

# Masterflex® Tubing Compatibility Tables

Determine the right tubing formulation for your application using the chemical compatibility tables at right. These tables are for use with all Masterflex® tubing sizes. All ratings in the tables indicate tubing condition after exposure to the chemical at 70°F (21°C).

## Ratings and Materials Legend

### Ratings

- A:** No effect; little noticeable change
- B:** Minor effect; slight corrosion or discoloration
- C:** Moderate effect; not recommended for continuous use; softening, loss of strength, swelling and/or shrinkage
- D:** Severe effect; not recommended for use; severe softening, swelling and/or shrinkage
- : No data available

### Tubing formulations

- PN:** PharMed®, High-Pressure PharMed®, Norprene®, High-Pressure Norprene®, Norprene® food
- CF:** C-FLEX®
- S:** Silicone (peroxide/platinum), BioPharm, BioPharm Plus
- T:** Tygon®, Tygon® food, Tygon® LFL
- TU:** Tygon® fuel and lubricant
- V:** Viton®, FDA Viton®
- PT:** Polytetrafluoroethylene (PTFE)

### Pump head materials

- PSF:** Polysulfone
- PC:** Polycarbonate
- PPS:** Polyphenylene sulfide
- SS:** Stainless steel

## SPECIAL NEEDS?

Trouble finding a formulation to meet your difficult chemical compatibility needs?

### PTFE Tubing

Order a peristaltic pump head that uses PTFE tubing on page 1317 or a PTFE tubing pump system on page 1338.

### Tygon® 2075

Specifically formulated to handle organic solvents or other aggressive chemicals; call 1-800-MASTERFLEX for more information.



### FDA Viton® Tubing

We offer FDA Viton® tubing that offers excellent chemical resistance; see page 1299 for details.

## WHERE TO ORDER TUBING

- **C/L®** ..... 1305
- **L/S®** ..... 1323-1327
- **I/P®** ..... 1358-1359
- **B/T®** ..... 1383

## ⚠ DANGER

Even if tubing passes the immersion test, variations in temperature, pressure, or concentration may cause tubing failure.

### SERIOUS INJURY MAY RESULT.

Use suitable guards and/or personal protection when pumping chemicals.

## ⚠ WARNING

The information in this table has been supplied to Cole-Parmer by the tubing manufacturers and is to be used ONLY as a guide to select your tubing.

Before you order or use tubing, call us for your **FREE** tubing test kit. Then test fluids and tubing using the tubing test procedure below.

Cole-Parmer does not warrant (neither express nor implied) that the information in this table is accurate or complete or that any material is suitable for any purpose.

### Tubing Test Procedure

- Measure and weigh a sample of tubing.
- Immerse the sample in the fluid for 72 hours in a closed vessel.
- Dry sample, then measure and weigh it. Inspect carefully for signs of deterioration such as swelling, embrittlement, cracking, softness, or change of size or weight.
- If there is no sign of deterioration, test a sample in pump under the conditions of your application.

Fluid	Tubing formulation							Pump head material			
	PN	CF	S	T	TU	V	PT	PSF	PC	PPS	SS
Acetaldehyde	A	—	B	D	D	D	A	D	—	A	A
Acetate LMW	A	C	—	D	D	—	A	D	A	A	A
Acetic acid <5%	A	B	B	A	D	C	—	A	A	A	B
Acetic acid >5%	A	C	B	B	D	—	A	A	C	A	B
Acetic anhydride	A	—	D	D	D	D	A	D	D	A	B
Acetone	D	D	D	D	D	D	A	D	D	A	A
Acetonitrile	D	—	—	D	D	D	A	D	D	A	A
Acetyl bromide	D	C	—	D	D	—	A	—	—	—	—
Acetyl chloride	D	C	C	D	D	A	A	D	D	A	A
Air	A	A	A	A	A	A	A	A	A	A	A
Aliphatic hydrocarbons	C	D	—	C	A	—	A	—	—	—	B
Aluminum chloride	A	B	B	A	A	A	A	A	A	A	D
Aluminum sulfate	A	B	A	A	—	A	A	A	A	A	B
Alums	A	B	—	A	A	—	A	—	—	—	—
Ammonia, gas and liquid	A	B	—	B	B	D	A	A	D	A	B
Ammonium acetate	C	B	—	A	A	—	A	—	A	—	B
Ammonium carbonate	A	B	C	A	A	—	A	A	—	A	B
Ammonium chloride	A	B	C	A	A	—	A	A	—	A	C
Ammonium hydroxide	A	B	A	B	D	A	A	A	D	A	A
Ammonium nitrate	A	B	C	A	A	—	A	A	—	A	A
Ammonium phosphate	A	B	A	A	A	—	A	A	—	A	B
Ammonium sulfate	A	B	A	A	A	A	A	A	D	A	B
Amyl acetate	A	D	D	D	D	D	A	D	D	A	A
Amyl alcohol	B	D	D	B	B	A	A	—	A	A	A
Amyl chloride	A	D	D	B	B	—	A	D	D	D	A
Aniline	C	—	B	D	D	—	A	D	D	A	A
Aniline hydrochloride	C	—	—	D	D	D	A	—	D	—	D
Aqua regia (80% HCl, 20% H)	C	B	—	D	D	—	A	D	D	D	D
Aromatic hydrocarbons	D	D	—	D	B	—	—	—	—	—	B
Arsenic salts	A	B	—	A	A	—	—	—	—	—	—
Barium salts	A	B	A	A	A	—	A	A	—	A	B
Benzaldehyde	C	D	—	D	D	D	A	C	C	A	B
Benzenesulfonic acid	D	A	D	B	B	A	A	D	D	A	B
Bleaching liquors	A	B	B	B	B	A	A	—	—	—	—
Boric acid	A	B	A	A	A	A	A	A	A	A	B
Bromine	D	B	D	D	D	A	A	—	D	D	D
Butane	C	D	D	B	B	A	A	—	—	A	A
Butanol (butyl alcohol)	C	B	B	B	B	A	A	A	C	A	A
Butyl acetate	D	D	D	D	D	D	A	D	D	A	B
Butyric acid	A	B	D	D	B	—	A	—	—	A	B
Calcium oxide	A	B	A	A	A	—	A	—	—	—	A
Calcium salts	A	B	B	A	A	—	A	—	—	A	B
Carbon bisulfide	D	D	—	D	D	—	—	—	—	—	A
Carbon dioxide	A	B	B	A	A	A	A*	—	A	A	A
Carbon tetrachloride	D	—	D	D	D	A	A	A	D	A	B
Chlorine, dry	D	B	D	A	A	A	A*	D	—	D	A
Chlorine, wet	D	B	D	B	B	B	A	D	—	D	C
Chloroacetic acid	A	B	—	D	D	D	A	D	D	A	B
Chlorobenzene	D	D	D	D	D	A	B	D	D	A	A
Chlorobromomethane	B	D	D	D	D	A	A	D	—	—	—
Chloroform	D	D	D	D	D	A	A	D	D	A	A
Chlorosulfonic acid	D	B	D	B	B	D	A	D	—	—	D
Chromic acid, 30%	A	B	D	A	A	A	A	D	D	A	B
Chromium salts	A	B	—	A	A	—	—	—	—	—	—
Copper salts	A	B	A	A	A	—	A	—	—	A	B
Cresol	C	D	—	D	D	A	A	D	D	A	A
Cyclohexane	D	D	D	D	C	A	A	A	B	A	A
Cyclohexanone	D	D	D	D	D	D	A	D	D	A	A
Diacetone alcohol	A	B	—	D	D	—	A	—	D	—	B
Dimethyl formamide	D	D	—	D	D	D	A	D	D	A	A
Essential oils	A	B	C	B	B	—	—	—	—	—	—
Ethanol (ethyl alcohol)	C	B	B	B	B	A	A	B	B	A	A
Ether	D	D	D	D	D	—	A	D	D	A	A
Ethyl acetate	C	D	D	D	D	D	A	A	D	A	B
Ethyl bromide	D	D	D	D	D	—	A	—	—	—	—
Ethyl chloride	D	B	D	D	D	A	A	D	D	—	A
Ethylamine	D	A	C	D	D	—	—	—	—	—	—
Ethylene chlorohydrin	D	B	C	D	D	A	A	D	D	A	B
Ethylene dichloride	D	B	D	D	D	B	A	D	D	A	B
Ethylene glycol	A	B	A	B	B	A	A	A	C	A	B
Ethylene oxide	B	B	D	B	B	D	A	A	D	D	B
Fatty acids	A	B	C	A	A	A	A	—	C	—	B
Ferric chloride	A	A	B	A	A	B	A	A	—	A	D
Ferric sulfate	A	A	C	A	A	A	A	A	—	A	B
Ferrous chloride	A	A	C	A	A	—	A	A	D	A	B
Ferrous sulfate	A	A	C	A	A	—	A	A	—	A	B
Fluoboric acid	A	A	A	A	A	—	A	A	—	A	B
Fluoroborate salts	A	B	—	A	A	—	—	—	—	—	—
Fluosilicic acid	A	A	—	A	A	—	A	A	—	A	C
Formaldehyde	A	A	B	B	B	D	A	A	A	A	C
Formic acid	A	B	C	B	B	D	A	C	A	D	B
Freon® TMS	D	D	—	D	D	—	A	—	D	A	—
Gasoline, high-aromatic	D	D	D	D	B	A	B	A	C	A	A
Gasoline, nonaromatic	D	D	D	D	B	A	A	A	C	A	—

\*Do not use the L/S\* PTFE-tubing pump head with gases due to excessive heat build up.



Fluid	Tubing formulation							Pump head material			
	PN	CF	S	T	TU	V	PT	PSF	PC	PPS	SS
Glucose	A	A	A	A	A	A	A	—	A	—	A
Glue, P.V.A.	A	A	A	A	A	A	A	—	—	—	A
Glycerin	A	B	A	A	A	A	A	A	A	A	A
Hydriodic acid	D	B	—	A	A	—	—	—	—	—	—
Hydrobromic acid, 30%	B	B	D	A	A	A	A	B	D	A	D
Hydrochloric acid (dil)	A	B	D	A	B	A	A	A	A	D	D
Hydrochloric acid (med)	—	B	D	A	B	B	A	A	D	D	D
Hydrochloric acid (conc)	—	B	D	A	A	B	A	A	B	D	D
Hydrocyanic acid	A	A	C	A	A	A	A	—	—	—	B
Hydrocyanic acid, gas, 10%	A	A	C	A	A	A	A	—	—	—	—
Hydrofluoric acid, 50%	—	A	D	C	D	A	A	—	D	A	D
Hydrofluoric acid, 75%	—	A	D	D	D	B	A	—	D	A	D
Hydrogen peroxide (dil)	A	A	A	A	A	A	A	A	A	—	B
Hydrogen peroxide, 90%	A	D	C	D	D	—	A	A	—	—	—
Hyochlorous acid	A	A	C	A	A	—	A	—	—	—	—
Iodine solutions	A	D	C	A	A	—	A	—	D	D	D
Iodoform	—	—	—	—	—	—	C	—	—	—	A
Kerosene	D	D	D	D	B	A	A	A	A	A	A
Ketones	D	D	—	D	D	—	A	D	D	A	A
Lacquer solvents	D	D	D	D	D	D	A	—	D	—	A
Lactic acid	A	A	A	A	A	A	A	A	A	A	B
Lead acetate	A	B	D	B	A	—	A	A	—	A	B
Linseed oil	A	D	—	A	A	A	A	A	A	A	A
Lithium hydroxide	B	A	D	A	A	—	A	—	D	A	B
Magnesium chloride	A	A	A	A	A	A	A	A	A	A	B
Magnesium sulfate	—	A	A	A	A	A	A	A	A	A	B
Malic acid	A	B	B	A	A	A	A	—	—	—	A
Manganese salts	A	B	B	A	A	—	A	—	—	—	D
Mercury salts	A	B	—	A	A	—	A	—	—	—	B
Methane	A	D	—	A	A	A*	—	—	—	—	A
Methanol (methyl alcohol)	D	—	A	C	C	D	A	D	B	A	A
Methyl chloride	D	D	D	D	D	A	A	D	—	A	A
Methyl ethyl ketone (MEK)	C	—	D	D	D	D	A	D	D	A	A
Mixed acid (40% H <sub>2</sub> SO <sub>4</sub> , 15% HNO <sub>3</sub> )	B	B	—	B	D	—	A	D	—	—	B
Molybdenum disulfide	—	B	—	—	—	—	—	—	—	—	—
Monoethanolamine	B	A	B	—	—	D	A	—	A	A	A
Naphtha	D	D	D	B	B	A	B	B	—	A	A
Natural gas	A	D	—	A	A	—	A*	—	—	—	A
Nickel salts	A	A	A	A	A	—	A	A	—	A	B
Nitric acid (dil)	A	A	C	A	D	A	A	A	B	A	A
Nitric acid (med)	C	—	D	A	D	—	A	C	C	—	A
Nitric acid (conc)	D	—	D	D	D	—	A	C	D	D	A
Nitrobenzene	D	D	D	D	D	—	A	D	D	A	B
Nitrogen oxides	A	B	D	A	A	—	A	—	—	—	—
Nitrous acid	A	A	—	A	A	—	A	—	—	—	B
Oils, animal	A	B	—	D	B	—	A	—	—	—	A
Oils, mineral	D	D	D	D	B	A	A	B	A	A	A
Oils, vegetable	A	—	A	B	A	—	A	A	—	A	A
Oleic acid	C	A	D	D	D	B	A	A	A	A	B
Oxalic acid, cold	A	A	B	A	A	—	A*	—	B	A	B
Oxygen, gas	A	A	B	A	A	—	A*	A	A	—	A
Palmitic acid	—	—	D	—	—	A	A	—	—	—	B
Perchloric acid	D	A	D	D	D	A	A	D	D	A	C
Perchloroethylene	D	B	—	D	D	A	A	D	D	A	B
Phenol (carbolic acid)	—	D	D	B	B	—	A	—	D	—	B
Phosphoric acid, 50%	A	A	—	A	A	A	A	A	B	—	A
Phthalic acid	A	D	B	A	A	—	A	—	—	—	B
Plating solutions	A	B	D	A	A	A	A	—	—	—	—
Polyglycol	B	B	A	A	A	—	A	—	—	—	—
Potassium carbonate	B	A	—	A	A	—	A	—	A	A	B
Potassium chlorate	B	A	B	A	A	—	A	—	A	A	B
Potassium hydroxide (med)	A	A	B	B	B	B	A	A	D	A	B
Potassium hydroxide (conc)	A	A	C	D	D	B	A	A	D	—	B
Potassium iodide	B	A	—	A	A	—	A	—	—	—	A
Propanol (propyl alcohol)	C	—	A	D	D	D	B	A	B	A	A
Pyridine	C	D	D	D	D	D	A	D	D	A	A
Silicone fluids	A	A	—	B	B	—	A	—	—	A	A
Silicone oils	A	A	—	B	B	A	A	—	A	A	A
Silver nitrate	A	A	A	A	A	A	A	A	A	A	B
Soap solutions	A	A	B	A	A	A	A	A	A	A	A
Sodium bicarbonate	A	A	A	A	A	A	A	A	A	A	B
Sodium bisulfate	A	A	—	A	A	—	A	A	A	A	D
Sodium bisulfite	A	A	A	A	A	A	A	—	A	—	B
Sodium borate	A	A	A	A	A	A	A	A	A	A	B
Sodium carbonate	A	A	A	A	A	B	A	A	A	A	A
Sodium chlorate	A	A	C	B	B	—	A	A	A	A	B
Sodium chloride	A	A	B	A	A	—	A	A	A	A	C
Sodium ferrocyanide	A	A	—	B	B	—	A	—	—	—	B
Sodium hydrosulfite	B	A	—	A	A	—	A	—	—	—	—
Sodium hydroxide (dil)	A	A	A	A	D	B	A	A	D	A	A
Sodium hydroxide, 25%	C	B	B	B	D	B	A	A	D	A	B
Sodium hydroxide (conc)	—	C	—	B	D	B	A	—	D	A	C

\*Do not use the L/S\* PTFE-tubing pump head with gases due to excessive heat build up.

Fluid	Tubing formulation							Pump head material			
	PN	CF	S	T	TU	V	PT	PSF	PC	PPS	SS
Sodium hypochlorite, <5%	B	A	B	B	B	B	A	A	B	A	A
Sodium hypochlorite, >5%	C	A	B	B	B	A	A	A	—	—	C
Sodium nitrate	B	A	D	A	A	—	A	—	—	A	B
Sodium silicate	A	A	A	A	A	A	A	A	—	A	B
Sodium sulfide	A	A	A	B	A	—	A	A	—	A	C
Sodium sulfite	A	A	A	A	A	—	A	—	D	—	A
Sulfuric acid (dil)	A	A	D	A	B	A	A	A	A	A	D
Sulfuric acid (med)	C	A	D	A	B	A	A	A	B	D	C
Sulfuric acid (conc)	D	A	D	D	D	A	A	D	C	D	D
Sulfurous acid	A	A	D	A	A	A	A	A	—	A	C
Tannic acid	A	A	B	A	A	—	A	A	—	A	B
Tanning liquors	A	B	—	A	A	—	A	A	—	—	A
Tartaric acid	—	A	A	A	A	A	A	A	B	A	C
Tin salts	B	A	B	A	A	—	A	—	—	—	—
Toluene (toluol)	D	D	D	D	D	—	A	—	D	D	A
Trichloroacetic acid	D	A	D	B	D	C	A	—	D	A	D
Trichloroethylene	D	D	D	D	D	A	A	C	D	A	B
Trisodium phosphate	A	A	—	A	A	A	A	—	—	A	B
Turpentine	C	D	D	B	A	A	A	—	—	A	A
Urea	A	A	B	A	A	—	A	C	D	A	A
Uric acid	A	A	—	A	A	—	A	—	—	—	B
Water, fresh	A	A	B	A	A	A	A	A	A	A	A
Water, salt	A	A	A	A	A	A	A	A	A	A	A
Xylene	D	D	D	D	D	A	A	D	D	A	B
Zinc chloride	B	A	B	A	A	A	A	A	A	A	D

\*Do not use the L/S\* PTFE-tubing pump head with gases due to excessive heat build-up.

## Tubing for Food Products

Liquified food products	Norprene® food	Silicone	Tygon® food
Alcohol	B	—	—
Beer	B	A	—
Brandy	B	—	—
Butter	A	B	A
Carrot	A	—	A
Chocolate syrup	A	—	A
Citric acid	A	—	A
Coffee	A	A	—
Corn oil	—	A	—
Corn syrup	—	—	A
Fish	—	—	A
Fruit juices	A	—	A
Liqueurs	B	B	—
Mayonnaise	A	—	A
Milk	A	—	A
Milk of magnesia	A	—	B
Molasses	A	—	B
Orange syrup	A	B	—
Sauerkraut	A	—	B
Shortening (liquid)	C	B	—
Soft drink concentrate	B	C	—
Sugar	A	—	A
Tomatoes	A	—	A
Vegetable oil	B	A	B
Vinegar	A	B	A
Whiskey	B	B	B
Wines	B	—	B

**BE ABSOLUTELY SURE!**

Request your  
**FREE**

Masterflex® Tubing Test Kit to test the compatibility of your chemicals against up to 15 different tubing formulations. See tubing test procedure on the facing page.



**NEW!**