

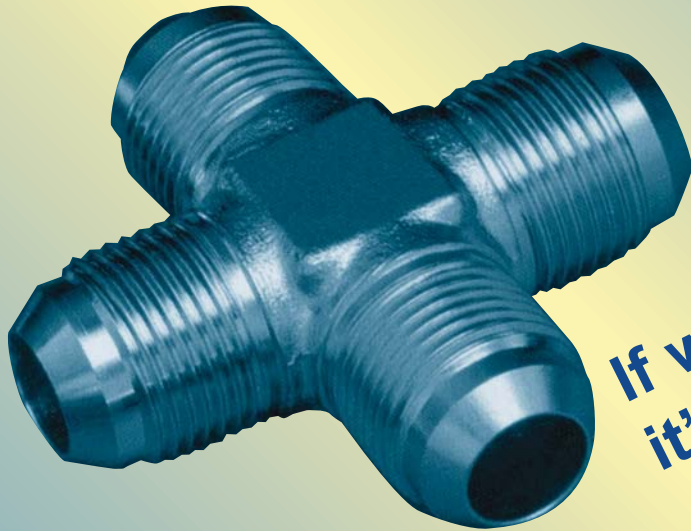
Thorburn Flex Inc

Flexible Piping Specialist

TUBE FITTINGS, HOSE ADAPTERS, AND LIVE SWIVEL ADAPTERS

3rd Edition

*If we don't have it,
it's not made!*



NEW!
Metric
Conversion
Adapters



COMPLIANCES:
ASME Section III, VIII,
B.31.1, B31.3, B51



Thorburn Flex Inc
Flexible Piping Specialist

173 Oneida Drive, Pointe-Claire,
Quebec, Canada H9R 1A9
Tel.: (514) 695-8710 Fax: (514) 695-8716

TOLL-FREE 1-800-363-6613

Thorburn Flex Inc

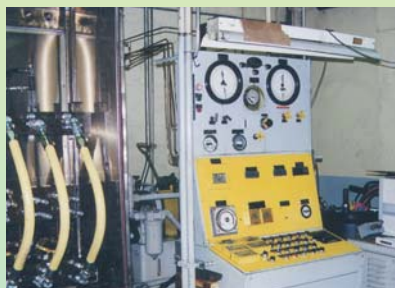
Flexible Piping Specialist

■ **THORBURN** is a world leader in the design and manufacture of non-metallic hose assemblies for fluid transfer flexible piping systems.

In-house design, manufacturing and testing capabilities.



Impulse testing up to 10,000 psi. Burst testing up to 150,000 psi.



**Design pressures up to 6,000 psi
Sizes 1/8" to 2" ID**



BENEFITS

- 360° blow-off proof crimp, better holding power and reliability.
- Smaller finished crimp; streamlined assemblies.
- High flow orifice, low pressure drop.



*In-house crimping.
1/8" to 2" pipe size.*

No more leaks with Thorburn's "O" Seal Technology

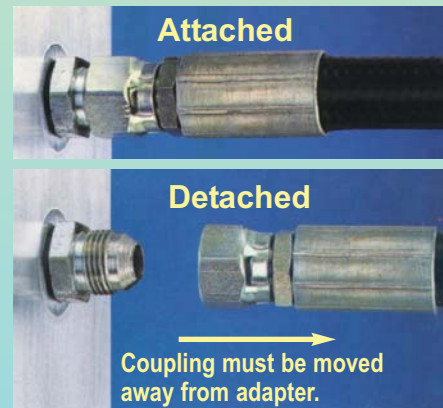


A leak dripping every 10 seconds adds up to a loss of nearly 40 gallons of fluid a year. When other factors are considered—downtime for cleaning up and repairs, product contamination, dirty machinery, possible safety and fire hazards—costs add up... and that's one expensive drip!

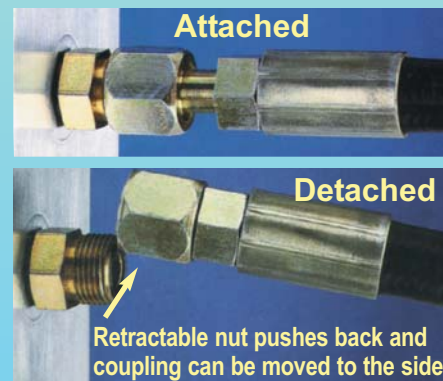
FEATURES

- Sizes 1/8" to 1 1/2"
- Design pressures vacuum to 6000 psi
- Materials: SA182/SA479 type 316; Carbon steel A108 (zinc plated)

**JIC 37°
Removal**



**"O" Seal
Removal**



Spécialiste en tuyaux flexibles

THORBURN

elle Song Artist

EMPLOYEES

Thorburn people are the key factor in bringing together its technological, engineering, manufacturing, quality assurance and administrative resources to provide our customers with total satisfaction.

Our employees, representing over twenty nationalities have turned Thorburn into a lean manufacturing company. We are flexible, ready to respond instantly to customer needs with products and services unique in our industry.

THE HEART & SOUL OF THE COMPANY

Our people have turned Thorburn into a lean manufacturing company. We are flexible, ready to respond instantly to customer needs with products and services unique in our industry.

Through our combined efforts, we have designed systems for administration, engineering and manufacturing, based on our experience and knowledge gained from each customer and application.

CANDU BUSINESS UNIT

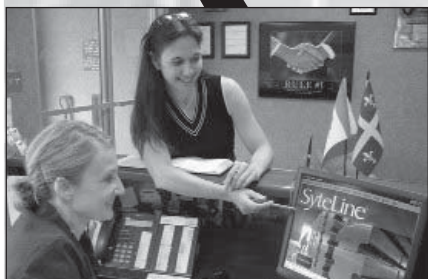
THORBURN offers unmatched capabilities and expertise in applications engineering, design development and manufacture of non-metallic and metallic flexible piping systems for Candu nuclear power plants. Operating under a strategy of global presence, Thorburn has developed a Candu business unit to service this niche market sector. Thorburn's nuclear components consistently meet and exceed all the quality design requirements of our Candu nuclear reactor business partners.

TOTAL CUSTOMER SATISFACTION

Our company may be known by its products but Thorburn knows that its products are the result of people whose combined competences build value, work towards excellence and keep the customer satisfied. Thorburn people are the key factor in bringing together its technological, engineering, manufacturing, quality assurance and administrative resources to provide the customer with total satisfaction.

QUALITY POLICY

Quality Assurance is a company culture at Thorburn which has been developed by a comprehensive Quality Management System; it requires the dedication, involvement and motivation of Thorburn's personnel at all levels of operation to ensure customer satisfaction and facilitate the continuous improvement process.



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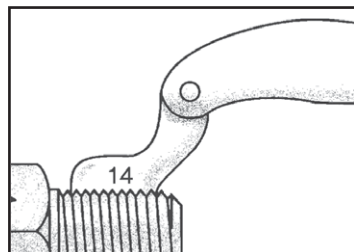
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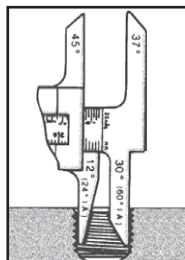
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HOW TO MEASURE THREADS

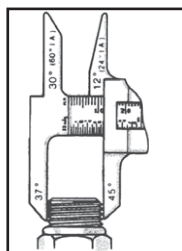
Use the thread pitch gauge to determine the number of threads per inch. Or in the case of metric connections, the distance between threads. Place the gauge on the threads until the threads are snug. Match the measurements to the charts. Comparison of gauge and coupling threads against a lit background will assure an accurate reading.



To measure ID/OD: With the Caliper, measure the thread diameter at the largest point: OD for male threads and ID for female threads. Match measurements to charts.



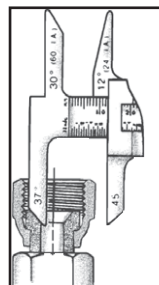
ID



OD

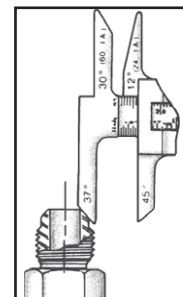
To measure sealing surface angles:

Female connections are normally measured by inserting the gauge into the connection and placing it on the sealing surface. If the centre-line and lines of the connection match, the correct angle has been determined.



Female

Male flare type connectors are normally measured by placing the gauge on the sealing surface. If the centre-lines of the connection and gauge are parallel, the correct angle has been determined.



Male

North American Thread Types

NORTH AMERICAN THREAD TYPES

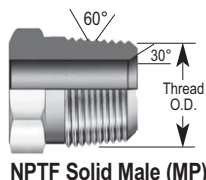
Iron Pipe Thread Abbreviations

N = National
F = Fuels

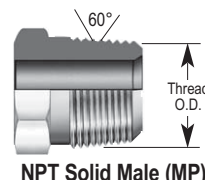
P = Pipe
S = Straight Thread

T = Tapered Thread
M = Mechanical Joint

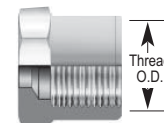
NATIONAL PIPE THREADS



NPTF Solid Male (MP)



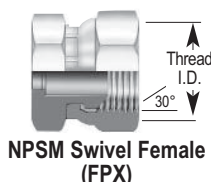
NPT Solid Male (MP)



NP Solid Female (FP)

NPTF (National Pipe Tapered Threads for Fuels) is a dryseal thread used for male and female ends. The NPTF male has tapered threads and 30° inverted seat. It mates with the NPTF, NPSF or NPSM female. The NPTF female has tapered threads and no seat. The seal takes place by deformation of the threads. The NPSM female has straight threads and a 30° inverted seat. The seal takes place on the 30° seat. Additional sealing aids, such as teflon tape are often used with these tapes.

The NPTF connector is similar to, but not interchangeable with the BSPT (British Standard Pipe/Tapered) connector. The thread pitch differs in most sizes and the thread angle is 60° instead of the 55° angle on BSPT threads (see **British Thread Types** page 29-30).



NPSM Swivel Female (FPX)

NPSM (National Pipe Straight Threads for Mechanical Joint) is used on female swivel nut or iron pipe swivel adapters. The leak-resistant joint is made by a tapered 30° convex seat in the coupling end. A properly chamfered NPTF male will seal with the NPSM female.

NPT (National Pipe Taper Threads) can connect with a NPTF or NPT female end. It is similar to the NPTF in all areas except for the following:

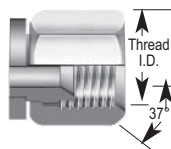
- 1) There is no 30° inverted seat;
- 2) Thread root and crest is sharp "V"-shaped with minimum truncation;
- 3) Tape or sealing compound required for assembly.

THREAD NOMENCLATURE

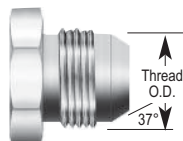
Dash Size	Nominal Size (in.)	Number Threads per inch	Male Thread Thread OD (in.)	Female Thread Thread ID (in.)
-2	1/8	27	13/32	3/8
-4	1/4	18	17/32	1/2
-6	3/8	18	11/16	5/8
-8	1/2	14	27/32	25/32
-12	3/4	14	1 1/16	1
-16	1	11 1/2	1 5/16	1 1/4
-20	1 1/4	11 1/2	1 43/64	1 19/32
-24	1 1/2	11 1/2	1 29/32	1 3/16
-32	2	11 1/2	2 3/8	2 5/16

SAE J514 37° FLARE (JIC)

JIC 37°
Flare
Female



JIC
37°
Male



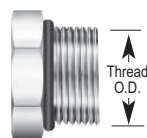
SAE 37° Flare (JIC) (Society of Automotive Engineers) Often referred to as 37° JIC, this connection is quite common in fluid power systems. SAE specifies a 37° angle flare or seat be used with high pressure hydraulic tubing. These are commonly known as JIC (Joint Industrial Congress) couplings.

Both the male and female halves of the connections have 37° seats. The JIC 37° flare male mates with a JIC female only. The JIC female has straight threads and a 37° flare seat. The seal is made when a line contact is established between the male flare and the female cone seat. The threads hold the connection mechanically.

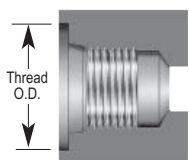
THREAD NOMENCLATURE

Dash Size	Nominal Size (in.)	Thread Size	Male Thread Thread OD (in.)	Female Thread Thread ID (in.)
-2	1/8	5/16-24	5/16	17/64
-3	3/16	3/8-24	3/8	21/64
-4	1/4	7/16-20	7/16	25/64
-5	5/16	1/2-20	1/2	29/64
-6	3/8	9/16-18	9/16	17/32
-8	1/2	3/4-16	3/4	11/16
-10	5/8	7/8-14	7/8	13/16
-12	3/4	1 1/16-12	1 1/16	31/32
-14	7/8	1 3/16-12	1 3/16	17/64
-16	1	1 5/8-12	1 5/8	1 1/4
-20	1 1/4	1 7/8-12	1 7/8	1 9/16
-24	1 1/2	2-12	2	1 13/16
-32	2	2 1/2-12	2 1/2	2 7/16

SAE J514 STRAIGHT THREAD O-RING BOSS



O-Ring Boss
Male (MB)



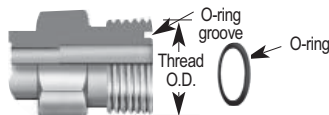
O-Ring Boss
Female Port (FB)

O-Ring Boss This port connection is recommended by the NPFA for optimum leakage control in medium and high pressure hydraulic systems. The male connector has a straight thread and an O-ring. The O-ring boss male mates with an O-ring boss female only. The female is usually found on ports. The female port has a straight thread, a machined surface and a chamfer to accept the O-ring. The seal takes place by compressing the O-ring into the chamfer. The threads hold the connection mechanically.

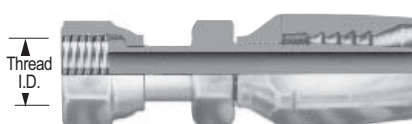
THREAD NOMENCLATURE

Dash Size	Nominal Size (in.)	Thread Size	Male Thread Thread OD (in.)	Female Thread Thread ID (in.)
-2	1/8	5/16-24	5/16	17/64
-3	3/16	3/8-24	3/8	21/64
-4	1/4	7/16-20	7/16	25/64
-5	5/16	1/2-20	1/2	29/64
-6	3/8	9/16-18	9/16	17/32
-8	1/2	3/4-16	3/4	11/16
-10	5/8	7/8-14	7/8	13/16
-12	3/4	1 1/16-12	1 1/16	31/32
-14	7/8	1 3/16-12	1 3/16	17/64
-16	1	1 5/8-12	1 5/8	1 15/64
-20	1 1/4	1 7/8-12	1 7/8	1 35/64
-24	1 1/2	2-12	2	1 51/64
-32	2	2 1/2-12	2 1/2	2 27/64

THORBURN "O" SEAL™ SAE J1453 O-RING FACE SEAL



O-Ring Face Seal
Solid Male (MFFOR)



O-Ring Face Seal Swivel Female
(FFORX)

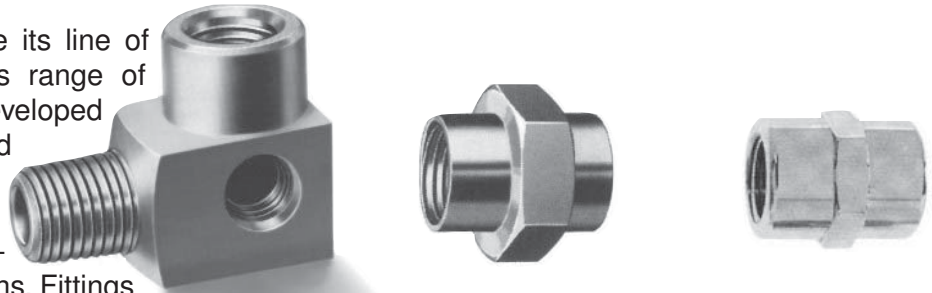
O-Seal This connection offers the very best leakage control available today. The male connector has a straight thread and an O-ring resting in the O-ring groove in the face. The solid male O-ring face seal fitting will mate with a swivel female O-ring face seal fitting only. The female has a straight thread and a machined flat face. The seal occurs by compressing the O-ring onto the flat face of the female. The threads hold the connection mechanically.

THREAD NOMENCLATURE

Dash Size	Nominal Size (in.)	Thread Size	Male Thread Thread ID (in.)	Female Thread Thread OD (in.)	O-ring Size (SAE J120)
-4	1/4	9/16-18	9/16	1/2	-011
-6	3/8	1 1/16-16	1 1/16	5/8	-012
-8	1/2	1 3/16-16	1 3/16	3/4	-014
-10	5/8	1-14	1	15/16	-016
-12	3/4	1 3/16-12	1 3/16	1 1/8	-018
-16	1	1 7/16-12	1 7/16	1 11/32	-021
-20	1 1/4	1 11/16-12	1 11/16	1 19/32	-025
-24	1 1/2	2-12	2	1 29/32	-029

That Use Advanced Technology To Meet Today's Needs

Thorburn is pleased to introduce its line of quality adapter/fittings. Thorburn's range of quality pipe fittings have been developed to fill a wide variety of hydraulic and pneumatic applications found in the power generation, petro-chemical, pulp and paper processing, and other industrial applications. Fittings are properly packaged and meet quality appearance requirements.



SIZES

1/8" to 2" pipe thread.

COMMERCIAL MATERIAL SPECIFICATIONS

PIPE FITTINGS	BRASS	STEEL	STAINLESS	
	ASTM	ASTM	TYPE	ASME
Forged Bodies	B-283	A576	316	SA182
Barstock Bodies	B21 / B16	A108	316	SA479

DESIGN PRESSURE RATINGS

Design pressures calculated in accordance with Power Piping Code ANSI B31.1, Refiner Piping Code B31.3 and ASME Section VIII Boiler and Pressure Vessel Code.

DESIGN PRESSURE RATING CARBON STEEL & STAINLESS STEEL (ALL TYPES)

SIZE	PIPE THREAD	DESIGN PRESSURE	
		PSI	MPa
2	1/8	5,000	27.6
4	1/4	5,000	27.6
6	3/8	4,000	27.6
8	1/2	3,500	24.1
10	5/8	3,200	22.1
12	3/4	3,000	20.7
16	1	2,500	17.2
20	1 1/4	2,200	15.2
24	1 1/2	1,800	12.4
32	2	1,500	10.3

DESIGN PRESSURE RATING BRASS ADAPTERS

SIZE	PIPE THREAD	DESIGN PRESSURE	
		PSI	MPa
2	1/8	1,500	10.3
4	1/4	1,500	10.3
6	3/8	1,500	10.3
8	1/2	600	4.1
12	3/4	500	3.4
16	1	400	3.4

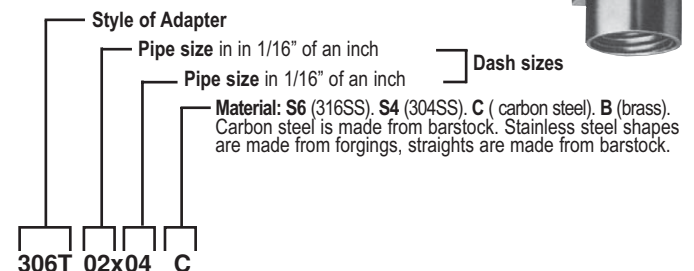
Note: Higher pressure ratings available on request.

BURST PRESSURE RATING

SIZE	PIPE THREAD	HOLE SIZE (INCHES)		CALCULATED BURST PRESSURE			
				STEEL: T.S. 55,000 PSI		STAINLESS STEEL T.S. 75,000 PSI	
				BARSTOCK	FORGED	MALE	FEM.
		MALE	FEM.				
2	1/8	11/64	22/64	19,820	18,680	38,300	27,000
4	1/4	17/64	7/16	20,740	19,120	30,400	21,000
6	3/8	25/64	9/16	17,960	15,700	24,600	17,000
8	1/2	33/64	45/64	15,810	14,960	21,500	19,900
12	3/4	45/64	59/64	13,770	13,760	18,500	18,600
16	1	59/64	1 5/32	11,910	11,910	17,000	15,100
20	1 1/4	1 15/64	1 1/24	10,430	10,430	14,000	13,500
24	1 1/2	1 31/64	1 47/64	—	—	11,500	15,900
32	2	1 59/64	2 7/32	—	—	10,400	14,000

HOW TO ORDER THORBURN COMMERCIAL GRADE QUALITY PIPE FITTINGS

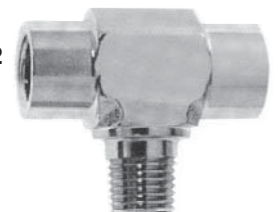
Example: 306T 02x04 CS



306T TS 02x04 is a carbon steel 45° Street Elbow with 1/8" male pipe and 1/4" female pipe.

HOW TO ORDER THORBURN ASME CODE GRADE QUALITY PIPE FITTINGS

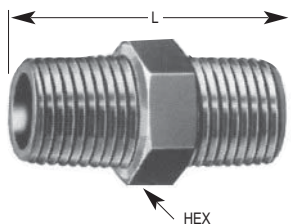
Example: N 313T 16x16 S6 Class 2



	Part number	Dash sizes	Material	Code Class
N	313T	16x16	S6	Class 2
Prefix N means adapter meets ASME code requirements and has a CRN (Canadian Registered Number).	Base part number 313F is a Female to Male to Female Tee.	Dash sizes number specifies OD tube size first and pipe thread last. Sizes are in 1/16" Thus, 16x16 = 1"x1"	Available material: S6=316SS. B=Brass. Stainless steel shapes are made from forgings, straights are made from barstock.	For nuclear classes insert suffix Class 1, 2 or 3 . For class 6, leave blank.
Style N 313T 16x16 S6 Class 2 is a stainless steel ASME Section III Class 2 Branch Tee with 1" female pipe by 1" female pipe with a 1" male NPT branch.				

HEX NIPPLE

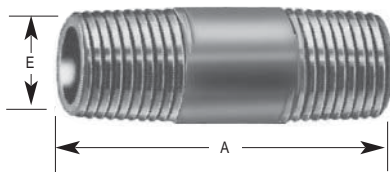
SAE 140137



STYLE (N) 300T

Size #	Male	Male	L	Hex
02x02	1/8	1/8	1.060	7/16
04x04	1/4	1/4	1.450	5/8
04x02	1/4	1/8	1.270	5/8
06x06	3/8	3/8	1.450	3/4
06x02	3/8	1/8	1.270	3/4
06x04	3/8	1/4	1.450	3/4
08x08	1/2	1/2	1.890	7/8
08x04	1/2	1/4	1.700	7/8
08x06	1/2	3/8	1.700	7/8
12x12	3/4	3/4	1.970	1 1/8
12x08	3/4	1/2	1.970	1 1/8
16x16	1	1	2.340	1 3/8
16x12	1	3/4	2.160	1 3/8
20x20	1 1/4	1 1/4	2.470	1 3/4
20x16	1 1/4	1	2.450	1 3/4
24x24	1 1/2	1 1/2	2.610	2
32x32	2	2	2.830	2 1/2

CLOSE NIPPLE



STYLE (N) 300CNT

Size #	Male Pipe Size	A	E. Min. Opening
02	1/8	.75	.19
04	1/4	1.12	.28
06	3/8	1.12	.38
08	1/2	1.25	.47
12	3/4	1.25	.62
16	1	1.88	.88

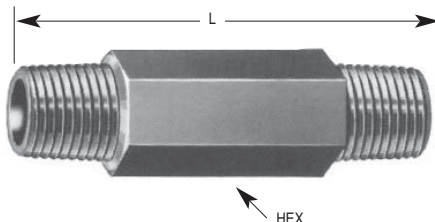
TO ORDER, SEE PAGE 5

All items on this page listed under CRN:
OH 0527.5.6.7

Use prefix **N** for ASME Code grade adapters only.

LONG HEX NIPPLE

This is a non-stock item. Contact Thorburn for availability



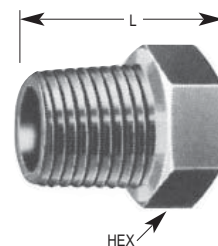
STYLE (N) 300LT

Size #	Male	L	Hex
02x1.5	1/8	1.5	7/16
02x2	1/8	2	7/16
02x2.5	1/8	2.5	7/16
02x3	1/8	3	7/16
04x2	1/4	2	5/8
04x2.5	1/4	2.5	5/8
04x3	1/4	3	5/8
04x4	1/4	4	5/8
04x6	1/4	6	5/8
06x2	3/8	2	3/4
06x2.5	3/8	2.5	3/4
06x3	3/8	3	3/4
06x4	3/8	4	3/4
06x6	3/8	6	3/4
06x7	3/8	7	3/4
08x2.5	1/2	2.5	7/8
08x3	1/2	3	7/8
08x4	1/2	4	7/8
08x6	1/2	6	7/8
12x3	3/4	3	1 1/8
12x4	3/4	4	1 1/8
12x6	3/4	6	1 1/8
16x3	1	3	1 3/8
16x6	1	6	1 3/8
20x4	1 1/4	4	1 3/4
20x6	1 1/4	6	1 3/4
24x4	1 1/2	4	2
24x6	1 1/2	6	2
32x4	2	4	2 1/2
32x6	2	6	2 1/2

REDUCER BUSHING

Male to Reduced Female Pipe Thread

SAE 140140



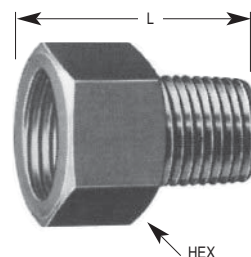
STYLE (N) 301T

Size #	Male	Female	L	Hex
04x02	1/4	1/8	.850	5/8
06x02	3/8	1/8	.850	3/4
06x04	3/8	1/4	.850	3/4
08x02	1/2	1/8	1.10	7/8
08x04	1/2	1/4	1.10	7/8
08x06	1/2	3/8	1.10	7/8
12x04	3/4	1/4	1.170	1 1/8
12x06	3/4	3/8	1.170	1 1/8
12x08	3/4	1/2	1.170	1 1/8
16x04	1	1/4	1.360	1 3/8
16x06	1	3/8	1.360	1 3/8
16x08	1	1/2	1.360	1 3/8
16x12	1	3/4	1.360	1 3/8
20x08	1 1/4	1/2	1.470	1 3/4
20x12	1 1/4	3/4	1.470	1 3/4
20x16	1 1/4	1	1.470	1 3/4
24x12	1 1/2	3/4	1.570	2
24x16	1 1/2	1	1.570	2
24x20	1 1/2	1 1/4	1.570	2
32x20	2	1 1/4	1.750	2 1/2
32x24	2	1 1/2	1.750	2 1/2

ADAPTER

Female to Reduced Male Pipe Thread

SAE 140139



STYLE (N) 302T

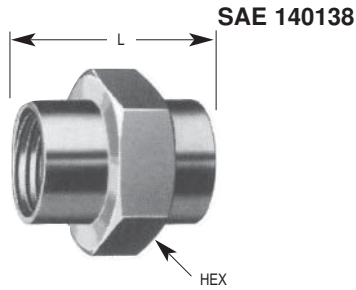
Size #	Female	Male	L	Hex
04x02	1/4	1/8	1.190	3/4
04x04	1/4	1/4	1.270	7/8
06x04	3/8	1/4	1.440	7/8
08x02	1/2	1/8	1.500	1 1/8
08x04	1/2	1/4	1.670	1 1/8
08x06	1/2	3/8	1.670	1 1/8
12x04	3/4	1/4	1.720	1 3/8
12x06	3/4	3/8	1.720	1 3/8
12x08	3/4	1/2	1.910	1 3/8
12x12	3/4	3/4	1.960	1 5/8
16x08	1	1/2	2.160	1 5/8
16x12	1	3/4	2.160	1 5/8
20x16	1 1/4	1	2.430	2

NOTE: All dimensions are in inches.

Dimensions for reference only, subject to change.

Carbon steel fittings are made from barstock. **Stainless steel fitting shapes** are made from forgings, straights are made from barstock.

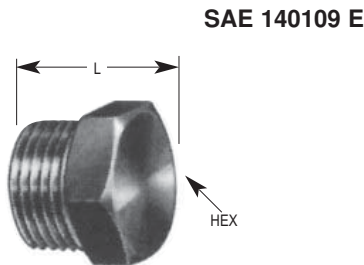
PIPE COUPLING Female to Female



STYLE (N) 303T

Size #	Female	Male	L	Hex
02x02	1/8	1/8	.750	5/8
04x04	1/4	1/4	1.130	3/4
04x02	1/4	1/8	.930	3/4
06x06	3/8	3/8	1.130	7/8
06x04	3/8	1/4	1.110	7/8
08x08	1/2	1/2	1.500	1 1/8
08x04	1/2	1/4	1.300	1 1/8
08x06	1/2	3/8	1.300	1 1/8
12x12	3/4	3/4	1.530	1 3/8
12x08	3/4	1/2	1.500	1 3/8
16x16	1	1	1.890	1 5/8
20x20	1 1/4	1 1/4	1.930	2
24x24	1 1/2	1 1/2	1.930	2 3/8

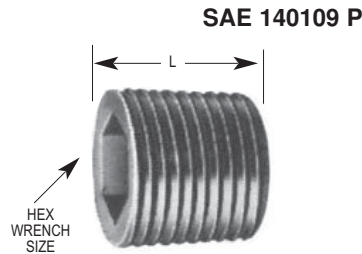
HEAD HEX PLUG



STYLE (N) 304T

Size #	Male	L	Hex
02	1/8	.56	7/16
04	1/4	.75	9/16
06	3/8	.78	1 1/16
08	1/2	.97	7/8
12	3/4	1.15	1 1/16
16	1	1.34	1 5/16
20	1 1/4	1.47	1 3/4
24	1 1/2	1.57	2
32	2	1.75	2 1/2

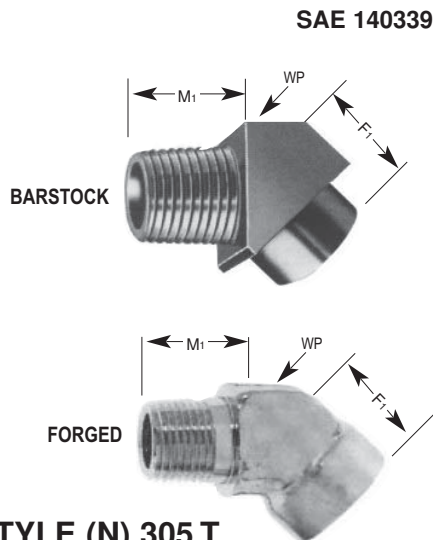
HOLLOW HEX PLUG



STYLE (N) 304HT

Size #	Male	L	Hex Wrench Size
02	1/8	.290	3/16
04	1/4	.450	1/4
06	3/8	.450	5/16
08	1/2	.610	3/8
12	3/4	.630	9/16
16	1	.770	5/8
20	1 1/4	.810	3/4
24	1 1/2	.830	1
32	2	.880	1

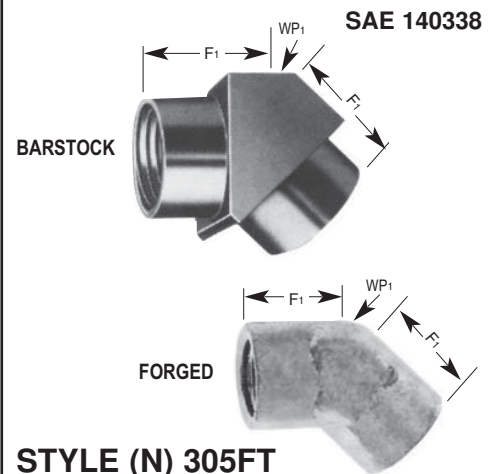
45° STREET ELBOW



STYLE (N) 305 T

Size #	Male	Female	M1	F1	WP
02x02	1/8	1/8	.720	.470	5/8
04x04	1/4	1/4	1.050	.630	3/4
06x06	3/8	3/8	1.070	.720	7/8
08x08	1/2	1/2	1.690	.910	1 1/8
12x12	3/4	3/4	1.370	.970	1 3/8
16x16	1	1	1.720	1.130	1 3/4
20x20	1 1/4	1 1/4	1.800	1.630	2
24x24	1 1/2	1 1/2	2.070	1.690	2 1/2

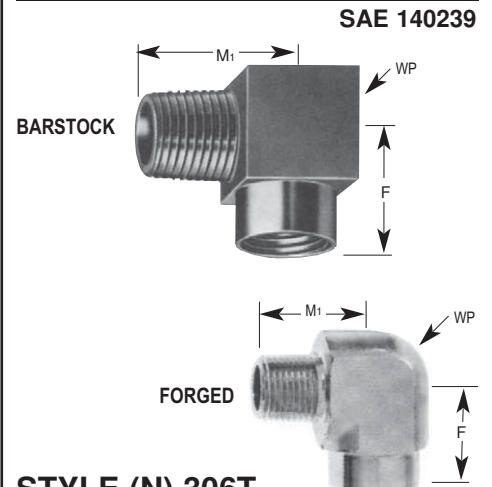
45° FEMALE ELBOW



STYLE (N) 305FT

Size #	Female	Female	F1	WP
02x02	1/8	1/8	.500	5/8
04x04	1/4	1/4	.690	3/4
06x06	3/8	3/8	.750	7/8
08x08	1/2	1/2	.940	1 1/8
12x12	3/4	3/4	1.000	1 3/8
16x16	1	1	1.190	1 3/4

90° STREET ELBOW



STYLE (N) 306T

Size #	Male	Female	M1	F	WP
02x02	1/8	1/8	.780	.660	5/8
02x04	1/8	1/4	.880	.830	5/8
04x04	1/4	1/4	1.080	.880	3/4
04x02	1/4	1/8	1.040	.710	3/4
04x06	1/4	3/8	1.150	.960	3/4
06x06	3/8	3/8	1.220	1.020	7/8
06x04	3/8	1/4	1.160	.810	7/8
06x08	3/8	1/2	1.290	1.160	7/8
08x08	1/2	1/2	1.470	1.180	1 1/8
08x06	1/2	3/8	1.400	.950	1 1/8
08x12	1/2	3/4	1.500	1.180	1 3/8
12x12	3/4	3/4	1.590	1.300	1 3/8
12x08	3/4	1/2	1.410	1.320	1 1/8
16x16	1	1	1.970	1.610	1 5/8
20x20	1 1/4	1 1/4	2.380	1.700	2
24x24	1 1/2	1 1/2	2.650	2.080	2 1/2
32x32	2	2	3.000	2.390	3

TO ORDER, SEE PAGE 5

All items on this page listed under CRN:
OH 0527.5.6.7

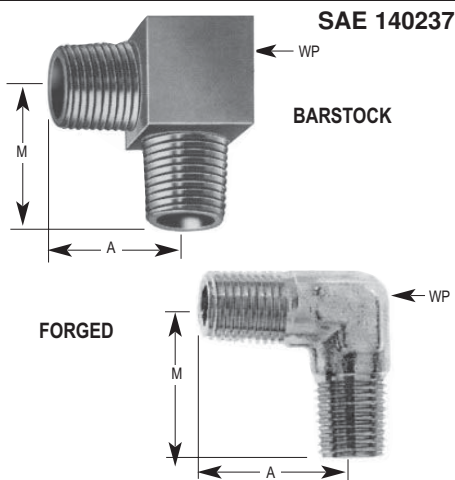
Use prefix **N** for ASME Code grade adapters only.

NOTE: All dimensions are in inches. Dimensions for reference only, subject to change.
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Quality Pipe Fittings

THORBURN

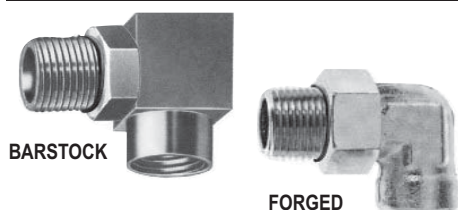
90° MALE ELBOW



STYLE (N) 306MT

Size #	Male	Male	M	A	WP
02x02	1/8	1/8	.780	.780	1/2
04x04	1/4	1/4	1.08	.880	5/8
06x06	3/8	3/8	1.11	1.11	3/4
06x04	3/8	1/4	1.150	1.150	3/4
08x08	1/2	1/2	1.470	1.470	7/8
08x06	1/2	3/8	1.410	1.410	7/8
08x12	1/2	3/4	1.590	1.590	1 1/8
12x12	3/4	1/2	1.500	1.560	1 1/8
12x08	1	1/2	1.970	1.970	1 3/8
16x16	1	3/4	1.860	1.710	1 3/8
20x20	1 1/4	1 1/4	2.380	2.380	2
24x24	1 1/2	1 1/2	2.640	2.640	2 1/4

90° ADJUSTABLE FEMALE ADAPTER O.R.B. TO FEMALE NPTF



STYLE (N) 306TO

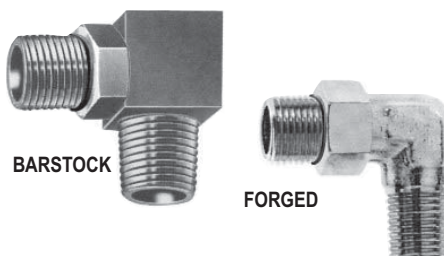
Size #	Straight Thread	Male Straight Thread	Female Pipe Thread
02x04	7/16 - 20	1/8	1/4
02x06	1/2 - 20	1/8	5/16
04x06	9/16 - 18	1/4	3/8
06x08	3/4 - 18	3/8	1/2
08x10	7/8 - 14	1/2	5/8
12x12	1 1/16 - 12	3/4	3/4
12x14	1 3/16 - 12	3/4	7/8
16x16	1 5/16 - 12	1	1
20x20	1 5/8 - 12	1 1/4	1 1/4
24x24	1 7/8 - 12	1 1/2	1 1/2

TO ORDER, SEE PAGE 5

All items on this page listed under CRN: OH 0527.5.6.7

Use prefix **N** for ASME Code grade adapters only.

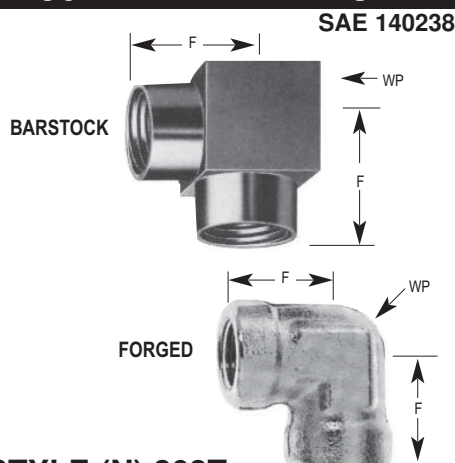
ADJUSTABLE O.R.B. TO MALE NPTF ELBOW



STYLE (N) 306MTO

Size #	Male Straight Thread	Male Pipe Thread
04x02	1/4	1/8
05x02	5/16	1/8
06x04	3/8	1/4
08x06	1/2	3/8
10x08	5/8	1/2
12x12	3/4	3/4
14x12	7/8	3/4
16x16	1	1
20x20	1 1/4	1 1/4
24x24	1 1/2	1 1/2

90° FEMALE ELBOW



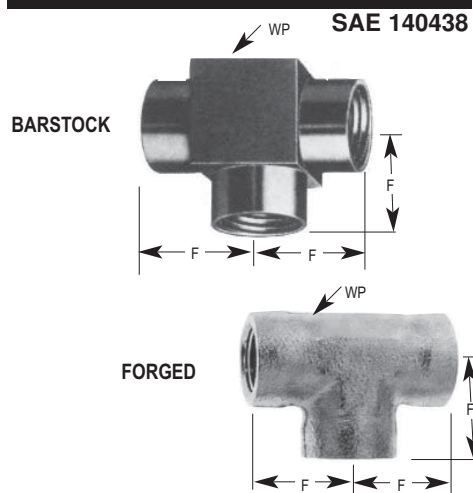
STYLE (N) 308T

Size #	Female	Female	F	WP
02x02	1/8	1/8	.670	5/8
04x04	1/4	1/4	.870	3/4
04x02	1/4	1/8	.870	5/8
06x06	3/8	3/8	1.020	7/8
06x04	3/8	1/4	.940	7/8
08x08	1/2	1/2	1.230	1 1/8
08x06	1/2	3/8	1.130	1 1/8
12x12	3/4	3/4	1.360	1 3/8
12x08	3/4	1/2	1.300	1 3/8
16x16	1	1	1.620	1 5/8
20x20	1 1/4	1 1/4	1.700	2
24x24	1 1/2	1 1/2	2.080	2 1/2
32x32	2	2	2.390	3

NOTE: All dimensions are in inches. Dimensions for reference only, subject to change.

Carbon steel fittings are made from barstock. Stainless steel fitting shapes are made from forgings, straights are made from barstock.

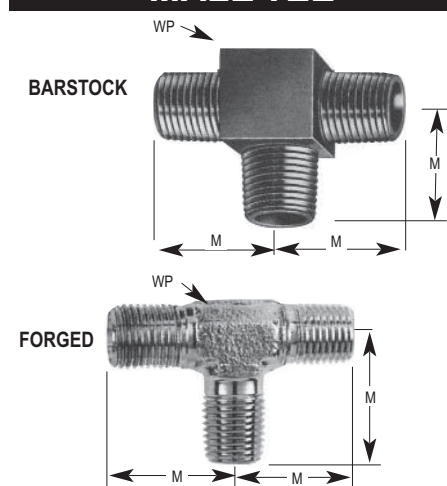
FEMALE TEE



STYLE (N) 309T

Size #	Female	F	WP
02	1/8	.660	5/8
04	1/4	1.880	3/4
06	3/8	1.020	7/8
08	1/2	1.170	1 1/8
12	3/4	1.300	1 3/8
16	1	1.610	1 5/8
20	1 1/4	1.700	2
24	1 1/2	2.080	2 1/2
32	2	2.390	3

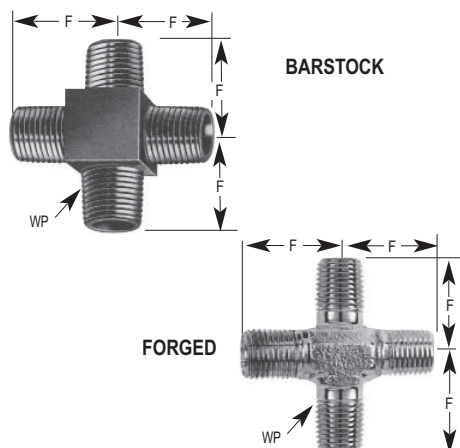
MALE TEE



STYLE (N) 309MT

Size #	Male	M	WP
02	1/8	.750	7/16
04	1/4	1.063	9/16
06	3/8	1.190	3/4
08	1/2	1.440	7/8
12	3/4	1.560	1 1/8
16	1	1.940	1 3/8
20	1 1/4	2.340	1 5/8
24	1 1/2	2.480	2
32	2	2.970	2 1/2

MALE CROSS

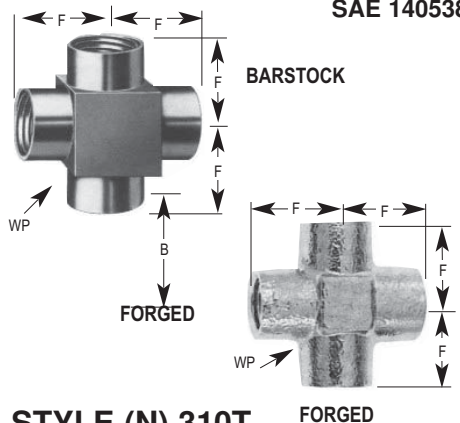


STYLE (N) 310MT

Size #	Male	F	WP
02	1/8	.660	5/8
04	1/4	.880	3/4
06	3/8	1.020	7/8
08	1/2	1.170	1 1/8
12	3/4	1.300	1 3/8
16	1	1.610	1 5/8
20	1 1/4	1.700	2
24	1 1/2	2.080	2 1/8
32	2	2.710	3

FEMALE CROSS

SAE 140538



STYLE (N) 310T

Size #	Female	F	WP
02	1/8	.660	5/8
04	1/4	.880	3/4
06	3/8	1.020	7/8
08	1/2	1.170	1 1/8
12	3/4	1.300	1 3/8
16	1	1.610	1 5/8
20	1 1/4	1.700	2
24	1 1/2	2.080	2 1/8
32	2	2.710	3

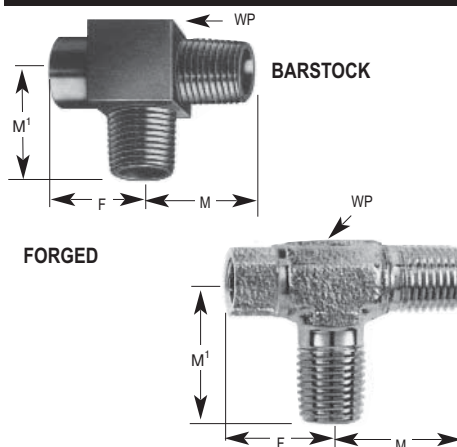
TO ORDER, SEE PAGE 5

All items on this page listed under CRN: OH 0527.5.6.7

Use prefix N for ASME Code grade adapters only.

TEE

Female to Male to Male



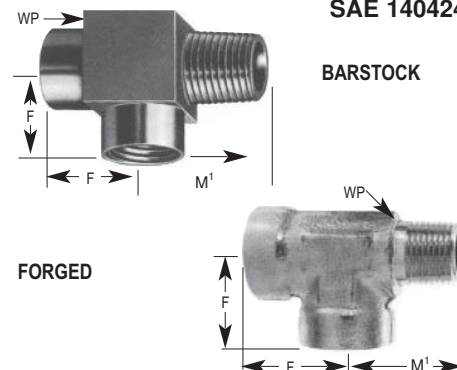
STYLE (N) 311T

Size #	Male	Fem.	M	M ₁	F ₁	WP
02x02	1/8	1/8	.750	.780	.660	5/8
04x04	1/4	1/4	1.063	1.090	1.880	3/4
06x06	3/8	3/8	1.190	1.220	1.020	7/8
08x08	1/2	1/2	1.440	1.470	1.170	1 1/8
12x12	3/4	3/4	1.560	1.590	1.300	1 3/8
16x16	1	1	1.940	1.970	1.610	1 5/8
20x20	1 1/4	1 1/4	2.340	2.380	1.700	2
24x24	1 1/2	1 1/2	2.480	2.640	2.080	2 1/2
32x32	2	2	2.970	3.000	2.390	3

TEE

Female to Male to Female

SAE 140424



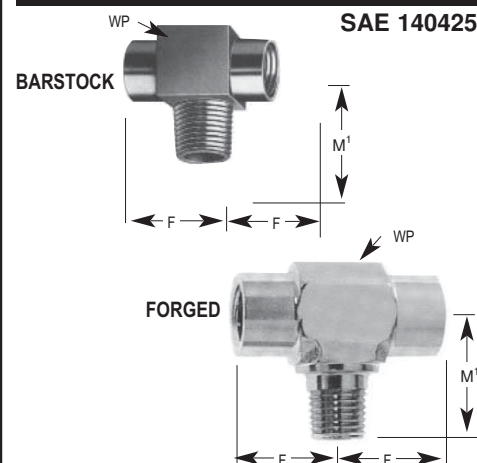
STYLE (N) 312T

Size #	Male	Fem.	M ₁	F	WP
02x02	1/8	1/8	.780	.660	5/8
04x04	1/4	1/4	1.090	1.880	3/4
06x06	3/8	3/8	1.220	1.020	7/8
08x08	1/2	1/2	1.470	1.170	1 1/8
12x12	3/4	3/4	1.590	1.300	1 3/8
16x16	1	1	1.970	1.610	1 5/8
20x20	1 1/4	1 1/4	2.380	1.700	2
24x24	1 1/2	1 1/2	2.640	2.080	2 1/2
32x32	2	2	3.000	2.390	3

TEE

Female to Female to Male

SAE 140425

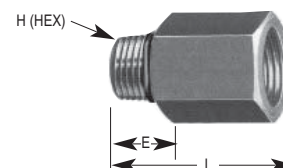


STYLE (N) 313T

Size #	Male	Fem.	M ₁	F	WP
02x02	1/8	1/8	.780	.660	5/8
04x04	1/4	1/4	1.090	1.880	3/4
06x06	3/8	3/8	1.220	1.020	7/8
08x08	1/2	1/2	1.470	1.170	1 1/8
12x12	3/4	3/4	1.590	1.300	1 3/8
16x16	1	1	1.970	1.610	1 5/8
20x20	1 1/4	1 1/4	2.380	1.700	2
24x24	1 1/2	1 1/2	2.640	2.080	2 1/2
32x32	2	2	3.000	2.390	3

MALE O-RING

Male Straight Thread to Female Pipe Thread



STYLE (N) 314TO

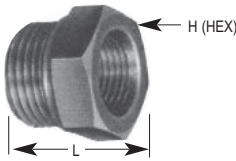
Size #	Male Straight Thread	Fem. Pipe Thread	E	H	L
04x02	7/16 - 20	1/8	.359	9/16	.969
04x04	7/16 - 20	1/4	.391	9/16	1.141
05x02	1/2 - 20	1/8	.359	5/8	1.000
06x04	9/16 - 18	1/4	.391	3/4	1.141
06x06	9/16 - 18	3/8	.391	7/8	1.266
08x06	3/4 - 16	3/8	.438	7/8	1.313
08x08	3/4 - 16	1/2	.438	1 1/8	1.485
10x08	7/8 - 14	1/2	.500	1 1/8	1.547
10x06	7/8 - 14	3/8	.500	1 1/8	1.375
12x12	1 1/16 - 12	3/4	.594	1 3/8	1.734
12x08	1 1/16 - 12	1/2	.594	1 3/8	1.641
14x12	1 3/16 - 12	3/4	.594	1 3/8	1.734
16x16	1 5/8 - 12	1	.594	1 5/8	1.906
16x08	1 5/8 - 12	1/2	.594	1 5/8	.641
16x12	1 5/8 - 12	3/4	.594	1 5/8	1.734
20x20	1 5/8 - 12	1 1/4	.594	2	2.063
20x16	1 5/8 - 12	1	.594	2	1.906
24x24	1 7/8 - 12	1 1/2	.594	2 1/2	2.063
32x32	2 1/2 - 12	2	.594	3	2.125

NOTE: All dimensions are in inches. Dimensions for reference only, subject to change. Carbon steel fittings are made from barstock. Stainless steel fitting shapes are made from forgings, straights are made from barstock.

Quality Pipe Fittings

THORBURN

MALE O-RING TO FEMALE O-RING

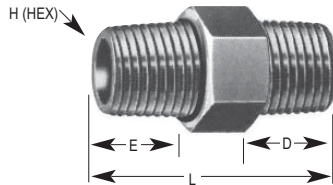


STYLE (N) 315TO

Size #	Male Straight Thread	Fem. Straight Thread	H	L
08x06	3/4 - 16	9/16 - 18	7/8	1.250
12x08	1 1/16 - 12	3/4 - 16	1 1/4	1.094
14x12	1 3/16 - 12	1 1/16 - 12	1 3/8	1.781
16x08	1 5/16 - 12	3/4 - 16	1 1/2	1.125
16x12	1 5/16 - 12	1 1/16 - 12	1 1/2	1.125
20x12	1 5/8 - 12	1 1/16 - 12	1 7/8	1.781
20x16	1 5/8 - 12	1 5/16 - 12	1 7/8	1.781
24x20	1 7/8 - 12	1 5/8 - 12	2 1/8	1.781

O-RING

Male Straight Thread to Male Pipe Thread

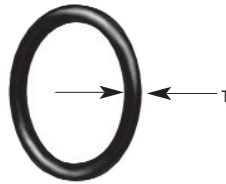


STYLE (N) 316TO

Size #	Male Straight Thread	Male Pipe Thread	D	E	H	L
04x02	7/16 - 20	1/8	.391	.359	9/16	.969
05x02	1/2 - 20	1/8	.391	.359	5/8	.969
06x04	9/16 - 18	1/4	.563	.391	1 1/16	1.203
06x06	9/16 - 18	3/8	.563	.391	3/4	1.266
08x06	3/4 - 16	3/8	.563	.438	7/8	1.250
08x08	3/4 - 16	1/2	.750	.438	1	1.532
10x08	7/8 - 14	1/2	.750	.500	1	1.594
12x12	1 1/16 - 12	3/4	.750	.594	1 1/4	1.719
14x12	1 3/16 - 12	3/4	.750	.594	1 3/8	1.719
16x16	1 5/16 - 12	1	.953	.594	1 1/2	1.953
20x20	1 5/8 - 12	1 1/4	.984	.594	1 7/8	1.984
24x24	1 7/8 - 12	1 1/2	1.000	.594	2 1/8	2.000
32x32	2 1/2 - 12	2	1.031	.594	2 3/4	2.063

O-RING

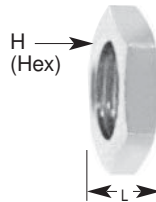
Made of BUNA-N 90



STYLE (N) 317TO

Size #	Port Straight Thread	O-Ring I.D.	O-Ring T
02	5/16 - 24	.239	.064
03	3/8 - 24	.301	.064
04	7/16 - 20	.351	.072
05	1/2 - 20	.414	.072
06	9/16 - 18	.468	.078
08	3/4 - 16	.644	.087
10	7/8 - 14	.755	.097
12	1 1/16 - 12	.924	.116
14	1 3/16 - 12	1.048	.116
16	1 5/16 - 12	1.171	.116
20	1 5/8 - 12	1.475	.118
24	1 7/8 - 12	1.720	.118
32	2 1/2 - 12	2.337	.118

STRAIGHT THREAD O-RING LOCKNUT

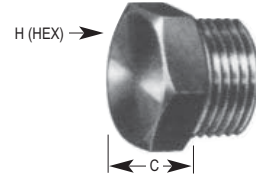


STYLE(N) 318TO

Size #	Straight Thread	H	L
04	7/16 - 20	9/16	.250
05	1/2 - 20	5/8	.250
06	9/16 - 18	1 1/16	.266
08	3/4 - 16	7/8	.313
10	7/8 - 14	1	.359
12	1 1/16 - 12	1 1/4	.406
14	1 3/16 - 12	1 3/8	.406
16	1 5/16 - 12	1 1/2	.406
20	1 5/8 - 12	1 7/8	.406
24	1 7/8 - 12	2 1/8	.406
32	2 1/2 - 12	2 3/4	.406

THREAD STRAIGHT O-RING PLUG

SAE 09109 A



STYLE (N) 319TO

Size #	Straight Thread	C	H	L
04	7/16 - 20	.156	9/16	.672
05	1/2 - 20	.156	5/8	.672
06	9/16 - 18	.188	1 1/16	.734
08	3/4 - 16	.188	7/8	.813
10	7/8 - 14	.250	1	.938
12	1 1/16 - 12	.313	1 1/4	1.094
14	1 3/16 - 12	.313	1 3/8	1.094
16	1 5/16 - 12	.375	1 1/2	1.125
20	1 5/8 - 12	.375	1 7/8	1.203
24	1 7/8 - 12	.375	2 1/8	1.281

CAP FOR MALE NPT



STYLE (N) 320T

Size #	FEMALE NPT
04	1/4
06	3/8
08	1/2
12	3/4
16	1
20	1 1/4
24	1 1/2
32	2

O-RING REPLACEMENT

Thorburn Pipe Fittings that require O-rings are shipped with the O-rings installed. If it becomes necessary to replace the O-ring, lubricate the replacement O-ring with a light coating of oil or petroleum jelly. Stretch the O-ring and carefully roll it over the fitting threads into the O-ring groove, being careful not to nick or cut the O-ring on the threads. A damaged O-ring could lead to leakage. Once the O-ring has been installed, final assembly to an SAE straight thread port can be accomplished. Properly installed Thorburn O-rings provide a dependable seal.

Thorburn standard O-rings are made of Buna-N material standard. Other materials available on special order.

TO ORDER, SEE PAGE 5

NOTE: All dimensions are in inches. Dimensions for reference only, subject to change. **Carbon steel fittings** are made from barstock. **Stainless steel fitting shapes** are made from forgings, straights are made from barstock.

All items on this page listed under CRN: OH 0527.5.6.7

Use prefix **N** for ASME Code grade adapters only.

Quality Swivel Pipe Adapters

THORBURN

Thorburn is proud to introduce its line of quality swivel pipe adapters. These connectors are used in fluid power systems where a swivel pipe adapter is required to connect to a rigid NPTF male connection.

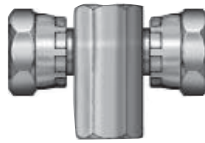
DESIGN PRESSURE RATING FOR CARBON STEEL AND STAINLESS 316

SIZE	PIPE THREAD	HOLE SIZE (INCHES)		DESIGN PRESSURE
		MALE	FEM.	
2	1/8	11/64	22/64	5,000
4	1/4	17/64	7/16	5,000
6	3/8	23/64	9/16	4,000
8	1/2	33/64	45/64	3,500
10	5/8	43/64	55/64	3,200
12	3/4	53/64	65/64	3,000
16	1	63/64	1 1/32	2,500
20	1 1/4	1 1/8	1 1/4	2,200
24	1 1/2	1 3/4	1 7/8	2,000
32	2	1 5/8	2 1/8	1,500

Note: Higher pressure ratings available on request.

HOW TO ORDER THORBURN ASME CODE GRADE QUALITY SWIVEL PIPE STEEL ADAPTERS

Example: N 360VH 20x20 S6
Class 1



Style N 360VH 20x20 S6 Class 1 is a stainless steel tee 1 1/4" NPSM female to female NPSM to 1 1/4" female NPTF branch for ASME class 1 service.

N

Prefix N means fitting meets ASME code requirements and has a CRN (Canadian Registered Number).

Part number
360VH

Base part number 360VH is a Tee NPSM Female to Female NPSM to Female NPTF Branch.

Dash sizes
20x20

Dash sizes number specifies OD tube size first and pipe thread last. Sizes are in 1/16". Thus, 20x20 = 1 1/4"x1 1/4"

Material
S6

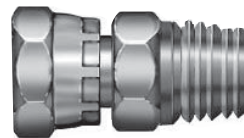
Made of SA479 type 316 standard. Other materials available upon request.

Code Class
Class 1

For nuclear classes insert suffix **Class 1, 2** or **3**. For class 6, leave blank.

HOW TO ORDER THORBURN COMMERCIAL GRADE QUALITY SWIVEL PIPE STEEL ADAPTERS

Example: 360SA TSS 02x02



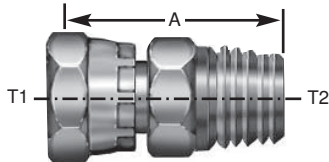
Style of Adapter
Tube OD in 1/16" of an inch
Pipe size in 1/16" of an inch
Material: (steel). "S6" (316)
Dash sizes
360SA 02x02 S6

Dash Sizes numbers specify the O.D. tube size first and the pipe thread or O-Ring thread last.

Style 360SA TSS 02x02 is a 316 stainless steel 1/8" male NPTF to 1/8" female NPSM.

MALE NPTF TO FEMALE NPSM

SAE 140130

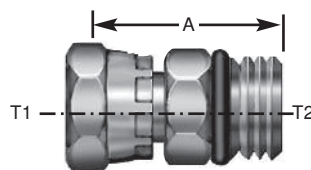


STYLE (N) 360SA

Size #	Male NPTF Thread T1	Female NPSM Thread T2	A
02x02	1/8	1/8	15/16
02x04	1/8	1/4	1 1/8
04x02	1/4	1/8	1 1/8
04x04	1/4	1/4	1 1/4
04x06	1/4	3/8	1 1/4
06x04	3/8	1/4	1 1/4
06x06	3/8	3/8	1 5/8
06x08	3/8	1/2	1 5/8
08x04	1/2	1/4	1 1/2
08x06	1/2	3/8	1 3/8
08x08	1/2	1/2	1 5/8
08x12	1/2	3/4	1 5/8
12x08	3/4	1/2	1 5/8
12x12	3/4	3/4	1 3/4
12x16	3/4	1	1 5/8
16x12	1	3/4	1 3/4
16x20	1	1 1/4	2
16x16	1	1	2
20x16	1 1/4	1	2
20x20	1 1/4	1 1/4	2 1/8
20x24	1 1/4	1 1/2	2 1/4
24x20	1 1/2	1 1/4	2 1/4
24x24	1 1/2	1 1/2	2 1/2
32x32	2	2	2 3/8

MALE O-RING TO FEMALE NPSM

Furnished with O-Ring SAE 140157

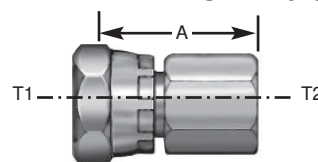


STYLE (N) 360SB

Size #	Straight Male Thread Thread T1	Female NPSM Thread T2	A
04x04	7/16 - 20	1/4	1
05x04	1/2 - 20	1/4	1
06x04	9/16 - 18	1/4	1
06x06	9/16 - 18	3/8	1 1/8
06x08	9/16 - 18	1/2	1 5/8
08x04	3/4 - 16	1/4	1 3/8
08x06	3/4 - 16	3/8	1 3/8
08x08	3/4 - 16	1/2	1 1/4
08x12	3/4 - 16	3/4	1 1/4
10x06	7/8 - 14	3/8	1 1/4
10x08	7/8 - 14	1/2	1 1/4
10x12	7/8 - 14	3/4	1 1/2
12x08	1 1/8 - 12	1/2	1 1/2
12x12	1 1/8 - 12	3/4	1 1/2
14x12	1 3/8 - 12	3/4	1 1/2
16x16	1 5/8 - 12	1	1 5/8
20x20	1 5/8 - 12	1 1/4	1 3/4
24x24	1 7/8 - 12	1 1/2	2

FEMALE NPTF TO FEMALE NPSM

SAE 140131

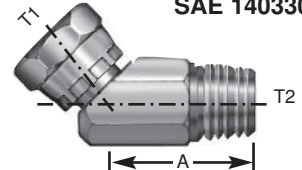


STYLE (N) 360SG

Size #	Female NPTF Thread T1	Female NPSM Thread T2	A
02x02	1/8	1/8	7/8
02x04	1/8	1/4	1 1/8
04x02	1/4	1/8	1
04x04	1/4	1/4	1 1/8
04x06	1/4	3/8	1 5/8
06x04	3/8	1/4	1 5/8
06x06	3/8	3/8	1 5/8
06x08	3/8	1/2	1 7/8
08x04	1/2	1/4	1 1/4
08x06	1/2	3/8	1 1/4
08x08	1/2	1/2	1 1/2
08x12	1/2	3/4	1 1/2
12x08	3/4	1/2	1 5/8
12x12	3/4	3/4	1 5/8
12x16	3/4	1	1 5/8
16x12	1	3/4	1 5/8
16x16	1	1	2
20x20	1 1/4	1 1/4	2
24x24	1 1/2	1 1/2	2
32x32	2	2	2 1/8

45° ELBOW MALE NPTF TO FEMALE NPSM

SAE 140330



STYLE (N) 360TA

Size #	Male NPTF Thread T1	Female NPSM Thread T2	A
02x02	1/8	1/8	5/8
04x02	1/4	1/8	1 1/8
04x04	1/4	1/4	1 3/8
04x06	1/4	3/8	1 5/8
06x04	3/8	1/4	1
06x06	3/8	3/8	1 1/8
06x08	3/8	1/2	1 1/8
08x04	1/2	1/4	1 1/8
08x06	1/2	3/8	1 1/8
08x08	1/2	1/2	1 1/8
12x08	3/4	1/2	1 1/8
12x12	3/4	3/4	1 1/8
12x16	3/4	1	1 1/8
16x12	1	3/4	1 1/2
16x16	1	1	1 1/2
20x16	1 1/4	1	1 3/4
20x20	1 1/4	1 1/4	1 3/4
24x24	1 1/2	1 1/2	1 5/8
32x32	2	2	2

TO ORDER, see above

All items on this page listed under CRN:
OH 0527.5.6.7

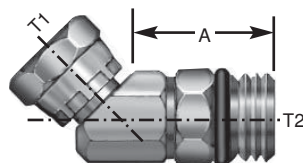
Use prefix N for ASME Code grade adapters only.

NOTE: All dimensions are in inches. Dimensions for reference only, subject to change.

Carbon steel fittings are made from barstock. **Stainless steel fitting shapes** are made from forgings, straights are made from barstock.

45° ELBOW MALE O-RING TO FEMALE NPSM

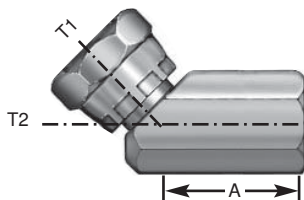
Furnished with O-Ring, Back-up Washer and Lock Nut



STYLE (N) 360TB

Size #	Straight Male Thread T1	Female NPSM Thread T2	A
04x04	7/16 - 20	1/4	1 1/4
06x04	9/16 - 18	1/4	1 1/2
06x06	9/16 - 18	3/8	1 5/32
06x08	9/16 - 18	1/2	1 5/32
08x06	3/4 - 16	3/8	1 5/8
08x08	3/4 - 16	1/2	1 5/8
10x06	7/8 - 14	3/8	1 3/4
10x08	7/8 - 14	1/2	1 13/16
10x12	7/8 - 14	3/4	1 13/16
12x08	1 1/16 - 12	1/2	1 5/16
12x12	1 1/16 - 12	3/4	1 3/4
12x16	1 1/16 - 12	1	1 27/32
16x16	1 5/8 - 12	1	1 27/32
20x16	1 5/8 - 12	1	2 1/2
20x20	1 5/8 - 12	1 1/4	3

45° ELBOW FEMALE NPTF TO FEMALE NPSM

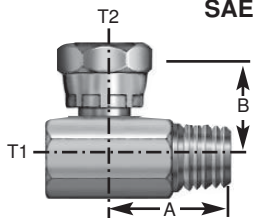


STYLE (N) 360TG

Size #	Female NPTF Thread T1	Female NPSM Thread T2	A
04x04	1/4	1/4	7/8
04x06	1/4	3/8	15/16
06x06	3/8	3/8	1 1/8
08x06	1/2	3/8	1 1/8
08x08	1/2	1/2	1 3/32
12x12	3/4	3/4	1 3/32
16x12	1	3/4	1 3/8
16x16	1	1	1 11/32
20x20	1 1/4	1 1/4	1 1/2
24x24	1 1/2	1 1/2	1 5/8

90° ELBOW MALE NPTF TO FEMALE NPSM

SAE 140230

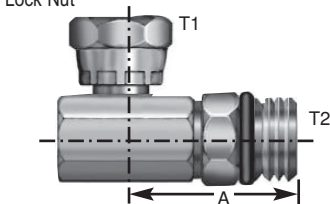


STYLE (N) 360UA

Size #	Male NPTF Thread T1	Female NPSM Thread T2	A	B
02x02	1/8	1/8	15/16	11/16
02x04	1/8	1/4	15/16	3/4
04x02	1/4	1/8	15/16	3/4
04x04	1/4	1/4	1 3/16	3/4
04x06	1/4	3/8	1 3/16	27/32
06x04	3/8	1/4	1 1/2	25/32
06x06	3/8	3/8	1 1/2	13/16
06x08	3/8	1/2	1 13/16	1
08x04	1/2	1/4	1 13/16	15/16
08x06	1/2	3/8	1 11/16	1
08x08	1/2	1/2	1 13/16	1
08x12	1/2	3/4	2	1 1/8
12x06	3/4	3/8	2	1 15/16
12x08	3/4	1/2	1 13/16	1 3/32
12x12	3/4	3/4	2	1 3/32
12x16	3/4	1	2 3/8	1 13/16
16x12	1	3/4	2	1 1/4
16x16	1	1	2 3/8	1 3/8
16x20	1	1 1/4	2 3/8	1 5/8
20x16	1 1/4	1	2 19/32	1 5/8
20x20	1 1/4	1 1/4	2 5/8	1 5/8
24x24	1 1/2	1 1/2	2 13/16	1 13/16
32x32	2	2	3 5/16	2 5/16

90° ELBOW MALE O-RING TO FEMALE NPSM

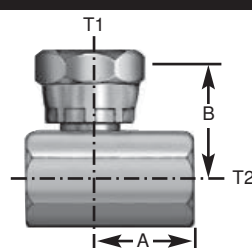
Furnished with O-Ring, Back-up Washer and Lock Nut



STYLE (N) 360UB

Size #	Male NPTF Thread T1	Female NPSM Thread T2	A
04x04	7/16 - 20	1/4	1 1/16
06x04	9/16 - 18	1/4	1 1/2
06x06	9/16 - 18	1/4	1 1/4
06x08	9/16 - 18	1/2	1 1/2
08x06	3/4 - 16	3/8	1 5/8
08x08	3/4 - 16	1/2	1 1/2
08x12	3/4 - 16	3/4	1 3/4
10x06	7/8 - 14	3/8	1 5/16
10x08	7/8 - 14	1/2	1 13/16
10x12	7/8 - 14	3/4	1 7/8
12x08	1 1/16 - 12	1/2	1 1/2
12x12	1 1/16 - 12	3/4	1 15/16
12x16	1 1/16 - 12	1	2 1/8
14x12	1 3/16 - 12	3/4	2 3/16
16x12	1 5/16 - 12	3/4	2 1/4
16x16	1 5/16 - 12	1	2 1/16
20x16	1 5/8 - 12	1	2 7/8
20x20	1 5/8 - 12	1 1/4	2 1/4
24x24	1 7/8 - 12	1 1/2	2 3/8

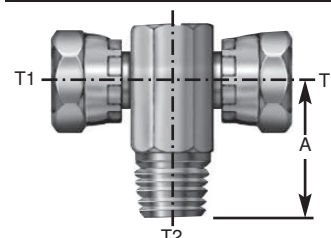
90° ELBOW MALE NPTF TO FEMALE NPSM



STYLE (N) 360UG

Size #	Female NPTF Thread T1	Female NPSM Thread T2	A	B
02x02	1/8	1/8	11/16	5/8
04x02	1/4	1/8	15/16	5/8
04x04	1/4	1/4	7/8	3/4
04x06	1/4	3/8	15/16	13/16
06x04	3/8	1/4	1 1/16	7/8
06x06	3/8	3/8	1 1/16	15/16
06x08	3/8	1/2	1 1/16	57/64
08x04	1/2	1/4	1 1/4	15/16
08x06	1/2	3/8	1 1/4	15/16
08x08	1/2	1/2	1 1/4	1 1/16
08x12	1/2	3/4	1 1/4	1 11/16
12x08	3/4	1/2	1 1/16	15/16
12x12	3/4	3/4	1 3/8	1 13/64
12x16	3/4	1	1 7/16	1 27/64
16x12	1	3/4	1 3/4	1 11/64
16x16	1	1	1 5/8	1 15/32
20x20	1 1/4	1 1/4	2	1 3/4
24x24	1 1/2	1 1/2	2 3/32	2 11/32

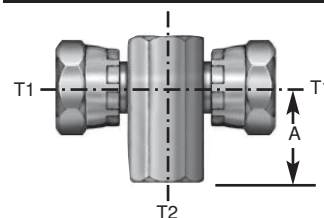
TEE FEMALE NPSM TO FEMALE NPSM TO MALE NPTF BRANCH



STYLE (N) 360VC

Size #	Male NPTF Thread T1	Female NPSM Thread T2	A
02x02	1/8	1/8	15/16
04x04	1/4	1/4	1 3/16
06x04	3/8	1/4	1 1/4
06x06	3/8	3/8	1 1/2
08x08	1/2	1/2	1 13/16
12x08	3/4	1/2	2
12x12	3/4	3/4	2
12x16	3/4	1	2
16x12	1	3/4	2 5/16
16x16	1	1	2 3/8
20x20	1 1/4	1 1/4	2 5/8
24x24	1 1/2	1 1/2	2 13/16

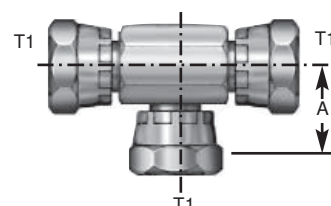
TEE NPSM FEMALE TO FEMALE NPSM TO FEMALE NPTF BRANCH



STYLE (N) 360VH

Size #	Female NPTF Thread T1	Female NPSM Thread T2	A
02x02	1/8	1/8	7/8
04x04	1/4	1/4	1
06x06	3/8	3/8	1 1/16
06x08	3/8	1/4	1 1/16
08x08	1/2	1/2	1 1/4
08x06	1/2	3/8	1 1/4
12x12	3/4	3/4	1 3/8
16x16	1	1	1 5/8
16x12	1	3/4	1 3/4
20x20	1 1/4	1 1/4	2

FEMALE NPSM FULL SWIVEL TEE



STYLE (N) 360VJ

Size #	Female NPSM Thread T1	A
02	1/8	5/8
04	1/4	3/4
06	3/8	7/8
08	1/2	15/16
12	3/4	1 1/8
16	1	1 5/16
20	1 1/4	1 1/2

NOTE: All dimensions are in inches. Dimensions for reference only, subject to change.
Carbon steel fittings are made from barstock.
Stainless steel fitting shapes are made from forgings, straights are made from barstock.

TO ORDER, see page 11

All items on this page listed under CRN: OH 0527.5.6.7

Use prefix N for ASME Code grade adapters only.

37° Flare Tube Fittings and Hose Adapters

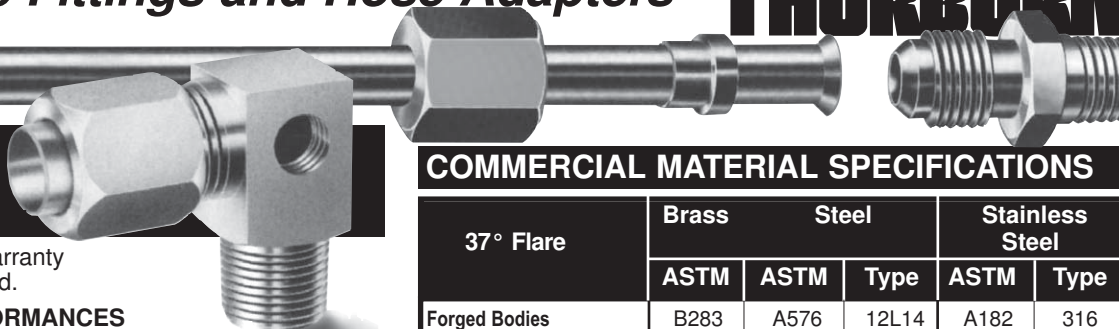
THORBURN

WHY USE THORBURN 37° FITTINGS?

Thorburn offers the widest warranty of 37° tube fittings in the world.

COMPLIANCES & CONFORMANCES

- SAE J514
- ASME Section III; B31.1; B51; ASME Section VIII; B31.3; c/w CRN.
- Military Specification MIL-F-18866
- Military Standards MS 51500

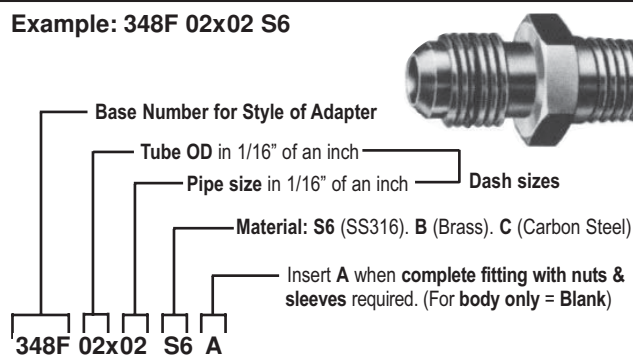


COMMERCIAL MATERIAL SPECIFICATIONS

37° Flare	Brass		Steel	Stainless Steel	
	ASTM	ASTM	Type	ASTM	Type
Forged Bodies	B283	A576	12L14	A182	316
Barstock Bodies	B21/B16	A108	12L14	A479	316
Cold Formed Tube Nuts	—	A578	C1110	A479	316
Cold Formed Tube Sleeves	—	SAE1020		A276	316
Barstock Tube Nuts	—	A108	12L14	A479	316
Barstock Tube Sleeves	—	A108	C1137	A276	316

HOW TO ORDER THORBURN COMMERCIAL GRADE PRECISION MACHINED 37° FLARE TUBE FITTINGS

Example: 348F 02x02 S6



Carbon steel is made from barstock. Stainless steel shapes are made from forgings, straights are made from barstock.

Style 348F 02x02 S6 is a male connector with precision machined $\frac{1}{8}$ " tube OD 37° male flare tube $\frac{5}{16}$ "-24 thread by $\frac{1}{8}$ " male pipe $\frac{1}{8}$ "-27 thread made from type 316 stainless steel.

ASSEMBLY TORQUE TABLE FOR 37° FLARE FITTING

Size	37° Flare Fitting Torque foot lbs.	
	Steel & Stainless Steel Tube & Fitting	
	Min.	Max.
2	6	8
3	8	10
4	13	15
5	17	19
6	24	26
8	50	53
10	70	75
12	95	100
14	115	120
16	130	135
20	175	185
24	215	225
32	290	300

DESIGN PRESSURE RATING

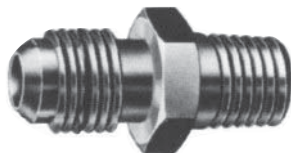
SIZE	PIPE THREAD	HOLE SIZE (INCHES)		DESIGN PRESSURE
		MALE	FEM.	
2	$\frac{1}{8}$	$\frac{11}{64}$	$\frac{22}{64}$	5,000
4	$\frac{1}{4}$	$\frac{17}{64}$	$\frac{7}{16}$	4,500
6	$\frac{3}{8}$	$\frac{25}{64}$	$\frac{9}{16}$	4,000
8	$\frac{1}{2}$	$\frac{33}{64}$	$\frac{45}{64}$	4,000
10	$\frac{5}{8}$			3,000
12	$\frac{3}{4}$	$\frac{45}{64}$	$\frac{59}{64}$	3,000
16	1	$\frac{59}{64}$	$\frac{1}{32}$	2,700
20	$1\frac{1}{4}$	$\frac{15}{16}$	$\frac{1}{24}$	2,000
24	$1\frac{1}{2}$	$\frac{31}{64}$	$\frac{17}{64}$	1,750
32	2	$\frac{59}{64}$	$\frac{2}{32}$	1,500

Note: Higher pressure ratings available on request.

Note: Torque values are for Stainless Steel Fittings only. The minimum torque values shown were established on the basis of having a smooth contact surface between the flare and the seat of the fitting. Do not lubricate threads.

HOW TO ORDER THORBURN ASME CODE GRADE PRECISION MACHINED 37° FLARE HOSE ADAPTER TUBE FITTING BODIES

Example: N 348 F 08x08 S6 Class 2



N	348F	08x08	S6	Class 2
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Prefix N means fitting meets ASME code requirements and has a CRN (Canadian Registered Number).

Base part number 348F is a Male Connector with Tube to Male Pipe Thread.

Dash sizes number specifies OD tube size first and pipe thread last. Sizes are in $\frac{1}{16}$ ". Thus, 08x08 = $\frac{1}{2}$ "x $\frac{1}{2}$ ".

Material code here is S6. Straights made of SA479 type 316. Shapes (forged) made of SA182 type 316. Other materials available upon request.

Style N 348F 08x08 S6 class 2 is a male connector with $\frac{1}{2}$ " precision machined 37° flare ($\frac{3}{4}$ -16) tube with $\frac{1}{2}$ " male pipe threads in 316 type stainless steel for ASME class 2 service.

HOW TO ORDER THORBURN ASME CODE GRADE 37° FLARED TUBE FITTING ASSEMBLIES

Example: N 349FA 08x08 S6 Class 3



N	349FA	08x08	S6	Class 2
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Prefix N means fitting meets ASME code requirements and has a CRN (Canadian Registered Number).

Part number 349FA is a 90° Elbow with Tube to Male Pipe Thread, complete with nuts and sleeve.

Dash size number specifies OD tube size first and pipe thread last. Sizes are in $\frac{1}{16}$ ". Thus, 08x08 = $\frac{1}{2}$ "x $\frac{1}{2}$ ".

Straights made of SA479 type 316. Shapes (forged) made of SA182 type 316. Other materials available upon request.

For nuclear classes insert suffix **Class 1**, **2** or **3**. For class 6, leave blank.

Style 349FA is an assembly consisting of a 316 type stainless steel 90° elbow with $\frac{1}{2}$ " precision machined 37° flare tube with $\frac{1}{2}$ " male pipe threads, complete with nuts and sleeve for ASME class 3 service. (FA=Fitting Assembly)

Precision Machined 37° Flare Tube Fittings and Hose Adapters

THORBURN

ASSEMBLY INSTRUCTIONS FOR THORBURN 37° FLARE TUBE STAINLESS STEEL AND CARBON STEEL FITTINGS

RECOMMENDED TUBING

Use fully annealed type 304 or 316 stainless steel seamless or welded tubing suitable for bending or flaring.

PREPARATION

- Cut tube to length using fine blade hacksaw or abrasive saw. Do not use a tube cutter because it may work harden tubing as it cuts and cause flares to split. Be sure each cut is square.
- Remove burrs with deburring tool, fine file or emery paper. Clean tubing to be sure it is free of dirt, grit, metal filings and other foreign material that might scratch or mar the flare. Chips, burrs or filings not removed before flaring can be pressed into the tube during flaring, causing pock marks, scratches, draw marks, and other surface irregularities on tube surface. These defects make a tight seal uncertain and can cause split flares. Flare will have to be cut off and tube reflared.
- Place nut and then sleeve on tube with open threaded end of nut and larger tapered opening of sleeve toward the end of the tube.

FLARING

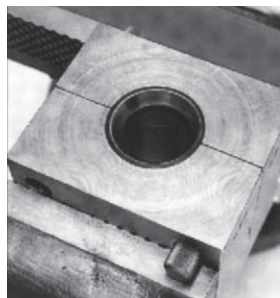
- Flare tube end to 37° using a block and pin flaring tool or power flaring equipment (see photos 1, 2, 3).



1- Flaring tool in position.



2- Flare being created.

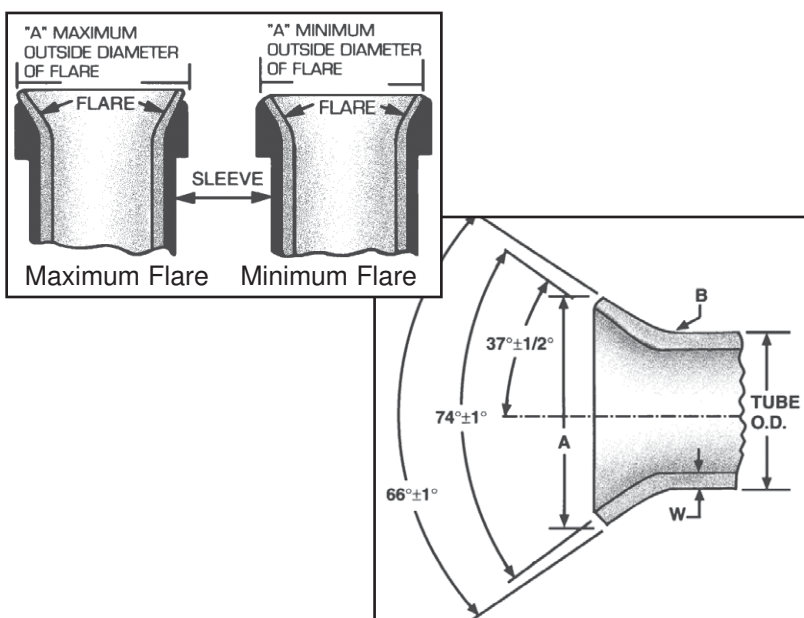


3- Completed flare



4- Inspect flare before installing

- Inspect flare to be certain flare dimensions (see drawings and chart this page) are correct and flare is not split or cracked (see photo 4). To seat properly, flare must be perfectly smooth, free of any scratches or surface imperfections of any kind, and square and concentric with fitting sleeve (i.e., amount of flare must be equal all around tube and not cocked or uneven). If tubes flared too short, full clamping area of the fitting is not utilized, resulting in flare being squeezed thin by pressure on the smaller area; joints may fail because of leakage, breaks at flare or pullout strains. Tubes flared too long may stick and jam on the nut's threads when assembling the fitting.



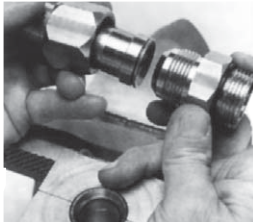
Tube OD	A		B	W
	Maximum	Minimum	Radius ±0.02	Wall Maximum
1/8	0.200	0.180	0.03	0.035
3/16	0.280	0.260	0.03	0.035
1/4	0.360	0.340	0.03	0.065
5/16	0.430	0.400	0.03	0.065
3/8	0.490	0.460	0.04	0.065
1/2	0.660	0.630	0.06	0.083
5/8	0.790	0.760	0.06	0.095
3/4	0.950	0.920	0.08	0.109
7/8	1.070	1.040	0.08	0.109
1	1.200	1.170	0.09	0.120
1 1/4	1.510	1.480	0.09	0.120
1 1/2	1.730	1.700	0.11	0.120
2	2.360	2.330	0.11	0.134

ASSEMBLY

Proper assembly practices are necessary to ensure that fittings and tubing seal. The tubing must be aligned with the axis of the fitting so that the entire circumference of the flare makes simultaneous full-circle contact with the nose cone of the fitting. The cone must enter the flare perfectly straight. The tubing must also be supported so it does not sag and disturb the alignment.



5- Begin to draw up nut and sleeve.



6- Orient fitting to flared tubing.

- To prevent galling, apply high pressure grease to threads and contacting surfaces. Galling occurs when two surfaces move against each other under pressure. Metal can be ripped off surface, destroying sealing areas or causing threads to seize.

- Only the nut should be turned during assembly. Fitting must be held still so it does not rotate against the mating surface.
- Tighten tube to bring flare into contact with nose cone. Avoid overtightening. Any "slop" or spring in assembly must be taken up so installer is certain that tubing is fully seated.
- When assembling swivel nut fitting, it is very important to get female taper of swivel end into contact with nose cone. Pin wire that holds swivel nut to body has outward spring that causes the nut and body to be held apart. This separation must be overcome by extra tightening of swivel nut to seat tapers against each other.



7- Tighten nut by hand before using wrench in final assembly.

- Once nose cone is firmly seated, assembly is completed by turning nut the appropriate distance. Use either of two different methods: **Flats of Tube Nut Method** or **Torque Method**.
- Flats of Tube Nut Method:** the distance is measured by flats on nut hex compared to a point on fitting body. Mark nut and body with permanent ink to show starting point. Further tighten nut according to chart on this page. The chart here shows number of

flats the nut should be turned after the sealing surfaces have been brought into contact. Put second mark on body in line with nut in the tightened position as a visual indication that assembly is completed.

- Torque Method:** Use a torque wrench to tighten fitting to set value. The chart here shows the amount of torque to apply. One disadvantage of Torque Method: no visual check for correct assembly as in Flats of Tube Nut Method.



8- Completed installation

THORBURN 37° FLARED TUBE FITTINGS that require "O" rings are shipped with the "O" rings installed. If it becomes necessary to replace the "O" ring, lubricate the replacement "O" ring with a light coating of oil or petroleum jelly. Stretch the "O" ring and carefully roll it over the fitting threads into the "O" ring groove, being careful not to nick or cut the "O" ring on the threads. A damaged "O" ring could lead to leakage. Once the "O" ring has been installed, final assembly to an SAE straight thread port can be accomplished. Properly installed Thorburn "O" rings provide a dependable seal.

Thorburn standard "O" ring is made of Buna-N material.

Other materials available on special order.

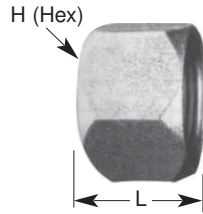
ASSEMBLY TORQUE TABLE FOR 37° FLARE FITTING

Tube OD	Nut Hex	Number of Flats of Nut to Turn				Torque	
		With Tubing		Swivel Nut Fitting		Foot Pounds	
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
2	3/8	2 1/4	2 1/2	2 1/4	2 1/2	6	8
3	7/16	2 1/4	2 1/2	2 1/4	2 1/2	8	10
4	9/16	2	2 1/4	2	2 1/4	13	15
5	5/8	2	2 1/4	2	2 1/4	17	19
6	11/16	1 1/2	1 3/4	1 1/4	1 1/2	24	26
8	7/8	1 1/2	1 3/4	1	1 1/4	50	53
10	1	1 1/2	1 3/4	1	1 1/4	70	75
12	1 1/4	1 1/4	1 1/2	1	1 1/4	95	100
14	1 3/8	1	1 1/4	1	1 1/4	115	120
16	1 1/2	1	1 1/4	1	1 1/4	130	135
20	2	1	1 1/4	1	1 1/4	175	185
24	2 1/4	1	1 1/4	1	1 1/4	215	225
32	2 7/8	1	1 1/4	1	1 1/4	290	300

Precision Machined 37° Flare Tube Fittings and Hose Adapters

THORBURN

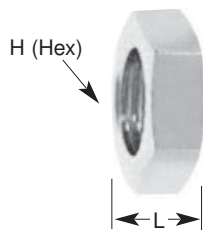
CAP Cap to Cap 37° Flare Fitting Tube End SAE 070112



STYLE (N) 330F

Size #	Tube O.D.	Straight Thread	L	H
02	1/8	5/16-24	2 1/32	3/8
03	3/16	3/8-24	4 7/64	7/16
04	1/4	7/16-20	3/4	9/16
05	5/16	1/2-20	53/64	5/8
06	3/8	9/16-18	7/8	11/16
08	1/2	3/4-16	1 1/64	7/8
10	5/8	7/8-14	1 5/32	1
12	3/4	1 1/16-12	1 15/64	1 1/4
14	7/8	1 3/16-12	1 5/16	1 3/8
16	1	1 5/16-12	1 23/64	1 1/2
20	1 1/4	1 5/8-12	1 1/2	2
24	1 1/2	1 7/8-12	1 23/32	2 1/4
32	2	2 1/2-12	2 3/16	2 7/8

BULKHEAD LOCKNUT SAE 070118



STYLE (N) 331F

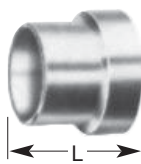
Size #	Tube O.D.	Straight Thread	H	L
02	1/8	5/16-24	9/16	7/32
03	3/16	3/8-24	5/8	7/32
04	1/4	7/16-20	11/16	1/4
05	5/16	1/2-20	3/4	1/4
06	3/8	9/16-18	13/16	17/64
08	1/2	3/4-16	1	5/16
10	5/8	7/8-14	1 1/8	23/64
12	3/4	1 1/16-12	1 3/8	13/32
14	7/8	1 3/16-12	1 1/2	13/32
16	1	1 5/16-12	1 5/8	13/32
20	1 1/4	1 5/8-12	1 7/8	13/32
24	1 1/2	1 7/8-12	2 1/8	13/32
32	2	2 1/2-12	2 3/4	13/32

TO ORDER, SEE PAGE 13

All items on this page listed under
CRN: OH 0527.5.6.7

Use prefix **N** for ASME Code
grade adapters only.

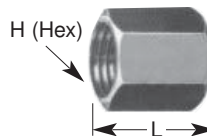
SLEEVE SAE 070115



STYLE (N) 340F

Size #	Tube O.D.
04	1/4
05	5/16
06	3/8
08	1/2
10	5/8
12	3/4
14	7/8
16	1
20	1 1/4
24	1 1/2
32	2

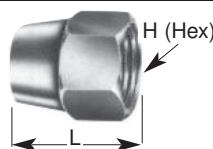
NUT Tube Nut SAE 070110



STYLE (N) 341F

Size #	Tube O.D.	Straight Thread	L	H
02	1/8	5/16-24	35/64	3/8
03	3/16	3/8-24	19/32	7/16
04	1/4	7/16-20	39/64	9/16
05	5/16	1/2-20	43/64	5/8
06	3/8	9/16-18	23/32	11/16
08	1/2	3/4-16	27/32	7/8
10	5/8	7/8-14	31/32	1
12	3/4	1 1/16-12	1 1/64	1 1/4
14	7/8	1 3/16-12	1 5/64	1 3/8
16	1	1 5/16-12	1 1/8	1 1/2
20	1 1/4	1 5/8-12	1 7/32	2
24	1 1/2	1 7/8-12	1 13/32	2 1/4
32	2	2 1/2-12	1 47/64	2 7/8

LONG NUT



STYLE (N) 341LF

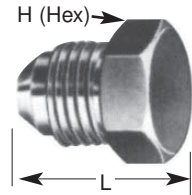
Size #	Tube O.D.	Straight Thread	L	H
03	3/16	3/8-24	3/8	7/16
04	1/4	7/16-20	3/4	9/16
05	5/16	1/2-20	7/8	5/8
06	3/8	9/16-18	1	11/16
08	1/2	3/4-16	1 1/8	7/8
10	5/8	7/8-14	1 5/16	1
12	3/4	1 1/16-12	1 1/2	1 1/4
16	1	1 5/16-12	1 13/16	1 1/2
20	1 1/4	1 5/8-12	1 15/16	2
24	1 1/2	1 7/8-12	—	2 1/4
32	2	2 1/2-12	—	2 7/8

NOTE: All dimensions are in inches.
Dimensions for reference only, subject to change.
Carbon steel fittings are made from barstock.
Stainless steel fitting shapes are made from forgings, straights are made from barstock.

PLUG Plugs Pre-flared Tube End SAE 070109

Must be used with nuts and sleeve

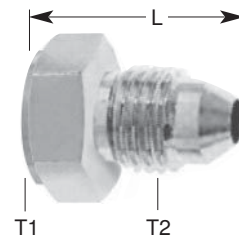
All sizes for
STYLE 339 F
listed under
CRN:
OD 3256.5



STYLE (N) 339F

Size #	Tube O.D.	Straight Thread	L	H
02	1/8	5/16-24	45/64	7/16
03	3/16	3/8-24	47/64	7/16
04	1/4	7/16-20	51/64	1/2
05	5/16	1/2-20	51/64	9/16
06	3/8	9/16-18	27/32	5/8
08	1/2	3/4-16	15/16	13/16
10	5/8	7/8-14	1 3/32	15/16
12	3/4	1 1/16-12	1 9/32	1 1/8
14	7/8	1 3/16-12	1 5/16	1 1/4
16	1	1 5/16-12	1 21/64	1 3/8
20	1 1/4	1 5/8-12	1 29/64	1 11/16
24	1 1/2	1 7/8-12	1 41/64	2
32	2	2 1/2-12	2 3/64	2 5/8

TUBE END REDUCER SAE 070123



Two styles available:
Single piece or
two pieces.

STYLE (N) 383F

Size #	T1	T2	L Thread
06x04	3/8	1/4	31/32
08x04	1/2	1/4	1
08x06	1/2	3/8	1
10x04	5/8	1/4	1 1/32
10x06	5/8	3/8	1 1/32
10x08	5/8	1/2	1 1/2
12x04	3/4	1/4	1 3/32
12x06	3/4	3/8	1 3/32
12x08	3/4	1/2	1 3/16
12x10	3/4	5/8	1 43/64
14x06	7/8	3/8	1 3/32
14x08	7/8	1/2	1 3/16
14x10	7/8	5/8	1 19/64
14x12	7/8	3/4	1 53/64
16x08	1	1/2	1 17/64
16x10	1	5/8	1 3/8
16x12	1	3/4	1 15/32
20x08	1 1/4	1/2	1 15/32
20x12	1 1/4	3/4	1 15/32
20x14	1 1/4	7/8	1 1/2
20x16	1 1/4	1	1 33/64
24x16	1 1/2	1	1 37/64
24x20	1 1/2	1 1/4	2 9/64
32x24	2	1 1/2	—

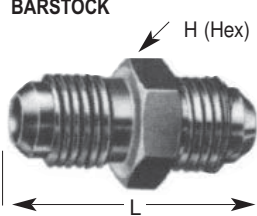
Precision Machined 37° Flare Tube Fittings and Hose Adapters

THORNBURN

UNION Tube to Tube

All sizes for
STYLE 342 F
listed under
CRN:
OD 3256.5

BARSTOCK SAE 070101



STYLE (N) 342F

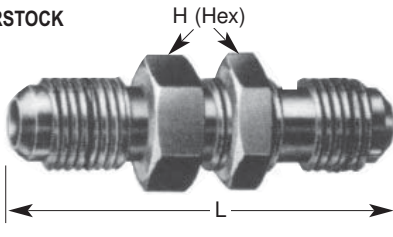
Size #	Tube O.D.	Tube O.D.	Straight Thread	Straight Thread	L	H
02	1/8	1/8	5/16-24	5/16-24	1 5/32	7/16
03	3/16	3/16	3/8-24	3/8-24	1 1/32	7/16
04	1/4	1/4	7/16-20	7/16-20	1 23/64	1 1/2
05	5/16	5/16	1/2-20	1/2-20	1 23/64	9/16
06	3/8	3/8	9/16-18	9/16-18	1 23/64	5/8
06x04	3/8	1/4	9/16-18	7/16-20	1 3/8	5/8
08	1/2	1/2	3/4-16	7/16-20	1 21/32	13/16
08x06	1/2	3/8	3/4-16	9/16-18	1 9/16	13/16
10	5/8	5/8	7/8-14	7/8-14	1 21/32	15/16
10x08	5/8	1/2	7/8-14	3/4-16	1 3/4	15/16
12	3/4	3/4	1 1/16-12	1 1/16-12	2 3/64	1 7/8
14	7/8	7/8	1 13/16-12	1 13/16-12	2 13/64	1 7/8
16	1	1	1 15/16-12	1 15/16-12	2 15/64	1 7/8
20	1 1/4	1 1/4	1 5/8-12	1 5/8-12	2 27/64	1 11/16
24	1 1/2	1 1/2	1 7/8-12	1 7/8-12	2 41/64	2
32	2	2	2 1/2-12	2 1/2-12	3 25/64	2 5/8

BULKHEAD UNION Tube to Tube

All sizes for STYLE 342
BHF listed under CRN:
OD 3256.5

SAE 070601

BARSTOCK



STYLE (N) 342BHF

Size #	Tube O.D.	Straight Thread	L	H
02	1/8	5/16-24	1 55/64	9/16
03	3/16	3/8-24	1 57/64	5/8
04	1/4	7/16-20	2 1/16	1 11/16
05	5/16	1/2-20	2 1/16	3/4
06	3/8	9/16-18	2 11/16	13/16
08	1/2	3/4-16	2 27/64	1
10	5/8	7/8-14	2 3/4	1 1/8
12	3/4	1 1/16-12	3 3/64	1 3/8
14	7/8	1 13/16-12	3 3/64	1 1/2
16	1	1 15/16-12	3 3/8	1 5/8
20	1 1/4	1 5/8-12	3 3/4	1 7/8
24	1 1/2	1 7/8-12	3 1/2	2 1/8
32	2	2 1/2-12	4 3/16	2 3/4

TO ORDER, SEE PAGE 13

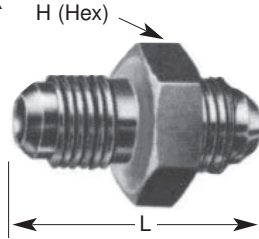
All items on this page listed under
CRN:
OH 0527.5.6.7

Use prefix **N** for ASME Code
grade adapters only.

UNION LARGE HEX Tube to Tube

BARSTOCK

SAE 070119



STYLE (N) 342LHF

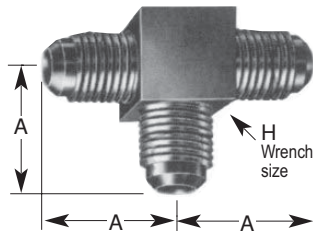
Size#	Tube O.D.	Tube O.D.	Straight Thread	Straight Thread	L	H
04	1/4	1/4	7/16-20	7/16-20	1 1/4	1 1/16
05	5/16	5/16	1/2-20	1/2-20	1 1/4	1 1/4
06	3/8	3/8	9/16-18	9/16-18	1 3/8	13/16
08	1/2	1/2	3/4-16	3/4-16	1 9/16	1
10	5/8	5/8	7/8-14	7/8-14	1 53/64	1 1/8
12	3/4	3/4	1 1/16-12	1 1/16-12	2 1/64	1 3/8
16	1	1	1 5/8-12	1 5/8-12	2 3/16	1 5/8
20	1 1/4	1 1/4	1 5/8-12	1 5/8-12	2 3/32	1 7/8
24	1 1/2	1 1/2	1 7/8-12	1 7/8-12	2 41/64	2 1/8
32	2	2	2 1/2-12	2 1/2-12	3 25/64	2 3/4

UNION TEE Tube to Tube to Tube

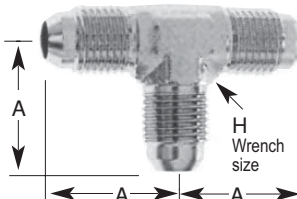
BARSTOCK

SAE 070401

All sizes
for STYLE
344 F
listed
under
CRN:
OD 3256.5



FORGED



STYLE (N) 344F

Size #	Tube O.D.	Straight Thread	A	H
02	1/8	5/16-24	49/64	7/16
03	3/16	3/8-24	53/64	7/16
04	1/4	7/16-20	57/64	5/8
05	5/16	1/2-20	61/64	5/8
06	3/8	9/16-18	1 1/16	7/8
08	1/2	3/4-16	1 1/4	7/8
10	5/8	7/8-14	1 29/64	7/8
12	3/4	1 1/16-12	1 21/32	1 1/8
14	7/8	1 13/16-12	1 23/32	1 1/4
16	1	1 15/16-12	1 13/16	1 3/8
20	1 1/4	1 5/8-12	2 1/16	2 1/8
24	1 1/2	1 7/8-12	2 21/64	2 1/4
32	2	2 1/2-12	3 1/16	3 1/4

NOTE: All dimensions are in inches. Dimensions for reference only, subject to change.

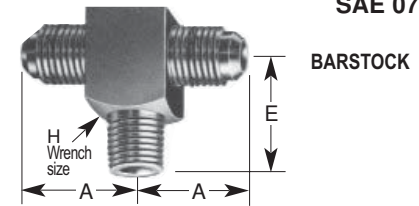
Carbon steel fittings are made from barstock.
Stainless steel fitting shapes are made from forgings, straights are made from barstock.

TEE

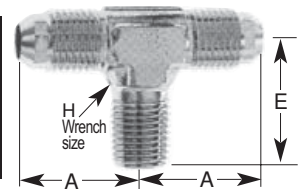
Run: Tube to Tube

Side: Male Pipe

SAE 070425



All sizes for
STYLE 345 F
listed under
CRN:
OD 3256.5



STYLE (N) 345F

Size #	Tube O.D.	Male Pipe	A	E
04x02	1/4	1/8	57/64	25/32
04x04	1/4	1/4	13/64	13/32
05x02	5/16	1/8	61/64	25/32
05x04	5/16	1/4	61/64	25/32
06x04	3/8	1/4	1 1/16	13/32
06x06	3/8	3/8	1 5/32	17/64
08x06	1/2	3/8	1 1/4	17/32
08x08	1/2	1/2	1 11/32	1 15/32
10x08	5/8	1/2	1 29/64	1 15/32
12x12	3/4	3/4	1 21/32	1 19/32
14x12	7/8	3/4	1 29/32	1 11/16
16x16	1	1	1 13/16	1 31/32
20x20	1 1/4	1 1/4	2 1/16	2 3/8
24x24	1 1/2	1 1/2	2 21/64	2 5/8

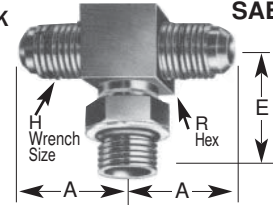
TEE

Run: Tube to Tube

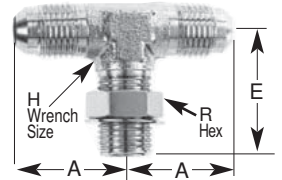
Side: Straight Thread

SAE 070429

BARSTOCK



FORGED



STYLE (N) 345FO

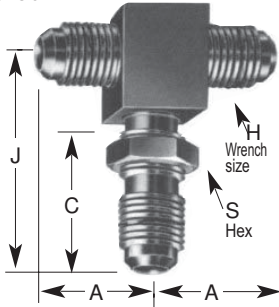
Size #	Tube O.D.	Tube Straight Thread	Male Straight Thread	A	E
04X04	1/4	7/16-20	7/16-20	7/8	1 1/64
05X05	5/16	1/2-20	1/2-20	15/16	1 5/64
06X06	3/8	9/16-18	9/16-18	1 1/64	1 15/64
08X08	1/2	3/4-16	3/4-16	1 15/64	1 17/16
10X08	5/8	7/8-14	7/8-14	1 1/16	1 11/16
12X12	3/4	1 1/16-12	1 1/16-12	1 41/64	1 15/16
14X14	7/8	1 13/16-12	1 13/16-12	1 23/32	1 63/64
16X16	1	1 15/16-12	1 15/16-12	1 31/64	2 1/32
20X20	1 1/4	1 5/8-12	1 5/8-12	2 3/64	2 15/64
24X24	1 1/2	1 7/8-12	1 7/8-12	2 5/16	2 3/64
32X32	2	2 1/2-12	2 1/2-12	3 3/64	2 7/8

Precision Machined 37° Flare Tube Fittings and Hose Adapters

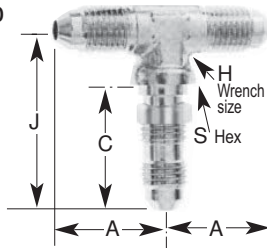
THORBURN

TEE Run: Tube to Tube Side: Tube (bulkhead) SAE 070959

BARSTOCK



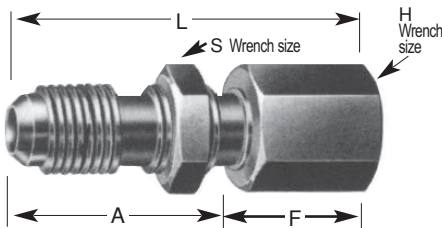
FORGED



STYLE (N) 345BHF

Size #	Tube O.D.	Straight Thread	A	C	J	H	S
04	1/4	7/16-20	61/64	1 1/8	1 37/64	5/8	1 11/16
06	3/8	9/16-18	1 5/64	1 3/16	1 51/64	7/8	1 13/16
08	1/2	3/4-16	1 11/32	1 3/8	2 3/32	7/8	1
10	5/8	7/8-14	1 35/64	1 33/64	2 3/8	7/8	1 1/8
12	3/4	1 1/16-12	1 49/64	1 11/16	2 21/32	1 1/8	1 3/8

STRAIGHT Tube to Female Pipe (3/8" bulkhead) SAE 070603



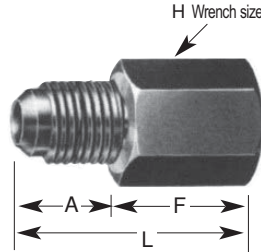
STYLE (N) 346BHF

Size #	Tube O.D.	Straight Thread	Pipe Thread	A	F	L
02x02	1/8	5/16-24	1/8	1 9/64	41/64	1 25/32
03x02	3/16	3/8-24	1/8	1 9/64	39/64	1 3/4
04x02	1/4	7/16-20	1/8	1 15/64	39/64	1 27/32
05x02	5/16	1/2-20	1/8	1 15/64	41/64	1 7/8
06x04	3/8	9/16-18	1/4	1 5/16	3/4	2 1/16
08x08	1/2	3/4-16	1/2	1 15/32	7/8	2 11/32
10x08	5/8	7/8-14	1/2	1 39/64	1 3/4	2 21/32
12x12	3/4	1 1/16-12	3/4	1 25/32	1 9/64	2 59/64
14x12	7/8	1 3/16-12	3/4	1 25/32	1 7/64	2 57/64
16x16	1	1 5/16-12	1	1 25/32	1 5/16	3 3/32

STRAIGHT Tube to Female Pipe

SAE 070703

All sizes for
STYLE 346 F
listed under
CRN:
OD 3256.5

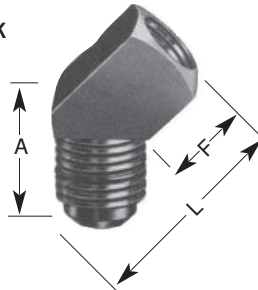


STYLE (N) 346F

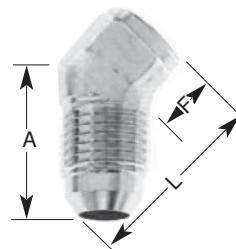
Size #	Tube O.D.	Straight Thread	Pipe Thread	A	F	L	H
02x02	1/8	5/16-24	1/8	29/64	21/64	1 7/64	9/16
03x02	3/16	3/8-24	1/8	31/64	41/64	1 1/8	9/16
04x02	1/4	7/16-20	1/8	35/64	5/8	1 11/64	9/16
04x04	1/4	7/16-20	1/4	35/64	53/64	1 3/8	3/4
05x02	5/16	1/2-20	1/8	35/64	5/8	1 11/64	9/16
05x04	5/16	1/2-20	1/4	35/64	51/64	1 11/32	3/4
06x04	3/8	9/16-18	1/4	9/16	53/64	1 25/64	3/4
06x06	3/8	9/16-18	3/8	9/16	27/32	1 13/32	7/8
08x04	1/2	3/4-16	1/4	21/32	53/64	1 31/64	3/4
08x06	1/2	3/4-16	3/8	21/32	57/64	1 35/64	7/8
08x08	1/2	3/4-16	1/2	21/32	1 3/32	1 3/4	1 1/8
10x08	5/8	7/8-14	1/2	49/64	1 7/64	1 7/8	1 1/8
10x06	5/8	7/8-14	3/8	49/64	57/64	1 21/32	7/8
12x12	3/4	1 1/16-12	3/4	55/64	1 1/16	2 3/64	1 3/8
12x08	3/4	1 1/16-12	1/2	55/64	1 3/32	1 61/64	1 7/8
14x12	7/8	1 3/16-12	3/4	57/64	1 5/32	2 3/64	1 3/8
16x12	1	1 5/16-12	1	29/32	1 7/16	2 11/32	1 5/8
16x16	1	1 5/16-12	1	29/32	1 7/8	2 11/32	1 5/8
20x20	1 1/4	1 5/8-12	1 1/4	61/64	1 17/32	2 31/64	2
24x24	1 1/2	1 7/8-12	1 1/2	1 5/64	1 17/32	2 39/64	2 3/8
32x32	1	2 1/2-12	2	1 21/64	1 5/8	2 61/64	2 7/8

45° ELBOW Tube to Female Pipe

BARSTOCK



FORGED



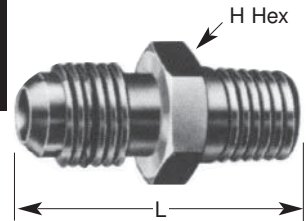
STYLE (N) 347F

Size#	Tube O.D.	Straight Thread	Fem.Pipe Thread	A	F	L
06x04	3/8	9/16-18	1/4	4/16	53/64	1 25/32
08x06	1/2	3/4-16	3/8	21/32	57/64	1 25/32
10x08	5/8	7/8-14	1/2	49/64	1 7/64	2 1/8
12x12	3/4	1 1/16-12	3/4	55/64	1 3/16	2 5/16

MALE CONNECTOR Tube to Male P.T.

SAE 070102

All sizes for
STYLE 348 F
listed under
CRN:
OD 3256.5



STYLE (N) 348F

Size #	Tube O.D.	Straight O.D.	Pipe Thread	L	H
02x02	1/8	5/16-24	1/8	1 3/32	7/16
03x02	3/16	3/8-24	1/8	1 1/8	7/16
04x02	1/4	7/16-20	1/8	1 13/32	9/16
04x04	1/4	7/16-20	1/4	1 13/32	9/16
04x06	1/4	7/16-20	3/8	1 13/32	9/16
05x02	5/16	1/2-20	1/8	1 13/32	9/16
05x04	5/16	1/2-20	1/4	1 27/64	5/8
06x06	3/8	9/16-18	3/8	1 27/64	5/8
06x02	3/8	9/16-18	1/8	1 1/4	5/8
06x04	3/8	9/16-18	1/4	1 27/64	5/8
06x06	3/8	9/16-18	3/8	1 27/64	3/4
06x08	3/8	9/16-18	1/2	1 43/64	7/8
08x04	1/2	3/4-16	1/4	1 33/64	13/16
08x06	1/2	3/4-16	3/8	1 33/64	13/16
08x08	1/2	3/4-16	1/2	1 49/64	7/8
08x12	1/2	3/4-16	3/4	1 27/32	1 1/8
10x06	5/8	7/8-14	3/8	1 41/64	15/16
10x08	5/8	7/8-14	1/2	1 7/8	15/16
10x12	5/8	7/8-14	3/4	1 61/64	1 1/8
12x08	3/4	1 1/16-12	1/2	2 3/64	1 1/8
12x12	3/4	1 1/16-12	3/4	2 3/64	1 1/8
12x16	3/4	1 1/16-12	1	2 15/64	1 1/8
14x12	7/8	1 3/16-12	3/4	2 5/64	1 1/4
16x12	1	1 5/16-12	3/4	2 5/64	1 3/8
16x16	1	1 5/16-12	1	2 9/32	1 3/8
16x20	1	1 5/16-12	1 1/4	2 25/64	1 11/16
20x16	1 1/4	1 5/8-12	1	2 13/32	1 11/16
20x20	1 1/4	1 5/8-12	1 1/4	2 7/16	1 11/16
24x24	1 1/2	1 7/8-12	1 1/2	2 43/64	2
32x32	2	2 1/2-12	2	3 3/32	2 5/8

TO ORDER, SEE PAGE 13

All items on this page listed under
CRN: OH 0527.5.6.7

Use prefix **N** for ASME Code
grade adapters only.

NOTE: All dimensions are in inches. Dimensions
for reference only, subject to change.

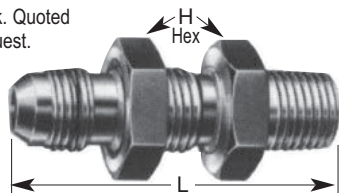
Carbon steel fittings are made from barstock.
Stainless steel fitting shapes are made from
forgings, straights are made from barstock.

Precision Machined 37° Flare Tube Fittings and Hose Adapters

THORBURN

STRAIGHT Tube to Male Pipe (3/8" bulkhead)

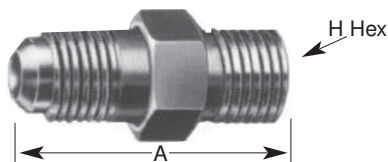
Non-stock. Quoted upon request.



STYLE (N) 348BHF

Size #	Tube O.D.	Straight O.D.	Pipe Thread	L	H
02x02	1/8	5/16-24	1/8	1 49/64	9/16
03x02	3/16	3/8-24	1/8	1 48/64	5/8
04x02	1/4	7/16-20	1/8	1 51/64	11/16
05x02	5/16	1/2-20	1/8	1 51/64	3/4
06x04	3/8	9/16-18	1/4	2 1/32	13/16
08x06	1/2	3/4-16	3/8	2 23/64	1
10x08	5/8	7/8-14	1/2	2 45/64	1 1/8
12x12	3/4	1 1/16-12	3/4	2 58/64	1 3/8
14x12	7/8	1 3/16-12	3/4	2 58/64	1 1/2
16x16	1	1 5/16-12	1	3 1/8	1 5/8
20x20	1 1/4	1 5/8-12	1 1/4	3 31/64	1 7/8
24x24	1 1/2	1 7/8-12	1 1/2	3 31/64	2 1/8
32x32	2	2 1/2-12	2	3 35/64	2 3/4

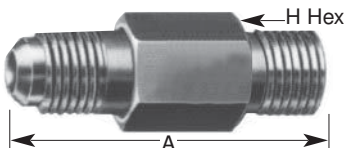
STRAIGHT ADAPTER Male (Long) 37° to NPTF



STYLE (N) 348LF

Size #	Tube O.D.	Straight Thread	Male Pipe Thread	A
04x02	1/4	7/16-20	1/8	1 13/16
05x02	5/16	1/2-20	1/8	1 15/16
06x04	3/8	9/16-18	1/4	2
08x06	1/2	3/4-16	3/8	2 1/2
10x08	5/8	7/8-14	1/2	3 3/8
12x12	3/4	1 1/16-12	3/4	3 1/2
16x16	1	1 5/16-12	1	4
20x20	1 1/4	1 5/8-12	1 1/4	4 1/2

STRAIGHT ADAPTER Male (Extra Long) 37° to NPTF



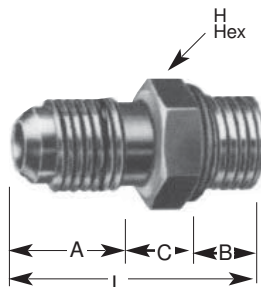
STYLE (N) 348LLF

Size #	Tube O.D.	Straight Thread	Male Pipe Thread	A
04x02	1/4	7/16-20	1/8	2 9/16
06x04	3/8	9/16-18	3/8	3 1/4
08x06	1/2	3/4-16	3/8	4
10x08	5/8	7/8-14	1/2	4
12x12	3/4	1 1/16-12	3/4	5
16x16	1	1 5/16-12	1	5 1/4

MALE "O" RING CONNECTOR Male Straight

SAE 070120S

Except for 6x5, 6x10, 12x10, all sizes for STYLE 348 FO are listed under CRN: OD 3256.5

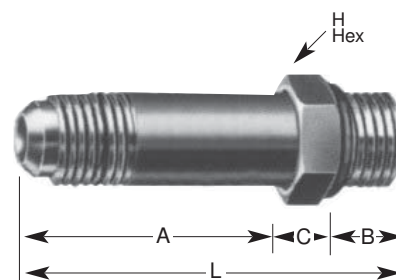


STYLE (N) 348FO

Size#	Tube O.D.	Straight Thread Tube End	Male Straight Thread	A	C	B	H	L
02X02	1/8	5/16-24	5/16-20	29/64	5/16	19/64	7/16	1 1/16
03X03	3/16	3/8-24	3/8-24	31/64	5/16	19/64	1/2	1 3/32
04X04	1/4	7/16-20	7/16-20	35/64	5/16	23/64	9/16	1 1/32
04X05	1/4	7/16-20	1/2-20	35/64	5/16	23/64	5/8	1 1/32
04X06	1/4	7/16-20	9/16-18	35/64	21/64	25/64	11/16	1 1/64
05X05	5/16	1/2-20	1/2-20	35/64	5/16	23/64	5/8	1 1/32
05X06	5/16	1/2-20	9/16-18	35/64	21/64	25/64	11/16	1 9/32
06X06	3/8	9/16-18	9/16-18	9/16	3/8	7/16	7/8	1 3/8
06X05	3/8	9/16-18	1/2-20	9/16	5/16	25/64	7/8	1 1/2
06X08	3/8	9/16-18	3/4-16	9/16	3/8	7/16	7/8	1 3/8
06X10	3/8	9/16-18	7/8-14	9/16	27/64	1/2	1	1 31/64
08X08	1/2	3/4-16	3/4-16	21/32	3/8	7/16	7/8	1 15/32
08X06	1/2	3/4-16	9/16-18	21/32	3/8	25/64	7/8	1 27/64
08X10	1/2	3/4-16	7/8-14	21/32	27/64	1/2	1	1 37/64
08X12	1/2	3/4-16	1 1/16-12	21/32	1/2	19/32	1 1/4	1 3/4
10X10	5/8	7/8-14	7/8-14	49/64	27/64	1/2	1	1 11/16
10X08	5/8	7/8-14	3/4-16	49/64	27/64	7/16	1	1 5/8
10X12	5/8	7/8-14	1 1/16-12	49/64	1/2	19/32	1 1/4	1 55/64
12X12	3/4	1 1/16-12	1 1/16-12	55/64	1/2	19/32	1 1/4	1 61/64
12X08	3/4	1 1/16-12	3/4-16	55/64	1/2	7/16	1 1/4	1 51/64
12X10	3/4	1 1/16-12	7/8-14	55/64	1/2	1/2	1 1/4	1 55/64
12X14	3/4	1 1/16-12	1 3/16-12	55/64	1/2	1/2	1 1/4	2
12X16	3/4	1 1/16-12	1 5/16-12	55/64	1/2	1/2	1 1/4	2
12X20	3/4	1 1/16-12	1 5/8-12	55/64	1/2	19/32	1 1/2	2
14X14	7/8	1 3/16-12	1 3/16-12	57/64	1/2	19/32	1 3/8	1 63/64
16X16	1	1 5/16-12	1 5/8-12	1 1/2	35/64	19/32	1 1/2	1 1/2
16X12	1	1 5/16-12	1 1/16-12	29/32	39/64	19/32	1 7/8	2 3/32
16X20	1	1 5/16-12	1 5/8-12	61/64	39/64	19/32	1 7/8	2 3/32
20X20	1 1/4	1 5/8-12	1 5/8-12	61/64	39/64	19/32	1 7/8	2 3/32
20X16	1 1/4	1 5/8-12	1 5/16-12	15/64	11/16	19/32	1 7/8	2 3/32
24X24	1 1/2	1 7/8-12	1 7/8-12	15/64	11/16	19/32	2 1/8	2 23/64
24X20	1 1/2	1 7/8-12	1 5/8-12	13/4	27/32	19/32	2 1/8	2 23/64
24X32	1 1/2	1 7/8-12	2 1/2-12	1 21/64	27/32	19/32	2 3/4	2 49/64
32X32	2	2 1/2-12	2 1/2-12				2 3/4	2 49/64

STRAIGHT (LONG) Tube to Straight Thread

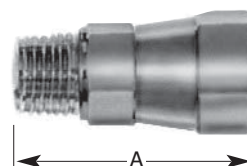
SAE 070122 L



STYLE (N) 348LFO

Size #	Tube O.D.	Tube Straight Thread	Male Straight Thread	D	A	B	C	L	H
04	1/4	7/16-20	7/16-20	1 19/32	1 25/64	23/64	5/16	2 1/16	9/16
05	5/16	1/2-20	1/2-20	1 11/16	1 29/64	23/64	5/16	2 1/8	5/8
06	3/8	9/16-18	9/16-18	1 55/64	1 9/16	25/64	11/32	2 19/64	11/16
08	1/2	3/4-16	3/4-16	2 3/16	1 7/8	7/16	3/8	2 11/16	1 1/8
10	5/8	7/8-14	7/8-14	2 5/16	2 1/32	1/2	7/16	3 1/32	1
12	3/4	1 1/16-12	1 1/16-12	2 53/64	2 1/2	19/32	1/2	3 19/32	1 1/4
14	7/8	1 3/16-12	1 3/16-12	3 5/64	2 11/16	19/32	1/2	3 25/32	1 3/8
16	1	1 5/16-12	1 5/16-12	3 3/32	2 27/32	19/32	17/32	3 31/32	1 1/2
20	1 1/4	1 5/8-12	1 5/8-12	3 99/64	3 15/32	19/32	39/64	4 43/64	1 7/8
24	1 1/2	1 7/8-12	1 7/8-12	5 1/16	3 3/8	19/32	11/16	5 5/32	2 1/8
32	2	2 1/2-12	2 1/2-12	5 59/64	4 27/32	19/32	27/32	6 9/32	2 3/4

CONNECTOR Male Pipe to Female 37° Swivel



STYLE (N) 348SF

Size #	Tube O.D.	Straight Thread	Female Pipe	A
04x02	1/4	7/16-20	1/8	1 13/16
06x04	3/8	9/16-18	1/4	1 1/4
08x06	1/2	3/4-16	3/8	1 33/64
10x08	5/8	7/8-14	1/2	1 7/8
12x12	3/4	1 1/16-12	3/4	2 3/64
16x16	1	1 5/16-12	1	2 9/32

TO ORDER, SEE PAGE 13

All items on this page listed under CRN: OH 0527.5.6.7

Use prefix N for ASME Code grade adapters only.

NOTE: All dimensions are in inches. Dimensions for reference only, subject to change. Carbon steel fittings are made from barstock. Stainless steel fitting shapes are made from forgings, straights are made from barstock.

Precision Machined 37° Flare Tube Fittings and Hose Adapters

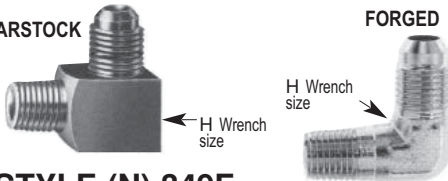
90° ELBOW Tube to Male Pipe

All sizes for STYLE 349 F
listed under CRN:OD 3256.5

SAE 070202

BARSTOCK

FORGED



STYLE (N) 349F

Size #	Tube O.D.	Straight Thread	Pipe Thread	L	H
02x02	1/8	5/16-24	1/8	49/64	29/32
03x02	3/16	3/8-24	1/8	53/64	23/32
04x02	1/4	7/16-20	1/8	57/64	23/32
04x04	1/4	7/16-20	1/4	1 3/64	1 3/32
04x06	1/4	7/16-20	3/8	1 3/64	1 7/64
04x08	1/4	7/16-20	1/2	1 3/64	1 15/32
05x02	5/16	1/2-20	1/8	61/64	2 5/32
05x04	5/16	1/2-20	1/4	1 1/16	1 3/32
05x06	5/16	1/2-20	3/8	1 1/16	1 7/64
06x04	3/8	9/16-18	1/4	1 1/16	1 3/32
06x06	3/8	9/16-18	3/8	1 5/32	1 7/64
06x08	3/8	9/16-18	1/2	1 5/16	1 15/32
08x04	1/2	3/4-16	1/4	1 1/4	1 5/32
08x06	1/2	3/4-16	3/8	1 1/4	1 7/32
08x08	1/2	3/4-16	1/2	1 11/32	1 15/32
08x12	1/2	3/4-16	3/4	1 29/64	1 19/32
10x06	5/8	7/8-14	3/8	1 1/4	1 7/32
10x08	5/8	7/8-14	1/2	1 29/64	1 15/32
10x12	5/8	7/8-14	3/4	1 29/64	1 19/32
12x08	3/4	1 1/16-12	1/2	1 21/32	1 19/32
12x12	3/4	1 1/16-12	3/4	1 21/32	1 19/32
12x16	3/4	1 1/16-12	1	1 21/32	1 31/32
14x16	7/8	1 3/16-12	1	1 23/32	1 31/32
16x12	1	1 5/16-12	3/4	1 13/16	1 25/32
16x16	1	1 5/16-12	1	1 13/16	1 31/32
20x16	1 1/4	1 5/8-12	1	2 1/16	1 11/32
20x20	1 1/4	1 5/8-12	1 1/4	2 1/16	2 3/8
24x20	1 1/2	1 7/8-12	1 1/4	2 21/64	2 3/8
24x24	1 1/2	1 7/8-12	1 1/2	2 21/64	2 5/8
32x32	2	2 1/2-12	2	3 1/16	3

90° ELBOW

(Long) Tube to Male Pipe

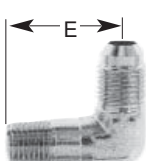
(Extra Long)

SAE 071502

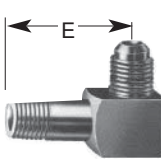
SAE 071602

FORGED

BARSTOCK



Except for 14x12, all sizes for STYLE 349 LLF listed under CRN: OD 3256.5



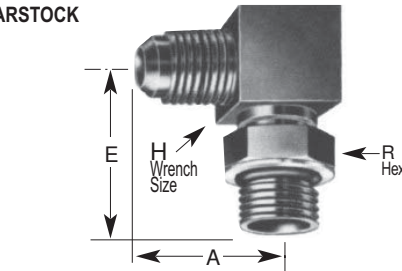
STYLE (N) 349LF STYLE (N) 349LLF

Size #	E	Size #	E
02x02	1 1/32	02x02	1 11/32
03x02	1 1/32	03x02	1 27/64
04x02	1 3/16	04x02	1 35/64
04x04	1 21/32	04x04	2 1/16
05x02	1 1/32	05x02	1 43/64
06x04	1 21/32	06x04	2 1/16
06x06		06x06	2 31/64
08x06	1 13/16	08x08	2 29/32
08x08	2 7/32	10x08	2 29/32
10x08	2 3/32	12x12	3 7/16
12x12	2 15/32	14x12	3 5/8
14x12	2 3/4	16x16	4 5/32
16x16	3 1/16	20x20	4 55/64
20x20	3 19/16	24x24	5 1/2
24x24	4 1/16	32x32	7
32x32	4 13/16		

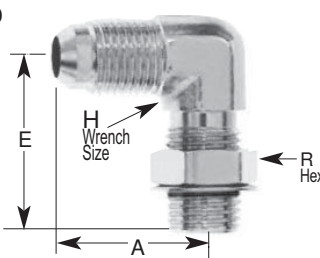
90° ELBOW Tube to Straight Thread

SAE 070220

BARSTOCK



FORGED



STYLE (N) 349FO

Size #	Tube O.D.	Tube Straight End	Male Straight End	A	E
02X02	1/8	5/16-24	5/16-24	3/4	7/8
03X03	3/16	3/8-24	3/8-24	3/4	7/8
04X04	1/4	7/16-20	7/16-20	7/8	1 1/64
04X06	1/4	7/16-20	9/16-18	7/8	1 15/64
05X05	5/16	1/2-20	1/2-20	1 5/16	1 5/64
05X06	5/16	1/2-20	9/16-18	1 3/64	1 15/64
06X06	3/8	9/16-18	9/16-18	1 3/64	1 15/64
06X05	3/8	9/16-18	1/2-20	1 3/64	1 15/64
06X08	3/8	9/16-18	3/4-16	1 3/64	1 29/64
06X10	3/8	9/16-18	7/8-14	1 1/4	1 11/16
08X08	1/2	3/4-16	3/4-16	1 15/64	1 7/16
08X06	1/2	3/4-16	9/16-18	1 15/64	1 15/64
08X10	1/2	3/4-16	7/8-14	1 21/64	1 11/16
08X12	1/2	3/4-16	1 1/16-12	1 29/64	1 15/16
10X10	5/8	7/8-14	7/8-14	1 7/16	1 11/16
10X08	5/8	7/8-14	3/4-16	1 1/4	1 29/64
10X12	5/8	7/8-14	1 1/16-12	1 29/64	1 15/16
12X12	3/4	1 1/16-12	1 1/16-12	1 41/64	1 15/16
12X08	3/4	1 1/16-12	3/4-16	1 41/64	1 7/16
12X10	3/4	1 1/16-12	7/8-14	1 21/32	1 45/64
12X16	3/4	1 1/16-12	1 5/16-12	1 13/16	1 15/16
14X14	7/8	1 3/16-12	1 3/16-12	1 23/32	1 63/64
16X16	1	1 5/16-12	1 5/16-12	1 51/64	2 1/32
16X12	1	1 5/16-12	1 1/16-12	1 51/64	2 1/32
16X20	1	1 5/16-12	1 5/8-12	1 5/64	2 7/64
20X20	1 1/4	1 5/8-12	1 5/8-12	2 3/64	2 15/64
24X24	1 1/2	1 7/8-12	1 7/8-12	2 5/16	2 3/8
32X32	2	2 1/2-12	2 1/2-12	3 3/64	2 7/8

TO ORDER, SEE PAGE 13

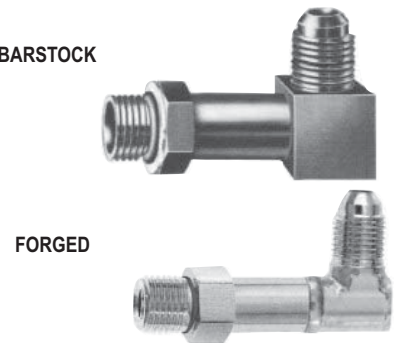
All items on this page listed under CRN: OH 0527.5.6.7

Use prefix N for ASME Code grade adapters only.

THORBURN

90° ELBOW (LONG) Tube to Straight Thread

BARSTOCK

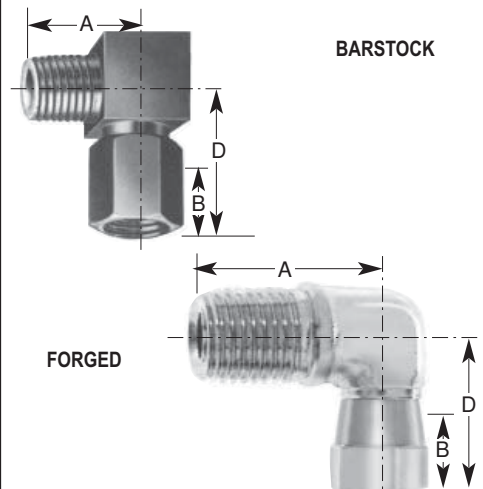


FORGED

STYLE (N) 349LFO STYLE (N) 349LLFO STYLE (N) 349LLLFO

Size #	Tube	Size #	Tube	Size #	Tube
04	1 21/32	04	2 19/64	04	2 15/16
06	2 1/32	06	2 13/16	06	2 19/32
08	2 7/16	08	3 7/16	08	4 7/16
10	2 53/64	10	3 31/32	10	5 7/64
12	3 3/32	12	4 5/8	12	5 11/32
14	3 15/32	14	4 61/64	14	6 19/64
16	3 23/32	16	5 13/32	16	7 1/32
20	4 11/32	20	6 1/16	20	8 11/32

CONNECTOR Male Pipe to 90° Female 37° Swivel



STYLE (N) 349SF

Size #	Female 37° Swivel	Female Straight Thread	Male Pipe Thread	A	B	D
04x02	1/4	7/16-20	1/8	25/32	.344	1
06x04	3/8	9/16-18	1/4	1 3/32	.375	1 1/4
08x06	1/2	3/4-16	3/8	1 7/32	.422	1 3/8
10x08	5/8	7/8-14	1/2	1 15/32	.500	1 5/8
12x12	3/4	1 1/16-12	3/4	1 19/32	.562	1 3/4
16x16	1	1 5/16-12	1	1 31/32	.594	2

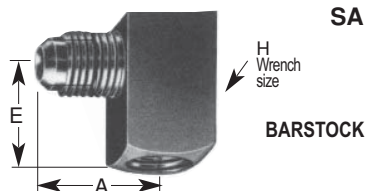
NOTE: All dimensions are in inches. Dimensions for reference only, subject to change.
Carbon steel fittings are made from barstock. **Stainless steel fitting shapes** are made from forgings, straights are made from barstock.

Precision Machined 37° Flare Tube Fittings and Hose Adapters

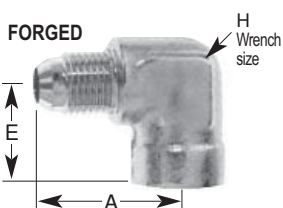
THORBURN

90° ELBOW Tube to Female Pipe

SAE 070203



FORGED



All sizes for
STYLE 350
are listed
under CRN:
OD 3256.5

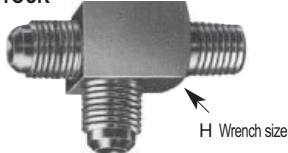
STYLE (N) 350F

Size #	Tube O.D.	Straight Thread	Pipe Thread	A	E	H
04x02	1/4	7/16-20	1/8	1 1/16	41/64	5/8
04x04	1/4	7/16-20	1/4	1 1/8	7/8	3/4
05x02	5/16	1/2-20	1/8	1 1/16	41/64	5/8
05x04	5/16	1/2-20	1/4	1 7/32	7/8	3/4
06x04	3/8	9/16-18	1/4	1 15/64	1	7/8
06x06	3/8	9/16-18	3/8	1 13/32	7/8	7/8
08x04	1/2	3/4-16	1/4	1 1/4	1	7/8
08x06	1/2	3/4-16	3/8	1 13/32	1 15/64	1 1/8
08x08	1/2	3/4-16	1/2	1 13/32	1 15/64	1 1/8
10x08	5/8	7/8-14	1/2	1 5/8	1 15/64	1 3/8
12x08	3/4	1 1/16-12	1/2	1 21/32	1 11/32	1 3/8
12x12	3/4	1 1/16-12	3/4	1 7/8	1 13/32	1 3/8
14x12	7/8	1 3/16-12	3/4	1 27/32	1 5/8	1 5/8
16x16	1	1 5/16-12	1	2 5/32	1 11/16	2 1/8
20x20	1 1/4	1 5/8-12	1 1/4	2 5/16	2 1/16	2 1/2
24x24	1 1/2	1 7/8-12	1 1/2	2 7/8	2 3/8	1 1/4
32x32	2	2 1/2-12	2	3 9/32		

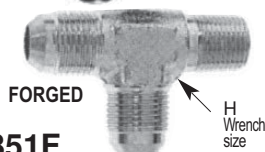
TEE Tube to Male Pipe

SAE 070424

BARSTOCK



FORGED



Except for
10x08, all
sizes for
STYLE
348 FO are
listed
under
CRN:
OD 3256.5

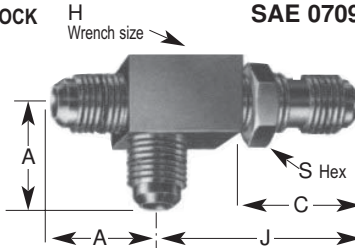
STYLE (N) 351F

Size #	Tube O.D.	Straight Thread	Male Pipe	L	H
04x02	1/4	7/16-20	1/8	57/64	25/32
04x04	1/4	7/16-20	1/4	13/64	13/32
05x02	5/16	1/2-20	1/8	61/64	25/32
06x04	3/8	9/16-18	1/4	1 1/16	13/32
06x06	3/8	9/16-18	3/8	1 5/32	17/64
08x06	1/2	3/4-16	3/8	1 1/4	17/32
10x08	5/8	7/8-14	1/2	1 28/64	1 15/32
12x12	3/4	1 1/16-12	3/4	1 21/32	1 19/32
14x12	7/8	1 3/16-12	3/4	1 23/32	1 11/16
16x16	1	1 5/16-12	1	1 13/16	1 31/32
20x20	1 1/4	1 5/8-12	1 1/4	2 1/16	2 3/8
24x24	1 1/2	1 7/8-12	1 1/2	3 1/16	3

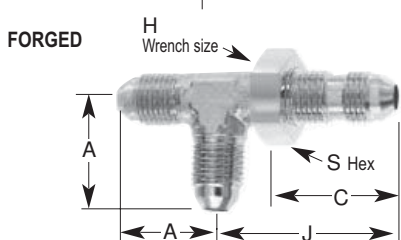
TEE

Run: Tube to Tube Side: Tube (bulkhead)

BARSTOCK H Wrench size SAE 070958



FORGED



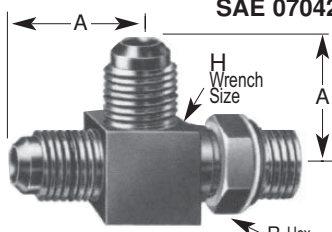
STYLE (N) 351BHF

Size #	Tube O.D.	Straight Thread	A	C	J	H	S
06	3/8	9/16-18	1 5/64	1 3/16	1 51/64	7/8	13/16
08	1/2	3/4-16	1 11/32	1 3/8	2 3/32	7/8	1
10	5/8	7/8-14	1 35/64	1 33/64	2 5/8	7/8	1 1/8
12	3/4	1 1/16-12	1 49/64	1 11/16	2 21/32	1 1/8	1 3/8

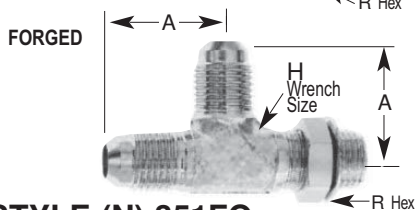
TEE

Run: Tube to Straight Thread Side: Tube

BARSTOCK H Wrench size SAE 070428



FORGED



STYLE (N) 351FO

Size #	Tube O.D.	Tube Straight Thread	Male Straight Thread	A	E
04X04	1/4	7/16-20	7/16-20	7/8	1 1/64
05X05	5/16	1/2-20	1/2-20	15/16	1 5/64
06X06	3/8	9/16-18	9/16-18	1 3/64	1 15/64
08X08	1/2	3/4-16	3/4-16	1 15/64	1 7/16
10X10	5/8	7/8-14	7/8-14	1 7/8	1 11/16
12X12	3/4	1 1/16-12	1 1/16-12	1 41/64	1 15/16
14X14	7/8	1 3/16-12	1 3/16-12	1 23/32	1 63/64
16X16	1	1 5/16-12	1 5/16-12	1 51/64	2 1/32
20X20	1 1/4	1 5/8-12	1 5/8-12	2 5/64	2 15/64
24X24	1 1/2	1 7/8-12	1 7/8-12	2 5/16	2 3/8
32X32	2	2 1/2-12	2 1/2-12	3 3/64	2 7/8

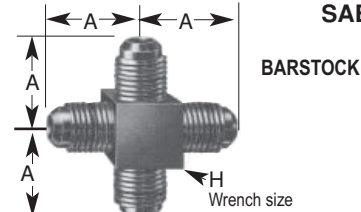
All items on this page listed
under CRN: OH 0527.5.6.7

Use prefix N for ASME Code
grade adapters only.

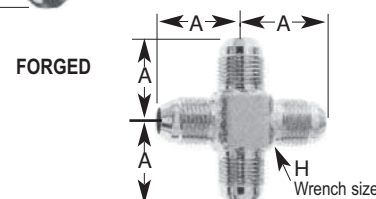
CROSS

Tube to Tube to Tube to Tube

SAE 070501



FORGED



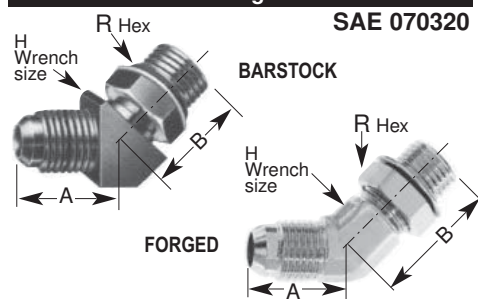
STYLE (N) 352F

Size #	Tube O.D.	Straight Thread	A	H
02	1/8	5/16-24	49/64	7/16
03	3/16	3/8-24	53/64	7/16
04	1/4	7/16-20	57/64	5/8
05	5/16	1/2-20	61/64	5/8
06	3/8	9/16-18	1 1/16	7/8
08	1/2	3/4-16	1 1/4	7/8
10	5/8	7/8-14	1 29/64	7/8
12	3/4	1 1/16-12	1 21/32	1 1/8
14	7/8	1 3/16-12	1 23/32	1 1/4
16	1	1 5/16-12	1 13/16	1 3/8
20	1 1/4	1 5/8-12	2 1/16	2 1/8
24	1 1/2	1 7/8-12	2 21/64	2 1/4
32	2	2 1/2-12	3	3 1/4

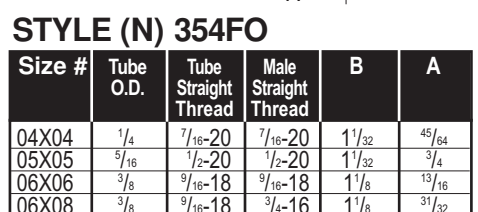
45° ELBOW

Tube to Straight Thread

SAE 070320



FORGED



STYLE (N) 354FO

Size #	Tube O.D.	Tube Straight Thread	Male Straight Thread	B	A
04X04	1/4	7/16-20	7/16-20	1 1/32	45/64
05X05	5/16	1/2-20	1/2-20	1 1/32	3/4
06X06	3/8	9/16-18	9/16-18	1 1/8	13/16
06X08	3/8	9/16-18	3/4-16	1 1/8	31/32
08X08	1/2	3/4-16	3/4-16	1 9/32	31/32
08X10	1/2	3/4-16	7/8-14	1 1/2	1 3/32
10X08	5/8	7/8-14	3/4-16	1 1/2	1 3/32
12X12	3/4	1 1/16-12	1 1/16-12	1 23/32	1 17/64
12X10	3/4	1 1/16-12	7/8-14	1 1/2	1 11/32
14X14	7/8	1 3/16-12	1 3/16-12	1 25/32	1 3/8
16X16	1	1 5/16-12	1 5/16-12	1 27/32	1 29/64
20X20	1 1/4	1 5/8-12	1 5/8-12	1 57/64	1 37/32
24X24	1 1/2	1 7/8-12	1 7/8-12	1 57/64	1 49/64

NOTE: All dimensions are in inches. Dimensions
for reference only, subject to change.

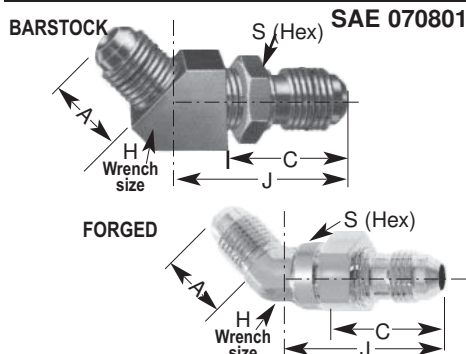
Carbon steel fittings are made from barstock.
Stainless steel fitting shapes are made from
forgings, straights are made from barstock.

TO ORDER, SEE PAGE 13

Precision Machined 37° Flare Tube Fittings and Hose Adapters

All items on this page listed under CRN: OH 0527.5.6.7

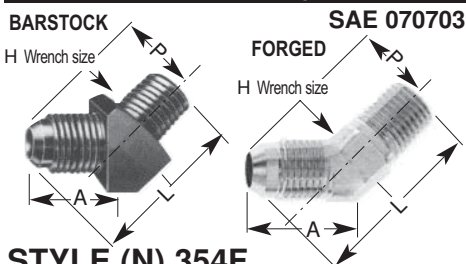
UNION LARGE HEX Tube to Tube



STYLE (N) 354BHF

Size #	Tube O.D.	Straight Thread	A	C	J	H	S
02	1/8	5/16-24	41/64	11/64	13/8	7/16	9/16
03	3/16	3/8-24	41/64	11/64	13/8	7/16	5/8
04	1/4	7/16-20	45/64	11/8	11/64	5/8	11/16
05	5/16	1/2-20	3/4	11/8	11/32	5/8	3/4
06	3/8	9/16-18	3/16	13/16	143/64	7/8	13/16
08	1/2	3/4-16	31/32	13/8	215/64	7/8	1
10	5/8	7/8-14	13/32	133/64	23/16	1	1 1/8
12	3/4	1 1/16-12	117/64	111/16	21/16	1 1/8	1 3/8
14	7/8	1 3/16-12	123/64	111/16	21/2	1 1/4	1 1/2
16	1	1 5/8-12	129/64	111/16	29/16	1 3/8	1 5/8
20	1 1/4	1 5/8-12	137/64	147/64	321/32	2 1/8	1 7/8

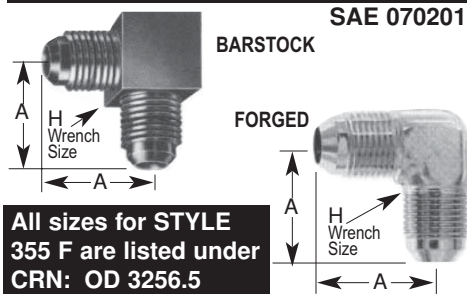
45° ELBOW Tube to Male Pipe



STYLE (N) 354F

Size #	Tube O.D.	Straight Thread	Male Pipe Thread	A	L	P
02x02	1/8	5/16-24	1/8	41/64	1	31/64
03x02	3/16	3/8-24	1/8	41/64	1	1/2
04x02	1/4	7/16-20	1/8	45/64	1 3/16	9/16
04x04	1/4	7/16-20	1/4	7/8	1 15/32	21/32
05x02	5/16	1/2-20	1/8	3/4	1 1/4	5/8
05x04	5/16	1/2-20	1/4	7/8	1 11/32	21/32
06x02	3/8	9/16-18	1/8	7/8	1 3/8	11/16
06x04	3/8	9/16-18	1/4	7/8	1 9/16	11/16
06x06	3/8	9/16-18	3/8	15/16	1 23/32	25/32
06x08	3/8	9/16-18	1/2	1 1/16	2	27/32
08x04	1/2	3/4-16	1/4	31/32	2 25/32	27/32
08x06	1/2	3/4-16	3/8	31/32	1 25/32	27/32
08x08	1/2	3/4-16	1/2	1 1/8	3	31/32
08x12	1/2	3/4-16	3/4	1 3/16	2 3/32	1
10x06	5/8	7/8-14	3/8	1 3/32	2 5/32	61/64
10x08	5/8	7/8-14	1/2	1 3/32	2 1/8	61/64
10x12	5/8	7/8-14	3/4	1 3/32	2 1/8	61/64
12x08	3/4	1 1/16-12	1/2	1 17/64	2 5/16	1 1/32
12x12	3/4	1 1/16-12	3/4	1 13/64	2 1/16	1 1/32
12x16	3/4	1 1/16-12	1	1 13/64	2 5/16	1 1/32
14x12	7/8	1 3/16-12	3/4	1 3/8	2 1/2	1 1/4
16x12	1	1 5/8-12	3/4	1 21/64	2 13/32	1 1/2
16x16	1	1 5/8-12	1	1 13/32	2 13/16	1 11/32
20x20	1 1/4	1 5/8-12	1 1/4	1 37/64	3 3/32	1 1/2
24x24	1 1/2	1 7/8-12	1 1/2	1 1/4	3 1/2	1 3/4
32x32	2	2 1/2-12	2	2 13/64	4 5/16	1 13/16

UNION ELBOW Tube to Tube

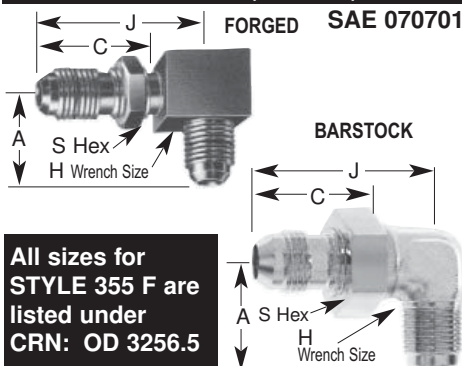


All sizes for STYLE 355 F are listed under CRN: OD 3256.5

STYLE (N) 355F

Size #	Tube O.D.	Straight Thread	A	H
02	1/8	5/16-20	49/64	7/16
03	3/16	3/8-20	53/64	7/16
04	1/4	7/16-18	57/64	1/2
05	5/16	1/2-20	61/64	1/2
06	3/8	9/16-18	1 1/16	5/8
08	1/2	3/4-16	1 1/4	7/8
10	5/8	7/8-20	1 29/64	1
12	3/4	1 1/16-12	1 21/32	1 1/8
14	7/8	1 3/16-12	1 23/32	1 1/4
16	1	1 5/16-12	1 13/16	1 3/8
20	1 1/4	1 5/8-12	2 1/16	2 1/8
24	1 1/2	1 7/8-12	2 1/4	2 1/4
32	2	2 1/2-12	3 1/16	3 1/4

90° ELBOW Tube to Tube (bulkhead)



All sizes for STYLE 355 F are listed under CRN: OD 3256.5

STYLE (N) 355BHF

Size #	Tube O.D.	Straight Thread	A	C	J	H
02	1/8	5/16-24	53/64	11/64	1 13/32	7/16
03	3/16	3/8-24	57/64	11/64	1 7/16	7/16
04	1/4	7/16-20	61/64	11/8	1 37/64	9/16
05	5/16	1/2-20	1 1/64	11/8	1 39/64	5/8
06	3/8	9/16-18	1 5/64	1 3/16	1 51/64	3/4
08	1/2	3/4-16	1 11/32	1 3/8	2 3/32	7/8
10	5/8	7/8-14	1 39/64	1 33/64	2 5/8	1
12	3/4	1 1/16-12	1 49/64	1 11/16	2 21/32	1 1/8
14	7/8	1 3/16-12	1 27/32	1 11/16	2 23/32	1 1/4
16	1	1 5/16-12	1 59/64	1 11/16	2 25/32	1 3/8
20	1 1/4	1 5/8-12	2 3/32	1 47/64	3 1/64	1 3/4

(Data other than dimension "E" are the same as in 349 FO).

*Note: Non-Stock item. Check availability.

TO ORDER, SEE PAGE 13

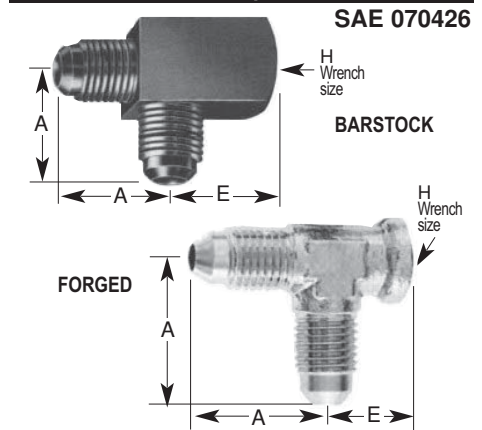
All items on this page listed under CRN: OH 0527.5.6.7

Use prefix N for ASME Code grade adapters only.

THORBURN

TEE Run: Tube to Female Pipe

Side: Tube



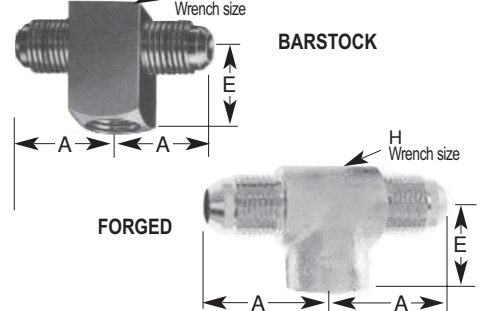
STYLE (N) 357F

Size #	Tube O.D.	Female Pipe	A	E
04x02	1/4	1/8	1 1/16	41/64
05x02	5/16	1/8	1 1/16	41/64
06x04	3/8	1/4	1 1/32	7/8
08x06	1/2	3/8	1 13/32	1 1/16
10x08	5/8	1/2	1 5/8	1 15/64
12x12	3/4	3/4	1 7/8	1 11/32
14x12	7/8	3/4	1 27/32	1 13/32
16x16	1	1	2 5/32	1 5/8
20x20	1 1/4	1 1/4	2 5/16	1 11/16

TEE Run: Tube to Tube

Side: Female Pipe

SAE 070427



STYLE (N) 358F

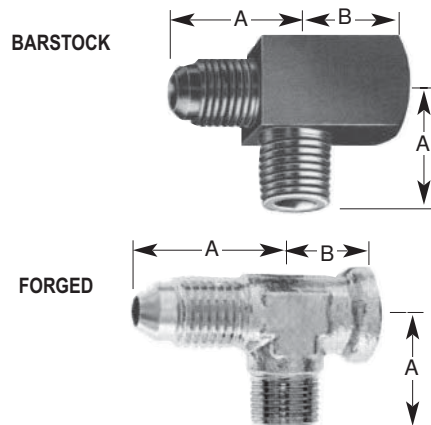
Size #	Tube O.D.	Female Pipe	A	E
04x02	1/4	1/8	1 1/16	41/64
04x04	1/4	1/4	1 1/8	7/8
05x02	5/16	1/8	1 1/16	41/64
06x04	3/8	1/4	1 7/32	7/8
06x06	3/8	3/8	1 15/64	1
08x06	1/2	3/8	1 13/32	1 1/16
08x08	1/2	1/2	1 13/32	1 15/16
10x08	5/8	1/2	1 5/8	1 15/64
12x12	3/4	3/4	1 7/8	1 11/32
14x12	7/8	3/4	1 27/32	1 13/32
16x16	1	1	2 5/32	1 5/8
20x20	1 1/4	1 1/4	2 5/16	1 11/16
24x24	1 1/2	1 1/2	2 7/8	2 1/16

NOTE: All dimensions are in inches. Dimensions for reference only, subject to change. Carbon steel fittings are made from barstock. Stainless steel fitting shapes are made from forgings, straights are made from barstock.

Precision Machined 37° Flare Tube Fittings and Hose Adapters

THORNBURN

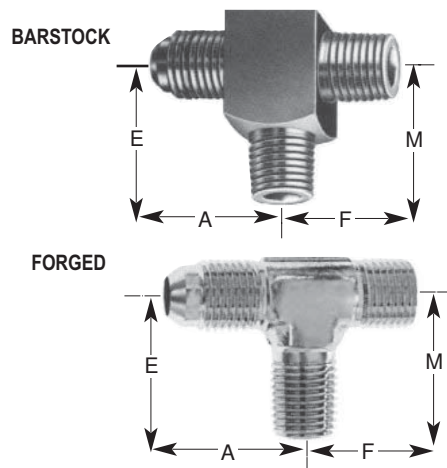
37° MALE TO NPT MALE TO NPT FEMALE RUN TEE



STYLE (N) 359F

Size #	Tube O.D.	Straight Thread	Male Pipe	Female Pipe	A	B
04x02	1/4	7/16-20	1/8	1/8	1 47/64	27/32
06x04	3/8	9/16-18	1/4	1/4	2 1/8	1 1/8
08x06	1/2	3/4-16	3/8	3/8	2 7/16	1 19/64
10x08	5/8	7/8-14	1/2	1/2	2 1/2	1 21/32
12x12	3/4	1 1/16-12	3/4	3/4	3 1/4	1 3/4

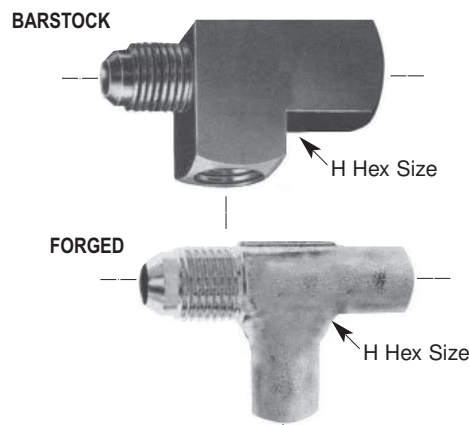
TEE Tube to Male Pipe to Male



STYLE (N) 360 F

Size #	Tube O.D.	Male Straight Thread	Male Pipe Thread	A	F	E	M
04x02	1/4	7/16-20	1/8	57/64	.780	25/32	.780
06x04	3/8	9/16-18	1/4	1 1/16	1.08	1 3/32	1.08
08x06	1/2	3/4-16	3/8	1 1/4	1.11	1 1/32	1.11
10x08	5/8	7/8-14	1/2	1 29/64	1.470	1 15/32	1.470
12x12	3/4	1 1/16-12	3/4	1 21/32	1.590	1 19/32	1.590

TEE Tube to Female Pipe to Female Pipe to Tube

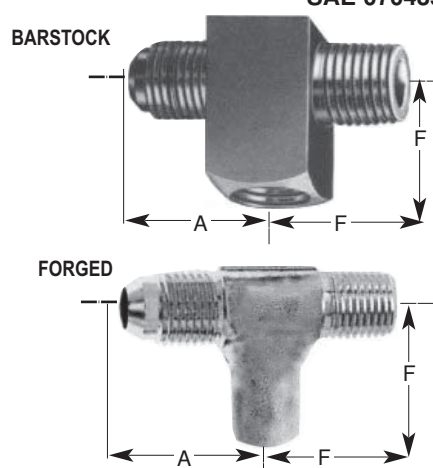


STYLE (N) 361F

Size #	Tube O.D.	Male Straight Thread	Female Pipe	H
04x02	1/4	7/16-20	1/8	.670
06x04	3/8	9/16-18	1/4	.870
08x06	1/2	3/4-16	3/8	1.020
10x08	5/8	7/8-14	1/2	1.130

TEE Tube to Male Pipe to Female Pipe

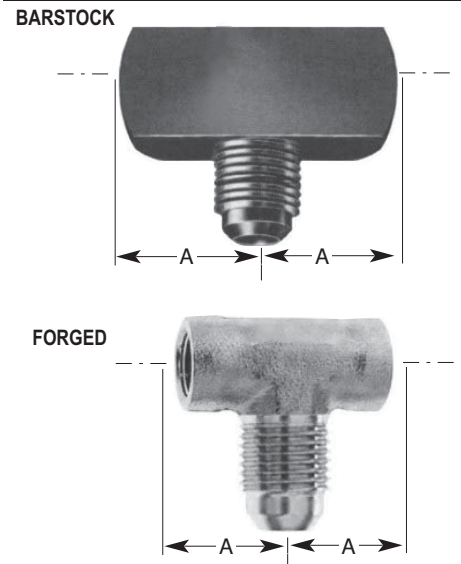
SAE 070435



STYLE (N) 362F

Size #	Tube O.D.	Male Straight Thread	Male Pipe	Female Pipe	A	F
04x02	1/4	7/16-20	1/8	1/8	41/64	.780
06x04	3/8	9/16-18	1/4	1/4	7/8	1.08
08x06	1/2	3/4-16	3/8	3/8	1 1/16	1.110
10x08	5/8	7/8-14	1/2	1/2	1 15/64	1.470
12x12	3/4	1 1/16-12	3/4	3/4	1 7/8	1.590

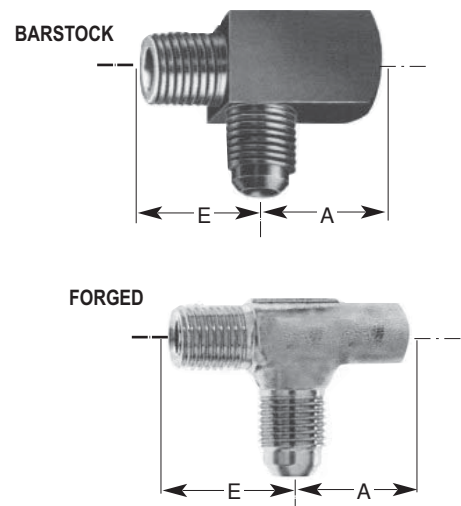
TEE Female Pipe to Female Pipe to Tube



STYLE (N) 363F

Size #	Tube O.D.	Male Straight Thread	Female Pipe	A
04x02	1/4	7/16-20	1/8	41/64
06x04	3/8	9/16-18	1/4	7/8
08x06	1/2	3/4-16	3/8	1 1/16
10x08	5/8	7/8-14	1/2	1 15/32

TEE Male Pipe to Female Pipe to Tube



STYLE (N) 364F

Size #	Tube O.D.	Male Straight Thread	Male Pipe	Female Pipe	E	A
04x02	1/4	7/16-20	1/8	1/8	25/32	41/64
06x04	3/8	9/16-18	1/4	1/4	1 3/32	7/8
08x06	1/2	3/4-16	3/8	3/8	1 1/32	1 1/16
10x08	5/8	7/8-14	1/2	1/2	1 15/32	1 15/64
12x12	3/4	1 1/16-12	3/4	3/4	1 19/32	1 7/8

TO ORDER, SEE PAGE 13

All items on this page listed under CRN: OH 0527.5.6.7

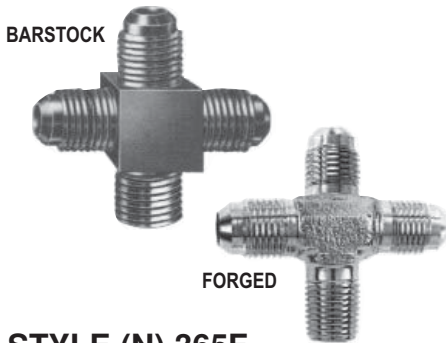
Use prefix **N** for ASME Code grade adapters only.

NOTE: All dimensions are in inches. Dimensions for reference only, subject to change.
Carbon steel fittings are made from barstock. Stainless steel fitting shapes are made from forgings, straights are made from barstock.

Precision Machined 37° Flare Tube Fittings and Hose Adapters

THORBURN

CROSS Tube to Tube to Tube to Male Pipe

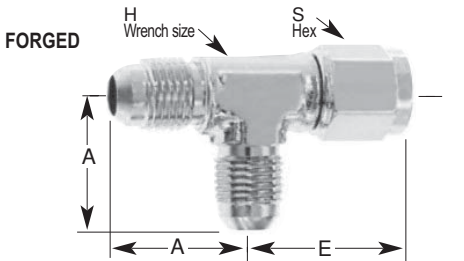
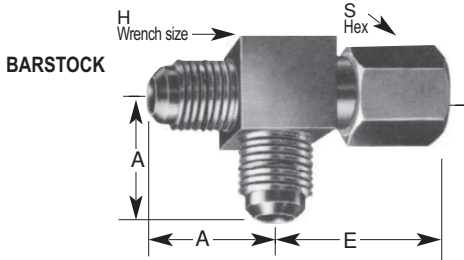


STYLE (N) 365F

Size #	Tube O.D.	Straight Thread	Male Pipe
04x02	1/4	7/16-20	1/8
06x04	3/8	9/16-18	1/4
08x06	1/2	3/4-16	3/8
10x08	5/8	7/8-14	1/2
12x12	3/4	1 1/16-20	3/4

TEE Run: Tube to Female 37° Swivel Side: Tube

SAE 070432

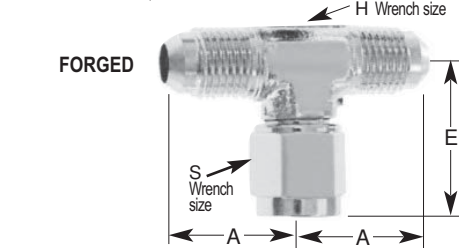
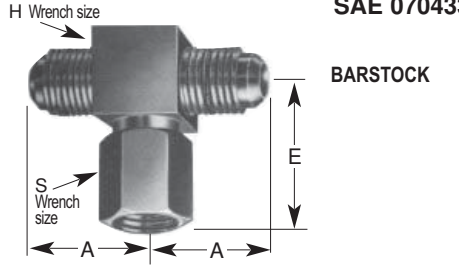


STYLE (N) 371F

Size #	Tube O.D.	Male Straight Thread	37° Swivel Female	Female Straight Thread	E	A
04	1/4	7/16-20	1/4	7/16-20	1 1/32	57/64
06	3/8	9/16-18	3/8	9/16-18	1 1/16	1 9/32
08	1/2	3/4-16	1/2	3/4-16	1 15/32	1 1/4
10	5/8	7/8-14	5/8	7/8-14	1 21/32	1 29/64
12	3/4	1 1/16-12	3/4	1 1/16-12	1 53/64	1 21/32
16	1	1 5/16-12	1	1 5/16-12	2 5/64	1 13/16

TEE Run: Tube to Tube Side: Female 37° Swivel

SAE 070433

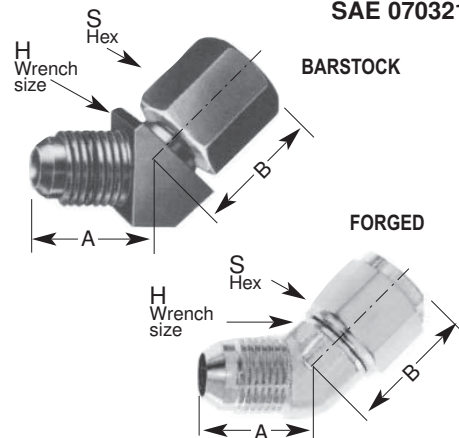


STYLE (N) 372F

Size #	Tube O.D.	Male Straight Thread	37° Swivel Female	Female Straight Thread	E	A
04	1/4	7/16-20	1/4	7/16-20	1 1/32	57/64
06	3/8	9/16-18	3/8	9/16-18	1 9/32	1 1/16
08	1/2	3/4-16	1/2	3/4-16	1 15/32	1 1/4
10	5/8	7/8-14	5/8	7/8-14	1 21/32	1 29/64
12	3/4	1 1/16-12	3/4	1 1/16-12	1 53/64	1 21/32
16	1	1 5/16-12	1	1 5/16-12	2 5/64	1 13/16

45° ELBOW Tube to 37° Female Swivel

SAE 070321

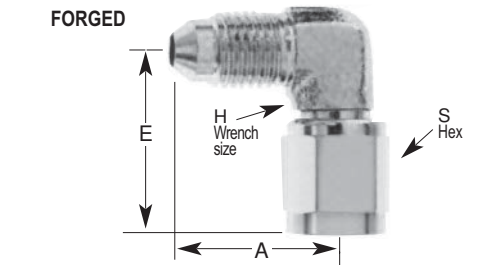
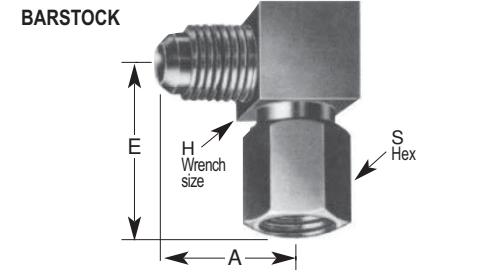


STYLE (N) 374F

Size #	Tube O.D.	37° Swivel Female	A	B
04	1/4	1/4	47/64	63/64
06	3/8	3/8	27/64	1 3/4
08	1/2	1/2	1	1 23/64
10	5/8	5/8	1 1/8	1 33/64
12	3/4	3/4	1 19/64	1 9/32
16	1	1	1 7/16	1 53/64

90° ELBOW Tube to Female 37° Swivel

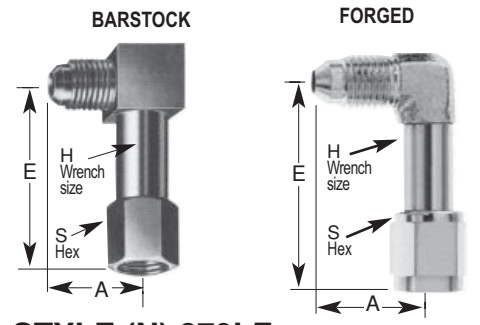
SAE 070221



STYLE (N) 379 F

Size #	Tube O.D.	Male Straight Thread	37° Swivel Thread	Female Straight Thread	E	A
04	1/4	7/16-20	1/4	7/16-20	1 1/32	57/64
06	3/8	9/16-18	3/8	9/16-18	1 9/32	1 1/16
08	1/2	3/4-16	1/2	3/4-16	1 15/32	1 1/4
10	5/8	7/8-14	5/8	7/8-14	1 21/32	1 29/64
12	3/4	1 1/16-12	3/4	1 1/16-12	1 53/64	1 21/32
16	1	1 5/16-12	1	1 5/16-12	2 5/64	1 13/16
20	1 1/4	1 5/8-12	1 1/4	1 5/8-12	2 7/16	2 1/16

90° SWIVEL ELBOW (Long) 37° Female Swivel



STYLE (N) 379LF

Size #	Tube O.D.	37° Swivel Female	E	A
04	1/4	1/4	1 57/64	55/64
06	3/8	3/8	2 3/16	1 1/32
08	1/2	1/2	2 1/16	1 1/32
10	5/8	5/8	2 37/64	1 27/64
12	3/4	3/4	3 7/64	1 9/8
16	1	1	4 21/64	1 25/32

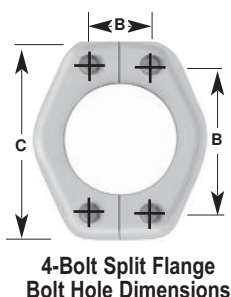
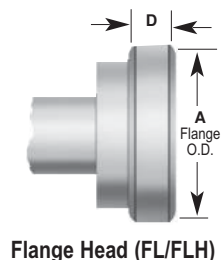
TO ORDER, SEE PAGE 13

All items on this page listed under
CRN: OH 0527.5.6.7

Use prefix **N** for ASME Code
grade adapters only.

NOTE: All dimensions are in inches.
Dimensions for reference only, subject to change.
Carbon steel fittings are made from barstock.
Stainless steel fitting shapes are made from forgings, straights are made from barstock.

SAE CODE 61 AND CODE 62 4-BOLT SPLIT FLANGE



THREAD NOMENCLATURE

Nom. Flange Size	Code 61 (FL)				Code 62 (FLH)				Caterpillar (FLC)			
	Flange OD (A)	B	C	D	Flange OD (A)	B	C	D	Flange OD (A)	B	C	D
1/2	1.188	.688	1.500	.265	1.250	.718	1.574	.305				
5/8	1.338			.265								
3/4	1.500	.875	1.875	.265	1.625	.937	2.000	.345	1.625	.938	2.000	.560
1	1.750	1.031	2.062	.315	1.875	1.093	2.250	.375	1.875	1.094	2.250	.560
1 1/4	2.000	1.188	2.312	.315	2.125	1.250	2.625	.405	2.125	1.250	2.625	.560
1 1/2	2.375	1.406	2.750	.315	2.500	1.437	3.125	.495	2.500	1.438	3.125	.560
2	2.812	1.688	3.062	.375	3.125	1.750	3.812	.495	3.125	1.750	3.812	.560
2 3/4	3.312	2.000	3.500	.375								
3	4.000	2.438	4.188	.375								
3 1/2	4.500	2.750	4.750	.442								
4	5.000	3.062	5.125	.442								
5	6.000	3.625	6.000	.442								

SAE Code 61 and Code 62 4-Bolt Split Flange SAE J518

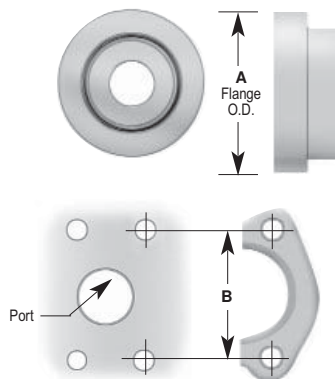
The SAE code 61 and Code 62 4-Bolt Split Flange. Code 61 is considered the "standard" series and Code 62 is the "6000 psi" series. Their basic design is the same, but for the higher pressure Code 62 connection, the bolt hole spacing and flanged head diameters are larger and the flange head thicker (D dimension in picture). These connectors are used the world over in fluid power systems, usually as a connection to pumps and motors.

Special Clarification Notes:

1. The -10 size, common outside North America, is not an SAE Standard size.
2. Caterpillar flanges are the same flange OD as SAE Code 62, but have a thicker flange head (see dimension D in table).
3. Poclain flanges are completely different from SAE flanges. (see page 49 for details)

COMMERCIAL MATERIAL SPECIFICATIONS

	Steel		Stainless Steel	
	ASTM	Type	ASTM	Type
Tubing	SAE1008/J524B		A249	316
Barstock Bodies	A108	12L14	A479	316
Cold Formed Tube Nuts	A578	C1110	A479	316
Cold Formed Tube Sleeves	SAE1020		A276	316
Barstock Tube Nuts	A108	12L14	A479	316
Barstock Tube Sleeves	A108	C1137	A276	316



The female (port) is an unthreaded hole with four bolt holes in a rectangular pattern around the port. The male consists of a flanged head with a groove for an O-ring, and either a captive flange or split flange or split flange halves with bolt holes to match the port. The seal takes place when the O-ring is compressed between the flange head and the flat surface surrounding the port. The threaded bolts hold the connection together.

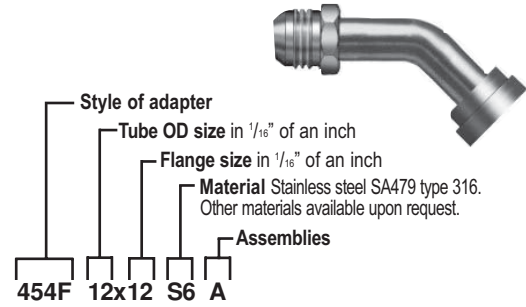
*SAE J518, JIS B 8363, ISO/DIS 6162 and DIN 20066 are interchangeable, except for bolt sizes.

CODE 61 & CODE 62 SPECIFICATIONS

Inch Size (Dash Size)	Port Hole ID Fraction (Decimal)	Bolt Dimensions (Inch)		Bolt Hole Spacing "B" Inch (Decimal)		Flanged Head Diameter "A" Inch (Decimal)	
		Code 61	Code 62	Code 61	Code 62	Code 61	Code 62
1/2 (08)	1/2 (.50)	5/16-18x1 1/4	5/16-18x1 1/4	1 1/2 (1.50)	1 19/32 (1.59)	1 3/16 (1.19)	1 1/4 (1.25)
3/4 (12)	3/4 (.75)	3/8-16x1 1/4	3/8-16x1 1/2	1 7/8 (1.88)	2 (2.00)	1 1/2 (1.50)	1 5/8 (1.63)
1 (16)	1 (1.00)	3/8-16x1 1/4	7/16-14x1 3/4	2 1/16 (2.06)	2 1/4 (2.25)	1 3/4 (1.75)	1 7/8 (1.88)
1 1/4 (20)	1 1/4 (1.25)	7/16-14x1 1/2	1/2-13x1 3/4	2 5/16 (2.31)	2 5/8 (2.63)	2 (2.00)	2 1/8 (2.13)
1 1/2 (24)	1 1/2 (1.50)	1/2-13x1 1/2	5/8-11x2 1/4	2 3/4 (2.75)	3 1/8 (3.13)	2 3/8 (2.38)	2 1/2 (2.50)
2 (32)	2 (2.00)	1/2-13x1 1/2	3/4-10x1 1/2	3 1/16 (3.06)	3 13/16 (3.81)	2 13/32 (2.81)	3 1/8 (3.13)

HOW TO ORDER THORNBURN COMMERCIAL GRADE SAE J5518 O-RING FLANGES

Example: 454F 12x12 S6 A



Style 454F 12x12 S6 A is a 3/4" 37° Male Coupling to 3/4" O-Ring Flange made of 316 type stainless steel.

HOW TO ORDER THORNBURN ASME CODE GRADE SAE J5518 O-RING FLANGES

Example: N 468F 08x08 S6 Class 3

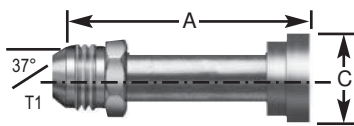


Part number	Dash sizes	Material	Code Class
N	468F	08x08	S6
Prefix N means fitting meets ASME code requirements and has a CRN (Canadian Registered Number).	Part number 468F is a 37° Male Coupling to O-Ring Flange.	Dash sizes number specifies OD tube size first and flange size last. Sizes are in 1/16". Thus, 08x08 = 1/2" x 1/2"	SA479 type 316. Other materials available upon request.

Style N 468F 08x08 S6 Class 3 is a 316 type stainless steel 1/2" 37° Male Coupling to 1/2" O-Ring Flange for ASME class 3 service.

FLANGE HEAD (CODE 61) STANDARD PRESSURE

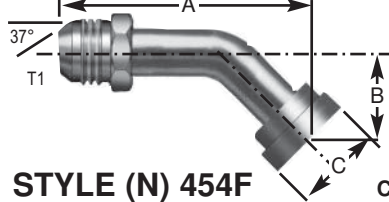
37° Male to O-Ring Flange



STYLE (N) 468F CODE 61

Size #	Thread T1	Nominal Flange Size	Max. Rec. W.P. (PSI)	A	C
08X08	3/4-16	1/2	5000	3/4	1 3/16
12X12	1 1/16-12	3/4	5000	2 19/32	1 1/2
16X16	1 5/16-12	1	5000	2 27/32	1 3/4
20X20	1 7/8-12	1 1/4	3500	3 11/32	2
24X24	1 7/8-12	1 1/2	3000	3 19/32	2 1/8
32X32	2 1/2-12	2	3000	4 1/4	2 13/16

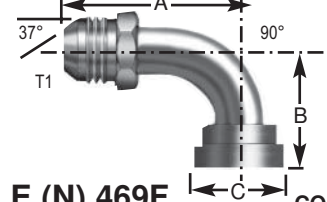
37° Male to O-Ring Flange 45°



STYLE (N) 454F CODE 61

Size #	Thread T1	Nominal Flange Size	Max. Rec. W.P. (PSI)	A	B Tube Drop	C
08X08	3/4-16	1/2	5000	3/8	2 1/32	1 3/16
12X12	1 1/16-12	3/4	5000	3 1/16	7/8	1 1/2
16X16	1 5/16-12	1	5000	3 15/32	1 3/32	1 3/4
20X20	1 7/8-12	1 1/4	3500	4 7/32	1 11/64	2
24X24	1 7/8-12	1 1/2	3000	5 1/8	1 1/16	2 1/8
32X32	2 1/2-12	2	3000	5 31/32	2 5/64	2 13/16

37° Male to O-Ring Flange 90°

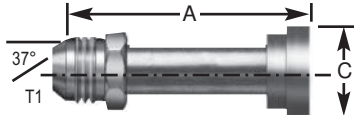


STYLE (N) 469F CODE 61

Size #	Thread T1	Nominal Flange Size	Max. Rec. W.P. (PSI)	A	B Tube Drop	C
08X08	3/4-16	1/2	5000	3	1/4	1 3/16
12X12	1 1/16-12	3/4	5000	2 7/32	3 1/32	1 1/2
16X16	1 5/16-12	1	5000	3 15/32	2 7/8	1 3/4
20X20	1 7/8-12	1 1/4	3500	4 13/32	2 13/16	2
24X24	1 7/8-12	1 1/2	3000	4 49/64	3 3/8	2 1/8
32X32	2 1/2-12	2	3000	5 11/16	4 23/32	2 13/16

FLANGE HEAD (CODE 62) HIGH PRESSURE

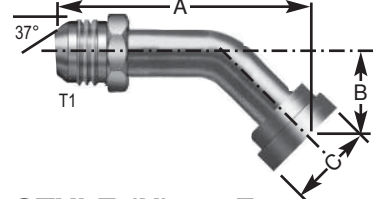
37° Male to O-Ring Flange



STYLE 568 F CODE 62

Size #	Thread T1	Nominal Flange Size	Max. Rec. W.P. (PSI)	A	C
08X08	3/4-16	1/2	6000	3/4	1 3/16
12X12	1 1/16-12	3/4	6000	2 15/16	1 5/8
12X16	1 1/16-12	1	6000	3 3/64	1 7/8
16X16	1 5/16-12	1	6000	3 7/64	1 7/8
16X20	1 5/16-12	1 1/4	6000	3 19/64	2 1/8
20X20	1 5/8-12	1 1/4	6000	3 23/32	2 1/8
20X24	1 5/8-12	1 1/2	6000	3 29/32	2 1/2
24X24	1 7/8-12	1 1/2	6000	3 63/64	2 1/2
32X32	2 1/2-12	2	6000	5 3/8	3 1/8

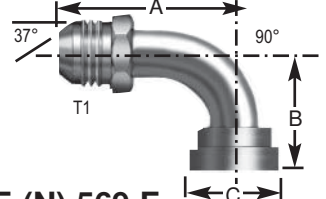
37° Male to O-Ring Flange 45°



STYLE (N) 554F CODE 62

Size #	Thread T1	Nominal Flange Size	Max. Rec. W.P. (PSI)	A	B Tube Drop	C
08X08	3/4-16	1/2	6000	3 1/2	1 3/16	1 5/8
12X12	1 1/16-12	3/4	6000	3 19/32	1 17/64	1 7/8
12X16	1 1/16-12	1	6000	3 21/32	1 17/64	1 7/8
16X16	1 5/16-12	1	6000	3 25/32	1 13/32	2 1/8
16X20	1 5/16-12	1 1/4	6000	4 7/16	1 31/64	2 1/8
20X20	1 5/8-12	1 1/4	6000	4 9/16	1 5/8	2 1/2
24X24	1 7/8-12	1 1/2	6000	5 25/64	1 23/32	2 1/2
32X32	2 1/2-12	2	6000	6 7/16	1 11/16	3 1/8

37° Male to O-Ring Flange 90°



STYLE (N) 569 F CODE 62

Size #	Thread T1	Nominal Flange Size	Max. Rec. W.P. (PSI)	A	B Tube Drop	C
08X08	3/4-16	1/2	6000	1.46	1.25	1.19
12X12	1 1/16-12	3/4	6000	3 7/16	2 33/64	1 5/8
12X16	1 1/16-12	1	6000	3 7/16	2 3/8	1 7/8
16X16	1 5/16-12	1	6000	3 15/32	2 5/8	1 7/8
16X20	1 5/16-12	1 1/4	6000	3 15/32	2 13/16	2 1/8
20X20	1 5/8-12	1 1/4	6000	4 7/16	3 1/8	2 1/8
20X24	1 5/8-12	1 1/2	6000	4 7/8	3 1/16	2 1/2
24X24	1 7/8-12	1 1/2	6000	4 31/64	3 3/4	2 1/2
32X32	2 1/2-12	2	6000	5 11/16	5 3/64	3 1/8

NOTE: All dimensions are in inches. Dimensions for reference only, subject to change.
Carbon steel fittings are made from barstock.
Stainless steel fitting shapes are made from forgings, straights are made from barstock.

All items on this page listed under CRN: OH 0527.5.6.7

Use prefix N for ASME Code grade adapters only.

TO ORDER, see above

SPLIT FLANGES, KITS & O-RINGS

Split Flanges

Thorburn has standard pressure series (code 61) and high pressure series (code 62) split flange components in kit form, that save time in selecting and ordering. Each kit consists of two flange halves, 4 grade 8 hex bolts, 4 lock washers and an O-ring. The standard kit has a Buna-N 90 durometer O-ring that is compatible with petroleum and water base hydraulic fluids. Optional kits may contain EPDM and Viton O-rings for applications where fluid compatibility or higher temperatures require other O-ring materials.

Two methods can be used to determine the flange dash size and code. The first is by measuring the flange head diameter on the fitting itself (Flange OD "A" dimension). The second is by measuring the "B" dimension on the flange or the port flange. Either will determine the dash size and the code since these dimensions are exclusive to either code 61 or code 62 split flange kits. See chart for these dimensions.

Assembly Procedure

Many leakage problems can be avoided if the split flanges are properly assembled.

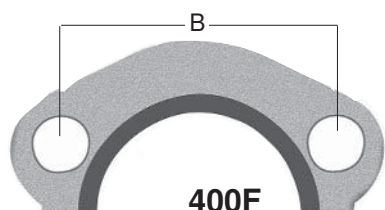
For proper assembly:

1. Clean all mating surfaces.
2. Lubricate the O-ring.
3. Partially tighten each bolt in rotation until all are fully tightened to the recommended torque value.

How to Order:

1. Determine the dash size and the code
2. Select the O-ring for fluid compatibility.
3. Order by kit number shown below.

SPLIT FLANGE HALF - SAE J518C (CODE 61)



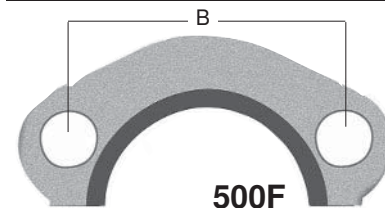
Zinc plated yellow, chromate finish, standard series -2 required.



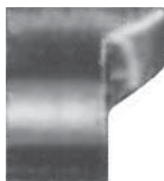
Flange Halves Number	Nominal Flange Size	Flange Head dia.	Maximum Operating Pressure	Recommended Bolt Torque (lb.-in.)
(N) 400F-61-08	1/2	1.188	5000	175-225
(N) 400F-61-12	3/4	1.500	5000	225-350
(N) 400F-61-16	1	1.750	5000	325-425
(N) 400F-61-20	1 1/4	2.000	4000	425-550
(N) 400F-61-24	1 1/2	2.375	3000	550-700
(N) 400F-61-32	2	2.812	3000	650-800
(N) 400F-61-40	2 1/2	3.312	2500	950-1100

Burst pressure four times maximum operating pressure.

SPLIT FLANGE HALF - SAE J518C (CODE 62)



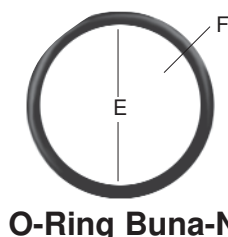
Zinc plated yellow, chromate finish, high pressure 6000 psi series -2 required.



Flange Halves Number	Nominal Flange Size	Flange Head dia.	Maximum Operating Pressure	Recommended Bolt Torque (lb.-in.)
(N) 500F-62-12	3/4	1.625	6000	300-400
(N) 500F-62-16	1	1.875	6000	500-600
(N) 500F-62-20	1 1/4	2.125	6000	750-9000
(N) 500F-62-24	1 1/2	2.500	6000	1400-1600
(N) 500F-62-32	2	3.125	6000	2400-2600

Burst pressure four times maximum operating pressure.

REPLACEMENT O-RINGS FOR SAE J518C SPLIT FLANGE FITTINGS



O-Ring Buna-N

Material Type	Material Code	Operating Temperature Range
70 durometer EPDM	H	-65°F to +300°F
90 durometer Buna-N	D	-40°F to +250°F
90 durometer Viton	I	-15°F to +400°F

O-Ring Dash Size Designation	Flange Dash Size	Nominal Flange Size	ID E	Thickness F
ORF210-(D)	08	1/2	.734	.139
ORF214-(D)	12	3/4	.984	.139
ORF219-(D)	16	1	1.296	.139
ORF222-(D)	20	1 1/4	1.484	.139
ORF225-(D)	24	1 1/2	1.859	.139
ORF228-(D)	32	2	2.234	.139

D = Buna N standard O-Ring material.

H = EPDM.

I = Viton

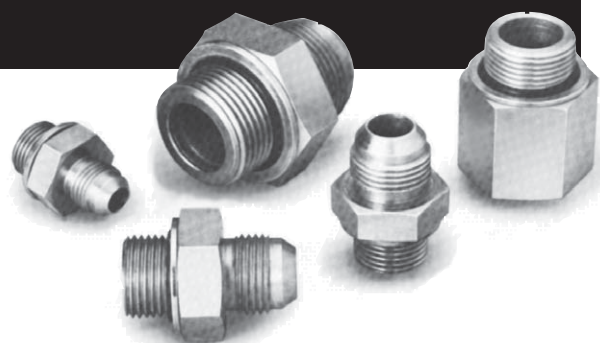
Use prefix **N** for ASME Code grade flanges only.

All items on this page listed under CRN:OH 0527.5.6.7

NOTE: All dimensions in inches. Dimensions for reference only, subject to change.

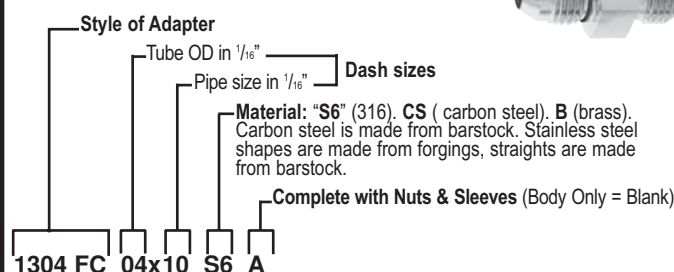
BRIDGING THE CONTINENTS

Thorburn introduces conversion adapter fittings linking North America with the European and Japanese thread configurations. There are five coupling systems generally used for hydraulic connections. They are identified geographically or by country as: **North American** (see page 4), **British**, **French**, **German**, and **Japanese**.



HOW TO ORDER THORBURN COMMERCIAL GRADE CONVERSION ADAPTERS

Example: 1304FC SS 24 04x10



1304FC S6 04x10 is a 316 stainless steel male SAE 37° to Male Light Type 24 with 1/2" tube with 5/8" male pipe threads.

HOW TO ORDER THORBURN ASME CODE GRADE CONVERSION ADAPTERS

Example: 1400FC 04x02 S6 Class 1

N	Part number	Dash sizes	Material	Code Class
N	1400FC	04x02	S6	Class 1
Prefix N means fitting meets ASME code requirements, has a CRN (Canadian Registered Number).	Part number 1400FC is a Male BSPP to Male NPT.	Dash sizes number specifies tube OD and pipe thread last. Sizes are in 1/8". Thus, 04x02 = 1/2"x1/8"	Straights made of SA479 type 316. Shapes (forged) made of SA182 type 316. Other materials available upon request.	For nuclear classes insert suffix Class 1, 2 or 3 . For class 6, leave blank.

Style N 1400FC 04x02 S6 is a 316 stainless steel male BSPP to Male Pipe with 1/4" tube with 1/8" male pipe threads for ASME class 1 service.

Foreign Thread Types

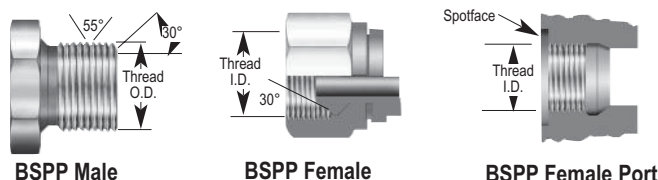
British Thread Types

Popular British couplings have British Standard Pipe (BSP) threads, also known as Whitworth threads. These can be parallel (BSPP) or tapered (BSPT), with a 30° inverted flare. Flanges are equivalent to SAE code 61 or Code 62 (except -10, a non-SAE size flange). Port connections are normally made with BSPP threads and a soft metal cutting ring for sealing.

BSPP (British Standard Pipe Parallel) The BSPP male mates with a BSPP female or a female port. The BSPP male has straight threads and a 30° chamfered seat. The BSPP female has straight threads and a 30° seat. The female port has straight threads. The seal on the port is made with an O-ring or a soft metal washer on the male. The female swivel has a tapered nose flareless swivel which seals on the cone seat of the male.

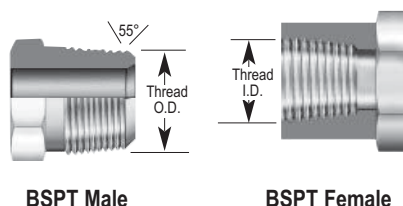
The BSPP connector is similar to, but not interchangeable with the NPSM connector. The thread pitch differs in most sizes and the thread angle is 55° instead of the 60° angle on NPSM threads (see **North American Thread Types**, page 4).

BSPP (British Standard Pipe Parallel)



BSPT (British Standard Pipe/Tapered) The BSPT male mates with a BSPT female or BSPP female. The BSPT male has tapered threads. When mating with the BSPT female or with the BSPP female port, the seal is accomplished through thread distortion. The BSPT connector is similar to, but not interchangeable with the NPTF connector. The thread pitch differs in most sizes and the thread angle is 55° instead of the 60° angle on NPTF threads (see **North American Thread Types**, page 4).

BSPT (British Standard Pipe / Tapered)



BSP THREAD NOMENCLATURE

Dash Size	Nominal Size (in.)	Thread Size	Male Parallel Thread OD (in.)	Female Parallel Thread ID (in.)
-2	1/8	1/8-28	3/8	11/32
-4	1/4	1/4-19	17/32	15/32
-6	3/8	3/8-19	21/32	19/32
-8	1/2	1/2-14	13/16	3/4
-10	5/8	5/8-14	29/32	13/16
-12	3/4	3/4-14	1 1/32	31/32
-16	1	1-11	1 11/32	1 7/32
-20	1 1/4	1 1/4-11	1 21/32	1 17/32
-24	1 1/2	1 1/2-11	1 7/8	1 25/32
-32	2	2-11	2 11/32	2 1/4

JIC to BSPP Adapters

FEMALE SAE 37° SWIVEL TO BSP FEMALE SWIVEL



(N) 1000FC

Part #	Tube (in)	T1 (in)	T2 (in)
06x06	3/8	9/16-18	3/8-19
06x08	3/8	9/16-18	1/2-14
08x06	1/2	3/4-16	3/8-19
08x08	1/2	3/4-16	1/2-14

FEMALE SAE 37° SWIVEL TO BSPP MALE



(N) 1100FC

Part #	Tube (in)	T1 (in)	T2 (in)
04x04	1/4	7/16-20	1/4-19
04x06	1/4	7/16-20	3/8-19
06x04	3/8	9/16-18	1/4-19
06x06	3/8	9/16-18	3/8-19
06x08	3/8	9/16-18	1/2-14
08x06	1/2	3/4-16	3/8-19
08x08	1/2	3/4-16	1/2-14
10x8	5/8	7/8-14	1/2-14
10x10	5/8	7/8-14	5/8-14
12x12	3/4	1 1/16-12	3/4-14
16x16	1	1 5/16-12	1-11
20x20	1 1/4	1 5/8-12	1 1/4-11
24x24	1 1/2	1 7/8-12	1 1/2-11

MALE 37° TO FEMALE BSP FLAT FACE SWIVEL



(N) 1200FC

Part #	Tube (in)	T1 (in)	T2 (in)
06x08	3/8	9/16-18	1/2-14
08x08	1/2	3/4-16	1/2-14
08x12	1/2	3/4-16	3/4-14
12x12	3/4	1 1/16-12	3/4-14

45° MALE SAE 37° TO BSP FEMALE SWIVEL



(N) 1201FC

Part #	Tube (in)	T1 (in)	T2 (in)
04x04	1/4	7/16-20	1/4-19
06x06	3/8	9/16-18	3/8-19
08x08	1/2	3/4-16	1/2-14
10x10	5/8	7/8-14	5/8-14
12x12	3/4	1 1/16-12	3/4-14
16x16	1	1 5/16-12	1-11

MALE SAE 37° TO BSP FEMALE SWIVEL



(N) 1202FC

Part #	Tube (in)	T1 (in)	T2 (in)
04x04	1/4	7/16-20	1/4-19
04x06	1/4	7/16-20	3/8-19
06x06	3/8	9/16-18	3/8-19
06x08	3/8	9/16-18	1/2-14
08x06	1/2	3/4-16	3/8-19
08x08	1/2	3/4-16	1/2-14
08x12	1/2	3/4-16	3/4-14
10x08	5/8	7/8-14	1/2-14
12x12	3/4	1 1/16-12	3/4-14
12x16	3/4	1 1/16-12	1-11
16x16	1	1 5/16-12	1-11
20x20	1 1/4	1 5/8-12	1 1/4-11

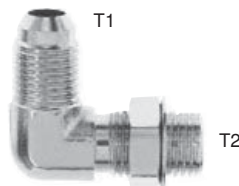
45° MALE SAE 37° TO MALE BSPP ADJUSTABLE



(N) 1203FC

Part #	Tube (in)	T1 (in)	T2 (in)
04x04	1/4	7/16-20	1/4-19
06x04	3/8	9/16-18	1/4-19
06x06	3/8	9/16-18	3/8-19
08x06	1/2	3/4-16	3/8-19
08x08	1/2	3/4-16	1/2-14
10x08	5/8	7/8-14	1/2-14
12x08	3/4	1 1/16-12	1/2-14
12x12	3/4	1 1/16-12	3/4-14
12x16	3/4	1 1/16-12	1-11
16x12	1	1 5/16-12	3/4-14
16x16	1	1 5/16-12	1-11

90° MALE SAE 37° TO MALE BSPP ADJUSTABLE



(N) 1303FC

Part #	Tube (in)	T1 (in)	T2 (in)
04x04	1/4	7/16-20	1/4-19
06x04	3/8	9/16-18	1/4-19
06x06	3/8	9/16-18	3/8-19
08x06	1/2	3/4-16	3/8-19
08x08	1/2	3/4-16	1/2-14
10x08	5/8	7/8-14	1/2-14
12x08	3/4	1 1/16-12	1/2-14
12x12	3/4	1 1/16-12	3/4-14
12x16	3/4	1 1/16-12	1-11
16x12	1	1 5/16-12	3/4-14
16x16	1	1 5/16-12	1-11

MALE SAE 37° TO MALE BSPP



(N) 1304FC

Part #	Tube	T1 (in)	T2 (in)
04x02	1/4	7/16-20	1/8-28
04x04	1/4	7/16-20	1/4-19
04x06	1/4	7/16-20	3/8-19
04x08	1/4	7/16-20	1/2-14
05x02	5/16	1/2-20	1/8-28
05x04	5/16	1/2-20	1/4-19
05x06	5/16	1/2-20	3/8-19
05x08	5/16	1/2-20	1/2-14
06x02	3/8	9/16-18	1/8-28
06x04	3/8	9/16-18	1/4-19
06x06	3/8	9/16-18	3/8-19
06x08	3/8	9/16-18	1/2-14
06x10	3/8	9/16-18	5/8-14
08x04	1/2	3/4-16	1/4-19
08x06	1/2	3/4-16	3/8-19
08x08	1/2	3/4-16	1/2-14
08x10	1/2	3/4-16	5/8-14
08x12	1/2	3/4-16	3/4-14
08x16	1/2	3/4-16	1-11
10x04	5/8	7/8-14	1/4-19
10x06	5/8	7/8-14	3/8-19
10x08	5/8	7/8-14	1/2-14
10x10	5/8	7/8-14	5/8-14
10x12	5/8	7/8-14	3/4-14
10x16	5/8	7/8-14	1-11
12x06	3/4	1 1/16-14	3/8-19
12x08	3/4	1 1/16-14	1/2-14
12x10	3/4	1 1/16-14	5/8-14
12x12	3/4	1 1/16-14	3/4-14
12x16	3/4	1 1/16-14	1-11
12x20	3/4	1 1/16-14	1 1/4-11
14x12	7/8	1 3/16-12	3/4-14
14x16	7/8	1 3/16-12	1-11
14x08	1	1 3/16-12	1/2-14
14x12	1	1 3/16-12	3/4-14
14x16	1	1 3/16-12	1-11
16x20	1	1 5/16-12	1 1/4-11
16x24	1	1 5/16-12	1 1/2-11
20x12	1 1/4	1 5/8-12	3/4-14
20x16	1 1/4	1 5/8-12	1-11
20x20	1 1/4	1 5/8-12	1 1/4-11
20x24	1 1/4	1 5/8-12	1 1/2-11
24x16	1 1/2	1 7/8-12	1-11
24x20	1 1/2	1 7/8-12	1 1/4-11
24x24	1 1/2	1 7/8-12	1 1/2-11
32x32	2	2 1/2-12	2-11

TO ORDER, see page 28

NOTE: All dimensions are in inches. Dimensions for reference only, subject to change.
Carbon steel fittings are made from barstock.
Stainless steel fittings shapes are made from forgings, straights are made from barstock.

All items on this page listed under CRN: OH 0527.5.6.7

Use prefix N for ASME Code grade adapters only.

BSPP to Pipe Adapters

MALE BSPP TO MALE NPT



(N) 1400FC

Part #	T1 (in)	T2 (in)
02x02	1/8-28	1/8-27
02x04	1/8-28	1/4-18
04x02	1/4-19	1/8-27
04x04	1/4-19	1/4-18
04x06	1/4-19	3/8-18
04x08	1/4-19	1/2-14
06x02	3/8-19	1/8-27
06x04	3/8-19	1/4-18
06x06	3/8-19	3/8-18
06x08	3/8-19	1/2-14
06x12	3/8-19	3/4-14
06x16	3/8-19	1-11 1/2
08x04	1/2-14	1/4-18
08x06	1/2-14	3/8-18
08x08	1/2-14	1/2-14
08x12	1/2-14	3/4-14
08x16	1/2-14	1-11 1/2
10x08	5/8-14	1/2-14
10x12	5/8-14	3/4-14
12x04	3/4-14	1/4-18
12x06	3/4-14	3/8-18
12x08	3/4-14	1/2-14
12x12	3/4-14	3/4-14
12x16	3/4-14	1-11 1/2
16x08	1-11	1/2-14
16x12	1-11	3/4-14
16x16	1-11	1-11 1/2
16x20	1-11	1 1/4-11 1/2
20x16	1 1/4-11	1-11 1/2
20x20	1 1/4-11	1 1/4-11 1/2
20x24	1 1/4-11	1 1/2-11 1/2
24x16	1 1/2-11	1-11 1/2
24x20	1 1/2-11	1 1/4-11 1/2
24x24	1 1/2-11	1 1/2-11 1/2
24x32	1 1/2-11	2-11 1/2
32x20	2-11	1 1/4-11 1/2
32x24	2-11	1 1/2-11 1/2
32x32	2-11	2-11 1/2

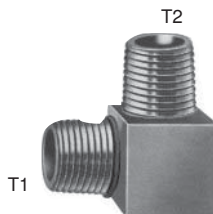
MALE BSPP TO FEMALE NPT



(N) 1401FC

Part #	T1 (in)	T2 (in)
02x02	1/8-28	1/8-27
04x04	1/4-19	1/4-18
04x06	1/4-19	3/8-18
06x04	3/8-19	1/4-18
06x06	3/8-19	3/8-18
08x06	1/2-14	3/8-18
08x08	1/2-14	1/2-14
12x12	3/4-14	3/4-14
16x16	1-11	1-11 1/2
20x20	1 1/4-11	1 1/4-11 1/2
24x24	1 1/2-11	1 1/2-11 1/2

90° MALE BSPP TO MALE NPT



(N) 1402FC

Part #	T1 (in)	T2 (in)
04x04	1/4-19	1/4-18
06x06	3/8-19	3/8-18
08x08	1/2-14	1/2-14
12x12	3/4-14	3/4-14

BSPP FEMALE SWIVEL TO MALE NPT



(N) 1500FC

Part #	T1 (in)	T2 (in)
02x02	1/8-28	1/8-27
04x04	1/4-19	1/4-18
04x06	1/4-19	3/8-18
06x06	3/8-19	3/8-18
08x06	1/2-14	3/8-18
08x08	1/2-14	1/2-14
08x12	1/2-14	3/4-14
12x12	3/4-14	3/4-14
12x16	3/4-14	1-11 1/2
16x16	1-11	1-11 1/2

TO ORDER, see page 28

NOTE: All dimensions are in inches. Dimensions for reference only, subject to change.
Carbon steel fittings are made from barstock.
Stainless steel fittings shapes are made from forgings, straights are made from barstock.

All items on this page listed under CRN: OH 0527.5.6.7

Use prefix N for ASME Code grade adapters only.

German Metric Thread Types

German Thread Types

DIN = Deutsch Industriale Norme

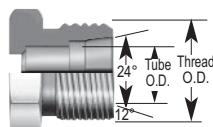
This thread standard is divided into two sections: sheet 1 covers metric threads and sheet 2, Whitworth (BSPP) threads. Both thread styles are available in parallel or tapered configurations. A coupling referred to as metric is usually a DIN coupling. Flanges are standard Code 61 or Code 62, except -10 (-10 is 2 non-SAE size flange).

DIN 24° Cone The DIN 24° cone male mates with any of these three females: female 24° cone with O-ring, female metric tube, or female universal 24° or 60° cone. The male has a 24° seat, straight metric threads, and a recessed counterbore that matches the tube OD of the coupling used with it.

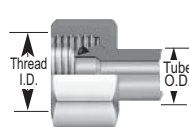
There is a light and heavy series DIN coupling. Proper identification is made by measuring both the thread size and the tube OD. The heavy series has a smaller tube ID and thicker wall section than the light series.

When measuring the flare angle with a seat angle gauge, use a 12° gauge. (The seat angle gauge measures the angle from the connector centerline).

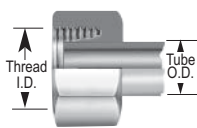
DIN 24° Male and Mating Females



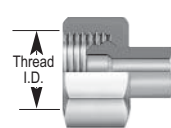
Male 24° Cone,
DIN 2353



Female 24° Cone
with O-Ring



Female Metric Tube



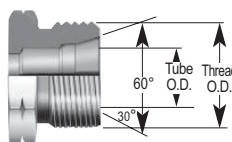
Female Universal
24° or 60° Cone

THREAD NOMENCLATURE

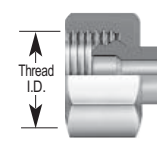
Tube OD Light Series (mm)	Heavy Series (mm)	Tube OD Metric Thread Size	Male Thread OD (mm)	Female Thread ID (mm)
6	-	M12x1.5	12.0	10.5
8	6	M14x1.5	14.0	12.5
10	8	M16x1.5	16.0	14.5
12	10	M18x1.5	18.0	16.5
14	12	M20x1.5	20.0	18.5
15	14	M22x1.5	22.0	20.5
-	16	M24x1.5	24.0	22.5
18	-	M26x1.5	26.0	24.5
22	20	M30x2.0	30.0	28.0
28	25	M36x2.0	36.0	34.0
-	30	M42x2.0	42.0	40.0
35	-	M45x2.0	45.0	43.0
42	38	M52x2.0	52.0	50.0

DIN 60° Cone This connection is often used in hydraulic systems. The DIN 60° cone male mates with any of the female: female universal 24° or 60° cone connector only. The male has a 60° seat and straight metric threads. The female has a 24° and 60° universal seat and straight metric threads. The seal takes place by contact between the cone of the male and the nose of the female. The threads hold the connection mechanically. When measuring the flare angle with a seat angle gauge, use a 30° gauge. (The seat angle gauge measures the angle from the connector centerline).

DIN 60° Male and Mating Female



Male 60° Cone,
DIN 7611

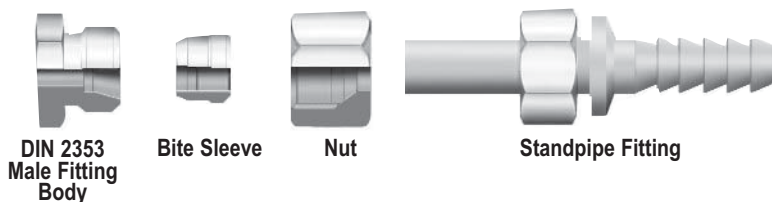


Female Universal
24° or 60° Cone

THREAD NOMENCLATURE

Tube OD (mm)	Metric Thread Size	Male Thread OD (mm)	Female Thread ID (mm)
6	M12x1.5	12.0	10.5
8	M14x1.5	14.0	12.5
10	M16x1.5	16.0	14.5
12	M18x1.5	18.0	16.5
15	M22x1.5	22.0	20.5
18	M26x1.5	26.0	24.5
22	M30x1.5	30.0	28.5
28	M38x1.5	38.0	36.5
35	M45x1.5	45.0	43.5
42	M52x1.5	52.0	50.5

Metric Standpipe Assembly



Metric Standpipe Assembly A metric standpipe assembly consists of three components attached to a male fitting: a standpipe, a bite sleeve and a metric nut. The nut is placed over the standpipe, then the bite sleeve. For DIN light assemblies, a DIN light metric nut is used. For DIN heavy assemblies, a DIN heavy metric nut is used. The bite sleeve and standpipe are selected by required tube OD.

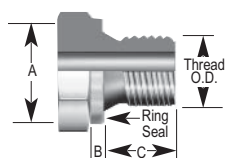
THREAD NOMENCLATURE

Metric Standpipe DIN Tube OD (mm)	Bite Sleeve DIN Tube OD (mm)	Metric Nut Thread	
		Light	Heavy
6	6	M12x1.5	—
8	8	M14x1.5	M16x1.5
10	10	M16x1.5	M18x1.5
12	12	M18x1.5	M20x1.5
15	15	M22x1.5	—
16	16	—	M24x1.5
18	18	M26x1.5	—
20	20	—	M36x2.0
22	22	M30x2.0	—
25	25	—	M42x2.0
28	28	M36x2.0	—
30	30	—	M45x2.0
35	35	M45x2.0	—
38	38	—	M52x2.0
42	42	M52x2.0	—

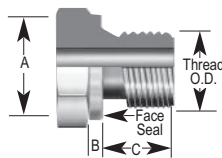
Conversion Adapters - German Metric Thread Types

THORBURN

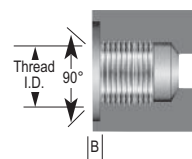
DIN 3852 Couplings Type A & B (Parallel Threads)



Male
Type A, DIN 3852, Sheets 1 & 2



Male
Type B, DIN 3852, Sheets 1 & 2



Female
Type A & B, DIN 3852, Sheets 1 & 2

DIN 3852 Couplings Type A & B (Parallel Threads)

The male DIN 3852 Type A & B couplings mates with the female DIN 3852 type A & B (Sheet 1 & 2). The male and female type A & B couplings have straight threads. Sheet 1 refers to straight metric threads and Sheet 2 refers to straight Whitworth threads. The seal happens when the ring seal (Type A) or the face seal (Type B) mates with the face of the female port.

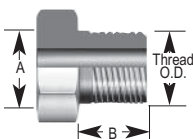
There is a light (L) and heavy (H) series of DIN 3852 Type A & B couplings.

This DIN is controlled by Germany, but other countries may use it as a reference for their connector and port designs.

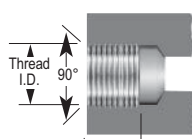
THREAD NOMENCLATURE

Series	Male Metric Thread Parallel DIN 3852 Type A & B Sheet 1						Male Whitworth Thread Parallel DIN 3852 Type A & B Sheet 2					Female Metric Thread Parallel DIN 3852 Type A & B Sheet 1				Female Whitworth Thread Parallel DIN 3852 Type A & B Sheet 2			
	Tube OD (mm)	Metric Thread size	Thread OD (mm)	A (mm)	B (mm)	C (mm)	Whitworth Thread size	Thread OD (in)	A (mm)	B (mm)	C (mm)	Metric Thread size	Thread ID (in)	A (mm)	B (mm)	Whitworth Thread size	Thread ID (in)	A (mm)	B (mm)
L Light	6	10x1	10	14	1.5	8	1/8-28	3/8	14	1.5	8	10x1	8.5	15	1.0	1/8-28	11/32	15	1.0
	8	12x1.5	12	17	2.0	12	1/4-19	17/32	17	2.0	12	12x1.5	10.5	18	1.5	1/4-19	15/32	19	1.5
	10	14x1.5	14	19	2.0	12	1/4-19	17/32	19	2.0	12	14x1.5	12.5	20	1.5	1/4-19	15/32	19	1.5
	12	16x1.5	16	21	2.5	12	3/8-19	21/32	21	2.5	12	16x1.5	14.5	22	2.0	3/8-19	19/32	23	2.0
	15	18x1.5	18	23	2.5	12	1/2-14	13/16	23	2.5	12	18x1.5	16.5	24	2.5	1/2-14	3/4	27	2.5
	18	22x1.5	22	27	3.0	14	1/2-14	13/16	27	3.0	14	22x1.5	20.5	28	2.5	1/2-14	3/4	27	2.5
	22	26x1.5	26	31	3.0	16	3/4-14	11/32	31	3.0	16	26x1.5	24.5	32	2.5	3/4-14	31/32	33	2.5
	28	33x2	33	39	3.0	18	1-11	111/32	39	3.0	18	33x2	31.0	40	2.5	1-11	11/32	40	2.5
S Heavy	35	42x2	42	49	3.0	20	1 1/4-11	121/32	49	3.0	20	42x2	40.0	50	2.5	1 1/4-11	111/32	50	2.5
	42	48x2	48	55	3.0	22	1 1/2-11	17/8	55	3.0	22	48x2	46.0	56	2.5	1 1/2-11	125/32	56	2.5
	6	12x1.5	12	17	2.0	12	1/4-19	17/32	17	2.0	12	12x1.5	10.5	18	1.5	1/4-19	15/32	19	1.5
	8	14x1.5	14	19	2.0	12	1/4-19	17/32	19	2.0	12	14x1.5	12.5	20	1.5	1/4-19	15/32	19	1.5
	10	16x1.5	16	21	2.5	12	3/8-19	21/32	21	2.5	12	16x1.5	14.5	22	1.5	3/8-19	19/32	23	2.0
	12	18x1.5	18	23	2.5	12	3/8-19	21/32	23	2.5	12	18x1.5	16.5	24	2.0	3/8-19	19/32	23	2.0
	14	20x1.5	20	25	3.0	14	1/2-14	13/16	25	3.0	14	20x1.5	18.5	26	2.0	1/2-14	3/4	27	2.5
	16	22x1.5	22	27	3.0	14	1/2-14	13/16	27	3.0	14	22x1.5	20.5	28	2.5	1/2-14	3/4	27	2.5
H	20	27x1.5	27	32	3.0	16	3/4-14	11/32	32	3.0	16	22x2	25.5	33	2.5	3/4-14	31/32	33	2.5
	25	33x2	33	39	3.0	18	1-11	111/32	39	3.0	18	33x2	31.0	40	2.5	1-11	11/32	40	2.5
	30	42x2	42	49	3.0	20	1 1/4-11	121/32	49	3.0	20	42x2	40.0	50	2.5	1 1/4-11	111/32	50	2.5
	38	48x2	48	55	3.0	22	1 1/2-11	17/8	55	3.0	22	48x2	46.0	56	2.5	1 1/2-11	125/32	56	2.5

DIN 3852 Type C Sheets 1 & 2 Metric and Whitworth Tapered Thread Connectors



Male



Female

DIN 3852 Type C Sheets 1 & 2 Metric and Whitworth Tapered Thread Connectors

The DIN 3852 Type C Couplings are available with either metric or Whitworth British threads. The male mates only with its female counterpart. The male and female couplings have tapered threads. Sheet 1 refers to tapered metric threads and Sheet 2 refers to tapered Whitworth threads. The seal occurs on the threads.

There are three series of DIN 3852 Type C couplings: extra light (LL), light (L), and heavy (S).

This DIN is controlled by Germany, but other countries may use it as a reference for their connector and port designs.

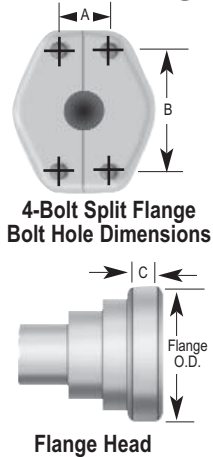
THREAD NOMENCLATURE

Series		Male DIN 3852 Type C, Sheet 1 Metric Tapered Threads				Male DIN 3852 Type C, Sheet 2 Whitworth Tapered Threads				Female DIN 3852 Type C, Sheet 1 Metric Tapered Threads			Female DIN 3852 Type C, Sheet 2 Whitworth Tapered Threads		
		Tube OD (mm)	Metric Thread size	A (mm)	B (mm)	Thread OD (mm)	Whitworth Thread (mm)	A (in)	B (mm)	Thread OD (mm)	Metric Thread size	Thread ID (mm)	A (mm)	Whitworth Thread size	Thread ID (in)
LL	4	8x1	8.40	8	8	1/8-28	.392	8	1/8	8x1	6.5	5.5	1/8-28	11/32	5.5
Extra	5	8x1	8.40	8	8	1/8-28	.392	8	1/8	8x1	6.5	5.5	1/8-28	11/32	5.5
Light	6	10x1	10.40	8	10	1/8-28	.392	8	1/8	10x1	8.5	5.5	1/8-28	11/32	5.5
	8	10x1	10.40	8	10	1/8-28	.392	8	1/8	10x1	8.5	5.5	1/8-28	11/32	5.5
L	6	10x1	10.40	8	10	1/8-28	.392	8	1/8	10x1	8.5	5.5	1/8-28	11/32	5.5
	8	12x1.5	12.53	12	12	1/4-19	.532	12	1/4	12x1.5	10.5	8.5	1/4-19	15/32	8.5
Light	10	14x1.5	14.53	12	14	1/4-19	.532	12	1/4	14x1.5	12.5	8.5	1/4-19	15/32	8.5
	12	16x1.5	16.53	12	16	3/8-19	.670	12	3/8	16x1.5	14.5	8.5	3/8-19	19/32	8.5
	15	18x1.5	18.53	12	18	1/2-14	.839	14	1/2	18x1.5	16.5	8.5	1/2-14	3/4	8.5
	18	22x1.5	22.65	14	22	1/2-14	.839	14	1/2	22x1.5	20.5	10.5	1/2-14	3/4	10.5
S	6	12x1.5	12.40	12	12	1/4-19	.532	12	1/4	12x1.5	10.5	8.5	1/4-19	15/32	8.5
	8	14x1.5	14.40	12	14	1/4-19	.532	12	1/4	14x1.5	12.5	8.5	1/4-19	15/32	8.5
Heavy	10	16x1.5	16.53	12	16	3/8-19	.670	12	3/8	16x1.5	14.5	8.5	3/8-19	19/32	8.5
	12	18x1.5	18.53	12	18	3/8-19	.670	12	3/8	18x1.5	16.5	8.5	3/8-19	19/32	8.5
	14	20x1.5	20.65	12	20	1/2-14	.839	14	1/2	20x1.5	18.5	10.5	1/2-14	3/4	10.5
	16	22x1.5	22.65	14	22	1/2-14	.839	14	1/2	22x1.5	20.5	10.5	1/2-14	3/4	10.5

Conversion Adapters - German Metric Thread Types

THORNBURN

DIN 20066 4-Bolt Flange



DIN 20066 Form R and Form S 4-Bolt Flange These connections are commonly used in fluid power systems. There are two pressure ratings: **Form R**, the identical equivalent to North America's Code 61, is the "standard duty" series; **Form S**, the identical equivalent to North America's Code 62, is the "heavy duty" series. The basic design for the two is the same, but in the case of the higher pressure Form S connection, the bolt hole spacing and flanged head diameters are larger. Both metric and inch bolts are used.

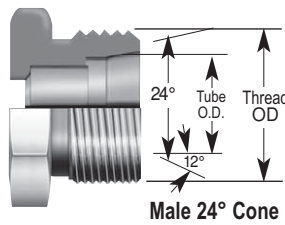
The female port is an unthreaded hole with four bolt holes in a rectangular pattern around the port. The male consists of a flanged head with a groove for an O-ring, and either captive flange or split flange halves with bolt O-ring, which is compressed between the flanged head and the flat surface surrounding the port. The threaded bolts hold the connection together.

THREAD NOMENCLATURE

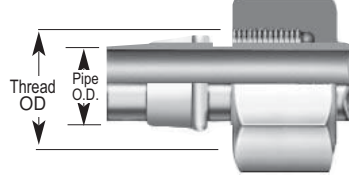
Nom. Flange Size	Form R				Form S			
	Flange OD	A	B	C	Flange OD	A	B	C
1/2	1.188	.688	1.500	.265	1.250	.718	1.574	.305
5/8	1.338			.265				
3/4	1.500	.875	1.875	.265	1.625	.937	2.000	.345
1	1.750	1.031	2.062	.315	1.875	1.093	2.250	.375
1 1/4	2.000	1.188	2.312	.315	2.125	1.250	2.625	.405
1 1/2	2.375	1.406	2.750	.315	2.500	1.437	3.125	.495
2	2.812	1.688	3.062	.375	3.125	1.750	3.812	.495
2 3/4	3.312	2.000	3.500	.375				
3	4.000	2.438	4.188	.375				
3 1/2	4.500	2.750	4.750	.442				
4	5.000	3.062	5.125	.442				
5	6.000	3.625	6.000	.442				

French Metric Thread Types

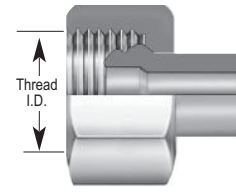
GAZ 24° Male & Mating Females



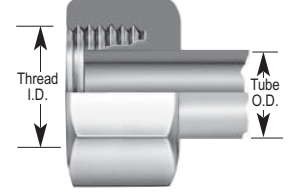
Male 24° Cone



Bite Type Ferrule



Female 24° Cone



Female Tube Fitting

French Metric (Millimetric and GAZ Series) 24° Popular couplings are French GAZ. These have a 24° seat and metric threads. These are similar to German DIN couplings, but the threads are different in some couplings. Although both are metric threads, the French use fine threads in all sizes and German DIN couplings use coarse threads in larger sizes.

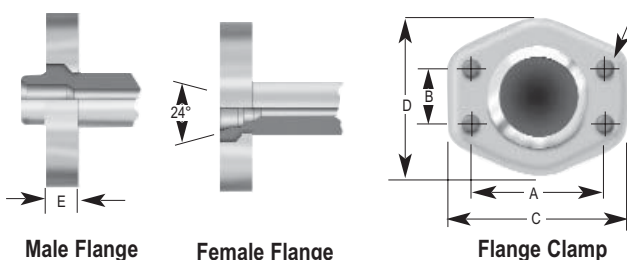
The male mates with the female 24° cone or the female tube fitting. The male has a 24° seat and straight metric threads. The female has a 24° seat or a tubing sleeve and straight metric threads. The seal occurs on the 24° taper in the male end. When measuring the flare angle with a seat metric gauge, use a 12° gauge. The seat angle gauge measures the angle from the connector centreline.

The Millimetrique Series is used with whole number metric OD tubing and the GAZ Series is used with fractional number metric OD pipe size tubing.

MILLIMETRIQUE & GAZ THREADS

Tube OD mm (inch)	GAZ Pipe OD mm (inch)	Metric Thread size	Male Thread Thread OD mm (inch)	Female Thread Thread OD mm (inch)
6 (.24)		M12x1.0	12 (.47)	11 (.43)
8 (.32)		M14x1.5	14 (.55)	12.5 (.49)
10 (.39)		M16x1.5	16 (.63)	14.5 (.57)
12 (.47)		M18x1.5	18 (.71)	16.5 (.65)
14 (.55)	13.25 (.52)	M20x1.5	20 (.78)	18.5 (.73)
15 (.59)		M22x1.5	22 (.87)	20.5 (.81)
16 (.63)	16.75 (.66)	M24x1.5	24 (.94)	22.5 (.89)
18 (.71)		M27x1.5	27 (1.06)	25.5 (1.00)
22 (.87)	21.25 (.83)	M30x1.5	30 (1.18)	28.5 (1.12)
25 (.98)		M33x1.5	33 (1.30)	31.5 (1.24)
28 (1.10)	26.75 (1.05)	M36x1.5	36 (1.41)	34.5 (1.36)
30 (1.18)		M39x1.5	39 (1.54)	37.5 (1.48)
32 (1.25)		M42x1.5	42 (1.65)	40.5 (1.60)
35 (1.38)	33.50 (1.32)	M45x1.5	45 (1.77)	43.5 (1.71)
38 (1.50)		M48x1.5	48 (1.89)	46.5 (1.83)
40 (1.57)	42.25 (1.66)	M52x1.5	52 (2.04)	50.5 (1.99)
45 (1.77)		M54x2.0	54 (2.12)	52 (2.05)
	48.25 (1.90)	M58x2.0	58 (2.28)	55 (2.16)

Poclain (French GAZ) 24° High Pressure Flange



Poclain (French GAZ) 24° Flange Most port connections are flange connections. French flanges differ from SAE in that they have a lip the protrudes from the flange face. These are called Poclain style flanges. These high-pressure flanges are usually found on Poclain equipment. The male flange mates with a female flange or port. The seal is made on the 24° seat.

THREAD NOMENCLATURE

Nominal Size (in.)	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	F (in.)
1/2	1.57	.72	2.20	1.89	.55	.35
5/8	1.57	.72	2.20	1.89	.55	.35
3/4	2	.94	2.75	2.38	.71	.43

JIC / Metric Adapters

MALE SAE 37° TO MALE LIGHT TYPE 24°



(N) 2000FC

Part #	Tube Dash Size	T1 (in)	T2 (mm)
04x10	4	7/16-20	M10x1.0
04x12	4	7/16-20	M12x1.5
04x14	4	7/16-20	M14x1.5
05x14	5	1/2-20	M14x1.5
05x16	5	1/2-20	M16x1.5
06x14	6	9/16-18	M14x1.5
06x16	6	9/16-18	M16x1.5
06x18	6	9/16-18	M18x1.5
08x18	8	3/4-16	M18x1.5
08x22	8	3/4-16	M22x1.5
10x22	10	7/8-14	M22x1.5
10x26	10	7/8-14	M26x1.5
12x26	12	1 1/16-12	M26x1.5
12x30	12	1 1/16-12	M30x2.0
16x36	16	1 5/16-12	M36x2.0

MALE SAE 37° TO MALE HEAVY TYPE 24°



(N) 2001FC

Part #	Tube Dash Size	T1 (in)	T2 (mm)
04x16	4	7/16-20	M16x1.5
04x18	4	7/16-20	M18x1.5
05x16	5	1/2-20	M16x1.5
05x18	5	1/2-20	M18x1.5
06x18	6	9/16-18	M18x1.5
06x20	6	9/16-18	M20x1.5
06x22	6	9/16-18	M22x1.5
08x22	8	3/4-16	M22x1.5
08x24	8	3/4-16	M24x1.5
10x30	10	7/8-14	M30x2.0
10x36	10	7/8-14	M36x2.0
12x30	12	1 1/16-12	M30x2.0
12x36	12	1 1/16-12	M36x2.0

MALE SAE 37° TO FEMALE LIGHT TYPE 24°



(N) 2002FC

Part #	Tube Dash Size	T1 (in)	T2 (mm)
04x12	4	7/16-20	M12x1.5
04x14	4	7/16-20	M14x1.5
05x14	5	1/2-20	M14x1.5
05x16	5	1/2-20	M16x1.5
06x14	6	9/16-18	M14x1.5
06x16	6	9/16-18	M16x1.5
06x18	6	9/16-18	M18x1.5
08x18	8	3/4-16	M18x1.5
08x22	8	3/4-16	M22x1.5
10x22	10	7/8-14	M22x1.5
10x26	10	7/8-14	M26x1.5
12x26	12	1 1/16-12	M26x1.5
12x30	12	1 1/16-12	M30x2.0
16x36	16	1 5/16-12	M36x2.0

MALE SAE 37° TO FEMALE HEAVY TYPE 24°



(N) 2003FC

Part #	Tube Dash Size	T1 (in)	T2 (mm)
04x16	4	7/16-20	M16x1.5
04x18	4	7/16-20	M18x1.5
05x16	5	1/2-20	M16x1.5
05x18	5	1/2-20	M18x1.5
06x18	6	9/16-18	M18x1.5
06x20	6	9/16-18	M20x1.5
06x22	6	9/16-18	M22x1.5
08x22	8	3/4-16	M22x1.5
08x24	8	3/4-16	M24x1.5
10x30	10	7/8-14	M30x2.0
10x36	10	7/8-14	M36x2.0
12x30	12	1 1/16-12	M30x2.0
12x36	12	1 1/16-12	M36x2.0

FEMALE SAE 37° SWIVEL TO METRIC MALE



(N) 2004FC

Part #	T1 (in)	T2 (mm)
05x12	1/2-20	M12x1.5
06x14	9/16-18	M14x1.5
06x16	9/16-18	M16x1.5
06x18	9/16-18	M18x1.5
06x20	9/16-18	M20x1.5
06x22	9/16-18	M22x1.5
08x16	3/4-16	M16x1.5
08x18	3/4-16	M18x1.5
08x20	3/4-16	M20x1.5
08x22	3/4-16	M22x1.5
10x16	7/8-14	M16x1.5
10x18	7/8-14	M18x1.5
10x20	7/8-14	M20x1.5
10x22	7/8-14	M22x1.5

BONDED SEAL FOR METRIC THREAD

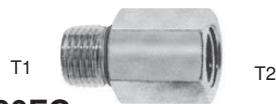


(N) 2100FC

Part #	Thread (mm)
10	M10x1.0
12	M12x1.5
14	M14x1.5
16	M16x1.5
18	M18x1.5
22	M22x1.5
26	M26x1.5
30	M30x2.0
36	M36x2.0
45	M45x2.0
52	M52x2.0

Metric to NPTF Adapters

MALE METRIC TO FEMALE NPTF



(N) 2200FC

Part #	T1 (mm)	T2 (in)
10x02	10x1.5MM	1/8-27
12x04	12x1.5MM	1/4-18
14x04	14x1.5MM	1/4-18
16x06	16x1.5MM	3/8-18
16x08	16x1.5MM	1/2-14
18x06	18x1.5MM	3/8-18
18x08	18x1.5MM	1/2-14
22x08	22x1.5MM	1/2-14
27x12	27x1.5MM	3/4-14
33x16	33x1.5MM	1-11 1/2

Metric Adapters

MALE METRIC PLUG



(N) 2300FC

Part #	Tube (mm)	T1 (mm)
14x04	8 L	14x1.5MM
16x06	10 L	16x1.5MM
18x06	10 S	18x1.5MM
22x08	15 L	22x1.5MM

TO ORDER, see page 28

NOTE: All dimensions are in inches. Dimensions for reference only, subject to change.
Carbon steel fittings are made from barstock.
Stainless steel fittings shapes are made from forgings, straights are made from barstock.

All items on this page listed under
CRN: OH 0527.5.6.7

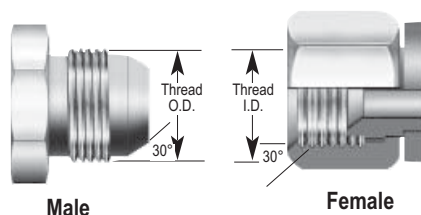
Use prefix **N** for ASME Code
grade adapters only.

Japanese Thread Types

Two popular coupling styles in Japan:

1. Komatsu equipment uses couplings with a 30° seat and metric fine threads. Flanges are standard Code 61 or Code 62, except-10 (-10 is 2 non-SAE size flange).
2. Most other Japanese equipment uses couplings with a 30° seat and BSPP (see **British**) threads, usually called JIS (Japanese Industrial Standard) couplings. They are not interchangeable with British couplings, since the flare is not inverted. Flanges as per 1.

Japanese 30° Flare Parallel Threads

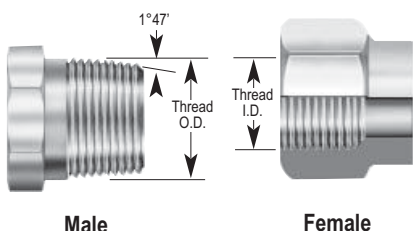


Japanese 30° Flare Parallel Threads

This connector is similar to the North American 37° JIC flare except for the 30° seat angle. The Japanese 30° flare male connector mates with Japanese 30° flare female connector only. The male and female have straight threads and a 30° seat. The seal is made on the 30° seat. The threads on the Japanese 30° flare connector conform to JIS (Japanese Industrial Standards) B 0202, which are the same as the BSPP threads. Both the Japanese and the British connectors have a 30° seat, but they are not interchangeable, because the British seat is inverted.

Dash Size	Nominal Size (in)	Thread Size	Male Thread OD (in)	Female Thread ID (in)
-2	1/8	1/8-28	3/8	11/32
-4	1/4	1/4-19	17/32	15/32
-6	3/8	3/8-19	21/32	19/32
-8	1/2	1/2-14	13/16	3/4
-10	5/8	5/8-14	29/32	13/16
-12	3/4	3/4-14	1 1/32	31/32
-16	1	1-11	1 5/16	1 7/32
-20	1 1/4	1 1/4-11	1 21/32	1 17/32
-24	1 1/2	1 1/2-11	1 7/8	1 25/32
-32	2	2-11	2 11/32	2 7/32

Japanese 30° Tapered Pipe Thread

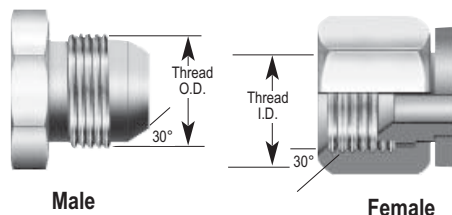


Japanese Tapered Pipe Threads

The Japanese tapered pipe thread connector is identical and fully interchangeable with the BSPT (tapered) connector. The Japanese connector does not have a 30° flare and will not mate with the BSPP female. The threads conform to JIS B 0203, which are the same as the BSPT threads. However, the male end does not have a 60° chamfer and will only seal when the threads are crushed together in an appropriate JIS or BSP port. The seal is made on the threads.

Dash Size	Nominal Size (in)	Thread Size	Male Thread OD (in)	Female Thread ID (in)
-2	1/8	1/8-28	3/8	11/32
-4	1/4	1/4-19	17/32	15/32
-6	3/8	3/8-19	21/32	19/32
-8	1/2	1/2-14	13/16	3/4
-12	3/4	3/4-14	1 1/32	31/32
-16	1	1-11	1 5/16	1 7/32
-20	1 1/4	1 1/4-11	1 21/32	1 17/32
-24	1 1/2	1 1/2-11	1 7/8	1 25/32
-32	2	2-11	2 11/32	2 7/32

Komatsu Style 30° Flare Parallel Threads

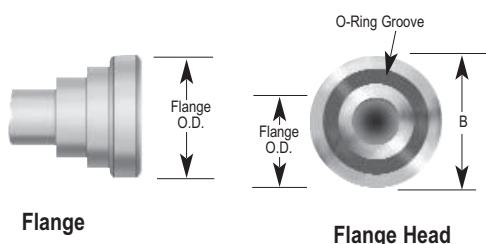


Komatsu Style 30° Flare Parallel Threads

Used extensively on Komatsu equipment, the Komatsu Style 30° flare parallel thread connector is identical to the Japanese 30° flare parallel thread connector except for the threads. The Komatsu connector uses metric fine threads that conform to JIS B 0207. The Komatsu connector seals on the 30° flare.

Dash Size	Nominal Size		Metric Thread Size	Male Thread OD (mm)	Female Thread ID (mm)
	(in)	(mm)			
-4	1/4	6.5	M14x1.5	14	12.5
-6	3/8	9.5	M18x1.5	18	16.5
-8	1/2	13	M22x1.5	22	20.5
-10	5/8	16	M24x1.5	24	22.5
-12	3/4	19	M30x1.5	30	28.5
-16	1	25	M33x1.5	33	31.5
-20	1 1/4	32	M36x1.5	36	34.5
-24	1 1/2	38	M42x1.5	42	40.5

Komatsu Flange Fitting



Komatsu Flange Fitting

The Komatsu Style flange fitting is nearly identical and fully interchangeable with the SAE Code 61 flange fitting. In all sizes the O-ring dimensions are different. When replacing a Komatsu flange with an SAE style flange, an SAE style O-ring must always be used.

Dash Size	Nominal Size		Flange OD (in)	A (in)	B (in)
	(in)	(mm)			
-8	1/2	12.7	1.188	.728	.984
-10*	5/8	15.9	1.345	.728	1.102
-12	3/4	19.1	1.500	.846	1.220
-16	1	25.4	1.750	1.122	1.496
-20	1 1/4	31.7	2.000	1.358	1.732
-24	1 1/2	38.0	2.375	1.750	2.125
-32	2	50.8	2.812	2.225	2.559

*10 is a non-SAE size range.

"Komatsu" Adapters

KOMATSU PLUG



(N) 4000FC

Part #	Thread (mm)
14	14x1.5
18	18x1.5
22	22x1.5
24	24x1.5
30	30x1.5
33	33x1.5

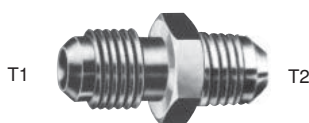
KOMATSU CAP



(N) 4001FC

Part #	Thread (mm)
14	M14x1.5
18	M18x1.5
22	M22x1.5
24	M24x1.5
30	M30x1.5
33	M33x1.5

CONNECTOR MALE SAE 37° TO MALE KOMATSU



(N) 4100FC

Part #	Tube	T1 (in)	T2 (mm)
04x14	1/4	7/16-20	M14x1.5
06x18	3/8	9/16-18	M18x1.5
08x22	1/2	3/4-16	M22x1.5
10x24	5/8	7/8-14	M24x1.5
12x30	3/4	1 1/16-12	M30x1.5

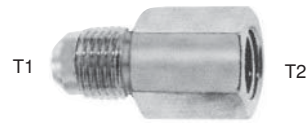
MALE KOMATSU UNION



(N) 4200FC

Part #	T1 (mm)
14	M14x1.5
18	M18x1.5
22	M22x1.5
24	M24x1.5
30	M30x1.5
36	M36x1.5

ADAPTOR MALE SAE 37° TO FEMALE KOMATSU



(N) 4300FC

Part #	Tube	T1 (in)	T2 (mm)
04x14	1/4	7/16-20	M14x1.5
06x18	3/8	9/16-18	M18x1.5
08x22	1/2	3/4-16	M22x1.5
10x24	5/8	7/8-14	M24x1.5
12x30	3/4	1 1/16-12	M30x1.5

"JIS" Adapters

JIS PLUG



(N) 4400FC

Part #	T1 (in)
02 1/8-28	
04 1/4-19	
06 3/8-19	
08 1/2-14	
12 3/4-14	

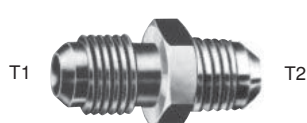
JIS CAP



(N) 4500FC

Part #	T1 (in)
02	1/8-28
04	1/4-19
06	3/8-19
08	1/2-14
12	3/4-14

CONNECTOR MALE SAE 37° TO MALE JIS



(N) 4600FC

Part #	Tube	T1 (in)	T2 (mm)
04x02	1/4	7/16-20	1/8-28
04x04	1/4	7/16-20	1/4-19
06x06	3/8	9/16-18	3/8-19
08x08	1/2	3/4-16	1/2-14

MALE JIS UNION



(N) 4700FC

Part #	T1 (in)
02x02	1/8-28
04x04	1/4-19
06x06	3/8-19
08x08	1/2-14
12x12	3/4-14

ADAPTOR MALE SAE 37° TO FEMALE JIS SWIVEL



(N) 4800FC

Part #	Tube	T1 (in)	T2 (mm)
04x02	1/4	7/16-20	1/8-28
04x04	1/4	7/16-20	1/4-19
06x06	3/8	9/16-18	3/8-19
08x08	1/2	3/4-16	1/2-14
12x12	3/4	1 1/16-12	3/4-14

TO ORDER, see page 28

NOTE: All dimensions are in inches. Dimensions for reference only, subject to change.
Carbon steel fittings are made from barstock.
Stainless steel fittings shapes are made from forgings, straights are made from barstock.

All items on this page listed under CRN: OH 0527.5.6.7

Use prefix N for ASME Code grade adapters only.

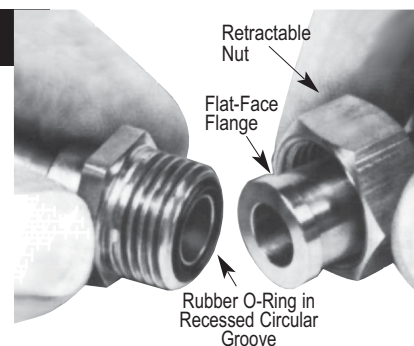
Precision Machined "O" Seal Hose Adapters and Tube Fitting Bodies

THORBURN

WHY USE THORBURN O-SEAL?

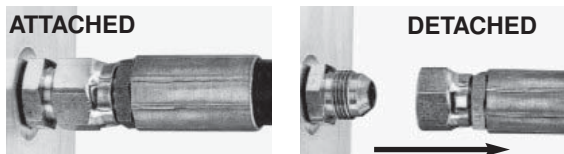
A leak dripping every ten seconds adds up to a loss of nearly 40 gallons of fluid in a year. When other factors are considered—downtime for cleaning up and repairs, product contamination, dirty machinery, possible safety and fire hazards—costs add up... and that's one very expensive drip!

- Sizes from 1/8" to 2" • Vacuum to 6000 psi • Materials: SA182/SA479 type 316 Carbon Steel A108 (zinc plated)



More leak resistant than traditional JIC 37° couplings whose metal-to-metal seals can leak when metal surfaces grind into each other, leaving distortions.

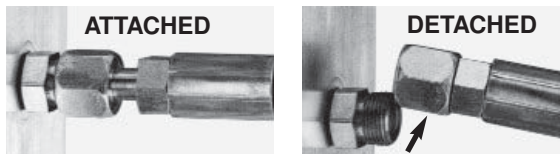
JIC 37° REMOVAL



Coupling must be pushed away from adapter, risking damage to surrounding components.

The rubber-to-metal seal Thorburn "O" Seal leaves no distortion. Retractable nut makes Thorburn "O" Seal Hose Adapters easier to install and remove than JIC 37°.

"O"SEAL ADAPTER REMOVAL



Retractable nut pushes back and coupling can be moved to one side, facilitating repeatable break and make connections.

Design Pressure at 70° F

Dash size	Inch size	Maximum Operating Pressure
04	1/4	6000
06	3/8	6000
08	1/2	6000
10	5/8	6000
12	3/4	6000
16	1	6000
20	1 1/4	4000
24	1 1/2	4000

For both carbon steel and stainless.

Eliminate expensive leaks— thanks to THORBURN "O" SEAL HOSE ADAPTERS FEATURES

EASY BREAK / REMAKE CONNECTIONS

- Flat-faced design allows easy break and remake connections without springing or cutting line. Connections can be broken and remade as often as desired.



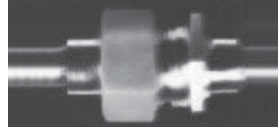
BACKUP SEAL:

- A secondary backup seal is achieved when male connector is drawn into contact with the flange. This prevents extrusion of O-ring under extreme pressures.

WON'T LOOSEN!

- Severe pulses, torques and vibration won't loosen Thorburn "O" Seal Hose Adapters. Never needs retightening.

Won't vibrate loose

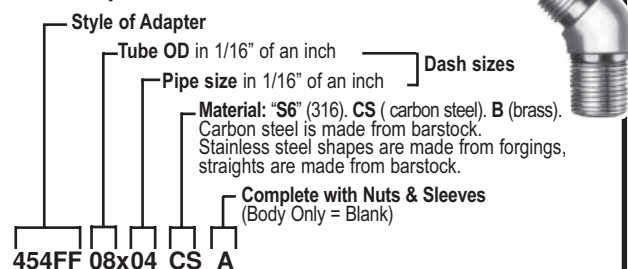


LEAKPROOF CONNECTIONS!

- Leakproof connections made by simply tightening union nuts, without twisting hose. The flat face retractable nut comes to a complete stop when flat face flange and O-ring are firmly together.

HOW TO ORDER THORBURN COMMERCIAL GRADE PRECISION MACHINED "O" SEAL ADAPTERS

Example: 454FF CS 08x04



454FF CS 08x04 is a carbon steel Flatface "O" Seal to Male NPTF 45° Elbow with 1/2" tube and 1/4" male pipe.

HOW TO ORDER THORBURN ASME CODE GRADE PRECISION MACHINED "O" SEAL ADAPTERS

Example: N 448FFO 10x08 S6 Class 2

Part number	Dash sizes	Material	Code Class
N 448FFO	10x08	S6	Class 2
Prefix N means fitting meets ASME code requirements & has a CRN (Canadian Registered Number).	Base part number 448F is a Flat Face "O" Seal to Male O-Ring Boss Straight.	Dash sizes number specifies OD tube size first and pipe thread last. Sizes are in 1/16". Thus, 10x08 = 5/8"x1/2"	Straights made of SA479 type 316. Shapes (forged) made of SA182 type 316. Other materials available upon request.

Style N 448FFO 10x08 S6 Class 2 is a 316 stainless steel Flat Face "O" Seal to Male O-ring Boss Straight with 5/8" tube with 1/2" male pipe threads for ASME class 2 service.

Precision Machined "O" Seal Hose Adapters and Tube Fitting Bodies

THORBURN



BRAZING INSTRUCTIONS FOR MAKING "O" SEAL TUBE FITTINGS

Brazing

Brazing joins metals by applying heat to a non-ferrous filler metal that melts above 800°F, but below the melting point of the base metal. Brazing differs from welding in that the filler metal is distributed by capillary action, whereas the filler metal in welding is fused where it is deposited. The process is based on the fact that a molten non-ferrous metal will form a strong bond with clean metal surfaces that have been heated to the right temperature.

Brazing Materials

Silver and copper alloy

Choosing the proper tubing alloy

Steel-seamless, #SAE1010, A179, fully annealed, also SAE welded and redrawn type suitable for bending. For maximum hardness, Rockwell B72.

Stainless Steel-A269, A213, seamless, fully annealed and welded redrawn, fully annealed suitable for bending. For maximum hardness, Rockwell B90.

PREPARATION AND CLEANING

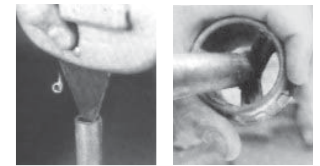
A. Preparing the Tube

1. Establish the required length of tubing. Allow for insertion depth in the "O" Seal external shoulder by adding the proper length of straight unbent tubing to enter into the shoulder counterbore. The counterbore depth depends on the "O" Seal external shoulder size.

"O" Seal External Shoulder size	Depth of Counterbore (inches)
-04	.25
-06	.25
-08	.38
-10	.38
-12	.38
-16	.50
-20	.50
-24	.50



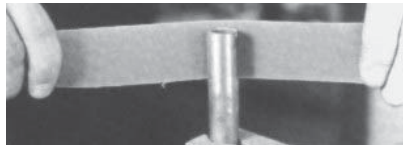
2. Cut the tubing squarely ($\pm 1\%$) to the right length. The best tool for this is a tubing cutter, but a hacksaw or an abrasive wheel can be used



3. Lightly deburr both the ID and the OD of the tube

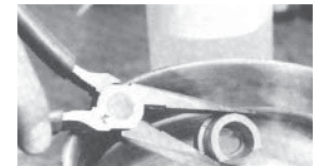


4. Clean the end of the tubing, using a liquid solvent, such as trichloroethane, denatured alcohol, alkaline cleaner or equivalent. For proper use, follow the solvent manufacturer's recommendation. Follow approved procedures for disposal. Avoid touching the tubing, because oily surfaces tend to repel the flux and silver material, leaving voids and inclusions.



5. Polish tubing end to bare metal, using silicon carbide emery cloth. All oil and grease must be removed before the tube is polished (see 4) because abrasives tend to scrub the oil into the surface and/or impregnate it with a fine abrasive powder, causing further contamination. Clean the tube end with either a clean solvent rinse or a soft oil-free cloth to remove the grit produced by the polishing.

B. Preparing the Shoulder



6. Degrease the shoulder thoroughly. Inspect for presence of rust. If rust present, follow the steps detailed previously to emery the counterbore.

C. Preparing the BrazeRings



7. Degrease the rings thoroughly. Preformed silver braze rings (part number OS size-SB) are available from Thorburn, saving you time and simplifying the brazing process. If site-made rings are used, cut off a piece of silver wire just short of three times the counterbore's diameter. For example, if the counterbore is $\frac{3}{4}$ ", one cuts $2\frac{3}{16}$ ". If bulk wire is used, it must contain at least 45% silver content. Use needle-nose pliers to shape the silver wire into a ring.

Braze Rings

Silver braze rings. Specify SB for steel tubing and SB-SS for stainless steel tubing

Size #	Tube O.D.
OS-4SB-SS	$\frac{1}{4}$
OS-6SB-SS	$\frac{3}{8}$
OS-08SB-SS	$\frac{1}{2}$
OS-10SB-SS	$\frac{5}{8}$
OS-12SB-SS	$\frac{3}{4}$
OS-14SB-SS	$\frac{7}{8}$
OS-16SB-SS	1
OS-20SB-SS	$1\frac{1}{4}$
OS-24SB-SS	$1\frac{1}{2}$

D. Trial Assembly

8. Fit the shoulder onto the tube; it should fit freely for the full counterbore depth. Thorburn recommends .002" to .010" diametrical clearance. Avoid touching or contaminating surfaces.

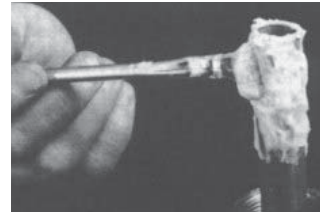
Precision Machined "O" Seal Hose Adapters and Tube Fitting Bodies

THORBURN

FLUXING AND ASSEMBLY

9. For silver brazing, the right flux conforms to an AWS A5.31 type 3A on all steel parts and AWS A5.31 type 3C on all stainless steel parts. Mix flux with clear tap or distilled water to consistency of rich cream. Warm up to about 150°F to make it easier to apply. Apply flux by brush into the fitting.

10. Clamp tube snugly in a vise. Short tubes can be done in a vertical position; slight pressure on the fitting is sufficient. On longer tubes, joint should be horizontal; a slight spring pressure will cause the fitting to seat itself on the tube. Slip "O" Seal nut (441FF-Size) over the tube. The flux (recommended high temperature 700°F to 1800°F) is applied to all components and adjacent areas to minimize heat scale formation, act as a temperature indicator, and promote proper alloy flow during brazing.



11. Lightly flux the "O" Seal shoulder sleeve (4440FF-Size) counterbore, install clean braze ring to bottom of counterbore. Reflux counterbore.

Caution: In applications exceeding +480° F. (such as during brazing), order the oil-coated/non-plated shoulder sleeve. When plating is heated above 480° F., toxic gases are given off.



12. Slip shoulder sleeve onto tube squarely and so that the braze ring is snug between the tube and counterbore lip. Bottom tube end against the ring.



13. Flux outer surface of shoulder. Cover entire braze joint area and about 1/2" up on tube below shoulder sleeve. Be careful that braze mixture allows sleeve to settle and bottom on the tube completely after heating.

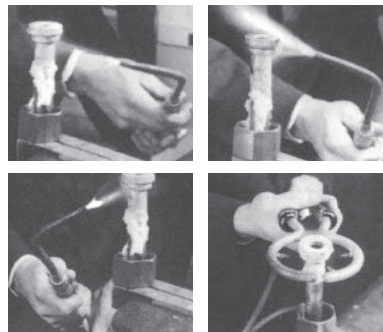
BRAZING PROCESS (HEATING)

14. Proper brazing involves heating the assembly to brazing temperature and flowing the filler material through the joint. The application of heat should bring both the tube and shoulder to a uniform brazing temperature. The brazing joint area needs to be heated uniformly, not just the OD surface. Thus, most of the heat should be directed to the shoulder and not the tube. Thicker sections take longer to heat than thinner sections. Entire assembly should come up to brazing temperature at the same time.

The brazing alloy will always run towards the hotter area. The preform ring of brazing alloy has been placed inside the joint area, the last part to come up to temperature. Thus, once the alloy is seen to come outside the joint area onto the tube, the joint is complete. If the tube has not settled, a slight pressure will cause the tube to settle and complete the braze joint.

To heat, use a hand-held torch or induction heating coil designed for the brazing of "O" Seal fittings. At brazing temperature, the components will have a dark red to medium cherry red colour. Do not overheat the parts as to char the flux.

Remove the heat once the alloy has melted and pulled through the joint. Settle the shoulder onto the tube to insure proper insertion.



Note: heating source could be varied. When using a flame, the fuel mixture should be adjusted so that the base of the flame is blue and there are also feathery orange licks at the end of the flame.

The flux may be used as a guide:

- At 212°F, the water boils off.
- At 600° to 700°F, the flux becomes puffy and starts "working" as it bubbles.
- At 800°F, it lies against the surface and has a translucent appearance.
- At 1100°F, it has the appearance of dark clear water.
- At 1125°F, the silver braze rings melts and flows at 1145°F. At this point, the shoulder should drop onto the tube at a distance equal to the diameter of the braze ring, which is now melted and filling in the area between the counterbore and tube OD. There should be visible braze material at both ends of the shoulder.

CLEANING THE ASSEMBLY AFTER BRAZING

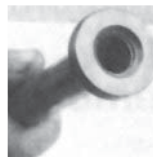
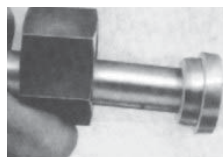


15. The flux residue must be removed because it is corrosive. Allow braze alloy to solidify completely before quenching. Cool brazed area in 180°F water. Flux removers can be added to the water.

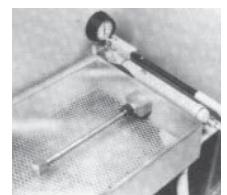
Brush slightly with stainless steel brush to remove stubborn residue. Avoid damaging sealing surface. Remove the oxides on the tube and area unprotected or insufficiently protected by the flux. Use a commercial cleaning agent such as Bernite 45® or Oakite® in a warm solution at about 160°F.

INSPECTION

16. Inspect the braze joint to insure 360° flow of alloy. Inspect braze for a fillet all the way around the tube. Inspect the shoulder sealing surface. There should be no alloy overrun or alloy build-up on the sealing surface. An accumulation of braze alloy on the sealing surface or a void in the fillet is unacceptable and the shoulder should be replaced.



17. It is recommended to proof test the assembly in an enclosed chamber. Proof test pressure should be twice the system's operating pressure, but should not exceed twice the recommended operating pressure of the tube or end connections.



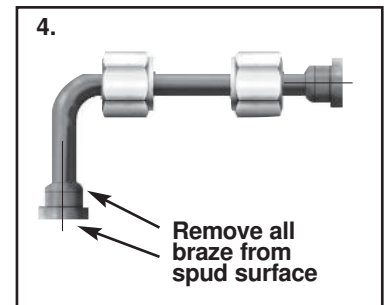
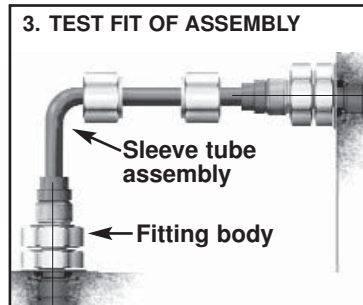
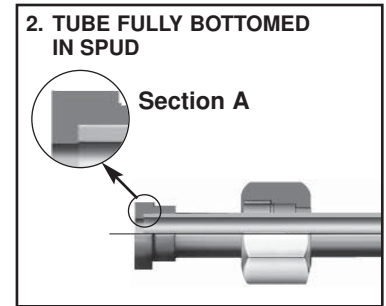
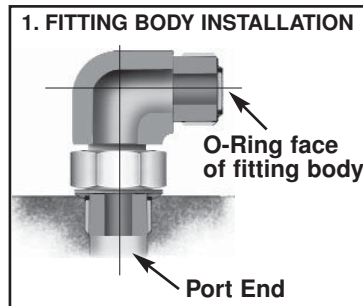
Precision Machined “O” Seal Hose Adapters and Tube Fitting Bodies

THORBURN

INSTALLATION & ASSEMBLY OF THORBURN O-SEAL

To install “O” Seal assemblies:

1. Assemble fitting body or bodies into desired port(s). (Fig. 1) Install securely using recommended torques as per Table. Lubricate O-ring.
2. Cut tubing to required length. De-burr and clean both tube ends and socket of spud to keep free of grease, rust, etc.
3. Slip spud on tube end. Make sure tube is completely bottomed in the socket. (Fig. 2)
Note: nut is inserted over tubing **before** spud is positioned.
4. Test fit of tube and spud assembly between the fitting bodies prior to brazing of the spuds (Fig. 3). If fit does not conform to alignment criteria, refabricate tube.
5. Conduct brazing of spud to tube in accordance with MIL-B-7883B specification. Not recommended that spud be brazed while in contact with fitting body. Remove excess braze from outer surface of spud. (Fig. 4)
6. Install brazed tube assembly to fitting bodies by screwing nuts on finger tight, then tighten nuts to recommended torques listed in Table.

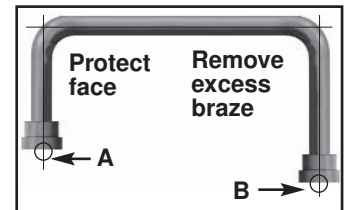


ASSEMBLY TORQUE TABLE FOR “O” SEAL HOSE ADAPTER

SAE Tube Size	SAE Port Thread Size	Nominal Bore in	SAE Port Assembly Torque		Tube Side Assembly Torque	
			In lbs.	Newton-Meters	In lbs.	Newton-Meters
4	7/16-20	.172	190±10	22±1	220±10	27±1
6	9/16-18	.264	420±20	48±2	320±15	35±2
8	3/4-16	.382	720±35	81±4	480±25	54±3
10	7/8-14	.482	1260±60	142±7	750±35	84±4
12	1 1/16-12	.609	1680±80	190±9	1050±50	118±5
16	1 5/16-12	.812	2520±125	284±14	1440±75	160±8
20	1 5/8-12	1.045	3080±150	345±17	1680±85	190±9
24	1 7/8-12	1.312	3780±180	425±20	2000±100	220±10

Alignment Criteria

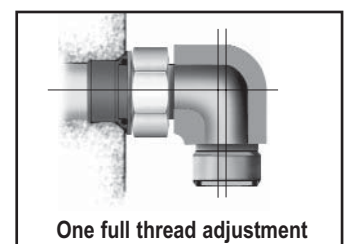
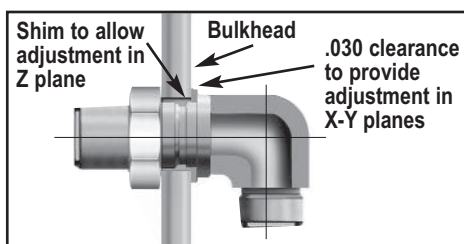
Common industrial is to allow a .060 inch true position tolerance on bent tube brazed assemblies. With point A fixed, point B can be anywhere within a .60 radius sphere of true position. This means that some means of adjustment of fitting ends must be provided.



Another possible method is to use a C tube configuration. For a 10 inch leg length, a .060 true position tolerance would mean that the maximum angle of deviation would be approximately 1/3 of a degree or 20 minutes.

Adjustable elbows used with a C brazed tube assembly allow additional movement.

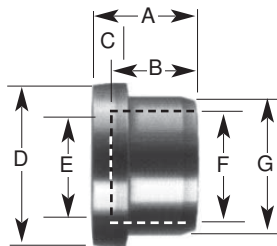
Adjustable Tees or Elbows



Precision Machined "O" Seal Hose Adapters and Tube Fitting Bodies

THORBURN

SLEEVE Shoulder Internal Braid

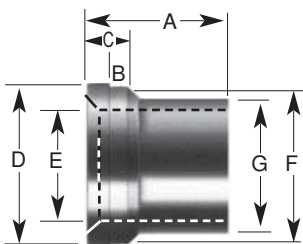


STYLE (N) 440FI

Size #	Tube OD	A	B	C	D	E	F	G
04x04	.25	.29	.25	.16	.50	.17	.25	.40
06x04	.38	.33	.25	.18	.62	.17	.25	.52
06x06	.38	.29	.25	.18	.62	.26	.38	.52
08x06	.50	.39	.25	.47	.65	.26	.38	.64
08x08	.50	.42	.38	.20	.74	.38	.50	.64
10x08	.63	.57	.38	.24	.92	.38	.50	.82
12x08	.50	.61	.38	.26	1.09	.38	.50	.94
10x10	.63	.42	.38	.24	.92	.48	.63	.82
12x10	.75	.61	.38	.26	1.09	.48	.63	.94
12x12	.75	.44	.38	.26	1.09	.61	.75	.94
14x14	.88	.68	.62	.45	1.09	.61	.88	.97
16x12	1.00	.55	.38	.28	1.34	.61	.75	1.13
16x14	1.00	.56	1.10	.28	1.34	.71	.88	1.13
16x16	1.00	.56	.50	.28	1.34	.81	1.00	1.13
20x16	1.25	.68	.50	.28	1.59	.81	1.00	1.40
20x20	1.25	.56	.50	.28	1.59	1.05	1.25	1.40
24x20	1.50	.74	.50	.28	1.91	1.05	1.25	1.71
24x24	1.50	.56	.50	.28	1.91	1.31	1.50	1.71

Caution: In applications exceeding +480° F. (such as during brazing), order the oil-coated/non-plated sleeve. When plating is heated above 480° F., toxic gases are given off.

SLEEVE Shoulder External Braid

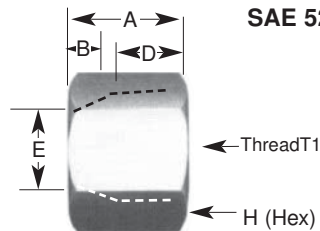


STYLE (N) 440FE

Size #	Tube OD	A	B	C	D	E	F	G
04x04	.25	.88	.16	.26	.50	.17	.40	.25
06x04	.38	.96	.18	.30	.62	.16	.52	.25
06x06	.38	.96	.18	.30	.62	.26	.52	.38
08x06	.50	1.12	.20	.37	.74	.26	.64	.38
08x08	.50	1.25	.20	.37	.74	.36	.64	.50
10x08	.63	1.34	.24	.39	.92	.36	.82	.50
10x10	.63	1.34	.26	.39	.92	.45	.82	.63
12x10	.75	1.44	.26	.45	1.09	.45	.94	.63
12x12	.75	1.44	.28	.45	1.09	.55	.94	.75
16x12	1.00	1.51	.28	.51	1.34	.55	1.13	.75
16x16	1.00	1.63	.28	.51	1.34	.78	1.13	1.00
20x16	1.25	1.63	.28	.51	1.59	.78	1.40	1.00
20x20	1.25	1.63	.28	.51	1.59	1.05	1.40	1.25
24x16	1.50	1.63	.28	.51	1.91	.78	1.71	1.00
24x24	1.50	1.63	.28	.51	1.91	1.26	1.71	1.50

Caution: In applications exceeding +480° F. (such as during brazing), order the oil-coated/non-plated sleeve. When plating is heated above 480° F., toxic gases are given off.

NUT



SAE 520110

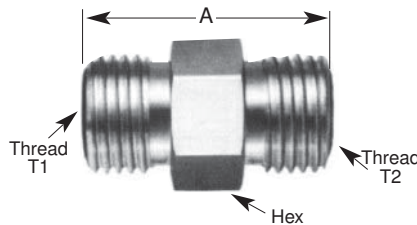
STYLE (N) 441F

Size #	Tube OD	Thread T1	A	B	D	E	Hex
04	.25	9/16-18	.58	.10	.35	.41	.69
06	.38	11/16-16	.67	.12	.41	.53	.81
08	.50	13/16-16	.83	.20	.47	.65	.94
10	.63	1-14	.92	.16	.57	.83	1.12
12	.75	1 1/16-12	1.02	.20	.61	.95	1.38
14	.88	1 3/16-12	1.22	.20	.61	.99	1.38
16	1.00	1 7/16-12	1.10	.24	.63	1.14	1.62
20	1.25	1 11/16-12	1.10	.24	.63	1.42	1.88
24	1.50	2-12	1.10	.24	.63	1.73	2.25

Caution: In applications exceeding +480° F. (such as during brazing), order the oil-coated/non-plated nut. When plating is heated above 480° F., toxic gases are given off.

FLAT FACE "O" SEAL UNION Tube to Tube

SAE 520101



STYLE (N) 442F

Size #	Tube O.D.	Thread T1	Thread T2	A	Hex
04X04	.25	9/16-18	9/16-18	1.08	.62
06X04	.38	11/16-16	9/16-18	1.17	.75
06X06	.38	11/16-16	11/16-16	1.22	.75
08X06	.50	13/16-16	11/16-16	1.33	.88
08X08	.50	13/16-16	13/16-16	1.39	.88
10X08	.63	1-14	13/16-16	1.57	1.06
10X10	.63	1-14	1-14	1.68	1.06
12X08	.75	1 3/16-12	13/16-16	1.69	1.25
12X10	.75	1 3/16-12	1-14	1.80	1.25
12X12	.75	1 3/16-12	1 3/16-12	1.86	1.25
16X12	1.00	1 7/16-12	1 3/16-12	1.92	1.50
16X16	1.00	1 7/16-12	1 7/16-12	1.94	1.50
20X20	1.25	1 11/16-12	1 11/16-12	2.02	1.75
24X24	1.50	2-12	2-12	2.09	2.21

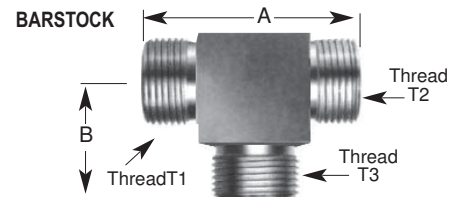
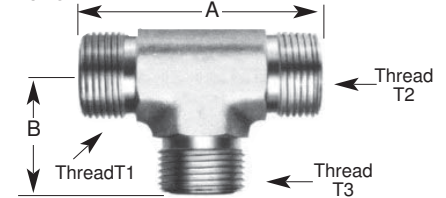
TO ORDER, SEE PAGE 37

NOTE: All dimensions in inches. Dimensions are for reference only, subject to change.
Carbon steel fittings are made from barstock.
Stainless steel fitting shapes are made from forgings, straights are made from barstock.

All items on this page listed under CRN:
OH 0527.5.6.7
Use prefix N for ASME Code grade adapters only.

FLAT FACE "O" SEAL UNION TEE Tube to Tube

FORGED SAE 520401

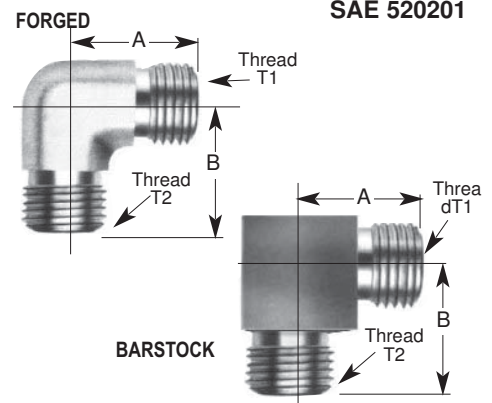


STYLE (N) 444F

Size #	Tube O.D.	Thread T1	Thread T2	Thread T3	A	B
04X04	.25	9/16-18	9/16-18	9/16-18	1.70	.85
06X06	.38	11/16-16	11/16-16	11/16-16	1.96	.98
06X08	.38	11/16-16	11/16-16	13/16-16	2.08	1.10
08X08	.50	13/16-16	13/16-16	13/16-16	2.20	1.10
10X10	.63	1-14	1-14	1-14	2.62	1.31
00X04		1 3/16-12	1 3/16-16	1 3/16-16	2.79	1.32
12X12	.75	1 3/16-12	1 3/16-12	1 3/16-12	2.94	1.47
12X12	.75	1 3/16-12	1 3/16-12	1 3/16-12	3.24	1.76
16X16	1.00	1 7/16-12	1 7/16-12	1 7/16-12	3.28	1.64
00X03		1 11/16-12	1 7/16-12	1 3/16-12	3.52	1.74
20X16	1.25	1 11/16-12	1 11/16-12	1 11/16-12	3.52	1.76
20X20	1.25	1 11/16-12	1 11/16-12	1 11/16-12	3.52	1.76
24X24	1.50	2-12	2-12	2-12	3.84	1.92

FLAT FACE "O" SEAL UNION ELBOW Tube to Tube

SAE 520201

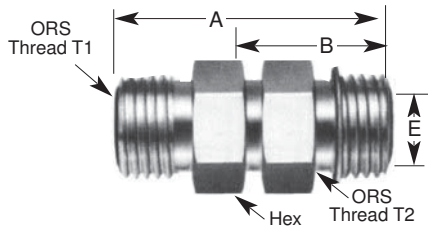


STYLE (N) 455F

Size #	Tube O.D.	Thread T1	Thread T2	A	B
04X04	.25	9/16-18	9/16-18	.85	.85
06X04	.38	11/16-16	9/16-18	.98	.92
06X06	.38	11/16-16	11/16-16	.98	.98
08X04	.50	13/16-16	9/16-18	1.10	.97
08X06	.50	13/16-16	11/16-16	1.10	1.04
08X08	.50	13/16-16	13/16-16	1.10	1.10
10X10	.63	1-14	1-14	1.31	1.31
12X08	.75	1 3/16-12	13/16-16	1.47	1.34
12X12	.75	1 3/16-12	1 3/16-12	1.47	1.47
16X16	1.00	1 7/16-12	1 7/16-12	1.64	1.64
20X20	1.25	1 11/16-12	1 11/16-12	1.76	1.76
24X24	1.50	2-12	2-12	1.92	1.92

Precision Machined "O" Seal Hose Adapters and Tube Fitting Bodies

FLAT FACE "O" SEAL BULKHEAD UNION

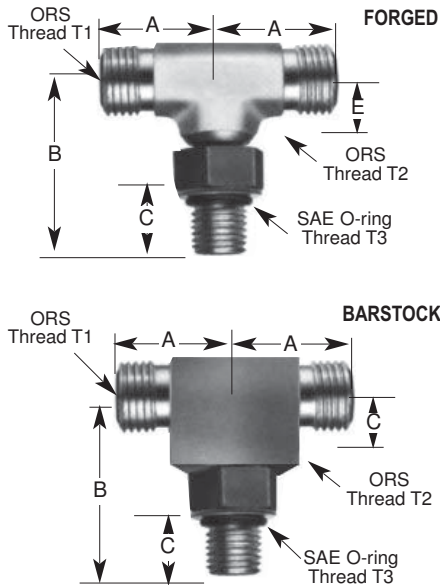


STYLE (N) 442BHF

Size #	Tube O.D.	Thread T1	Thread T2	A T3	B	E	Hex
04X04	.25	9/16-18	9/16-18	1.90	1.24	.17	.81
06X06	.38	1 1/16-16	1 1/16-16	2.09	1.34	.26	1.00
06X08	.38	1 1/16-16	1 3/16-16	2.24	1.44	.26	1.12
08X08	.50	1 3/16-16	1 3/16-16	2.30	1.44	.38	1.12
10X08	.63	1-14	1 3/16-16	2.46	1.44	.38	1.12
10X10	.63	1-14	1-14	2.62	1.60	.48	1.31
12X12	.75	1 3/16-12	1 3/16-12	2.72	1.64	.61	1.50
16X16	1.00	1 7/16-12	1 7/16-12	2.76	1.66	.81	1.75
20X16	1.25	1 11/16-12	1 7/16-12	2.76	1.66	.81	1.75
20X20	1.25	1 11/16-12	1 11/16-12	2.76	1.66	1.03	2.00
24X24	1.50	2-12	2-12	2.76	1.66	1.26	2.38

FLAT FACE "O" SEAL TEE Run: Tube to Tube Side: O-Ring Boss

SAE 520429

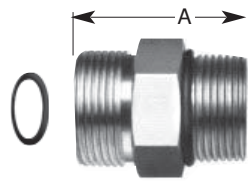


STYLE (N) 445FFO

Size #	Tube O.D.	Thread T1	Thread T2	Thread T3	A	B	C	E
04X03	.25	9/16-18	9/16-18	3/8-24	.85	1.19	.37	.12
04X04	.25	9/16-18	9/16-18	7/16-20	.85	1.29	.43	.17
06X06	.38	1 1/16-16	1 1/16-16	9/16-18	.98	1.45	.47	.26
06X08	.38	1 1/16-16	1 1/16-16	3/4-16	1.04	1.60	.55	.26
08X08	.50	1 3/16-16	1 3/16-16	3/4-16	1.10	1.60	.55	.38
10X10	.63	1-14	1-14	7/8-14	1.31	1.97	.63	.48
12X10	.75	1 3/16-12	1 3/16-16	7/8-14	1.47	2.01	.63	.48
12X12	.75	1 3/16-12	1 3/16-12	1 1/16-12	1.47	2.17	.73	.61
12X16	.75	1 3/16-12	1 3/16-12	1 5/16-12	1.62	2.35	.71	.61
16X16	1.00	1 7/16-12	1 7/16-12	1 5/16-12	1.64	2.35	.73	.81
20X20	1.25	1 11/16-12	1 11/16-12	1 5/8-12	1.76	2.45	.73	1.03
24X24	1.50	2-12	2-12	1 7/8-12	1.92	2.59	.73	1.26

FLAT FACE "O" SEAL TO MALE "O" RING BOSS STRAIGHT

SAE 520120



STYLE (N) 448FO

Size #	Tube O.D.	"S" Seal	Boss	A
04X03	1/4	9/16-18	3/8-24	1.07
04X04	1/4	9/16-18	7/16-20	1.13
04X05	1/4	9/16-18	1/2-20	1.13
04X06	1/4	9/16-18	9/16-18	1.20
04X08	1/4	9/16-18	3/4-16	1.32
06X03	3/8	1 1/16-16	3/8-24	1.28
06X04	3/8	1 1/16-16	7/16-20	1.34
06X05	3/8	1 1/16-16	1/2-20	1.22
06X06	3/8	1 1/16-16	9/16-18	1.26
06X08	3/8	1 1/16-16	3/4-16	1.38
06X10	3/8	1 1/16-16	7/8-14	1.53
06X12	3/8	1 1/16-16	1 1/16-12	1.69
06X16	3/8	1 1/16-16	1 5/16-12	1.73
08X06	1/2	1 3/16-16	9/16-18	1.48
08X08	1/2	1 3/16-16	3/4-16	1.44
08X10	1/2	1 3/16-16	7/8-14	1.59
08X12	1/2	1 3/16-16	1 1/16-12	1.75
08X14	1/2	1 3/16-16	1 3/16-12	1.75
08X16	1/2	1 3/16-16	1 5/16-12	1.79
10X08	5/8	1-14	3/4-16	1.78
10X10	5/8	1-14	7/8-14	1.70
10X12	5/8	1-14	1 1/16-12	1.86
10X14	5/8	1-14	1 3/16-12	1.86
12X06	3/4	1 3/16-12	9/16-18	1.77
12X08	3/4	1 3/16-12	3/4-16	1.91
12X10	3/4	1 3/16-12	7/8-14	1.99
12X12	3/4	1 3/16-12	1 1/16-12	1.92
12X14	3/4	1 3/16-12	1 3/16-12	1.92
12X16	3/4	1 3/16-12	1 5/16-12	1.96
16X08	1	1 7/16-12	3/4-16	1.96
16X10	1	1 7/16-12	7/8-14	2.04
16X12	1	1 7/16-12	1 1/16-12	2.14
16X14	1	1 7/16-12	1 3/16-12	1.98
16X16	1	1 7/16-12	1 5/16-12	1.98
16X20	1	1 7/16-12	1 5/8-12	2.06
20X16	1 1/4	1 11/16-12	1 5/16-12	2.28
20X20	1 1/4	1 11/16-12	1 5/8-12	2.06
20X24	1 1/4	1 11/16-12	1 7/8-12	2.13
24X20	1 1/2	2-12	1 5/8-12	2.35
24X24	1 1/2	2-12	1 7/8-12	2.13

TO ORDER, SEE PAGE 37

NOTE: All dimensions in inches. Dimensions are for reference only, subject to change.
Carbon steel fittings are made from barstock.
Stainless steel fitting shapes are made from forgings, straights are made from barstock.

Caution: In applications exceeding +480° F. (such as during brazing), order the oil-coated/non-plated nut. When plating is heated above 480° F., toxic gases are given off.

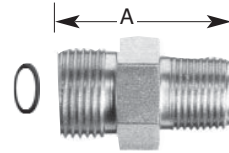
All items on this page listed under CRN:
OH 0527.5.6.7

Use prefix **N** for ASME Code grade adapters only.

THORNBURN

FLAT FACE "O" SEAL TO MALE NPTF

SAE 520102

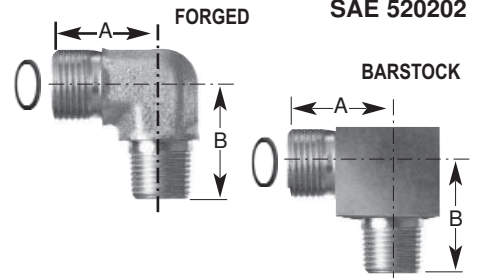


STYLE (N) 448F

Size #	Tube O.D.	"O" Seal	Male NPTF	A
04X02	1/4	9/16-18	1/8-27	1.03
04X04	1/4	9/16-18	1/4-18	1.24
04X06	1/4	9/16-18	3/8-18	1.24
04X08	1/4	9/16-18	1/2-14	1.49
06X02	3/8	1 1/16-16	1/8-27	1.12
06X04	3/8	1 1/16-16	1/4-18	1.30
06X06	3/8	1 1/16-16	3/8-18	1.30
06X08	3/8	1 1/16-16	1/2-14	1.55
08X04	1/2	1 3/16-16	1/4-18	1.36
08X06	1/2	1 3/16-16	3/8-18	1.36
08X08	1/2	1 3/16-16	1/2-14	1.61
08X12	1/2	1 3/16-16	3/4-14	1.68
10X08	5/8	1-14	1/2-14	1.72
10X12	5/8	1-14	3/4-14	1.78
10X16	5/8	1-14	1-11 1/2	1.97
12X08	3/4	1 3/16-12	1/2-14	1.84
12X12	3/4	1 3/16-12	3/4-14	1.84
12X16	3/4	1 3/16-12	1-11 1/2	2.03
16X12	1	1 7/16-12	3/4-14	1.86
16X16	1	1 7/16-12	1-11 1/2	2.05
16X20	1	1 7/16-12	1 1/4-11 1/2	2.16
20X16	1 1/4	1 11/16-12	1-11 1/2	2.13
20X20	1 1/4	1 11/16-12	1 1/4-11 1/2	2.16
24X24	1 1/2	2-12	1 1/2-11 1/2	2.26

FLAT FACE "O" SEAL TO MALE NPTF 90° ELBOW

SAE 520202



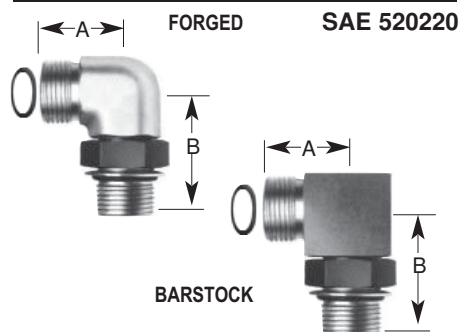
STYLE (N) 449F

Size #	Tube O.D.	"O" Seal	Male NPTF	A	B
04X02	1/4	9/16-18	1/8-27	.85	.78
04X04	1/4	9/16-18	1/4-18	.92	1.08
06X02	3/8	1 1/16-16	1/8-27	.98	.86
06X04	3/8	1 1/16-16	1/4-18	.98	1.08
06X06	3/8	1 1/16-16	3/8-18	1.04	1.21
06X08	3/8	1 1/16-16	1/2-14	1.15	1.53
08X02	1/2	1 3/16-16	1/8-27	1.10	1.06
08X06	1/2	1 3/16-16	3/8-18	1.10	1.21
08X08	1/2	1 3/16-16	1/2-14	1.21	1.53
08X12	1/2	1 3/16-16	3/4-14	1.32	1.65
10X08	5/8	1-14	1/2-14	1.31	1.53
10X12	5/8	1-14	3/4-14	1.41	1.65
12X08	3/4	1 3/16-12	1/2-14	1.47	1.65
12X12	3/4	1 3/16-12	3/4-14	1.47	1.65
12X16	3/4	1 3/16-12	1-11 1/2	1.62	2.03
16X12	1	1 7/16-12	3/4-14	1.64	1.84
16X16	1	1 7/16-12	1-11 1/2	1.64	2.03
20X16	1 1/4	1 11/16-12	1 1/4-11 1/2	1.76	2.38
20X20	1 1/4	1 11/16-12	1 1/4-11 1/2	1.76	2.41
24X24	1 1/2	2-12	1 1/2-11 1/2	1.92	2.70

Precision Machined "O" Seal Hose Adapters and Tube Fitting Bodies

THORBURN

FLAT FACE "O" SEAL TO MALE O-RING BOSS 90°



STYLE (N) 449FO

Size #	Tube O.D.	"O" Seal	Boss	A	B
04X03	1/4	9/16-18	3/8-24	.85	1.19
04X04	1/4	9/16-18	7/16-20	.85	1.29
04X05	1/4	9/16-18	1/2-20	.92	1.37
04X06	1/4	9/16-18	9/16-18	.92	1.45
04X08	1/4	9/16-18	3/4-16	.97	1.60
06X04	3/8	1 1/16-16	7/16-20	.98	1.37
06X05	3/8	1 1/16-16	1/2-20	.98	1.37
06X06	3/8	1 1/16-16	9/16-18	.98	1.45
06X08	3/8	1 1/16-16	3/4-16	1.04	1.60
06X10	3/8	1 1/16-16	7/8-14	1.15	1.97
06X12	3/8	1 1/16-16	1 1/16-12	1.25	2.17
08X06	1/2	1 3/16-16	9/16-18	1.10	1.44
08X08	1/2	1 3/16-16	3/4-16	1.10	1.60
08X10	1/2	1 3/16-16	7/8-14	1.21	1.97
08X12	1/2	1 3/16-16	1 1/16-12	1.32	2.17
10X08	5/8	1-14	3/4-16	1.31	1.80
10X10	5/8	1-14	7/8-14	1.31	1.97
10X12	5/8	1-14	1 1/16-12	1.41	2.17
12X08	3/4	1 3/16-12	3/4-16	1.47	1.84
12X10	3/4	1 3/16-12	7/8-14	1.47	2.01
12X12	3/4	1 3/16-12	1 1/16-12	1.47	2.17
12X14	3/4	1 3/16-12	1 3/16-12	1.47	2.17
12X16	3/4	1 3/16-12	1 5/16-12	1.62	2.35
16X12	1	1 7/16-12	1 1/16-12	1.64	2.32
16X14	1	1 7/16-12	1 3/16-12	1.64	2.32
16X16	1	1 7/16-12	1 5/16-12	1.64	2.35
16X20	1	1 7/16-12	1 5/8-12	1.76	2.45
20X12	1 1/4	1 11/16-12	1 5/16-12	1.76	2.42
20X16	1 1/4	1 11/16-12	1 3/4-12	1.76	2.42
20X20	1 1/4	1 11/16-12	1 5/8-12	1.76	2.45
24X20	1 1/2	2-12	1 5/8-12	1.92	2.56
24X24	1 1/2	2-12	1 7/8-12	1.92	2.59

TO ORDER, SEE PAGE 37

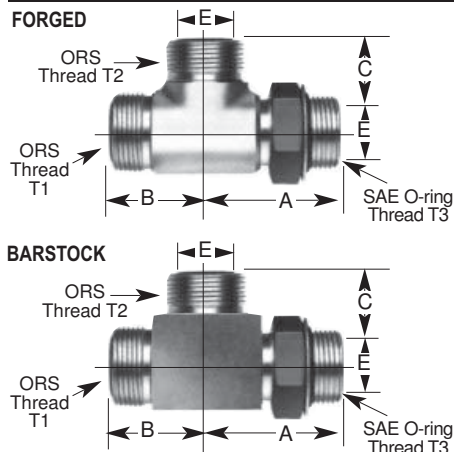
NOTE: All dimensions in inches. Dimensions are for reference only, subject to change.
Carbon steel fittings are made from barstock.
Stainless steel fitting shapes are made from forgings, straights are made from barstock.

Caution: In applications exceeding +480° F. (such as during brazing), order the oil-coated/non-plated nut. When plating is heated above 480° F., toxic gases are given off.

All items on this page listed under
CRN: OH 0527.5.6.7

Use prefix **N** for ASME Code
grade adapters only.

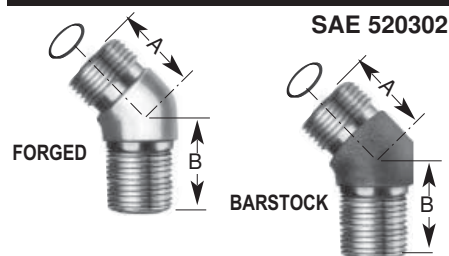
FLAT FACE "O" SEAL TEE Run: Tube to O-Ring Boss Side: Tube



STYLE (N) 451FO

Size #	Tube O.D.	Thread T1	Thread T2	Thread T3	A	B	C	E
04X04	1/4	9/16-18	9/16-18	7/16-20	1.29	.85	.85	.17
04X06	1/4	9/16-18	9/16-18	9/16-18	1.45	.92	.92	.10
06X04	3/8	1 1/16-16	1 1/16-16	7/16-20	1.37	1.17	.98	.17
06X06	3/8	1 1/16-16	1 1/16-16	9/16-18	1.45	.98	.98	.26
08X06	1/2	1 3/16-16	1 3/16-16	3/4-16	1.44	1.10	1.10	.30
08X08	1/2	1 3/16-16	1 3/16-16	3/4-16	1.60	1.10	1.10	.38
08X12	1/2	1 3/16-16	1 3/16-16	1 1/16-12	2.17	1.32	1.32	.38
10X10	5/8	1-14	1-14	7/8-14	1.97	1.31	1.31	.48
10X12	5/8	1-14	1-14	1 1/16-12	2.17	1.41	1.41	.48
12X12	3/4	1 3/16-12	1 3/16-12	1 1/16-12	2.17	1.47	1.47	.61
12X16	3/4	1 3/16-12	1 3/16-12	1 5/16-12	2.45	1.74	1.74	.61
16X16	1	1 7/16-12	1 7/16-12	1 5/8-12	2.35	1.64	.73	.81
20X20	1 1/4	1 11/16-12	1 11/16-12	1 5/8-12	2.45	1.76	1.64	1.03
24X24	1 1/2	2-12	2-12	1 7/8-12	2.59	1.92	1.76	1.26
00X05	-	1 7/16-12	1 3/16-12	1 1/16-12	2.32	1.64	1.92	.61
00X01	-	1 7/16-12	1 3/16-12	1 5/8-12	2.35	1.64	1.62	.61
00X12	-	1 3/16-12	1 11/16-12	1 5/8-12	2.42	1.59	1.76	.38
00X03	-	1-14	1 13/16-16	1 1/16-12	2.17	1.41	1.32	.38

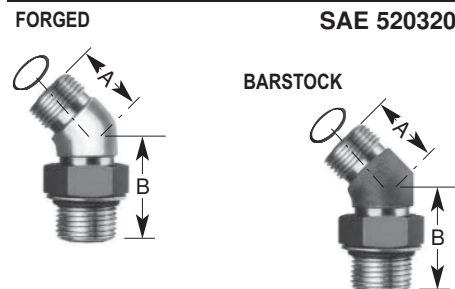
FLAT FACE "O" SEAL TO MALE NPTF 45° ELBOW



STYLE (N) 454F

Size #	Tube O.D.	"O" Seal	Male NPTF	A	B
04X02	1/4	9/16-18	1/8-27	.63	.68
04X04	1/4	9/16-18	1/4-18	.68	.93
04X06	1/4	9/16-18	3/8-18	.67	1.04
06X04	3/8	1 1/16-16	1/4-18	.74	.93
06X06	3/8	1 1/16-16	3/8-18	.74	1.04
06X08	3/8	1 1/16-16	1/2-14	.76	1.21
08X04	1/2	1 3/16-16	1/4-18	.80	.92
08X06	1/2	1 3/16-16	3/8-18	.80	1.04
08X08	1/2	1 3/16-16	1/2-14	.82	1.20
10X08	5/8	1-14	1/2-14	.92	1.20
12X12	3/4	1 3/16-12	3/4-14	1.02	1.23
16X16	1	1 7/16-12	1-11 1/2	1.18	1.51
20X20	1 1/4	1 11/16-12	1 1/4-11 1/2	1.26	1.69
24X24	1 1/2	2-12	1 1/2-11 1/2	1.45	1.80

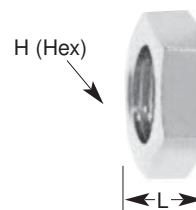
FLAT FACE "O" SEAL TO MALE O-RING BOSS 45° ELBOW



STYLE (N) 454FO

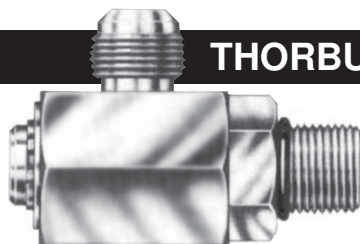
Size #	Tube O.D.	"O" Seal	Boss	A	B
04X04	1/4	9/16-18	7/16-20	.63	1.18
04X06	1/4	9/16-18	9/16-18	.68	1.30
04X08	1/4	9/16-18	3/4-16	.67	1.43
06X04	3/8	1 1/16-16	7/16-20	.74	1.22
06X06	3/8	1 1/16-16	9/16-18	.74	1.30
06X08	3/8	1 1/16-16	3/4-16	.74	1.43
08X06	1/2	1 3/16-16	9/16-18	.80	1.29
08X08	1/2	1 3/16-16	3/4-16	.80	1.43
08X10	1/2	1 3/16-16	7/8-14	.82	1.76
08X12	1/2	1 3/16-16	1 1/16-12	1.01	2.06
10X08	5/8	1-14	3/4-16	.92	1.59
10X10	5/8	1-14	7/8-14	.92	1.76
10X12	5/8	1-14	1 1/16-12	.96	1.97
12X10	3/4	1 3/16-12	7/8-14	1.02	1.81
12X12	3/4	1 3/16-12	1 1/16-12	1.02	.97
12X16	3/4	1 3/16-12	1 5/16-12	1.16	2.06
16X12	1	1 7/16-12	1 1/16-12	1.18	2.03
16X16	1	1 7/16-12	1 5/16-12	1.18	2.06
16X20	1	1 7/16-12	1 5/8-12	1.26	2.11
20X20	1 1/4	1 11/16-12	1 5/8-12	1.26	2.11
24X24	1 1/2	2-12	1 7/8-12	1.45	2.11

BULKHEAD LOCKNUT



STYLE (N) 431F

Size #	Tube O.D.	Straight Thread	H	L
04	1/4	9/16-18	1 3/16	1 1/4
06	3/8	1 1/16-16	1	5/16
08	1/2	1 3/16-16	1 1/8	1 1/32
10	5/8	1-14	1 5/16	1 3/32
12	3/4	1 3/16-12	1 1/2	1 3/32
16	1	1 7/16-12	1 3/4	1 3/32
20	1 1/4	1 11/16-12	2	1 3/32
24	1 1/2	2-12	2 3/8	1 3/32



THORBURN 600 SERIES SWIVEL JOINT ADAPTERS

Thorburn Swivel Joints' pressure balanced design distributes pressure evenly through the body of the joint, eliminating axial loading of the sleeve. The pressure balanced design allows the Thorburn swivel joint to turn with very low torque, even under pressure up to 3000 psi.

ADVANTAGES

	Without Swivels:	The Swivel Advantage:
1. Better System Plumbing: ■ Less hose needed when using swivel joints. ■ Eliminate the need for tubing configurations to accommodate 90° and other angles. ■ Connect directly to hose line, eliminating need for adapters.	90° Elbows plus bent hose are required	Straight fittings make the connection
2. Prevent Hose Twisting / Less Downtime: ■ Swivel action prevents hose twisting and kinking.	Hose twist	No twisting or kinking
3. Less Downtime: ■ Elimination of hose twisting and kinking eliminated; hose line replacement less frequent.		
4. Absorb System Shock: ■ Swivel joints are not rigid and therefore are capable of absorbing some hose shortening when the system is pressurized.	Can't absorb hose shortening	Absorbs hose shortening
5. Save Money: ■ Less hose, fewer adapters and tubing configurations yields less downtime, saving money.		

SELECTION CRITERIA

The many variables involved in the application and selection of industrial swivel joints must be considered to achieve maximum efficiency:

1. Pressure A force or thrust applied on the surface of a fluid carrying vehicle. System operating pressure must not exceed the rating of the swivel joint.

2. Temperature Both internal and ambient temperatures are important. The internal temperature rating is determined by the seals. Select seals that meet the required temperature ranges. Too hot fluid or too high external temperature can cause the seals to deteriorate and damage the casing, causing leakage and poor swivel rotation.

3. Fluid Compatibility Internal swivel joint components not suitable for the fluid being conveyed can be severely damaged.

4. Cost While important, the cost of a swivel joint can be offset by cost reduction benefits, such as improved system routing with less hose, fewer adapters and fittings, and longer service life.

5. Side Loading Defined as the stress caused by angular deflection in a piping system; causes excessive wear on the bearing surfaces and inhibits smooth swivel joint operation. Care is needed to avoid stress situations when plumbing a system with swivel joints.

6. Pressure drop This is the resistance to the flow of the fluid through the swivel joint, measured in pounds per square inch (psi). A high resistance to flow inhibits efficiency. Thorburn swivel joints have been designed for minimal resistance to flow.

7. Torque This is the force that produces a rotation. Thorburn swivel joints rotate freely with low torque even under pressures up to 10,000 psi.

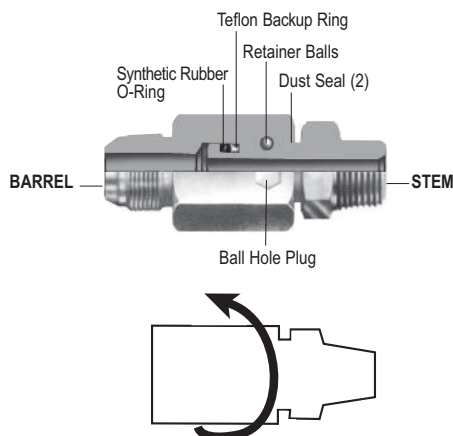
8. Configurations The swivel joint configuration specified (straight, 90°, dual plane, or parallel plane) depends on space, system routing, and other factors. Make sure the swivel joint configuration and envelope dimensions allow freedom of movement while compatible with the system's routing.

9. Port Size The port size and thread must match that of the end fitting on the connecting hose line.

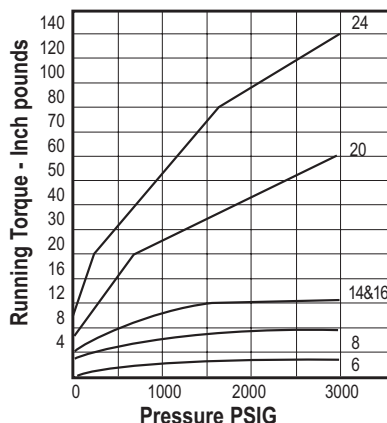
10. Corrosion Resistance Avoid corrosive elements in the fluid carried and in the swivel joint's environment that could shorten service life. If corrosive elements are unavoidable, specify a Thorburn swivel joint with brass/steel or stainless steel material.

11. Rotation Rotation must be easy and unrestricted for proper service. The joint and connecting line must be allowed to rotate freely for optimum performance.

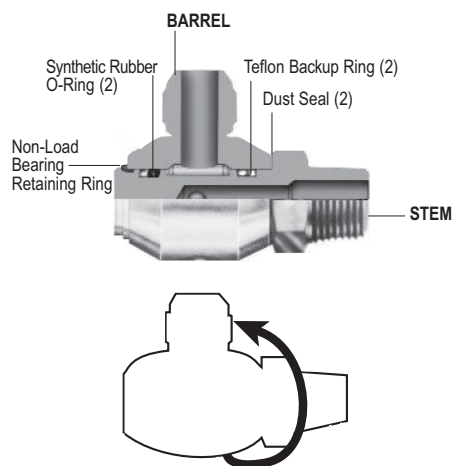
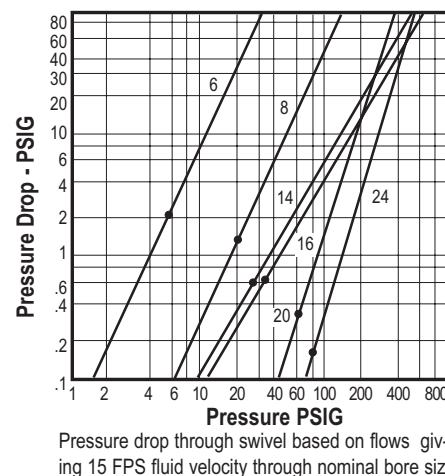
ROTATIONAL TORQUE AND PRESSURE DROP CHART



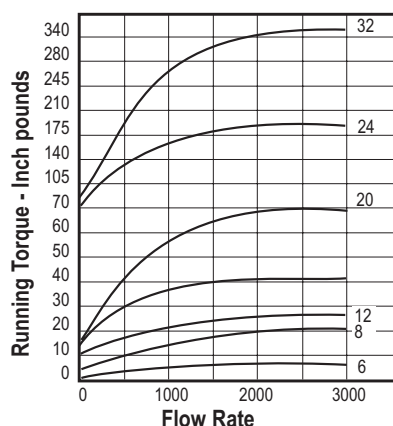
ROTATIONAL TORQUE VS. PRESSURE
- IN-LINE -



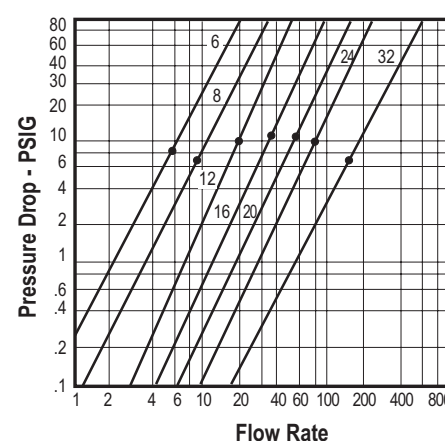
PRESSURE DROP VS. FLOW (GPM)
- IN-LINE -



ROTATIONAL TORQUE VS. PRESSURE
- 90° -



PRESSURE DROP VS. FLOW (GPM)
- 90° -



MATERIALS

Material	ASTM/ASME	Codes
Carbon Steel Zinc plated	A108	CZ
SS316	SA479/SA182	S6

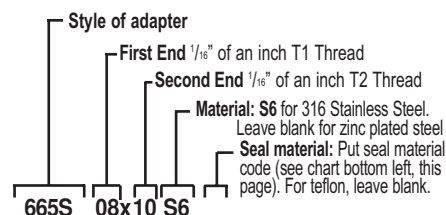
Seal Material	Codes
Viton	I
Buna-N	D
EPDM	H

Standard seal material is Teflon.
To order special seals, put code after base number.

HOW TO ORDER

HOW TO ORDER THORBURN COMMERCIAL GRADE 600 SERIES SWIVEL ADAPTERS

Example: 665S SS 08x10



Style 665S 08x10 S6 is a 316 stainless steel 1/2" male JIC to 5/8" male JIC with teflon seals.

HOW TO ORDER THORBURN ASME GRADE 600 SERIES SWIVEL ADAPTERS

Example: N 606SO 08x10 SS class 3

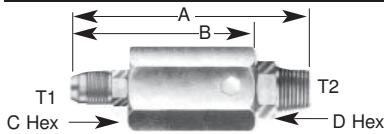


	Part number	Dash sizes	Material	Code Class
N	606SO	08x10	S6	Class 3
Prefix N means fitting meets ASME code requirements and has a CRN (Canadian Registered Number).	Base part number 846SFJ is a Male JIC with Female JIC.	Dash sizes number specifies T1 thread first and T2 thread last. Sizes are in 1/16". Thus, 10x08 = 1/2" x 5/8"	SA479 type 316. Other materials available upon request.	For nuclear classes insert suffix Class 1, 2 or 3. For class 6, leave blank.

N 606SO 08x10 S6 class 3 is a 316 stainless steel 1/2" female pipe union to 5/8" male O-ring boss for ASME class 3 service.

IN-LINE SWIVELS / FULL FLOW

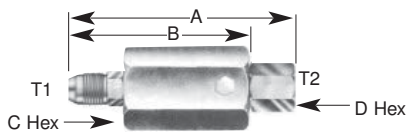
MALE JIC TO MALE PIPE



STYLE (N) 648S

Size #	A	B	Thread1	Thread2	C Hex	D Hex
06X04	2.61	1.77	9/16-18	1/4-18	1.00	1.00
08X06	2.76	1.90	3/4-16	3/8-18	1.00	1.00
10X08	3.09	2.00	7/8-14	1/2-14	1.25	1.25
12X12	3.31	2.09	1 1/16-12	3/4-14	1.25	1.25
16X16	4.10	2.60	1 5/16-12	1-11 1/2	1.75	1.62
20X20	4.49	2.74	1 7/8-12	1 1/4-11 1/2	2.25	2.00
24X24	5.17	3.12	1 7/8-12	1 1/2-11 1/2	2.75	2.37
32X32	6.96	4.39	2 1/2-12	2-11 1/2	3.50	3.00

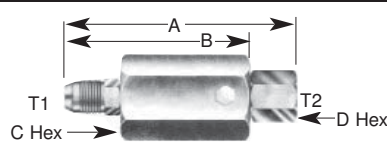
MALE JIC TO FEMALE PIPE



STYLE (N) 646S

Size #	A	B	Thread1	Thread2	C Hex	D Hex
06X04	2.67	1.77	9/16-18	1/4-18	1.00	1.00
08X06	2.81	1.90	3/4-16	3/8-18	1.00	1.00
10X08	3.14	2.00	7/8-14	1/2-14	1.25	1.25
12X12	3.23	2.09	1 1/16-12	3/4-14	1.25	1.25
16X16	3.75	2.58	1 5/16-12	1-11 1/2	1.75	1.62
20X20	4.08	2.74	1 7/8-12	1 1/4-11 1/2	2.25	2.00
24X24	4.82	3.12	1 7/8-12	1 1/2-11 1/2	2.75	2.37
32X32	6.16	4.39	2 1/2-12	2-11 1/2	3.50	3.00

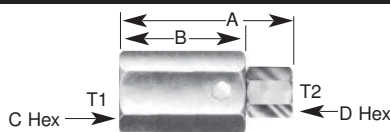
MALE JIC TO FEMALE JIC



STYLE (N) 671S

Size #	A	B	Thread1	Thread2	C Hex	D Hex
06X06	2.37	1.77	9/16-18	9/16-18	1.00	1.00
08X08	2.56	1.90	3/4-16	3/4-16	1.00	1.00
10X10	2.78	2.00	7/8-14	7/8-14	1.25	1.25
12X12	2.89	2.09	1 1/16-12	1 1/16-12	1.25	1.25
14X14	2.89	2.09	1 1/16-12	1 1/16-12	1.37	1.37
16X16	3.40	2.60	1 5/16-12	1 5/16-12	1.75	1.62
20X20	3.65	2.74	1 7/8-12	1 7/8-12	2.25	2.00
24X24	4.12	3.12	1 7/8-12	1 7/8-12	2.75	2.37
32X32	5.68	4.39	2 1/2-12	2 1/2-12	3.50	3.00

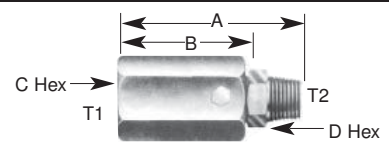
FEMALE PIPE TO FEMALE PIPE



STYLE (N) 608S

Size #	A	B	Thread1	Thread2	C Hex	D Hex
04X04	2.45	1.55	1/4-18	1/4-18	1.00	1.00
06X06	2.45	1.55	3/8-18	3/8-18	1.00	1.00
08X08	2.85	1.70	1/2-14	1/2-14	1.25	1.25
12X12	2.85	1.70	3/4-14	3/4-14	1.25	1.25
16X16	3.55	2.40	1-11 1/2	1-11 1/2	1.75	1.63
20X20	4.00	2.60	1 1/4-11 1/2	1 1/4-11 1/2	2.25	2.00
24X24	4.92	3.22	1 1/2-11 1/2	1 1/2-11 1/2	2.75	2.37
32X32	6.07	4.30	2-11 1/2	2-11 1/2	3.50	3.00

FEMALE PIPE TO MALE PIPE



STYLE (N) 602S

Size #	A	B	Thread1	Thread2	C Hex	D Hex
04X04	2.34	1.50	1/4-18	1/4-18	1.00	1.00
06X06	2.34	1.50	3/8-18	3/8-18	1.00	1.00
08X08	2.77	1.68	1/2-14	1/2-14	1.25	1.25
12X12	2.89	1.68	3/4-14	3/4-14	1.25	1.25
16X16	3.89	2.37	1-11 1/2	1-11 1/2	1.75	1.63
20X20	4.35	2.60	1 1/4-11 1/2	1 1/4-11 1/2	2.25	2.00
24X24	5.27	3.22	1 1/2-11 1/2	1 1/2-11 1/2	2.75	2.37
32X32	6.87	4.30	2-11 1/2	2-11 1/2	3.50	3.00

Other styles available

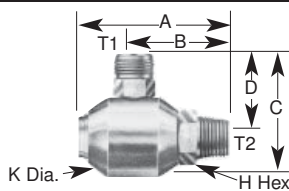
To Order, see page 45

NOTE: All dimensions in inches. Dimensions for reference only, subject to change.

Use prefix N for ASME Code grade adapters only.

90° SWIVELS - PRESSURE BALANCED

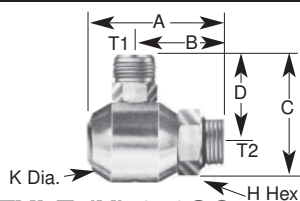
MALE JIC TO MALE PIPE



STYLE (N) 649S

Size #	Thread1	Thread2	A	B	C	D	H Hex	K Dia.
05X04	1/2-20	1/4-18	2.50	1.65	1.80	1.17	.87	1.25
05X06	1/2-20	3/8-18	2.50	1.65	1.80	1.17	.87	1.25
06X04	9/16-18	1/4-18	2.50	1.65	1.81	1.18	.87	1.25
06X06	9/16-18	3/8-18	2.50	1.65	1.91	1.18	.87	1.25
08X06	3/4-16	3/8-18	2.50	1.65	2.20	1.28	.87	1.25
08X08	3/4-16	1/2-14	2.83	1.99	2.26	1.44	1.00	1.50
10X08	7/8-14	1/2-14	2.83	1.99	2.26	1.50	1.00	1.50
12X12	1 1/16-12	3/4-14	3.40	2.37	3.05	1.99	1.25	2.12
16X16	1 5/16-12	1-11 1/2	3.82	2.70	3.36	2.18	1.62	2.37
20X20	1 7/8-12	1 1/4-11 1/2	4.18	2.86	3.70	2.33	2.00	2.75
24X24	1 7/8-12	1 1/2-11 1/2	5.32	3.55	4.65	2.90	2.37	3.50
32X32	2 1/2-12	2-11 1/2	6.20	4.10	5.67	3.54	3.12	4.25

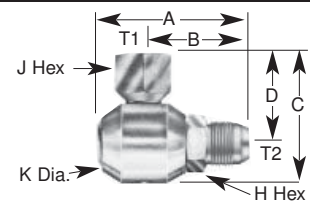
MALE JIC TO MALE O-RING



STYLE (N) 649SO

Size #	Thread1	Thread2	A	B	C	D	H Hex	K Dia.
05X06	1/2-20	9/16-18	2.50	1.65	1.80	1.17	.87	1.25
06X06	9/16-18	9/16-18	2.50	1.65	1.81	1.18	.87	1.25
06X08	9/16-18	3/4-16	2.50	1.65	1.81	1.18	.87	1.25
08X08	3/4-16	3/4-16	2.50	1.65	1.91	1.28	.87	1.25
10X10	7/8-14	7/8-14	2.58	1.74	2.26	1.50	1.00	1.50
12X12	1 1/16-12	1 1/16-12	3.24	2.21	3.05	1.99	1.25	2.12
16X16	1 5/16-12	1 5/16-12	3.82	2.70	3.36	2.18	1.62	2.37
20X20	1 7/8-12	1 7/8-12	3.76	2.44	3.70	2.33	2.00	2.75
24X24	1 7/8-12	1 7/8-12	4.78	3.02	4.65	2.90	2.37	3.50
32X32	2 1/2-12	2 1/2-12	5.50	3.41	5.67	3.54	3.12	4.25

FEMALE PIPE TO MALE JIC



STYLE (N) 650S

Size #	Thread1	Thread2	A	B	C	D	H Hex	J Hex	K Dia.
04X05	1/4-18	1/2-20	2.50	1.65	2.00	1.37	.87	.75	1.25
04X06	1/4-18	9/16-18	2.50	1.65	2.00	1.37	.87	.75	1.25
06X05	3/8-18	1/2-20	2.50	1.65	2.00	1.37	.87	.87	1.25
06X06	3/8-18	9/16-18	2.50	1.65	2.00	1.37	.87	.87	1.25
06X08	3/8-18	3/4-16	2.50	1.65	2.00	1.37	.87	.87	1.25
08X10	1/2-14	7/8-14	2.83	1.99	2.59	1.84	1.00	1.00	1.50
12X12	3/4-14	1 1/16-12	3.40	2.37	3.30	2.24	1.25	1.37	2.12
16X16	1-11 1/2	1 5/16-12	3.82	2.70	3.64	2.46	1.62	1.62	2.37
20X20	1 1/4-11 1/2	1 7/8-12	4.12	2.81	3.98	2.61	2.00	2.00	2.75
24X24	1 1/2-11 1/2	1 7/8-12	5.27	3.51	5.20	3.45	2.37	2.37	3.50
32X32	2-11 1/2	2 1/2-12	6.25	4.16	6.06	3.94	3.12	2.87	4.25

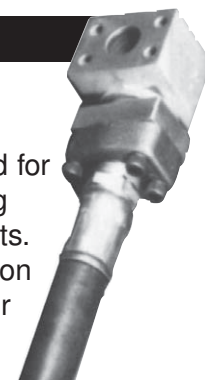
To Order, see page 45



SAE 4-BOLT FLANGED FLUID CONDUCTING SWIVEL JOINTS

Thorburn 4-Bolt Flanged Fluid Conducting Swivel Joints provide design versatility, simplified plumbing, longer flex hose life, and ease of maintenance.

The 4-Bolt Flanged Swivel Joint incorporates SAE 4-Bolt flange connections rated for fluid pressures of 3000 and 6000 psi. Connectors comply to SAE J518 Flanged Plumbing Code 61 and Code 62 specifications. They are manufactured without weld and braze joints. Durable materials provide service life demanded of such tough applications as construction and mining. The result of Thorburn's high standards is rugged swivel joint performance for continuous duty high power fluid power transmission systems.



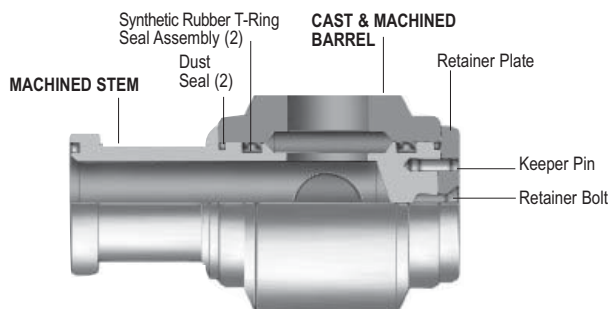
INSTALLATION AND PERFORMANCE

Features

- One piece barrel and stem— no weld or braze joint.
- Burnished barrel bore— extended seal life.
- Heavy duty retainer plate and broad wear bands.
- Resists mechanical loads.
- Protective treatment meets SAE Hose Fitting Standards.
- Recessed and protected dust seals.
- Pressure balanced for low rotational torques (see chart).
- Excellent flow characteristics (see chart).
- Field replacement kits.

Thorburn 4-Bolt Flanged Fluid Conducting Swivel Joints are for low speed rotation as in most fluid powered material handling systems. Maximum speed of rotation depends on system environment. Fluid types and extreme conditions are an important consideration. Questionable applications should be tested.

Wear of swivel components from mechanical loading shortens seal life through increased clearances between mating surfaces. Minimize mechanical loading from connecting plumbing. Verify hose lengths, hose twist and hard tubing alignment for cause of accelerated swivel wear. Swivel should not be used as a structural member.



Pressure Drop at Rated Flow

Pressure drop (ΔP) in PSIG of fluid flowing through the swivel at 15 feet per second velocity through the nominal bore size as follows:

Series	Size & ΔP in PSIG at Rated Flow						
	8	12	16	20	24	32	40
691 (Code 61)		6.7	8.0	7.1	8.7	7.5	7.9
693 (Code 62)	5.1	3.6	5.3	5.3	4.7	4.9	

Rotational Torque at Rated Operating Pressure

Rotational torque are within limits of fluid pressure generated flex hose rigidity. Strength of fluid piping restraining devices must be considered.

Series	Size & ΔP in PSIG at Rated Flow						
	8	12	16	20	24	32	40
691 (Code 61)		46	70	87	370	456	480
693 (Code 62)	60	90	110	420	520	636	

SAE Flange Series

	Code 61	Code 62
Sizes	3/4" to 2 1/2"	1/2" to 2"
Operating Pressures	3000 psi	6000 psi
Operating Temp.	-40°F to 200°F	

Materials

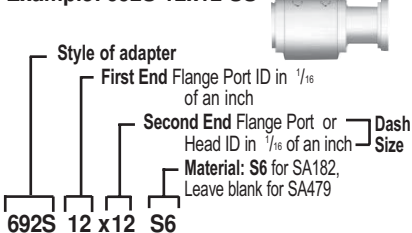
Type	Grade
316SS	SA479 / SA182*

*Special order.

ORDERING INFORMATION

HOW TO ORDER THORBURN COMMERCIAL GRADE 4-BOLT FLANGED SWIVEL JOINTS

Example: 692S 12x12 SS



Style 692S 12x12 S6 is a Code 62 3/4" stainless steel flange port to 3/4" flange port.

HOW TO ORDER THORBURN ASME GRADE 4-BOLT FLANGED SWIVEL JOINTS

Example: N 693 16x16 SS class 1



Part number	Dash sizes	Material	Code Class
N 693S	16x16	S6	Class 1

Prefix N means fitting meets ASME code requirements and has a CRN (Canadian Registered Number).

Base part number 693 is a Code 61 Flange Port with Flange Port.

Dash sizes number specifies port OD size first and head thread last. Sizes are in 1/16". Thus, 16x16 = 1"x1"

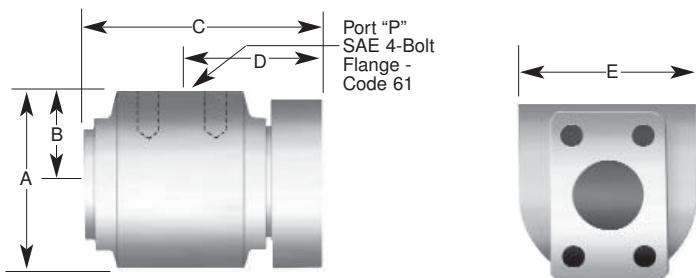
SA479 type 316. Other materials available upon request.

For nuclear classes insert suffix Class 1, 2 or 3. For class 6, leave blank.

Style N 693S 16x16 S6 class 1 is a 316 stainless steel Code 61 1" flange port to 1" flange head for ASME Section III class 1 service.

CODE 61 - 3000 PSI

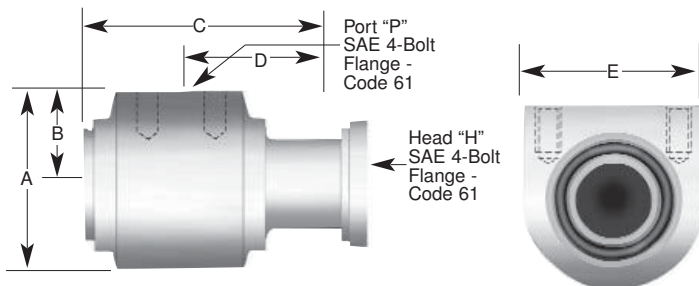
FLANGE PORT TO FLANGE PORT



STYLE (N) 691S

Size #	ID	A	B	C	D	E	P	Wt/lbs
12X12	3/4	2.86	1.58	3.26	2.00	2.60	3/4	3.75
16X16	1	3.04	1.64	3.73	2.21	2.84	1	4.50
20X20	1 1/4	3.35	1.75	4.32	2.57	3.30	1 1/4	6.25
24X24	1 1/2	3.87	2.00	4.93	2.88	3.80	1 1/2	10.25
32X32	2	5.05	2.67	6.65	3.89	4.80	2	20.00
40X40	2 1/2	6.37	3.37	7.39	4.17	6.03	2 1/2	33.25

FLANGE PORT TO FLANGE HEAD

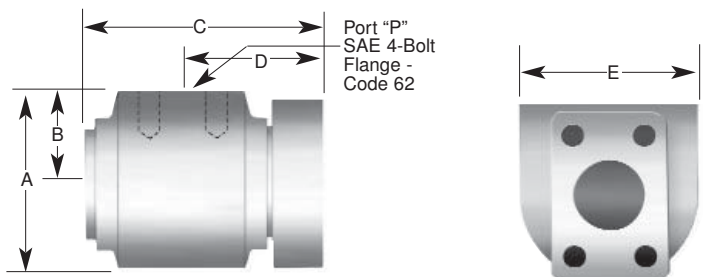


STYLE (N) 692S

Size #	ID	A	B	C	D	E	P	H	Wt/lbs
12X12	3/4	2.86	1.58	4.18	2.92	2.60	3/4	3/4	3.50
16X16	1	3.04	1.64	4.63	3.12	2.84	1	1	4.20
20X20	1 1/4	3.34	1.75	5.40	3.65	3.30	1 1/4	1 1/4	5.80
24X24	1 1/2	3.87	2.00	6.05	4.00	3.80	1 1/2	1 1/2	9.60
32X32	2	5.04	2.67	7.56	4.80	4.80	2	2	18.30
40X40	2 1/2	6.37	3.37	8.64	5.24	6.03	2 1/2	2 1/2	32.00

CODE 62 - 6000 PSI

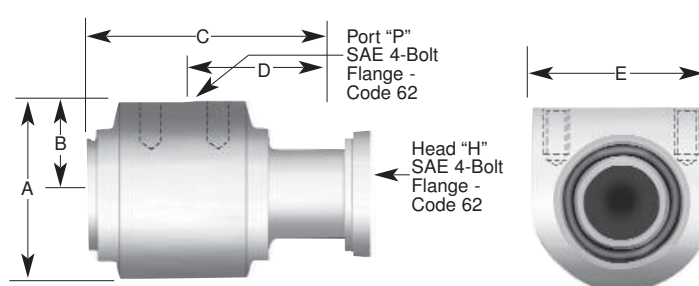
FLANGE PORT TO FLANGE PORT



STYLE (N) 693S

Size #	ID	A	B	C	D	E	P	Wt/lbs
08X08	1/2	2.86	1.58	3.13	1.88	2.60	1/2	3.75
12X12	3/4	3.04	1.64	3.73	2.21	2.84	3/4	4.75
16X16	1	3.35	1.75	4.24	2.50	3.30	1	6.60
20X20	1 1/4	3.87	2.00	4.93	2.88	3.80	1 1/4	10.60
24X24	1 1/2	5.04	2.67	6.84	4.08	4.80	1 1/2	22.30
32X32	2	6.37	3.37	7.71	4.48	6.03	2	37.75

FLANGE PORT TO FLANGE HEAD



STYLE (N) 694S

Size #	ID	A	B	C	D	E	P	H	Wt/lbs
08X08	1/2	2.86	1.58	4.13	2.87	2.60	1/2	1/2	3.38
12X12	3/4	3.04	1.64	4.88	3.37	2.84	3/4	3/4	4.38
16X16	1	3.35	1.75	5.64	3.89	3.30	1 1/2	1 1/2	6.12
20X20	1 1/4	3.87	2.00	6.31	4.25	3.80	1 1/4	1 1/4	11.00
24X24	1 1/2	5.04	2.67	8.40	5.64	4.80	1 1/2	1 1/2	24.00
32X32	2	6.37	3.37	9.88	6.65	6.03	2	2	34.50

Replacement Seal Kits

Kits contain dust and fluid seals, retaining plate and retaining screw.

695TSK Series

Body Size	695TSK12	695TSK16	695TSK20	695TSK24	695TSK32	695TSK40
Kit no.	12X08	16X12	20X16	24X20	32X24	40X32

696TSK Series

Body Size	695TSK12	695TSK12	695TSK16	695TSK20	695TSK24	695TSK32
Kit no.	12X08	16X12	20X16	24X20	32X24	40X32

To order, see page 48

Use prefix **N** for ASME Code grade adapters only.

NOTE: All dimensions in inches. Dimensions for reference only, subject to change.

“SUPER S” 800 Series Rebuildable Swivels THORBURN

“SUPER S” HEAVY DUTY HYDRAULIC REBUILDABLE SWIVELS BALL BEARING DESIGN

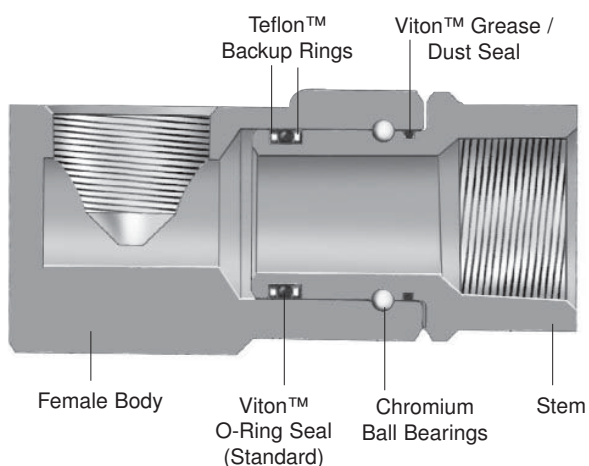
**SWITCH YOUR SWIVEL TO
“SUPER S”
800 SERIES
& EXPERIENCE
THE DIFFERENCE
NOW AVAILABLE IN
NICKEL PLATED STEEL**



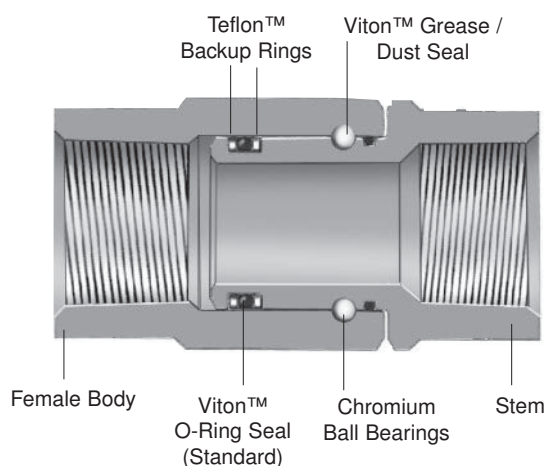
- 1/2" size
- 10,000 psi working pressures
- Thorough hardened (not just case hardened)
- Superior quality alloy steel
- Chrome ball bearings for long life
- Larger ball bearings for more bearing area
- Burnished (micro smooth) barrel bores
- Viton seals standard
- Zinc and nickel plated
- Competitive pricing
- Rebuilding Kits available
- Lower rotating torque
- No snap ring to blow-off
- Withstands heavy side loads

SIZES 4 TO 16

90° Super Swivel

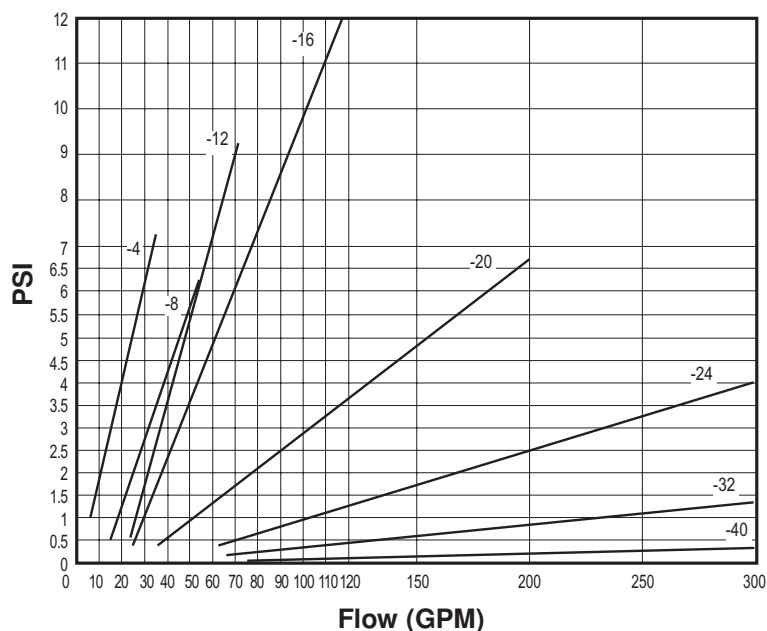


Inline Super Swivel



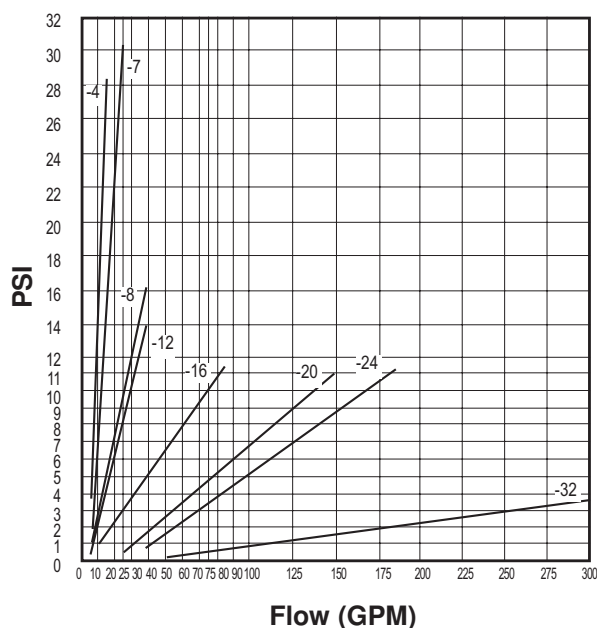
PRESSURE DROP CHARTS

Pressure Drop “Super S” 800 Series In-line 1/4" to 2 1/4"



Tests conducted with 150 SUS oil at 100°F with Female Pipe to Female Pipe (FPxFP)

Pressure Drop “Super S” 800 Series 90° 1/4" to 2"



Tests conducted with 150 SUS oil at 100°F with Female Pipe to Female Pipe (FPxFP)

"SUPER S" 800 Series Rebuildable Swivels THORBURN

MATERIALS

Material	ASTM/ASME	Codes
Carbon Steel Zinc plated	A108	CZ
Carbon Steel Nickel plated	A108	CN

Seal Material	Codes
Viton	I
Teflon	J
EPDM*	H

Standard seal material is Viton.

*Available on special order.

ORDERING INFORMATION

HOW TO ORDER THORBURN ASME GRADE "SUPER S" SWIVEL ADAPTERS

Example: N 803SHD 08x08 CZ



N	Part number	Dash sizes	Material	Code Class
Prefix N means fitting meets ASME code requirements and has a CRN (Canadian Registered Number).	803SHD	08x08	CZ	Class 3

Style N 803SHD 08x08 CZ is a zinc-plated carbon steel 1/2" female pipe to 1/2" female pipe for ASME class 3 service.

HOW TO ORDER THORBURN COMMERCIAL GRADE "SUPER S" SWIVEL ADAPTERS

Example: 802SHD 08x08 CN

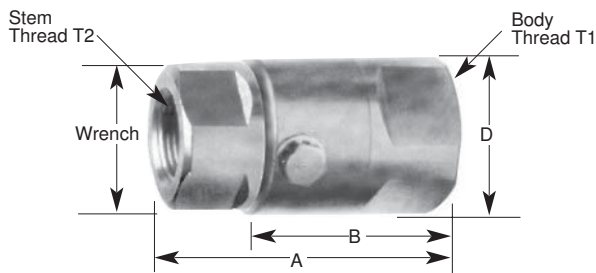


Style of adapter	First End 1/16" of an inch T1 Thread	Second End 1/16" of an inch T2 Thread	Material: CN Carbon steel, nickel plated. Leave blank for zinc plated steel.
802SHD	08x08	CN	

Style 802SHD is a nickel plated carbon steel 1/2" male pipe to 1/2" female pipe.

HIGH PRESSURE INLINE SWIVELS - 10,000 PSI

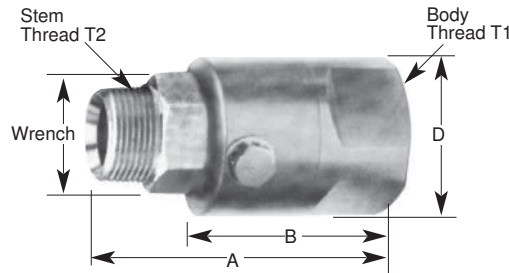
FEMALE PIPE (NPT) TO FEMALE PIPE (NPT)



STYLE (N) 803SHD

Size #	Dim. A	Dim. B	Dim. C Ø	Wrench	Body T1	Stem T2	Max. PSIG	Through Hole
08X08	3.070	2.085	1.480	1.250	1/2-14	1/2-14	10,000	0.437

MALE PIPE (NPT) TO FEMALE PIPE (NPT)

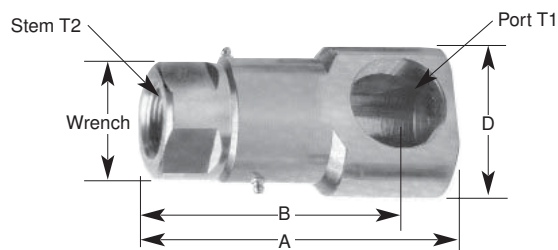


STYLE (N) 802SHD

Size #	Dim. A	Dim. B	Dim. C Ø	Wrench	Body T1	Stem T2	Max. PSIG	Through Hole
08X08	3.320	2.085	1.480	1.000	1/2-14	1/2-14	10,000	0.437

HIGH PRESSURE 90° SWIVELS - 10,000 PSI

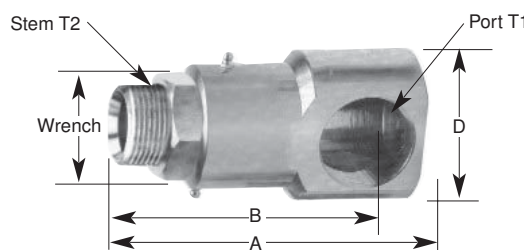
FEMALE PIPE (NPT) TO FEMALE PIPE (NPT)



STYLE (N) 808SHD

Size #	Dim. A	Dim. B	Dim. C Ø	Wrench	Port T1	Stem T2	Swg. radius	Max. PSIG	Through Hole
08X08	3.605	2.895	1.842	1.250	1/2-14	1/2-14	1.048	10,000	0.437

MALE PIPE (NPT) TO FEMALE PIPE (NPT)



STYLE (N) 806SHD

Size #	Dim. A	Dim. B	Dim. C Ø	Wrench	Port T1	Stem T2	Swg. radius	Max. PSIG	Through Hole
08X08	3.855	3.145	1.842	1.000	1/2-14	1/2-14	1.048	10,000	0.437

Other styles and shapes available on request.

NOTE: All dimensions in inches. Dimensions for reference only, subject to change.

Use prefix N for ASME Code grade adapters only.

"SUPER S" 800 Series Rebuildable Swivels THORBURN

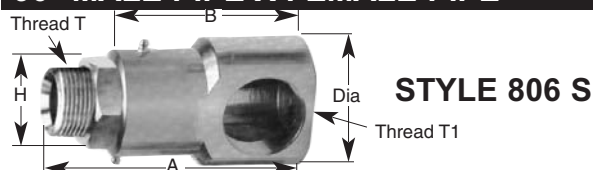
"SUPER S" HEAVY DUTY HYDRAULIC REBUILDABLE SWIVELS BALL BEARING DESIGN



- Available in sizes from 1/4" through 2"
- Up to 4000 psi WP with 4 to 1 safety factor
- Thorough hardened (not just case hardened)
- Superior quality alloy steel
- Chrome ball bearings for long life
- Larger ball bearings for more bearing area

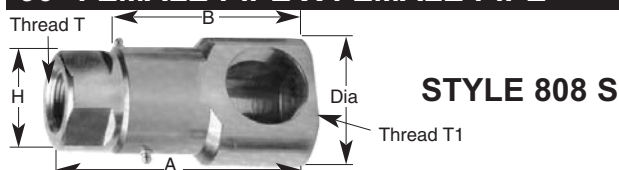
- Viton seals standard
- Zinc and nickel plated
- Rebuilding Kits available
- Lower rotating torque
- Withstands heavy side loads
- Burnished (micro smooth) barrel bores

90° MALE PIPE X FEMALE PIPE



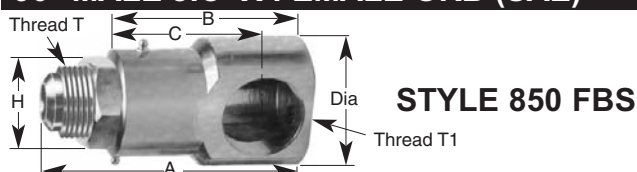
Size #	A	B	WP	TH'D T	TH'D T1 O.R.B.	H Hex	Dia
04X04	3.190	2.250	4000	1/4-18	1/4-18	0.625	1.192
06X06	3.448	2.270	4000	3/8-18	3/8-18	0.750	1.357
08X08	3.573	2.270	4000	1/2-14	1/2-14	1.000	1.495
12X12	3.775	2.570	4000	3/4-14	3/4-14	1.125	1.710
16X16	4.650	3.260	4000	1-11 1/2	1-11 1/2	1.375	2.162
20X20	4.925	3.450	4000	1 1/4-11 1/2	1 1/4-11 1/2	1.750	2.702
24X24	6.185	4.956	4000	1 1/2-11 1/2	1 1/2-11 1/2	2.125	2.917
32X32	7.105	5.765	3000	2-11 1/2	2-11 1/2	2.500	3.667

90° FEMALE PIPE X FEMALE PIPE



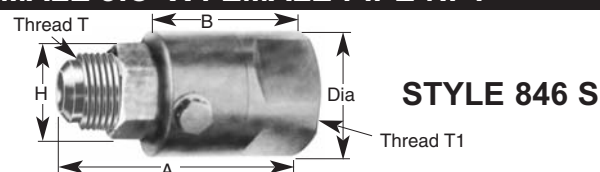
Size #	A	B	WP	TH'D T	TH'D T1 O.R.B.	H Hex	Dia
04X04	3.100	2.250	4000	1/4-18	1/4-18	0.750	1.192
06X06	3.350	2.270	4000	3/8-18	3/8-18	0.875	1.495
08X08	3.350	2.270	4000	1/2-14	1/2-14	1.125	1.495
12X12	3.555	2.570	4000	3/4-14	3/4-14	1.375	1.710
16X16	4.440	3.260	4000	1-11 1/2	1-11 1/2	1.825	2.162
20X20	4.790	3.450	4000	1 1/4-11 1/2	1 1/4-11 1/2	2.000	2.702
24X24	5.605	4.375	4000	1 1/2-11 1/2	1 1/2-11 1/2	2.375	2.917
32X32	6.420	5.050	3000	2-11 1/2	2-11 1/2	2.875	3.667

90° MALE JIC X FEMALE ORB (SAE)



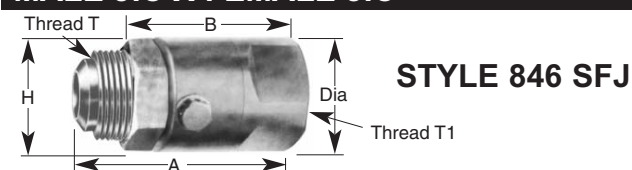
Size #	A	B	C	TH'D T	TH'D T1 O.R.B.	H Hex	Dia
04X04		2.250	1.495				
06X06	3.230	2.270	1.560	9/16-18	9/16-18	1	2
08X08	3.350	2.270	1.560	3/4-16	3/4-16	1 1/4	2
10X10	3.555	2.270	1.560	7/8-14	7/8-14	1 1/4	2
12X12	3.650	2.570	1.660	1 1/16-12	1 1/16-12	1 1/2	2 1/4
16X16	4.600	3.260	2.230	1 5/16-12	1 5/16-12	1 3/4	2 5/8
20X20	5.000	3.450	2.250	1 5/8-12	1 5/8-12	2 1/4	3 1/4

MALE JIC X FEMALE PIPE NPT



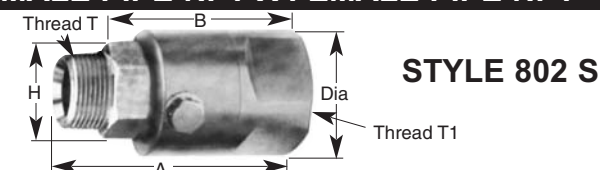
Size #	A	B	TH'D T	TH'D T1	Hex	Dia
04X04	2.572	1.720	9/16-18	1/4-18	1	1.170
06X06	2.935	1.850	3/4-16	3/8-18	1 1/4	1.420
08X08	2.935	1.850	3/4-16	1/2-14	1 1/4	1.545
10X10	3.040	1.850	7/8-14	1/2-14	1 1/4	1.545
12X12	3.130	2.145	1 1/16-12	3/4-14	1 1/2	1.795
16X16	3.826	2.480	1 5/16-12	1-11 1/2	1 3/4	2.125
20X20	4.240	2.685	1 5/8-12	1 1/4-11 1/2	2 1/4	2.500

MALE JIC X FEMALE JIC



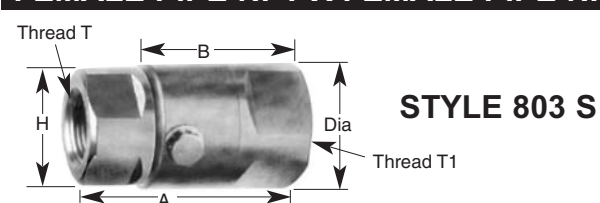
Size #	A	B	TH'D T	TH'D T1	Hex	Dia
04X04	2.675	1.720	9/16-18	9/16-18	1	1.170
06X06	2.935	1.850	3/4-16	3/4-16	1 1/4	1.420
08X08	3.040	1.850	7/8-14	7/8-14	1 1/4	1.545
12X12	3.425	2.145	1 1/16-12	1 1/16-12	1 1/2	1.795
16X16	3.890	2.546	1 5/16-12	1 5/16-12	1 3/4	2.125
20X20	4.190	2.635	1 5/8-12	1 5/8-12	2 1/4	2.500

MALE PIPE NPT X FEMALE PIPE NPT



Size #	A	B	TH'D T	TH'D T1	Hex	Dia
04X04	2.665	1.720	1/4-18	1/4-18	1	1.170
06X06	2.930	1.850	3/8-18	3/8-18	1 1/4	1.420
08X08	3.055	1.850	1/2-14	1/2-14	1 1/4	1.545
12X12	3.055	1.850	3/4-14	3/4-14	1 1/2	1.795
16X16	3.875	2.480	1-11 1/2	1-11 1/2	1 3/4	2.125
20X20	4.160	2.685	1 1/4-11 1/2	1 1/4-11 1/2	2 1/4	2.500

FEMALE PIPE NPT X FEMALE PIPE NPT

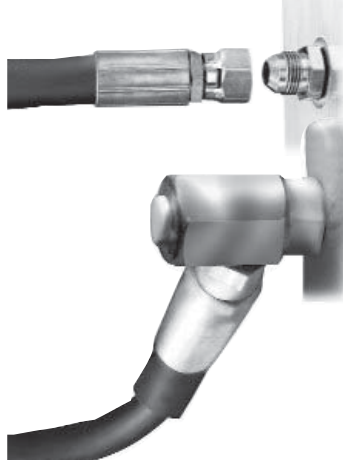


Size #	A	B	WP	TH'D T	TH'D T1	Hex	Dia
04X04	2.572	1.720	4000	1/4-18	1/4-18	0.750	1.170
06X06	2.835	1.850	4000	3/8-18	3/8-18	0.875	1.420
08X08	2.835	1.850	4000	1/2-14	1/2-14	1.125	1.545
12X12	2.835	1.850	4000	3/4-14	3/4-14	1.375	1.795
16X16	3.660	2.480	4000	1-11 1/2	1-11 1/2	1.825	2.125
20X20	4.025	2.685	4000	1 1/4-11 1/2	1 1/4-11 1/2	2.000	2.500
24X24	4.700	3.290	4000	1 1/2-11 1/2	1 1/2-11 1/2	2.375	2.625
32X32	5.200	3.800	3000	2-11 1/2	2-11 1/2	2.875	3.250

QUALITY, INNOVATION, SERVICE

Thorburn Equipment Inc. is committed to a policy of continuous development and research to provide fitting and adapter products that set the industry standards for quality, safety, environmental protection, durability and ease of handling. Therefore, the company reserves the right to alter and modify designs without notice.

THORBURN'S WARRANTY



Thorburn warrants its products to be free from any defects of workmanship, components and material. Thorburn's warranty shall only cover the components of such assemblies manufactured by Thorburn. Should any such defects be discovered within three (3) months from the date of purchase by the end user, the questionable part should be returned to Thorburn. If, upon inspection, the part proves to be defective, Thorburn will furnish a replacement, or, at its option, repair the part.

This warranty shall not apply to any part or parts of fitting and adapter products if it has been installed, altered, repaired or misused, through negligence or otherwise, in a way that in the opinion of Thorburn affects the reliability of, or detracts from, the performance of the product. Nor does this warranty cover replacements or repairs necessitated by loss of dam-

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Since performance depends largely upon local conditions and proper care in use, which are outside Thorburn Equipment's control, Thorburn Equipment Inc. can accept no liability for any defect, damage, injury or loss arising from the products and information contained in this catalogue. Readers and customers are encouraged to conduct their own tests before using any product.

age resulting from any cause beyond the control of Thorburn, including but not limited to acts of God, acts of government, floods and fires.

The obligation of Thorburn under this warranty is limited to making a replacement part available or the repair of the defective part, and does not include the furnishing of any labor involved or connected therewith, such as that required to diagnose trouble or to remove or install any such product, nor does it include responsibility for any transportation expenses or any damages or losses incurred in transportation in connection therewith.

The foregoing is in lieu of any other warranties, expressed, implied or statutory, and Thorburn neither assumes nor authorizes any person to assume for Thorburn any other obligation or liability in connection with the sale of its products.

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AEROQUIP TO THORBURN INTERACTION

Aeroquip	Thorburn	Aeroquip	Thorburn	Aeroquip	Thorburn	Aeroquip	Thorburn
FF1010	315 T	2068	360 UB	2257	309 MT	208 006	906 T
1290 T	341 F	2070 T	374 F	22617	317 T	208 007	908 T
2020 T	352 F	2071 T	379 F	202 003 T	365 F	208 008	960 WJ
2021 T	348 F	2080	310 T	202 005 T	969 F	210 212	318 T
2022 T	346 F	2081	301 T	202 009 T	968 F	210 292	330 F
2023 T	354 F	2083	300 T	202 113 T	348 LF	210 295	331 F
2024 T	349 F	2084	900 T	202 114 T	348 LLF	212 501 T	383 F
2025 T	350 F	2085	306 MT	202 411 T	349 LF	500 023 T	454 F
2027 T	342 F	2087	308 T	202 413 T	349 LLTF	500 024 T	469 F
2028 T	351 F	2088	305 T	202 414 T	349 LLLF	500 025 T	468 F
2029 T	357 F	2089	306 T	202 702 T	348 FO	500 454 T	379 LF
2030 T	345 F	2090	309 T	202 712 T	342 LHF	504 095 T	979 LLF
2031 T	358 F	2091	313 T	202 713 T	340 LFO	900 599	339 F
2033 T	344 F	2092	312 T	202 832 T	966 F	900 605	340 F
2039 T	355 F	2093	311 T	202 901 T	363 F	FF 5541	568 F
2040 T	302 F	2096	303 T	203 002 T	395 BAF	FF 5539	554 F
2041 T	342 BHF	2215 T	383 F	203 003 T	345 FO	FF 5540	569 F
2042 T	354 BHF	2239 T	346 BHF	203 006 T	364 F	BD 55006	649 S
2043 T	355 BHF	2240 T	348 BHF	203 007 T	360 F	BD 55021	649 SO
2044 T	346 F - 45°	2245	360 UG	203 008 T	351 BHF	BD 55010	655 S
2045	360 SA	2246	915 T	203 101 T	372 F	BD 55000	606 S
2046	360 SG	2247	902 T	203 102 T	371 F	BD 55004	606 SO
2047	360 UA	2249	910 T	203 103 T	362 F	BD 55011	608 S
2048	360 UG	2250	360 UA	203 104 T	361 F	BD 58012	806 S
2049	360 TA	2251	909 T	203 301 T	364 F	BD 58013	850 S
2050	360 TG	2252	911 T	206 209 T	349 LFO	BD 58000	803 S
2061 T	354 FO	2253	360 VA	206 801 T	306 TO	BD 58001	846 S
2062	349 FO	2254	360 VC	208 003	310 MT		
2066	360 SB	2255	360 VJ	208 004	905 T		
2067	360 TB	2256	903 T	208 005	907 T		

Note: If Aeroquip # finishes with a "T", sizes will be tube to pipe like Thorburn. If not, 37° flared fittings will be pipe to tube.

Thorburn's Innovative Connection Technologies

Thorburn is an innovative manufacturer of specialized engineered flexible piping systems (i.e. custom hose assemblies, expansion joints and precision machined couplings). Since 1954, Thorburn's corporate mission, evolutions and business philosophy have been custom driven and targeted to selected niche applications in industries such as power generation (both fossil fuel and nuclear), pulp and paper, petro-chemical, aluminum smelting, shipbuilding, aerospace and pharmaceuticals where Thorburn can achieve clear positions and sustainable technological and market share leadership.



Quality Certifications & Compliances

- ISO 9001
- CSA CAN3 Z299.1
- ASME Section III NCA-4000 NQA-1
- CSA N-285.0
- ASME Section VIII Division 1
- CSA B.51

Thorburn "O" Seal System is the universal answer to troublesome fluid leakage problems.



Thorburn Adapter/Tube Dimensions and Pressure Compliance

- SAE 516, 517, J514
- Military Special Fittings MIL-F-18866
- Military Standards MS 51500
- ASME Section VIII B51, B31.1



Thorburn's Industrial Standard 37° Flare Type Adapter/Tube Fitting System

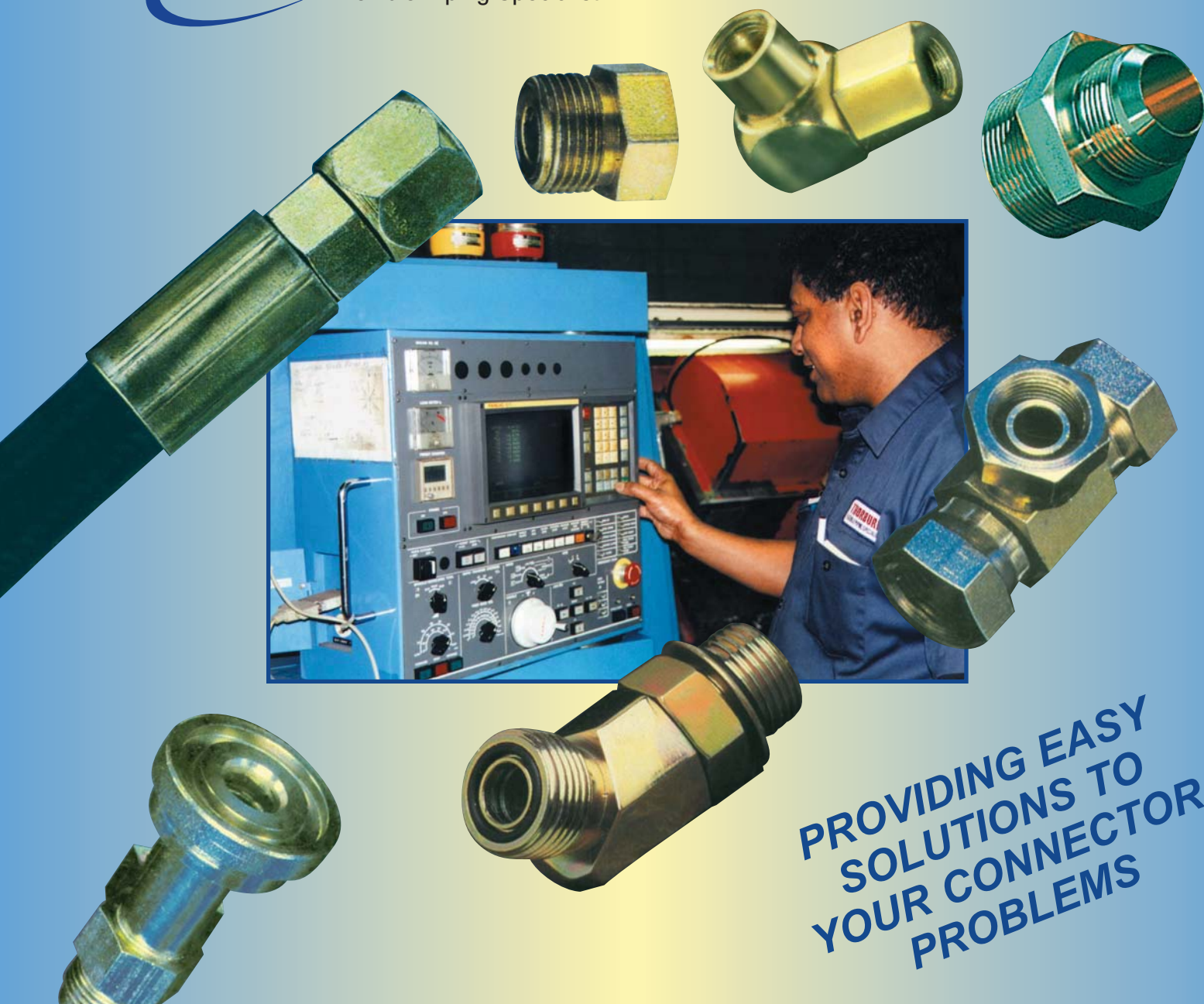


Shown is Jack Thorburn, who founded the company in 1954, enjoying one of his passions, sailing. Unfortunately, Jack passed away on February 16th, 1995. He will be sorely missed. The company's leadership passed on to Jack's eldest son, Robert, in September 1994.



Thorburn's Conversion Fitting System simplifies connections with Metric, JIS, DIN, GAZ and BSP piping systems.





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PROBLEMS**

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**MONTREAL HEAD OFFICE
MARITIMES / WESTERN CANADA
THORBURN FLEX INC.**

Manufacturing Division
173 Oneida Drive
Pointe-Claire, Quebec, Canada H9R 1A9
Tel.: (514) 695-8710 Fax: (514) 695-8716

**UNITED STATES
THORBURN FLEX INC.**

151 New Park Avenue
Hartford, Connecticut, USA 06106
Tel.: 1-800-363-6613
Fax: (514) 695-8716

**TORONTO / ONTARIO
THORBURN FLEX INC.**

49-6A The Donway West, Suite 815
Don Mills, Ontario M3C 2E8
Tel.: (905) 715-7013
Fax: (905) 715-7816

Toll free: 1-800-363-6613