27	7	10	12

Tube Size	Standard Type						Compact Type		
	Ø5/32	Ø3/16	Ø1/4	Ø5/16	Ø3/8	Ø1/2	Ø1/8	Ø5/32	Ø1/4
X	10	11	12	14	17	21	6.2	8	10
Y	12	13	14	16	19	23	7.2	10	12



Tube has a tolerance of $\pm 0.1\text{mm}$, and ellipticity of within 0.2mm (between Max and Min diameter) is allowed for the tube.

The tube must not be bent excessively near the joint. For installation of the tube, use the recommendation below.



▶ Tube Size of Bend Radius

Tube Size	Standard Type					Compact Type		
	Ø4	Ø6	Ø8	Ø10	Ø12	Ø3	Ø4	Ø6
R	20	30	50	80	150	15	20	30

Tube Size	Standard Type						Compact Type		
	Ø5/32	Ø3/16	Ø1/4	Ø5/16	Ø3/8	Ø1/2	Ø1/8	Ø5/32	Ø1/4
R	20	25	30	50	80	150	15	20	30



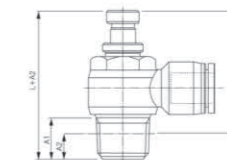
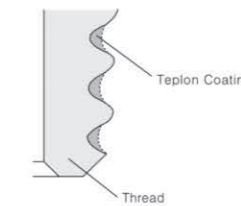
The taper pipe thread is coated with teflon, thus requiring no additional teflon tape or sealing treatment.

Metric fittings are sealed with gaskets, thus requiring no additional sealing treatment.

For installation, use the recommended tightening torque specified below for proper sealing. Note that excessive tightening may damage the thread.

▶ Recommended Torque per Thread Size

Thread Type	Thread Size	Torque (kgf·cm)
Metric Thread	M3	7
	M5	15-19
	M6	20-27
Pipe Taper Thread	R 1/8	70-90
	R 1/4	120-140
	R 3/8	220-240
UNF (Unified) Thread	No. 10-32 UNF	15-19
	NPT 1/8	70-90
NPT Thread	NPT 1/4	120-140
	NPT 3/8	220-240
	NPT 1/2	280-300



After installing the equipment on the instrument, the "L" is the product of the subtraction value of thread part (A2) from the main body.

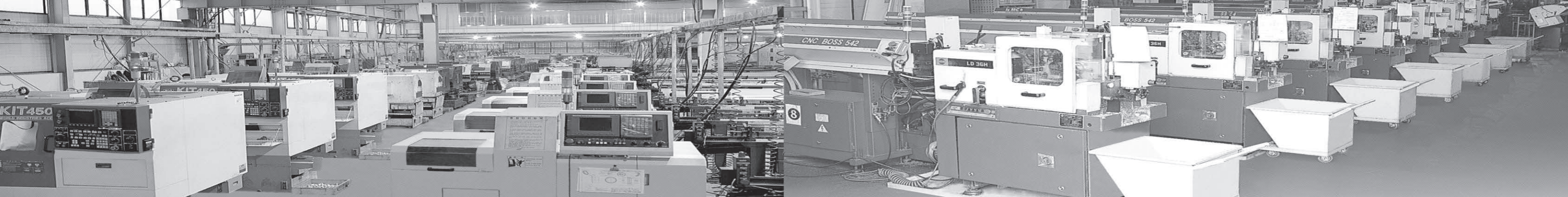
The "L" size plus "A2" makes the total length of the fitting.

▶ Size of thread parts




Thread Type	Metric thread		Taper thread			
	M5	M6	R1/8	R1/4	R3/8	R1/2
A1	3.5	4.5	8.0	11.0	12.0	15.0
A2	3.5	4.5	4.0	6.0	6.5	8.0

▶ Standard size of metric thread



Thread Code	Thread Size	Name of products applied
M3	M3 × 0.5	All products available
M5	M5 × 0.8	
M6	M6 × 1.0	
M6	M6 × 0.75	Only use for "PCC" model of compact one-touch fitting
M8	M8 × 0.75	




Classification of Warning Indication

-  **DANGER** Risk of death or serious injury. (The most dangerous condition.)
-  **WARNING** Potential risk of danger, death or serious injury. (Potential danger)
-  **CAUTION** Potential risk of danger and of financial damage.

Common Precautions


-  **DANGER** ▶ Never use for the following:
 - ① As equipment for the purpose of the maintenance and management of human life.
 - ② As equipment for the purpose of movement of human transportation.
 - ③ As equipment requiring essential safety.
-  **WARNING** ▶ Never use on the following environment:
 - ① Using for applications other than originally intended.
 - ② Place of excessive vibration, shock, rotation and curve.
 - ③ Place consisting of corrosive gas, inflammable/flammable gas, chemicals, sea water, water and vapor.
 - ▶ Never disassemble or remodel the equipment; this may cause malfunction or leakage.
 - ▶ When repairing or checking equipment, remove air pressure first.
 - ▶ Never tamper with the sleeve of fitting when pressure is on.


-  **CAUTION** ▶ Never assemble with parts from other manufacturers: this may cause leakage or damage to the equipment.

Sang-A Pneumatic Co., Ltd. is not responsible for damage or injury that may occur due to interchanging of parts outside of the Sang-A Pneumatic brand.

Using Precautions of Fitting Series

Never fail to check the following

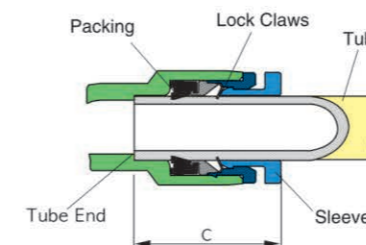
-  **WARNING**
 1. Never use for fluids other than air and water (Water: available in case of special order only)
 2. Never use at the place of spatter to avoid fire.
 3. Be sure to use with Rotary Joint to prevent damage or leakage at the place of rotation.
 4. Never use with water hotter than 60°C. This causes breakage of resin due to hydrolysis or heat.
 5. Be sure to use after checking static electricity prevention requirements.
 6. Avoid external impact such as bending, twisting and drawing on fittings.

-  **CAUTION** ❶ Be sure to meet the following conditions for the tube, otherwise it may cause leakage of air or inferiority of the application.

SIZE	POLYURETHANE TUBE	NYLON TUBE	SIZE	POLYURETHANE TUBE	NYLON TUBE
∅ 3mm	± 0.10	± 0.08	∅ 1/8	± 0.10	± 0.08
∅ 4mm	± 0.10	± 0.08	∅ 5/32	± 0.10	± 0.08
∅ 6mm	± 0.12	± 0.10	∅ 3/16	± 0.12	± 0.10
∅ 8mm	± 0.12	± 0.10	∅ 1/4	± 0.12	± 0.10
∅ 10mm	± 0.15	± 0.12	∅ 5/16	± 0.15	± 0.12
∅ 12mm	± 0.15	± 0.12	∅ 3/8	± 0.15	± 0.12
∅ 16mm	± 0.15	± 0.15	∅ 1/2	± 0.15	± 0.15

❷ Cautions in the application of tube:

- Be sure to confirm that the section of tube is cut at a right angle. Make sure that there is no indication of damage to the outside of the tube.
- Be sure to refer to the following for application and removal of the tube. Sang-A Pneumatic equipment is made to follow a 2-step insertion of tubing into the fitting. The 1st step goes past the Lock Claws, and the 2nd step goes into the Packing. Make sure that the second step has been acquired.
- The elliptical design of the sleeve makes for a simple and easy application. (Please order the round sleeve if there are restrictions)



▶ The size of Sleeve

SLEEVE SIZE	∅3	∅4	∅6	∅8	∅10	∅12	∅16
	General Specification (mm)	∅1/8	∅5/32	∅3/16	∅1/4	∅5/16	∅3/8
Compact Specification (mm)	7 × 6	10 × 8	11 × 13	12 × 14	14 × 16	17 × 19	21 × 23

- Minimum insertion part of tube is as follows and be sure to use leaving as much as the following size as margin.

TUBE SIZE	∅3	∅4	∅6	∅8	∅10	∅12	∅16
	General Specification (mm)	∅1/8	∅5/32, 3/16	∅1/4	∅5/16	∅3/8	∅1/2
Compact Specification (mm)	9.5	16	17	18.5	21	22	25

❸ Cautions on disconnecting tube:

- Before disconnecting tube, be sure to confirm that the pressure inside the tube is at zero.
- Before disconnecting tube, pull it out after pressing the sleeve equally on both sides. Unequal pressing strength will make scratch on tube by insufficient open of lock claws, this will cause air leakage.
- Be sure not to shake or make 360 degree rotation when disconnecting the tube. The scratch made by the misuses will cause air leakage.

❹ Cautions on treatment of the equipment body:

- When fastening the body onto the six-angle part of the inside and outside of the fitting, choose the correct tool and size.
- When fastening the thread, please refer to the "Torque Recommended" (P11). If torque is higher than the recommended, this may cause damage or air leakage. If torque is lower than the recommended, this may cause air leakage.
- After fastening the thread, most of Sang-A equipment allows control of the direction of the pipe.

⚠ Material Using Range According To Anti-Chemicals
Refer to the following statement.

JUDGEMENT STANDARD

◎ : Excellent ○ : Good △ : Require Confirmation × : Incongruity - : No data

- Although the result(using environment, using condition, using period) proves to be “good”, it may not be suitable in some cases.
- Secure the conditions below before using.

★ANTI-CHEMICALS LIST(Reference)

Name of Chemicals (Density of weight %, Temperature °C)	Tube Type				Fitting						Seal Quality		
	Urethane	Nylon	Polyolefin	Fluorine	Brass	SUS304	SUS316	POM	PBT	PP	NBR	EPDM	FKM
Caustic soda (10% 20°C)	×	○	○	○	△	△	○	○	△	○	○	○	○
Caustic soda (30% 20°C)	×	○	○	○	-	-	-	○	×	○	-	-	-
Caustic soda (30% 70°C)	×	×	△	○	-	-	-	○	×	△	-	-	-
Gasoline	○	○	△	○	○	○	○	○	○	△	○	×	○
Air	○	○	○	○	○	○	○	○	○	○	○	○	○
Sodium perborate	-	○	○	○	×	-	○	○	○	○	○	○	○
Sodium peroxide	-	×	○	○	×	-	○	-	-	○	○	○	-
Hydrogen peroxide (5%,20°C)	○	○	○	○	×	○	○	○	○	○	-	-	-
Hydrogen peroxide (5%,20°C)	△	△	○	○	×	○	○	△	○	○	-	-	-
Hydrogen peroxide (30%,20°C)	×	×	○	○	×	○	○	×	○	○	-	-	-
Perchloric acid	×	×	○	○	×	×	×	×	○	○	-	○	○
Grease	○	○	△	○	○	○	○	○	○	△	○	×	○
Sodium silicate	○	○	○	○	△	-	○	○	○	○	○	○	○
Glycerin	○	○	○	○	○	○	○	○	○	○	○	○	○
Naphtha	△	○	△	○	△	○	○	○	△	△	×	×	○
Naphthaline	△	○	△	○	△	-	△	○	○	○	×	×	○
Nitropropane	-	-	○	○	-	-	-	○	-	○	-	-	-
Kerosene	○	○	△	○	○	○	○	○	△	○	×	○	○
Dichloro benzene	×	△	×	○	△	-	-	△	△	△	-	-	-
Linoleic acid	-	△	△	○	-	-	-	○	-	△	○	×	○
Maleic acid	△	○	○	○	-	△	△	-	-	○	-	△	○
Cottonseed oil	○	○	○	○	△	○	○	○	-	○	○	○	○
Methane	○	○	○	○	○	-	△	○	○	○	○	×	○
Methyl alcohol(Methanol)	△	○	○	○	○	△	○	○	○	○	○	○	△
Methyl ethyl ketone(MEK)	×	○	○	○	○	△	○	○	○	○	×	○	×
Methyl isobutyl ketone(MIBK)	×	○	○	○	△	-	△	○	○	○	×	△	×
Monoethanolamine	-	○	△	○	-	-	△	○	-	○	×	○	×
Monochlorobenzene	×	×	×	○	-	-	-	○	-	×	×	×	○
Chloroacetic acid	×	×	×	○	-	-	-	△	△	×	-	-	-
Hydrofluoric acid Anhydride	×	×	×	○	×	-	×	×	-	×	-	○	-
Acetic Anhydride	×	×	△	○	×	○	○	×	-	△	△	○	×
Water (24°C)	○	○	○	○	○	○	○	○	○	○	○	○	○
Water (100°C)	△	△	△	○	×	○	○	△	×	△	-	-	-
Sea Water	○	○	○	○	△	○	○	○	○	○	-	-	-
Bunker oil	-	○	○	-	△	-	○	-	-	○	○	-	○
Benzene(Benzol)	×	○	×	○	×	△	△	○	○	△	×	×	○
Butane	-	-	△	○	○	○	○	○	○	○	○	×	○
Fluorine	×	-	×	×	×	×	△	×	-	×	-	△	○
Borax	○	○	○	○	×	-	○	-	-	○	○	○	○
Boric acid	○	○	○	○	○	○	○	○	○	○	○	○	○
Amyl borate	-	-	△	○	-	-	-	○	-	△	○	×	○
Bromine	×	×	×	○	×	-	×	×	×	△	-	-	○
Arsenic acid	-	△	○	○	△	○	○	-	-	○	-	-	-
Carbon tetrachloride	×	△	×	○	△	△	△	○	△	△	×	○	○
Oxygen	○	○	○	○	○	○	○	○	○	○	○	○	○

Name of Chemicals (Density of weight %, Temperature °C)	Tube Type				Fitting						Seal Quality		
	Urethane	Nylon	Polyolefin	Fluorine	Brass	SUS304	SUS316	POM	PBT	PP	NBR	EPDM	FKM
Petroleum	○	○	×	○	-	-	-	○	○	×	○	×	○
Salt Water	-	○	○	○	×	△	△	○	○	○	-	-	-
Soda water	○	○	○	○	-	-	-	○	○	○	-	-	-
Soda ash→Sodium carbonate	○	○	○	○	○	△	△	○	○	○	○	○	○
Pine oil	-	×	○	○	△	○	○	-	○	○	○	×	○
Oxalic acid	△	○	○	○	△	△	△	×	○	○	○	○	○
Ethyl oxalate	×	○	×	○	-	-	-	○	○	×	×	○	○
Magnesium hydroxide	△	○	○	○	△	-	△	○	×	○	○	○	○
Barium hydroxide	-	○	○	○	×	-	○	○	△	○	○	○	○
Ammonium hydroxide	△	○	○	○	×	△	○	○	×	○	×	○	○
Potassium hydroxide	△	△	○	○	△	△	△	○	×	○	○	○	○
Calcium hydroxide	△	○	○	○	△	△	△	○	×	○	○	○	○
Hydrogen	○	○	○	○	△	○	○	○	○	○	○	○	○
Mercury	-	○	○	○	×	-	△	-	-	○	○	○	○
Steam (150°C over)	×	×	×	○	○	-	○	△	△	×	×	×	×
Steam (150°C below)	×	×	×	○	-	-	-	×	×	△	×	○	×
Vegetable oil	-	○	○	○	-	-	-	○	○	○	○	○	○
Salt water	○	○	○	○	△	△	△	○	○	○	-	-	-
Silicone greases	-	○	△	○	-	-	-	○	○	△	○	○	○
Silicone oil	-	○	△	○	-	-	-	○	○	△	○	○	○
Glue	-	○	○	○	△	-	△	-	-	○	-	-	-
Aniline	×	×	×	○	×	△	△	○	○	△	×	○	△
Amyl naphthalene	-	-	△	○	-	-	-	○	○	△	×	×	○
Amyl alcohol	○	○	○	○	○	△	△	○	○	○	○	○	○
Acetone	×	○	△	○	○	△	○	○	○	△	×	○	×
Acetamide	-	-	△	○	-	-	-	○	○	△	○	○	○
Acetaldehyde	○	○	△	○	○	○	○	○	○	○	×	○	×
Acetylene	○	○	○	○	×	○	○	○	○	○	○	○	○
Sulfurous acid	×	×	○	○	×	△	△	×	○	○	○	○	○
Sulfurous acid gas	×	×	△	○	-	-	○	△	○	○	○	○	○
Sodium sulfite	-	△	○	○	○	○	○	○	○	○	-	-	-
Ammonia	-	○	○	○	△	○	○	○	△	○	○	○	×
Ammonia gas	×	△	△	○	×	○	○	○	△	△	○	○	×
Ammonia gas	×	×	×	○	×	○	○	○	×	×	○	○	×
Liquid Ammonia	-	○	○	○	○	○	○	○	△	○	-	-	-
Chlorine Liquide	×	×	×	○	-	-	-	×	○	×	-	-	-
Liquefied petroleum gas(LPG)	-	○	△	○	○	○	○	○	○	△	○	×	○
Ethanolamine	-	△	△	○	-	-	-	○	△	△	○	○	×
Ethylene glycol	○	○	○	○	△	△	△	○	○	○	○	○	○
Ethyl cellulose	-	-	○	○	-	-	△	○	○	○	-	○	×
Ethyl alcohol(Ethanol)	△	○	○	○	○	○	○	○	○	○	○	○	○
Lye solution	-	○	○	○	-	-	-	○	○	○	○	○	○
Hydrochloric acid(10%, 20°C)	△	○	○	○	×	×	×	×	○	○	-	-	-
Hydrochloric acid (20%, 20°C)	×	×	○	○	×	×	×	×	△	○	-	-	-
Hydrochloric acid (20%, 80°C)	×	×	×	○	×	×	×	×	×	×	×	△	○

⚠ Material Using Range According To Anti-Chemicals
Refer to the following statement.

JUDGEMENT STANDARD

◎ : Excellent ○ : Good △ : Require Confirmation × : Incongruity - : No data

- Although the result(using environment, using condition, using period) proves to be "good", it may not be suitable in some cases.
- Secure the conditions below before using.

★ANTI-CHEMICALS LIST(Reference)

Name of Chemicals (Density of weight %, Temperature °C)	Tube Type				Fitting						Seal Quality		
	Urethane	Nylon	Polyolefin	Fluorine	Brass	SUS304	SUS316	POM	PBT	PP	NBR	EPDM	FKM
Hydrochloric acid (38%, 20°C)	×	×	○	○	×	×	×	×	△	○	○	○	○
Magnesium chloride	○	○	○	○	△	△	○	○	○	○	○	○	○
Methyle chloride	×	△	×	○	○	○	○	-	×	×	△	○	○
Barium chloride	○	○	○	○	×	-	○	-	○	○	○	○	○
Zinc chloride	○	○	○	○	×	△	○	×	○	○	○	○	○
Acetyl chloride	×	×	×	-	-	-	△	×	-	×	-	-	○
Aluminium chloride	-	△	○	○	×	×	×	-	○	○	○	○	○
Ammonium chloride	○	○	○	○	×	△	△	○	○	○	○	○	○
Ethyl chloride	×	○	×	-	○	○	○	○	-	×	○	○	○
Sulfur chloride	-	-	△	○	×	-	△	-	-	△	△	×	○
Potassium chloride	○	○	○	○	△	△	○	○	○	○	○	○	○
Calcium chloride	○	○	○	○	○	△	△	○	○	○	○	○	○
Ozone	△	○	△	○	○	○	○	△	○	△	○	○	○
Oleic acid	△	○	△	○	△	△	△	△	○	○	△	○	○
Olive oil	○	○	○	○	△	○	○	○	○	○	○	○	○
Uric acid	×	○	-	○	-	-	-	○	○	-	-	-	-
Aqua acid	×	×	×	○	-	-	-	×	-	△	-	△	○
Lactic acid	-	○	○	○	×	△	△	○	○	○	○	○	○
Sulfur	△	○	○	○	×	○	○	○	-	○	×	○	○
Lubricating oil(Petroleum base)	○	○	×	○	○	○	○	○	○	×	○	×	○
Lubricating oil(Ester base)	×	○	×	○	○	○	○	○	○	×	-	-	-
Isooctane	△	○	×	○	○	○	○	○	○	×	○	×	○
Isopropyl alcohol	-	△	○	○	○	○	○	○	○	○	○	○	○
Isopropyl ether	-	△	△	○	○	○	○	○	○	○	×	×	○
Carbon disulfide	×	○	×	○	○	○	○	-	×	△	×	○	○
Phenyl disulfide	△	○	-	○	-	-	-	-	-	-	-	-	-
Carbon monoxide	○	○	○	○	○	○	○	○	○	○	○	○	○
Gelatin	○	○	○	○	○	○	○	○	○	○	○	○	○
Heavy water	○	○	○	○	-	-	-	○	○	○	-	-	-
Soap solutions	○	○	△	○	○	○	○	○	○	○	○	○	○
Sodium nitrate	○	○	○	○	○	○	○	○	○	○	○	○	-
Aluminium nitric	△	○	○	○	-	-	△	○	○	○	○	○	-
Ammonium nitric	○	○	○	○	×	○	○	○	○	○	○	○	-
Potassium nitric	○	○	○	○	△	△	△	○	○	○	○	○	○
Calcium nitric	-	○	○	○	-	-	-	○	○	○	○	○	○
Nitrogen	○	○	○	○	○	○	○	○	○	○	○	○	○
Natural gas	-	○	○	○	○	○	○	○	○	○	×	○	○
Acetic acid (10%, 20°C)	×	△	○	○	×	○	○	△	○	○	○	○	○
Acetic acid (50%, 20°C)	×	×	○	○	×	○	○	×	○	○	-	-	-
Acetic acid (50%, 70°C)	×	×	×	○	×	○	○	×	△	×	-	-	-
Acetic acid (100%, 20°C)	×	×	×	○	×	△	△	×	△	×	-	-	-
Lead acetate	-	○	○	○	-	△	-	-	○	○	○	○	-
Nickel acetate	-	○	○	○	-	-	△	-	○	○	○	○	×
Zinc acetate	-	○	○	○	-	-	-	○	○	○	○	○	×
Aluminium acetate	-	○	○	○	-	-	-	○	○	○	○	○	-

Name of Chemicals (Density of weight %, Temperature °C)	Tube Type				Fitting						Seal Quality		
	Urethane	Nylon	Polyolefin	Fluorine	Brass	SUS304	SUS316	POM	PBT	PP	NBR	EPDM	FKM
Calcium acetate	○	○	○	○	△	-	△	○	○	○	○	○	×
Cresol	×	×	△	○	○	△	○	△	○	○	△	×	○
Chlorosulfonic acid	-	×	×	○	△	×	×	×	○	×	×	×	△
Chloroacetone	-	-	×	-	-	-	-	-	-	×	×	○	×
Chlorotoluene	-	×	×	○	-	-	-	○	○	×	×	×	○
Chloroform	×	○	×	○	○	○	○	△	△	×	×	×	○
Soybean oil	-	○	○	○	△	○	○	○	○	○	○	△	○
Tannic acid	△	○	○	○	×	△	△	○	-	○	○	○	○
Tar	○	○	○	○	△	○	○	-	-	○	○	×	○
Carbonic acid	△	○	○	○	○	△	△	-	-	○	○	○	○
Carbon dioxide	○	○	○	○	○	○	○	○	○	○	-	-	-
Sodium carbonate	○	○	○	○	○	△	△	○	○	○	-	-	-
Ammonium carbonate	-	○	○	○	-	△	△	○	○	○	×	○	-
Toluene	△	○	△	○	○	○	○	○	△	△	×	×	○
Triacetin	-	-	○	-	-	-	-	-	-	○	○	○	×
Phenol	×	×	○	○	○	○	○	×	○	○	-	○	○
Glucose	○	○	○	○	○	○	○	○	○	○	○	○	○
Freon11	-	○	-	○	○	○	○	○	○	-	○	×	○
Freon12	-	○	-	○	○	○	○	○	○	-	○	○	○
Freon21	-	○	-	○	○	○	○	○	○	-	×	×	×
Freon22	-	○	-	○	○	○	○	○	○	-	×	○	×
Freon113	-	○	-	○	○	○	○	○	○	-	○	×	○
Freon114	-	○	-	○	○	○	○	○	○	-	○	○	○
Propane	○	○	○	○	○	○	○	○	○	○	○	×	○
Propylene	-	○	-	○	○	○	○	○	○	-	×	×	○
Castor oil	△	○	○	○	○	○	○	○	○	○	○	○	○
Hexane	○	○	×	○	○	○	○	○	○	△	○	×	○
Sulfuric acid(10%, 20°C)	×	○	○	○	×	×	×	×	○	○	×	○	○
Sulfuric acid (10%, 70°C)	×	×	△	○	×	×	×	×	×	△	-	-	-
Sulfuric acid (30%, 20°C)	×	×	○	○	×	×	×	×	△	○	-	-	-
Sulfuric acid (30%, 70°C)	×	×	△	○	×	×	×	×	×	△	-	-	-
Sulfuric acid (98%, 20°C)	×	×	×	○	×	×	×	×	×	×	-	-	-
Sulfuric acid (70°C)	×	×	×	○	×	×	×	×	×	×	-	-	-
Sodium sulfate	○	○	○	○	○	△	○	○	○	○	○	○	○
Nickel sulfate	-	○	○	○	-	△	○	-	○	○	○	○	○
Copper sulfate	○	○	○	○	○	△	○	○	○	○	○	○	○
Magnesium sulfate	○	○	○	○	○	○	○	-	○	○	○	○	○
Methyl sulfate	×	△	×	○	-	-	-	-	○	×	-	-	-
Barium sulfate	-	○	○	○	△	○	○	-	○	○	○	○	○
Aluminium sulfate	-	○	○	○	×	○	○	○	○	○	○	○	○
Ammonium sulfate	○	○	○	○	△	△	△	○	○	○	○	○	-
Lead sulfate	○	○	○	○	△	-	△	-	○	○	-	-	-
Sodium sulfide	○	○	○	○	×	△	△	○	○	○	○	○	○
Barium sulfide	-	○	○	○	-	-	○	○	○	○	○	○	○
Zinc sulfide	△	×	○	○	△	○	○	○	○	○	-	-	-
Calcium sulfide	-	○	○	○	-	-	△	○	○	○	○	○	○