



Powering Business Worldwide



Powering Business Worldwide

The Power of Eaton



Char-Lynn®



Walterscheid®

Synflex®



1911

1968

1971

1999

2000

2002

2004

2005

2006

2007

2008

2010

2011

Airflex®



BOSTON
WEATHERHEAD

Winner®



HANSEN™
GROMELLE™



Powering Business Worldwide

There's a certain energy at Eaton. It's the power of integrating the competencies of some of the world's most respected names to build a brand you can trust to meet every power management need. The energy created supports our commitment to powering business worldwide.

As the world's demand increases for high-efficiency hydraulic systems for mobile and stationary applications, Eaton is helping to solve these challenges more reliably, efficiently, and sustainably. Our goal is simple; to provide unique solutions across a wide range of markets that keep businesses on the leading edge of change. Visit Eaton.com/hydraulics/fusion.

That's the power of Eaton.

Serving eight key segments - sharing one focus



Alternative Energy

Making energy sources technically practical and economically sound requires the kind of control made possible by high-quality components. When Eaton is on the inside, you will experience the reliable, consistent performance to create and capture energy—making renewable energy an every-day energy.



Discrete Manufacturing

Produce at peak efficiency with the superior precision and repeatability of Eaton products. Eaton hydraulic components provide the precise control and consistent operation required for virtually every step in your manufacturing operation. With Eaton, we'll help you redefine the meaning of raw productivity.



Oil & Gas

As the oil & gas industry continues to face further globalization and consolidation, large-scale organizations that can meet your needs in every corner of the world are more difficult to find. At Eaton, our portfolio of products is only surpassed by our tremendous reach.



Processing

Whatever your industry, no matter which processes you manage, Eaton parts and systems help keep you up and running. Our components make equipment more efficient and easier to use, so you get optimal machine performance and maximum productivity.



Agriculture & Forestry

There's a reason farming and forestry are called "working the land." These segments involve some of the hardest work and longest hours of any sector in the economy. Your productivity and profitability depend on the way you manage time and tasks.



Commercial Vehicles

Eaton technologies can make your driving operation more successful. Greater comfort and productivity help increase driver retention, while reduced emissions, leaks, and noise improve environmental performance. Increased efficiencies overall mean lower costs and higher net revenue.



Material Handling

Eaton hydraulic systems provide the precise control and consistent operation required for material handling and utility work. With a broad selection of products and solutions built in, Eaton helps make you a master of your domain.



Construction & Mining

When you work on a large scale, even the details are big. You need to trust every part of the equipment that lets you handle construction and mining jobs. For reliable components that deliver consistent performance in extreme conditions, turn to Eaton.

Eaton is a leading diversified power management company

Eaton provides reliable, efficient and safe power management for a growing number of industries.

Understanding and helping our customers succeed

- Listening and understanding to requirements and business drivers
- Delivering solutions with value propositions to solve the critical business needs

Knowing what's important to our customers and integrating that knowledge into the fabric of our business

- ...to deliver innovative, quality products
- ...to respond fast
- ...to provide dedicated customer service and support around the globe

Our strength is global reach with local responsiveness and support

- Customers served in more than 150 countries
- Diverse channels ensure reliable availability and support
- Design and engineering teams provide support for standard products and custom solutions
- Eaton experts offer efficient product and application training

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Application Data

Important Safety Information



Warning

Selection of Tubing

Selecting the proper tubing for a given application is essential to the proper operation and safe use of the tubing and related equipment. Inadequate attention to the selection of the tubing for an application can result in leakage, bursting, or other failure which can cause serious bodily injury or property damage from spraying fluids or flying projectiles. In order to avoid serious bodily injury or property damage resulting from selection of the wrong tubing, carefully review the information in this catalog. Some of the factors that are involved in the selection of the proper tubing are:

- material of tubing
- bends
- tubing size
- temperature
- tubing length
- tubing pressure rating
- tubing end connections
- installation design
- fluid conveyed (compatibility)

These factors and the other information in this catalog should be considered when selecting the proper tubing for an application.

Proper Selection of Tube Fittings

Selection of the proper Eaton tube products for the application is essential to the proper operation and safe use of tubing and related equipment. Inadequate attention to the selection of the products for your application can result in tube leakage, bursting, or other failure which can cause serious injury or property damage from spraying fluids or flying projectiles. In order to avoid serious bodily injury or property damage resulting from selection of the wrong tube end fitting, carefully review the information in this catalog. Some of the factors which are involved in the selection of the proper products are:

- tube end connections
- installation design
- compatibility with tubing
- tubing size
- temperature
- corrosion requirements

These factors and the other information in this catalog should be considered selecting the proper tube when for an application.

Tubing Installation

Proper installation of the tubing is essential to the proper operation and safe use of the tubing and related equipment. Improper installation of the tubing can result in serious injury or property damage. In order to avoid serious bodily injury or property damage resulting from improper installation of the tubing, carefully review the information in this catalog regarding tubing installation.

Some of the factors you must consider in installing the tubing properly are:

- proper installation procedures
- changes in length
- protection from high temperature sources
- twisting
- stress
- rubbing and abrasion

These factors and other information in this catalog regarding tubing installation should be considered before installing the tubing.

Tubing Assembly

Changes in materials, finishes, and assembly techniques may affect the sealing or holding capability of the joint. Due to the great variety of possible assembly scenarios, assembly procedures should be tested to determine if the joint is adequate for its intended use. Improper assembly or overtightening could result in leakage, tubing separation or other failures which could cause serious bodily injury or property damage from spraying fluids or flying projectiles.

These factors and other information in this catalog regarding tubing assembly should be considered before installing the tubing.

Dimensions

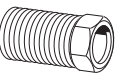
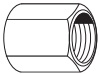
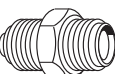
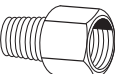
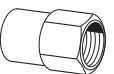
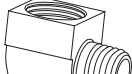
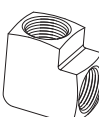
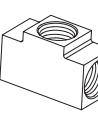
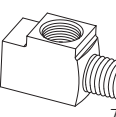
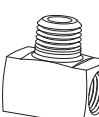
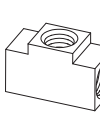
Dimensions given in this catalog are approximate and should be used for reference only. Exact dimensional information for a given product is subject to change and varying tolerances.

Note: Please contact Eaton Technical Support at 1-888-258-0222 for questions on applications.

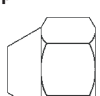
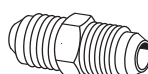
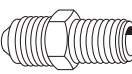
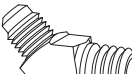
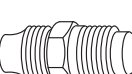
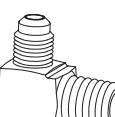
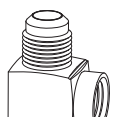
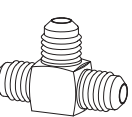
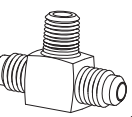
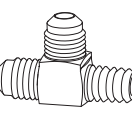
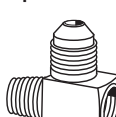
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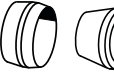
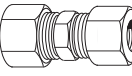
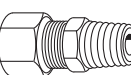
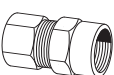
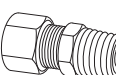
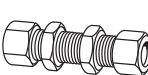
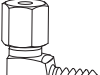
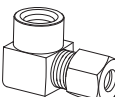
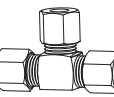
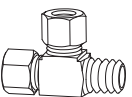
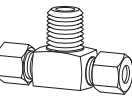
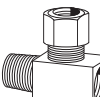
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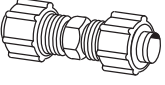
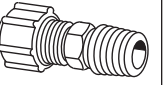
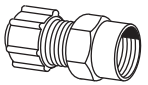
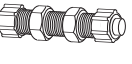
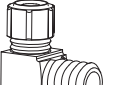
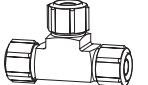
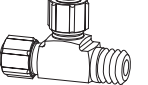
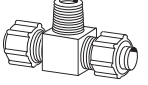
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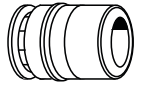
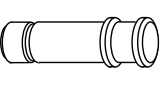
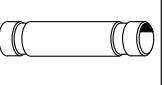
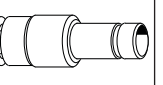
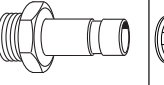
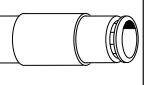
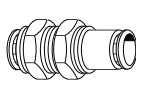
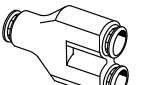
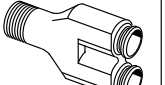
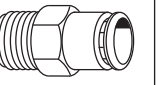
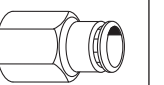
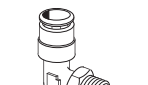
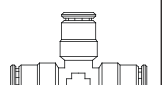
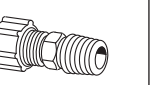
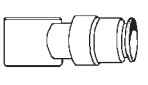
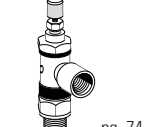
Application Data

Visual Index

Polyline Flareless

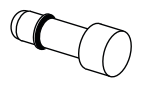
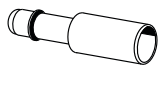
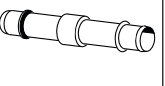
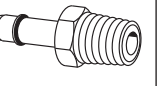
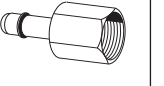
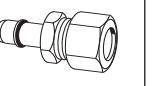
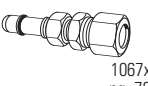
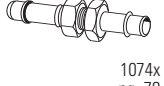
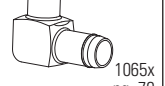
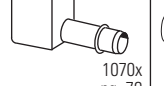
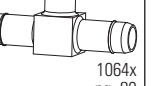
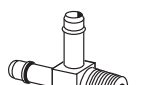
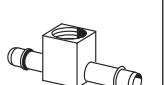
Plastic Sleeve  1260x pg. 59	Brass Nut  1261x- pg. 59	Brass Nut/Plastic Sleeve Assembly  1261x-Ax pg. 59	Brass Bulkhead Nut  1202x-A pg. 59	Union  1262x pg. 59	Male Connector  1268x pg. 60
Female Connector  1266x pg. 60	Bulkhead Union  1274x pg. 60	Male Elbow  1269x pg. 61	Female Elbow  1270x pg. 61	Union Tee  1264x pg. 61	Male Run Tee  1271x pg. 61
Male Branch Tee  1272x pg. 61					

Push>Connect

Cartridge  Metric 1161x pg. 69 64	Plug (Plastic)  Metric 1129x pg. 69 64	Double Union  Metric 1105x pg. 69 64	Reducer  Metric 1109x pg. 69 64	Stem Adapter  Metric 1180x pg. 69 65	Union  Metric 1612x pg. 69 65
Bulkhead Union  Metric 1174x pg. 70 65	Union "Y"  Metric 1107x pg. 70 65	Male "Y"  Metric 1108x pg. 70 66	Male Connector  Metric 1168x pg. 70 66	Female Connector  Metric 1166x pg. 70 66	Union Elbow  Metric 1165x pg. 71 66
Swivel Male Elbow  Metric 1169x-S pg. 71 67	Male Elbow  Metric 1169x pg. 71 67	Union Tee  Metric 1164x pg. 72 67	Male Run Tee Swivel  Metric 1171x-S pg. 72 67	Male Connector  Metric 1168x pg. 70 66	Stud Manifolds  pg. 68
Banjoes  pg. 68	Flow Controls  pg. 74				

Push > Connect Plus see page 75.

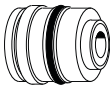
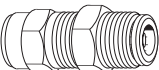
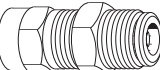
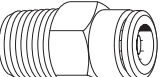
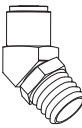
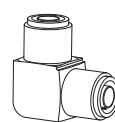
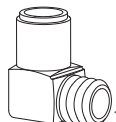
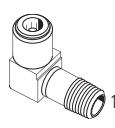
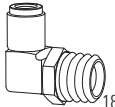
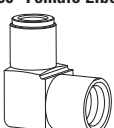
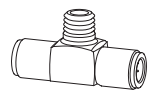
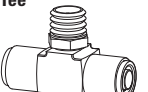
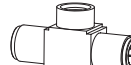
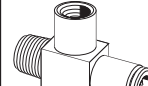
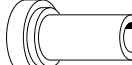
Mini-Barb

Plug  1073x pg. 78	Solder Connector  1079x pg. 78	Union  1062x pg. 78	Male Connector  1068x pg. 78	Female Connector  1066x pg. 78	Compression Connector  1078x pg. 78
Bulkhead Compression Connector  1067x pg. 79	Bulkhead Union  1074x pg. 79	Union Elbow  1065x pg. 79	90° Male Elbow  1069x pg. 79	90° Female Elbow  1070x pg. 79	Union Tee  1064x pg. 80
Male Run Tee  1071x pg. 80	Male Branch Tee  1072x pg. 80	Female Branch Tee  1077x pg. 80	Adapter Tee  1075x pg. 80		

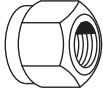
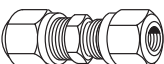
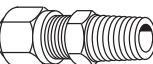
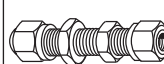
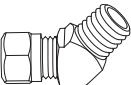
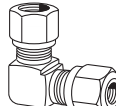
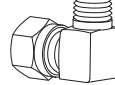
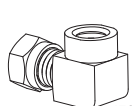
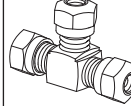
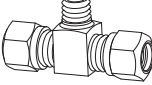
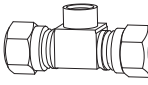
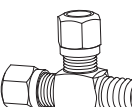
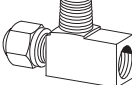
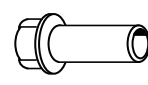
Application Data

Visual Index

Quick>Connect Air Brake

Encapsulated Cartridge  1861x pg. 83	Union  1862x pg. 83	Quick Connect Bulkhead Union  1874x pg. 83	Female Bulkhead Union  1873x pg. 83	Male Connector  1868x pg. 84	Female Connector  1866x pg. 84
45° Male Elbow  1880x pg. 84	45° Male Swivel Elbow  1880x-S pg. 85	90° Union Elbow  1865x pg. 85	90° Male Elbow  1869x pg. 85	90° Male Elbow Long  1869x-L pg. 85	90° Male Swivel Elbow  1869x-S pg. 86
90° Female Elbow  1870x pg. 86	Union Tee  1864x pg. 86	Male Run Tee  1871x pg. 86	Male Swivel Run Tee  1871x-S pg. 87	Male Branch Tee  1872x pg. 87	Swivel Male Branch Tee  1872x-S pg. 87
Female Branch Tee  1877x pg. 87	Adapter Tee  1883x pg. 89	Pressure Plug  1829x pg. 89	Composite 45° Q-Elbow  217-30000 pg. 88	Composite 90° Q-Elbow  217-10000 pg. 88	

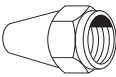
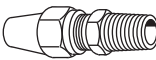
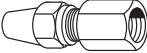
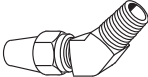
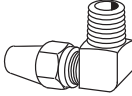
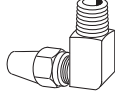
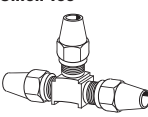
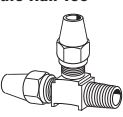
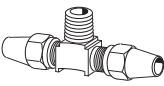
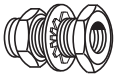
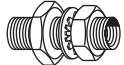
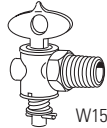
Air Brake Connectors for Nylon Tubing

Sleeve  1460x pg. 91	Nut  1461x pg. 91	Union  1462x pg. 91	Male Connector  1468x pg. 92	Female Connector  1466x pg. 92	Bulkhead Union  1474x pg. 92
45° Male Elbow  1480x pg. 92	Union Elbow  1465x pg. 93	90° Male Elbow  1469x pg. 93	90° Male Elbow Long  1469x-L pg. 93	90° Female Elbow  1470x pg. 93	Union Tee  1464x pg. 94
Male Branch Tee  1472x pg. 94	Female Branch Tee  1477x pg. 94	Male Run Tee  1471x pg. 94	Adapter Tee  1482x pg. 95	Insert  1484x pg. 95	Gauge Ring  1485x pg. 95

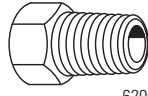
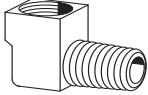
Application Data

Visual Index

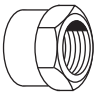
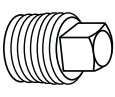
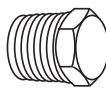
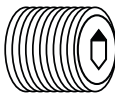
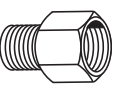
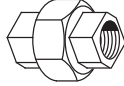
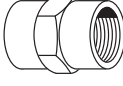
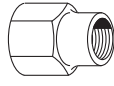
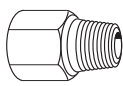
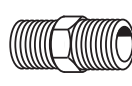
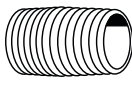
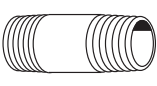
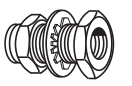
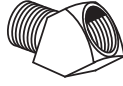
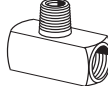
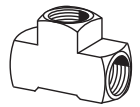
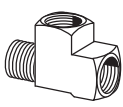
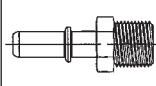
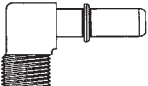
Air Brake Connectors for Copper Tubing

Sleeve  1360x pg. 97	Nut  1361x pg. 97	Union  1362x pg. 97	Male Connector  1368x pg. 97	Female Connector  1366x pg. 98	45° Male Elbow  1380x pg. 98
90° Male Elbow  1369x pg. 98	90° Male Elbow Long  1369x-L pg. 98	Union Tee  1364x pg. 99	Male Run Tee  1371x pg. 99	Male Branch Tee  1372x pg. 99	Bulkhead Coupling (brass)  pg. 99
Bulkhead Coupling (brass)  pg. 100	Bulkhead Coupling (brass)  pg. 100	Drain Cock  W15310 pg. 100	Shut-Off Valve  W2033L pg. 100	External Seat Draincock  145 pg. 100	

Threaded Sleeve

Nut  6100x pg. 102	Male Connector  6200x pg. 102	Male Elbow  6400x pg. 102
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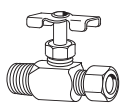
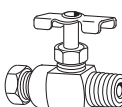
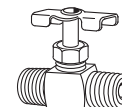
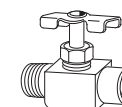
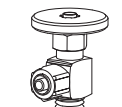
Pipe

Cap  3129x pg. 104	Slotted Plug  3150x pg. 104	Square Head Plug  3151x pg. 104	Hex Head Plug  3152x pg. 104	Hex Socket Plug  3153x pg. 104	Adapter  3200x pg. 104
Bushing  3220x pg. 105	Union  3250x pg. 105	Coupling  3300x pg. 105	Reducer Coupling  3300x pg. 105	Restriction Pipe Adapter  pg. 105	Hex Nipple  3325x pg. 106
Close Nipple  3326x pg. 106	Long Nipple  pg. 106	Bulkhead Coupling (brass)  pg. 107	45° Street Elbow  3350x pg. 107	90° Street Elbow  3400x pg. 107	90° Elbow  3500x pg. 108
Male Branch Tee  3600x pg. 108	Tee  3700x pg. 108	Male Run Tee  3750x pg. 108	Cross  3950x pg. 108	Straight  pg. 109	90° Elbow  pg. 109

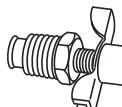
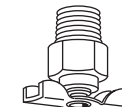
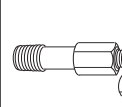
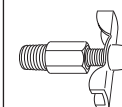
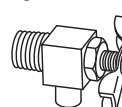
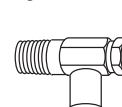
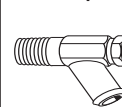
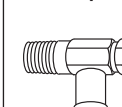
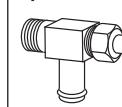
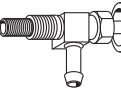
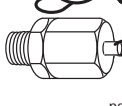
Application Data

Visual Index

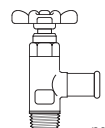
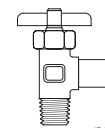
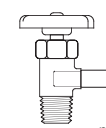
Needle Valves

Compression Double  pg. 110	Compression Straightway  pg. 110	Compression Angle  pg. 110	Inverted Straightway  pg. 110	Male Pipe Double  pg. 111	Male to Female Pipe  pg. 111
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Drain Cocks

External Seat  pg. 113	External Seat  pg. 113	Internal Seat  pg. 113	Internal Seat (long)  pg. 113	Internal Seat  pg. 114	Internal Seat Drain Valve  pg. 114
Air Vent  pg. 114	Angle Bib Drain  pg. 114	Angle Bib Drain  pg. 114	Hose to Pipe (steel)  pg. 115	Hose to Pipe (steel)  pg. 115	Pipe to Hose Shut-Off  pg. 115
Gasoline Shut-Off with screen filter  pg. 115	Air Tank Drain Valve  pg. 115				

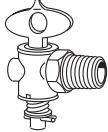
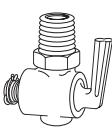
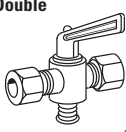
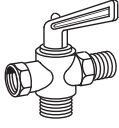
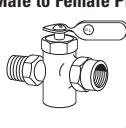
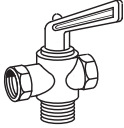
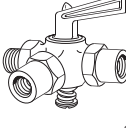
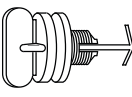
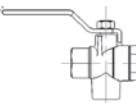
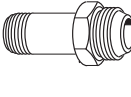
Truck Valves

Truck Valve  7502 pg. 116	Truck Valve  7504 pg. 116	Truck Valve  7506 pg. 116	Truck Valve  7508 pg. 116	Truck Valve  7509 pg. 116
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Application Data

Visual Index

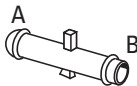
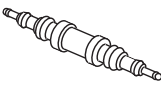
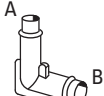
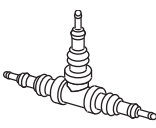
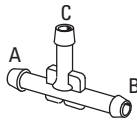
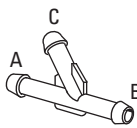
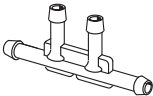
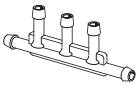
Ground Plug & Multiple Shut-Offs

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Male to Female Pipe  pg. 119	Truck Shut-Off to Female Pipe  pg. 119	Marine Shut-Off Male to Female Pipe  pg. 120	Female Pipe Double  pg. 120	3-Way Shut-Off  pg. 120	3-Way Multiple Shut-Off  pg. 120
4-Way Multiple Shut-Off  pg. 120	Plastic Drain Cocks  pg. 117	Brass Ball Valves  pg. 121-127	Special Adapters  pg. 125-128	BSPP Products  pg. 141	

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Union Tee  1564x pg. 137	Union Elbow  1564x pg. 137	Male Branch Tee  1572x pg. 137	Male Run Tee  1571x pg. 138	Compression Nut  1561x pg. 138	Insert  1584x pg. 138
Cap Nut  1529x pg. 139	Bulkhead Nut  1502x pg. 139	KYNAR Check Valve  1531x pg. 139			

Plastic Barbed Fittings

Straight Connector  pg. 140	Universal Connector  pg. 140	Elbow Connector  pg. 140	Universal Tee  pg. 140	3 Way T  pg. 140	Y Connector  pg. 140
4 Way Tee  pg. 140	5 Way Tee  pg. 140				

48 X 6
↑ ↑
1 2

48 X 6 X 2
↑ ↑ ↑
1 2 3

Parts in this catalog are identified by a series of numbers separated by the letter "X."

1. The number preceding the "X" is the Catalog "Base Number" and indicates the type of connector. See Table 1 for additional base number data (sometimes referred to as dash size).

2. The second number is the tube and/or pipe size in sixteenths of an inch. When a pipe thread for a given tube size follows the SAE standard as shown in Table 2, no other number is required. Example: 48X6 = SAE 45° Flare Male Connector-3/8" tube, 1/4" Male Pipe.

3. If the pipe size is not to the SAE standard, another "X" is added followed by the pipe size indicated in sixteenths of an inch. Example: 1/8" is equal to 2/16" or X2 suffix.

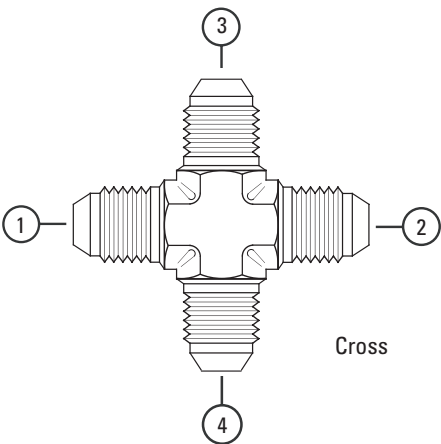
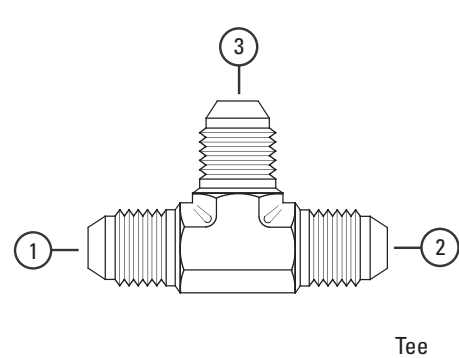
In designating tube and pipe sizes for tees and crosses that are not SAE standard, indicate the sizes in the sequence shown.

Table 1

Type	Example Male Connector	Example Female Connector
45° Flare	48	46
Compression	68	66
Polyline	1268	1266
Selfalign	681	661
Air Brake (Nylon)	1468	1466
Air Brake (Copper)	1368	1366

Table 2

	Tube Size	Pipe Threads
X2	1/8"	1/8"
X3	3/16"	1/8"
X4	1/4"	1/8"
X5	5/16"	1/8"
X6	3/8"	1/4"
X7	7/16"	1/4"
X8	1/2"	3/8"
X10	5/8"	1/2"
X12	3/4"	1/2"
X14	7/8"	3/4"
X16	1"	1"
X20	1-1/4"	No Standard
X24	1-1/2"	No Standard
X32	2"	No Standard



Application Data

Tube Connector Selector Chart

 Refer to safety information regarding proper selection of tubing and tube connectors on page 5.

Connector Types	Mini-Barb	Polyline	Threaded Sleeve	Pipe	Inverted Flare	SAE 45° Flare	Compression	Selfalign	1400 Series Air Brake	1300 Series Air Brake	Push> Connect	Q-CAB®	Molded Compression
Material	Brass	Brass	Brass	Brass	Brass	Brass	Brass	Brass	Brass	Brass	Brass	Brass Comp.	Nylon Poly
Tube Size	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/4	1/4	1/8	1/8	1/8
(O.D. range in inches)	1/2	1/2	3/8	3/4	1	3/4	1	1	3/4	3/4	1/2	2	2
Maximum Working Pressure Depends on tubing material, O.D., wall thickness and connector size.	135	500	500	1200	2000	2000	2000	2000	150	150	250	150	50/220

Vibration (Comparative)

Fair													
Good													
Excellent													

Tubing Types

Copper													
Steel													
Aluminum													
Stainless Steel-Annealed													
Stainless Steel-1/8-Hard													
Polyethylene							w/insert	w/insert					
Nylon									w/insert				
Polyvinyl Chloride (PVC)							w/insert	w/insert					
Bundy							B	B					

Conforms

SAE													
NSF Listed													
FDA Listed													N
UL				F	F	F	F						
ASA													
ASME													
Military									H				
DOT												H	

Typical Use

Instrumentation													
Oil-Air-Water													
Refrigeration													
Hydraulic Systems													
Cooling Systems													
Lubrication Systems													
Air Brake													

 Recommendation and Applicability

B — May be used if bundy is tin dipped
N — Nylon material

F — Available on special order

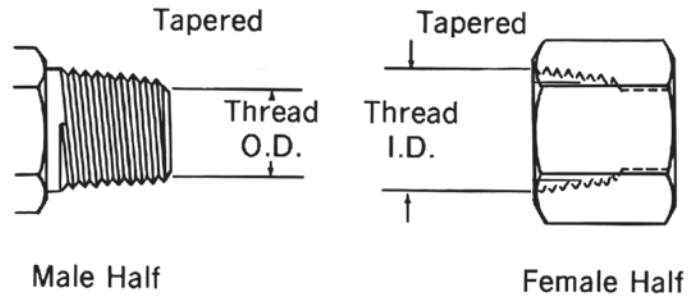
H — Available in most sizes

Application Data

Thread Identification

American Connections NPTF (National Pipe Tapered Fuel)

This connection is still widely used in fluid power systems, even though it is not recommended by the National Fluid Power Association (NFPA) for use in hydraulic applications. The thread is tapered and the seal takes place by deformation of the threads.



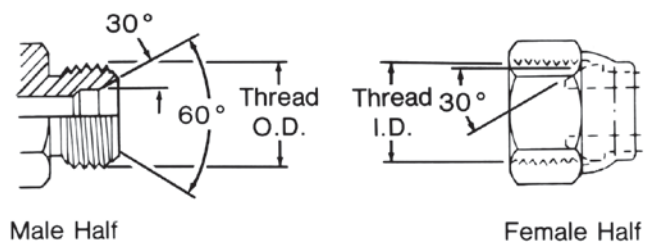
NPTF Threads

Measure thread diameter and subtract 1/4-inch to find the nominal pipe size.

Inch Size	Dash Size	Nominal Thread Size	Male Thread O.D. Inch		Female Thread I.D. Inch	
			Fraction	Decimal	Fraction	Decimal
1/8	02	1/8-27	13/32	0.41	3/8	0.38
1/4	04	1/4-18	17/32	0.54	1/2	0.49
3/8	06	3/8-18	11/16	0.68	5/8	0.63
1/2	08	1/2-14	27/32	0.84	25/32	0.77
3/4	12	3/4-14	1-1/16	1.05	1	0.98
1	16	1-11-1/2	1-5/16	1.32	1-1/4	1.24
1-1/4	20	1-1/4-11-1/2	1-21/32	1.66	1-19/32	0.58
1-1/2	24	1-1/2-11-1/2	1-29/32	1.90	1-13/16	1.82
2	32	2-11-1/2	2-3/8	2.38	2-5/16	2.30

NPSM (National Pipe Straight Mechanical)

This connection is sometimes used in fluid power systems. The female half has a straight thread and an inverted 30° seat. The male half of the connection has a straight thread and a 30° internal chamfer. The seal takes place by compression of the 30° seat on the chamfer. The threads hold the connection mechanically.



Note: A properly chamfered NPTF male will also seal with the NPSM female.

Inch Size	Dash Size	Nominal Thread Size	Male Thread O.D. Inch		Female Thread I.D. Inch	
			Fraction	Decimal	Fraction	Decimal
1/8	02	1/8-27	13/32	0.41	3/8	0.38
1/4	04	1/4-18	17/32	0.54	1/2	0.49
3/8	06	3/8-18	11/16	0.68	5/8	0.63
1/2	08	1/2-14	27/32	0.84	25/32	0.77
3/4	12	3/4-14	1-1/16	1.05	1	0.98
1	16	1-11-1/2	1-5/15	1.32	1-1/4	1.24
1-1/4	20	1-1/4-11-1/2	1-21/32	1.66	1-19/32	0.58
1-1/2	24	1-1/2-11-1/2	1-29/32	1.90	1-13/16	1.82
2	32	2-11-1/2	2-3/8	2.38	2-5/16	2.30

Application Data

Thread Identification

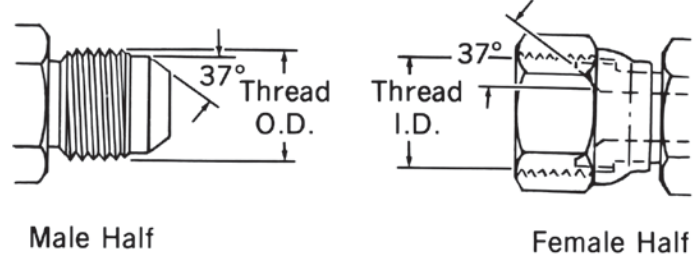
American Connections SAE J514 37° Hydraulic

This connection is very common in fluid power systems. Both the male and female halves of the connections have 37° seats. The seal takes place by establishing a line contact between the male flare and the female cone seat.

The threads hold the connection mechanically.

Caution:

In the -02, -03, -04, -05, -08 and -10 sizes, the threads of the SAE 45° flare and the SAE 37° flare are the same. However, the sealing surface angles are not the same.



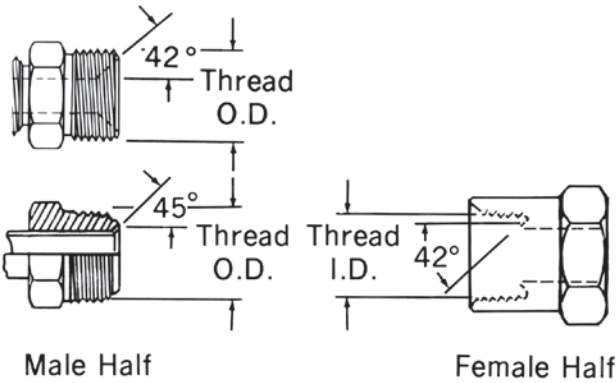
Inch Size	Dash Size	Nominal Thread Size	Male Thread O.D. Inch		Female Thread I.D. Inch	
			Fraction	Decimal	Fraction	Decimal
1/8	02	5/16-24	5/16	0.31	9/32	0.27
3/16	03	3/8-24	3/8	0.38	11/32	0.34
1/4	04	7/16-20	7/16	0.44	13/32	0.39
5/16	05	1/2-20	1/2	0.50	15/32	0.45
3/8	06	9/16-18	9/16	0.56	17/32	0.51
1/2	08	3/4-16	3/4	0.75	11/16	0.69
5/8	10	7/8-14	7/8	0.88	13/16	0.81
3/4	12	1-1/16-12	1-1/16	1.06	1	0.98
7/8	14	1-3/16-12	1-3/16	1.19	1-1/8	1.13
1	16	1-5/16-12	1-5/16	1.31	1-1/4	1.23
1-1/4	20	1-5/8-12	1-5/8	1.63	1-9/16	1.54
1-1/2	24	1-7/8-12	1-7/8	1.88	1-13/16	1.79
2	32	2-1/2-12	2-1/2	2.50	2-7/16	2.42

Application Data

Thread Identification

American Connections SAE J512 Inverted

This connection is frequently used in automotive systems. The male connector can either be a 45° flare in the tube fitting form or a 42° seat in the machined adapter form. The female has a straight thread with a 42° inverted flare. The seal takes place on the flared surfaces. The threads hold the connection mechanically.



Inch Size	Dash Size	Nominal Thread Size	Male Thread O.D. Inch		Female Thread I.D. Inch	
			Fraction	Decimal	Fraction	Decimal
1/8	02	5/16-28	5/16	0.32	9/32	0.28
3/16	03	3/8-24	3/8	0.38	11/32	0.34
1/4	04	7/16-24	7/16	0.44	13/32	0.40
5/16	05	1/2-20	1/2	0.50	15/32	0.45
3/8	06	5/8-18	5/8	0.63	9/16	0.57
7/16	07	1 1/16-18	1 1/16	0.69	5/8	0.63
1/2	08	3/4-18	3/4	0.75	23/32	0.70
5/8	10	7/8-18	7/8	0.88	13/16	0.82
3/4	12	1 1/16-16	1 1/16	1.06	1	1.00

Application Data

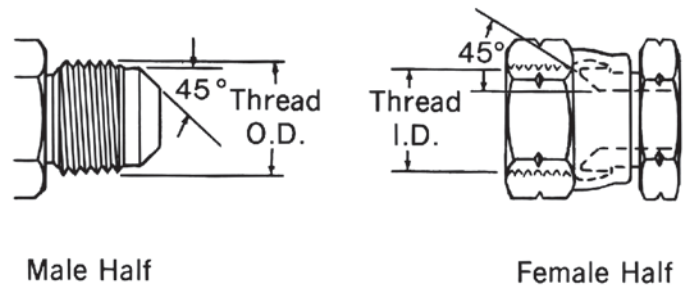
Thread Identification

American Connections SAE J512 45°

This connection is commonly used in refrigeration, automotive and truck piping systems. The connector is frequently made of brass. Both the male and female connectors have 45° seats. The seal takes place between the male flare the female cone seat. The threads hold the connection mechanically.

Caution:

In the -02, -03, -04, -05, -08 and -10 sizes, the threads of the SAE 45° flare and the SAE 37° flare are the same. However, the sealing surface angles are not the same.



Inch Size	Dash Size	Nominal Thread Size	Male Thread O.D. Inch		Female Thread I.D. Inch	
			Fraction	Decimal	Fraction	Decimal
1/8	02	5/16-24	5/16	0.31	9/32	0.27
3/16	03	3/8-24	3/8	0.38	11/32	0.34
1/4	04	7/16-20	7/16	0.44	13/32	0.39
5/16	05	1/2-20	1/2	0.50	15/32	0.45
3/8	06	5/8-18	5/8	0.63	9/16	0.57
1/2	08	3/4-16	3/4	0.75	11/16	0.69
5/8	10	7/8-14	7/8	0.88	13/16	0.81
3/4	12	1-1/16-14	1-1/16	1.06	1	0.99
7/8	14	1-1/4-12	1-1/4	1.25	1-5/32	1.16
1	16	1-3/8-12	1-3/8	1.38	1-9/32	1.29

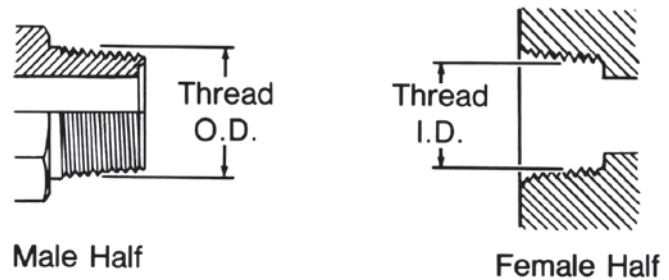
Application Data

Thread Identification

British Connections

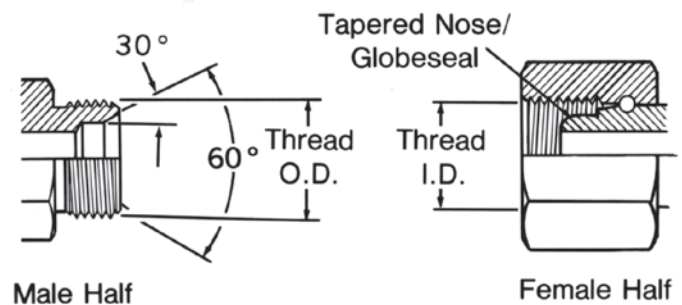
British Standard Pipe (BSP)

This BSPT (tapered) connection is similar to the NPT, except that the thread pitches are different in most sizes, and the thread form and O.D.s are close but not the same. Sealing is accomplished by thread distortion. A thread sealant is recommended.



The BSP (parallel) male is similar to the NPSM male except the thread pitches are different in most sizes.

The female swivel BSPP has a tapered nose/Globeseal flareless swivel which seals on the cone seat of the male.



BSPT/BSPP Threads

Inch Size	Dash Size	Nominal Thread Size*	Male Thread O.D. Inch		Female thread I.D. Inch	
			Fraction	Decimal	Fraction	Decimal
1/8	02	1/8-28	3/8	0.38	11/32	0.35
1/4	04	1/4-19	33/64	0.52	15/32	0.47
3/8	06	3/8-19	21/32	0.65	19/32	0.60
1/2	08	1/2-14	13/16	0.82	3/4	0.75
5/8	10	5/8-14	7/8	0.88	13/16	0.80
3/4	12	3/4-14	11/32	1.04	31/32	0.97
1	16	1-11	15/16	1.30	1-7/32	1.22
1-1/4	20	1-1/4-11	1-21/32	1.65	1-9/16	1.56
1-1/2	24	1-1/2-11	1-7/8	1.88	1-25/32	1.79
2	32	2-11	2-11/32	2.35	2-1/4	2.26

*Frequently, the thread size is expressed as a fractional dimension preceded by the letter "G" or the letter "R".

The "G" represents a parallel thread and the "R" indicates a tapered thread.

For example, BSPP 3/8-19 may be expressed as G 3/8, and BSPT 3/8-19 may be expressed as R3/8.

To select tubing for a particular installation, two factors must be determined...

Tubing Types

1. Tubing Type:
material and construction
2. Size:
Inside diameter (I.D.)
and wall thickness.
Information listed below
will aid in your tubing
selection. Commercial
tubing is available in a
wide variety of materials,
types of construction and
quality. Each is best suited
for certain specific appli-
cations.

Aluminum Tubing

Seamless annealed is approved by SAE for low pressure applications.

Copper Tubing:

Seamless fully annealed coils and fully annealed or quarter-hard straight lengths can be used for systems that do not use petroleum based fluids (copper acts as an oil-oxidation catalyst, causing sludge). Copper also tends to work harden when flared or bent and has poor resistance to vibration. Therefore, the use of copper tubing is limited to low-pressure stationary applications and air circuits.

Special Alloy Tubing:

May be required for specific corrosion problems. Information on these applications can be obtained from your tubing supplier or from tubing manufacturers.

Tubing Size

The two variables in tubing size are the inside diameter (ID) and the wall thickness. Each of these is dependent upon a number of factors.

Inside Diameter –

The tubing I.D. will determine the flow and velocity of the fluid in the system.

Flow is the volume of fluid that is to be moved through the line to perform a given job within a specified time. Flow rate is expressed in gallons per minute (gpm).

Velocity is the rate of speed at which the fluid passes through the line. It is expressed in feet per second (fps). With a given flow rate, the velocity will increase as the inside diameter of the tubing decreases.

Note:

To determine the appropriate tubing I.D. for specific flow rate and velocity, refer to the Velocity vs. Flow chart on page 21.

Wall Thickness

The required wall thickness of the tubing depends upon operating pressure, safety factor, temperatures, and tubing material.

Operating Pressure is the pressure of the fluid in the system. It is expressed in pounds per square inch (psi).

Safety Factor is a multiplier applied to the wall thickness that compensates for additional mechanical strains and hydraulic shocks to which the tubing may be subjected during operation.

Note:

To determine the appropriate wall thickness, refer to the data on page 22.

Pressure Drop

Total pressure supplied to a line must equal usable pressure (or output) plus the pressure that is lost through fluid transmission, which is referred to as pressure drop. These pressure drops cause loss of energy and should be kept to a minimum. Elements which cause pressure drop in the transmission of fluids include sudden enlargements or contractions, bends, fittings and valves. Mathematical analysis of pressure drop, although possible, is not precise because of the interrelationship of factors such as fluid velocity, density, flow area and friction coefficients. Therefore, to obtain optimum efficiency, the system (or the questionable portions of the system) should be mocked-up to obtain empirical pressure drop data.

Application Data

Tubing Selection

 Refer to safety information regarding proper selection of tubing and tube connectors on page 5.

Problem

Following is a typical problem that illustrates, step by step, the procedure for determining tube size.

Select Bundyweld tubing with the appropriate I.D. and wall thickness for the following conditions:

Flow — 5 gpm
Velocity — not to exceed 10 fps
Pressure — 2000 psi
Safety Factor — 4:1

Solution

1. Using the Flow/Velocity chart on Page 21, follow the horizontal flow line (5 gpm) until it intersects the vertical velocity line (10fps). From this point, follow the diagonal line upward to get the required tube I.D. (.444). If the horizontal flow line and the vertical velocity line intersect between two diagonal lines, normally the larger inside diameter would be selected since it would mean less velocity.
2. Refer to the chart of Standard Size Hydraulic Tubing, below. Note that .444 I.D. tubing is not listed. If you want to use standard tubing, select one with a larger I.D. Do not select a smaller size since this would increase

the velocity to over the 10 fps limit. Therefore, by going to the next largest size, you would select the 5/8" O.D. tubing having an I.D. of .459 and a wall thickness of .083.

3. To determine whether this tubing will meet the pressure and safety factor requirements, refer to the Recommended Wall Thickness data on page 18. For 5/8" O.D. tubing at 2000 psi, the chart for Bundyweld indicates that the minimum wall thickness with a safety factor of 4:1 is .05952. Since you have selected a tubing with a .083 wall, this would easily fulfill the requirements. However, for savings on weight and cost, you can select

another tubing with a thinner wall that will still meet the performance requirements. Therefore, refer again to the chart on standard size tubing and select a tubing with a wall thickness closer to the minimum requirements. This would be the 5/8" O.D. tubing with a .509 I.D. and a .058 wall. This tubing will handle the pressure requirements of 2000 psi with a safety factor of 4:1, and also provides the required flow while keeping the velocity within the 10 fps limitation.

Standard Size Hydraulic Tubing

Tube O.D.	Tube I.D.	Tube Wall	Tube O.D.	Tube I.D.	Tube Wall	Tube O.D.	Tube I.D.	Tube Wall	Tube O.D.	Tube I.D.	Tube Wall
1/8"	.055	.035	3/8"	.245	.065	5/8"	.435	.095	7/8"	.657	.109
	.061	.032		.259	.058		.459	.083		.685	.095
	.065	.030		.277	.049		.481	.072		.709	.083
	.069	.028		.291	.042		.495	.065		.731	.072
3/16"	.117	.035	1/2"	.305	.035	3/4"	.509	.058	1"	.745	.065
	.123	.032		.311	.032		.527	.049		.759	.058
	.127	.030		.310	.095		.541	.042		.777	.049
1/4"	.120	.065		.334	.083		.555	.035		.760	.120
	.134	.058	3/4"	.358	.072		.532	.109	3/4"	.782	.109
	.152	.049		.370	.065		.560	.095		.810	.095
	.166	.042		.384	.058		.584	.083		.834	.083
	.180	.035		.402	.049		.606	.072		.856	.072
	.190	.030		.416	.042		.620	.065		.870	.065
5/16"	.182	.065	1"	.430	.035		.634	.058		.884	.058
	.196	.058		.436	.032		.652	.049		.902	.049
	.214	.049					.680	.035			
	.228	.042									
	.242	.035									
	.248	.032									

Application Data

Tubing Selection

Flow/Velocity Chart

To Find Required Tube I.D.

Flow—20 gpm
Velocity—9 fps

Follow horizontal flow line (20 gpm) until it intersects vertical velocity line (9 fps). From this point follow diagonal line to get required Tube I.D. —(.944).

To Find Permissible Flow

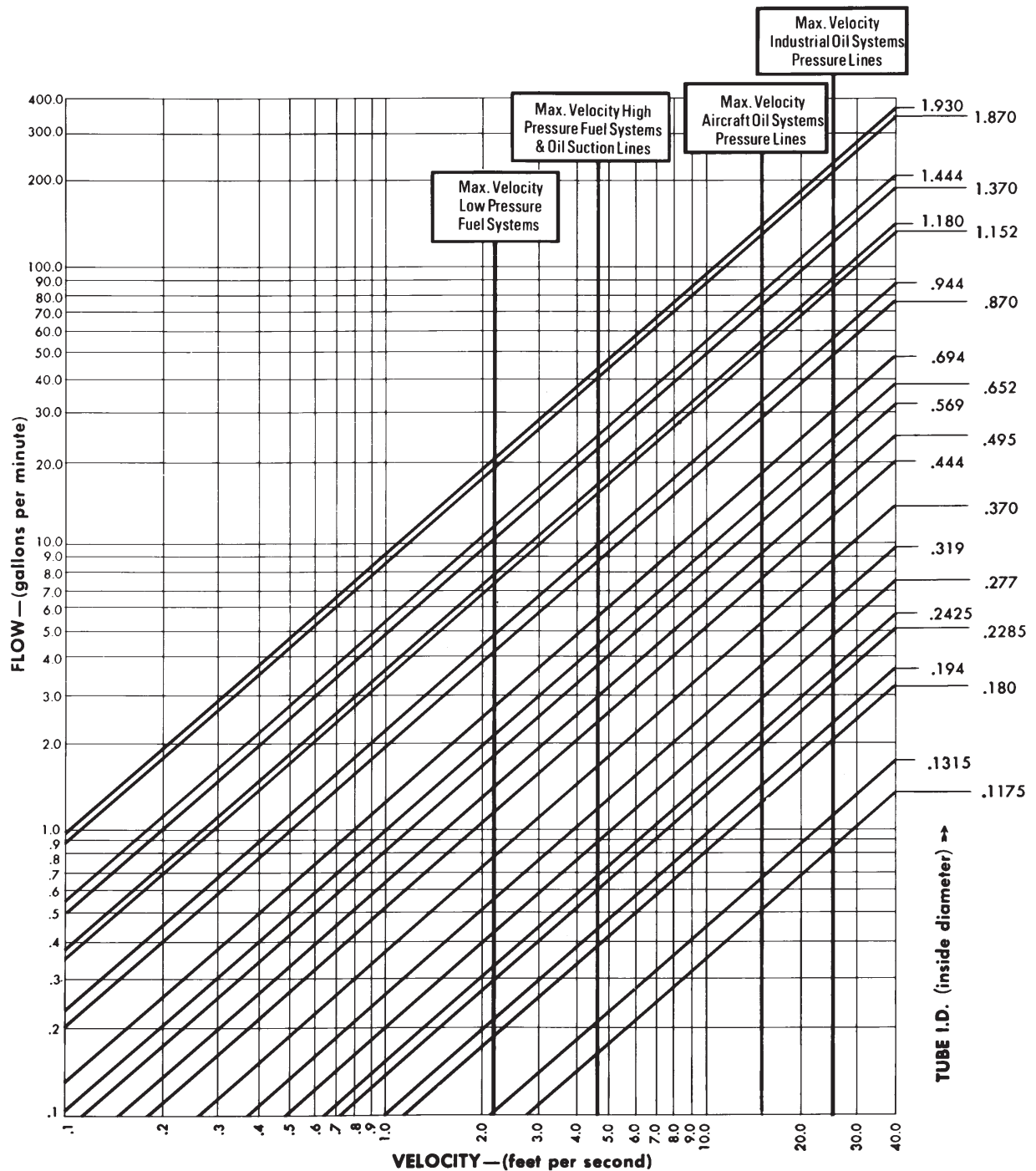
Velocity—15 fps
Tube I.D.—.495

Follow vertical velocity line (15 fps) until it intersects diagonal line representing .495 tube I.D. Then project this point horizontally to get the permissible flow—(9 gpm).

To Find Velocity of Fluid in System

Flow—6 gpm
Tube I.D.—.694

Follow horizontal flow line (6 gpm) until it intersects diagonal line representing .694 tube I.D. Then project this point vertically downward to get the velocity of fluid —(5 fps).



Application Data

Tubing Selection

With the following recommended wall thickness tables the tubing wall can be selected that is best suited for a particular application. The data given in these tables are raw figures based on the equation:

$$t = \frac{Dp(FS)}{2S}$$

- t** – wall thickness (inches)
D – O.D. of tube (inches)
p – pressure (psi)
FS – Safety Factor
S – tensile strength of tubing material

Therefore, many of the wall thicknesses given in these tables are not found on standard tubing, but serve to establish the minimum wall required.

Safety Factor

The standard safety factors indicate three grades of severity of service:

- 4:1** – mechanical and hydraulic shocks not excessive
6:1 – considerable mechanical strain and hydraulic shock
8:1 – hazardous applications with severe service conditions

The wall thickness shown in these tables are based on ultimate strength of material and a safety factor of 4:1.

To obtain the recommended wall for a specific pressure based on a safety factor of 6:1, multiply the wall thickness indicated in the table by 1.5. For a safety factor of 8:1, multiply by 2

Temperature

The wall thickness found by using these tables can be corrected for temperature by multiplying the wall thickness by the appropriate correction factor given in the chart below. The table is based on strength reduction due to increased temperature.

⚠ Refer to safety information regarding proper selection of tubing and tube connectors on page 5.

Recommended Wall Thickness		
Temperature	Copper	Aluminum
+100F.	1.00	1.00
+200F.	1.08	1.00
+300F.	1.22	1.08
+400F.	2.30	1.41
+500F.	–	2.10
+600F.	–	–
+700F.	–	–
+800F.	–	–
+900F.	–	–
+1000F.	–	–

Bundyweld Based on 42,000#/IN. ² Strength (F S=4)					
O.D.	Tube 1,000	Working Pressure (psi)			
		2,000	3,000	4,000	5,000
1/8	.00595	.01190	.01786	.02381	.02976
3/16	.00893	.01786	.02679	.03571	.04464
1/4	.01190	.02381	.03571	.04762	.05952
5/16	.01488	.02976	.04464	.05952	.07440
3/8	.01786	.03571	.05357	.07143	.08929
1/2	.02381	.04762	.07143	.09524	.11905
5/8	.02976	.05952	.08929	.11905	.14881

Aluminum 3003 (H-14) Based on 20,000#/IN. ² Strength (F.S. –4)						Aluminum 5052 (H-32) Based on 31,000#/IN. ² Strength (F.S. –4)				
Tube O.D.	Working Pressure (psi)					Working Pressure (psi)				
	1,000	2,000	3,000	4,000	5,000	1,000	2,000	3,000	4,000	5,000
1/8	.01250	.02500	.3750	.05000		.00806	.01613	.02419	.03226	.04032
3/16	.01875	.03750	.05650	.07500		.01210	.02419	.03629	.04839	.06048
1/4	.02500	.05000	.07500	.10000		.01613	.03226	.04839	.06452	.08065
5/16	.03125	.06250	.09375	.12500		.02016	.04032	.06048	.08065	.10081
3/8	.03750	.07500	.11250	.15000		.02419	.04839	.07258	.09677	.12097
1/2	.05000	.10000	.15000	.20000		.03227	.06452	.09677	.12903	.16129
5/8	.06250	.12500	.18750	.25000		.04032	.08065	.12097	.16129	.20161
3/4	.07500	.15000	.22500	.30000		.04839	.09677	.14516	.19355	.24194
7/8	.08750	.17500	.26250	.35000		.05645	.11290	.16935	.22581	.28226
1	.10000	.20000	.30000	.40000		.06452	.12903	.19355	.25806	.32258
1-1/4	.12500	.25000	.37500	.50000		.08065	.16129	.24194	.32258	.40323
1-1/2	.15000	.30000	.45000	.60000		.09677	.19355	.29032	.38710	.48387
2	.20000	.40000	.60000	.80000		.12903	.25806	.38710	.51613	.64516

Annealed Copper Based on 30,000#/IN. ² Strength (F.S. –4)						Copper (UNS C12200 Light Drawn) Based on 40,000#/IN. ² Strength (F.S. –4)				
Tube O.D.	Working Pressure (psi)					Working Pressure (psi)				
	1,000	2,000	3,000	4,000	5,000	1,000	2,000	3,000	4,000	5,000
1/8	.00833	.01667	.02500	.03333	.04167	.00625	.01250	.01875	.02500	.03125
3/16	.01250	.02499	.03750	.04999	.06250	.00938	.01875	.02812	.03750	.04688
1/4	.01667	.03333	.05000	.06666	.08333	.01250	.02500	.03750	.05000	.06250
5/16	.02083	.04167	.06250	.08333	.10417	.01562	.03125	.04688	.06250	.07812
3/8	.02499	.04999	.07500	.09999	.12499	.01875	.03750	.05625	.07500	.09375
1/2	.03333	.06667	.10000	.13333	.16667	.02500	.05000	.07500	.10000	.12500
5/8	.04167	.08333	.12500	.16666	.20883	.03125	.06250	.09375	.12500	.15625
3/4	.04999	.09999	.15000	.19999	.24999	.03750	.07500	.11250	.15000	.18750
7/8	.05833	.11667	.17500	.23333	.29166	.04375	.08750	.13125	.17500	.21875
1	.06667	.13333	.20000	.26666	.33333	.05000	.10000	.15000	.20000	.25000
1-1/4	.08333	.16667	.25000	.33333	.41667	.06250	.12500	.18750	.25000	.31250
1-1/2	.09999	.19999	.30000	.39999	.49999	.07500	.15000	.22500	.30000	.37500
2	.13333	.26667	.40000	.53333	.66667	.10000	.20000	.30000	.40000	.50000

Shaded Areas

Tubing wall thickness listed in the shaded areas are generally either too light or too heavy for practical applications, and are listed only to provide data for accurate computation.

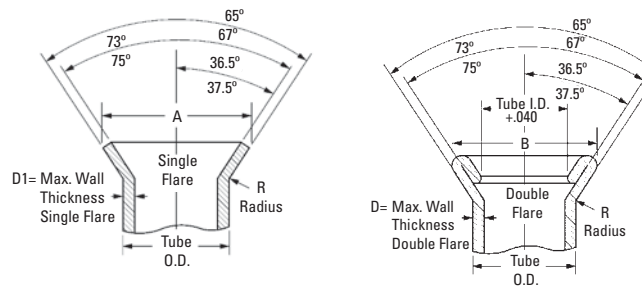
Application Data

Flare Dimensions

JIC 37° Flare Tubes

(SAE J533)

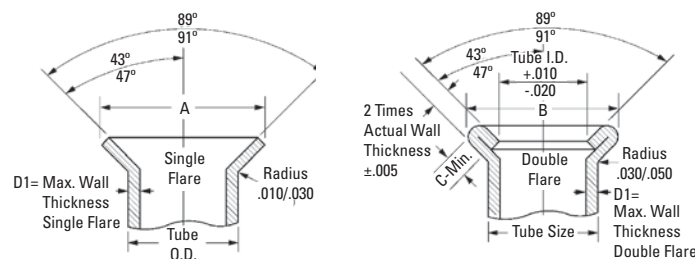
Tube Size O.D.	Single Flare A Diameter		Double Flare B Diameter		R Radius ±.020	Maximum Wall Thickness	
	Max.	Min.	Max.	Min.		Single Flare D	Double Flare D
1/8	0.200	0.180	0.200	0.180	0.030	0.035	0.025
3/16	0.280	0.260	0.280	0.260	0.030	0.035	0.028
1/4	0.360	0.340	0.360	0.340	0.030	0.065	0.035
5/16	0.430	0.400	0.430	0.400	0.030	0.065	0.035
3/8	0.490	0.460	0.490	0.460	0.040	0.065	0.049
1/2	0.660	0.630	0.660	0.630	0.060	0.083	0.049
5/8	0.790	0.760	0.790	0.760	0.060	0.083	0.049
3/4	0.950	0.920	0.960	0.920	0.080	0.109	0.049
7/8	1.070	1.040	1.070	1.040	0.080	0.109	0.065
1	1.200	1.170	1.200	1.170	0.090	0.120	0.065
1 1/4	1.510	1.480	1.510	1.480	0.090	0.120	0.065
1 1/2	1.730	1.700	1.730	1.700	0.110	0.120	0.065
2	2.360	2.330	2.360	2.330	0.110	0.134	0.065



SAE 45° Flare Tubes

(SAE J533)

Tube Size	Single Flare A Diameter		Single Flare B Diameter		Double Coined Flare Seat Length C	Maximum Wall Thickness	
	Max.	Min.	Max.	Min.		Single Flare D	Double Flare D ₁
1/8	0.171/	0.181	0.198/	0.213	0.040	0.035	0.025
3/16	0.239/	0.249	0.265/	0.280	0.040	0.035	0.028
1/4	0.315/	0.325	0.345/	0.360	0.040	0.049	0.035
5/16	0.388/	0.404	0.410/	0.425	0.062	0.049	0.035
3/8	0.471/	0.487	0.485/	0.500	0.062	0.065	0.049
7/16	0.545/	0.561	0.555/	0.570	0.062	0.065	0.049
1/2	0.607/	0.623	0.625/	0.640	0.062	0.083	0.049
9/16	0.660/	0.676	0.697/	0.712	0.062	0.083	0.049
5/8	0.732/	0.748	0.757/	0.772	0.062	0.095	0.049
3/4	0.900/	0.916	0.897/	0.912	0.062	0.109	0.049
7/8	1.025/	1.041	—	—	—	0.109	—
1	1.141/	1.157	—	—	—	0.120	—



Application Data

Tubing Installation

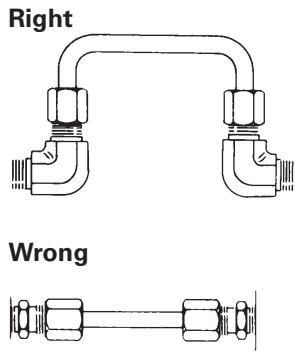


Figure 1

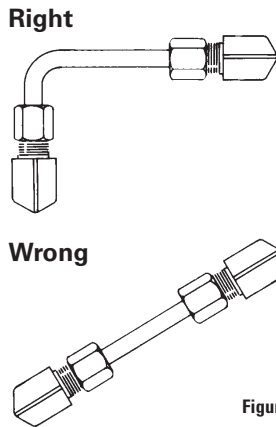


Figure 2

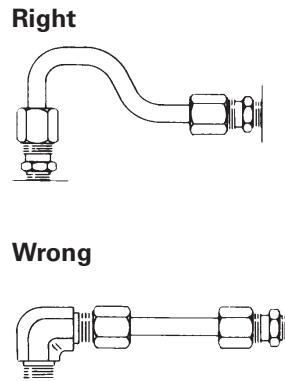


Figure 3

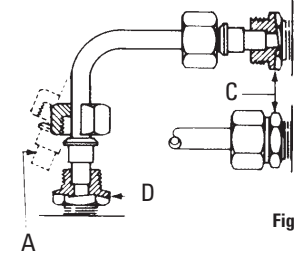


Figure 4

Note:

Springing the tubing to force alignment places strain on fitting joints.

Nearly all industrial equipment now in service makes some use of fluid lines. From an economic point of view, the best fluid lines system is that which is easiest to maintain at the lowest original cost. The use of tubing and tube connectors on lines up to 2" diameter is usually more economical than the use of pipe and pipe connectors in modern installations. A few of the more important reasons follow:

1. Size for size, tubing is lighter weight, easier to handle and can be bent more easily than iron pipe.
2. Ductile hydraulic tubing reduces the number of connections required, thus reducing material and labor costs. Bent tubing also reduces pressure drop and turbulence in the system.
3. Fewer joints means lower costs and fewer points of potential leakage.
4. The use of tube connectors makes every joint a

union, permitting easier, faster maintenance and repair work.

5. Modern flared and flare-less tube fittings eliminate the need for threading, soldering, or welding.

Tube Bending

Tubing should be bent whenever possible to reduce the number of connectors.

Copper tubing can be bent easily with a hand bender. Steel tubing can be bent in sizes 1/8" to 5/8" O.D. by using a hand bender designed for steel tubing. For production quantities, or for sizes larger than 5/8" O.D., a power bender is generally used.

Tubing should be bent accurately. Tubing manufacturers will advise the correct radii for various types and wall thicknesses of tubing. Kinks, flattened bends, wrinkles and tube breakage or loss should be avoided by the use of proper tube bending equipment.

Precautions

Avoid straight line connections wherever possible, especially in short runs.

Design piping systems symmetrically. They are easier to install and present a neat appearance.

Care should be taken to eliminate stress from tubing lines. Long tubing runs should be supported by brackets or clips. All parts installed on tubing lines such as heavy fittings, valves, etc., should be bolted down to eliminate tubing fatigue.

Before installing tubing, inspect the tube to see that it conforms to the required specifications, is of the correct diameter and wall thickness and is not out of round.

Cut tube ends reasonably square and lightly deburr inside and outside edge. Chamfer on outside edge will destroy bearing of tube end on the connector seat.

To avoid difficulty in assembly and disconnecting, a sufficient straight length of

tube must be allowed from the end of the tube to the start of the bend. Allow twice the length of the nut as a minimum.

Tubes should be formed to assemble with true alignment to the center line of the fittings, without distortion or tension. Tubing which has to be sprung from position, "A," (see Fig. 4), to be inserted into the connector has not been properly fabricated, and when so installed and connected, places the tubing under stress.

When assembling the tubing, insert the longer leg to the connector as at "C" (Fig. 4). With the nut free, the short leg of the tubing can be easily moved and brought to proper position with and inserted into the seat in connector "D". The nuts can then be tightened as required.

Application Data

Chemical Compatibility Chart

 Refer to safety information regarding proper selection of tubing and tube connectors on page 5.

These tables alphabetically list commonly used materials of various chemical composition. After each agent listing you will find the basic tubing and connector materials rated according to their chemical resistance to each individual agent. The chart is intended to be used as a guide only. Many factors (concentration, temperature, intermittent or continuous exposure, etc.) have a

bearing upon the suitability of any tubing or connector for any specific application, and these factors must be considered by you as you review the chemical compatibility chart.

Where unusual conditions exist or where questions arise, consult Eaton for expert assistance on your tubing application requirements.

Note:

All data given herein is believed to be accurate and reliable but presented without guarantee, warranty, or responsibility of any kind, express or implied, on our part. Chemical resistance will vary with the wide diversity of possible mixtures and service conditions. It is not therefore possible to give any guarantee whatsoever in individual cases. Eaton Eclipse[®] and Solstice[™] tubing should only be used in air brake applications.

Fluid	Nylon 11 MTP160	Nylon 6/6 PT230	PVC PT200	Polyethylene PT240 (LDPE)	Brass
Acetaldehyde	G	F	X	X	G
Acetic Acid (Concentrated)	X	X	X	X	X
Acetic Acid (Dilute)	F	X	F	G	X
Acetic Anhydride	X	X	X	X	X
Acetone	G	F	X	G	G
Acrylonitrile	G	—	G	—	—
Air	G	G	G	G	G
Alcohols					
Amyl Alcohol	G	G	X	G	G
Butyl Alcohol, Butanol	G	G	X	G	G
Ethyl Alcohol, Ethanol	G	G	F	G	G
Isopropyl Alcohol, Isopropanol	G	G	G	G	G
Methyl Alcohol, Methanol	G	G	X	G	G
Aluminum Chloride	X	X	G	G	X
Aluminum Fluoride	X	X	G	G	X
Aluminum Hydroxide	G	G	G	G	X
Aluminum Nitrate	G	F	G	G	X
Aluminum Sulfate	G	F	G	G	X
Alums	F	G	G	G	X
Ammonia, Anhydrous	Use approved anhydrous ammonia hose				X
Ammonia Solution (10%)	G	X	G	G	X
Ammonium Chloride	X	X	G	G	X
Ammonium Hydroxide	G	X	X	G	X
Ammonium Nitrate	G	G	G	G	X
Ammonium Phosphate	G	G	F	G	X
Ammonium Sulfate	G	G	G	G	X
Amyl Acetate	G	G	X	X	G
Amyl Alcohol	G	G	X	G	G
Aniline	X	X	X	X	X
Aniline Dyes	X	X	X	X	X
Animal Oils and Fats	G	—	G	X	G
Anti-Freeze (Glycol Base)	G	—	G	F	G
Aqua Regia	X	X	X	X	—
Aromatic Hydrocarbons	G	G	X	G	G
Asphalt Emulsion	G	—	X	—	G
Barium Chloride	G	—	G	G	G
Barium Hydroxide	G	G	G	G	X
Barium Sulfate	G	G	G	G	G
Barium Sulfide	X	—	G	G	X
Beet Sugar Liquors	G	G	G	G	X
Benzaldehyde	G	G	X	X	F

Codes:

G = Good Resistance
 F = Fair Resistance
 X = Incompatible
 — = No data available
 + = Call Technical Support
 for specific application

Application Data

Chemical Compatibility Chart

 Refer to safety information regarding proper selection of tubing and tube connectors on page 5.

Fluid	Nylon 11 MTP 160	Nylon 6/6 PT230	PVC PT200	Polyethylene PT240 (LDPE)	Brass
Benzene, Benzol	G	G	X	X	G
Benzoic Acid	X	X	X	G	G
Black Sulfate Liquor	X	X	X	G	X
Bleach Solution	X	X	F	G	X
Borax Solution	G	—	G	G	G
Boric Acid	G	G	G	G	G
Brake Fluid (Glycol Ether Base)	G	—	X	X	G
Brine	G	—	G	G	G
Bromine	X	X	X	X	X
Butane	Use Butane approved hose				
Butyl Acetate	G	—	X	X	G
Butyl Alcohol, Butanol	G	G	X	G	G
Calcium Bisulfite	G	X	G	G	X
Calcium Chloride	G	X	G	G	X
Calcium Hydroxide	G	G	G	G	G
Calcium Hypochlorite	X	X	G	G	G
Cane Sugar Liquors	G	—	G	G	G
Carbon Dioxide (Dry)	G	G	G	G	G
Carbon Dioxide (Wet)	G	G	G	G	F
Carbon Disulfide (Bisulfide)	X	X	X	X	G
Carbon Monoxide (Hot)	X	X	X	X	G
Carbon Tetrachloride	G	G	X	X	G
Carbonic Acid	G	—	G	G	X
Castor Oil	G	—	G	X	G
Cellosolve Acetate	G	—	X	—	X
Chlorinated Solvents	F	G	X	X	G
Chloroacetic Acid	X	X	X	X	X
Chlorobenzene	X	X	X	X	F
Chlorine Gas (Dry)	X	X	X	X	G
Chlorine Gas (Wet)	X	X	X	X	X
Chloroform	F	G	X	X	G
Chlorosulfonic Acid	X	X	X	X	X
Chromic Acid (under 25%)	X	X	F	F	X
Chromic Acid (over 25%)	X	X	X	X	X
Citric Acid	X	F	G	G	X
Coke Oven Gas	G	—	X	G	F
Copper Chloride	X	X	G	G	X
Copper Cyanide	G	G	G	G	X
Copper Sulfate	G	G	G	G	X
Corn Syrup (Non-food)	G	—	G	G	—
Cottonseed Oil	G	—	F	G	G
Creosote	X	X	X	X	F
Cresol	X	X	X	X	—
Cyclohexanol	G	G	X	F	G
Dextrose (Food Grade)	X	X	X	G	—
Dichlorobenzene	G	—	X	X	—
Diesel Fuel	G	—	X	X	G
Diethanolamine	G	—	X	—	X
Diethylenetriamine	X	X	X	G	—
Dowtherm A	X	X	X	X	X
Enamel (Solvent Base)	G	—	X	G	G
Ethanolamine	G	—	X	G	X
Ethers (Ethyl Ether)	G	—	X	X	G
Ethyl Alcohol	G	G	F	G	G
Ethyl Acetate	G	G	X	G	G
Ethyl Acrylate	X	—	X	—	—
Ethyl Methacrylate	X	—	X	—	—
Ethylamine	X	X	X	G	G

Codes:

G = Good Resistance
 F = Fair Resistance
 X = Incompatible
 — = No data available
 + = Call Technical Support
 for specific application

Application Data

Chemical Compatibility Chart

 Refer to safety information regarding proper selection of tubing and tube connectors on page 5.

Fluid	Nylon 11 MTP 160	Nylon 6/6 PT230	PVC PT200	Polyethylene PT240 (LDPE)	Brass
Ethyl Cellulose	F	—	X	G	G
Ethyl Chloride	G	—	X	X	G
Ethylenediamine	X	X	X	G	G
Ethylene Dibromide	F	—	X	—	—
Ethylene Dichloride	F	—	X	X	F
Ethylene Glycol	G	G	G	G	G
Ethylene Oxide	G	—	X	X	X
Fatty Acids	G	G	G	G	F
Ferric Chloride 5%	G	G	G	G	X
Ferric Sulfate	G	G	G	G	X
Fertilizer Salts Solution	F	—	G	G	—
Formaldehyde	G	G	X	G	G
Formic Acid	X	X	X	G	F
Freon 12	Use approved Freon 12 hose				G
Freon 134a	Use approved Freon 134a hose				—
Fuel Oil	G	—	F	X	G
Furfural	X	X	X	X	G
Gasoline (Refined)	G	G	X	X	G
Gasoline (Unleaded)	G	G	X	X	G
Gasoline (10% Ethanol)	G	G	X	X	G
Gasoline (10% Methanol)	G	G	X	X	G
Glucose (non-food)	G	G	G	G	G
Glycerine, Glycerol (Non-food)	G	G	G	G	G
Greases	G	G	G	G	G
Green Sulfate Liquor	X	X	G	G	X
Heptane	G	G	X	X	G
Hexane	G	G	X	X	G
Houghto Safe 273 to 640	G	—	F	G	G
Houghto Safe 5046, 5047F	G	—	G	G	G
Houghto Safe 1000 Series	G	—	X	X	G
Hydraulic Oils					
Straight Petroleum Base	G	G	G	G	G
Water Petroleum Emulsion	G	—	—	F	G
Water Glycol	G	G	X	—	G
Straight Phosphate Ester	G	G	X	X	G
Phos. Ester/Petroleum Blend	G	G	X	X	G
Polyol Ester	G	—	—	—	G
Hydrobromic Acid (under 48%)	X	X	G	G	X
Hydrochloric Acid	X	X	G	G	X
Hydrocyanic Acid	X	X	G	G	G
Hydrofluoric Acid (under 50%)	X	X	F	F	X
Hydrofluoric Acid (over 50%)	X	X	X	X	X
Hydrofluosilicic Acid	X	X	G	G	X
Hydrogen	Use approved hydrogen hose or metal tubing				G
Hydrogen Peroxide	X	X	—	G	X
Hydrogen Sulfide	X	X	G	G	G
Hydrolube	G	—	G	G	G
Iodine	X	X	X	X	X
Isocyanates	X	X	X	X	—
Isopropyl Alcohol, Isopropanol	G	G	G	G	G
Isopropylamine	X	—	X	—	G
Iso-Octane	G	G	X	X	G
Jet Fuel (Transfer Only)	G	G	X	X	G
Kerosene	G	G	X	X	G
Lacquer	G	G	X	F	G
Lacquer Solvents	G	G	X	F	G
Lactic Acid	G	G	G	G	F
Lime Sulfur	G	F	G	G	X

Codes:

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for specific application

Application Data

Chemical Compatibility Chart

 Refer to safety information regarding proper selection of tubing and tube connectors on page 5.

FLUID	Nylon 11 MTP 160	NYLON 6/6 PT230	PVC PT200	POLYETHYLENE PT240 (LDPE)	BRASS
Lindol	G	G	—	—	F
Linseed Oil	G	G	G	G	G
Lubricating Oils	G	G	G	G	G
Lye	G	F	G	G	F
Magnesium Chloride	G	G	G	G	F
Magnesium Hydroxide	G	G	G	G	G
Magnesium Sulfate	G	G	G	G	G
Mercuric Chloride	X	X	F	G	X
Mercury	G	G	F	G	X
Methyl Alcohol, Methanol	G	G	X	G	G
Methyl Acrylate	X	X	X	—	G
Methyl Bromide	G	F	X	X	G
Methyl Chloride	G	G	X	X	G
Methylene Chloride	F	F	X	X	G
Methyl t-Butyl Ether (MTBE)	G	G	X	—	—
Methyl Ethyl Ketone	G	G	X	G	G
Methyl Isobutyl Ketone	G	G	X	G	G
Methyl Isopropyl Ketone	G	G	X	G	G
Methyl Methacrylate	X	—	X	—	—
Mineral Oil	G	G	F	X	G
Mineral Spirits	G	G	X	G	G
Naphtha	G	G	X	G	—
Napthalene	G	G	X	X	G
Nickel Acetate	G	G	G	G	F
Nickel Chloride	G	G	G	G	X
Nickel Sulfate	G	G	G	G	G
Nitric Acid (under 35%)	X	X	G	F	X
Nitric Acid (35% to 60%)	X	X	F	X	X
Nitric Acid (over 60%)	X	X	X	X	X
Nitrobenzene	X	—	X	X	G
Nitrogen Gas	G	G	G	G	G
Nitrous Oxide	F	F	X	X	G
Oleic Acid	G	G	F	G	G
Oleum (Fuming Sulfuric Acid)	X	X	X	X	X
Oxalic Acid	X	X	G	G	F
Oxygen (non-breathing, non-welding) +	G	G	G	G	G
Ozone (300 pphm)	X	X	X	X	—
Paint (Solvent Base)	G	G	X	F	G
Palmitic Acid	G	G	F	G	X
Paper Mill Liquors	X	X	X	X	—
Pentane	G	—	X	X	G
Perchloroethylene	F	G	X	X	G
Petroleum Ether	G	G	X	X	G
Petroleum Oils	G	G	G	G	G
Phenol	X	X	X	X	G
Phosphoric Acid (to 85%)	X	X	G	G	G
Picric Acid (Molten)	X	X	X	X	X
Picric Acid (Solution)	X	X	X	X	X
Potassium Chloride	G	G	G	G	F
Potassium Cyanide	G	G	G	G	X
Potassium Dichromate	F	—	G	G	F
Potassium Hydroxide	G	F	G	G	F
Potassium Permanganate	X	X	G	G	—
Potassium Sulfate	G	G	G	G	F
Propane Liquid	Use hose approved for Propane Liquid				G
Propylene Glycol	G	—	F	G	F
Pyridine	X	X	X	G	F
Sea Water	G	G	G	G	G

Codes:

G = Good Resistance
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Application Data

Chemical Compatibility Chart

 Refer to safety information regarding proper selection of tubing and tube connectors on page 5.

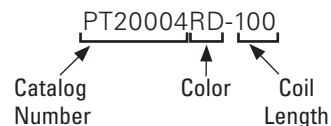
Fluid	Nylon 11 MTP 160	Nylon 6/6 PT230	PVC PT200	Polyethylene PT240 (LDPE)	Brass
Silver Nitrate	G	G	G	G	X
Skydrol	G	G	X	X	G
Soap Solution	G	G	G	X	G
Sodium Bicarbonate	G	G	G	G	G
Sodium Bisulfate	G	G	G	G	F
Sodium Bisulfite	G	G	G	G	F
Sodium Borate	G	G	G	G	G
Sodium Carbonate	G	G	G	G	G
Sodium Chloride	G	G	G	G	X
Sodium Cyanide	G	G	G	G	X
Sodium Hydroxide	G	F	G	G	F
Sodium Hypochlorite	X	X	G	G	X
Sodium Nitrate	G	G	G	G	F
Sodium Perborate	G	F	G	G	X
Sodium Peroxide	X	X	X	X	X
Sodium Phosphates	G	G	G	G	G
Sodium Silicate	G	G	G	G	G
Sodium Sulfate	G	G	G	G	G
Sodium Sulfide	G	G	G	G	X
Sodium Thiosulfate	G	G	G	G	X
Soybean Oil	G	—	F	G	G
Stannic Chloride	F	X	G	G	X
Steam 450° F	X	X	X	X	F
Stearic Acid	G	G	F	G	X
Stoddard Solvent	G	G	X	X	G
Styrene	G	G	X	X	G
Sulfur 70° F	G	G	F	G	X
Sulfur 200° F	X	X	X	X	X
Sulfur Chloride	X	X	X	G	X
Sulfur Dioxide	X	X	X	X	G
Sulfuric Acid (under 50%)	X	X	G	G	X
Sulfuric Acid (51% to 70%)	X	X	G	X	X
Sulfuric Acid (71% to 95%)	X	X	X	X	X
Sulfuric Acid (96% to 98%)	X	X	X	X	X
Tannic Acid	X	X	G	G	G
Tar	G	G	X	X	G
Tartaric Acid	G	G	G	G	F
Tetrachloroethane	F	—	X	F	—
Tetrahydrofuran (THF)	G	—	X	X	—
Toluene	G	G	X	G	G
Transmission Oil (Petrol. Base)	G	G	G	G	G
Trichloroethane	F	G	X	G	G
Trichloroethylene	F	G	X	G	G
Tung Oil	G	—	—	—	G
Turpentine	G	G	X	G	G
Urea (Water Solution)	G	G	G	G	—
Uric Acid	G	G	G	G	—
Varnish	G	G	X	G	G
Vegetable Oil (Non-food)	G	G	F	G	G
Vinegar	G	X	G	G	X
Vinyl Acetate	G	—	X	—	F
Water (non-potable)	G	G	G	G	G
Water-Glycol Mixture	G	G	X	—	G
Water-Petroleum Mixture	G	G	—	F	G
Xylene	G	G	X	G	G
Zinc Chloride	X	X	G	G	X
Zinc Sulfate	G	G	G	G	X

Codes:

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F = Fair Resistance
X = Incompatible
— = No data available
+ = Call Technical Support
for specific application

Note:
For plastic tube cutter,
see page 143.

Part Number Key:



PT200 Polyvinyl Chloride



Typical Application:

Soft, pliable, plasticized PVC Resin Tubing, for practically any low pressure laboratory, industrial, agricultural or domestic application.

Temperature Range:

-5°F to +105°F
(-20°C to +41°C)

Available Colors:

Clear (suffix NA)

Connectors:

Polyline pgs. 58-61

SelfAlign pgs. 52-57
with 2030x insert

Compression pgs. 46-51
with 2030x insert

Molded Compression pgs.
132-139

Catalog Number	Tube O.D. (in)	Tube Wall (in)	Max. Work. Pres. PSI 75°	Min. Burst Pres. PSI 75°	Min. Bend Radius 70° F	Lbs. Per 100 Ft.	Coil Length(s) (Ft)
PT20004	1/4 (.250)	.062	65	195	1.0"	2.00	100
PT20044	1/4 (.250)	.040	55	165	1.0"	2.00	100
PT20005	5/16 (.312)	.062	55	165	1.25"	2.60	100
PT20006	3/8 (.375)	.062	55	165	1.5"	3.30	100
PT20008	1/2 (.500)	.062	45	135	2.0"	4.60	100
PT20010	5/8 (.625)	.062	30	90	2.5"	5.90	100
PT20012	3/4 (.750)	.094	40	120	3.0"	10.3	100
PT20016	1(1.00)	.125	35	105	4.0"	18.5	100

PT230 Polyamide "Nylon 6/6"



Natural off-white compound covered under 21CFR177.1500 regulations for food contact.

Typical Application:

Semi-rigid general purpose tubing.

Temperature Range:

-40°F to +180°F
(-40°C to +82°C)

Available Colors:

Natural off-white (NA) and black (BK). FDA colors available on request.

Contains:

Ultra-Violet Stabilizer in black tubing.

Connectors:

SelfAlign pgs. 52-57

Compression pgs. 46-51

Push>Connect pgs. 62-72

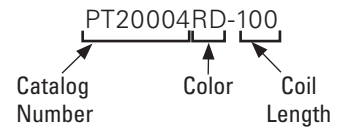
Push>Connect Flow Controls pgs. 73-74

Push>Connect Plus pgs. 75-76

Catalog Number	Tube O.D. (in)	Tube Wall (in)	Max. Work. Pres. PSI 70°	Min. Burst Pres. PSI 70°	Min. Bend Radius 70° F	Lbs. Per 100 Ft.	Coil Length(s) (Ft)
PT23002	1/8 (.125)	.015	300	1,000	0.75"	0.3	100, 1,000
PT23003	3/16 (.188)	.023	300	1,000	1.25"	0.6	100, 1,000
PT23004	1/4 (.250)	.030	300	1,000	1.50"	1.0	100, 1,000
PT23005	5/16 (.312)	.036	300	1,000	2.00"	1.5-1.6	100, 1,000
PT23006	3/8 (.375)	.040	300	1,000	2.25"	2.1	100, 1,000

Note:
For plastic tube cutter,
see page 143.

Part Number Key:



PT240 Polyethylene



Meets FDA for food contact. Natural off-white compound covered under 21CFR177.1520 regulations for food contact.

Typical Application:

Economical, flexible, low density Polyethylene has a wide range of uses in industrial and agricultural applications.

Temperature Range:

-40°F to +135°F
(-40°C to +57°C)

Available Colors:

Natural off-white (NA), black (BK), yellow (YW), orange (OR), blue (BU), red (RD), green (GN). FDA colors available on request. Refer to current price list for availability of colors.

Contains:

Ultra-Violet Stabilizer in black tubing.

Connectors:

Minibarbs pgs. 77-80
Polyline pgs. 58-61
SelfAlign pgs. 52-57 with 2030 insert
Compression pgs. 46-51 with 2030 insert
Push>Connect pgs. 62-72
Push>Connect Flow Controls pgs. 73-74
Push>Connect Plus pgs. 75-76
Molded Compression pgs. 132-139

Catalog Number	Tube O.D. (in)	Tube Wall (in)	Max. Work. Pres. PSI 70°	Min. Burst Pres. PSI 70°	Min. Bend Radius 70° F	Lbs. Per 100 Ft.	Coil Length(s) (Ft)
PT24004	1/4 (.250)	.062	200	600	0.75"	1.50	100, 1,000
PT24044	1/4 (.250)	.040	133	400	0.62"	1.00	100, 1,000
PT24005	5/16 (.312)	.062	135	480	1.00"	1.90	100, 1,000
PT24006	3/8 (.375)	.062	135	400	1.50"	2.40	100, 1,000
PT24008	1/2 (.500)	.062	100	300	2.00"	3.40	100, 500
PT24010	5/8 (.625)	.062	80	240	2.50"	4.40	100
PT24012	3/4 (.750)	.094	70	210	3.00"	7.60	100
PT24016	1 (1.000)	.125	100	300	5.00"	13.4	100

TP160 Polyamide "Nylon 11"



Typical Application:

Flexible nylon tubing. Used for instrumentation; lubrication and air lines; gas, chemical and oil processing; low pressure hydraulics.

Temperature Range:

-40°F to +200°F
(-40°C to +93°C)

Available Colors:

Black (BK) or natural (NA).

Contains:

Ultra-Violet Stabilizer

Connectors:

SelfAlign pgs. 52-57
Compression pgs. 46-51

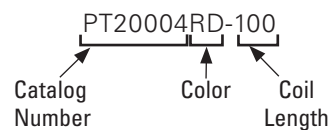
Connectors (cont.):

Push>Connect pgs. 62-72
Push>Connect Flow Controls pgs. 58, 73-74
Push>Connect Plus pgs. 75-76
Molded Compression pgs. 132-139

Catalog Number	Tube O.D. (in)	Tube Wall (in)	Max. Work. Pres. PSI 70°	Min. Burst Pres. PSI 70°	Min. Bend Radius 70° F	Lbs. Per 100 Ft.	Coil Length(s) (Ft)
TP16002	1/8 (.125)	.023	250	1,000	.62"	.30	100, 1,000
TP16025	5/32 (.156)	.029	250	1,000	1"	.75	100, 1,000
TP16004	1/4 (.250)	.040	250	1,000	1.25"	1.2	100, 1,000
TP16005	5/16 (.312)	.040	250	1,000	2"	2.0	100, 1,000
TP16006	3/8 (.375)	.062	250	1,000	3"	2.7	100, 1,000
TP16008	1/2 (.500)	.062	250	1,000	4.5"	3.8	100, 500

Note:
For plastic tube cutter,
see page 143.

Part Number Key:



**MTP160 Polyamide "Nylon
11" Metric Tubing**



Typical Application:

Flexible nylon tubing. Used for instrumentation; lubrication and air lines; gas, chemical and oil processing; low pressure hydraulics.

Temperature Range:

-40°F to +200°F
(-40°C to +93°C)

Available Colors:

Natural (NA).

Contains:

Ultra-Violet Stabilizer

Connector:

Metric Push>Connect
pgs. 69-72

Catalog Number	Tube O.D. (mm)	Tube Wall (mm)	Max. Work. Pres. PSI 75°	Min. Burst Pres. PSI 75°	Min. Bend Radius 75° F	Lbs. Per 100 Ft.	Coil Length(s) (Ft)
MTP16004	4	.65	250	1,000	.75"	0.6	100
MTP16005	5	1	250	1,000	1"	0.9	100
MTP16006	6	1	250	1,000	1.5"	1.1	100
MTP16008	8	1	250	1,000	2.25"	1.5	100
MTP16010	10	1	200	800	3"	1.9	100
MTP16012	12	1	112	450	3.5"	2.3	100

Eclipse® Air Brake Tubing

Meets SAE J844, 1131, J2494-3 and DOT FMVSS106

Synflex Eclipse Type A Air Brake Tubing



Part Number	Nominal O.D.		Nominal I.D.		Minimum Bend Radius		Nominal Wall Thickness		Minimum Burst Pressure		Weight	
	mm	in	mm	in	mm	in	mm	in	kpa	psi	kg/100 m	lbs/100 ft
4245-022	3.18	1/8	2.01	.079	6.35	1/4	0.58	.023	6,900	1,000	.49	.33
4245-025	3.96	5/32	2.34	.092	12.70	1/2	0.79	.031	8,300	1,200	.83	.56
4245-03	4.77	3/16	2.97	.117	19.05	3/4	0.89	.035	8,300	1,200	1.06	.71
4245-05	7.95	5/16	5.89	.232	28.58	1-1/8	1.02	.040	6,900	1,000	2.29	1.54

Synflex Eclipse Type B Air Brake Tubing



Part Number	Nominal O.D.		Nominal I.D.		Minimum Bend Radius		Nominal Wall Thickness		Minimum Burst Pressure		Weight	
	mm	in	mm	in	mm	in	mm	in	kpa	psi	kg/100 m	lbs/100 ft
3270-06	9.53	3/8	6.38	.251	38.10	1.5	1.57	.062	9,700	1,400	4.2	2.8
3270-08	12.70	1/2	9.55	.376	50.80	2.0	1.57	.062	6,600	950	5.8	3.8
3270-10	15.88	5/8	11.20	.441	63.50	2.5	2.34	.092	6,200	900	10.4	7.0
3270-12	19.05	3/4	14.38	.566	76.20	3.0	2.34	.092	5,500	800	12.8	8.6

Features

- Superior abrasion resistance
- Easy to cut
- Enhanced flexibility and extension
- Flow performance

Applications

- Truck air brake systems
- Trailer air brake systems

- Auxiliary air systems
- Formed tubes
- Formed and straight air brake harness assemblies

Construction

- Distinctive patented construction
- 100% polyamide construction with polyester yarn reinforcement

- UV stabilized
- Thermoformable
- Available in standard and custom colors
- Available in all standard sizes

Temperature Range

- -65°F to 200°F (-54°C to 93°C).

Connectors:

QCAB pages 81-89 1400 series Air Brake pages 90-95

For 1/8" Tubing use Selfalign.

Note: SelfAlign Connectors are not designed to meet DOT standards.

Solstice™ Type A Air Brake Tubing

Meets or exceeds the performance requirements SAE J844, J1131, J2494-3, and DOT FMVSS106 Synflex Solstice Type Air Brake Tubing



Part Number	Nominal O.D.		Nominal I.D.		Min. Bend Radius		Nominal Wall Thickness		Min Burst Pressure		Weight	
	mm	in	mm	in	mm	in	mm	in	kpa	psi	kg/100m	lbs/100 ft
4247-041	6.35	1/4	4.32	.170	25.40	1	1.02	0.04	8,300	1,200	2.20	1.50

Applications

- Truck air brake systems
- Trailer air brake systems
- Auxiliary air systems
- Formed tubes
- Formed and straight air brake harness assemblies

Features

- Highly engineered thermoplastic material
- Monowall tubing
- UV stabilized
- Thermoformable
- Available in standard and custom colors

Temperature Range

(-40°F to 200°F)
-40°C to 93°C

Connectors:

QCAB pages 81-89
1400 Series Air Brake pages 90-95

Eclipse ABT Part #	O.D.	Master Pack Color	Master Pack Quantities	Configuration
4245-02207	1/8"	black	12,000 ft	6 reels of 2000 ft
4245-02227	1/8"	red	12,000 ft	6 reels of 2000 ft
4245-02257	1/8"	green	12,000 ft	6 reels of 2000 ft
4245-02267	1/8"	blue	12,000 ft	6 reels of 2000 ft
4245-02506	5/32"	black	6,000 ft	6 reels of 1000 ft
4245-02526	5/32"	red	6,000 ft	6 reels of 1000 ft
4245-02546	5/32"	yellow	6,000 ft	6 reels of 1000 ft
4245-02556	5/32"	green	6,000 ft	6 reels of 1000 ft
4245-02566	5/32"	blue	6,000 ft	6 reels of 1000 ft
4245-03306	3/16"	black	6,000 ft	6 reels of 1000 ft
4245-03326	3/16"	red	6,000 ft	6 reels of 1000 ft
4245-03356	3/16"	green	6,000 ft	6 reels of 1000 ft
4247-04106	1/4"	Black	6,000 ft	6 reels of 1000 ft
4247-04156	1/4"	Green	6,000 ft	6 reels of 1000 ft
4247-04126	1/4"	Red	6,000 ft	6 reels of 1000 ft
4247-04166	1/4"	Blue	6,000 ft	6 reels of 1000 ft
4247-041C6	1/4"	Brown	6,000 ft	6 reels of 1000 ft
4247-04146	1/4"	Yellow	6,000 ft	6 reels of 1000 ft
4247-04136	1/4"	Orange	6,000 ft	6 reels of 1000 ft
4247-041D6	1/4"	Purple	6,000 ft	6 reels of 1000 ft
4247-04116	1/4"	White	6,000 ft	6 reels of 1000 ft
4247-041F6	1/4"	Silver	6,000 ft	6 reels of 1000 ft
4245-05204	5/16"	black	3,000 ft	6 reels of 500 ft
4245-05224	5/16"	red	3,000 ft	6 reels of 500 ft
4245-05244	5/16"	yellow	3,000 ft	6 reels of 500 ft
4245-05254	5/16"	green	3,000 ft	6 reels of 500 ft
4245-05264	5/16"	blue	3,000 ft	6 reels of 500 ft
3270-06104	3/8"	black	3,000 ft	6 reels of 500 ft
3270-06124	3/8"	red	3,000 ft	6 reels of 500 ft
3270-06134	3/8"	orange	3,000 ft	6 reels of 500 ft
3270-06144	3/8"	yellow	3,000 ft	6 reels of 500 ft
3270-06154	3/8"	green	3,000 ft	6 reels of 500 ft
3270-06164	3/8"	blue	3,000 ft	6 reels of 500 ft
3270-08104	1/2"	black	1,500 ft	3 reels of 500 ft
3270-08124	1/2"	red	1,500 ft	3 reels of 500 ft
3270-08134	1/2"	orange	1,500 ft	3 reels of 500 ft
3270-08144	1/2"	yellow	1,500 ft	3 reels of 500 ft
3270-08154	1/2"	green	1,500 ft	3 reels of 500 ft
3270-08164	1/2"	blue	1,500 ft	3 reels of 500 ft
3270-10103	5/8"	black	750 ft	3 reels of 250 ft
3270-10123	5/8"	red	750 ft	3 reels of 250 ft
3270-10133	5/8"	orange	750 ft	3 reels of 250 ft
3270-10143	5/8"	yellow	750 ft	3 reels of 250 ft
3270-10153	5/8"	green	750 ft	3 reels of 250 ft
3270-10163	5/8"	blue	750 ft	3 reels of 250 ft
3270-12103	3/4"	black	750 ft	3 reels of 250 ft
3270-12123	3/4"	red	750 ft	3 reels of 250 ft
3270-12133	3/4"	orange	750 ft	3 reels of 250 ft
3270-12153	3/4"	green	750 ft	3 reels of 250 ft
3270-12163	3/4"	blue	750 ft	3 reels of 250 ft