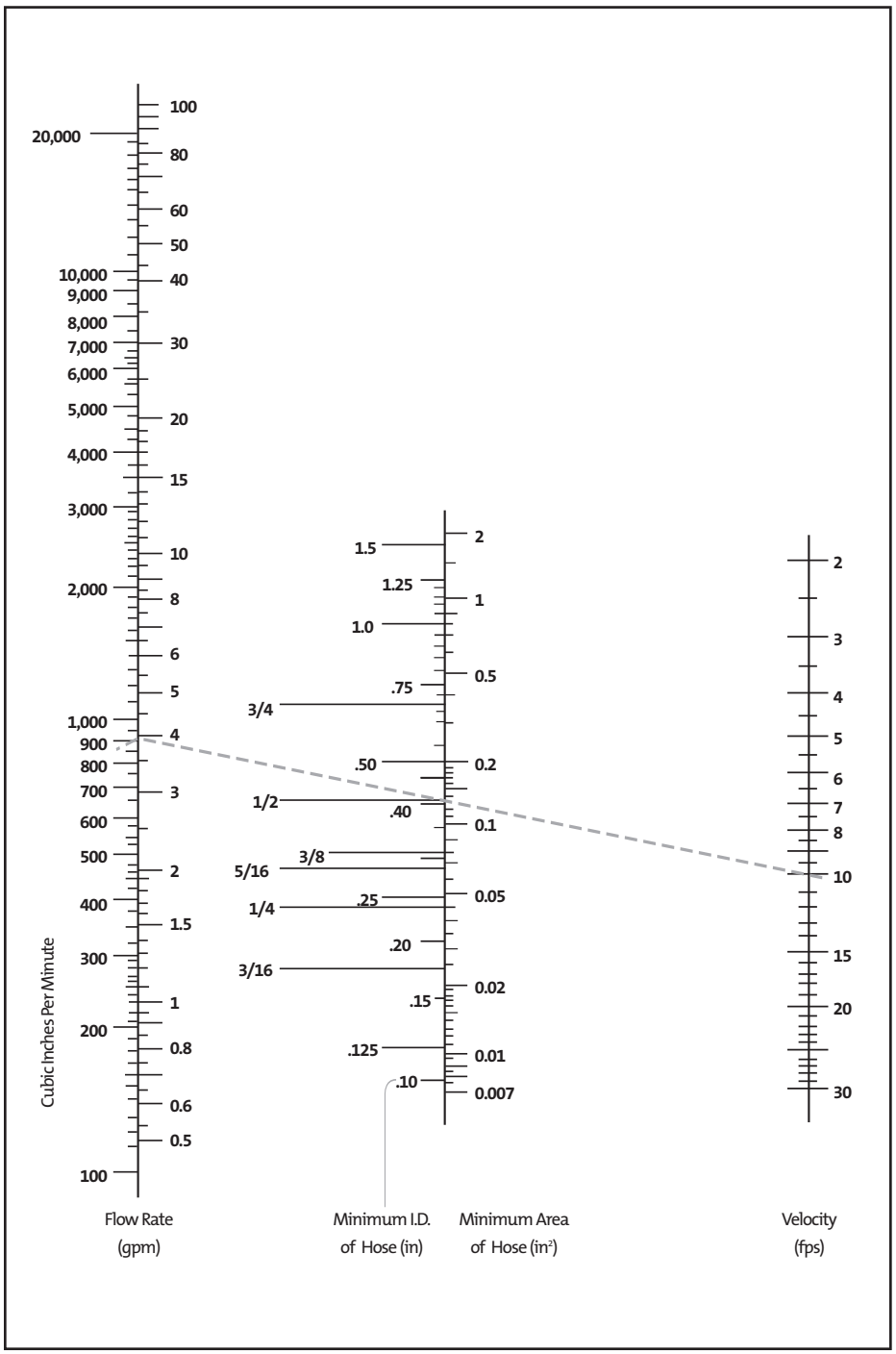
8 Technical and Design Information

Technical and Design Information

Hose Size vs. Flow Capacity



How to Select the Correct Hose Size

The hose I.D. may be determined if the fluid flow rate and velocity are known by using the nomograph.

Nomograph data is based on the formula:

$$\text{Area} = \frac{\text{Flow Rate x 0,3208}}{\text{Velocity}}$$

How to Use the Nomograph

1. Find the two known values.
2. Lay a straightedge to connect the known values.
3. The intersection point on the third vertical line identifies the point for that factor.

Example: A pump has a flow rate of 4 gpm. The necessary velocity is 10 fps. What hose size is required?

With a straightedge placed on 4 gpm and 10 fps, the answer is 1/2 inch hose I.D.

Selection, Installation and Maintenance of Synflex Hose and Assemblies

Proper hose selection, installation and maintenance practices should be followed to ensure that hose and hose assemblies have long life and operate safely. Failure to consider these practices could result in unplanned down-time, damage or injury. The general industry practices assembled below are provided as a guide for hose selection, installation and maintenance. Careful consideration for applying these practices is recommended.

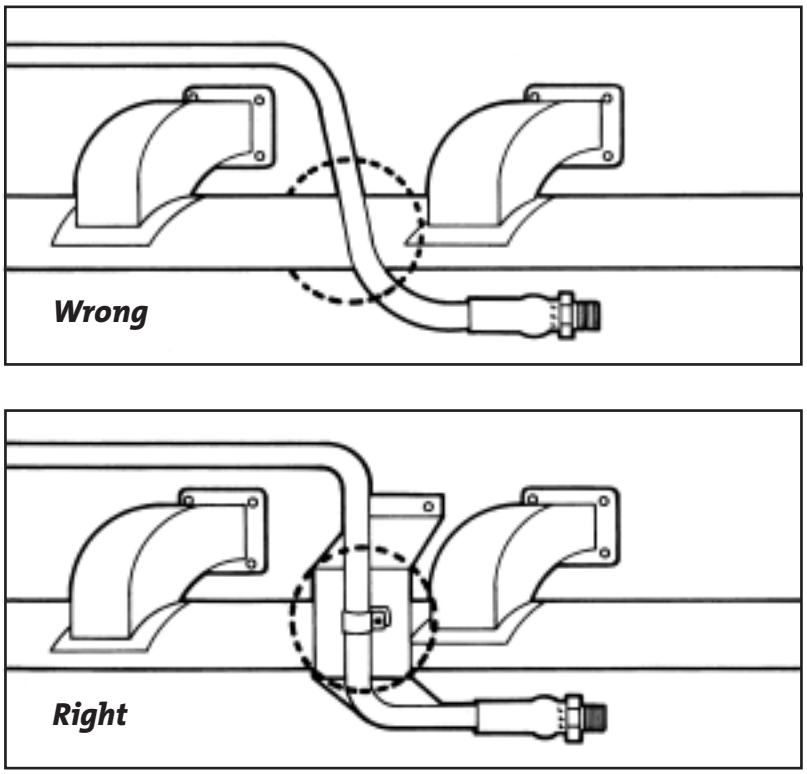


Figure 1

Pressure – Determine the maximum operating system pressure and select a hose that will have a maximum working pressure equal to or in excess of the operation system's maximum pressure. It is very important to take into account surge pressures that may be higher than normal operating pressures.

Temperature – Determine the maximum and minimum operating temperatures and select a hose that is designed for use within this temperature range. Consider transient thermal conditions resulting from startup, heat buildup from idling, etc. Special protection from hot equipment may be required.

Chemical and Environmental Resistance – Determine the type and concentration of the fluids and chemicals that will come in contact with the hose core tube I. D. and hose cover. Apply the Hose and Tubing Selection Guide or product construction description to identify the types of polymers used to form the core tube and cover. With this information, locate the compatibility rating of the combination of chemicals and/or fluids with the polymer type described in the Chemical Resistance data on pages 8.4-8.5 Contact Synflex Product Customer Support to request data for chemicals and conditions not listed.

Size – Select the proper I. D. based on system requirements such as fluid flow rate or velocity. The Hose Selection Nomograph on page 8.1. can help determine the hose I. D.

Electrical Conductivity – Each hose application should be evaluated for the importance of selecting a hose designed to prevent flow of electrical current (e.g. aerial hydraulics) or a hose designed to sufficiently conduct static electricity to safe ground connections. The conducting hose design requires special conducting couplings which should be selected along with the hose.

Component Inspection – Prior to installation, inspect hose for I. D. obstruction or damage such as blisters, looseness or cracks in the hose cover and evidence of having been kinked. Check couplings for thread damage or bent coupling components.

Routing – Many problems can be avoided by installing hose and hose assemblies away from hot equipment such as exhaust manifolds. Insulating heat shields may be necessary in some cases (Figure 1).

Selection, Installation and Maintenance of Synflex Hose and Assemblies

Minimum Bend Radius – Tight bends that exceed the hose minimum bend radius should be avoided. Spring guards or stress relief sleeves may be required to protect against exceeding prescribed minimum bend radii (Figure 2).

Torsional Flexing – When equipment parts exhibit relative motion, hose connections should be located so hoses bend instead of twist.

Coupling Connections – Follow the coupling installation instructions provided in this catalog or enclosed with assembly equipment and described in product standards. Attach only the couplings specified for each hose design and do not mix components that are produced by different manufacturers. Proper coupling end selection is very important to eliminate twists and kinks in installed assemblies when connecting couplings to port connections. Swivel couplings are designed to allow for the hex rotation during tightening and bent tube or elbow couplings can eliminate kinks (Figure 3).

Torque Wrench Application – Use torque values where specified when tightening coupling connections to prevent leakage and damage.

Final Check Out – After components are assembled, purge entrapped air and pressurize system to maximum operating pressure. Inspect for leaks and proper function. Perform electrical conductivity tests on designs serving as static electricity discharge paths.

It is important that designers and users consider hose and hose assemblies as having a finite life. Therefore maintenance and replacement is usually necessary at specific intervals.

Maintenance Interval – Frequency of maintenance inspection should be determined by the system designer and user based on the severity of the application, precious service life experience and risk potential.

Maintenance Program – Recommended maintenance should include the following steps as minimum practice:

Leakage – Turn off equipment and bleed down pressures prior to inspection to minimize risk to personnel. Inspect the full length of the hose and coupling connections for leaks.

Damage – Inspect hose for cuts, abrasion, cracks, blisters, kinked or crushed areas, heat degradation or cover looseness at the port or hose connection. Inspect hose guards for damage using the steps applied to the hose and couplings.

Electrical Continuity – In applications requiring the hose assembly to conduct static electricity to a ground connection, test hose assemblies using a megohmeter in accordance with recommended procedures described on the permanently attached tag.

Replacement – Hose and/or assembly replacement should be considered at specific intervals under normal conditions. If leakage, loss of conductivity (when required), coupling separation and/or signs of damage are detected, the hose assembly should be replaced immediately.

Hose Routing – Under pressure, a hose may change in length. Always provide some slack in the hose to allow for this shortening or elongation (However, excessive slack in hose lines may cause poor appearance) (Figure 4).

Figure 2

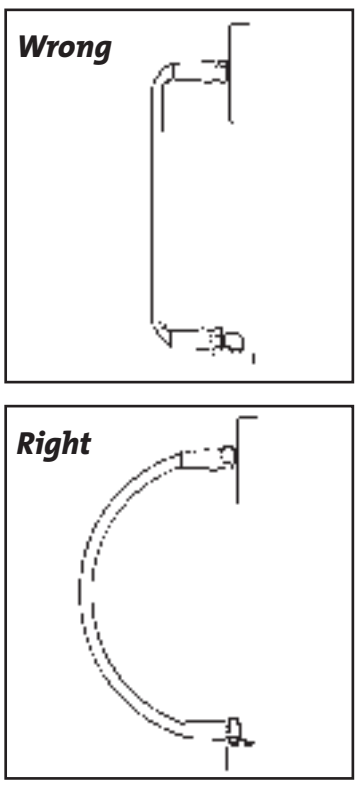


Figure 3

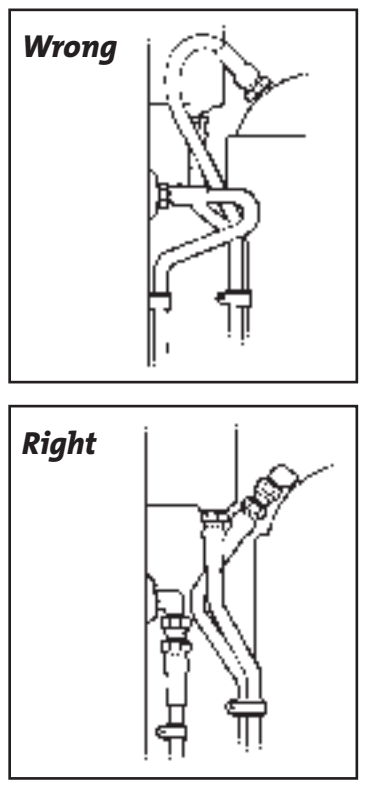
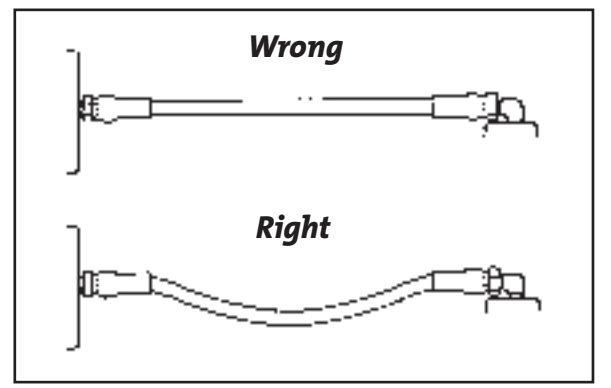


Figure 4



Chemical Resistance Data

Hose Material Key

N = Nylon
H = Polyester
P = Polyolefin
U = Polyurethane
V = PVC - Polyvinyl Chloride

Resistance Rating Key

G = Good
L = Limited
P = Poor
NT = Not Tested

This chart is intended to serve as a guide and does not guarantee suitability of hose material with the chemicals listed.
Final selection of materials is dependent on many factors including variations in temperature, pressure and duration of exposure.

	N	H	P	U	V		N	H	P	U	V		N	H	P	U	V
Acetaldehyde	G	G	L	G	P	Carbon Bisulfide	G	L	P	L	P	†Ethylene Glycol	G	G	G	L	G
Acetic Acid	L	L	G	L	G	Carbon Disulfide	G	L	P	L	P	Ethylene Oxide	G	L	L	L	NT
Acetic Anhydride	L	L	G	L	P	Carbon Monoxide	G	G	G	G	G	Fatty Acid	G	G	P	G	G
Acetone	G	L	L	P	P	Carbon Tetrachloride	G	P	P	P	L	Ferric Chloride	L	NT	G	NT	G
Acetyl Bromide	P	P	P	P	P	Carbonic Acid	G	L	G	L	G	Ferric Sulphate	G	G	G	G	G
Acetyl Chloride	P	P	P	P	P	Castor Oil	G	L	G	L	G	Fluoboric Acid	NT	P	G	P	GL
Acetylene	G	G	G	G	NT	Caustic Potash (>20%)	L	L	G	L	L	Fluorine	P	P	P	P	L
Air	G	G	G	G	G	Caustic Potash (<20%)	G	L	G	L	G	Fluorosilicic	NT	NT	G	P	GL
*Alcohols	G	L	G	L	G	Caustic Soda (>20%)	L	L	G	L	L	Formaldehyde	G	L	G	L	G
Aluminum Chloride	P	NT	G	NT	G	Caustic Soda (<20%)	G	L	G	L	G	Formic Acid	P	P	GL	P	GL
Aluminum Sulphate	G	NT	G	NT	G	Cellusolves Union Carbide	G	P	P	P	P	Freon	G	L	L	L	L
Alums	P	NT	G	NT	G	Cellulubes Celanese (Hydraulic						*Fruit Juices	G	G	G	G	G
Ammonia Gas	P	P	P	P	P	Fluid, Phosphate Ester Base)	G	P	P	P	P	Fuel Oil (Aromatic Gas)					
Ammonium Chloride	G	G	G	G	G	Chloracetic Acid	P	P	L	P	P	100 Octane	G	G	L	G	L
Ammonium Hydroxide	P	P	P	P	P	Chloroform	G	P	P	P	P	Fuel Oil	G	G	LP	G	L
Ammonium Nitrate	G	L	G	G	G	Chlordane	G	G	G	G	L	Furfuryl Alcohol	G	G	G	G	G
Ammonium Phosphate	G	L	G	G	G	Chlorinated Solvents	G	P	L	P	P	Galic Acid (<20%)	G	L	G	L	G
Ammonium Sulphate	G	L	G	G	G	Chlorine (Dry)	P	P	P	P	L	** Gas (Natural)	G	G	G	G	G
Amyl Acetate	G	L	P	L	P	Chlorine (Water) (<20%)	L	P	G	L	G	Gas Oil	G	GL	P	G	L
Amyl Alcohol	G	G	G	G	G	Chromic Acid	P	P	GL	P	L	Gasoline	G	G	LP	G	L
Anethole	G	NT	NT	NT	NT	Chromium Salts	G	G	G	G	G	Gasoline (Aromatic)	G	G	LP	G	L
Aniline	L	P	P	P	L	*Cider	G	G	G	G	G	Gasoline (Non-Aromatic)	G	G	LP	G	G
Animal Oils	G	G	P	G	G	Citric Acid	G	L	G	L	G	Gelatin	G	G	G	G	G
Antimony Salts	G	G	G	G	G	Coal Gas	G	G	G	G	G	Glucose	G	G	G	G	G
Apoclor Monsanto (Chlorinated						Copper Chloride	L	G	G	G	G	Glue (Depends on type)	G	G	G	G	G
Hydrocarbon Hydraulic Fluid)	G	L	L	L	L	Copper Sulphate	G	G	G	G	G	†Glycerine	G	G	G	G	G
Aromatic Hydrocarbons	G	L	P	L	P	*Corn Oil	G	G	G	G	G	†Glycol	G	G	G	L	G
Arsenic Salts	G	G	G	G	G	Cottonseed Oil	G	G	G	G	G	Greases	G	G	L	G	G
Asphalt	G	G	G	G	G	Creosote	P	P	L	P	L	Heavy Water (D2O)	G	G	NT	NT	NT
Auto Transmission Fluid	G	G		G		Cresols	P	P	L	P	L	Heptane	G	G	P	G	L
Barium Chloride	G	G	G	G	G	Cresylic Acid	P	P	L	P	L	Hexane	G	G	P	G	L
Barium Salts	G	G	G	G	G	Crude Petroleum Oil	G	L	P	G	G	†Houghto Safe Houghton 600					
Basic Copper Arsenate	G	G	G	G	G	Cupric Sulphate	L	L	G	L	G	Series (Hyd. Fluid Water					
Benzaldehyde	G	G	L	G	P	Cyclohexane	G	G	NT	G	NT	Glycol Base)	G	L	G	G	G
Benzene	G	L	P	L	P	Cyclohexanone	G	G	P	G	P	†Houghto Safe Houghton 1000					
Benzoic Acid	G	P	G	P	G	Decalin	G	NT	NT	NT	NT	Series (Phosphate Ester					
Benzol (Benzene)	G	L	P	L	P	Diacetone Alcohol	G	L	G	L	P	Base)	G	L	P	L	P
Benzyl Alcohol	L	L	L	L	L	Diammonium Phosphate	G	L	G	P	G	Hydraulic Fluid Petroleum Base	G	G	P	G	P
Borax	G	G	G	G	L	Dibutyl Phthalate	G	L	L	L	NT	†Hydraulic Fluid Water Glycol					
Bordeaux Mixture	G	G	G	G	G	Diesel Fuel	G	G	L	G	L	Base	G	G	G	G	G
Boric Acids	G	G	G	G	G	Diethanolamine (20% conc.)	G	L	NT	L	NT	†Hydraulic Fluid					
Boric Copper Sulphate	G	G	G	G	G	Diethyl Ether	G	L	G	L	L	Phosphate Ester	G	L	P	L	P
Bromine	P	P	P	P	L	Dioctyl Phosphate	G	L	P	L	P	Hydraulic Oil	G	G	P	G	NT
Butanol	G	G	G	G	G	Dioctylphthalate	G	L	P	L	P	Hydrochloric Acid (10%)	G	P	G	L	G
* Butter	G	G	G	G	G	Enamels	G	G	G	G	G	Hydrocyanic Acid	P	NT	G	NT	G
Butyl Acetate	G	L	P	L	P	Essential Oils	G	G	L	G	G	Hydrofluoric Acid	P	P	L	P	L
Calcium Arsenate	G	G	G	G	G	* Ethanol	G	L	L	L	L	Hydrogen Gas	G	G	G	G	G
Calcium Bisulphide	G	G	G	G	L	Ether	G	L	G	L	L	Hydrogen Peroxide (dil.)	G	G	G	G	G
Calcium Chloride	G	G	G	G	G	Ethyl Acetate	G	L	G	L	P	Hydrogen Peroxide (conc.)	P	P	G	P	L
Calcium Hydroxide (<20%)	G	L	G	L	G	* Ethyl Alcohol	G	L	G	L	L	Hydrogen Sulphide	L	L	G	NT	G
Calcium Hypochlorite	G	L	G	L	G	Ethyl Chloride	G	P	P	P	P	†Hydrolube Union Carbide—					
Calcium Salts	G	G	G	G	G	Ethylene Chlorhydrin	P	P	NT	P	P	(Hydraulic Fluid Water Glycol					
Carbolic Acid	P	P	G	P	P	Ethylene Dichloride	G	P	L	P	P	Base)	G	L	G	G	G

Chemical Resistance Data

	N	H	P	U	V		N	H	P	U	V		N	H	P	U	V
†Irus Shell 902 Hydraulic Fluid						Oleic Acid	G	G	P	G	L	Sodium Sulphate	G	G	G	G	G
(Water-Oil Emulsion)	G	G	L	G	G	OS 45 Monsanto Hydraulic Fluid						Sodium Sulphide	G	G	G	G	G
Isocyanates	G	G	G	G	NT	(Silicate Ester Base)	G	L	P	L	NT	Sodium Thiosulphate	G	G	G	G	G
Isopropyl Acetate	G	L	L	L	P	Oxalic Acid (-30%)	G	L	G	L	G	Solutions/Emulsions 2-4D					
Kerosene	G	G	LP	G	L	Oxygen	Refer to Factory					DDT Preparation Hydroxy					
Ketones	G	L	G	L	P	Ozone	G	G	P	G	G	Quinoline	G	NT	NT	NT	G
Lacquer Solvents	G	L	G	L	P	Paint (Oil Base)	G	G	L	G	L	Stannous Chloride	L	G	G	G	G
Lactic Acid	G	NT	L	NT	G	Paint Solvents (Oil Base)	G	L	L	L	L	Steam	P	P	P	P	P
Lard	G	G	G	G	G	Palmitic Acid	G	G	G	G	G	Stearic Acid	G	G	G	G	G
Lead Arsenate	G	G	G	G	G	Pentane	G	G	P	G	L	Stearin	G	G	NT	G	NT
Lead Sulphate	G	G	G	G	G	Perchloric Acid	P	P	G	P	L	Stoddard Solvent	G	P	L	P	L
Lead Tetramethyl	G	G	NT	G	NT	Perchlorethylene	G	P	P	P	L	Styrene	G	L	NT	L	NT
Lime	G	G	G	G	G	Petroleum Oils (Sour)	G	L	L	G	G	Sulphur	G	G	G	G	G
Linseed Cake	G	G	P	G	G	Petroleum Oils (Refined)	G	G	L	G	G	Sulphur Dioxide	P	P	G	P	L
Linseed Oil	G	G	P	G	G	Phenolates	L	L	L	G	L	Sulphur Trioxide	L	P	G	P	G
Lubricating Oils, Petroleum						Phenols	P	P	G	P	L	Sulphuric Acid (dil.)	L	LP	L	LP	G
Base	G	G	L	G	G	Phosphoric Acid	G	P	G	P	G	Sulphuric Acid (conc.)	P	P	L	P	P
†Lubricating Oils, Diester Base	G	L	P	L	NT	Picric Acid	L	P	G	P	G	Sulphurous Acid	P	LP	L	LP	L
Magnesium Chloride	G	G	G	G	G	Potash (Potassium Hydroxide)	L	P	G	P	L	Tannic Acid	G	L	G	L	G
Magnesium Hydroxide (<20%)	G	L	G	L	G	Potassium Chloride	G	G	G	G	G	Tar Oil	G	G	G	G	G
Magnesium Sulphate	G	G	G	G	G	Potassium Hydroxide						Tartaric Acid	G	G	G	G	G
Maleic Acid	G	L	G	L	G	(50% conc.)	L	P	G	P	L	Toluene	G	L	P	L	P
Mercuric Chloride	G	G	G	G	L	Potassium Nitrate	G	G	G	G	G	Toluol	G	L	P	L	P
Mercury	G	G	G	G	G	Potassium Permanganate						Tributyl Phosphate	G	L	P	L	P
**Methane	G	G	NT	G	P	(5% conc.)	P	P	P	P	G	Tricesylphosphate	G	L	P	L	P
Methanol	G	L	G	L	P	Potassium Sulphate	G	G	G	G	G	Trichloracetic Acid	P	P	GL	P	L
Methyl Acetate	G	L	G	L	P	Propane	G	G	G	G	G	Trichloroethylene	G	P	P	P	L
Methyl Bromide	L	P	P	P	P	†Pydraul (Stauffer) F-9, 150, 600,						†Trisodium Phosphate Solution	G	L	NT	L	G
Methyl Chloride	G	P	P	P	P	625	G	L	P	L	P	Turpentine	G	G	P	G	G
Methyl Sulphate	G	G	NT	G	NT	Pyrethrum	G	G	G	G	G	†Ucon Union Carbide (Hydraulic					
Methylethylketone (MEK)	G	L	G	L	P	Pyridine	L	L	G	G	P	Fluid Water Glycol Base)	G	L	G	G	G
Methylisobutylketone (MIBK)	G	L	G	L	P	†Sea Water	G	G	G	G	G	Urea	G	L	G	L	G
*Milk	G	G	G	G	G	†Skydrol Monsanto 500, 7000	G	P	P	P	P	Uric Acid	G	P	G	P	G
Mineral Oil	G	G	LP	G	G	†Soap Solution (conc.)	G	G	L	G	G	Varnish	G	G	L	G	P
Molasses	G	G	G	G	G	* † Soda Water	G	G	G	G	G	Vinegar	G	L	G	L	G
Mustard	G	G	NT	G	NT	Sodium Bicarbonate	G	G	G	G	G	† Water (150°F)	G	G	G	G	G
Naphtha	G	L	P	L	P	Sodium Bisulfite	G	G	G	G	G	White & Bagley No. 2190 Cutting					
Naphthalene	G	L	P	L	P	Sodium Borate	G	G	G	G	G	Oil	G	NT	NT	NT	NT
Nickel Chloride	P	P	G	NT	P	Sodium Carbonate	G	G	G	G	G	*Wine	G	G	G	G	G
Nicotine	G	G	G	G	G	Sodium Chloride	G	G	G	G	G	Wool Oil	G	G	G	G	G
Nitric Acid (<20%)	L	L	G	L	G	Sodium Cyanide	G	G	G	G	G	Xylol	G	L	P	L	P
Nitric Acid (>20%)	L	P	L	P	G	Sodium Hydroxide (<20%)	G	L	G	L	G	Xylene	G	L	P	L	P
Nitrobenzene	G	P	P	P	P	Sodium Hypochlorite	L	L	G	L	G	Zinc Chloride	G	G	G	G	G
* Nitrous Oxide	G	G	LP	G	G	Sodium Nitrate	G	G	G	G	G	Zinc Hydrate	P	L	G	L	G
Oil	G	G	L	G	L	†Sodium Phosphate Solution	G	G	G	G	G	Zinc Sulphate	P	L	G	L	G
* Oil of Turpentine	G	G	L	G	G	Sodium Silicate	G	G	G	G	G						

* *Does not imply NSF or FDA compliance*

† *Recommended operating temperature not to exceed 150° F (66°C)*

** *Does not imply AGA or UL compliance*

☁ *Recommended operating temperature not to exceed 100° F(37.8°C)*

Hose Material Reference Chart

Series	Core	Cover
3630	PVC	PVC
3R30	Nylon-Lined	Polyurethane
3000	Nylon	Polyurethane
3130	Nylon-Lined (1)	Polyurethane
3580	Polyester	Polyurethane
37AL	Polyester	Polyurethane
31NO	Nylon	Polyurethane
3440	Polyolefin	Polyurethane
3R80	Nylon	Polyurethane
3E80	Nylon	Polyurethane
3800	Nylon	Polyurethane
3840	Nylon	Polyurethane

Series	Core	Cover
3V10	Nylon-Lined	Polyurethane
3VE0	Nylon-Lined	Polyurethane
34BA	Polyester-Lined	PVC
31GW	Nylon	Polyurethane
32GW	Nylon	Polyurethane (2)
34GW	Nylon	Polyurethane
34PW	Polyolefin	Polyurethane
31B0	Nylon	Polyurethane
37B0	Polyurethane	Polyester
30CT	Polyester	Polyester

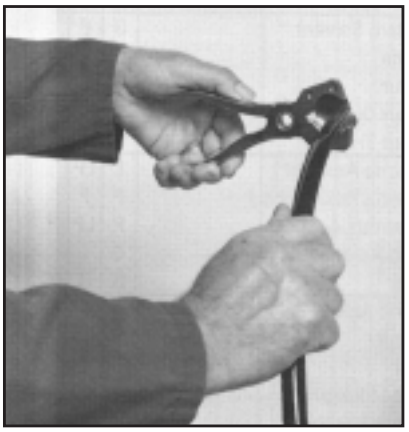
(1) –2 size is a nylon, single-wall design

(2) Except 32GW-DN4-JK1: Nylon Cover

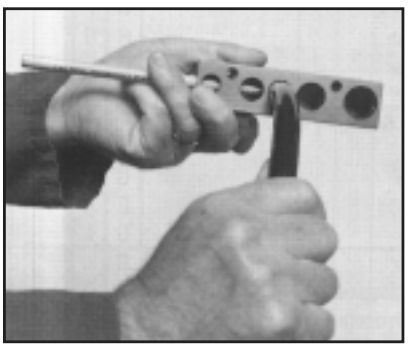
How to Assemble Permanent Hose Couplings

Instructions for using the Synflex Mark IX and Super Mark V Swaging Machines

1. Cut hose squarely with Hand-Held Hose Cutter 4523-04006 or Bench-Mounted Hose Cutter 4523-00000.



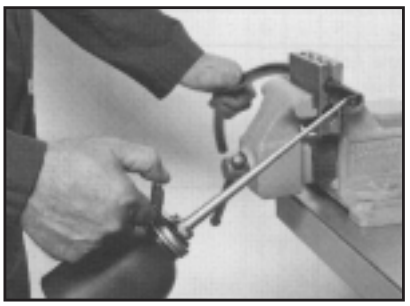
2. Mark hose for proper insertion depth into coupling. Use insertion depth chart below or use Insertion Depth marker 45J0-04603.



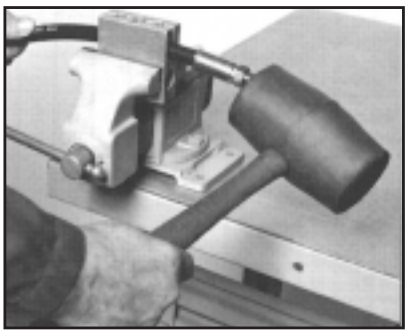
Permanent Coupling Chart
Insertion Depth Table

Hose I.D. (in)	Coupling Series Insertion Depth (in) 3903, 390A, 390P, 390H, 390L, 390S, 7903,790H, 390N	Coupling Series Insertion Depth (in) 3906
1/8	9/16	-
3/16	25/32	-
1/4	1-1/16	7/8
5/16	1-1/8	-
3/8	1-1/4	1-5/16
1/2	1-1/2	-
5/8	1-9/16	-
3/4	1-11/16	-
1	2-3/16	-

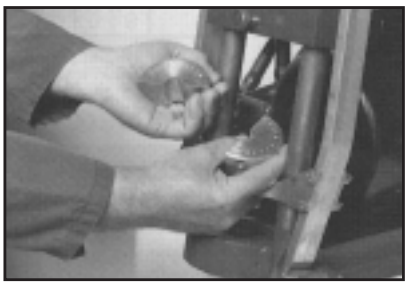
3. Oil inside hose diameter with SAE 20 oil. Consult Eaton Performance Plastics for oxygen system special assembly recommendations.

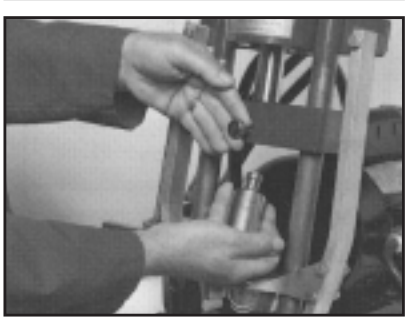


4. Insert hose into coupling to depth mark. (Use Vise Block 4504-00000 or 4504-01000 and rubber mallet to ease assembly.)

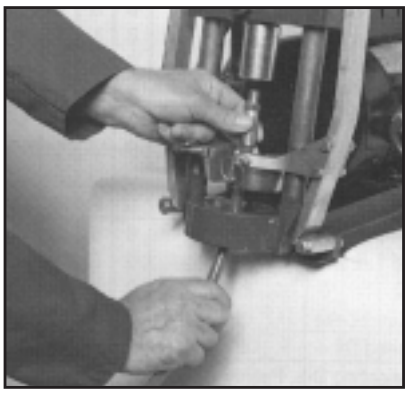


5. Insert the specified die and pusher into the swaging machine. Lubricate die swaging surface with SAE 90 gear oil. For stainless steel couplings use Swage Lubricant 4545-01001.

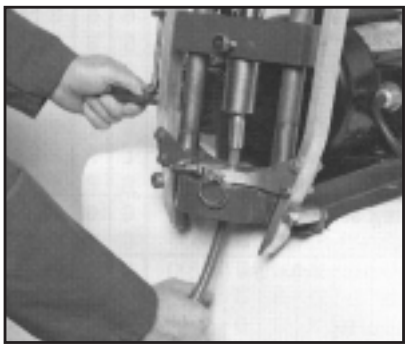


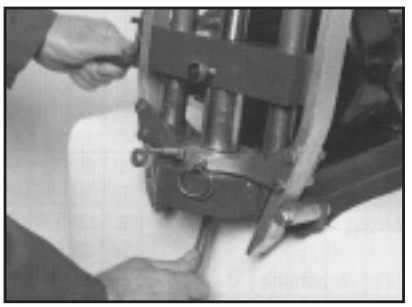


6. Insert hose end into the pusher.

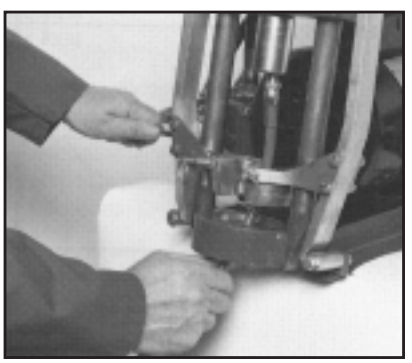


7. Pull control lever and guide coupling into the die until the pusher bottom is against the top of the die surface.





8. Push control lever to retract pusher and open die halves. Remove swaged hose assembly.



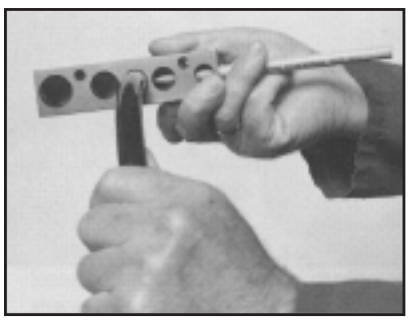
How to Assemble Permanent Hose Couplings

Instructions for using the Synflex SST Swaging Tool

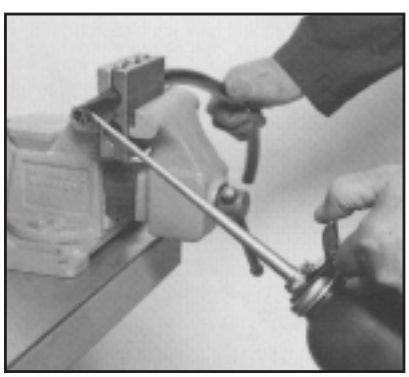
The SST may be used in several ways:
- *Clamp it by the "ear" in a vise*
- *Lay it on the floor with reaction arm in place*
- *Bolt it upright on your workbench using bench mounting bracket 4530-CP216*

1. Cut hose squarely with Hand-Held Hose Cutter 4523-04006 or Bench-Mounted Hose Cutter 4523-00000.

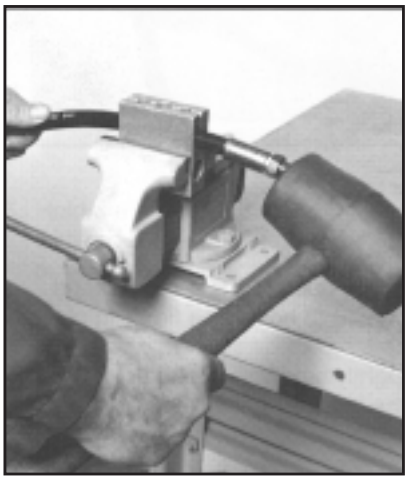
2. Mark hose for proper insertion depth into coupling. See page 8.6 for insertion depth table or use Insertion Depth marker 45J0-04603.



3. Lubricate inside hose diameter with SAE 20 oil or similar lightweight lubricant. Consult Eaton Performance Plastics for oxygen system special assembly recommendations.



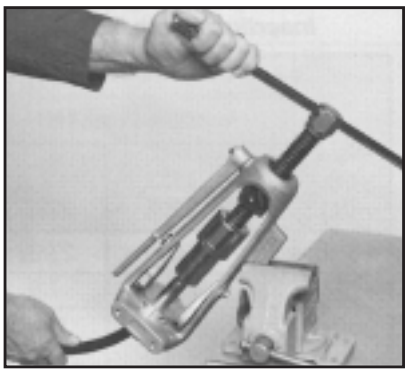
4. Insert hose into coupling to depth mark. (Use Vise Block 4504-00000 or 4504-01000 and rubber mallet to ease assembly.)



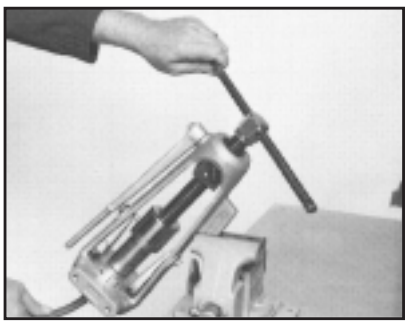
5. Insert the specified pusher with the pusher retainer in the raised position. Finger-tighten retaining screw to hold pusher firmly in place. Pusher must be allowed to rotate freely.

6. Place one die half into the base plate. Lightly oil the inner surface of both die halves with SAE 90 gear oil. For stainless steel couplings use Swage Lubricant 4545-01001.

7. Insert the assembled hose and fitting through the base plate and firmly into the pusher cavity. Place the other die half in base and lock into place by swinging clamps down firmly against top of dies. Rotate ball screw until coupling reaches the die.



8. With handle provided or 1-1/8 socket and ratchet, rotate screw CW until pusher bottom contacts top of die. Maintain pressure on ball screw and release die clamps. Slowly release pressure and rotate ball screw CCW until it is clear of the die. Remove swaged assembly.



How to Assemble Reusable Hose Couplings

Use Synflex 3000, 3R80, 3E80, 37AL series only.

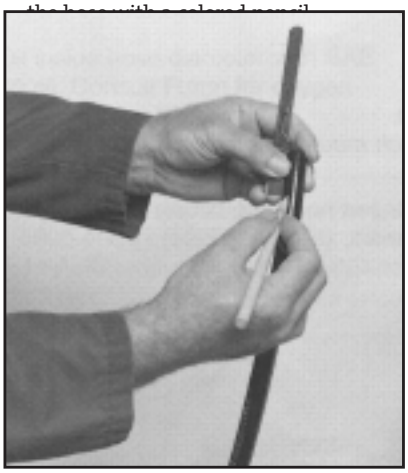
1. Cut hose squarely with Hand-Held Hose Cutter 4523-04006 or Bench-Mounted hose Cutter 4523-00000.

2. Use the following table to establish the length of hose that is inserted into the coupling socket.

Reusable Coupling Insertion Depth Table

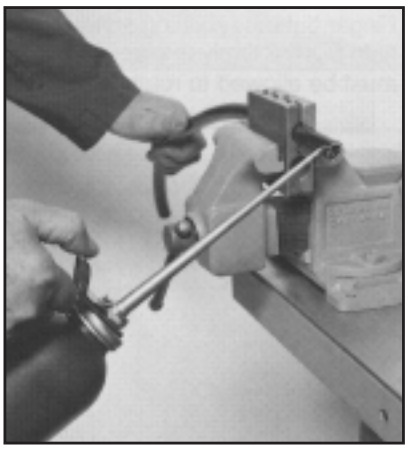
Hose I.D. (in)	Coupling Series Insertion Depth (in)	
	3901, 390J, 390K, 3908,	3902
1/8	21/32	-
3/16	27/32	27/32
1/4	1	7/8
5/16	1-3/32	1-1/8
3/8	1-3/16	1-1/4
1/2	1-5/16	1-1/2
3/4	1-1/4	1-11/16
1	1-11/16	-

3. Use a rule for measurement and mark the hose with a colored pencil.



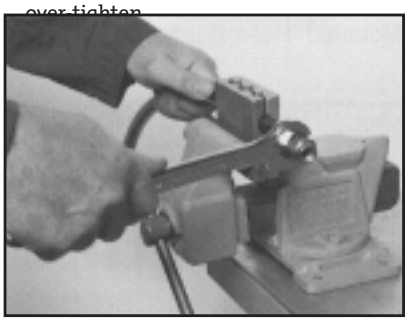
4. Insert hose into Vise Blocks (4504-0000 or 4504-01000) and tighten to hold hose firmly in place.

5. Lightly lubricate the outer surface of the hose to make it easier to push the coupling over the hose. For mild steel couplings and standard hose, use SAE 20 motor oil. For stainless steel couplings use Swage Lubricant 4545-01001*.



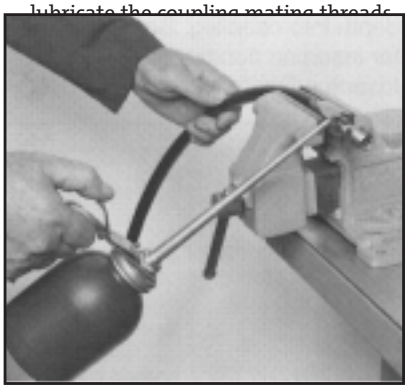
** Consult Eaton Performance Plastics for oxygen system assembly recommendations.*

6. Push coupling socket over the lubricated hose and screw coupling on by hand clockwise until the socket end is even with the depth mark. The end of the hose should be 3/23 inch to 1/16 inch from the inner shoulder of the coupling socket. It should NOT be bottomed against the shoulder. Do not over-tighten.

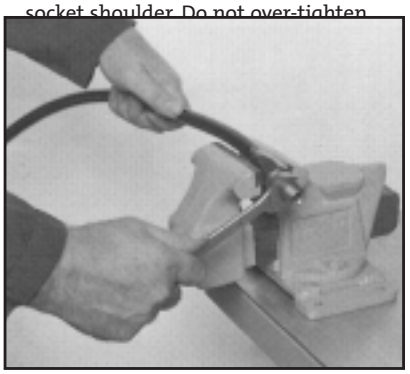


7. Remove hose and coupling assembly with Vise Blocks.

8. Place coupling socket in the vise and lubricate the coupling mating threads.



9. Screw the coupling insert clockwise into the socket with a wrench until the bottom of the insert hex contacts the socket shoulder. Do not over-tighten.



How to Separate Twin-Line and Multi-Line Hoses

Instructions for using the Twin-Line Hose Separation Tool

***** TOOL CONTAINS A SHARP BLADE. DO NOT PUT YOUR HANDS OR OBJECTS INSIDE THE TOOL. *****

1. The De-Twinner tool 4574-01000 is designed to split twinned hose without any damage to the hose. Selecting the proper die is critical to operating this tool safely. The proper die can be selected from the attached chart. Customer service can assist in proper die selection. The hose should fit snugly in the die without any extra slop.

Synflex De-Twinner Die Reference Sheet (4574-03000-xxx)

Hose Product	*Die * Number*	*Hose Product*	*Die * Number*
3R30-03	27	3R80-04	9
3R30-04	3	3R80-06	12
3R30-06	10	3R80-08	15
3R30-08	13		
		3E80-04	9
3130-02	1	3E80-06	12
3130-03	2	3E80-08	15
3130-04	4		
3130-05	8	3V10-03	5
3130-06	11	3V10-04	16
3130-08	13	3V10-06	17
3160-03	2	3VEO-03	5
3160-04	4	3VEO-04	16
3160-05	8	3VEO-06	17
3160-06	11		
3160-08	13	3840-03	18
		3840-04	19
37AL-03	2	3840-06	20
37AL-04	3	3840-08	21
37AL-05	7		
37AL-06	10	35NG-03	4
37AL-08	13	35NG-04	26
		35NG-06	12
30CT-04	3	35NG-08	15
30CT-05	22		
30CT-06	11	3V20-04	16
30CT-08	14	3V20-06	17
3360-03	2	3251-08	6
3360-04	4		
3360-05	23	31DW-04	5
3360-06	24		
3360-08	25		

** Die Number Stamped on end.*

2. To insert the die into the tool, first remove the retainer pin. This pin should also fit snuggly to prevent the die from moving. DO NOT REACH INTO THE TOOL OR PUSH ANYTHING THROUGH THE TOOL TO REMOVE THE DIE! The die extends out one side of the tool to allow ease of removal. Set the tool on its side with the long end of the die pointing up. Remove the die. Insert the new die from the same side and reset the pin.

3. Insert the assembled tool with die into a proper holding fixture (vise or other) and set stop at appropriate distance. The tool is cutting 2" before the exit end of the tool.

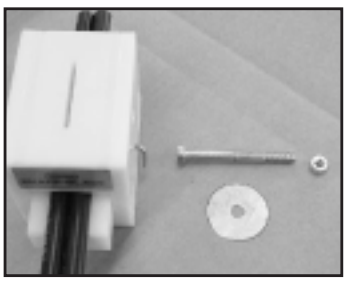
4. Apply a water soluble lubricant to the end of the first piece of product to be cut and slide it through the tool to the appropriate stop. Apply a few drops of lubricant to the end of each hose to be cut just before cutting. This will ease the cutting force and prolong blade life.

BLADE REPLACEMENT

1. Replacement blades are available from Eaton Performance Plastics.

2. Use proper protective gear (cut resistant gloves) when replacing the blade. This blade is very sharp.

3. Remove blade retainer nut and slide out blade retainer bolt. Tip tool over and the blade should fall out from the top. DO NOT TRY TO REMOVE IT FROM THE SLOT, THE MATERIAL SLIDES THROUGH.



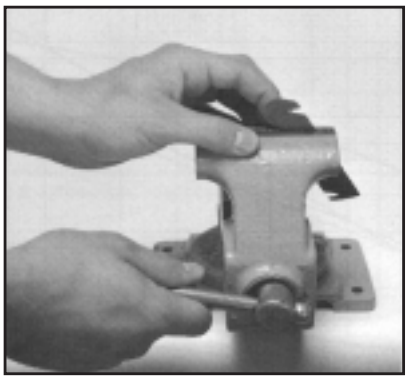
4. Insert new blade, bolt and nut. Tighten the locking nut only to the point that the bolt rotates as the product is cut. If it is too tight the blade and bolt will wear out prematurely.

5. The blade will last for thousands of cuts if properly installed and the operating procedures are followed correctly.

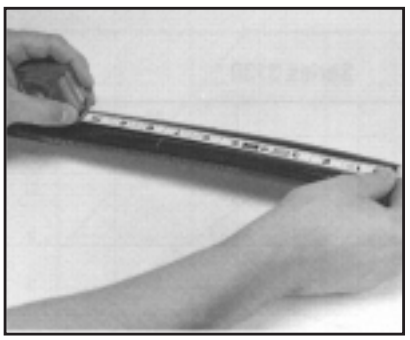
How to Separate Twin-Line and Multi-Line Hoses

Instructions for using the Multi-Line Hose Separation Tool

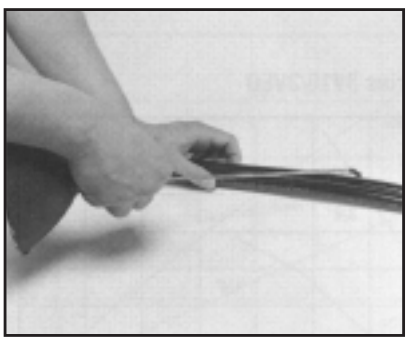
1. Remove the hose separation knife (Part Number 4573-00000) from the handle and place in a vise at a 45° angle to the top of the vise. Fasten securely in the vise jaws.



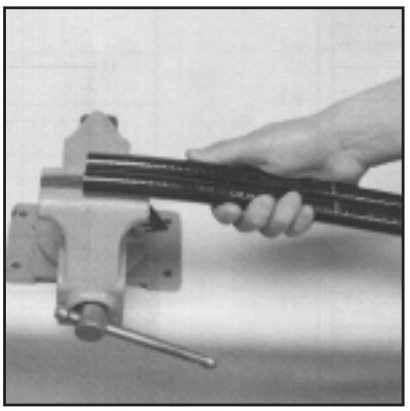
2. Measure and mark the distance to be separated.



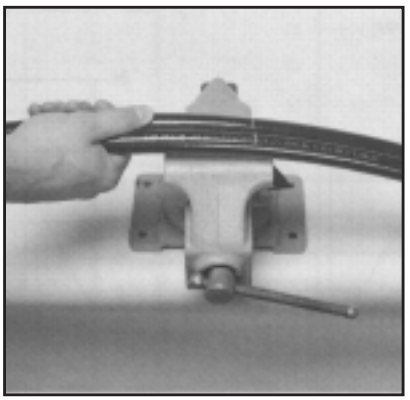
3. Lightly lubricate the hoses on both sides at the connecting web with a soap solution or lubricating oil. This step reduces friction between the knife blade and hose cover surfaces, plus keeps the knife centered during the cutting step.



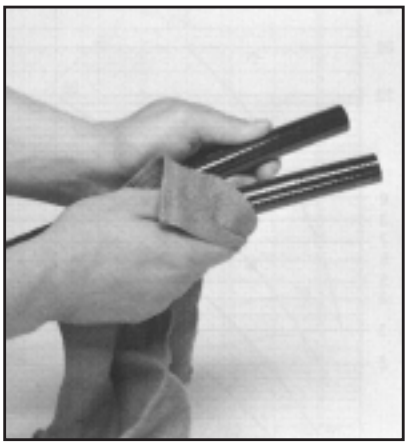
4. Push the hose into the "V" notch on the knife blade using a rocking motion to start the hoses into the blade.



5. Hold the hoses together and aligned with the blade while first pushing then pulling them to the mark, taking care not to cut the hose covers.



6. Remove the lubricant from the hoses and proceed with normal hose assembly.

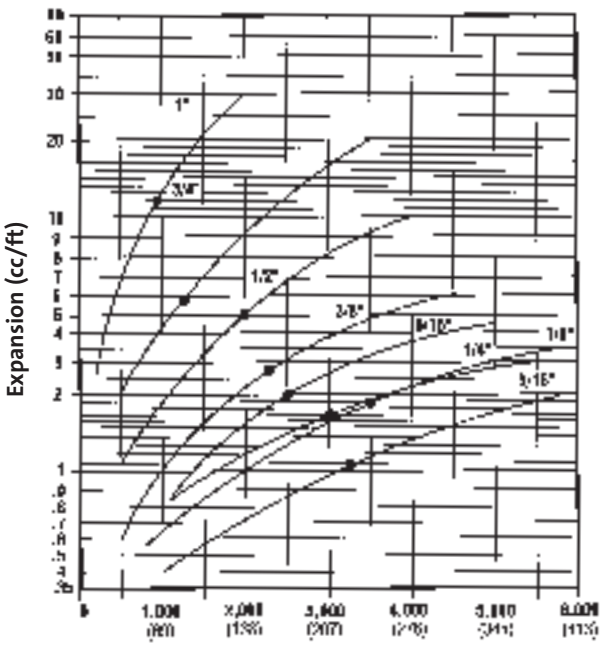


7. Examine the hose cover material where the hoses were attached to ensure they have not been cut, or the reinforcement fiber exposed. If the hose covers show signs of damage, the hose assembly should not be placed in service.

Volumetric Expansion Data

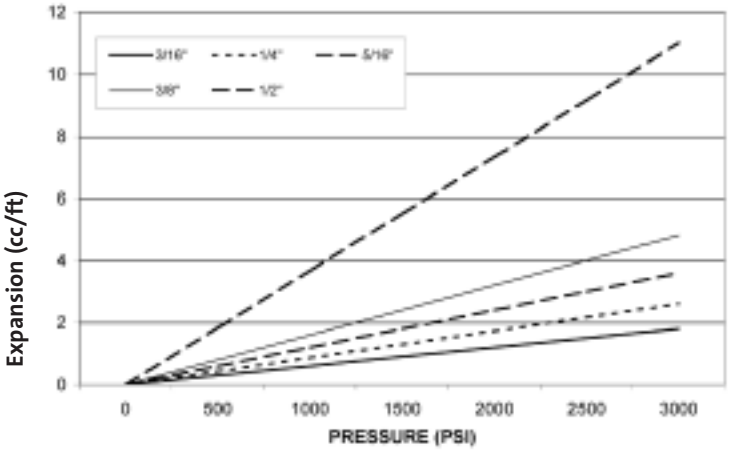
The following charts are based on a limited testing of each hose size according to SAE J343 Standard Publication.

Series 3000

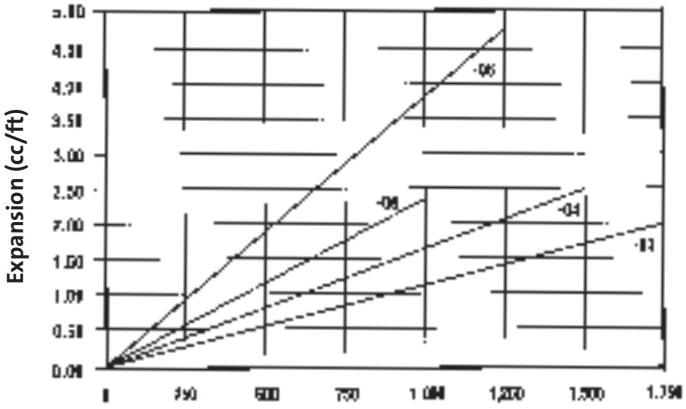


Pressure (psi) *Dots identify working pressures*

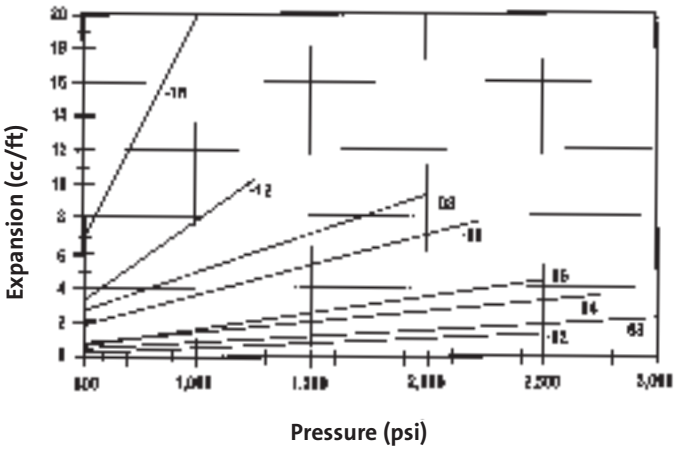
Series 37AL



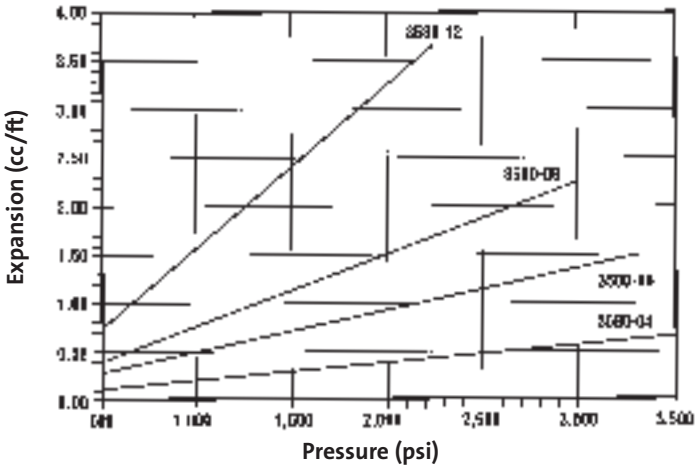
Series 3R30



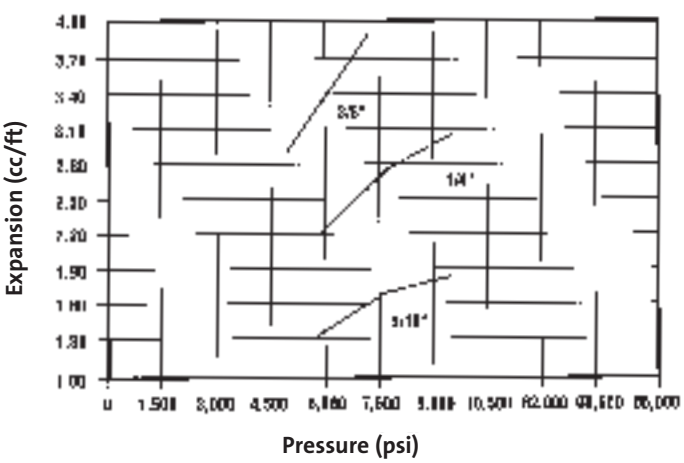
Series 3130



Series 3580

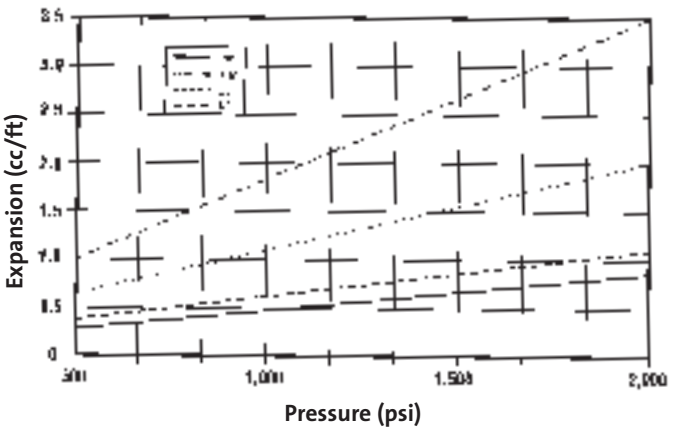


Series 3V10/3VEO

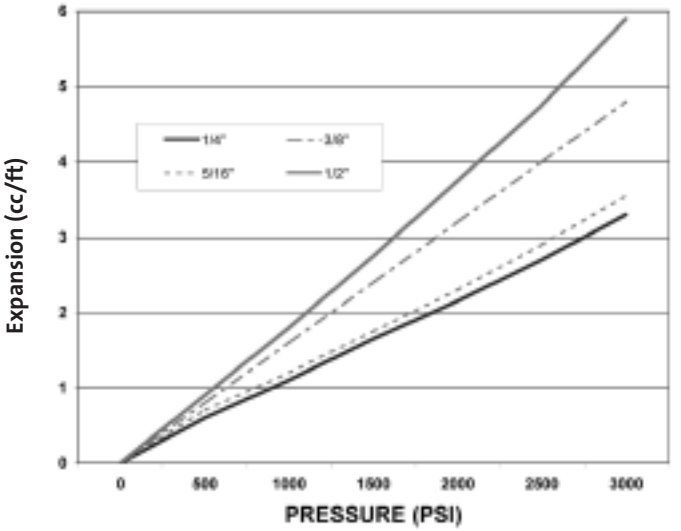


Volumetric Expansion Data

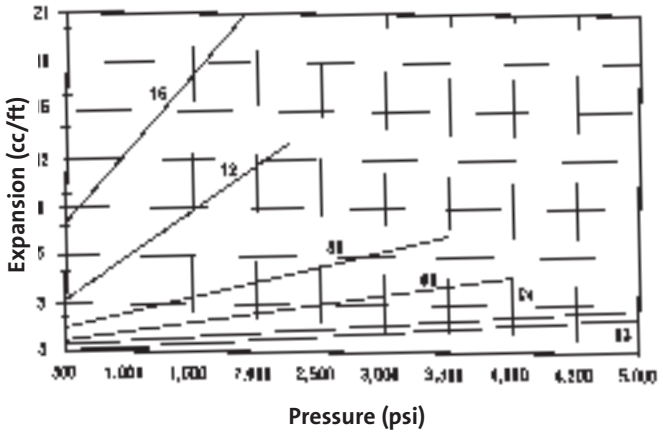
Series 31NO



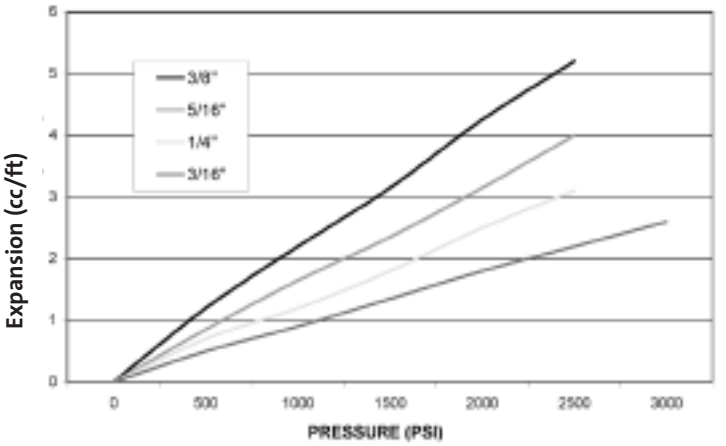
Series 30CT



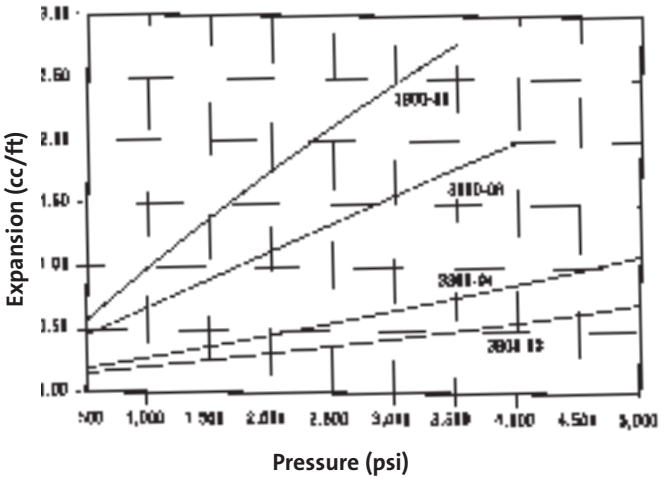
Series 3R80



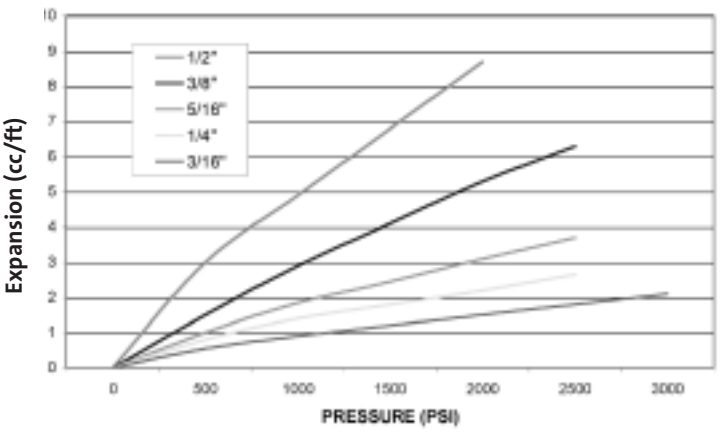
Series 31B0



Series 3800



Series 37B0



Conversion Tables

Pressure Conversions

From \ To	mmHg	in Hg	in H_2O	ft H_2O	atm	psi	Kg/cm²	kPa	bar
mmHg	1	0.03937	0.5353	0.04461	0.00132	0.01934	0.00136	0.1333	0.0013
inHg	25.40	1	13.6	1.133	0.03342	0.4912	0.03453	3.387	0.0339
inH_20	1.868	0.07355	1	0.08333	0.00246	0.03612	0.00254	0.249	0.0025
ftH_20	22.42	0.8826	12	1	0.0295	0.4334	0.03048	2.988	0.0299
atm	760	29.92	406.8	33.9	1	14.7	1.033	101.3	1.013
psi	51.71	2.036	27.69	2.307	0.06805	1	0.07031	6.895	0.0689
Kg/cm²	735.6	28.96	393.7	32.81	0.9678	14.22	1	98.05	0.981
kPa	7.5	0.2953	4.016	0.3347	0.00987	0.1451	0.0102	1	0.01
bar	750	29.53	401.6	33.47	0.987	14.51	1.02	100	1

How to Use Conversion Tables

- Locate known unit symbol in left vertical column - **From**
- Locate the desired unit in top horizontal row - **To**
- The factor at the intersection of the **From** row and **To** column is multiplied by the known unit quantity to calculate the desired unit quantity

Example:

Convert 3,000 lb/in² (psi) of a hydraulic pressure to kPa

Locate lb/in² row and kPa column in the Pressure Conversion Table; the factor is 6.895

Calculation:
6.895 x 3,000 lb/in² = 20,685 kPa

Flow Rate Conversions

From \ To	l/sec	gat/min	ft³/sec	ft³/min	bbl/hr	bbl/day
l/sec	1	15.85	0.3532	2.119	22.66	543.8
gal/min	0.06309	1	0.00223	0.1337	1.429	34.3
ft³/sec	28.32	448.8	1	60	641.1	$1.54x10^4$
ft³/min	0.4719	7.481	0.01667	1	10.69	256.5
bbl/hr	0.04415	0.6997	0.00156	0.09359	1	24
bbl/day	0.00184	0.02917	$6.50x10^5$	0.0039	0.04167	1

Length Conversions

From \ To	feet	inches	kilometers	meters	mm	miles
feet	1	12	0.000305	0.3048	304.8	0.0001894
inches	0.08333	1	0.0000254	0.0254	25.4	0.00001578
kilometers	3281	39372	1	1000	1000000	0.6214
meters	3.281	39.37	0.001	1	1000	0.000621
millimeters	0.003281	0.03937	0.000001	0.001	1	–
miles	5280	6360	1.609	1609	–	1

Weight Conversions

From \ To	g	kg	oz	lb
g	1	0.001	0.03527	0.0022
kg	1000	1	35.27	2.205
oz	28.35	0.02835	1	0.0625
lb	453.6	0.4536	16	1

Temperature Conversions

°C = (°F - 32) x .555
°F = (°C x 1.8) + 32

Look up the reading in the middle column. If in degrees Centigrade, read Fahrenheit equivalent in right-hand column; if in Fahrenheit degrees, read Centigrade equivalent in left-hand column.

C	F \ C	F
-73.0	-100	-148
-68.0	-90	-130
-62.0	-80	-112
-57.0	-70	-94
-51.0	-60	-76
-46.0	-50	-58
-40.0	-40	-40
-34.0	-30	-22
-29.0	-20	-4
-23.0	-10	14
-17.8	0	32
-17.2	1	33.8
-16.7	2	35.6
-16.1	3	37.4
-15.6	4	39.2
-15.0	5	41
-14.4	6	42.8
-13.9	7	44.6
-13.3	8	46.4
-12.8	9	48.2
-12.2	10	50
-11.7	11	51.8
-11.1	12	53.6
-10.6	13	55.4
-10.1	14	57.2
-9.4	15	59
-8.9	16	60.8
-8.3	17	62.6
-7.8	18	64.4
-7.2	19	66.2
-6.7	20	68
-6.1	21	69.8
-5.6	22	71.6
-5.0	23	73.4
-4.4	24	75.2
-3.9	25	77
-3.3	26	78.8
-2.8	27	80.6
-2.2	28	82.4
-1.7	29	84.2
-1.1	30	86
-0.6	31	87.8
0.0	32	89.6
0.6	33	91.4
1.1	34	93.2
1.7	35	95
2.2	36	96.8
2.8	37	98.6
3.3	38	100.4
3.9	39	102.2
4.4	40	104

C	F \ C	F
5	41	105.8
5.6	42	107.6
6.1	43	109.4
6.7	44	111.2
7.2	45	113
7.8	46	114.8
8.3	47	116.6
8.9	48	118.4
9.4	49	120.2
10	50	122
10.6	51	123.8
11.1	52	125.6
11.7	53	127.4
12.2	54	129.2
12.8	55	131
13.3	56	132.8
13.9	57	134.6
14.4	58	136.4
15	59	138.2
15.6	60	140
16.1	61	141.8
16.7	62	143.6
17.2	63	145.4
17.8	64	147.2
18.3	65	149
18.9	66	150.8
19.4	67	152.6
20	68	154.4
20.6	69	156.2
21.1	70	158
21.7	71	159.8
22.2	72	161.6
22.8	73	163.4
23.3	74	165.2
23.9	75	167
24.4	76	168.8
25	77	170.6
25.6	78	172.4
26.1	79	174.2
26.7	80	176
27.2	81	177.8
27.8	82	179.6
28.3	83	181.4
29.8	84	183.2
29.4	85	185
30	86	186.8
30.6	87	188.6
31.1	88	190.4
31.7	89	192.2
32.2	90	194
32.8	91	195.8

C	F \ C	F
33.3	92	197.6
33.9	93	199.4
34.4	94	201.2
34	95	203
35.6	96	204.8
36.1	97	206.6
36.7	98	208.4
37.2	99	210.2
37.8	100	212
43	110	230
49	120	248
54	130	266
60	140	284
66	150	302
71	160	320
77	170	338
82	180	356
88	190	374
93	200	392
99	210	410
100	212	413.6
104	220	428
110	230	446
116	240	464
121	250	482
127	260	500
132	270	518
138	280	536
143	290	554
149	300	572
154	310	590
160	320	608
166	330	626
170	338	640
171	340	644
177	350	662
182	360	680
186	366	691
188	370	698
193	380	716
198	388	730
199	390	734
204	400	752
208	406	763
210	410	770
216	420	788
221	430	806
227	440	824
232	450	842
238	460	860
243	470	878

Conversion Charts

Thread Chart

Dash Number	O.D. Tube Size	AN	JIC	SAE	NPTF (Male)
- 2	1/8	5/16-34	5/16-24	5/16-24	1/8-27
- 3	3/16	3/8-24	3/8-24	3/8-24	
- 4	1/4	7/16-20	7/16-20	7/16-20	1/4-18
- 5	5/16	1/2-20	1/2-20	1/2-20	
- 6	3/8	9/16-18	9/16-18	5/8-18	3/8-18
- 8	1/2	3/4-16	3/4-16	3/4-16	1/2-14
- 10	5/8	7/8-14	7/8-14	7/8-14	
- 12	3/4	1 1/16-12	1 1/16-12	1 1/16-14	3/4-14
- 16	1	15/16-12	15/16-2	1 3/8-12	1 -11-1/2

Decimal Equivalents of Inch Fractions

1/64	0.15625	17/64	0.265625	33/64	0.51563	49/64	0.765625
1/32	0.3125	9/32	0.28125	17/32	0.53125	25/32	0.78125
3/64	0.046875	19/64	0.296875	35/64	0.54688	51/64	0.796875
1/16	0.625	5/16	0.3125	9/16	0.5625	13/16	0.8125
5/64	0.78125	21/64	0.328125	37/64	0.57813	53/64	0.828125
3/32	0.9375	11/32	0.34375	19/32	0.59375	27/32	0.84375
7/64	0.109375	23/64	0.359375	39/64	0.60938	55/64	0.859375
1/8	0.125	3/8	0.375	5/8	0.625	7/8	0.875
9/64	0.140625	25/64	0.390625	41/64	0.64063	57/64	0.890625
5/32	0.15625	13/32	0.40625	21/32	0.66625	29/32	0.90625
11/64	0.171875	27/64	0.421875	43/64	0.67188	59/64	0.921875
3/16	0.1875	7/16	0.4375	11/16	0.6875	15/16	0.9375
13/64	0.203125	29/64	0.453125	45/64	0.70313	61/64	0.953125
7/32	0.21875	15/32	0.46875	23/32	0.71875	31/32	0.96875
15/64	0.234375	31/64	0.484375	47/64	0.73438	63/64	0.984375
1/4	0.25	1/2	0.5	3/4	0.75	1	1.000000

Conversion Table - Inches to Millimeters

in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
1/64	0.3969	13/64	5.1594	25/64	9.9219	37/64	14.68	49/64	19.4469	61/64	24.2094	1 9/32	32.544	1 21/32	42.0688
1/32	0.7937	7/32	5.5562	13/32	10.3187	19/32	15.08	25/32	19.8437	31/32	24.6062	15/16	33.338	1 11/16	42.8626
3/64	1.1906	15/64	5.9531	27/64	10.7156	39/64	15.48	51/64	20.2406	63/64	25.0031	1 11/32	34.131	1 23/32	43.6563
1/16	1.5875	1/4	6.3500	7/16	11.1125	5/8	15.88	13/16	20.6375	1	25.4001	1 3/8	34.925	1 3/4	44.4501
5/64	1.9844	17/64	6.7469	29/64	11.5094	41/64	16.27	53/64	21.0344	1 1/32	26.1938	1 13/32	35.719	1 25/32	45.2438
3/32	2.3812	9/32	7.1437	15/32	11.9062	21/32	16.67	27/32	21.4312	1 1/16	26.9876	1 7/16	36.513	1 13/16	46.0376
7/64	2.7781	19/64	7.5406	31/64	12.3031	43/64	17.07	55/64	21.8281	1 3/32	27.7813	1 15/32	37.306	1 27/32	46.8313
1/8	3.1750	5/16	7.9375	1/2	12.7000	11/16	17.46	7/8	22.2250	1 1/8	28.5751	1 1/2	38.100	1 7/8	47.6251
9/64	3.5719	21/64	8.3344	33/64	13.0969	45/64	17.86	57/64	22.6219	1 5/32	29.3688	1 17/32	38.894	1 29/32	48.4188
5/32	3.9687	11/32	8.7312	17/32	13.4937	23/32	18.26	29/32	23.0187	1 3/16	30.1626	1 9/16	39.688	1 15/16	49.2126
11/64	4.3656	23/64	9.1281	35/64	13.8906	47/64	18.65	59/64	23.4156	1 7/32	30.9563	1 19/32	40.481	1 31/32	50.0063
3/16	4.7625	3/8	9.5250	9/16	14.2875	3/4	19.05	15/16	23.8125	1 1/4	31.7501	1 5/8	41.275	2	50.8001

Conversion Table - Millimeters to Inches

in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
1	0.0394	7	0.2756	13	0.5118	19	0.748	26	1.0236	33	1.2992	40	1.5748	46	1.8810
2	0.0787	8	0.3150	14	0.5512	20	0.787	27	1.0630	34	1.3386	41	1.6142	47	1.8504
3	0.1181	9	0.3543	15	0.5905	21	0.827	28	1.1024	35	1.3779	42	1.6535	48	1.8898
4	0.1575	10	0.3937	16	0.6299	22	0.866	29	1.1417	36	1.4173	43	1.6929	49	1.9291
5	0.1968	11	0.4331	17	0.6693	23	0.906	30	1.1811	37	1.4567	44	1.7323	50	1.9685
6	0.2362	12	0.4724	18	0.7087	24	0.945	31	1.2205	38	1.4961	45	1.7716	51	2.0079
						25	0.984	32	1.2598	39	1.5354				

How to Order

Bulk Hose
Specify quantity in feet, part number or series, description, size, color (if choices are available) and coil lengths in feet.

Example - To order Synflex General Purpose Air and Water Hoses:
4,000 feet, Synflex part number 3630-08, General Purpose Air and Water Hose, 1/2 inch I.D., Black PVC cover, 400 feet coil lengths.

Hose Couplings
Specify quantity, part number, coupling material and type, hose I.D., connection and dash or pipe size, plus thread size.

Example - To order steel JIC 37° Female Swivel Permanent Hose Couplings:
100 couplings, Synflex part number 390H-04545 steel, JIC 37° female swivel, permanent type for 1/4 inch I.D. hose with -5 connection, 1/2-20 thread size.

Hose Assemblies
For hose assemblies requiring straight coupling designs*, specify quantity, part number, hose series, coupling material and type, hose I.D., end connection style and size for each end, plus overall length.

Example - To order hose assemblies constructed from 1/2 inch I.D. 3130 series hose with permanent steel couplings, both ends. The first coupling is a 1/2 inch male pipe size. The second, JIC 37° female swivel, -8 connection, 3/4-16 thread size. The assembly length is 36 inches.

Synflex Assembly Part Number

313 3 – 08 108 548 – 36

Hose Series, first three numbers, 3130.

Coupling material and type code, fourth number of coupling series, 3903 Table 1.

Hose I.D. in 16th of one inch or dash size.

First coupling end connection style code, plus pipe thread (16ths of one inch) or dash size. Last three numbers of coupling part number, 3903-08108.

Second coupling end connection style code, plus pipe thread (16ths of one inch) or dash size. Last three numbers of coupling part number, 3903-08548.

Length of assembly in inches.

** For elbow or bent tube coupling hose assemblies, the relative rotation angle between coupling ends must be specified.*

Table 1 – Coupling Material and Type Codes

Coupling Series	Code	Type
Zinc Plated Steel		
3903	3	Permanent
390H	H	Permanent
390N	N	Permanent
390V	V	Permanent
7903	3	Permanent
790H	H	Permanent
3901	1	Reusable
3902	2	Reusable
390J	J	Reusable

Couplings Series	Code	Type
Stainless Steel		
390A	A	Permanent
390L	L	Permanent
3908	8	Reusable
390K	K	Reusable
Monel		
390P	P	Permanent
390S	S	Permanent
Brass		
390C	C	Permanent
3906	6	Permanent

Note: *For current pricing, product availability, or terms and conditions, please contact a Synflex sales office or local Synflex sales representative. Office numbers and addresses are listed on the back cover of the binder. Product specifications and designs are subject to change without notice.*