

Quality Industrial Rubber Goods Since 1921

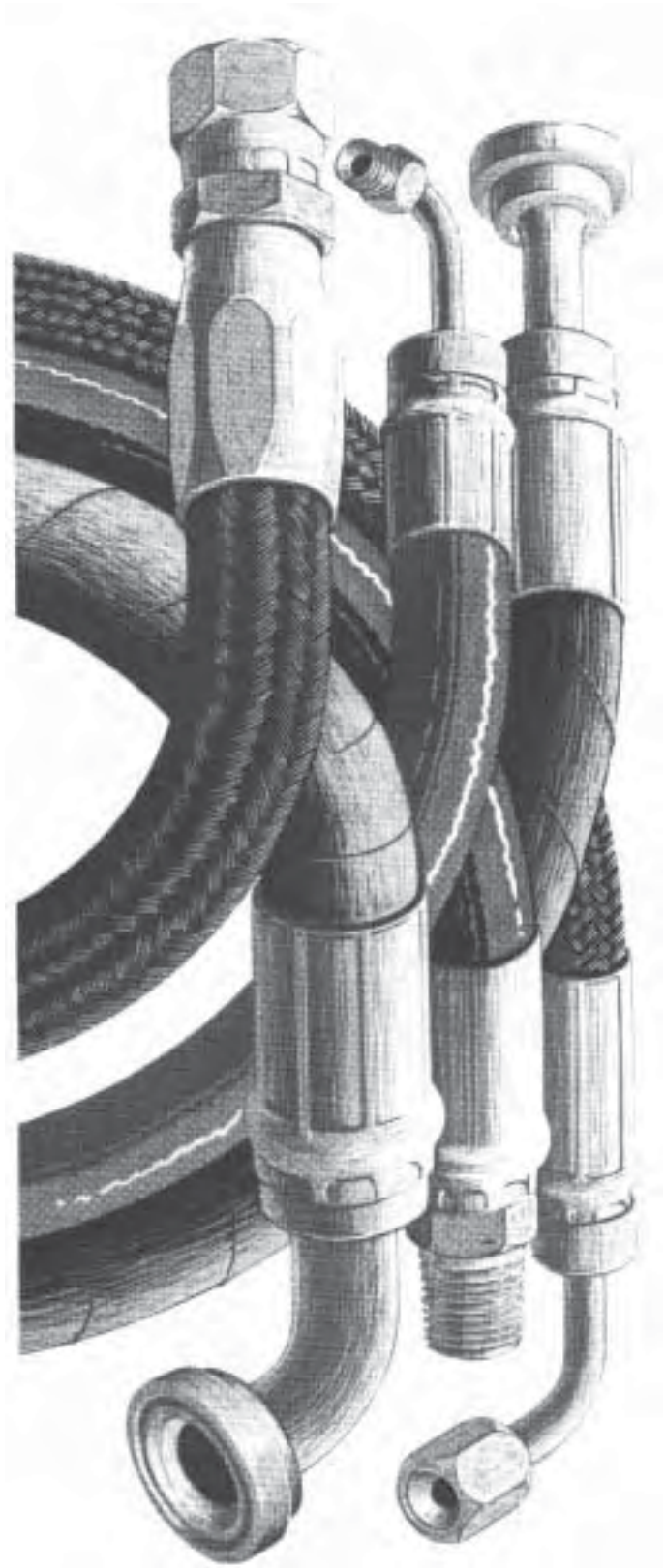


Potomac RUBBER COMPANY, INC.

Potomac Rubber Company • 9011 Hampton Overlook • Capitol Heights, MD 20743
Tel: 301-336-7400 • Fax: 301-350-6543 • info@potomacrubber.com • www.potomacrubber.com

Potomac

**HYDRAULIC
HOSE &
COUPLINGS**



GENERAL INFORMATION ENGINEERING DATA

Thread Types

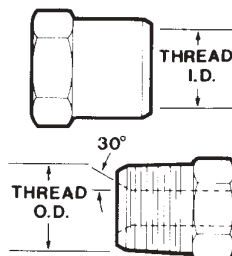
There are basically two thread systems used in hydraulics. One is the iron pipe thread, the other is the SAE standard screw thread. The type to be used on hydraulic hose couplings is usually predetermined by the pump and valve porting used in the system.

IRON PIPE THREADS

There are several variations of the iron pipe thread. For hydraulic service, it is recommended that the Dryseal American Standard Taper Pipe Thread form be used. This form seals by the mating of the male and female threads which are intentionally designed to provide a crushing of the threads as they mate. Note that the NPTF male is chamfered to 30°.

This allows mating with other iron pipe thread forms where the seal is obtained, not by thread interference, but by the seating of this chamfer against a corresponding seat in the female. Other iron pipe forms

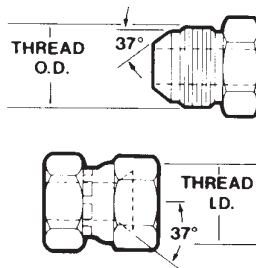
found, but not recommended for hydraulic systems, include National Pipe Straight thread for Fuel (NPSF).



Thread Size or Dash No.	Nominal Thread Size (In.)	No. Threads Per Inch	Male Thread O.D. (In.)	Female Thread I.D. (In.)
2	1/8	27	13/32	23/64
4	1/4	18	35/64	15/32
6	3/8	18	43/64	19/32
8	1/2	14	27/32	3/4
12	3/4	14	1 1/16	61/64
16	1	11 1/2	1 5/16	1 11/64

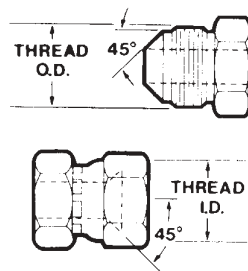
SAE SCREW THREADS

37° FLARED FITTINGS (JIC): JIC (Joint Industry Conference) seals are obtained by the mating of two beveled metal surfaces. The function of the threads is simply to draw these two surfaces together. This style is used particularly in high pressure systems. As illustrated to the right, both the bevel on the male and the seat in the female are machined to 37°.



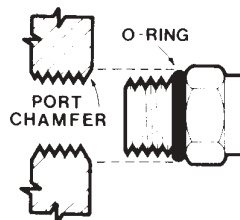
Thread Size or Dash No.	Nominal Thread Size (In.)	No. Threads Per Inch	Male Thread O.D. (In.)	Female Thread I.D. (In.)
2	5/16	24	5/16	17/64
3	3/8	24	3/8	21/64
4	7/16	20	7/16	25/64
5	1/2	20	1/2	29/64
6	9/16	18	9/16	1/2
8	3/4	16	3/4	1 1/16
10	7/8	14	7/8	13/16
12	1 1/16	12	1 1/16	31/32
14	1 3/16	12	1 3/16	1 1/64
16	1 5/16	12	1 5/16	1 15/64
20	1 5/8	12	1 5/8	1 35/64
24	1 7/8	12	1 7/8	1 51/64
32	2 1/2	12	2 1/2	2 27/64

45° FLARED FITTINGS (SAE): SAE flared fittings seal in the same manner as described above for JIC, however the mating surfaces are machined at 45°. These couplings are usually used for low pressure applications such as refrigerant and fuel lines in conjunction with copper tubing which flares easily to 45°.



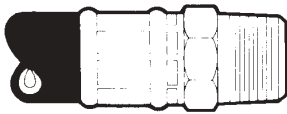
Thread Size or Dash No.	Nominal Thread Size (In.)	No. Threads Per Inch	Male Thread O.D. (In.)	Female Thread I.D. (In.)
2	5/16	24	5/16	17/64
3	3/8	24	3/8	21/64
4	7/16	20	7/16	25/64
5	1/2	20	1/2	29/64
6	5/8	18	5/8	9/16
8	3/4	16	3/4	1 1/16
10	7/8	14	7/8	13/16
12	1 1/16	14	1 1/16	63/64

O-RING BOSS — STRAIGHT THREAD: The O-Ring Boss fitting is a modification of the male JIC where the beveled 37° nose has been removed and a groove has been machined between the threads and the hex in which an O-Ring is seated. The female is a port which has been tapped to the proper straight thread size and chamfered at the port face to provide a O-Ring seat. Seal is made when O-Ring is trapped between port chamfer, thread under-cut, and the male fitting hex.

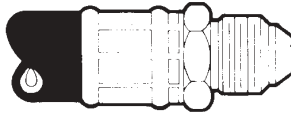


Thread Size or Dash No.	Nominal Thread Size (In.)	No. Threads Per Inch	Male Thread O.D. (In.)
4	7/16	20	7/16
5	1/2	20	1/2
6	9/16	18	9/16
8	3/4	16	3/4
10	7/8	14	7/8
12	1 1/16	12	1 1/16
16	1 5/16	12	1 5/16

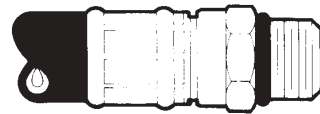
End Style Designation Chart



Style NP
Rigid Male
Pipe NPTF



Style NJ
Rigid Male 37° Flare
(JIC)



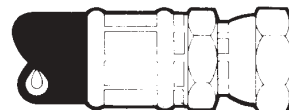
Style OS
Swivel Male
O-Ring Boss



Style MS
Swivel Male
Pipe NPTF



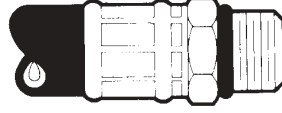
Style FJ
Swivel Female
37° Flare (JIC)



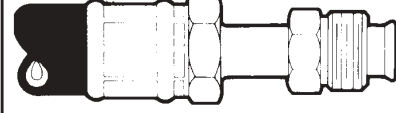
Style FA
Swivel Female
45° Flare (SAE)



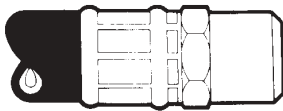
Style FN
Female Swivel
NPSM



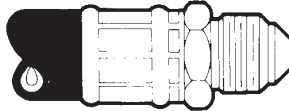
Style OR
Rigid Male
O-Ring Boss



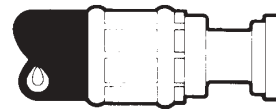
Style PES
Swivel Male SAE
45° Inverted Flare



Style FF
Rigid Female
NPTF



Style MA
Rigid Male 45°
Flare (SAE)



Style FH
Flange Head

THREAD STYLE CHART

THREAD SIZE REFERENCE NUMBERS: Just as size numbers are used to denote hose sizes, they also describe thread sizes.

SIZE OR "DASH" NO.	2	3	4	5	6	8	10	12	14	16	20	24	32	40	48
Tube O.D. (In.)	1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2	2	2 1/2	3
HOSE I.D. (In.)	—	3/16	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1	1 1/4	1 1/2	2	2 1/2	3
HOSE I.D. (In.) Style D, D3, RD, T1, T2, TS, TB	—	1/8	3/16	1/4	5/16	1 3/32	1/2	5/8	—	7/8	1 1/8	1 3/8	1 11/16	2 3/8	3
THREAD SIZE — T.P.I. IRON PIPE (NPTF)	1/8-27	—	1/4-18	—	3/8-18	1/2-14	—	3/4-14	—	1-11 1/2	1 1/4-11 1/2	1 1/2-11 1/2	2-11 1/2	2 1/2-8	3-8
THREAD SIZE — T.P.I. J.I.C. 37° FLARE	5/16-24	3/8-24	7/16-20	1/2-20	5/8-18	3/4-16	7/8-14	1 1/8-12	1 3/8-12	1 1/2-12	1 3/4-12	1 7/8-12	2 1/2-12	3-12	3 1/2-12
THREAD SIZE — T.P.I. SAE 45° FLARE	5/16-24	3/8-24	7/16-20	1/2-20	5/8-18	3/4-16	7/8-14	1 1/8-14	1 1/4-12	1 3/8-12	—	—	—	—	—
THREAD SIZE — T.P.I. O-Ring Boss	5/16-24	3/8-24	7/16-20	1/2-20	5/8-18	3/4-16	7/8-14	1 1/8-12	1 3/8-12	1 1/2-12	1 3/4-12	1 7/8-12	2 1/2-12	—	—
THREAD SIZE — T.P.I. Parker 30°	—	—	—	—	—	—	—	—	—	1 1/8-14	1 3/8-14	1 7/8-14	2 1/2-12	—	—
THREAD SIZE — T.P.I. SAE INVERTED FLARE	5/16-28	3/8-24	7/16-24	1/2-20	5/8-18	3/4-18	7/8-18	1 1/8-16	—	—	—	—	—	—	—

HYDRAULIC HOSES

VERY HIGH PRESSURE HOSE (TO 10,000 P.S.I. WORKING PRESSURE)



11 CE

SAE 100R12

PART NO.	HOSE SIZE (Nominal)		PRESSURE		BEND RADIUS	WEIGHT Per 100 Ft. (Lbs.)	COUPLING	CONSTRUCTION Temperature Range
	I. D. (In.)	O. D. (In.)	Maximum Recom. Working Pressure (PSI)	Minimum Burst Pressure (PSI)	Minimum Bend Radius (Inches)			
1112CE	3/4	1.210	4000	16000	9.5	89	BW	Tube: Seamless Neoprene, oil resistant. Reinforcement: Four alternate layers of high tensile steel wire, spirally applied. Cover: Oil and weather resistant, MSHA approved. Recomm. Temperature Range: -40°F to +250°F.
1116CE	1	1.495	4000	16000	12.0	130	BW	
1120CE	1 1/4	1.850	3000	12000	16.5	175	BW	
1124CE	1 1/2	2.105	2500	10000	20.0	200	BW	
1132CE	2	2.626	2500	10000	25.0	282	BW	

High Pressure Hose (To 5000 P.S.I. Working Pressure)



11 BX

SAE 100R2 AT

PART NO.	HOSE SIZE (NOMINAL)		PRESSURE		BEND RADIUS	APPLICATIONS	CONSTRUCTION
	I. D. (Inches)	O. D. (Inches)	Max. Recom. Working Pressure (PSI)	Min. Burst Pressure (PSI)	Min. Bend Radius (Inches)	Usual Service and Temperature Range	Compounding and Reinforcement
1104BX	3/4	1 1/2	5000	20000	4.0	Used for high pressure hydraulic lines on off-the-road construction equipment, machine tools, farm machinery, marine, and railroad equipment. Recomm. Temperature Range: -40°F. to +260°F.	Tube: Seamless, oil resistant Reinforcement: Two high tensile wire braids Cover: Oil and weather resistant
1106BX	3/4	3/4	4000	16000	5.0		
1108BX	3/4	3/4	3500	14000	7.0		
1112BX	3/4	1 1/4	2250	9000	9.5		
1116BX	1	1 3/4	2000	8000	12.0		
1120BX	1 1/4	1 3/4	1625	6500	16.5		
1124BX	1 1/2	2 1/4	1250	5000	20.0		
1132BX	2	2 3/4	1125	4500	25.0		

MEDIUM PRESSURE (TO 1,250 P.S.I. WORKING PRESSURE)



SAE 100R3

PART NO.	HOSE SIZE (Nominal)		PRESSURE		BEND RADIUS	WEIGHT Per 100 Ft. (Lbs.)	CONSTRUCTION Temperature Range
	I.D. (In.)	O.D. (In.)	Maximum Recom. Working Pressure (PSI)	Minimum Burst Pressure (PSI)			
1104H	¼	.577	1250	5000	3.0	13	Tube: Seamless Neoprene, oil resistant. Reinforcement: Two rayon braids. Cover: Oil and weather resistant. MSHA approved. Recomm. Temperature Range: -40°F. to +212°F.
1106H	⅝	.750	1125	4500	4.0	21	
1108H	¾	.930	1000	4000	5.0	30	
1112H	¾	1.240	750	3000	6.0	47	
1116H	1	1.478	565	2250	8.0	58	
1120H	1¼	1.759	375	1500	10.0	74	

LOW PRESSURE HOSE (PUSH-ON STYLE)



PART NO.	HOSE SIZE (Nominal)		PRESSURE		BEND RADIUS	WEIGHT Per 100 Ft. (Lbs.)	CONSTRUCTION Temperature Range
	I.D. (In.)	O.D. (In.)	Maximum Recom. Working Pressure (PSI)	Minimum Burst Pressure (PSI)			
1104L3	¼	.494	300	1200	2.5	9	Tube: Seamless Nitrile, oil resistant Reinforcement: One textile braid. Braid is laid over tube at a special angle which causes hose to tighten around coupling as pressure is applied. Cover: Oil and weather resistant. MSHA approved. Recomm. Temperature Range: -40°F to +212°F.
1106L3	⅜	.617	300	1200	3.0	11	
1108L3	½	.750	300	1200	5.0	15	
1110L3	⅝	.906	300	1200	6.0	19	
1112L3	¾	1.031	300	1200	7.0	23	

HYDRAULIC RETURN LINE (SUCTION)

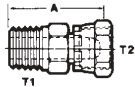


SAE 100R4

PART NO.	HOSE SIZE (Nominal)		PRESSURE		BEND RADIUS	WEIGHT Per	CONSTRUCTION Temperature Range
	I.D. (in.)	O.D. (in.)	Maximum Recom. Working Pressure (PSI)	Minimum Burst Pressure (PSI)	Minimum Bend Radius (Inches)	100 Ft. (Lbs.)	
1112C	¾	1.250	300	1200	5.0	58	Tube: Seamless Nitrile, oil resistant. Reinforcement: One circular woven layer with interwoven helix wire. Cover: Oil and weather resistant. MSHA approved. Vacuum: 25 inches Hg. Recomm. Temperature Range: -40°F to +212°F
1116C	1	1.500	250	1000	6.0	71	
1120C	1¼	1.766	200	800	8.0	79	
1124C	1½	2.078	150	600	10.0	114	
1132C	2	2.500	100	400	12.0	124	

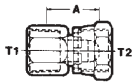
HYDRAULIC ADAPTERS

	Part No.	Thread T1	Thread T2	A
STYLE 53	1153-2-2	1/8	1/8	7/8
	1153-2-4	1/8	1/4	1 1/8
	1153-4-2	1/4	1/8	1 1/8
	1153-4-4	1/4	1/4	1 1/4
	1153-4-6	1/4	3/8	1 5/16
	1153-6-4	3/8	1/4	1 5/16
	1153-6-6	3/8	3/8	1 5/16
	1153-6-8	3/8	1/2	1 1/2
	1153-8-4	1/2	1/4	1 1/2
	1153-8-6	1/2	3/8	1 7/16
	1153-8-8	1/2	1/2	1 1/2
	1153-8-12	1/2	3/4	1 3/4
	1153-12-8	3/4	1/2	1 9/16
	1153-12-12	3/4	3/4	1 3/4
	1153-12-16	3/4	1	1 13/16
NPTF MALE TO NPSM SWIVEL FEMALE	1153-16-12	1	3/4	1 7/8
	1153-16-16	1	1	2
	1153-16-20	1	1 1/4	2
	1153-20-16	1 1/4	1	2
	1153-20-20	1 1/4	1 1/4	2 1/16



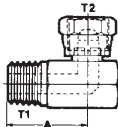
NPTF MALE TO NPSM SWIVEL FEMALE

STYLE 54	1154-2-2	1/8	1/8	3/4
	1154-4-4	1/4	1/4	1 1/4
	1154-4-6	1/4	3/8	1 5/16
	1154-6-4	3/8	1/4	1 5/16
	1154-6-6	3/8	3/8	1 5/16
	1154-6-8	3/8	1/2	1 1/4
	1154-8-4	1/2	1/4	1 1/4
	1154-8-6	1/2	3/8	1 1/4
	1154-8-8	1/2	1/2	1 1/4
	1154-12-8	3/4	1/2	1 9/16
	1154-12-12	3/4	3/4	1 9/16
	1154-12-16	3/4	1	1 9/16
	1154-16-12	1	3/4	1 9/16
	1154-16-16	1	1	1 59/64
	1154-20-20	1 1/4	1 1/4	1 59/64
NPTF RIGID FEMALE TO NPSM SWIVEL FEMALE	1154-24-24	1 1/2	1 1/2	2
	1154-32-32	2	2	2

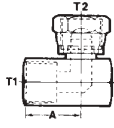


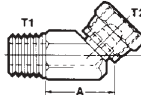
NPTF RIGID FEMALE TO NPSM SWIVEL FEMALE

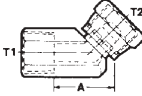
STYLE 55	1155-2-2	1/8	1/8	1 5/16
	1155-2-4	1/8	1/4	1 5/16
	1155-4-4	1/4	1/4	1 3/16
	1155-4-6	1/4	3/8	1 3/16
	1155-6-4	3/8	1/4	1 1/2
	1155-6-6	3/8	3/8	1 1/2
	1155-6-8	3/8	1/2	1 1/2
	1155-8-4	1/2	1/4	1 13/16
	1155-8-6	1/2	3/8	1 13/16
	1155-8-8	1/2	1/2	1 13/16
	1155-8-12	1/2	3/4	2
	1155-12-8	3/4	1/2	2
	1155-12-12	3/4	3/4	2
	1155-12-16	3/4	1	2 9/16
	1155-16-12	1	3/4	2 9/16
NPTF MALE TO 90° NPSM SWIVEL FEMALE	1155-16-16	1	1	2 3/8
	1155-16-20	1	1 1/4	2 9/16
	1155-20-16	1 1/4	1	2 19/32
	1155-20-20	1 1/4	1 1/4	2 9/8
	1155-24-24	1 1/2	1 1/2	2 13/16



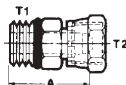
NPTF MALE TO 90° NPSM SWIVEL FEMALE

STYLE 56	1156-2-2	1/8	1/8	1 1/16
	1156-4-4	1/4	1/4	1 5/16
	1156-4-6	1/4	3/8	1 5/16
	1156-6-4	3/8	1/4	1 1/16
	1156-6-6	3/8	3/8	1 1/16
	1156-6-8	3/8	1/2	1 1/16
	1156-8-6	1/2	3/8	1 1/4
	1156-8-8	1/2	1/2	1 1/4
	1156-12-12	3/4	3/4	1 7/16
	1156-16-16	1	1	1 3/4
	1156-20-20	1 1/4	1 1/4	2
	1156-24-24	1 1/2	1 1/2	2 1/4
	NPTF RIGID FEMALE TO 90° NPSM SWIVEL FEMALE			
				
	NPTF RIGID FEMALE TO 90° NPSM SWIVEL FEMALE			

STYLE 57	1157-2-2	1/8	1/8	1 1/16
	1157-4-4	1/4	1/4	1 5/16
	1157-4-6	1/4	3/8	1 5/16
	1157-6-4	3/8	1/4	1
	1157-6-6	3/8	3/8	1
	1157-6-8	3/8	1/2	1
	1157-8-6	1/2	3/8	1 1/8
	1157-8-8	1/2	1/2	1 1/8
	1157-12-8	3/4	1/2	1 1/2
	1157-12-12	3/4	3/4	1 1/2
	1157-12-16	3/4	1	1 1/2
	1157-16-12	1	3/4	1 1/2
	1157-16-16	1	1	1 1/2
	1157-20-20	1 1/4	1 1/4	1 3/4
	1157-24-24	1 1/2	1 1/2	2
NPTF RIGID MALE TO 45° NPSM SWIVEL FEMALE				
	NPTF RIGID MALE TO 45° NPSM SWIVEL FEMALE			

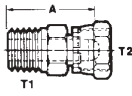
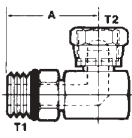
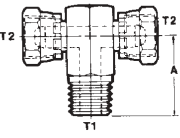
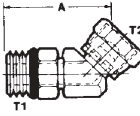
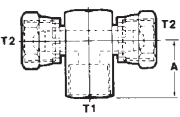
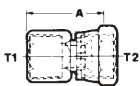
STYLE 58	1158-2-2	1/8	1/8	1 1/16
	1158-4-4	1/4	1/4	1 5/16
	1158-6-6	3/8	3/8	1
	1158-8-6	1/2	3/8	1 1/8
	1158-8-8	1/2	1/2	1 1/8
	1158-12-12	3/4	3/4	1 1/4
	1158-16-16	1	1	1 3/8
	1158-20-20	1 1/4	1 1/4	1 3/4
	1158-24-24	1 1/2	1 1/2	2 1/8
				
	NPTF RIGID FEMALE TO 45° NPSM SWIVEL FEMALE			
	NPTF RIGID FEMALE TO 45° NPSM SWIVEL FEMALE			
	NPTF RIGID FEMALE TO 45° NPSM SWIVEL FEMALE			
	NPTF RIGID FEMALE TO 45° NPSM SWIVEL FEMALE			
	NPTF RIGID FEMALE TO 45° NPSM SWIVEL FEMALE			

STYLE 59	1159-4-2	7/16-20	1/8	7/8
	1159-4-4	7/16-20	1/4	1
	1159-6-4	9/16-18	1/4	1
	1159-6-6	9/16-18	3/8	1 1/8
	1159-6-8	9/16-18	1/2	1 1/8
	1159-8-6	3/4-16	3/8	1 3/16
	1159-8-8	3/4-16	1/2	1 1/4
	1159-8-12	3/4-16	3/4	1 1/4
	1159-10-6	7/8-14	3/8	1 1/4
	1159-10-8	7/8-14	1/2	1 1/4
	1159-10-12	7/8-14	3/4	1 1/2
	1159-12-8	1 1/16-12	1/2	1 1/2
	1159-12-12	1 1/16-12	3/4	1 1/2
	1159-14-12	1 3/16-12	3/4	1 1/2
	1159-16-16	1 5/16-12	1	1 9/16
MALE ORB TO NPSM SWIVEL FEMALE	1159-20-20	1 5/8-12	1 1/4	1 3/4
	1159-24-24	1 7/8-12	1 1/2	2



MALE ORB TO NPSM SWIVEL FEMALE

HYDRAULIC ADAPTERS

	Part No.	Thread T1	Thread T2	A		Part No.	Thread T1	Thread T2	A
STYLE 60  NPTF MALE TO SWIVEL FEMALE ORB	1160-6-8 (1) 1160-8-8 (1) 1160-8-10 (1)	$\frac{3}{8}$ $\frac{1}{2}$ $\frac{1}{2}$	$\frac{3}{4}$ -16 $\frac{3}{4}$ -16 $\frac{7}{8}$ -14	$1\frac{5}{16}$ $1\frac{1}{2}$ $1\frac{1}{2}$	STYLE 64  MALE ORB TO 90° NPSM SWIVEL FEMALE	1164-4-4 1164-6-4 1164-6-6 1164-8-6 1164-8-8 1164-8-12 1164-10-6 1164-10-8 1164-10-12 1164-12-8 1164-12-12 1164-12-16 1164-16-12 1164-16-16	$\frac{7}{16}$ -20 $\frac{9}{16}$ -18 $\frac{9}{16}$ -18 $\frac{3}{4}$ -16 $\frac{3}{4}$ -16 $\frac{3}{4}$ -16 $\frac{7}{8}$ -14 $\frac{7}{8}$ -14 $\frac{7}{8}$ -14 $1\frac{1}{16}$ -12 $1\frac{1}{16}$ -12 $1\frac{1}{16}$ -12 $1\frac{5}{16}$ -12 $1\frac{5}{16}$ -12	$\frac{1}{4}$ $\frac{1}{4}$ $\frac{3}{8}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{3}{4}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{3}{4}$ $\frac{3}{4}$ 1 1	$1\frac{1}{4}$ $1\frac{1}{2}$ $1\frac{1}{2}$ $1\frac{5}{8}$ $1\frac{5}{8}$ $1\frac{3}{4}$ $1\frac{5}{16}$ $1\frac{13}{16}$ $1\frac{7}{8}$ 2 $2\frac{1}{8}$ $2\frac{1}{8}$ $2\frac{1}{4}$ $2\frac{1}{2}$
STYLE 61  NPTF MALE TO NPSM SWIVEL FEMALE TEE	1161-2-2 1161-4-4 1161-6-6 1161-8-8 1161-12-12 1161-16-16	$\frac{1}{8}$ $\frac{1}{4}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{3}{4}$ 1	$\frac{1}{8}$ $\frac{1}{4}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{3}{4}$ 1	1 $1\frac{1}{4}$ $1\frac{1}{2}$ $1\frac{3}{4}$ 2 $2\frac{5}{16}$	STYLE 65  MALE ORB TO 45° NPSM SWIVEL FEMALE ELBOW	1165-4-4 1165-6-4 1165-6-6 1165-8-6 1165-8-8 1165-10-6 1165-10-8 1165-10-12 1165-12-12 1165-16-16	$\frac{7}{16}$ -20 $\frac{9}{16}$ -18 $\frac{9}{16}$ -18 $\frac{3}{4}$ -16 $\frac{3}{4}$ -16 $\frac{7}{8}$ -14 $\frac{7}{8}$ -14 $\frac{7}{8}$ -14 $1\frac{1}{16}$ -12 $1\frac{5}{16}$ -12	$\frac{1}{4}$ $\frac{1}{4}$ $\frac{3}{8}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{3}{4}$ $\frac{3}{4}$ 1	$1\frac{1}{4}$ $1\frac{1}{2}$ $1\frac{1}{2}$ $1\frac{5}{8}$ $1\frac{5}{8}$ $1\frac{3}{4}$ $1\frac{13}{16}$ $1\frac{13}{16}$ $2\frac{1}{8}$ $2\frac{1}{2}$
STYLE 62  RIGID FEMALE TO NPSM SWIVEL TEE	1162-4 1162-6 1162-8 1162-12	$\frac{1}{4}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{3}{4}$	$\frac{1}{4}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{3}{4}$	1 $1\frac{1}{16}$ $1\frac{1}{4}$ $1\frac{7}{16}$	STYLE 66  NPTF RIGID FEMALE TO 37° SWIVEL FEMALE	1166-6-6 1166-8-8 1166-8-10 1166-12-12	$\frac{3}{8}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{3}{4}$	$\frac{9}{16}$ -18 $\frac{3}{4}$ -16 $\frac{7}{8}$ -14 $1\frac{1}{16}$ -12	$1\frac{7}{32}$ $1\frac{7}{32}$ $1\frac{13}{32}$ $1\frac{33}{64}$

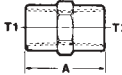
(1) THIS ADAPTER WILL ONLY SEAL PROPERLY ON MALE O-RING BOSS TERMINATIONS THAT HAVE A 30° FEMALE CHAMFER


HYDRAULIC CRIMPER

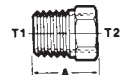


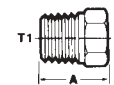
ACCURATE & RELIABLE, THIS 60 TON CRIMPER HAS A SIZE RANGE OF 1/4" THROUGH 1-1/4", IT IS AVAILABLE FOR SALE OR LEASE.

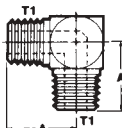
HYDRAULIC ADAPTERS

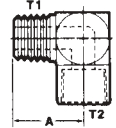
	Part No.	Thread T1	Thread T2	A
STYLE 5000	115000-2-2	1/8	1/8	7/8
	115000-4-4	1/4	1/4	1 1/8
	115000-6-6	3/8	3/8	1 9/16
	115000-8-8	1/2	3/8	1 1/2
	115000-8-8	1/2	1/2	1 1/2
	115000-12-8	3/4	1/2	2
	115000-12-12	3/4	3/4	2
	115000-16-16	1	1	2 1/8
	115000-20-20	1 1/4	1 1/4	2 5/16
NPTF FEMALE UNION				

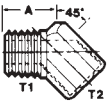
STYLE 5404	115404-2-2	1/8	1/8	1 5/16
	115404-4-4	1/4	1/4	1 3/8
	115404-6-4	3/8	1/4	1 17/32
	115404-6-6	3/8	3/8	1 17/32
	115404-8-4	1/2	1/4	1 13/16
	115404-8-6	1/2	3/8	1 13/16
	115404-8-8	1/2	1/2	1 13/16
	115404-12-8	3/4	1/2	1 7/8
	115404-12-12	3/4	3/4	1 7/8
MALE PIPE COUPLING	115404-16-12	1	3/4	2 7/32
	115404-16-16	1	1	2 7/32
	115404-20-20	1 1/4	1 1/4	2 13/32
	115404-24-24	1 1/2	1 1/2	2 19/32

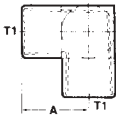
STYLE 5406	115406-4-2	1/4	1/8	25/32
	115406-6-2	3/8	1/8	7/8
	115406-6-4	3/8	1/4	25/32
	115406-8-2	1/2	1/8	1 1/8
	115406-8-4	1/2	1/4	1 1/8
	115406-8-6	1/2	3/8	1 1/16
	115406-12-6	3/4	3/8	1 3/16
	115406-12-8	3/4	1/2	1 1/16
	115406-16-8	1	1/2	1 3/8
NPTF MALE TO NPTF FEMALE BUSHING	115406-16-12	1	3/4	1 1/4
	115406-20-16	1 1/4	1	1 9/32
	115406-24-20	1 1/2	1 1/4	1 5/16

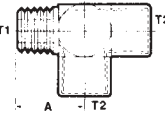
STYLE 5406-P	115406-2P	1/8	—	3/16
	115406-4P	1/4	—	25/32
	115406-6P	3/8	—	25/32
	115406-8P	1/2	—	1
	115406-12P	3/4	—	1 1/16
	115406-16P	1	—	1 1/4
	115406-20P	1 1/4	—	1 9/32
	115406-24P	1 1/2	—	1 5/16
	115406-32P	2	—	1 3/8
NPTF MALE PLUG				

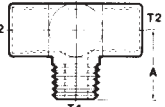
STYLE 5500	115500-2-2	1/8	—	3/4
	115500-4-4	1/4	—	1 3/32
	115500-6-6	3/8	—	1 7/32
	115500-8-8	1/2	—	1 15/32
	115500-12-12	3/4	—	1 19/32
	115500-16-16	1	—	1 31/32
	115500-20-20	1 1/4	—	2 3/8
NPTF MALE PIPE ELBOW 90°				

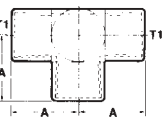
STYLE 5502	115502-2-2	1/8	1/8	1 3/16
	115502-4-4	1/4	1/4	1 1/4
	115502-6-6	3/8	3/8	1 1/4
	115502-6-8	3/8	1/2	1 1/4
	115502-8-8	1/2	1/2	1 1/2
	115502-12-12	3/4	3/4	1 5/8
	115502-16-16	1	1	2 1/16
	115502-20-20	1 1/4	1 1/4	2 7/16
NPTF 90° STREET ELBOW				

STYLE 5503	115503-2-2	1/8	1/8	5/8
	115503-4-4	1/4	1/4	1 5/16
	115503-6-6	3/8	3/8	1 1/8
	115503-8-8	1/2	1/2	1 3/16
	115503-12-12	3/4	3/4	1 3/8
				
NPTF 45° STREET ELBOW				

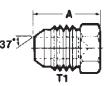
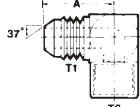
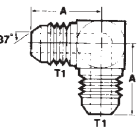
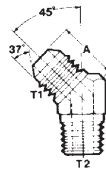
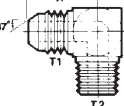
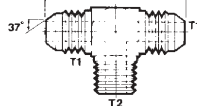
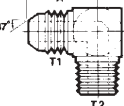
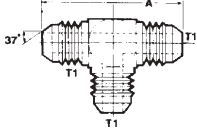
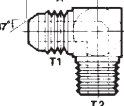
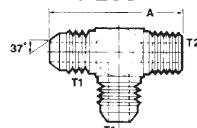
STYLE 5504	115504-2-2	1/8	—	1 1/16
	115504-4-4	1/4	—	1 3/16
	115504-6-6	3/8	—	1 5/16
	115504-8-8	1/2	—	1 1/8
	115504-12-12	3/4	—	1 5/16
	115504-16-16	1	—	1 5/8
NPTF 90° FEMALE PIPE				

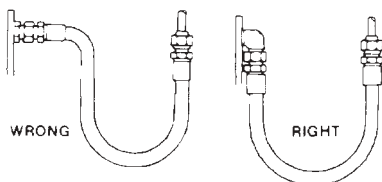
STYLE 5602	115602-2-2	1/8	1/8	1 3/16
	115602-4-4	1/4	1/4	1 1/4
	115602-6-6	3/8	3/8	1 1/4
	115602-8-8	1/2	1/2	1 1/2
	115602-12-12	3/4	3/4	1 5/8
				
NPTF SERVICE TEE				

STYLE 5604	115604-4-4	1/4	1/4	1 1/4
	115604-6-6	3/8	3/8	1 1/4
	115604-8-8	1/2	1/2	1 1/2
	115604-12-12	3/4	3/4	1 5/8
	115604-16-16	1	1	2 1/16
				
NPTF MALE-FEMALE PIPE TEE				

STYLE 5605	115605-2-2	1/8	—	1 1/16
	115605-4-4	1/4	—	1 3/16
	115605-6-6	3/8	—	1 5/16
	115605-8-8	1/2	—	1 1/8
	115605-12-12	3/4	—	1 5/16
	115605-16-16	1	—	1 5/8
	115605-20-20	1 1/4	—	1 3/4
NPTF FEMALE PIPE TEE				

HYDRAULIC ADAPTERS

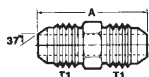
	Part No.	Thread T1	Thread T2	A		Part No.	Thread T1	Thread T2	A
STYLE 2408 	112408-4	7/16-20	—	47/64	STYLE 2502 	112502-4-2	7/16-20	1/8	1 1/16
	112408-5	1/2-20	—	49/64		112502-4-4	7/16-20	1/4	1 1/16
	112408-6	9/16-18	—	13/16		112502-5-2	1/2-20	1/8	1 1/16
	112408-8	3/4-16	—	15/16		112502-6-4	9/16-18	1/4	1 7/32
	112408-10	7/8-14	—	1 1/16		112502-6-6	9/16-18	3/8	1 7/32
	112408-12	1 1/16-12	—	1 13/64		112502-6-8	9/16-18	1/2	1 7/32
	112408-14	1 3/16-12	—	1 15/64		112502-8-6	3/4-16	3/8	1 13/32
	112408-16	1 5/16-12	—	1 9/32		112502-8-8	3/4-16	1/2	1 13/32
	112408-20	1 5/8-12	—	1 23/64		112502-10-8	7/8-14	1/2	1 5/8
	112408-24	1 7/8-12	—	1 31/64		112502-12-12	1 1/16-12	3/4	1 7/8
PLUG 37° FLARE MALE					37° FLARE MALE TO NPTF FEMALE 90° ELBOW				
STYLE 2500 	112500-4	7/16-20	—	57/64	STYLE 2503 	112503-4-2	7/16-20	1/8	45/64
	112500-5	1/2-20	—	61/64		112503-4-4	7/16-20	1/4	45/64
	112500-6	9/16-18	—	1 1/16		112503-5-4	1/2-20	1/4	7/8
	112500-8	3/4-16	—	1 1/4		112503-6-4	9/16-18	1/4	13/16
	112500-10	7/8-14	—	1 29/64		112503-6-6	9/16-18	3/8	13/16
	112500-12	1 1/16-12	—	1 21/32		112503-6-8	9/16-18	1/2	1 1/16
						112503-8-6	3/4-16	3/8	31/32
						112503-8-8	3/4-16	1/2	1
						112503-8-12	3/4-16	3/4	1
						112503-10-8	7/8-14	1/2	1 3/32
90° TUBE ELBOW 37° FLARE MALE					37° FLARE MALE TO 45° ELBOW NPTF MALE				
STYLE 2501 	112501-4-2	7/16-20	1/8	57/64	STYLE 2601 	112601-4-2	7/16-20	1/8	1 23/32
	112501-4-4	7/16-20	1/4	57/64		112601-4-4	7/16-20	1/4	1 23/32
	112501-4-8	7/16-20	1/2	57/64		112601-6-4	9/16-18	1/4	2 7/16
	112501-5-2	1/2-20	1/8	61/64		112601-6-6	9/16-18	3/8	2 3/8
	112501-5-4	1/2-20	1/4	1 1/16		112601-8-6	3/4-16	3/8	2 7/16
	112501-5-6	1/2-20	3/8	1 1/16		112601-10-8	7/8-14	1/2	2 27/32
	112501-6-2	9/16-18	1/8	1 1/8		112601-12-12	1 1/16-12	3/4	3 1/4
	112501-6-4	9/16-18	1/4	1 1/8		112601-16-16	1 5/16-12	1	3 9/16
	112501-6-6	9/16-18	3/8	1 9/64					
	112501-6-8	9/16-18	1/2	1 15/64					
STYLE 2501 	112501-8-4	3/4-16	1/4	1 1/4	STYLE 2603 	112603-4	7/16-20	—	1 23/32
	112501-8-6	3/4-16	3/8	1 1/4		112603-6	9/16-18	—	2 1/16
	112501-8-8	3/4-16	1/2	1 11/32		112603-8	3/4-16	—	2 7/16
	112501-8-12	3/4-16	3/4	1 21/64		112603-10	7/8-14	—	2 27/32
	112501-10-6	7/8-14	3/8	1 15/32		112603-12	1 1/16-12	—	3 1/4
	112501-10-8	7/8-14	1/2	1 29/32		112603-16	1 5/16-12	—	3 9/16
	112501-10-12	7/8-14	3/4	1 17/32					
	112501-12-8	1 1/16-12	1/2	1 21/32					
	112501-12-12	1 1/16-12	3/4	1 21/32					
	112501-12-16	1 1/16-12	1	1 5/8					
STYLE 2501 	112501-14-12	1 3/16-12	3/4	1 23/32	STYLE 2605 	112605-6-4	9/16-18	1/4	2 3/32
	112501-16-12	1 5/16-12	3/4	1 13/16		112605-6-6	9/16-18	3/8	2 3/8
	112501-16-16	1 5/16-12	1	1 13/16		112605-8-6	3/4-16	3/8	2 13/32
	112501-20-20	1 5/8-12	1 1/4	2 1/16		112605-10-8	7/8-14	1/2	2 55/64
	112501-24-24	1 7/8-12	1 1/2	2 21/64		112605-12-12	1 1/16-12	3/4	3 3/16
						112605-16-16	1 5/16-12	1	3 23/32
37° FLARE MALE TO NPTF MALE					TUBE TEE 37° FLARE MALE				
					STYLE 2605				
					RUN TEE 37° FLARE MALE TO NPTF MALE				



Avoid sharp twist or bend in hose by using proper angle adapters.

HYDRAULIC ADAPTERS

STYLE 2403

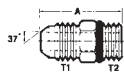


37° MALE UNION

Part No.	Thread T1	Thread T2	A
112403-4	7/16-20	—	1 1/4
112403-5	1/2-20	—	1 1/4
112403-6	9/16-18	—	1 3/8
112403-8	3/4-16	—	1 9/16
112403-10	7/8-14	—	1 53/64
112403-12	1 1/16-12	—	2 7/64
112403-14	1 3/16-12	—	2 5/32
112403-16	1 5/16-12	—	2 3/16
112403-20	1 5/8-12	—	2 9/32
112403-24	1 7/8-12	—	2 3/4

Part No.	Thread T1	Thread T2	A
----------	-----------	-----------	---

STYLE 6400

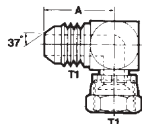


O.R.B. MALE TO
37° FLARE MALE

Part No.	Thread T1	Thread T2	A
116400-4	7/16-20	7/16-20	1 1/16
116400-4-5	7/16-20	1/2-20	1 1/16
116400-5	1/2-20	1/2-20	1 1/16
116400-6	9/16-18	9/16-18	1 3/16
116400-6-8	9/16-18	3/4-16	1 11/32
116400-8	3/4-16	3/4-16	1 11/32
116400-8-6	3/4-16	9/16-18	1 11/32
116400-8-10	3/4-16	7/8-14	1 3/16
116400-8-12	3/4-16	1 1/16-12	1 27/32
116400-10	7/8-14	7/8-14	1 9/16
116400-10-8	7/8-14	3/4-16	1 9/16
116400-10-12	7/8-14	1 1/16-12	1 27/32
116400-12	1 1/16-12	1 1/16-12	1 27/32
116400-12-8	1 1/16-12	3/4-16	1 27/32
116400-12-10	1 1/16-12	7/8-14	1 27/32
116400-14	1 3/16-12	1 3/16-12	1 53/64
116400-16	1 5/16-12	1 5/16-12	1 7/8
116400-16-12	1 5/16-12	1 1/16-12	2 3/64
116400-16-20	1 5/16-12	1 5/8-12	2 3/64
116400-20	1 5/8-12	1 5/8-12	1 53/64
116400-20-16	1 5/8-12	1 5/16-12	2 3/64

Part No.	Thread T1	Thread T2	A
----------	-----------	-----------	---

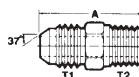
STYLE 6500



90° SWIVEL ELBOW 37°
FLARE MALE TO 37°
FLARE SWIVEL FEMALE

Part No.	Thread T1	Thread T2	A
116500-4	7/16-20	—	5 9/64
116500-5	1/2-20	—	5 9/64
116500-6	9/16-18	—	1 1/32
116500-8	3/4-16	—	1 7/32
116500-10	7/8-14	—	1 27/64
116500-12	1 1/16-12	—	1 5/8
116500-14	1 3/16-12	—	1 23/32
116500-16	1 5/16-12	—	1 25/32
116500-20	1 5/8-12	—	2 1/32
116500-24	1 7/8-12	—	2 19/64

STYLE 2404

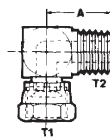


STRAIGHT ADAPTER —
MALE 37° FLARE
TO MALE NPTF

Part No.	Thread T1	Thread T2	A
112404-2-2	5/16-24	1/8	1 7/64
112404-4-2	7/16-20	1/8	1 7/64
112404-4-4	7/16-20	1/4	1 7/64
112404-5-2	1/2-20	1/8	1 9/64
112404-5-4	1/2-20	1/4	1 9/64
112404-6-2	9/16-18	1/8	1 3/8
112404-6-4	9/16-18	1/4	1 3/8
112404-6-6	9/16-18	3/8	1 3/8
112404-6-8	9/16-18	1/2	1 3/8
112404-8-4	3/4-16	1/4	1 1/2
112404-8-6	3/4-16	3/8	1 1/2
112404-8-8	3/4-16	1/2	1 1/2
112404-8-12	3/4-16	3/4	1 1/2
112404-10-6	7/8-14	3/8	1 53/64
112404-10-8	7/8-14	1/2	1 53/64
112404-10-12	7/8-14	3/4	1 53/64
112404-12-8	1 1/16-12	1/2	1 51/64
112404-12-12	1 1/16-12	3/4	1 51/64
112404-12-16	1 1/16-12	1	1 51/64
112404-14-12	1 3/16-12	3/4	2 1/16
112404-16-12	1 5/16-12	3/4	2 7/32
112404-16-16	1 5/16-12	1	2 7/32
112404-16-20	1 5/16-12	1 1/4	2 21/64
112404-20-16	1 5/8-12	1	2 23/64
112404-20-20	1 5/8-12	1 1/4	2 23/64
112404-24-20	1 7/8-12	1 1/4	2 39/64
112404-24-24	1 7/8-12	1 1/2	2 39/64
112404-32-32	2 1/2-12	2	3

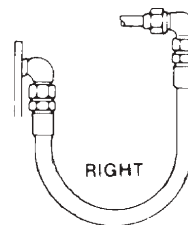
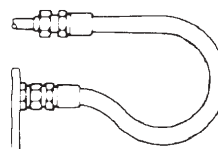
Part No.	Thread T1	Thread T2	A
----------	-----------	-----------	---

STYLE 6501



37° SWIVEL FEMALE
90° TO NPTF MALE

Part No.	Thread T1	Thread T2	A
116501-4-2	1/8	7/16-20	2 5/32
116501-6-4	1/4	9/16-18	1 3/32
116501-8-6	3/8	3/4-16	1 7/32
116501-10-8	1/2	7/8-14	1 15/32
116501-12-12	3/4	1 1/16-12	1 19/32



Where the radius falls below the required minimum, an angle adapter should be used as shown above to avoid sharp bends in hose.

Analyzing and preventing hose failure

This 3-step analysis of hose failure will provide you with enough information to correctly diagnose and solve your hose problems

J. Briggs

Hoses fail periodically and normally this is not a great problem—hose is simply replaced. But occasionally, when failures repeat, it is best to determine and correct the problem. Failure to find the cause eventually can result in loss of equipment.

There are several major reasons for hose failure:

Improper Application

As this is the most common cause of hose failure, pay particular attention to:

- maximum system working pressure
- recommended temperature range
- whether hose is rated for vacuum service
- fluid compatibility

Improper Assembly & Installation

This involves anything from using the wrong fitting to poor hose routing. Review assembly and installation techniques for maximum equipment operation.

External Damage

This can range from abrasion and corrosion to a crushed hose. These problems are easily solved: once the source and trouble is identified, re-route or clamp, or use a fire sleeve or abrasion guard. In case of corrosion, use a more chemical-resistant cover, or re-route.

Joe Briggs is Manager of Field Engineering Services, Aeroquip Corp., Jackson, Mich.

Faulty Equipment & Hose

Frequent or premature hose failure can be symptomatic of equipment malfunction. Prompt, corrective action will help avoid serious and costly repairs.

Occasionally the problem is in the hose itself. Old age is most likely the cause. Check the lay line on the hose to determine the date of manufacture; it may have exceeded recommended shelf life. hp

Problem Checklist

If you are having difficulty selecting or fitting the right hose to your application, talk with your supplier. Use the following checklist when describing your problem:

1. Send in a hose sample or provide the part number and date of manufacture.
2. Mention the type of equipment on which hose is used and its location on equipment.
3. Provide the brand name and number of fluid carried by hose.
4. Give internal and external maximum/minimum operating temperatures. Remember, temperature can vary widely from one part of your equipment to another. Try to get a reading as close to the failed part as possible.
5. If hose is bent, give size of bent radius along inside curve or send tracing of curve on paper. Note if hose bends in more than one plane.
6. Give flow (gpm) through the hose.
7. List static and transient maximum pressures.
8. Describe operating environment.
9. Tell if hose is used in vacuum service.

CURE

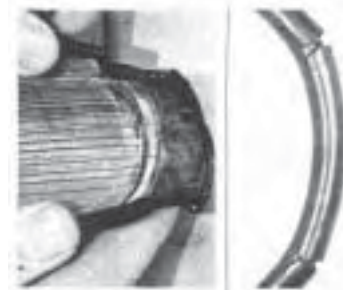
1 Heat in a hydraulic system can signal serious problems. Determine cause of overheating and correct the problem. Change to high temperature hose. Check for factors that release air normally dissolved in oil; i.e. vacuums, excessive flow rates, or factors that introduce air such as pressurized tanks.

2 Use a hose rated for your temperature range. Insulate hose with special sleeving to protect it from extreme ambient cold or to use heat tape with insulation.

CAUSE

1 Heat tends to leach plasticizers out of the tube. Plasticizers give hose its flexibility or plasticity. Aerated oil causes oxidation in the innertube and causes it to harden. Any combination of oxygen and heat greatly accelerates hardening of inner liner. Cavitation occurring inside the inner liner would have the same effect.

2 Probable reason is intense cold ambient conditions while hose was flexed. Most standard hoses are rated to -40 F (-40 C). Military specified hoses are generally rated to -65 F (-54 C). Teflon hose is rated to -100 F (-73 C).



SYMPTOM

1 Hose inner liner is very hard and has cracked.

2 Hose is cracked externally and internally, but elastomeric materials are soft and flexible at room temperature.

<p>3 A high frequency pressure impulse condition. SAE impulse test requirements for a double wire braid reinforcement are 200,000 cycles at 133% of recommended working pressure. SAE impulse test requirements for a four-spiral wrapped reinforcement (100R-10) are 400,000 cycles at 133% of working pressure at 200 F (93 C). If extrapolated impulses in a system exceed one million in a relatively short time, a spiral-reinforced hose is recommended.</p>	<p>3 Replace with spiral wrapped reinforced hose.</p>
<p>4 Pressure has exceeded minimum burst strength of the hose. Either a stronger hose is needed or the hydraulic circuit has a malfunction, causing unusually high pressure conditions.</p>	<p>4 Check hydraulic system for malfunction. Replace with hose rated for higher pressure.</p>
<p>5 Function of outer cover is to protect the reinforcement. Elements that destroy or remove the outer covers include: abrasion, cutting, battery acid, steam cleaners, chemical cleaning, solutions, muriatic acid, salt water, heat, extreme cold. Once cover protection is gone, reinforcement is susceptible to corrosion.</p>	<p>5 Determine cause of cover deterioration and correct by re-routing or protecting hose.</p>
<p>6 Using less than recommended minimum bend radius. Check SAE minimum bend radius specifications. Note: minimum bend radius can be less if pressure is reduced. Check with your supplier. In the case of pump supply line, partial hose collapse causes pump cavitation, creating noise and heat. This is a serious situation and will result in catastrophic pump failure if not corrected.</p>	<p>6 Re-route hose to avoid kinking. Install flat steel protective sleeve on outside of hose to limit deformation of hose while being bent.</p>
<p>7 Torquing of a hydraulic control hose tears loose reinforcement layers, allowing hose to burst through enlarged gaps between the braided plait of wire strands. Be sure there is never any twisting force on hydraulic hose.</p>	<p>7 Re-route hose or use adapters or swivel joints to eliminate twisting.</p>
<p>8 Probable cause is high vacuum or wrong hose for vacuum service. No vacuum is recommended for double wire braid, 4 and 6 spiral wire hose, unless some internal support coil is used. Though rated for vacuum service, if a hose is kinked, flattened out, or bent too sharply, this type of failure may occur. Condition as in Symptom 10 can cause loss of adhesion between inner liner and reinforcement. Fluid velocity can then cause inner liner to loosen and wash down stream</p>	<p>8 Use support coil for inner tube or replace with hose rated for vacuum service. Review assembly technique.</p>
<p>9 Improper assembly of hose end fitting allows moisture to enter outer shell edge and wick through reinforcement. System heat will drive it out around the fitting area, but 6" to 8" away, it will be entrapped between the inner liner and outer cover, causing wire reinforcement to rust.</p>	<p>9 Review hose assembly procedures.</p>



<p>3 Hose has burst; examination of the wire reinforcement after stripping back outer cover reveals random broken wires over entire length of hose.</p>	
<p>4 Hose has burst; there is no indication of multiple broken wires the entire length of the hose. Hose may have burst in more than one place.</p>	
<p>5 Hose has burst. Examination shows that wire braid is rusted and outer cover has been cut, abraded, or deteriorated badly.</p>	
<p>6 Hose has burst on the outside bend and appears elliptical in the bent section. In the case of a pump supply line, pump is noisy and very hot. Exhaust line on the pump is hard and brittle.</p>	
<p>7 Hose is flattened out in one or two areas and appears kinked. Hose has burst in this area and appears to be twisted.</p>	
<p>8 Hose inner liner has broken loose from reinforcement and "piled up" at the end of the hose. In some cases it may protrude from the end of the hose fitting.</p>	
<p>9 Hose has burst about six to eight inches from end fitting. Wire braid is rusted. There are no cuts or abrasions of the outer cover.</p>	

10 Oil-filled blisters appear in outer cover of hose.

11 Blistering of the outer cover where a gaseous fluid is being used.

12 Fitting blew off end of hose.

13 Inner liner of hose is badly deteriorated with evidences of extreme swelling. In some cases the inner liner may be partially "washed out."

14 Hose has burst. Hose cover is badly deteriorated and surface of rubber is crazed.

15 Hose is leaking at fitting because of a crack in tube adjacent to the braze on a split flange head.

16 Spiral reinforced hose burst and literally split open; wire has exploded out and badly entangled. In some cases fitting has separated from hose.

17 Hose is badly flattened out in burst area. Inner tube is very hard downstream of burst area but appears normal upstream of burst.



10 A minute pin hole allows high pressure oil to seep between inner liner and outer cover, eventually forming a blister where cover adhesion is weak. With screw-together-reusable-fitting, insufficient lubrication of hose and fitting can cause this condition because dry inner liner adheres to rotating nipple and tears enough to allow seepage. Faulty hose can also cause this condition.

11 High pressure gas is effusing through pores of inner liner, gathering under outer cover, and eventually forming a blister wherever adhesion is weakest.

12 The wrong fitting may have been put on hose. Re-check manufacturer's specifications and part numbers. In case of crimped fitting, wrong machine setting may have been used, resulting in over or under crimping. Outer socket of a screw-together fitting for multiple wire braided hose may be worn beyond its tolerance. Sockets should be discarded after being reused about six times. Swaging dies in a swaged hose assembly may be worn beyond manufacturer's tolerances.

13 Hose inner liner is not compatible with fluid carried. Even if fluid is normally compatible, added heat can be the catalyst causing inner liner deterioration.

14 This could be old age. The crazed appearance is the effect of weathering and ozone. Try to determine the age of the hose. Some manufacturers print or emboss cure dates on outside of hose.

15 Crack adjacent to braze and *not in the braze*, indicates stress failure caused by hose trying to shorten under pressure with insufficient slack to do so.

16 Hose is too short to accommodate change in length occurring while it is pressurized.

17 Hose has been kinked by bending it too sharply or squashing it, creating a major restriction. As fluid velocity increases through the restriction, pressure decreases to vaporization point of the fluid, causing cavitation. Heat and rapid oxidation harden the inner liner downstream of the restriction.

10 Replace hose line. Review assembly techniques.

11 Specially-constructed hoses are available for high pressure gaseous application. Replace hose line with hose designed for this application.

12 Review assembly procedures. File-mark outer socket each time it is reused. After six marks discard worn socket. Never use socket if it blew off end of hose.

13 Replace with hose suited to application. Consult your hose supplier for a compatibility list or give him a fluid sample for analysis. Make sure that external and internal operating temperatures do not exceed recommendations.

14 Review inventory rotation procedures. Set up preventive maintenance schedule to replace hose at regular intervals.

15 Lengthen hose assembly or change the routing to relieve forces on fitting.

16 Use a longer hose assembly.

17 Re-route the hose to avoid kinking or mechanical damage.

18 Hose has not burst but is leaking profusely. A bisection reveals that the inner liner has been gouged through to the wire braid for a distance of approximately two inches.

19 Hose fitting has been pulled out of the hose. Hose has been stretched out considerably. This may not be a high pressure application.

20 Hose has not burst but is leaking profusely. Examination of bisected hose reveals that inner liner has burst inwardly.

21 Teflon hose assembly has collapsed internally in one or more places.

22 Hose fittings keep blowing off nylon hose.

23 Hose assembly with a Teflon inner liner has developed one or more pin hole leaks.



18 Erosion of inner liner. A high-velocity, needle-like fluid stream from an orifice impinges at one point on the hose inner liner, hydraulically removing a section of it. With very high fluid velocities, particles in the fluid can cause considerable erosion in bent sections of the hose assembly.

19 Insufficient hose support. It is essential to support very long hose lengths especially if they are vertical. Hose weight and fluid weight inside of hose, are pulling on hose fitting.

20 Commonly referred to as inner liner blow down. Usually associated with very low viscosity fluids such as air or nitrogen. Under high pressure conditions, gases effuse into pores of the inner liner, charging them like miniature accumulators. If pressure is suddenly reduced to zero, the entrapped gases literally explode out of the inner liner, often tearing holes in it. Some hoses have a second inner liner of plastics, such as nylon, inserted on inside. A small leak allows gaseous fluid to seep between the two inner liners; when pressure is reduced to zero, inner-most liner collapses because of entrapped pressure around its outer diameter.

21 Most common cause is improper handling of the Teflon assembly. Teflon, a thermo-plastic material which is not rubber-like, collapses if bent sharply. Heat (which softens the inner liner) and sub-atmospheric internal conditions can cause the Teflon inner liner to fold longitudinally in one or more places. Because additional tension of the wire braid reinforcement is inherent with this type of hose, a radial tension on the tube always tries to push it in. Rapid cycling from a very hot-to-cold agent in the house can produce the same type of failure.

22 Providing the right hose fitting is selected and properly attached, the probable cause is heat. Nylons, under compression, have a tendency to soften and flow out of the compression area when subjected to temperatures around 200 F (93 C).

23 This happens when a low viscosity petroleum base fluid flows at high velocity, generating a high voltage caused by static electricity. The high voltage seeks a ground connection which is available at the braided stainless steel reinforcement. This causes an electric arc, which penetrates the Teflon inner liner as it travels to the outer reinforcement. Specially constructed Teflon inner liners are available with enough carbon black to be conductive. They drain off static electricity and avoid this problem.

18 Re-route hose or re-design system to move orifice to outlet of hose. Be sure the hose is not bent close to an orificed port.

19 This force is transmittable to a wire rope or chain by clamping the hose to it. Leave sufficient slack in the hose between clamps to make up for the possible 4% shortening that may take place when hose is pressurized.

20 Use inner tube support coil. Avoid sudden depressurization on high pressure gaseous systems.

21 Use inner tube support coil.

22 Review hose selection. Re-move cause of heat or insulate hose.

23 Replace with conductive hose lines.