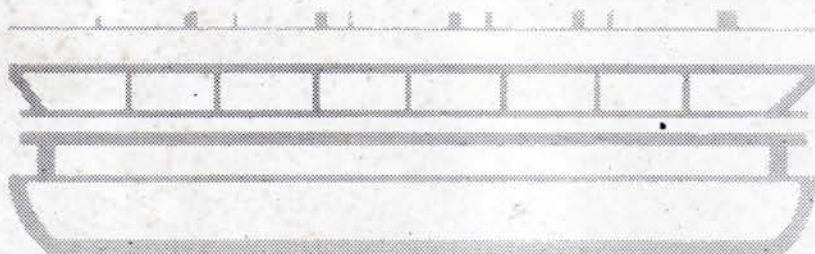
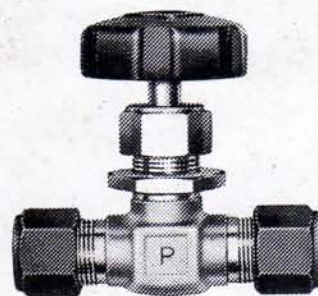
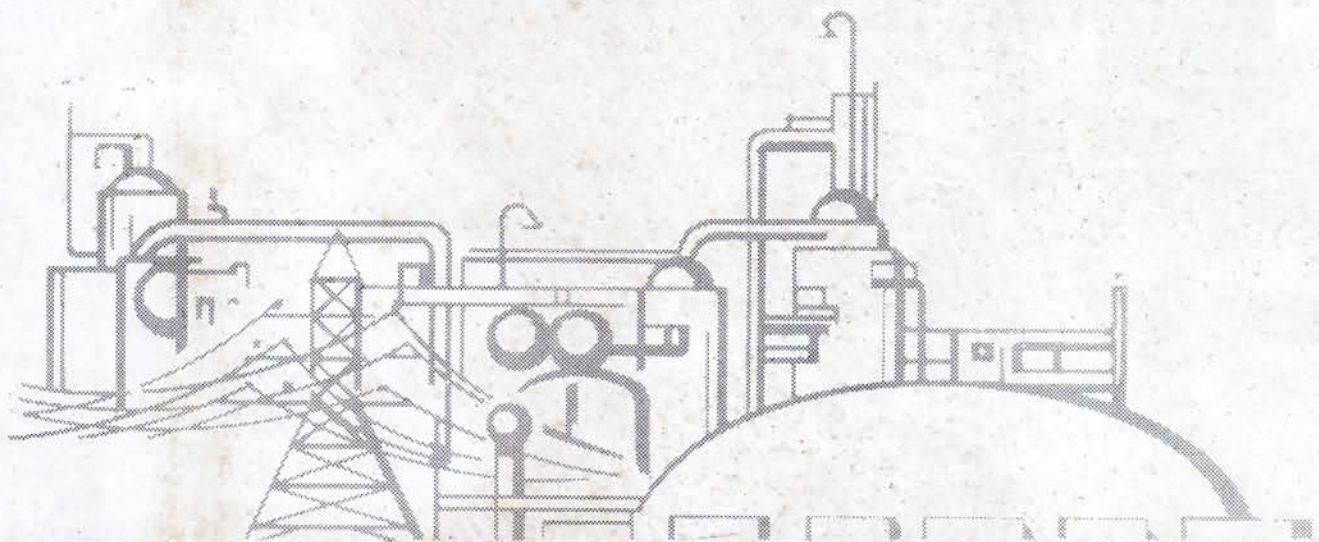


# Parker CPI Fittings and Valves

for Process, Power  
and Instrumentation



FOR PROCESS, POWER  
& INSTRUMENTATION



PARKER CPI

Your Distributor for Parker Hannifin




MATERIALS: Brass • Type 316 Stainless Steel • Steel  
Aluminum

**NOTE:** Not all of the fittings shown in Catalog 4230 are carried in standard stock. Please check current price lists for standard items.

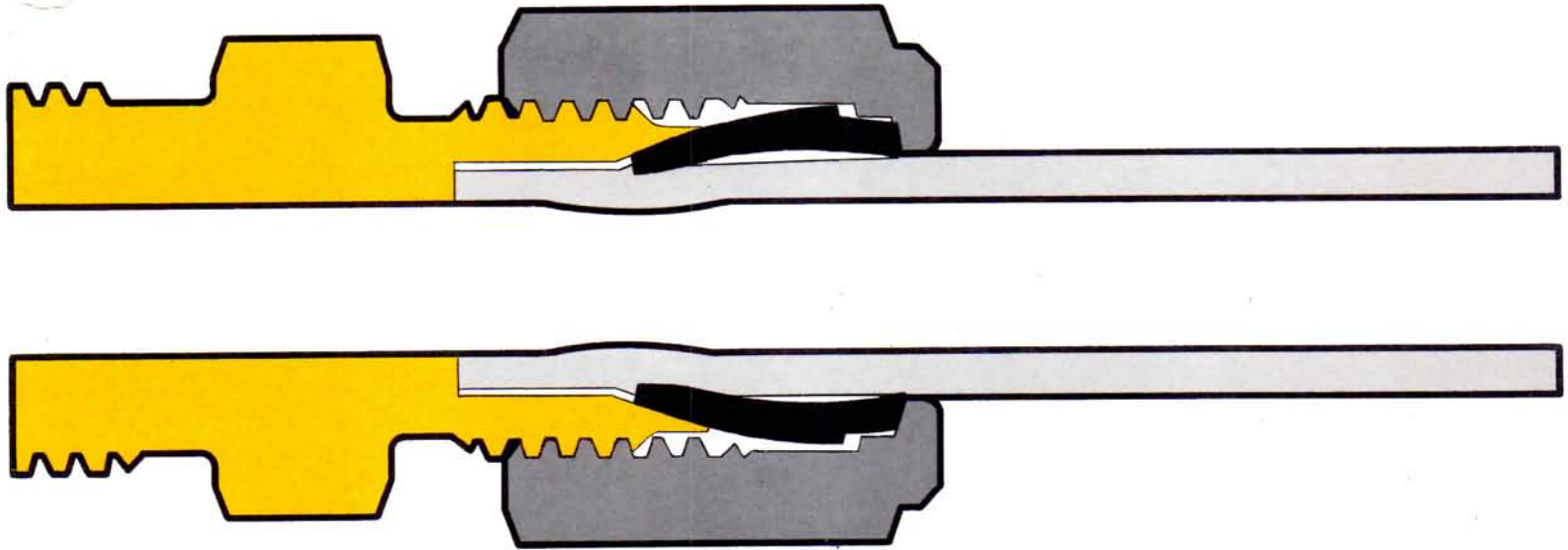
Price and delivery of non-stock items will be furnished on request. These prices and delivery will depend on quantity ordered.

**PARKER CPI**

  
**Fittings &**  
**Valves**

**FOR PROCESS, POWER  
& INSTRUMENTATION**

# PARKER CPI INSTRUMENTATION FITTINGS



The Parker CPI tube fitting has been specifically designed for use on instrumentation, process and control systems and equipment employed in chemical, petroleum, power generating, semiconductor and pulp and paper plants. The CPI tube fitting has also found extensive application in other fields where a very high-quality tube fitting is required.

## ADVANTAGES

**SINGLE FERRULE** — Provides excellent vibration resistance and temperature compensation and the integrity of two seal points. This design reduces the number of fitting pieces and simplifies assembly.

**BURNISHED SEAT** — The body seal point is roller burnished on stainless steel and monel fittings to enhance body-to-the-ferrule seal.

**NUT LUBRICATION** — In 316 stainless steel choose either the black (molybdenum disulfide coated) nut that reduces make-up torque by as much as 40 percent or the uncoated nut with silver-plated threads.

**QUALITY** — Parker CPI has a Quality Systems Certificate No. 408 issued by the ASME.

**AVAILABILITY** — Parker CPI tube fittings are available in a full line of configurations and sizes. We manufacture CPI fittings in sizes from 1/16" to 1" O.D. in brass, stainless steel (316), steel, monel and aluminum in all shapes.

Instrumentation pipe fittings are also available in stainless steel (316), brass and steel. For nuclear and other critical applications, Parker CPI stainless steel (316) fittings are available with documented heat code traceability as standard.

**ASSEMBLY** — Parker CPI fittings are sold completely assembled and ready for immediate use. Simply insert the tube until it bottoms in the fitting body. Tighten the nut finger tight. Wrench the nut 1-1/4 turns from the finger tight position in 1/4" — 1" sizes and 3/4 turn for 1/16" — 3/16" sizes.



Parker Hannifin Corporation  
Instrumentation Connectors Division  
Post Office Box 4288  
Huntsville, Alabama 35802

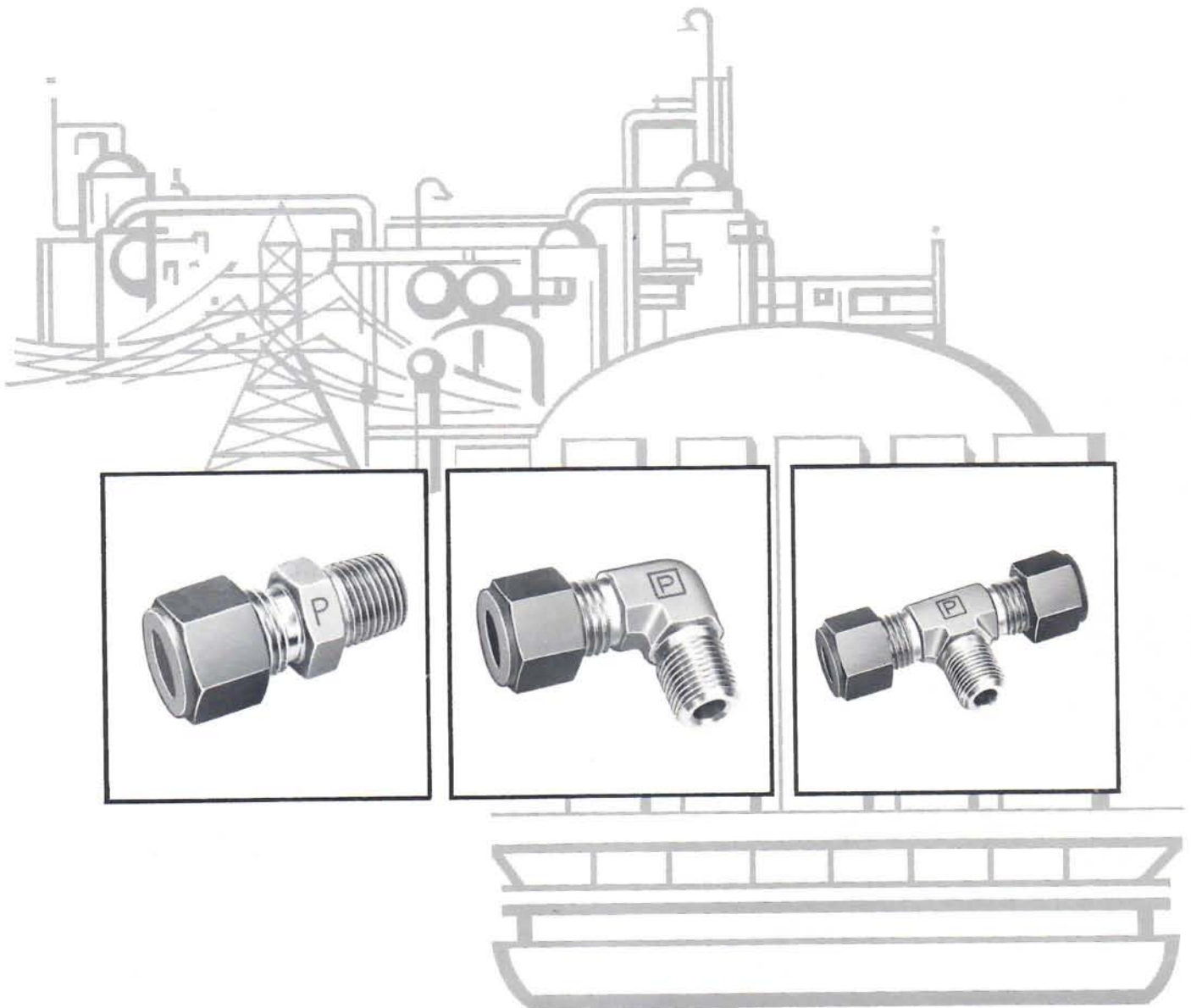




# Parker CPI Tube Fittings

for Process, Power  
and Instrumentation

Catalog No. 4230  
Revised May, 1982

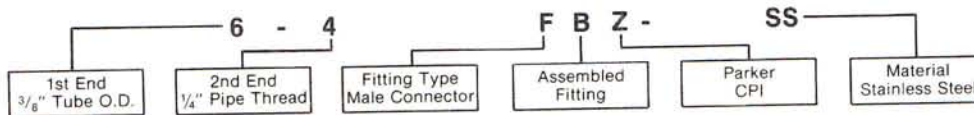


# PARKER CPI FITTING DESCRIPTION

tube to male pipe		stub tube connectors		tube to welded systems	
FBZ male connector page 5	VBZ male 45° elbow page 7	TRBZ tube end reducer page 12	T2HG tube end female adapter page 14	ZHBW socket weld connector page 19	ZEBW2 butt weld elbow page 20
FH2BZ male bulkhead connector page 5	RBZ male run tee page 7	T2H2BZ tube end bulkhead adapter page 12		ZHBW2 butt weld connector page 19	
FH4BZ thermocouple connector page 6	SBZ male branch tee page 7	ZPC port connector page 13		ZEBW socket weld elbow page 20	
CBZ male elbow page 6		T2HF tube end male adapter page 13		<b>plug and cap</b>	
<b>tube to female pipe</b>		<b>37° flare (AN) to CPI</b>		FNZ plug page 21	PNBZ cap page 21
GBZ female connector page 8	MBZ female run tee page 9	X6HBZ6 37° flare (AN) to CPI page 15	XH2BZ 37° flare bulkhead union page 15	<b>components</b>	
GH2BZ female bulkhead connector page 8	OBZ female branch tee page 9	XHBZ 37° flare union page 15		BZ tube nut page 22	L5N accessory locknut page 23
DBZ female elbow page 9		<b>tube to "O" ring seal</b>		BZP knurled nut page 22	
<b>tube to tube unions</b>		ZHBA male connector SAE straight thread page 16	T2H0A5 tube end to "O" ring straight thread page 18	TZ ferrules page 22	
HBZ union page 10	JBZ union tee page 11	ZHBF5 male connector to "O" ring pipe thread page 17		TIZ insert page 23	
WBZ bulkhead union page 10	KBZ union cross page 11	T2H0F5 tube end to "O" ring pipe thread page 17		WLZ bulkhead locknut page 23	
EBZ union elbow page 11		ZHBA5 male connector to "O" ring straight thread page 18			

## nomenclature

Parker CPI fittings part numbers are constructed from symbols that identify the size and style of the fitting and material used.  
**example:** The part number shown below is for a Parker CPI stainless steel male connector for 3/8" O.D. tube (-6) and 1/4" male pipe thread (-4).



## how to order

Parker CPI Tube Fittings are ordered by part number as listed in this catalog.

**size:** Tube and pipe thread sizes are designated by the number of sixteenths of an inch (3/8" tube = 6/16" = 6), (1/4" pipe thread = 4/16" = 4).

**straights & elbows:** Call out largest CPI tube end size first followed by the smaller CPI tube end or pipe thread size.

**tees & crosses:** For tees - first size the run (1 to 2) and then the branch (3). Example - the size designator for a male run tee for 3/8" O.D. tube and 1/4" male pipe thread would be 6-4-6. For crosses - first size the run (1 to 2) and then the branch (3 to 4).

**type:** A letter or combination of letters and numbers are used to designate the type of fitting. (i.e. F = male connector, H = union connector, etc.) See the visual index for other type fittings.

**Bz:** This is the standard CPI designator for assembled fitting with nut and ferrules.

**material:** Basic material type (B = brass, SS = stainless steel, type 316; S = steel; A = aluminum; M = Monel)

Parker CPI tube fittings, for special applications, can be furnished in almost any material suitable for machining.

**special fittings:** If there is any question as to the fitting desired, particularly for special fitting configurations, it is suggested that a sketch be submitted with the fitting order.

**availability:** Only items pricing in current price list 4230 are carried in stock. Price and delivery for non-stock items furnished on request for quantity specified.



## features

The Parker CPI tube fitting has been specifically designed for use on Instrumentation, Process and Control systems and equipment employed in Chemical, Petroleum, Power Generating and Pulp and Paper plants. The CPI tube fitting has also found extensive application in other fields where a very high quality tube fitting is required.

## materials

Parker CPI fittings are available as standard in Brass, Stainless Steel (type 316), Steel, Monel and Aluminum. Straight fittings are machined from cold finished bar stock and shaped bodies are machined from close grain forgings. The raw materials used fully conform to the chemical requirements of one or more of the specifications listed in Table 1. For nuclear and other critical applications, stainless steel CPI is readily available with documented heat code traceability.

## tubing

Parker CPI tube fittings can be used with a wide variety of tubing materials, including copper, stainless steel, steel, aluminum, glass, plastic and Monel. Teflon and nylon ferrules are available for use on glass and plastic tubing. Tubing should be selected to be compatible with the process media, temperature and pressures. Due to thermal expansion characteristics, the tubing should be of the same material as the fitting.

## torque

All Parker CPI tube fittings feature a prelubricated nut to reduce assembly torque by as much as 50%. Stainless steel CPI fittings offer the unique Parker "Black-Nut" using a bonded, inert dry-film lubricant approved per MIL-L-8937. On brass CPI fittings a clear, dry paraffin base lubricant is precisely applied to each nut. Steel CPI fittings employ a special close grained corrosion protective finish applied to bodies, nuts and ferrules to provide smooth, low torque assembly. Corrosion resistance meets or exceeds MIL-P-16232D. On Monel the lubricant is the same as S.S. As a true advantage, prelubrication of Parker CPI fittings eliminates the need for any additional thread lubricants or anti-galling compounds thereby minimizing the possibility of contaminating the fluid system.

## no distortion

In make-up, there is no undue force in an outward direction to distort the fitting body or ferrule to cause interference between the ferrule and nut. This assures that the nut will back-off freely for disassembly and permits a greater number of easy remakes.

## no twisting

Since no rotational force is imparted to the tubing during assembly, there is no tendency for the tube to turn or loosen completed joints in the same line. The tube is not prestressed by twisting; thus, better fatigue resistance is assured.

## sealing

Positive, reliable connections with PARKER CPI fittings have been qualified by exhaustive tests and over four decades of experience in the manufacture of quality tube fittings. In tests after repeated remakes, PARKER CPI fittings effected a helium seal at over 3000 psi. Vibration stand and impulse equipment tests in the multi-million cycle range prove outstanding, leakproof, fatigue resistance.

## thin wall tubing

It is possible to effect good connections with very thin wall tubing. For example: PARKER CPI fittings consistently seal helium in stainless steel tubing to 1" O.D. with a wall thickness of 0.035 inch at pressures exceeding those recommended for this size and wall thickness tubing.

**table 1 — typical raw material specifications**

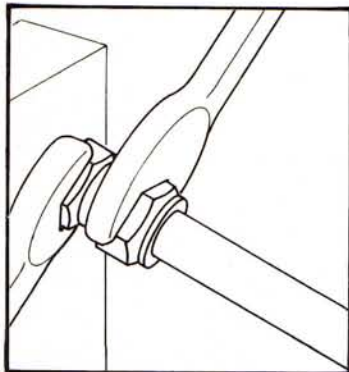
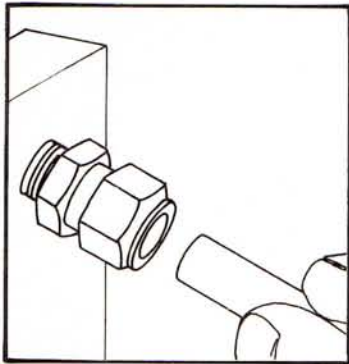
BASIC FITTING MATERIAL	BAR STOCK	FORGING	COMMON TUBING SPECIFICATIONS
BRASS	CA-360 QQ-B 626 Alloy 360 ASTM-B16 Alloy 360 CA-345 ASTM-B-453 Alloy 345	CA-377 QQ-B 626 Alloy 377 ASTM-B-124 Alloy 377	ASTM-B75 ASME-SB75
STAINLESS STEEL (Type 316) <sup>(1)</sup>	ASME-SA-479 Type 316-SS	ASME-SA-182 F316	ASME-SA-123 ASTM-A-213 ASTM-A-249 ASTM-A-269 <sup>(2)</sup> MIL-T-8504 MIL-T-8506
STEEL	ASTM-A-108 QQ-S-637	ASTM-A-576	SAE J524b SAE J525b
ALUMINUM	2017-T4 or 2024-T4 ASTM-B-211 QQ-A-225/5 or 6	2014 T (as fabricated) ASTM-B-211 QQ-A-225/4	3003, 6061
MONEL	ASTM-B-164 QQ-N-281	ASTM-B-164 QQ-N-281	Monel Tubing only ASTM-B-165

(1) If more specific information, including heat code traceability, is required, your Parker-Hannifin CPI distributor will provide details.

(2) Stainless Steel CPI fittings work reliably on both seamless and welded-redrawn, fully annealed type 304 and 316 tubing.



### assembly instructions



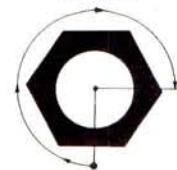
1. Parker CPI fittings are sold completely assembled and ready for immediate use. Simply insert the tube as illustrated until it bottoms in the fitting body. (If the fitting is disassembled, note that the small tapered end of the Ferrule goes into the fitting body.)
2. Tighten nut finger tight. Then tighten nut with wrench an additional 1 1/4 turns indicated below. Hold fitting body with a second wrench to prevent body from turning. It is helpful to mark the nut to facilitate counting the number of turns.

SIZE 4 thru 16  
(1/4" - 1")



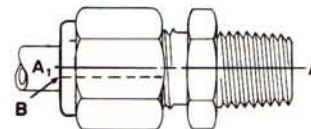
1 1/4 Turns from  
Finger Tight

SIZE 1 thru 3  
(1/16" - 3/16")



Only 3/4 Turn from  
Finger Tight is necessary  
to seal and will result  
in additional remakes  
of the fitting

For maximum number of remakes, mark the fitting and nut (scribe or ink) before disassembly. Remake by tightening until marks line up again. A slight torque rise will be felt indicating the ferrule is being re-sprung into sealing position. Only after several remakes may it become necessary to advance the nut slightly past original position. This advance (indicated by B) need only be 10°-20° (less than 1/3 of a hex flat).

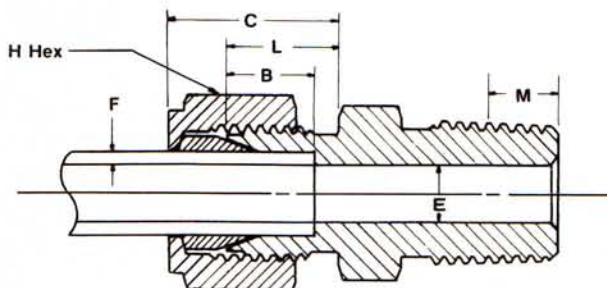


**NOTE:** All assembled fittings in this catalog are shown in the Finger Tight Position.

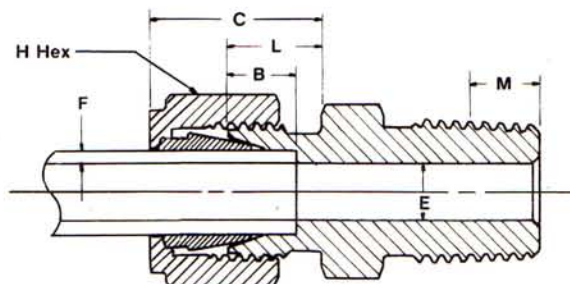
### tube end dimensional data

Size No.	Tube O.D.	NPT Pipe Thread	Straight Thread	†L		†B		†C		H Hex		M †Min. Thrd. Engagement		E Dia.		F Recom. Min. Tube Wall	
				in	mm	in	mm	in	mm	in	mm	in	mm	in	mm		
1	1/16	1/16-27	10-32	.288	7.32	.190	4.83	.47	11.94	5/16	7.13	.16	4.06	.052	1.32	.010	.25
2	1/8	1/8-27	5/16-20	.350	8.89	.250	6.35	.61	15.49	7/16	11.11	.18	4.57	.093	2.36	.016	.41
3	3/16	1/8-27	3/8-20	.382	9.70	.281	7.14	.65	16.51	1/2	12.70	.18	4.57	.125	3.18	.018	.46
4	1/4	1/8-27	7/16-20	.404	10.26	.302	7.67	.70	17.78	9/16	14.29	.18	4.57	.187	4.75	.020	.51
5	5/16	1/8-27	1/2-20	.437	11.11	.332	8.43	.75	19.05	5/8	15.88	.18	4.57	.187	4.75	.028	.71
6	3/8	1/4-18	9/16-20	.466	11.84	.365	9.27	.78	19.81	11/16	17.46	.20	5.08	.281	7.14	.028	.71
8	1/2	3/8-18	3/4-20	.476	12.09	.500	12.70	.91	23.11	7/8	22.23	.24	6.10	.406	10.31	.028	.71
10	5/8	1/2-14	7/8-20	.476	12.09	.562	14.27	.89	22.61	1	25.40	.32	8.13	.500	12.70	.032	.81
12	3/4	3/4-14	1-20	.476	12.09	.562	14.27	.89	22.61	1 1/8	28.58	.34	8.64	.625	15.88	.032	.81
14	7/8	3/4-14	1 1/8-20	.476	12.09	.625	15.88	.89	22.61	1 1/4	31.75	.34	8.64	.750	19.05	.032	.81
16	1	1-11 1/2	1 5/16-20	.570	14.48	.750	19.05	1.06	26.92	1 1/2	38.10	.40	10.16	.875	22.33	.032	.81

†Average Value



Sizes 1 to 6

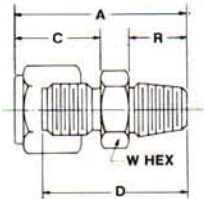


Sizes 8 to 16

**NOTE:** Dimension C is shown in the finger tight position.

**male connector  
FBZ**

includes body, nut and ferrule

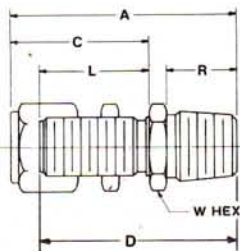


PART NO.	INCHES			†A		†C		D		R	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm
1-1 FBZ	1/16	1/16	5/16	.97	24.6	.47	11.9	.78	19.8	.38	9.7
1-2 FBZ	1/16	1/8	7/16	1.03	26.1	.47	11.9	.84	21.3	.38	9.7
1-4 FBZ	1/16	1/4	9/16	1.25	31.8	.47	11.9	1.06	26.9	.56	14.2
2-1 FBZ	1/8	1/16	3/8	1.18	30.0	.61	15.5	.91	23.1	.38	9.7
2-2 FBZ	1/8	1/8	7/16	1.18	30.0	.61	15.5	.91	23.1	.38	9.7
2-4 FBZ	1/8	1/4	9/16	1.40	35.6	.61	15.5	1.13	28.7	.56	14.2
3-1 FBZ	3/16	1/16	7/16	1.22	31.0	.65	16.5	.95	24.1	.38	9.7
3-2 FBZ	3/16	1/8	7/16	1.22	31.0	.65	16.5	.95	24.1	.38	9.7
3-4 FBZ	3/16	1/4	9/16	1.43	46.0	.65	16.5	1.16	29.5	.56	14.2
4-2 FBZ	1/4	1/8	1/2	1.29	32.8	.70	17.8	1.00	25.4	.38	9.7
4-4 FBZ	1/4	1/4	9/16	1.48	37.6	.70	17.8	1.19	30.2	.56	14.2
4-6 FBZ	1/4	3/8	1 1/16	1.51	38.4	.70	17.8	1.22	31.0	.56	14.2
4-8 FBZ	1/4	1/2	7/8	1.73	43.9	.70	17.8	1.44	36.6	.75	19.1
5-2 FBZ	5/16	1/8	9/16	1.36	34.5	.75	19.1	1.05	26.7	.38	9.7
5-4 FBZ	5/16	1/4	9/16	1.54	39.1	.75	19.1	1.23	31.2	.56	14.2
6-2 FBZ	3/8	1/8	5/8	1.40	35.6	.78	19.8	1.09	27.7	.38	9.7
6-4 FBZ	3/8	1/4	5/8	1.59	40.4	.78	19.8	1.28	32.5	.56	14.2
6-6 FBZ	3/8	3/8	1 1/16	1.59	40.4	.78	19.8	1.28	32.5	.56	14.2
6-8 FBZ	3/8	1/2	7/8	1.81	46.0	.78	19.8	1.50	38.1	.75	19.1
8-4 FBZ	1/2	1/4	1 3/16	1.75	44.5	.91	23.1	1.31	33.3	.56	14.2
8-6 FBZ	1/2	3/8	1 3/16	1.75	44.5	.91	23.1	1.31	33.3	.56	14.2
8-8 FBZ	1/2	1/2	7/8	1.94	49.3	.91	23.1	1.50	38.1	.75	19.1
8-12 FBZ	1/2	3/4	1 1/16	1.97	50.0	.91	23.1	1.53	38.9	.75	19.1
10-6 FBZ	5/8	3/8	1 5/16	1.76	44.7	.89	22.6	1.34	34.0	.56	14.2
10-8 FBZ	5/8	1/2	1 5/16	1.95	49.5	.89	22.6	1.53	38.9	.75	19.1
12-8 FBZ	3/4	1/2	1 1/16	2.01	51.1	.89	22.6	1.59	40.4	.75	19.1
12-12 FBZ	3/4	3/4	1 1/16	2.01	51.1	.89	22.6	1.59	40.4	.75	19.1
14-12 FBZ	7/8	3/4	1 3/16	2.01	51.1	.89	22.6	1.59	40.4	.75	19.1
16-12 FBZ	1	3/4	1 3/8	2.28	57.9	1.06	26.9	1.78	45.2	.75	19.1
16-16 FBZ	1	1	1 3/8	2.47	62.7	1.06	26.9	1.97	50.0	.94	23.9

†Average Value

**male bulkhead connector  
FH2BZ**

includes body, nut, ferrule, and locknut

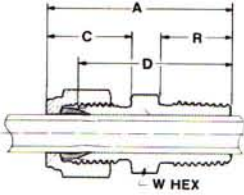


PART NO.	INCHES			A		†C		D		L		R	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm
1-1 FH2BZ	1/16	1/16	3/8	1.60	40.6	1.03	26.2	1.41	35.8	.84	21.3	.38	9.7
1-2 FH2BZ	1/16	1/8	7/16	1.60	40.6	1.03	26.2	1.41	35.8	.84	21.3	.38	9.7
2-2 FH2BZ	1/8	1/8	1/2	1.83	46.4	1.24	31.5	1.56	39.6	.97	24.6	.38	9.7
3-2 FH2BZ	3/16	1/8	9/16	1.86	47.3	1.27	32.3	1.59	40.3	1.00	25.4	.38	9.7
4-2 FH2BZ	1/4	1/8	5/8	1.95	49.5	1.32	33.5	1.66	42.2	1.03	26.2	.38	9.7
4-4 FH2BZ	1/4	1/4	5/8	2.17	55.1	1.32	33.5	1.88	47.8	1.03	26.2	.56	14.2
4-6 FH2BZ	1/4	3/8	1 1/16	2.18	55.4	1.32	33.5	1.89	48.0	1.03	26.2	.56	14.2
4-8 FH2BZ	1/4	1/2	7/8	2.48	63.0	1.32	33.5	2.19	55.6	1.03	26.2	.75	19.1
5-2 FH2BZ	5/16	1/8	7/16	2.08	52.8	1.44	36.6	1.77	45.0	1.13	28.7	.38	9.7
5-4 FH2BZ	5/16	1/4	1 1/16	2.28	57.9	1.44	36.6	1.97	50.0	1.13	28.7	.56	14.2
6-2 FH2BZ	3/8	1/8	3/4	2.12	53.8	1.47	37.3	1.81	45.9	1.16	29.5	.38	9.7
6-4 FH2BZ	3/8	1/4	3/4	2.31	58.7	1.47	37.3	2.00	50.8	1.16	29.5	.56	14.2
6-6 FH2BZ	3/8	3/8	3/4	2.33	59.2	1.47	37.3	2.02	51.3	1.16	29.5	.56	14.2
6-8 FH2BZ	3/8	1/2	7/8	2.62	66.5	1.47	37.3	2.31	58.7	1.16	29.5	.75	19.1
8-4 FH2BZ	1/2	1/4	1 5/16	2.58	65.5	1.69	42.9	2.14	54.4	1.25	31.8	.56	14.2
8-6 FH2BZ	1/2	3/8	1 5/16	2.58	65.5	1.69	42.9	2.14	54.4	1.25	31.8	.56	14.2
8-8 FH2BZ	1/2	1/2	1 5/16	2.86	72.6	1.69	42.9	2.42	61.5	1.25	31.8	.75	19.1
8-12 FH2BZ	1/2	3/4	1 1/8	2.86	72.6	1.69	42.9	2.42	61.5	1.25	31.8	.75	19.1
10-6 FH2BZ	5/8	3/8	1 1/16	2.64	67.1	1.70	43.2	2.22	56.4	1.28	32.5	.56	14.2
10-8 FH2BZ	5/8	1/2	1 1/16	2.80	71.1	1.70	43.2	2.38	60.5	1.28	32.5	.75	19.1
12-8 FH2BZ	3/4	1/2	1 3/16	3.05	77.5	1.89	48.0	2.63	66.8	1.47	37.3	.75	19.1
12-12 FH2BZ	3/4	3/4	1 3/16	3.06	77.7	1.89	48.0	2.64	67.1	1.47	37.3	.75	19.1
14-12 FH2BZ	7/8	3/4	1 5/16	3.26	82.8	2.11	53.6	2.84	72.1	1.69	42.9	.75	19.1
16-12 FH2BZ	1	3/4	1 9/16	3.55	90.1	2.28	57.9	3.05	77.5	1.78	45.2	.75	19.1
16-16 FH2BZ	1	1	1 9/16	3.73	94.7	2.28	57.9	3.23	82.0	1.78	45.2	.94	23.9

†Average Value

### thermocouple connector FH4BZ

includes body, nut and ferrule

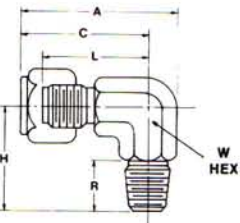


PART NO.	INCHES			†A		†C		D		R	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm
1-1 FH4BZ	1/16	1/16	5/16	.97	24.6	.47	11.9	.78	19.8	.38	9.7
1-2 FH4BZ	1/16	1/8	7/16	1.03	26.1	.47	11.9	.84	21.3	.38	9.7
2-1 FH4BZ	1/8	1/16	3/8	1.18	30.0	.61	15.5	.91	23.1	.38	9.7
2-2 FH4BZ	1/8	1/8	7/16	1.18	30.0	.61	15.5	.91	23.1	.38	9.7
2-4 FH4BZ	1/8	1/4	9/16	1.40	35.5	.61	15.5	1.13	28.7	.56	14.2
3-2 FH4BZ	3/16	1/8	7/16	1.22	31.0	.65	16.5	.95	24.1	.38	9.7
3-4 FH4BZ	3/16	1/4	9/16	1.43	36.0	.65	16.5	1.16	29.5	.56	14.2
4-2 FH4BZ	1/4	1/8	1/2	1.29	32.8	.70	17.8	1.00	25.4	.38	9.7
4-4 FH4BZ	1/4	1/4	9/16	1.48	37.6	.70	17.8	1.19	30.2	.56	14.2
5-4 FH4BZ	5/16	1/4	9/16	1.54	39.1	.75	19.1	1.23	31.2	.56	14.2
6-4 FH4BZ	3/8	1/4	5/8	1.59	40.4	.78	19.8	1.28	32.5	.56	14.2
6-6 FH4BZ	3/8	3/8	1 1/16	1.59	40.4	.78	19.8	1.28	32.5	.56	14.2
6-8 FH4BZ	3/8	1/2	7/8	1.81	46.0	.78	19.8	1.50	38.1	.75	19.1
8-8 FH4BZ	1/2	1/2	7/8	1.94	49.3	.91	23.1	1.50	38.1	.75	19.1
10-12 FH4BZ	5/8	3/4	1 1/16	2.01	51.1	.89	22.6	1.59	40.4	.75	19.1
12-12 FH4BZ	3/4	3/4	1 1/16	2.01	51.1	.89	22.6	1.59	40.4	.75	19.1
16-16 FH4BZ	1	1	1 3/8	2.47	62.7	1.06	26.9	1.97	50.0	.94	23.9

†Average Value

### male elbow CBZ

includes body, nut and ferrule

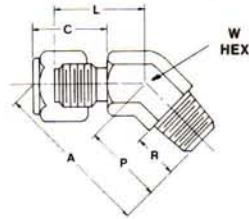


PART NO.	INCHES			†A		†C		H		L		R	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm
1-1 CBZ	1/16	1/16	5/16	.92	23.4	.75	19.1	.72	18.3	.56	14.2	.38	9.7
1-2 CBZ	1/16	1/8	5/16	.92	23.4	.75	19.1	.72	18.3	.56	14.2	.38	9.7
2-2 CBZ	1/8	1/8	5/16	1.10	27.9	.93	23.6	.72	18.3	.66	16.8	.38	9.7
2-4 CBZ	1/8	1/4	9/16	1.31	33.3	.99	25.2	.94	23.9	.72	18.3	.56	14.2
3-2 CBZ	3/16	1/8	3/8	1.17	29.7	.96	24.4	.75	19.1	.69	17.5	.38	9.7
4-2 CBZ	1/4	1/8	7/16	1.25	31.8	1.01	25.7	.78	19.8	.72	18.3	.38	9.7
4-4 CBZ	1/4	1/4	9/16	1.38	35.0	1.07	27.1	.94	23.9	.78	19.8	.56	14.2
4-6 CBZ	1/4	3/8	3/4	1.58	40.1	1.17	29.7	1.12	28.5	.88	22.4	.56	14.2
4-8 CBZ	1/4	1/2	7/8	1.74	44.2	1.26	32.0	1.31	33.3	.97	24.6	.75	19.1
5-2 CBZ	5/16	1/8	1/2	1.40	35.6	1.12	28.5	.81	20.6	.81	20.6	.38	9.7
5-4 CBZ	5/16	1/4	9/16	1.44	36.6	1.12	28.5	1.00	25.4	.81	20.6	.56	14.2
6-2 CBZ	3/8	1/8	9/16	1.47	37.3	1.15	29.2	.88	22.4	.84	21.3	.38	9.7
6-4 CBZ	3/8	1/4	9/16	1.47	37.3	1.15	29.2	1.00	25.4	.84	21.3	.56	14.2
6-6 CBZ	3/8	3/8	3/4	1.69	42.9	1.28	32.5	1.12	28.5	.97	24.6	.56	14.2
6-8 CBZ	3/8	1/2	7/8	1.82	46.2	1.34	34.0	1.31	33.3	1.03	26.2	.75	19.1
8-4 CBZ	1/2	1/4	3/4	1.82	46.2	1.41	35.8	1.12	28.5	.97	24.6	.56	14.2
8-6 CBZ	1/2	3/8	3/4	1.82	46.2	1.41	35.8	1.12	28.5	.97	24.6	.56	14.2
8-8 CBZ	1/2	1/2	7/8	1.95	49.5	1.47	37.3	1.31	33.3	1.03	26.2	.75	19.1
8-12 CBZ	1/2	3/4	1 1/16	2.19	55.6	1.60	40.6	1.50	38.1	1.16	29.5	.75	19.1
10-6 CBZ	5/8	3/8	7/8	1.93	49.0	1.45	36.8	1.25	31.8	1.03	26.2	.56	14.2
10-8 CBZ	5/8	1/2	7/8	1.93	49.0	1.45	36.8	1.38	35.1	1.03	26.2	.75	19.1
12-8 CBZ	3/4	1/2	1 1/16	2.17	55.1	1.58	40.1	1.50	38.1	1.16	29.5	.75	19.1
12-12 CBZ	3/4	3/4	1 1/16	2.17	55.1	1.58	40.1	1.50	38.1	1.16	29.5	.75	19.1
14-12 CBZ	7/8	3/4	1 5/16	2.36	59.9	1.70	43.2	1.50	38.1	1.28	32.5	.75	19.1
16-12 CBZ	1	3/4	1 5/16	2.53	64.3	1.81	46.0	1.66	42.2	1.31	33.3	.75	19.1
16-16 CBZ	1	1	1 5/16	2.53	64.3	1.81	46.0	1.84	46.7	1.31	33.3	.94	23.9

†Average Value

**male 45° elbow  
VBZ**

includes body, nut and ferrule

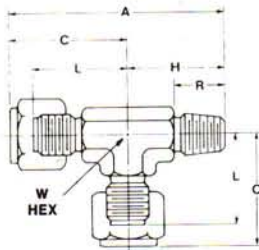


PART NO.	INCHES			†A		†C		L		P		R	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm
1-1 VBZ	1/16	1/16	5/16	1.01	25.7	.47	11.9	.44	11.2	.56	14.2	.38	9.7
2-2 VBZ	1/8	1/8	5/16	1.13	28.7	.61	15.5	.53	13.5	.52	13.2	.38	9.7
3-2 VBZ	3/16	1/8	3/8	1.11	28.2	.65	16.8	.56	14.2	.52	13.2	.38	9.7
4-2 VBZ	1/4	1/8	7/16	1.24	31.5	.70	17.8	.56	14.2	.64	16.3	.38	9.7
4-4 VBZ	1/4	1/4	9/16	1.53	38.9	.70	17.8	.66	16.8	.86	21.8	.56	14.2
5-2 VBZ	5/16	1/8	1/2	1.28	32.5	.75	19.1	.59	15.0	.64	16.3	.38	9.7
6-4 VBZ	3/8	1/4	9/16	1.59	40.4	.78	19.8	.72	18.3	.86	21.8	.56	14.2
8-6 VBZ	1/2	3/8	3/4	1.79	45.5	.91	23.1	.75	19.1	.95	24.1	.56	14.2
10-8 VBZ	5/8	1/2	7/8	2.04	51.8	.89	22.4	.81	20.6	1.17	29.7	.75	19.1
12-12 VBZ	3/4	3/4	1 1/16	2.09	53.1	.89	22.4	.84	21.3	1.20	30.5	.75	19.1
14-12 VBZ	7/8	3/4	1 3/16	2.24	56.9	.89	22.4	.94	23.9	1.27	32.3	.75	19.1
16-16 VBZ	1	1	1 5/16	2.68	68.1	1.06	26.9	1.19	30.2	1.48	37.6	.94	23.9

†Average Value

**male run tee  
RBZ**

includes body, nut and ferrule

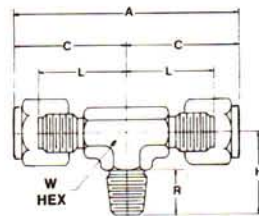


PART NO.	INCHES			†A		†C		H		L		R	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm
2-2-2 RBZ	1/8	1/8	5/16	1.68	42.6	.93	23.6	.75	19.1	.66	16.8	.38	9.7
3-2-3 RBZ	3/16	1/8	3/8	1.71	43.4	.96	24.4	.75	19.1	.69	17.5	.38	9.7
4-2-4 RBZ	1/4	1/8	7/16	1.79	45.5	1.01	25.7	.78	19.8	.72	18.3	.38	9.7
4-4-4 RBZ	1/4	1/4	9/16	2.01	51.1	1.07	27.2	.94	23.9	.78	19.8	.56	14.2
5-2-5 RBZ	5/16	1/8	1/2	1.93	49.0	1.12	28.5	.81	20.6	.81	20.6	.38	9.7
6-4-6 RBZ	3/8	1/4	9/16	2.16	54.9	1.16	29.5	1.00	25.4	.84	21.3	.56	14.2
8-6-8 RBZ	1/2	3/8	3/4	2.53	64.3	1.41	35.8	1.12	28.5	.97	24.6	.56	14.2
8-8-8 RBZ	1/2	1/2	7/8	2.78	70.6	1.47	37.3	1.31	33.3	1.03	26.2	.75	19.1
10-8-10 RBZ	5/8	1/2	7/8	2.83	71.9	1.45	36.8	1.38	35.1	1.03	26.2	.75	19.1
12-12-12 RBZ	3/4	3/4	1 1/16	3.08	78.2	1.58	40.1	1.50	38.1	1.16	29.5	.75	19.1
14-12-14 RBZ	7/8	3/4	1 3/16	3.20	81.3	1.70	43.2	1.50	38.1	1.28	32.5	.75	19.1
16-12-16 RBZ	1	3/4	1 5/16	3.47	88.1	1.81	46.0	1.66	42.2	1.31	33.3	.75	19.1
16-16-16 RBZ	1	1	1 5/16	3.65	92.7	1.81	46.0	1.84	46.7	1.31	33.3	.94	23.9

†Average Value

**male branch tee  
SBZ**

includes body, nut and ferrule

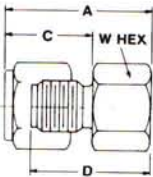


PART NO.	INCHES			†A		†C		H		L		R	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm
2-2-2 SBZ	1/8	1/8	5/16	1.86	47.2	.93	23.6	.75	19.1	.66	16.8	.38	9.7
3-3-2 SBZ	3/16	1/8	3/8	1.92	48.8	.96	24.4	.75	19.1	.69	17.5	.38	9.7
4-4-2 SBZ	1/4	1/8	7/16	2.02	51.3	1.01	25.7	.78	19.8	.72	18.3	.38	9.7
4-4-4 SBZ	1/4	1/4	9/16	2.14	54.4	1.07	27.2	1.00	25.4	.78	19.8	.56	14.2
5-5-2 SBZ	5/16	1/8	1/2	2.24	56.9	1.12	28.5	.81	20.6	.81	20.6	.38	9.7
6-6-4 SBZ	3/8	1/4	9/16	2.32	58.9	1.16	29.5	1.00	25.4	.84	21.3	.56	14.2
8-8-6 SBZ	1/2	3/8	3/4	2.82	71.6	1.41	35.8	1.12	28.5	.97	24.6	.56	14.2
8-8-8 SBZ	1/2	1/2	7/8	2.94	74.7	1.47	37.3	1.31	33.3	1.03	26.2	.75	19.1
10-10-8 SBZ	5/8	1/2	7/8	2.90	73.7	1.45	36.8	1.38	35.1	1.03	26.2	.75	19.1
12-12-12 SBZ	3/4	3/4	1 1/16	3.16	80.3	1.58	40.1	1.50	38.1	1.16	29.5	.75	19.1
14-14-12 SBZ	7/8	3/4	1 3/16	3.40	86.4	1.70	43.2	1.50	38.1	1.28	32.5	.75	19.1
16-16-12 SBZ	1	3/4	1 5/16	3.62	92.0	1.81	46.0	1.66	42.2	1.31	33.3	.75	19.1
16-16-16 SBZ	1	1	1 5/16	3.62	92.0	1.81	46.0	1.84	46.7	1.31	33.3	.94	23.9

†Average Value

### female connector GBZ

includes body, nut and ferrule

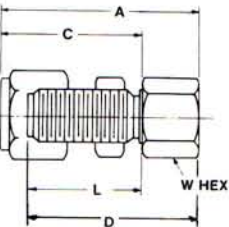


PART NO.	INCHES			†A		†C		D	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm
1-1 GBZ	1/16	1/16	7/16	.97	24.6	.47	11.9	.78	19.8
2-2 GBZ	1/8	1/8	9/16	1.15	29.2	.61	15.5	.88	22.4
2-4 GBZ	1/8	1/4	3/4	1.33	33.8	.61	15.5	1.06	26.9
3-2 GBZ	3/16	1/8	9/16	1.18	30.0	.65	16.5	.91	23.1
3-4 GBZ	3/16	1/4	3/4	1.36	34.5	.65	16.5	1.09	27.7
4-2 GBZ	1/4	1/8	9/16	1.23	31.2	.70	17.8	.94	23.9
4-4 GBZ	1/4	1/4	3/4	1.42	36.1	.70	17.8	1.13	28.7
4-8 GBZ	1/4	1/2	1 1/8	.73	43.9	.70	17.8	1.44	36.6
5-2 GBZ	5/16	1/8	9/16	1.28	32.5	.75	19.1	.97	24.6
5-4 GBZ	5/16	1/4	3/4	1.47	37.3	.75	19.1	1.16	29.5
6-2 GBZ	3/8	1/8	5/8	1.31	33.3	.78	19.8	1.00	25.4
6-4 GBZ	3/8	1/4	3/4	1.50	38.1	.78	19.8	1.19	30.2
6-6 GBZ	3/8	3/8	7/8	1.55	39.6	.78	19.8	1.25	31.8
6-8 GBZ	3/8	1/2	1 1/8	1.75	44.5	.78	19.8	1.44	36.6
8-4 GBZ	1/2	1/4	13/16	1.69	42.9	.91	23.1	1.25	31.8
8-6 GBZ	1/2	3/8	7/8	1.69	42.9	.91	23.1	1.25	31.8
8-8 GBZ	1/2	1/2	1 1/8	1.88	47.8	.91	23.1	1.44	36.6
10-6 GBZ	5/8	3/8	15/16	1.67	42.4	.89	22.6	1.25	31.8
10-8 GBZ	5/8	1/2	1 1/8	1.86	47.2	.89	22.6	1.44	36.6
12-8 GBZ	3/4	1/2	1 1/8	1.86	47.2	.89	22.6	1.44	36.6
12-12 GBZ	3/4	3/4	1 3/8	1.92	48.8	.89	22.6	1.50	38.1
14-12 GBZ	7/8	3/4	1 3/8	1.97	50.0	.89	22.6	1.56	39.6
16-16 GBZ	1	1	1 5/8	2.47	62.7	1.06	26.9	1.97	50.0

†Average Value

### female bulkhead connector GH2BZ

includes body, nut, ferrule, and locknut

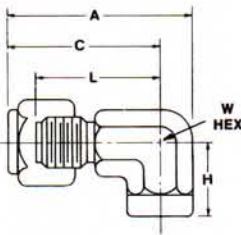


PART NO.	INCHES			†A		†C		D		L	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm
2-2 GH2BZ	1/8	1/8	9/16	1.77	45.0	1.24	31.5	1.50	38.1	.97	24.6
3-2 GH2BZ	3/16	1/8	9/16	1.80	45.7	1.27	32.2	1.53	38.9	1.00	25.4
4-2 GH2BZ	1/4	1/8	5/8	1.85	47.0	1.32	33.5	1.56	39.6	1.03	26.2
4-4 GH2BZ	1/4	1/4	3/4	2.04	51.8	1.32	33.5	1.75	44.4	1.03	26.2
5-2 GH2BZ	5/16	1/8	1 1/16	1.97	50.0	1.44	36.6	1.66	42.2	1.13	28.7
6-4 GH2BZ	3/8	1/4	3/4	2.19	55.6	1.47	37.3	1.88	47.8	1.16	29.5
8-6 GH2BZ	1/2	3/8	15/16	2.47	62.7	1.69	42.9	2.03	51.6	1.25	31.8
8-8 GH2BZ	1/2	1/2	1 1/8	2.66	67.6	1.69	42.9	2.25	57.2	1.25	31.8
10-8 GH2BZ	5/8	1/2	1 1/8	2.67	67.8	1.70	43.2	2.25	57.2	1.28	32.5
12-12 GH2BZ	3/4	3/4	1 3/8	2.92	74.2	1.89	48.0	2.50	63.5	1.47	37.3
14-12 GH2BZ	7/8	3/4	1 3/8	3.20	81.3	2.11	53.6	2.78	70.6	1.69	42.9
16-16 GH2BZ	1	1	1 5/8	3.69	93.7	2.28	57.9	3.19	81.0	1.78	45.2

†Average Value

**female elbow  
DBZ**

includes body, nut and ferrule

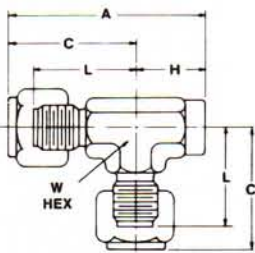


PART NO.	INCHES			†A		†C		H		L	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm
1-1 DBZ	1/16	1/16	7/16	1.00	25.4	.75	19.1	.56	14.2	.56	14.2
1-2 DBZ	1/16	1/8	1/2	1.16	29.5	.85	21.6	.75	19.1	.66	16.8
2-2 DBZ	1/8	1/8	1/2	1.30	33.0	.99	25.1	.75	19.1	.72	18.3
2-4 DBZ	1/8	1/4	3/4	1.52	38.6	1.11	28.2	.84	21.3	.84	21.3
3-2 DBZ	3/16	1/8	1/2	1.33	33.8	1.02	25.9	.75	19.1	.75	19.1
4-2 DBZ	1/4	1/8	1/2	1.38	35.0	1.07	27.2	.75	19.1	.78	19.8
4-4 DBZ	1/4	1/4	3/4	1.63	41.4	1.20	30.4	.84	21.3	.91	23.1
5-2 DBZ	5/16	1/8	9/16	1.43	36.3	1.12	28.5	.75	19.1	.81	20.6
5-4 DBZ	5/16	1/4	3/4	1.69	42.9	1.25	31.8	.88	22.4	.94	23.9
6-2 DBZ	3/8	1/8	9/16	1.46	37.1	1.15	29.2	.75	19.1	.84	21.3
6-4 DBZ	3/8	1/4	9/16	1.71	43.4	1.28	32.5	.84	21.3	.97	24.6
6-6 DBZ	3/8	3/8	7/8	1.84	46.7	1.34	34.0	.84	21.3	1.03	26.2
8-4 DBZ	1/2	1/4	3/4	1.84	46.7	1.41	35.8	.91	23.1	.97	24.6
8-6 DBZ	1/2	3/8	3/4	1.97	50.0	1.47	37.3	.91	23.1	1.03	26.2
8-8 DBZ	1/2	1/2	1 1/16	2.19	55.6	1.57	39.9	1.13	28.7	1.13	28.7
10-6 DBZ	5/8	3/8	7/8	1.97	50.0	1.47	37.3	.91	21.3	1.03	26.2
10-8 DBZ	5/8	1/2	7/8	2.17	55.1	1.55	39.3	1.13	28.7	1.13	28.7
12-8 DBZ	3/4	1/2	1 1/16	2.20	55.8	1.58	40.1	1.13	28.7	1.16	29.4
12-12 DBZ	3/4	3/4	1 1/16	2.42	61.5	1.67	42.4	1.25	31.8	1.25	31.8
14-12 DBZ	7/8	3/4	1 5/16	2.42	61.5	1.67	42.4	1.25	31.8	1.25	31.8
16-12 DBZ	1	3/4	1 5/16	2.56	65.0	1.81	46.0	1.25	31.8	1.31	33.2
16-16 DBZ	1	1	1 5/16	2.91	73.9	2.03	51.6	1.50	38.1	1.53	38.9

†Average Value

**female run tee  
MBZ**

includes body, nut and ferrule

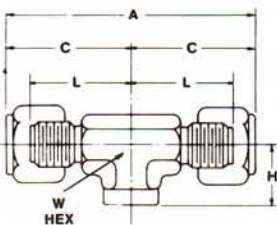


PART NO.	INCHES			†A		†C		H		L	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm
2-2-2 MBZ	1/8	1/8	1/2	1.74	44.2	.99	25.1	.75	19.1	.72	18.3
3-2-3 MBZ	3/16	1/8	1/2	1.77	45.0	1.02	25.9	.75	19.1	.75	19.1
4-2-4 MBZ	1/4	1/8	1/2	1.85	47.0	1.07	27.2	.75	19.1	.78	19.8
4-4-4 MBZ	1/4	1/4	3/4	2.11	53.6	1.20	30.4	.84	21.3	.91	23.1
5-2-5 MBZ	5/16	1/8	9/16	1.93	49.0	1.12	28.5	.75	19.1	.81	20.6
6-4-6 MBZ	3/8	1/4	3/4	2.25	57.2	1.28	32.5	.84	21.3	.97	24.6
8-6-8 MBZ	1/2	3/8	7/8	2.50	63.5	1.47	37.3	.91	23.1	1.03	26.6
10-8-10 MBZ	5/8	1/2	1 1/16	2.68	68.1	1.55	39.3	1.13	28.7	1.13	28.7
12-12-12 MBZ	3/4	3/4	1 5/16	2.92	74.2	1.67	42.4	1.25	31.8	1.25	31.8
14-12-14 MBZ	7/8	3/4	1 5/16	2.92	74.2	1.67	42.4	1.25	31.8	1.25	31.8
16-12-16 MBZ	1	3/4	1 5/16	3.12	79.2	1.81	46.0	1.25	31.8	1.31	33.2
16-16-16 MBZ	1	1	1 5/16	3.56	90.4	2.03	51.6	1.50	38.1	1.53	38.9

†Average Value

**female branch tee  
OBZ**

includes body, nut and ferrule

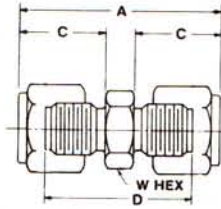


PART NO.	INCHES			†A		†C		H		L	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm
2-2-2 OBZ	1/8	1/8	1/2	1.98	50.3	.99	25.1	.75	19.1	.72	18.3
3-3-2 OBZ	3/16	1/8	1/2	2.04	51.8	1.02	25.9	.75	19.1	.75	19.1
4-4-2 OBZ	1/4	1/8	1/2	2.14	54.4	1.07	27.2	.75	19.1	.78	19.8
4-4-4 OBZ	1/4	1/4	3/4	2.40	61.0	1.20	30.4	.84	21.3	.91	23.1
5-5-2 OBZ	5/16	1/8	9/16	2.24	56.9	1.12	28.5	.75	19.1	.81	20.6
6-6-4 OBZ	3/8	1/4	3/4	2.56	65.0	1.28	32.5	.84	21.3	.97	24.6
8-8-6 OBZ	1/2	3/8	7/8	2.94	74.7	1.47	37.3	.91	23.1	1.03	26.6
10-10-8 OBZ	5/8	1/2	1 1/16	3.10	78.7	1.55	39.3	1.13	28.7	1.13	28.7
12-12-12 OBZ	3/4	3/4	1 5/16	3.34	84.8	1.67	42.4	1.25	31.8	1.25	31.8
14-14-12 OBZ	7/8	3/4	1 5/16	3.34	84.8	1.67	42.4	1.25	31.8	1.25	31.8
16-16-12 OBZ	1	3/4	1 5/16	3.62	91.9	1.81	46.0	1.25	31.8	1.31	33.2
16-16-16 OBZ	1	1	1 5/8	4.06	103.12	2.03	51.6	1.50	38.1	1.53	38.9

†Average Value

### union HBZ

includes body, nut and ferrule

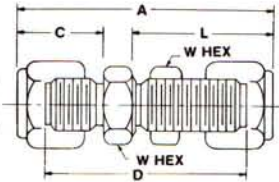


PART NO.	INCHES		†A		†C		D	
	TUBE O.D.	W HEX	in	mm	in	mm	in	mm
1-1 HBZ	1/16	5/16	1.07	27.2	.47	11.9	.69	17.5
2-1 HBZ	1/8 -1/16	7/16	1.27	32.2	.61-.47	15.5-11.9	.81	20.6
2-2 HBZ	1/8	7/16	1.42	36.1	.61	15.5	.88	22.4
3-2 HBZ	3/16-1/8	7/16	1.46	37.1	.65-.61	16.5-15.5	.92	23.4
3-3 HBZ	3/16	7/16	1.49	37.9	.65	16.5	.95	24.1
4-1 HBZ	1/4 -1/16	1/2	1.39	35.3	.70-.47	17.8-11.9	.91	23.1
4-2 HBZ	1/4 -1/8	1/2	1.53	38.9	.70-.61	17.8-15.5	.97	24.6
4-3 HBZ	1/4 -3/16	1/2	1.56	39.6	.70-.65	17.8-16.5	1.00	25.4
4-4 HBZ	1/4	1/2	1.61	40.9	.70	17.8	1.03	26.2
5-4 HBZ	5/16-1/4	9/16	1.68	42.7	.75-.70	19.1-17.8	1.08	27.4
5-5 HBZ	5/16	9/16	1.73	43.9	.75	19.1	1.11	28.2
6-4 HBZ	3/8 -1/4	5/8	1.72	43.7	.78-.70	19.8-17.8	1.12	28.5
6-5 HBZ	3/8 -5/16	5/8	1.78	45.2	.78-.75	19.8-19.1	1.16	29.5
6-6 HBZ	3/8	5/8	1.81	46.0	.78	19.8	1.19	30.2
8-4 HBZ	1/2 -1/4	13/16	1.89	48.0	.91-.70	23.1-17.8	1.16	29.5
8-6 HBZ	1/2 -3/8	13/16	1.97	50.0	.91-.78	23.1-19.8	1.22	31.0
8-8 HBZ	1/2	13/16	2.10	53.3	.91	23.1	1.22	31.0
10-8 HBZ	5/8 -1/2	15/16	2.11	53.6	.89-.91	22.6-23.1	1.25	31.8
10-10 HBZ	5/8	15/16	2.09	53.1	.89	22.6	1.25	31.8
12-8 HBZ	3/4 -1/2	1 1/16	2.17	55.1	.89-.91	22.6-23.1	1.31	33.3
12-10 HBZ	3/4 -5/8	1 1/16	2.15	54.6	.89	22.6	1.31	33.3
12-12 HBZ	3/4	1 1/16	2.15	54.6	.89	22.6	1.31	33.3
14-14 HBZ	7/8	1 3/16	2.22	56.4	.89	22.6	1.38	35.0
16-12 HBZ	1 -3/4	1 3/8	2.42	61.5	1.06-.89	26.9-22.6	1.50	38.1
16-16 HBZ	1	1 3/8	2.59	65.8	1.06	26.9	1.59	40.4

†Average Value

### bulkhead union WBZ

includes body, nut, ferrule, and locknut



PART NO.	INCHES		BULKHEAD HOLE DRILL SIZE		MAXIMUM BULKHEAD THICKNESS		†A		†C		D		†L	
	TUBE O.D.	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
2-2 WBZ	1/8	1/2	21/64	8.3	1/2	12.7	2.04	51.8	.61	15.5	1.50	38.1	1.24	31.5
3-3 WBZ	3/16	9/16	25/64	9.9	1/2	12.7	2.13	54.1	.65	16.5	1.59	40.4	1.27	32.3
4-4 WBZ	1/4	5/8	29/64	11.5	17/32	13.5	2.27	57.7	.70	17.8	1.69	42.9	1.32	33.5
5-5 WBZ	5/16	11/16	33/64	13.1	9/16	14.3	2.43	61.7	.75	19.1	1.81	46.0	1.44	36.6
6-6 WBZ	3/8	3/4	37/64	14.7	9/16	14.3	2.50	63.5	.78	19.8	1.88	47.8	1.47	37.3
8-8 WBZ	1/2	15/16	49/64	19.5	19/32	15.1	2.88	73.2	.91	23.1	2.00	50.8	1.69	42.9
10-10 WBZ	5/8	1 1/16	57/64	22.6	19/32	15.1	2.90	73.7	.89	22.6	2.06	52.3	1.70	43.2
12-12 WBZ	3/4	1 3/16	1 1/64	25.8	25/32	19.8	3.15	80.0	.89	22.6	2.31	58.7	1.89	48.0
14-14 WBZ	7/8	1 9/16	1 9/64	29.0	15/16	23.8	3.37	85.6	.89	22.6	2.53	64.3	2.11	53.6
16-16 WBZ	1	1 9/16	121/64	33.7	15/16	23.8	3.81	96.8	1.06	26.9	2.81	71.4	2.29	57.9

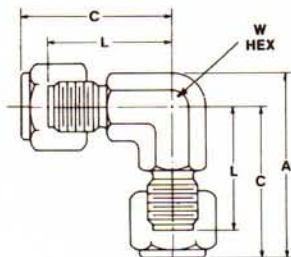
†Average Value

NOTE: For reducer sizes call out short end first.

**union elbow**

**EBZ**

includes body, nut and ferrule



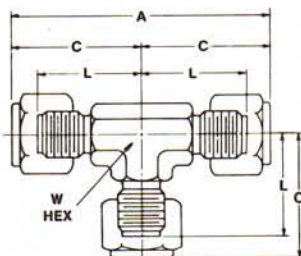
PART NO.	INCHES		†A		†C		L	
	TUBE O.D.	W HEX	in	mm	in	mm	in	mm
1-1 EBZ	1/16	5/16	.92	23.4	.75	19.1	.56	14.2
2-2 EBZ	1/8	5/16	1.10	27.9	.93	23.6	.66	16.8
3-3 EBZ	3/16	3/8	1.17	29.7	.96	24.4	.69	17.5
4-4 EBZ	1/4	7/16	1.25	31.8	1.01	25.7	.72	18.3
5-5 EBZ	5/16	1/2	1.40	35.6	1.12	28.5	.81	20.6
6-6 EBZ	3/8	9/16	1.47	37.3	1.15	29.2	.84	21.3
8-8 EBZ	1/2	3/4	1.82	46.2	1.41	35.8	.97	24.6
10-10 EBZ	5/8	7/8	1.93	49.0	1.45	36.8	1.03	26.2
12-12 EBZ	3/4	1 1/16	2.17	55.1	1.58	40.1	1.16	29.5
14-14 EBZ	7/8	1 5/16	2.36	59.9	1.70	43.2	1.28	32.5
16-16 EBZ	1	1 5/16	2.53	64.3	1.81	46.0	1.31	33.3

†Average Value

**union tee**

**JBZ**

includes body, nut and ferrule



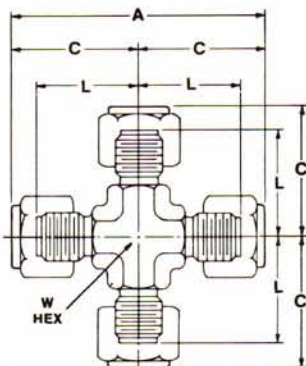
PART NO.	INCHES		†A		†C		L	
	TUBE O.D.	W HEX	in	mm	in	mm	in	mm
1-1-1 JBZ	1/16	5/16	1.50	38.1	.75	19.1	.56	14.2
2-2-2 JBZ	1/8	5/16	1.86	47.2	.93	23.6	.66	16.8
3-3-3 JBZ	3/16	3/8	1.92	48.8	.96	24.4	.69	17.5
4-4-4 JBZ	1/4	7/16	2.02	51.3	1.01	25.7	.72	18.3
5-5-5 JBZ	5/16	1/2	2.24	56.9	1.12	28.5	.81	20.6
6-6-6 JBZ	3/8	9/16	2.30	58.4	1.15	29.2	.84	21.3
8-8-8 JBZ	1/2	3/4	2.82	71.6	1.41	35.8	.97	24.6
10-10-10 JBZ	5/8	7/8	2.90	73.7	1.45	36.8	1.03	26.2
12-12-12 JBZ	3/4	1 1/16	3.16	80.3	1.58	40.1	1.16	29.5
14-14-14 JBZ	7/8	1 5/16	3.40	86.4	1.70	43.2	1.28	32.5
16-16-16 JBZ	1	1 5/16	3.62	92.0	1.81	46.0	1.31	33.3

†Average Value

**union cross**

**KBZ**

includes body, nut and ferrule



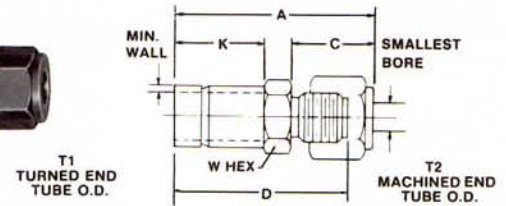
PART NO.	INCHES		†A		†C		L	
	TUBE O.D.	W HEX	in	mm	in	mm	in	mm
2 KBZ	1/8	5/16	1.86	47.2	.93	23.6	.66	16.8
3 KBZ	3/16	3/8	1.92	48.8	.96	24.4	.69	17.5
4 KBZ	1/4	7/16	2.02	51.3	1.01	25.7	.72	18.3
5 KBZ	5/16	1/2	2.24	56.9	1.12	28.5	.81	20.6
6 KBZ	3/8	9/16	2.30	58.4	1.15	29.2	.84	21.3
8 KBZ	1/2	3/4	2.82	71.6	1.41	35.8	.97	24.6
10 KBZ	5/8	7/8	2.90	73.7	1.45	36.8	1.03	26.2
12 KBZ	3/4	1 1/16	3.16	80.3	1.58	40.1	1.16	29.5
14 KBZ	7/8	1 3/16	3.40	86.4	1.70	43.2	1.25	31.8
16 KBZ	1	1 5/16	3.88	98.6	1.94	49.3	1.44	36.6

†Average Value



### tube end reducer TRBZ

includes body, nut and ferrule

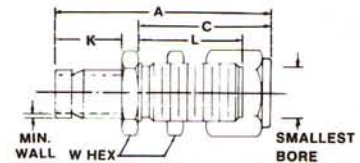


PART NO.	INCHES			MIN. WALL		SMALLEST BORE		†A		†C		D		K	
	T1 TURNED END TUBE O.D.	T2 MACHINE END TUBE O.D.	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
2-1 TRBZ	1/8	1/16	5/16	.023	.6	.052	1.3	1.19	30.2	.47	11.9	1.00	25.4	.53	13.5
3-2 TRBZ	3/16	1/8	7/16	.031	.8	.094	2.4	1.36	34.5	.61	15.5	1.09	27.7	.56	14.2
4-2 TRBZ	1/4	1/8	7/16	.031	.8	.094	2.4	1.43	36.3	.61	15.5	1.16	29.5	.63	16.0
5-2 TRBZ	5/16	1/8	7/16	.031	.8	.094	2.4	1.49	37.8	.61	15.5	1.22	30.9	.66	16.8
6-2 TRBZ	3/8	1/8	7/16	.047	1.2	.094	2.4	1.49	37.8	.61	15.5	1.22	30.9	.69	17.5
4-3 TRBZ	1/4	3/16	7/16	.031	.8	.125	3.2	1.47	37.3	.65	16.5	1.20	30.5	.63	16.0
5-3 TRBZ	5/16	3/16	7/16	.031	.8	.125	3.2	1.50	38.1	.65	16.5	1.23	31.2	.66	16.8
6-3 TRBZ	3/8	3/16	7/16	.047	1.2	.125	3.2	1.55	39.4	.65	16.5	1.28	32.5	.69	17.5
8-3 TRBZ	1/2	3/16	9/16	.055	1.4	.125	3.2	1.78	45.2	.65	16.5	1.51	38.4	.91	23.1
5-4 TRBZ	5/16	1/4	7/16	.031	.8	.188	4.8	1.57	39.9	.69	17.5	1.28	32.5	.66	16.8
6-4 TRBZ	3/8	1/4	1/2	.047	1.2	.188	4.8	1.60	40.6	.69	17.5	1.31	33.3	.69	17.5
8-4 TRBZ	1/2	1/4	9/16	.055	1.4	.188	4.8	1.82	46.2	.69	17.5	1.53	38.9	.91	23.1
10-4 TRBZ	5/8	1/4	1 1/16	.062	1.6	.188	4.8	1.88	47.7	.69	17.5	1.59	40.3	.97	24.6
6-5 TRBZ	3/8	5/16	9/16	.047	1.2	.250	6.4	1.67	42.4	.75	19.1	1.36	34.5	.69	17.5
8-5 TRBZ	1/2	5/16	9/16	.055	1.4	.250	6.4	1.87	47.5	.75	19.1	1.56	39.6	.91	23.1
10-5 TRBZ	5/8	5/16	1 1/16	.062	1.6	.250	6.4	1.97	50.0	.75	19.1	1.66	42.2	.97	24.6
12-5 TRBZ	3/4	5/16	1 3/16	.062	1.6	.250	6.4	1.97	50.0	.75	19.1	1.66	42.2	.97	24.6
8-6 TRBZ	1/2	3/8	5/8	.055	1.4	.281	7.1	1.94	49.3	.77	19.6	1.63	41.4	.91	23.1
10-6 TRBZ	5/8	3/8	1 1/16	.062	1.6	.281	7.1	2.00	50.8	.77	19.6	1.69	42.9	.97	24.6
12-6 TRBZ	3/4	3/8	1 3/16	.062	1.6	.281	7.1	2.00	50.8	.77	19.6	1.69	42.9	.97	24.6
14-6 TRBZ	7/8	3/8	1 5/16	.062	1.6	.281	7.1	2.06	52.3	.77	19.6	1.75	44.4	1.03	26.1
10-8 TRBZ	5/8	1/2	1 3/16	.062	1.6	.406	10.3	2.16	54.9	.91	23.1	1.72	43.7	.97	24.6
12-8 TRBZ	3/4	1/2	1 3/16	.062	1.6	.406	10.3	2.16	54.9	.91	23.1	1.72	43.7	.97	24.6
16-8 TRBZ	1	1/2	1 1/16	.062	1.6	.406	10.3	2.41	61.2	.91	23.1	1.97	50.0	1.22	30.9
12-10 TRBZ	3/4	5/8	1 5/16	.062	1.6	.500	12.7	2.17	55.1	.89	22.6	1.75	44.4	.97	24.6
14-10 TRBZ	7/8	5/8	1 5/16	.062	1.6	.500	12.7	2.23	56.6	.89	22.6	1.81	45.9	1.03	26.1
16-10 TRBZ	1	5/8	1 1/16	.062	1.6	.500	12.7	2.42	61.5	.89	22.6	2.00	50.8	1.22	30.9
14-12 TRBZ	7/8	3/4	1 1/16	.062	1.6	.625	15.9	2.30	58.4	.89	22.6	1.88	47.7	1.03	26.1
16-12 TRBZ	1	3/4	1 1/16	.062	1.6	.625	15.9	2.48	63.0	.89	22.6	2.06	52.3	1.22	30.9
16-14 TRBZ	1	7/8	1 3/16	.062	1.6	.750	19.1	2.48	63.0	.89	22.6	2.06	52.3	1.22	30.9

†Average Value

### tube end bulkhead adapter T2H2BZ

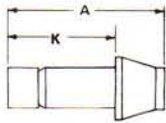
includes body, nut, ferrule, and locknut



PART NO.	INCHES		MIN. WALL		†A		†C		SMALLEST BORE		L		K	
	TUBE O.D.	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
2-2 T2H2BZ	1/8	1/2	.023	.6	1.95	49.5	1.24	31.5	.078	1.98	.97	24.6	.53	13.5
3-3 T2H2BZ	3/16	9/16	.031	.78	2.03	51.6	1.27	32.3	.125	3.18	1.00	25.4	.56	14.2
4-4 T2H2BZ	1/4	5/8	.031	.78	2.20	55.8	1.31	33.3	.187	4.75	1.02	25.9	.62	15.7
5-5 T2H2BZ	5/16	1 1/16	.031	.78	2.34	59.4	1.43	36.3	.250	6.35	1.12	28.5	.66	16.8
6-6 T2H2BZ	3/8	3/4	.047	1.19	2.40	61.0	1.46	37.1	.281	7.11	1.15	29.2	.69	17.5
8-8 T2H2BZ	1/2	1 5/16	.055	1.40	2.88	73.2	1.69	42.9	.391	9.93	1.25	31.8	.91	23.1
10-10 T2H2BZ	5/8	1 1/16	.062	1.6	2.98	75.7	1.70	43.2	.500	12.7	1.28	32.5	.97	24.6
12-12 T2H2BZ	3/4	1 3/16	.062	1.6	3.23	82.1	1.89	48.0	.625	15.87	1.47	37.3	.97	24.6
14-14 T2H2BZ	7/8	1 5/16	.078	2.0	3.51	89.1	2.11	53.6	.750	19.0	1.69	42.9	1.03	26.2
16-16 T2H2BZ	1	1 9/16	.078	2.0	3.97	100.8	2.28	57.9	.875	22.2	1.78	45.2	1.22	30.9

†Average Value

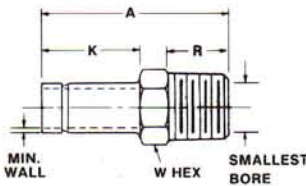
port connector  
ZPC



PART NO.	INCHES		A		K	
	TUBE O.D.		in	mm	in	mm
2-2 ZPC	1/8		.97	24.6	.61	15.5
3-3 ZPC	3/16		1.00	25.4	.64	16.3
4-4 ZPC	1/4		1.09	27.8	.73	18.7
5-5 ZPC	5/16		1.14	29.0	.78	19.8
6-6 ZPC	3/8		1.16	29.4	.80	20.2
8-8 ZPC	1/2		1.70	43.3	1.03	26.2
10-10 ZPC	5/8		1.77	44.8	1.09	27.8
12-12 ZPC	3/4		1.77	44.8	1.09	27.8

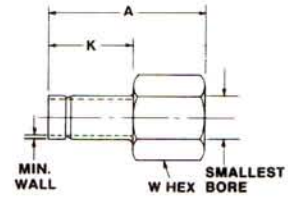
NOTE: The Machined Ferrule End requires only 1/4 turn from finger tight to assemble.

tube end male adapter  
T2HF



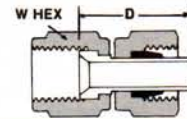
PART NO.	INCHES			MIN. WALL		A		R		SMALLEST BORE		K	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm
1-2 T2HF	1/16	1/8	7/16	.016	.4	.91	23.1	.38	9.7	.031	.78	.41	10.4
2-2 T2HF	1/8	1/8	7/16	.023	.6	1.13	28.7	.38	9.7	.078	2.0	.53	13.5
2-4 T2HF	1/8	1/4	9/16	.023	.6	1.31	33.2	.56	14.2	.078	2.0	.53	13.5
3-2 T2HF	3/16	1/8	7/16	.031	.8	1.16	29.4	.38	9.7	.125	3.2	.56	14.2
3-4 T2HF	3/16	1/4	9/16	.031	.8	1.34	34.0	.56	14.2	.125	3.2	.56	14.2
4-2 T2HF	1/4	1/8	7/16	.031	.8	1.22	30.9	.38	9.7	.188	4.8	.63	16.0
4-4 T2HF	1/4	1/4	9/16	.031	.8	1.41	35.8	.56	14.2	.188	4.8	.63	16.0
4-6 T2HF	1/4	3/8	1 1/16	.031	.8	1.44	36.5	.56	14.2	.188	4.8	.62	15.7
4-8 T2HF	1/4	1/2	7/8	.031	.8	1.66	42.1	.75	19.1	.188	4.8	.62	15.7
5-2 T2HF	5/16	1/8	7/16	.031	.8	1.25	31.7	.38	9.7	.250	6.4	.66	16.8
5-4 T2HF	5/16	1/4	9/16	.031	.8	1.47	37.3	.56	14.2	.250	6.4	.66	16.8
5-6 T2HF	5/16	3/8	1 1/16	.031	.8	1.47	37.3	.56	14.2	.250	6.4	.66	16.8
5-8 T2HF	5/16	1/2	7/8	.031	.8	1.69	42.9	.75	19.1	.250	6.4	.66	16.8
6-2 T2HF	3/8	1/8	7/16	.047	1.2	1.31	33.2	.38	9.7	.187	4.8	.69	17.5
6-4 T2HF	3/8	1/4	9/16	.047	1.2	1.50	38.1	.56	14.2	.281	7.1	.69	17.5
6-6 T2HF	3/8	3/8	1 1/16	.047	1.2	1.50	38.1	.56	14.2	.281	7.1	.69	17.5
6-8 T2HF	3/8	1/2	7/8	.047	1.2	1.72	43.6	.75	19.1	.281	7.1	.69	17.5
8-4 T2HF	1/2	1/4	9/16	.055	1.4	1.72	43.6	.56	14.2	.390	9.9	.91	23.1
8-6 T2HF	1/2	3/8	1 1/16	.055	1.4	1.75	44.4	.56	14.2	.390	9.9	.91	23.1
8-8 T2HF	1/2	1/2	7/8	.055	1.4	1.94	49.2	.75	19.1	.390	9.9	.91	23.1
10-6 T2HF	5/8	3/8	1 1/16	.062	1.6	1.81	45.9	.38	9.7	.406	10.3	.97	24.6
10-8 T2HF	5/8	1/2	7/8	.062	1.6	2.00	50.8	.75	19.1	.500	12.7	.97	24.6
10-12 T2HF	5/8	3/4	1 1/16	.062	1.6	2.03	51.5	.75	19.1	.500	12.7	.97	24.6
12-8 T2HF	3/4	1/2	7/8	.062	1.6	2.00	50.8	.75	19.1	.531	13.5	.97	24.6
12-12 T2HF	3/4	3/4	1 1/16	.062	1.6	2.03	51.5	.75	19.1	.718	18.2	.97	24.6
12-16 T2HF	3/4	1	1 3/8	.062	1.6	2.28	57.9	.94	23.9	.625	15.9	.97	24.6
16-12 T2HF	1	3/4	1 1/16	.062	1.6	2.28	57.9	.75	19.1	.718	18.2	1.21	30.7
16-16 T2HF	1	1	1 3/8	.062	1.6	2.56	65.0	.94	23.9	.875	22.2	1.21	30.7

### tube end female adapter T2HG



PART NO.	INCHES			MIN. WALL		A		SMALLEST BORE		K	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm
2-2 T2HG	1/8	1/8	9/16	.023	.6	1.06	26.9	.078	2.0	.53	13.5
2-4 T2HG	1/8	1/4	3/4	.023	.6	1.25	31.7	.078	2.0	.53	13.5
3-2 T2HG	3/16	1/8	9/16	.031	.8	1.09	27.7	.125	3.2	.56	14.2
3-4 T2HG	3/16	1/4	3/4	.031	.8	1.28	32.5	.125	3.2	.56	14.2
4-2 T2HG	1/4	1/8	9/16	.031	.8	1.16	29.4	.188	4.8	.63	16.0
4-4 T2HG	1/4	1/4	3/4	.031	.8	1.34	34.0	.188	4.8	.63	16.0
4-6 T2HG	1/4	3/8	7/8	.031	.8	1.41	35.8	.188	4.8	.63	16.0
4-8 T2HG	1/4	1/2	1 1/16	.031	.8	1.59	40.3	.188	4.8	.63	16.0
5-2 T2HG	5/16	1/8	9/16	.031	.8	1.19	30.2	.250	6.3	.66	16.8
5-4 T2HG	5/16	1/4	3/4	.031	.8	1.38	35.0	.250	6.3	.66	16.8
5-6 T2HG	5/16	3/8	7/8	.031	.8	1.44	36.5	.250	6.3	.66	16.8
5-8 T2HG	5/16	1/2	1 1/16	.031	.8	1.63	41.4	.250	6.3	.66	16.8
6-2 T2HG	3/8	1/8	9/16	.047	1.2	1.41	35.8	.281	7.1	.69	17.5
6-4 T2HG	3/8	1/4	3/4	.047	1.2	1.47	37.3	.281	7.1	.69	17.5
6-6 T2HG	3/8	3/8	7/8	.047	1.2	1.66	42.2	.281	7.1	.69	17.5
6-8 T2HG	3/8	1/2	1 1/16	.047	1.2	1.63	41.4	.381	7.1	.91	23.1
8-4 T2HG	1/2	1/4	3/4	.055	1.4	1.69	43.0	.391	9.9	.91	23.1
8-6 T2HG	1/2	3/8	7/8	.055	1.4	1.88	47.7	.391	9.9	.91	23.1
8-8 T2HG	1/2	1/2	1 1/16	.055	1.4	1.75	44.4	.391	9.9	.97	24.6
10-6 T2HG	5/8	3/8	7/8	.062	1.6	1.94	49.3	.500	12.7	.97	24.6
10-8 T2HG	5/8	1/2	1 1/16	.062	1.6	2.00	50.8	.500	12.7	.97	24.6
10-12 T2HG	5/8	3/4	1 1/4	.062	1.6	1.94	49.3	.500	12.7	.97	24.6
12-8 T2HG	3/4	1/2	1 1/16	.062	1.6	2.00	50.8	.625	15.9	.97	24.6
12-12 T2HG	3/4	3/4	1 1/4	.062	1.6	2.38	60.4	.625	15.9	.97	24.6
12-16 T2HG	3/4	1	1 5/8	.062	1.6	2.06	52.3	.625	15.9	1.03	26.2
16-12 T2HG	1	3/4	1 1/4	.062	1.6	2.25	57.2	.875	22.2	1.22	30.9
16-16 T2HG	1	1	1 5/8	.062	1.6	2.63	66.8	.875	22.2	1.22	30.9

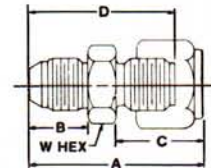
**37° flare (AN) to CPI  
X6HBZ6**



PART NO.	INCHES		D	
	TUBE O.D.	W HEX	in	mm
2-2 X6HBZ6	1/8	3/8	.98	24.9
3-3 X6HBZ6	3/16	7/16	1.06	26.9
4-4 X6HBZ6	1/4	9/16	1.09	27.7
5-5 X6HBZ6	5/16	5/8	1.22	31.0
6-6 X6HBZ6	3/8	11/16	1.22	41.0
8-8 X6HBZ6	1/2	7/8	1.52	38.6
10-10 X6HBZ6	5/8	1	1.64	41.7
12-12 X6HBZ6	3/4	1 1/4	1.63	41.4
16-16 X6HBZ6	1	1 1/2	2.00	50.8

**37° flare union  
XHBZ**

includes body, nut and ferrule

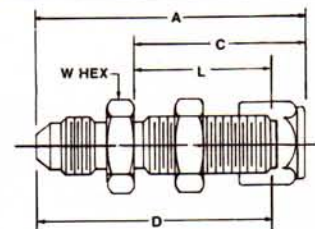


PART NO.	INCHES			†A		D		†G		H	
	FLARE END	TUBE O.D.	W HEX	in	mm	in	mm	in	mm	in	mm
2-2 XHBZ	1/8	1/8	7/16	1.24	31.4	.45	11.4	.61	15.5	.97	24.6
4-2 XHBZ	1/4	1/8	1/2	1.40	35.6	.55	13.9	.61	15.5	1.13	28.7
3-3 XHBZ	3/16	3/16	7/16	1.33	33.8	.48	12.2	.65	16.5	1.06	26.9
4-4 XHBZ	1/4	1/4	1/2	1.48	37.6	.55	13.9	.70	17.7	1.19	30.2
5-5 XHBZ	5/16	5/16	9/16	1.53	38.9	.55	13.9	.75	19.0	1.22	31.0
4-6 XHBZ	1/4	3/8	5/8	1.58	40.1	.55	13.9	.78	19.8	1.27	32.3
6-6 XHBZ	3/8	3/8	5/8	1.59	40.3	.56	14.2	.78	19.8	1.28	32.5
8-8 XHBZ	1/2	1/2	13/16	1.85	47.0	.66	16.8	.91	23.1	1.41	35.8
10-10 XHBZ	5/8	5/8	15/16	1.95	49.5	.76	19.3	.89	22.6	1.53	38.9
12-12 XHBZ	3/4	3/4	1 1/8	2.14	54.4	.86	21.8	.89	22.6	1.72	43.7
16-16 XHBZ	1	1	1 3/8	2.44	62.0	.91	23.1	1.06	26.9	1.94	49.3

†Average Value

**37° flare bulkhead union  
XH2BZ**

includes body, nut, ferrule, and locknut



PART NO.	INCHES			A		D		C		L	
	FLARE END	TUBE O.D.	W HEX	in	mm	in	mm	in	mm	in	mm
2-2 XH2BZ	1/8	1/8	1/2	1.88	47.8	1.61	40.9	1.24	31.5	.97	24.6
4-2 XH2BZ	1/4	1/8	5/8	2.04	51.8	1.77	45.0	1.24	31.5	.97	24.6
3-3 XH2BZ	3/16	3/16	9/16	1.97	50.0	1.70	43.2	1.27	32.3	1.00	25.4
4-4 XH2BZ	1/4	1/4	5/8	2.12	53.8	1.83	46.5	1.31	33.3	1.02	25.9
5-5 XH2BZ	5/16	5/16	11/16	2.23	56.6	1.92	48.8	1.43	36.3	1.12	28.4
4-6 XH2BZ	1/4	3/8	3/4	2.33	59.2	2.02	51.3	1.46	37.1	1.15	29.2
6-6 XH1BZ	3/8	3/8	3/4	2.28	57.9	1.97	50.0	1.46	37.1	1.15	29.2
8-8 XH2BZ	1/2	1/2	15/16	2.63	66.8	2.19	55.6	1.69	42.9	1.25	31.8
10-10 XH2BZ	5/8	5/8	1 1/16	2.78	70.6	2.36	59.9	1.70	43.2	1.28	32.5
12-12 XH2BZ	3/4	3/4	1 3/16	3.12	79.2	2.70	68.6	1.89	48.0	1.47	37.3
16-16 XH2BZ	1	1	1 9/16	3.66	93.0	3.16	80.3	2.28	57.9	1.78	45.2

†Average Value

### face seal "O" ring fittings

Face seal "O" ring fittings can be used to provide vacuum-tight or high pressure seals in pipe port connections. For tapered pipe thread ports use ZHBF5 or T2H5. For SAE straight thread ports use ZHBA. For "O" ring straight thread use ZHBA5 or T2H0A5.

### installation procedure

The "O" ring requires a smooth, flat seating surface. This surface must be perpendicular to the axis of the threads.

1. Turn the "O" ring seal fitting in the port until finger tight.
2. The "squeezing" effect on the "O" ring can be felt during the last 1/4 turn.
3. Snug lightly with a wrench.
4. When the tube end is connected, always use a back-up wrench on the hex of the fitting body to prevent turning while the tube nut is being tightened.
5. Always use a back-up wrench when disconnecting tubing.

Port Size	Straight Thread Machine Length	L5N Locknut Thickness	Maximum Tank Wall Thickness
2	.297	.219	.078 = 5/64
3	.297	.219	.078 = 5/64
4	.360	.250	.109 = 7/64
5	.360	.250	.109 = 7/64
6	.391	.265	.125 = 1/8
8	.438	.312	.125 = 1/8
10	.500	.360	.140 = 9/64
12	.594	.406	.188 = 3/16
14	.594	.406	.188 = 3/16
16	.594	.406	.188 = 3/16

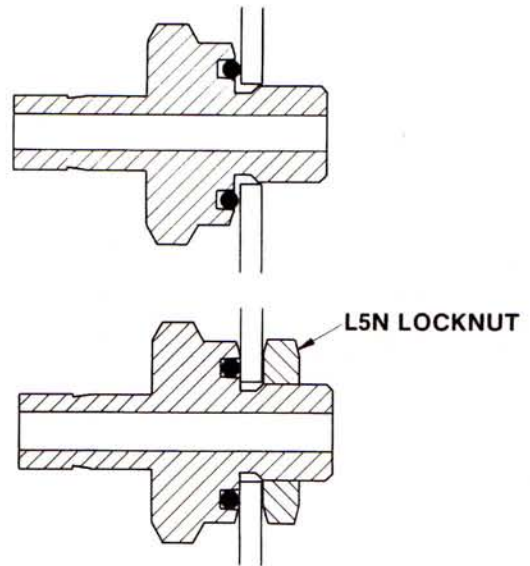
### typical application

Illustrated below is an application using the Face Seal "O" ring fitting with straight threads. The fitting can be adapted as a bulkhead fitting on thin wall tanks or vessels, eliminating welding, brazing or threading. Simply order the L5N locknut to take advantage of this option.

#### NOTES:

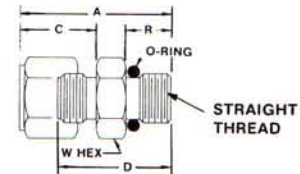
Standard "O" rings are Buna N material. For special "O" rings, state material after the part number.

L5N locknuts are ordered separately by size and part number. Refer to page 23.



### male connector to SAE straight thread ZHBA

includes body, nut, ferrule, and "O" ring

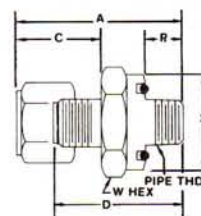


PART NO.	INCHES			†A		†C		D		R		O-RING ARP UNIFORM DASH NO.
	TUBE O.D.	STRAIGHT THREAD SIZE	W HEX	in	mm	in	mm	in	mm	in	mm	
1-2 ZHBA	1/16	5/16-24	7/16	.97	24.6	.47	11.9	.78	19.8	.30	7.6	-902
2-2 ZHBA	1/8	5/16-24	7/16	1.11	28.2	.61	16.3	.84	21.3	.30	7.6	-902
3-3 ZHBA	3/16	3/8-24	1/2	1.15	29.2	.65	16.5	.88	22.4	.30	7.6	-903
4-4 ZHBA	1/4	7/16-20	9/16	1.29	32.8	.70	17.8	1.00	25.4	.36	9.1	-904
5-5 ZHBA	5/16	1/2-20	5/8	1.44	36.6	.75	19.1	1.13	28.7	.36	9.1	-905
6-6 ZHBA	3/8	9/16-18	11/16	1.44	36.6	.78	19.8	1.13	28.7	.39	9.9	-906
8-8 ZHBA	1/2	3/4-16	7/8	1.72	43.7	.91	23.1	1.28	32.5	.44	11.2	-908
10-10 ZHBA	5/8	7/8-14	1	1.70	43.2	.89	22.6	1.28	32.5	.50	12.7	-910
12-12 ZHBA	3/4	1 1/16-12	1 1/4	1.86	47.2	.89	22.6	1.38	35.1	.59	15.0	-912
14-14 ZHBA	7/8	1 3/16-12	1 3/8	1.86	47.2	.89	22.6	1.44	36.6	.59	15.0	-914
16-16 ZHBA	1	1 5/16-12	1 1/2	2.13	54.1	1.06	26.9	1.63	41.4	.59	15.0	-916

†Average Value

**male connector to "O" ring pipe thread  
ZHBF5**

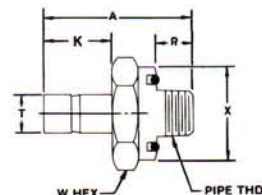
includes body, nut, ferrule and "O" ring



PART NO.	INCHES			A		C		D		R		X DIA.		O-RING ARP UNIFORM DASH NO.
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm	
1-2 ZHBF5	1/16	1/8	3/4	1.16	29.5	.47	11.9	.97	24.6	.28	7.1	.74	18.8	-011
2-2 ZHBF5	1/8	1/8	3/4	1.30	33.0	.61	16.3	1.03	26.1	.28	7.1	.74	18.8	-011
2-4 ZHBF5	1/8	1/4	15/16	1.43	36.3	.61	16.3	1.16	29.5	.38	9.7	.93	23.6	-113
3-2 ZHBF5	3/16	1/8	3/4	1.33	33.8	.65	16.5	1.06	26.9	.28	7.1	.74	18.8	-011
3-4 ZHBF5	3/16	1/4	15/16	1.46	37.1	.65	16.5	1.19	30.2	.38	9.7	.93	23.6	-113
4-2 ZHBF5	1/4	1/8	3/4	1.38	35.1	.70	17.8	1.09	27.7	.28	7.1	.74	18.8	-011
4-4 ZHBF5	1/4	1/4	15/16	1.51	38.3	.70	17.8	1.22	31.0	.38	9.7	.93	23.6	-113
4-6 ZHBF5	1/4	3/8	1 1/8	1.57	39.9	.70	17.8	1.28	32.5	.41	10.4	1.12	28.4	-116
5-2 ZHBF5	5/16	1/8	3/4	1.44	36.6	.75	19.1	1.13	28.7	.28	7.1	.74	18.8	-011
5-4 ZHBF5	5/16	1/4	15/16	1.56	39.6	.75	19.1	1.25	31.8	.38	9.7	.93	23.6	-113
6-2 ZHBF5	3/8	1/8	3/4	1.47	37.3	.78	19.8	1.16	29.5	.28	7.1	.74	18.8	-011
6-4 ZHBF5	3/8	1/4	15/16	1.59	40.4	.78	19.8	1.28	32.5	.38	9.7	.93	23.6	-113
6-6 ZHBF5	3/8	3/8	1 1/8	1.65	41.9	.78	19.8	1.34	34.0	.41	10.4	1.12	28.4	-116
6-8 ZHBF5	3/8	1/2	1 5/16	1.87	47.5	.78	19.8	1.56	39.6	.53	13.5	1.30	33.0	-212
8-4 ZHBF5	1/2	1/4	15/16	1.72	43.7	.91	23.1	1.28	32.5	.38	9.7	.93	23.6	-113
8-6 ZHBF5	1/2	3/8	1 1/8	1.78	45.2	.91	23.1	1.34	34.0	.41	10.4	1.12	28.4	-116
8-8 ZHBF5	1/2	1/2	1 5/16	2.00	50.8	.91	23.1	1.56	39.6	.53	13.5	1.30	33.0	-212
10-8 ZHBF5	5/8	1/2	1 5/16	1.98	50.4	.89	22.6	1.56	39.6	.53	13.5	1.30	33.0	-212
10-12 ZHBF5	5/8	3/4	1 1/2	2.08	52.8	.89	22.6	1.66	42.2	.56	14.2	1.49	37.8	-215
12-8 ZHBF5	3/4	1/2	1 5/16	1.98	50.4	.89	22.6	1.56	39.6	.53	13.5	1.30	33.0	-212
12-12 ZHBF5	3/4	3/4	1 1/2	2.08	52.8	.89	22.6	1.66	42.2	.56	14.2	1.49	37.8	-215
16-12 ZHBF5	1	3/4	1 1/2	2.25	57.2	1.06	26.9	1.75	44.5	.56	14.2	1.49	37.8	-215
16-16 ZHBF5	1	1	1 3/4	2.41	61.2	1.06	26.9	1.91	48.5	.66	16.8	1.74	44.2	-219

**tube end to "O" ring pipe thread  
T2H0F5**

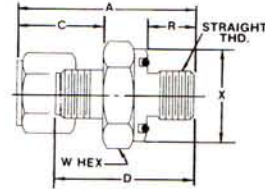
includes "O" ring



PART NO.	INCHES			A		K		R		X DIA.		O-RING ARP UNIFORM DASH NO.
	T TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm	
1-2 T2H0F5	1/16	1/8	3/4	1.03	26.1	.34	8.6	.28	7.1	.74	18.8	-011
2-2 T2H0F5	1/8	1/8	3/4	1.22	31.0	.53	13.5	.28	7.1	.74	18.8	-011
2-4 T2H0F5	1/8	1/4	15/16	1.34	34.0	.53	13.5	.38	9.7	.93	23.6	-113
3-2 T2H0F5	3/16	1/8	3/4	1.25	31.8	.56	14.2	.28	7.1	.74	18.8	-011
3-4 T2H0F5	3/16	1/4	15/16	1.38	35.1	.56	14.2	.38	9.7	.93	23.6	-113
4-2 T2H0F5	1/4	1/8	3/4	1.31	33.3	.63	16.0	.28	7.1	.74	18.8	-011
4-4 T2H0F5	1/4	1/4	15/16	1.44	36.6	.63	16.0	.38	9.7	.93	23.6	-113
4-6 T2H0F5	1/4	3/8	1 1/8	1.50	38.1	.63	16.0	.41	10.4	1.12	28.4	-116
5-2 T2H0F5	5/16	1/8	3/4	1.34	34.0	.66	16.8	.28	7.1	.74	18.8	-011
5-4 T2H0F5	5/16	1/4	15/16	1.47	37.3	.66	16.8	.38	9.7	.93	23.6	-113
6-2 T2H0F5	3/8	1/8	3/4	1.38	35.1	.69	17.5	.28	7.1	.74	18.8	-011
6-4 T2H0F5	3/8	1/4	15/16	1.50	38.1	.69	17.5	.38	9.7	.93	23.6	-113
6-6 T2H0F5	3/8	3/8	1 1/8	1.56	39.6	.69	17.5	.41	10.4	1.12	28.4	-116
8-6 T2H0F5	1/2	3/8	1 1/8	1.78	45.2	.91	23.1	.41	10.4	1.12	28.4	-116
10-8 T2H0F5	5/8	1/2	1 5/16	2.06	52.3	.97	24.6	.53	13.5	1.30	33.0	-212
12-12 T2H0F5	3/4	3/4	1 1/2	2.16	54.9	.97	24.6	.56	14.2	1.49	37.8	-215
16-16 T2H0F5	1	1	1 3/4	2.56	65.0	1.22	31.0	.66	16.8	1.74	44.2	-219

### male connector to "O" ring straight thread ZHBA5

includes body, nut, ferrule and "O" ring

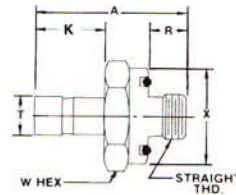


PART NO.	INCHES			†A		†C		D		R		X DIA.		O-RING ARP UNIFORM DASH NO.
	TUBE O.D.	STRT. THREAD	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm	
1-2 ZHBA5	1/16	5/16-24	9/16	1.10	27.9	.47	11.9	.91	23.1	.34	8.64	.55	14.0	-011
2-2 ZHBA5	1/8	5/16-24	9/16	1.30	33.0	.61	16.3	1.03	26.1	.34	8.64	.55	14.0	-011
3-3 ZHBA5	3/16	3/8-24	5/8	1.36	34.5	.65	16.5	1.09	27.6	.38	9.65	.62	15.7	-012
4-4 ZHBA5	1/4	7/16-20	3/4	1.51	38.3	.70	17.8	1.22	30.0	.41	10.41	.74	18.8	-111
5-5 ZHBA5	5/16	1/2-20	7/8	1.62	41.1	.75	19.1	1.31	33.2	.44	11.18	.87	22.1	-112
6-6 ZHBA5	3/8	9/16-18	15/16	1.69	42.9	.78	19.8	1.38	35.0	.47	12.00	.93	23.6	-113
8-8 ZHBA5	1/2	3/4-16	1 1/8	1.85	46.9	.91	23.1	1.41	35.8	.47	12.00	1.12	28.4	-116
10-10 ZHBA5	5/8	7/8-14	1 5/16	1.92	48.7	.89	22.6	1.50	38.1	.47	12.00	1.30	33.0	-212
12-12 ZHBA5	3/4	1 1/16-12	1 1/2	2.08	52.8	.89	22.6	1.66	42.1	.56	14.22	1.49	37.8	-215
14-12 ZHBA5	7/8	1 1/16-12	1 1/2	2.08	52.8	.89	22.6	1.66	42.1	.56	14.22	1.49	37.8	-215
16-16 ZHBA5	1	1 5/16-12	1 3/4	2.31	58.6	1.06	26.9	1.81	45.9	.56	14.22	1.74	44.2	-219

†Average Value

### tube end to "O" ring straight thread T2H0A5

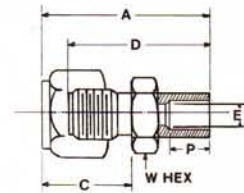
includes "O" ring



PART NO.	INCHES			A		K		R		X DIA.		O-RING ARP UNIFORM DASH NO.
	T TUBE O.D.	STRT. THREAD	W HEX	in	mm	in	mm	in	mm	in	mm	
1-2 T2H0A5	1/16	5/16-24	9/16	.97	24.6	.34	8.63	.34	8.64	.55	14.0	-011
2-2 T2H0A5	1/8	5/16-24	9/16	1.22	31.0	.53	13.5	.34	8.64	.55	14.0	-011
3-3 T2H0A5	3/16	3/8-24	5/8	1.28	32.5	.56	14.2	.38	9.65	.62	15.7	-012
4-4 T2H0A5	1/4	7/16-20	3/4	1.44	36.6	.63	16.0	.41	10.41	.74	18.8	-111
5-5 T2H0A5	5/16	1/2-20	7/8	1.53	38.9	.66	16.8	.44	11.18	.87	22.1	-112
6-6 T2H0A5	3/8	9/16-18	15/16	1.59	40.4	.68	17.3	.47	12.00	.93	23.6	-113
8-8 T2H0A5	1/2	3/4-16	1 1/8	1.84	46.7	.91	23.1	.47	12.00	1.12	28.4	-116
10-10 T2H0A5	5/8	7/8-14	1 5/16	2.00	50.8	.97	24.6	.47	12.00	1.30	33.0	-212
12-12 T2H0A5	3/4	1 1/16-12	1 1/2	2.16	54.9	.97	24.6	.56	14.22	1.49	37.8	-215
14-12 T2H0A5	7/8	1 1/16-12	1 1/2	2.22	56.4	1.03	26.2	.56	14.22	1.49	37.8	-215
16-16 T2H0A5	1	1 5/16-12	1 3/4	2.47	62.8	1.22	31.0	.56	14.22	1.74	44.2	-219

**socket weld connector  
ZHBW**

includes body, nut and ferrule

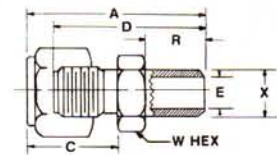


PART NO.	INCHES		†A		†C		D		E MIN. BORE		P	
	TUBE O.D.	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm
2-2 ZHBW	1/8	7/16	1.15	29.2	.61	15.5	.88	22.4	.094	2.4	.16	4.1
3-3 ZHBW	3/16	7/16	1.23	31.2	.65	16.5	.98	24.9	.125	3.2	.38	9.7
4-4 ZHBW	1/4	1/2	1.32	33.5	.70	17.8	1.03	26.2	.188	4.8	.25	6.4
6-6 ZHBW	3/8	5/8	1.50	38.1	.78	19.8	1.19	30.2	.281	7.1	.34	8.6
8-8 ZHBW	1/2	13/16	1.65	41.9	.91	23.1	1.22	31.0	.406	10.3	.41	10.4
10-10 ZHBW	5/8	15/16	1.66	42.2	.89	22.6	1.25	31.8	.500	12.7	.47	11.9
12-12 ZHBW	3/4	1 1/8	1.72	43.7	.89	22.6	1.31	33.3	.625	15.9	.50	12.7
16-16 ZHBW	1	1 3/8	2.09	53.1	1.06	26.9	1.59	40.4	.875	22.2	.56	14.2

†Average Value

**butt weld connector  
ZHBW2**

includes body, nut and ferrule



PART NO.	INCHES			†A		†C		D		E MIN. BORE		R		X BUTT WELD O.D.	
	TUBE O.D.	BUTT WELD PIPE SIZE	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
2-1/8 ZHBW2	1/8	1/8	7/16	1.19	30.2	.61	15.5	.91	23.1	.094	2.4	.38	9.7	.405	10.3
3-1/8 ZHBW2	3/16	1/8	7/16	1.23	31.2	.65	16.5	.95	24.1	.125	3.2	.38	9.7	.405	10.3
4-1/8 ZHBW2	1/4	1/8	1/2	1.26	32.0	.70	17.8	.97	24.6	.188	4.8	.38	9.7	.405	10.8
4-1/4 ZHBW2	1/4	1/4	9/16	1.50	38.1	.70	17.8	1.19	30.2	.188	4.8	.56	14.2	.540	13.7
6-1/4 ZHBW2	3/8	1/4	5/8	1.59	40.4	.78	19.8	1.28	32.5	.281	7.1	.56	14.2	.540	13.7
6-3/8 ZHBW2	3/8	3/8	3/4	1.62	41.1	.78	19.8	1.31	33.3	.281	7.1	.56	14.2	.675	17.2
6-1/2 ZHBW2	3/8	1/2	7/8	1.81	46.0	.78	19.8	1.50	38.1	.281	7.1	.75	19.1	.840	21.3
8-3/8 ZHBW2	1/2	3/8	13/16	1.75	44.4	.91	23.1	1.31	33.3	.406	10.3	.56	14.2	.675	17.2
8-1/2 ZHBW2	1/2	1/2	7/8	1.91	48.5	.91	23.1	1.50	38.1	.406	10.3	.75	19.1	.840	21.3
10-1/2 ZHBW2	5/8	1/2	15/16	1.92	49.3	.89	22.6	1.50	38.1	.500	12.7	.75	19.1	.840	21.3
12-3/4 ZHBW2	3/4	3/4	1 1/16	1.95	49.5	.89	22.6	1.53	38.8	.625	15.9	.75	19.1	1.060	26.9
16-1 ZHBW2	1	1	1 3/8	2.46	62.5	1.06	26.9	1.97	50.0	.875	22.2	.94	23.9	1.315	33.4

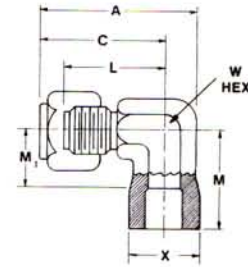
†Average Value



### socket weld elbow

#### ZEBW

includes body, nut and ferrules



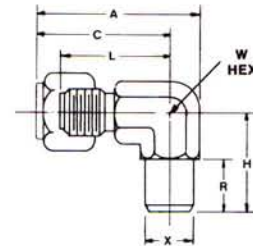
PART NO.	INCHES		†A		†C		L		M		M <sub>1</sub>		X	
	TUBE O.D.	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
2-2 ZEBW	1/8	5/16	1.10	27.9	.93	23.6	.66	16.8	.63	16.0	.47	11.9	.38	9.7
3-3 ZEBW	3/16	3/8	1.17	29.7	.96	24.4	.69	17.5	.66	16.8	.46	11.7	.47	11.9
4-4 ZEBW	1/4	7/16	1.25	31.8	1.01	25.7	.72	18.3	.69	17.5	.44	11.2	.50	12.7
6-6 ZEBW	3/8	9/16	1.47	37.3	1.15	29.2	.84	21.3	.91	23.1	.57	14.5	.63	16.0
8-8 ZEBW	1/2	3/4	1.82	46.2	1.41	35.8	.97	24.6	1.03	26.2	.62	15.7	.81	20.6
10-10 ZEBW	5/8	7/8	1.93	49.0	1.45	36.8	1.03	26.2	1.16	29.5	.69	17.5	.94	23.9
12-12 ZEBW	3/4	1 1/16	2.17	55.1	1.58	40.1	1.16	29.5	1.31	33.3	.81	20.6	1.13	28.7
16-16 ZEBW	1	1 5/16	2.53	64.3	1.81	46.0	1.31	33.3	1.47	37.3	.75	19.0	1.38	35.1

†Average Value

### butt weld elbow

#### ZEBW2

includes body, nut and ferrule



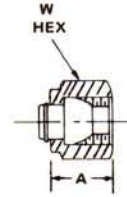
PART NO.	INCHES			†A		†C		H		L		R		X BUTT WELD O.D.	
	TUBE O.D.	BUTT WELD PIPE SIZE	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
2-1/8 ZEBW2	1/8	1/8	5/16	1.10	27.9	.93	23.6	.72	18.3	.66	16.8	.38	9.7	.405	10.3
3-1/8 ZEBW2	3/16	1/8	3/8	1.17	29.7	.96	24.4	.75	19.1	.69	17.5	.38	9.7	.405	10.3
4-1/8 ZEBW2	1/4	1/8	7/16	1.25	31.8	1.01	25.7	.78	19.6	.72	18.3	.38	9.7	.405	10.3
4-1/4 ZEBW2	1/4	1/4	9/16	1.33	33.8	1.07	27.2	.94	23.9	.78	19.8	.56	14.2	.540	13.7
6-1/4 ZEBW2	3/8	1/4	9/16	1.47	37.3	1.15	29.2	1.00	25.4	.84	21.3	.56	14.2	.540	13.7
8-3/8 ZEBW2	1/2	3/8	3/4	1.82	46.2	1.41	35.8	1.12	28.5	.97	24.6	.56	14.2	.675	17.2
8-1/2 ZEBW2	1/2	1/2	7/8	1.95	49.5	1.47	37.3	1.31	33.3	1.03	26.2	.75	19.1	.840	21.3
10-1/2 ZEBW2	5/8	1/2	7/8	1.93	49.0	1.45	36.8	1.38	35.1	1.03	26.2	.75	19.1	.840	21.3
12-3/4 ZEBW2	3/4	3/4	1 1/16	2.17	55.1	1.58	40.1	1.50	38.1	1.16	29.5	.75	19.1	1.060	27.1
16-3/4 ZEBW2	1	3/4	1 5/16	2.53	64.3	1.81	46.0	1.66	42.2	1.31	33.3	.75	19.1	1.060	27.1
16-1 ZEBW2	1	1	1 5/16	2.53	64.3	1.81	46.0	1.84	46.7	1.31	33.3	1.00	25.4	1.315	33.4

†Average Value

**plug  
FNZ**

**HOW TO ASSEMBLE**

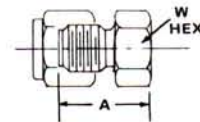
Wrench tighten only 1/4 turn from finger tight position.



PART NO.	INCHES		A		W HEX	
	TUBE O.D.	in	mm	in	mm	mm
1 FNZ	1/16	.31	7.9	5/16	7.9	
2 FNZ	1/8	.47	11.9	7/16	11.1	
3 FNZ	3/16	.47	11.9	1/2	12.7	
4 FNZ	1/4	.50	12.7	9/16	14.3	
5 FNZ	5/16	.53	13.5	5/8	15.9	
6 FNZ	3/8	.56	14.2	11/16	17.5	
8 FNZ	1/2	.69	17.5	7/8	22.2	
10 FNZ	5/8	.69	17.5	1	25.4	
12 FNZ	3/4	.69	17.5	1 1/8	28.6	
14 FNZ	7/8	.69	17.5	1 1/4	31.8	
16 FNZ	1	.81	20.6	1 1/2	38.1	

**cap  
PNBZ**

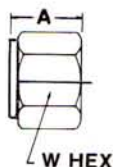
includes body, nut and ferrule



PART NO.	INCHES		A	
	TUBE O.D.	W HEX	in	mm
1 PNBZ	1/16	5/16	.41	10.4
2 PNBZ	1/8	7/16	.53	13.5
3 PNBZ	3/16	7/16	.58	14.7
4 PNBZ	1/4	1/2	.62	15.8
5 PNBZ	5/16	9/16	.67	17.0
6 PNBZ	3/8	5/8	.72	18.3
8 PNBZ	1/2	13/16	.75	19.1
10 PNBZ	5/8	15/16	.81	20.6
12 PNBZ	3/4	1 1/16	.84	21.3
14 PNBZ	7/8	1 3/16	.91	23.1
16 PNBZ	1	1 3/8	1.03	26.2

Parker CPI Plugs and Caps can be used to conveniently provide for future expansion of the tubing circuit. Additional hook-ups can be easily accommodated when they are required.

### tube nut BZ



PART NO.	INCHES		A		W HEX	
	TUBE O.D.		in	mm	in	mm
1 BZ	1/16	.31	7.9	5/16	7.9	
2 BZ	1/8	.47	11.9	7/16	11.1	
3 BZ	3/16	.47	11.9	1/2	12.7	
4 BZ	1/4	.50	12.7	9/16	14.3	
5 BZ	5/16	.53	13.5	5/8	15.9	
6 BZ	3/8	.56	14.2	11/16	17.5	
8 BZ	1/2	.69	17.5	7/8	22.2	
10 BZ	5/8	.69	17.5	1	25.4	
12 BZ	3/4	.69	17.5	1 1/8	28.6	
14 BZ	7/8	.69	17.5	1 1/4	31.8	
16 BZ	1	.81	20.6	1 1/2	38.1	

### knurled nut BZP



PART NO.	INCHES		A	
	TUBE O.D.		in	mm
2 BZP	1/8	.47	11.9	
3 BZP	3/16	.47	11.9	
4 BZP	1/4	.47	11.9	
6 BZP	3/8	.56	14.2	
8 BZP	1/2	.69	17.5	

Replace BZ nut and TZ ferrule on Parker CPI fitting body with BZP nut and nylon or teflon ferrule.

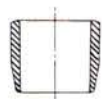
The knurled nut is designed for use with soft plastic tubing on low pressure applications where a finger tight assembly procedure is satisfactory.

Example: Laboratory test hook-ups. Nylon ferrules are frequently used instead of metal ferrules in this type of application.

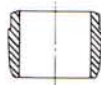
#### HOW TO ASSEMBLE

1. Replace BZ nut with BZP nut on Parker CPI fitting body.
2. Insert plastic tubing until it bottoms in fitting body.
3. Tighten finger tight.

### ferrules TZ



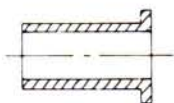
FOR SIZES  
1 TO 6



FOR SIZES  
8 TO 16

PART NO.	INCHES	
	TUBE O.D.	
1 TZ	1/16	
2 TZ	1/8	
3 TZ	3/16	
4 TZ	1/4	
5 TZ	5/16	
6 TZ	3/8	
8 TZ	1/2	
10 TZ	5/8	
12 TZ	3/4	
14 TZ	7/8	
16 TZ	1	

**insert  
TIZ**

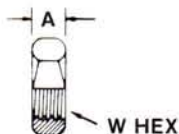


**NOTE:** The TIZ insert is designed to be used with soft plastic tubing. Tubing wall thickness and corresponding minimum I.D. flow paths are listed so the system designer can properly match the insert to the tubing.

**Example:** 4 TIZ (.125) is used with tubing having a wall thickness of .062 and I.D. of .125.

PART NO.	INCHES		
	TUBE O.D.	TUBE I.D.	TUBE WALL
4 TIZ (.170)	1/4	.170	.040
4 TIZ (.125)	1/4	.125	.062
4 TIZ (.188)	1/4	.188	.031
5 TIZ (.188)	5/16	.188	.062
5 TIZ (.125)	5/16	.125	.094
5 TIZ (.250)	5/16	.250	.031
6 TIZ (.250)	3/8	.250	.062
6 TIZ (.188)	3/8	.188	.094
8 TIZ (.375)	1/2	.375	.062
8 TIZ (.250)	1/2	.250	.125
10 TIZ (.375)	5/8	.375	.125
10 TIZ (.500)	5/8	.500	.062
12 TIZ (.500)	3/4	.500	.125
12 TIZ (.625)	3/4	.625	.062
16 TIZ (.750)	1	.750	.125
16 TIZ (.875)	1	.875	.062

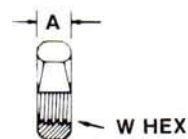
**bulkhead locknut  
WLZ**



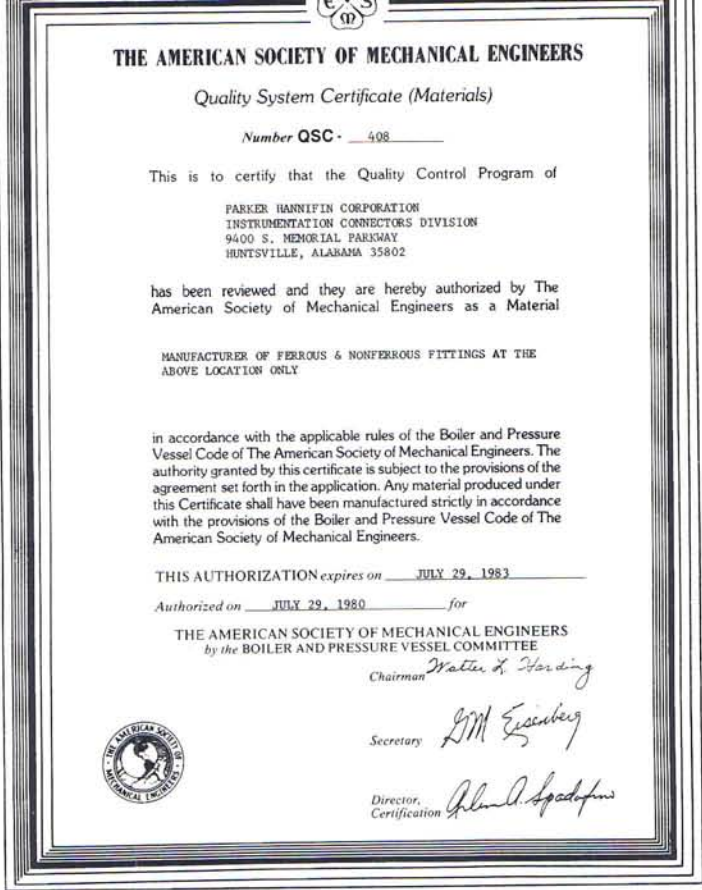
PART NO.	INCHES	INCHES	A		W HEX	
	CPI THREAD	TUBE O.D.	in	mm	in	mm
1 WLZ	10-32	1/16	.19	4.8	3/8	9.5
2 WLZ	3/16-20	1/8	.19	4.8	1/2	12.7
3 WLZ	3/8-20	3/16	.22	5.6	9/16	14.3
4 WLZ	7/16-20	1/4	.22	5.6	5/8	15.8
5 WLZ	1/2-20	5/16	.23	5.8	11/16	17.5
6 WLZ	9/16-20	3/8	.25	6.4	3/4	19.0
8 WLZ	3/4-20	1/2	.28	7.1	15/16	23.8
10 WLZ	7/8-20	5/8	.31	7.8	1 1/16	26.9
12 WLZ	1"-20	3/4	.34	8.6	1 3/16	30.1
14 WLZ	1 1/8-20	7/8	.38	9.6	1 5/16	33.3
16 WLZ	1 1/4-20		.38	9.7	1 9/16	39.7

**accessory locknut  
L5N**

for use with ZHBA5 and T2H0A5 fittings on page 18

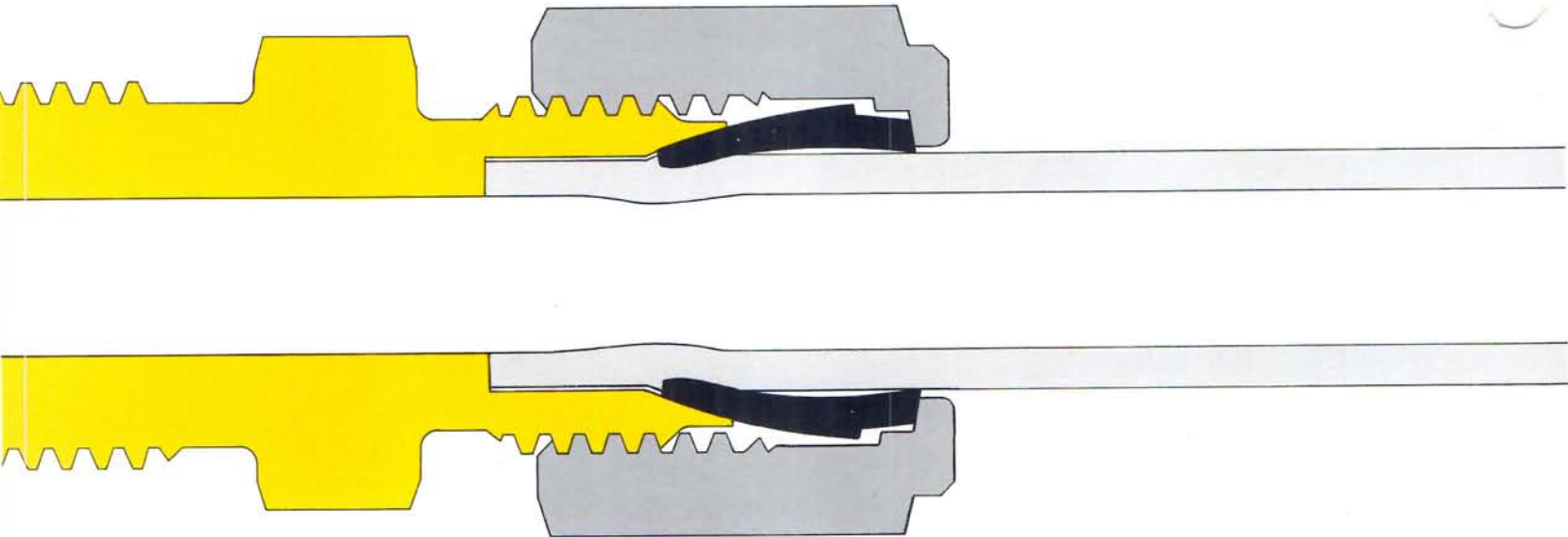


PART NO.	INCHES	A		W HEX	
	STRAIGHT THREAD	in	mm	in	mm
2 L5N	5/16-24	.22	5.6	7/16	11.1
3 L5N	3/8-24	.22	5.6	1/2	12.7
4 L5N	7/16-20	.25	6.4	9/16	14.3
5 L5N	1/2-20	.25	6.4	5/8	15.9
6 L5N	9/16-18	.27	6.7	11/16	17.5
8 L5N	3/4-16	.31	7.9	7/8	22.2
10 L5N	7/8-14	.36	9.1	1	25.4
12 L5N	1 1/16-12	.41	10.3	1 1/4	31.8
14 L5N	1 3/16-12	.41	10.3	1 3/8	35.0
16 L5N	1 5/16-12	.41	10.3	1 1/2	38.1

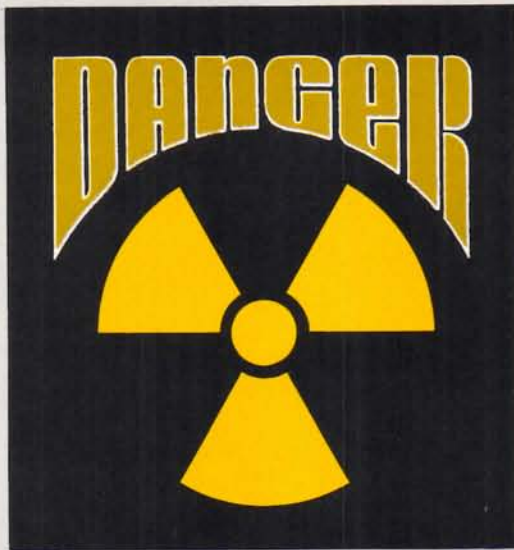


For information on the Parker "instrumentation family" of products ask your Parker representative for the following descriptive literature.

- Catalog 4232** CPI Fittings for Chromatography and Analytical Applications
- Catalog 4240** Parker CPI Ultraseal Fitting
- Catalog 4250** Parker CPI Valves
- Catalog 4260** Instrument Pipe Fittings
- Catalog 4261** CPI Barbed Connectors
- Catalog 4270** Weld-lok Socket Type Permanent Tube Fittings
- Catalog 4290** Parker Tube Fabricating Tools



Parker Hannifin Corporation  
**Instrumentation Connectors Div.**  
 9400 S. Memorial Pkwy.  
 Huntsville, Alabama 35802



**PARKER  
CPI  
HEAT CODE  
TRACEABLE**

# Tube Fittings

**FOR NUCLEAR POWER PLANTS**

260 B

# HEAT CODE TRACEABILITY of materials used in nuclear and other critical applications

Heat code traceability (HCT) refers to the fact that a particular part can be traced back to the original mill heat of metal from which it was made. Beginning with the original melt, a package of documents is created which completely describes the metal in physical and chemical terms. As the part takes shape, more documents are added to the package. The end result is that a number, which is permanently affixed to the part, refers back to the archival document package.

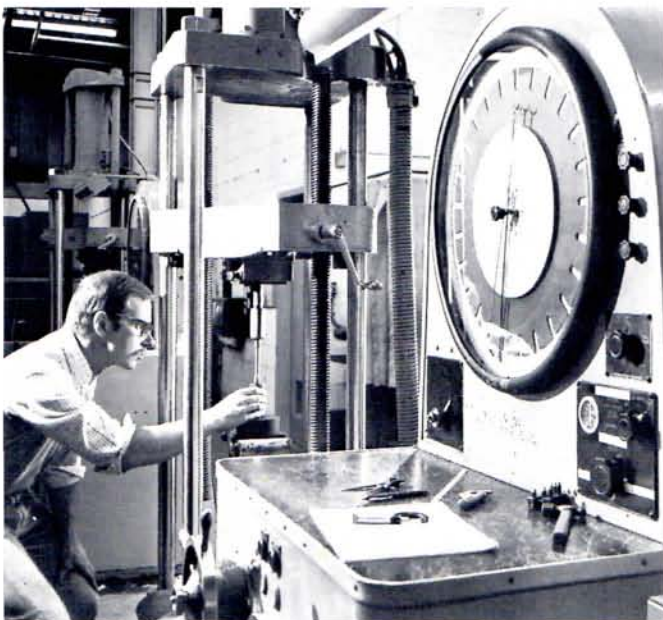
This concept is useful because it provides a method for locating all parts from a particular traceable heat lot, should that ever be necessary. Since it is not practical to stamp the actual heat number on small CPI fittings, a unique code number, referenced to the heat number, is applied.

The concept of HCT is not new. It has been used for some time in connection with many parts used in the construction of nuclear power plants, both stationary and marine. In this context, HCT not only assures the designers that the materials are as specified; it also guards against the possibility of continuing a part in nuclear service after a similar part (that can be traced back to the same mill heat of metal) has either reached the end of its service life or has been obsoleted by upgraded standards. Where seal welds are employed, such as at pipe thread connections, HCT provides



Percent of carbon in specimen of 316 stainless steel is measured with carbon gravimetric test. Sulphur content is also determined in this area of laboratory.

A test specimen of 316 stainless steel is inserted into a 60,000 pound tensile test machine to determine elasticity. Direct writing recorder at extreme right produces permanent record of test.



the added advantage that the actual chemistry of the fitting base metal is known, ensuring proper weld rod selection.

Recent interpretations of applicable specifications governing the use of materials in nuclear power plants lean toward the idea that HCT materials are not mandatory on  $\frac{3}{4}$ " and smaller pipe (1" and smaller O.D. tubing) lines. However, heat code traceability for larger material sizes is mandatory, and many designers insist that the protection offered by heat code traceability be made part of small line installations as well, especially in what is known as Class 1 or critical applications. Only Parker CPI Fittings offer the nuclear designer the capability to specify heat code traceability for his pressure retaining fitting bodies.

The material used in Parker's CPI Fittings is 316 stainless steel as specified and referenced in Section III of the ASME Boiler and Pressure Vessel code.

In addition to the documentation of chemical and physical properties, great care is taken throughout the manufacture of Parker's CPI fittings to ensure that potential stress corrosion will not be a problem in normal usage of the parts. Manufacturing processes avoid exposure of the parts to mercury or halogens, and control of thermal treatment avoids the condition known as continuous grain boundary carbide precipitation.

## STRAIGHT CONNECTOR



T2H2BZ  
Tube End Bulkhead Adapter



XHBZ  
37° Flare Union



XH2BZ  
37° Flare Bulkhead Union



X6HBZ6  
37° Flare Adapter



FBZ  
Male Connector



ZHBW  
Socket Weld Connector



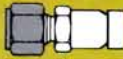
FH2BZ  
Male Bulkhead Connector



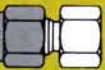
ZHBW2  
Butt Weld Pipe Connector



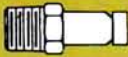
FH4BZ  
Thermocouple Connector



TRBZ  
Tube End Reducer



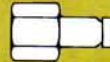
GBZ  
Female Connector



T2HF  
Tube End Male Adapter



GH2BZ  
Female Bulkhead Connector



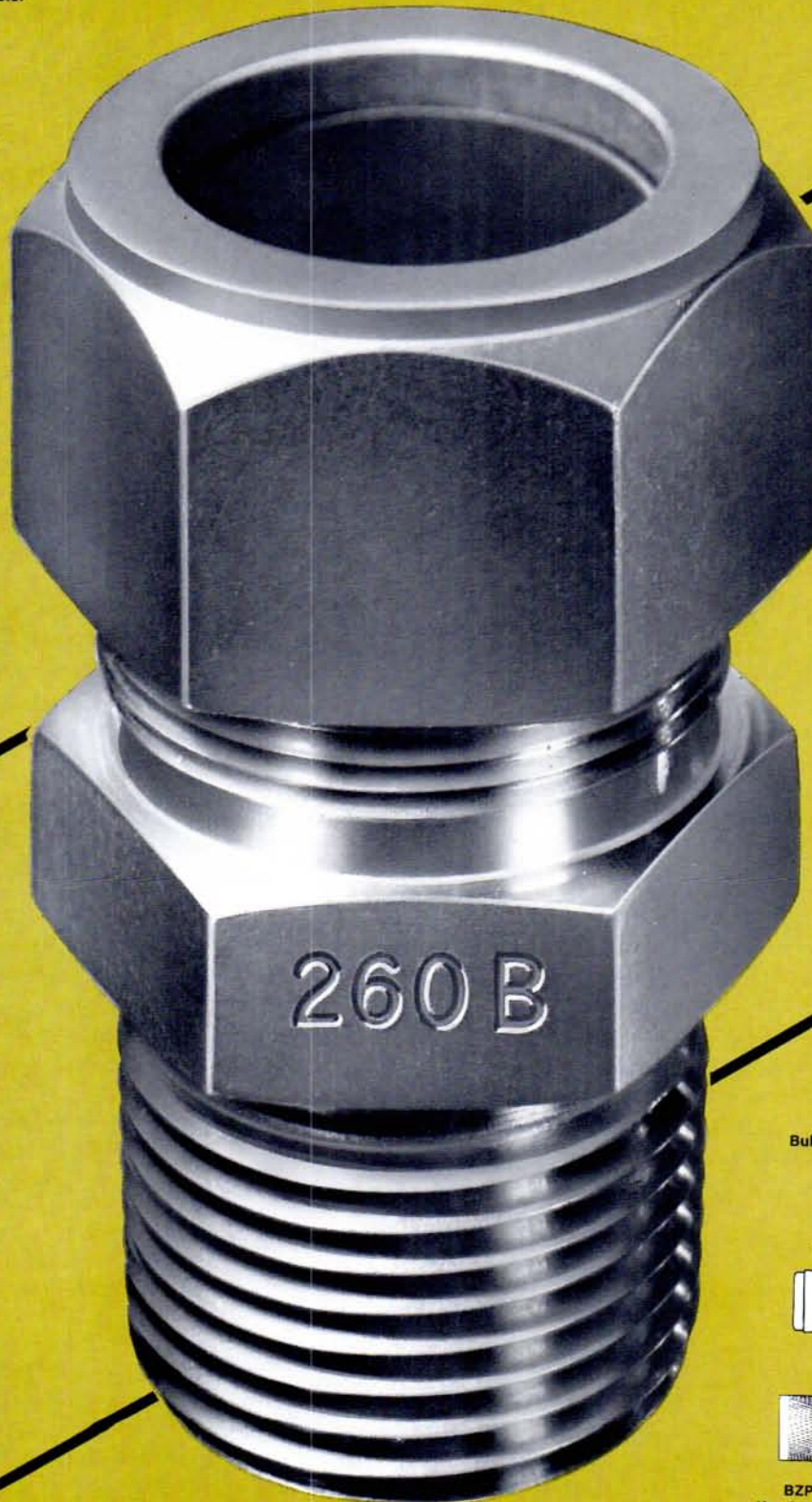
T2HG  
Tube End Female Adapter



HBZ  
Union



WBZ  
Bulkhead Union



## TEE & CROSS FITTINGS



JBZ  
Union Tee



OBZ  
Female Branch Tee



RBZ  
Male Run Tee



KBZ  
Union Cross



SBZ  
Male Branch Tee



MBZ  
Female Run Tee

## ELBOW FITTINGS



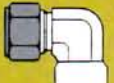
CBZ  
Male Elbow



VBZ  
Male 45° Elbow



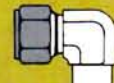
DBZ  
Female Elbow



ZEBW  
Socket Weld Elbow



EBZ  
Union Elbow



ZEBW2  
Butt Weld Pipe Elbow



WLZ  
Bulkhead Locknut



T1Z  
Tube Insert



TZ  
Ferrules



BZP  
Knurled Nut

## AUXILIARY COMPONENTS



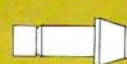
FNZ  
Cap



PNBZ  
Plug



PNZ  
Plug



ZPC  
Insert



BZ  
Nut

Parker also offers its line of Weld Lok fittings with heat code traceability. Request Catalog 4270.



# toward a new concept ...

## **MATERIAL CONTROL ACCOUNTING**

### **... a standard at PARKER**

The Material Control Accounting program instituted at Parker's Huntsville Plant is based on a formal Quality Assurance System that is in complete conformance with all contemporary standards. This program begins with the raw materials received and continues through to shipment.

The documented control of material received, and the certificate of compliance that accompanies materials shipped, assures the customer that he is receiving the highest quality product available. The requirements for producing these high quality, heat code traceable fittings, can be achieved only through Material Control Accounting.

To maintain positive internal control, each piece of raw material is permanently marked with an HCT code number before it enters the manufacturing process. Each part can then be traced through screw machine and chucker operation to final packaging. The HCT number is permanently marked on every fitting.

Highlights of the Quality Assurance program involved with Material Control Accounting include:

- Control of drawings
- Control of purchases
- Receiving inspection
- Handling, packaging, storage and delivery
- Verification procedures
- Internal audits
- Tool and gauge control

The Quality Assurance System and its implementation at the Huntsville plant have been surveyed and approved by engineering companies, contractors and utilities.

The Material Control Accounting program at Huntsville is STANDARD for all heat code traceable CPI fittings (sizes -4 through -16), regardless of who purchases them or where they are to be applied.

This means that there is only one quality standard maintained at Huntsville — that required for nuclear plant installations — the highest and toughest possible.

Parker recognizes that it is far more efficient to maintain one high quality standard for its employees, equipment and processes than it is to intermix nuclear quality with commercial quality.

The ongoing quality assurance program at the Huntsville plant is open to review by customer and vendor survey teams at any time. One of the reasons high quality can be maintained at this facility is that all operations (involving stainless steel CPI fittings) from raw material to finished product, are processed at Parker.

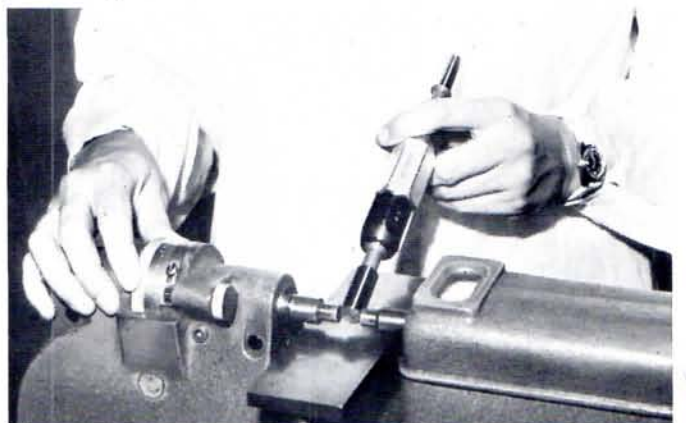
Parker welcomes surveys and inspection of our Huntsville plant facilities, our Material Control Accounting program and our Quality Assurance System.



Using a profilometer, technician measures surface finishes on I.D.s of straight fitting to within 10 microns.



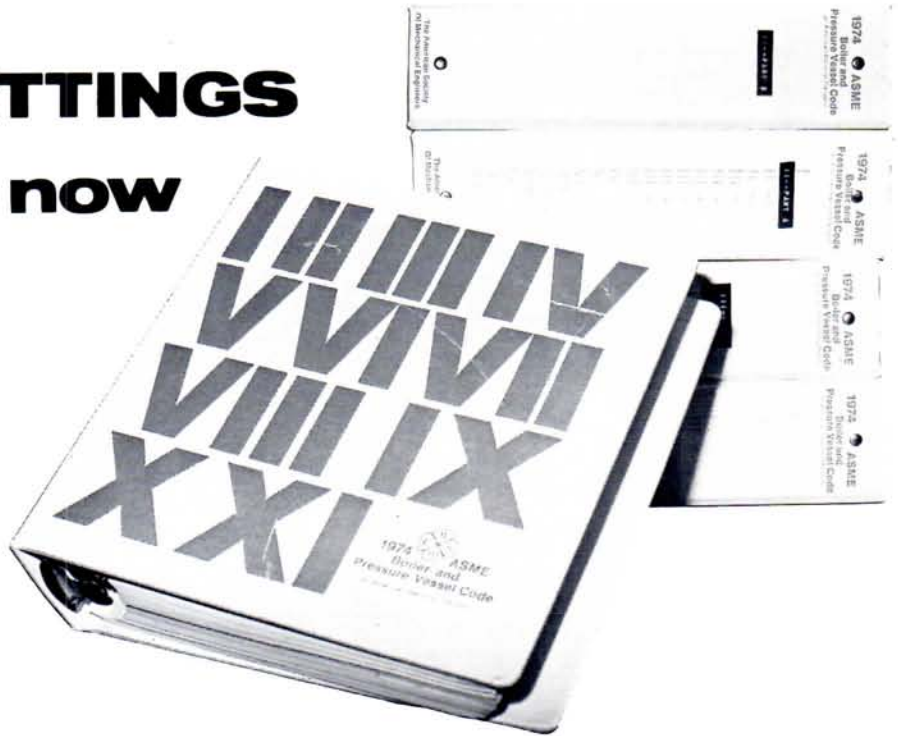
All gages are checked for accuracy upon receipt, and are re-checked periodically for wear.



In one of the two Gage Rooms at Huntsville, technician checks a plug-gage for wear, using a super-micrometer.

# CPI TUBE FITTINGS

are available now  
heat code  
traceable  
as standard  
off-the-shelf  
items



The Parker heat code traceable CPI fittings described in this brochure are manufactured to nuclear specifications for nuclear power plants. While these specifications ensure high quality grade material for nuclear applications, they also find wide use in fossil fuel power plants, and in many other areas, particularly the chemical, instrumentation and processing industries.

The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III, latest issue, entitled *Rules For Construction of Nuclear Power Plant Components*, is the principal document covering this type of fitting in the nuclear field. ANSI Standard B 31.1.0, *Power Piping*, and USA Standard B 31.7, *Nuclear Power Piping*, are also important documents in the field.

Parker has been working with these specifications and standards and their predecessors since the 1950's. During that time, Parker has been instrumental in obtaining code case interpretations of instrument fitting requirements.

The entire CPI line of stainless steel CPI fittings is manufactured to meet or exceed all applicable specifications to assure the designer that he is working with a quality product. This also assures the engineer, the contractor, and the utility that they are working with a high quality product that is in full compliance with all applicable specifications.

Not only are the raw materials continuously monitored, but Parker adheres to a formal, documented Quality Assurance Program that controls manufacture, marking, testing and examination procedures, cleaning and packaging.

Although not all customer orders require the high degree of quality assurance imposed by Parker, it is the policy of the company to manufacture their products to meet all existing specifications, as well as anticipated future requirements in the area of Heat Code Traceability.

In analyzing the philosophy of heat code traceability, Parker engineers recognize the importance of, and the

necessity for, this System Approach on an industry-wide basis.

HCT offers these advantages —

- Raw materials for manufacture must meet code requirements. This can be verified through documentation so that the customer is certain that what is ordered is received.
- HCT provides a record of chemical analysis with the raw material. Thus, in areas requiring welding, the correct weld rod can be selected, and the proper weld technique applied.
- Upgrading of a plant, based on revised standards, can be planned efficiently and economically since all fittings from the same melt can be located.

HCT relieves the user of any doubts. It acts as an insurance policy for today and for tomorrow.

At some time in the future the industry, through continuing research, may determine that a certain type of stainless steel is not suitable to applications intended for 40 years' service. At that time the user can immediately search his records to determine if there is any area of doubt. If so, the fittings involved can be located immediately through HCT records and replaced during a normal shutdown through a planned program.

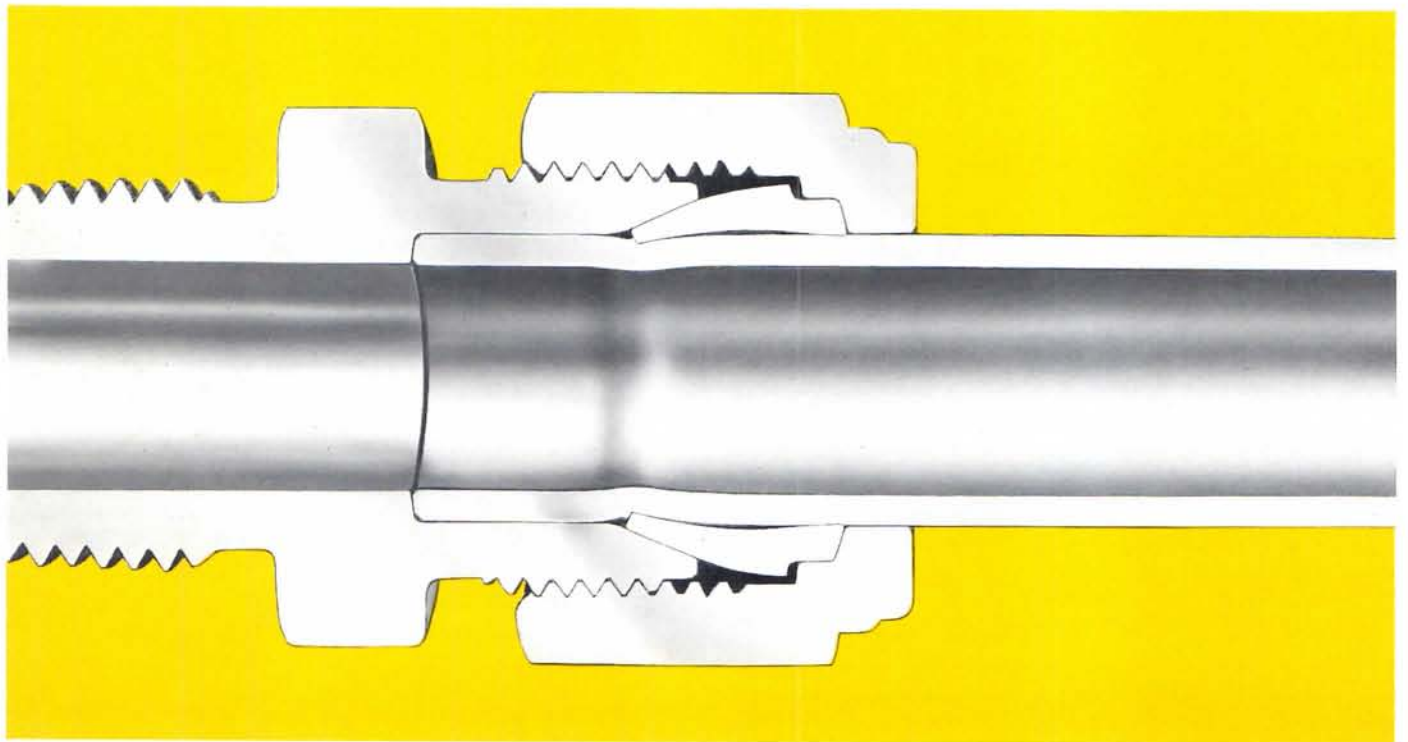
There are some trace elements (cobalt, boron, copper, arsenic, etc.) that are not analyzed because, based on current technology, they are not considered important. This can change. Should it be discovered through continuing technical advances that a trace of boron, for example, is considered undesirable, a representative fitting can be taken from each batch during a normal shutdown and analyzed according to the updated standards. This could lead to planned replacement of certain batches, or confirm the suitability of the existing installation.

# **PARKER CPI**

## **Tube Fittings**

**FOR PROCESS, POWER  
& INSTRUMENTATION**

**ALL STAINLESS STEEL FITTINGS SIZE 4 AND  
ABOVE ARE STANDARD WITH -HCT**



**Parker**  
FluidConnectors

**Parker Hannifin Corporation**

**Instrumentation Connectors Division**

P.O. Box 4288

9400 S. Memorial Pkwy.

Huntsville, Alabama 35802

(205) 881-2040



























# Parker CPI UltraSeal Fittings

Catalog 4240  
May 1982

A high integrity  
mechanical fitting  
for positive pressure  
and vacuum  
applications in  
ultra-pure systems.



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## Features

### Purpose:

The Parker CPI UltraSeal fitting is designed to provide a reliable mechanical seal in ultra-pure systems where component removal is required. UltraSeal is designed to function in positive pressure or vacuum applications.

### Design:

The UltraSeal fitting is designed to effect a helium leak-tight seal when the face of the gland makes full metal-to-metal contact with the face of the body, compressing the O-ring in the body groove.

The UltraSeal gland face and body O-ring groove are microfinished to accept either metallic (S.S.) or synthetic O-ring seals.

### Performance:

UltraSeal fittings are tested to a helium leak rate of  $1 \times 10^{-9}$  cc/sec. utilizing a helium mass spectrometer.

UltraSeal temperature ratings are governed by the choice of O-ring seal materials.

321 Stainless Steel . . .	- 350° to + 1000°F
	(- 212° to + 538°C)
Viton® . . . . .	- 15° to + 400°F
	(- 26° to + 204°C)
Teflon® . . . . .	- 50° to + 400°F
	(- 46° to + 232°C)

UltraSeal provides excellent vibration and thermal cycling performance because the O-ring seal (metallic or synthetic) is completely captured and not subjected to cyclic stresses.

UltraSeal virtually eliminates turbulence and entrainment zones within the fitting. The bore diameter of body and gland are matched in all sizes, providing a smooth flow path. At no point does the O-ring seal intrude into the flow path.

### Pressure:

UltraSeal pressure ratings will be governed by the UltraSeal gland selected for a particular system.

UltraSeal working pressures are rated at room temperature based on a 4-to-1 design factor. Pressure ratings are calculated in accordance with A.N.S.I. Power Piping Code B31.1.

### Assembly:

The following components are needed to make up an UltraSeal fitting: UltraSeal body, gland, nut and O-ring.

To assemble, place the O-ring in the UltraSeal body O-ring groove, position the UltraSeal gland against the O-ring, and advance the nut to a finger-tight position.

A positive seal is achieved by advancing the nut no less than ¼ turn from finger-tight position. When a sharp rise in torque is felt, the sealing faces have met and the O-ring seal is compressed into its groove.

UltraSeal is capable of repeated remakes; advance the nut to a finger-tight position and wrench until a sharp rise in torque is felt. No axial clearance is needed to remove UltraSeal components from a system; therefore, other system components are not disturbed.

*Socket Weld Ends*— For conventional tube size socket welding.

*Automatic Buttweld Ends*— For fully automated tube-to-tube welding. Parker CPI's ABW ends offer the easiest and most convenient way to fabricate welded systems. A full range of ABW fittings in straights and shapes are available. Automatic Buttweld is a patented product. Ask your CPI distributor for the names of Parker approved automated welder manufacturers. He can also arrange demonstrations of this equipment.

*Tube Stub Ends*— For adapting existing systems or components using Parker CPI fittings to UltraSeal.

**Materials**

UltraSeal fittings are available in Stainless Steel (Type 316). UltraSeal O-rings are available in Stainless Steel (Type 321-SS silver plated), Teflon® and Viton® materials (See Table 2). Straight fittings are machined from cold finished bar stock and shaped bodies are machined from close grain forgings. The raw materials used for fittings fully conform to the chemical & mechanical requirements of one or more of the specifications listed in Table 1. For nuclear and other critical applications, UltraSeal is available with documented heat code traceability.

UltraSeal fittings are manufactured to a Quality Control program certified by the American Society of Mechanical Engineers, Number QSC-408 (see back cover).

**Table 1**

<b>Typical Raw Material Specifications</b>			
<b>Fitting Material</b>	<b>Bar Stock</b>	<b>Forgings</b>	<b>Recommended Tubing Specifications</b>
Stainless Steel 316	ASTM A-276 TYPE 316-SS ASME SA-479 TYPE 316-SS	ASME SA-182 GRADE F316	ASME SA-213 ASTM A-213 ASTM A-249 ASTM A-269 MIL T-8504 MIL T-8506

**Table 2**

<b>O-Rings Typical Raw Material Specifications/Temperature Ratings</b>		
	<b>Material Specifications</b>	<b>Temperature Ratings</b>
Metal O-Rings	SAE AMS-5570 TYPE 321-SS (silver plated) SAE AMS-5576 TYPE 321-SS (silver plated)	(- 350° to + 1000 °F) (- 212° to + 538 °C)
Viton® O-Rings	MIL-R-25897 TYPE 1	(- 15° to + 400 °F) (- 26° to + 204 °C)
Teflon®	SAE AMS-2651	(- 50° to + 400 °F) (- 46° to + 232 °C)

## 2 Nomenclature/How To Order

### Nomenclature

UltraSeal fitting part numbers are constructed from symbols that identify the size and configuration of the fitting and material used.

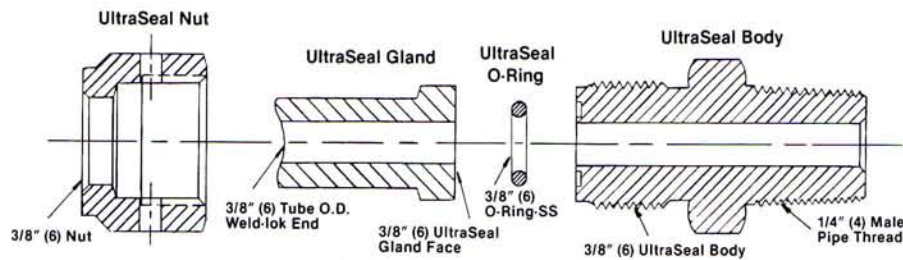
### How To Order

Parker UltraSeal components are ordered by part

number, as listed in this catalog.

Note: Each component must be ordered separately.

Example: If your system requires an UltraSeal fitting going from 3/8" tubing to 1/4" male NPT pipe thread, you would order the following part. (Keep in mind that you must order each component separately.)



### To Order:

- 6 BQ-SS Size 6 UltraSeal Nut Stainless Steel
- 6-6 Q1W-SS Size 6 UltraSeal Gland to Size 6 Weld-lok Socket — Stainless Steel
- 6 QO-SS Size 6 Stainless Steel O-Ring
- 6-4 FQ-SS Size 6 UltraSeal Body to Size 4 Male Pipe Thread Stainless Steel

*Type:* A letter or combination of letters and numbers are used to designate the type of UltraSeal fitting (i.e., F = Male Connector, H = Union, etc.). See Visual Index for other type fittings.

*Material:* UltraSeal Bodies, Glands and Nuts are all Type 316-SS. UltraSeal O-Rings are available in SS-Stainless Steel (Type 321-silver plated), TFE-Teflon® and VI-Viton®.

*Size:* Tube and Pipe Thread sizes are designated by the number of sixteenths of an inch (3/8" Tube = 6/16" = 6), (1/4" Pipe Thread = 4/16" = 4).

*Straights, Elbows and Tees:* Call out the UltraSeal end first, followed by the corresponding Pipe Thread size or Weld-lok end.

*Special Fittings:* If special fitting configurations are required, it is suggested that a sketch or drawing be submitted for review.

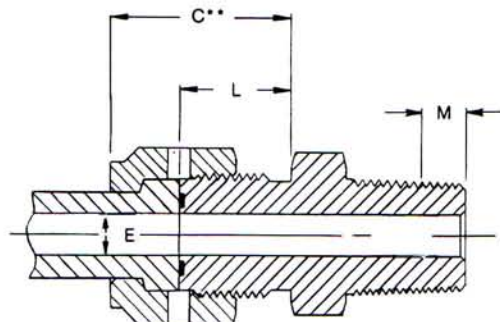
*Availability:* Only items as standard are carried in stock. Non-standard items can be quoted on request for quantities specified.

### UltraSeal End Data Information

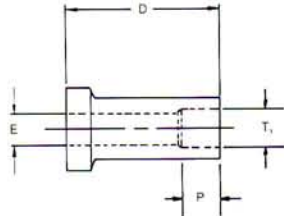
SIZE	NPT PIPE THREAD	ULTRA SEAL THREAD	*L		*C		H HEX		E DIA		*MIN TH'D. M ENGAGEMENT	
			IN	MM	IN	MM	IN	MM	IN	MM	IN	MM
4	1/4 - 18	9/16 - 20	.46	11.6	.73	18.54	11/16	17.45	.19	4.8	.20	5.08
6	3/8 - 18	3/4 - 20	.47	11.9	.84	21.34	7/8	22.23	.25	6.4	.24	6.10
8	1/2 - 14	7/8 - 20	.47	11.9	.85	21.59	1"	25.40	.31	7.9	.32	8.13

\*Average Value

\*\*Dimension C is shown in the finger tight position



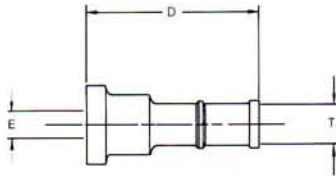
## UltraSeal Gland to Weld-lok Socket Q1W



\* NOTE: MACHINED BORE DIAMETERS TO MATCH MACHINED BORE IN BODY.

PART NO.	T <sub>1</sub> TUBE OD	D		P		*E BORE		WORKING PRESSURE
		IN	MM	IN	MM	IN	MM	
4-2 Q1W	1/8	1	25.4	.16	4.1	.19	4.8	10,000
4-4 Q1W	1/4	1	25.4	.25	6.4	.19	4.8	7,700
6-4 Q1W	1/4	1	25.4	.25	6.4	.19	4.8	10,000
6-6 Q1W	3/8	1	25.4	.34	8.6	.25	6.4	5,500
8-6 Q1W	3/8	1	25.4	.34	8.6	.31	7.9	9,500
8-8 Q1W	1/2	1	25.4	.41	10.4	.31	7.9	4,300

## UltraSeal Gland to Automatic Butt weld Q1Y



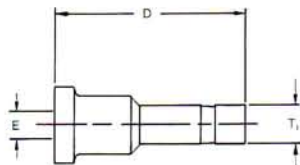
\* NOTE: MACHINED BORE DIAMETERS TO MATCH MACHINED BORE IN BODY.

PART NO.	T <sub>1</sub>	D		*E BORE		**AUTO BUTTWELD WALL SIZE	WORKING PRESSURE
		IN	MM	IN	MM		
4-4 Q1Y	1/4	1.13	29.0	.17	4.3	.035	7,700
6-4 Q1Y	1/4	1.19	30.2	.17	4.3	.035	7,700
6-6 Q1Y	3/8	1.19	30.2	.25	6.4	.035	4,900
8-6 Q1Y	3/8	1.19	30.2	.19	4.8	.035	4,900
8-8 Q1Y	1/2	1.34	34.0	.31	7.9	.049	5,000

Note: Wall thickness— fittings must be specified to match the corresponding tube wall thickness.

\*\*Other wall sizes available upon request. Consult Parker for further information.

## UltraSeal Gland to Tube Stub Adapter Q1T2



\* NOTE: MACHINED BORE DIAMETERS TO MATCH MACHINED BORE IN BODY.

SIZE	T <sub>1</sub>	D		*E BORE		WORKING PRESSURE
		IN	MM	IN	MM	
4-4 Q1T2	1/4	1.25	31.8	.19	4.8	4,500
6-6 Q1T2	3/8	1.37	34.8	.25	6.4	6,700
8-8 Q1T2	1/2	1.68	42.6	.31	7.9	6,250



## 4 UltraSeal Components

### UltraSeal O-Rings QO



#### Viton®

PART NO.	MATERIAL COMPOUND
4QO-VI	VITON
6QO-VI	VITON
8QO-VI	VITON

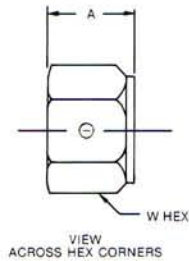
#### Stainless Steel

PART NO.	MATERIAL
4QO-SS	321 (SILVER PLATED)
6QO-SS	321 (SILVER PLATED)
8QO-SS	321 (SILVER PLATED)

#### Teflon®

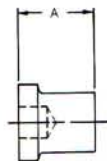
PART NO.	MATERIAL COMPOUND
4QO-TE	VIRGIN TFE
6QO-TE	VIRGIN TFE
8QO-TE	VIRGIN TFE

### UltraSeal Nut BQ



PART NO.	W HEX	A	
		IN	MM
4 BQ	11/16	.56	14.2
6 BQ	7/8	.69	17.5
8 BQ	1"	.69	17.5

### UltraSeal Plug FNQ1

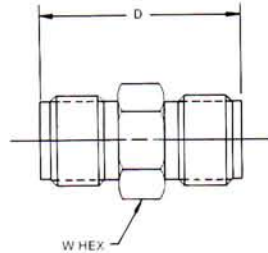


PART NO.	A	
	IN	MM
4 FNQ1	.50	12.7
6 FNQ1	.50	12.7
8 FNQ1	.50	12.7

**UltraSeal Union  
HQ**



PART NO.	W HEX	D	
		IN	MM
4-4 HQ	5/8	1.19	30.2
6-4 HQ	13/16	1.22	31.0
6-6 HQ	13/16	1.22	31.0
8-4 HQ	15/16	1.25	31.8
8-8 HQ	15/16	1.25	31.8

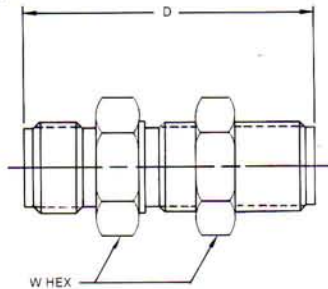


**UltraSeal to  
Bulkhead Connector  
WBQ**



PART NO.	W HEX	BULKHEAD HOLE DRILL SIZE		MAX BULKHEAD THICKNESS		D	
		IN	MM	IN	MM	IN	MM
4-4 WBQ	3/4	37/64	14.7	9/16	14.3	1.88	47.8
6-6 WBQ	15/16	49/64	19.4	19/32	15.1	2.00	50.8
8-8 WBQ	1-1/16	57/64	22.6	19/32	15.1	2.06	52.3

Fitting includes panel locking nut.

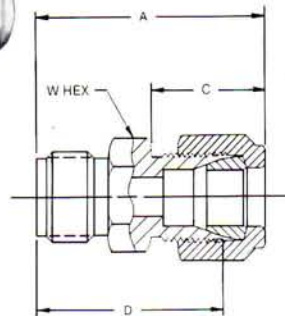


**UltraSeal to  
CPI Tube Union  
QHBZ**



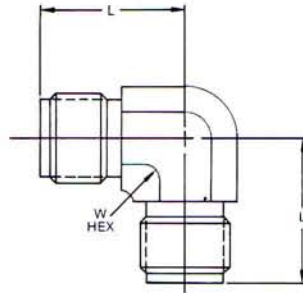
PART NO.	TUBE O.D.	W HEX	D		*C		*A	
			IN	MM	IN	MM	IN	MM
4-4 QHBZ	1/4	5/8	1.12	28.4	.70	17.8	1.41	35.8
6-4 QHBZ	1/4	13/16	1.12	29.5	.70	17.8	1.41	35.8
6-6 QHBZ	3/8	13/16	1.22	31.1	.78	19.8	1.53	38.9
8-6 QHBZ	3/8	15/16	1.25	31.8	.78	19.8	1.56	39.6
8-8 QHBZ	1/2	15/16	1.25	31.8	.91	23.1	1.69	42.9

CPI nut and ferrule are provided as shown.  
\*Dimensions shown with CPI nut finger tight.



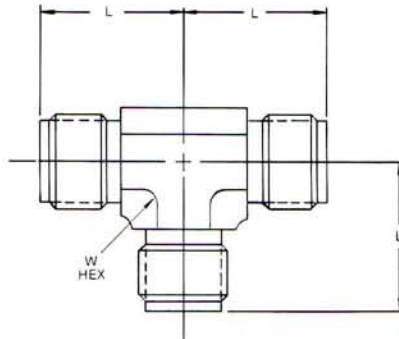
## 6 UltraSeal Unions

### UltraSeal Union Elbow EQ



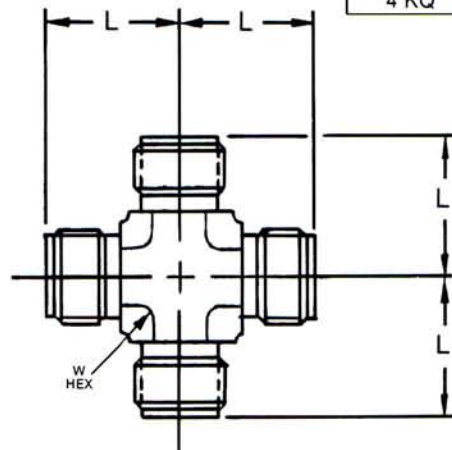
PART NO.	W HEX	L	
		IN	MM
4-4 EQ	9/16	.84	21.3
6-6 EQ	3/4	.97	24.6
8-8 EQ	7/8	1.03	26.2

### UltraSeal Union Tee JQ



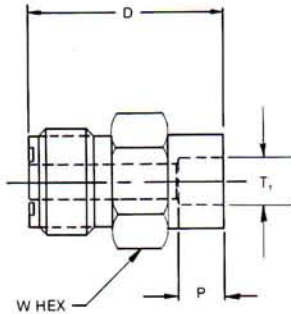
PART NO.	W HEX	L	
		IN	MM
4-4-4 JQ	9/16	.84	21.3
6-6-6 JQ	3/4	.97	24.6
8-8-8 JQ	7/8	1.03	26.2

### UltraSeal Union Cross KQ



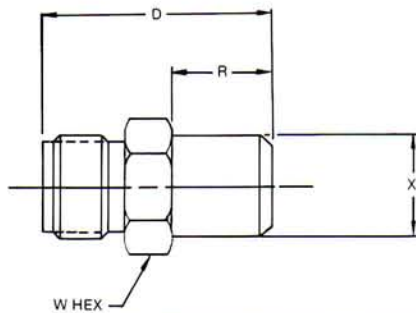
PART NO.	W HEX	L	
		IN	MM
4 KQ	9/16	.84	21.3

## UltraSeal to Socket Weld Connector QHW



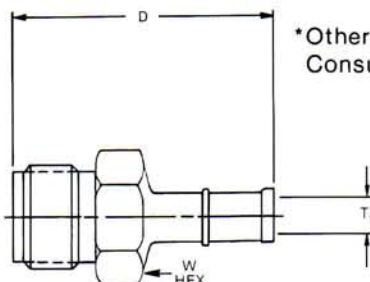
PART NO.	T <sub>1</sub> TUBE OD	W HEX	D		P	
			IN	MM	IN	MM
4-2 QHW	1/8	5/8	1.02	25.9	.16	4.1
4-4 QHW	1/4	5/8	1.09	27.7	.25	6.4
6-4 QHW	1/4	13/16	1.06	26.9	.25	6.4
6-6 QHW	3/8	13/16	1.16	29.5	.34	8.6
8-6 QHW	3/8	15/16	1.13	28.7	.34	8.6
8-8 QHW	1/2	15/16	1.19	30.2	.41	10.4

## UltraSeal to Buttweld Connector QHW2



PART NO.	BUTT-WELD PIPE SIZE	W HEX	D		R		X BUTTWELD O.D.	
			IN	MM	IN	MM	IN	MM
4-1/4 QHW2	1/4	5/8	1.28	32.5	.56	14.2	.540	13.7
6-3/8 QHW2	3/8	13/16	1.31	33.3	.56	14.2	.675	17.1
8-1/2 QHW2	1/2	15/16	1.50	38.2	.75	19.1	.840	21.3

## UltraSeal to Automatic Buttweld Connector QHY

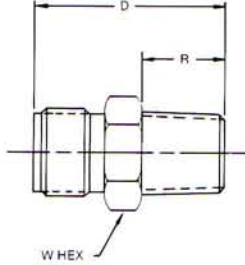


PART NO.	T <sub>1</sub>	W HEX	D		*AUTO BUTTWELD WALL SIZE
			IN	MM	
4-4 QHY	1/4	5/8	1.47	37.3	.035
6-4 QHY	1/4	13/16	1.53	38.9	.035
6-6 QHY	3/8	13/16	1.50	38.1	.035
8-6 QHY	3/8	15/16	1.53	38.9	.035
8-8 QHY	1/2	15/16	1.66	42.2	.049

\*Other standard wall sizes available upon request. Consult Parker for further information.

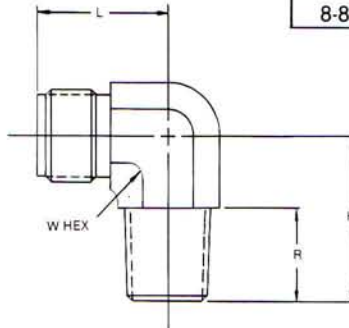
## 8 UltraSeal Pipe Connectors

### UltraSeal to Male Pipe Connector FQ



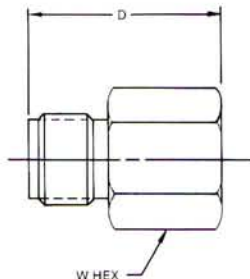
PART NO.	PIPE TH'D	W HEX	D		R	
			IN	MM	IN	MM
4-2 FQ	1/8	5/8	1.09	27.7	.38	9.7
4-4 FQ	1/4	5/8	1.28	32.5	.56	14.2
6-4 FQ	1/4	13/16	1.31	33.3	.56	14.2
8-6 FQ	3/8	13/16	1.31	33.3	.56	14.2
8-8 FQ	1/2	15/16	1.53	38.9	.75	19.1

### UltraSeal to Male Elbow CQ



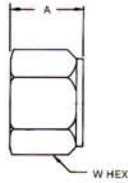
PART NO.	PIPE TH'D	W HEX	H		L		R	
			IN	MM	IN	MM	IN	MM
4-4 CQ	1/4	9/16	1.00	23.9	.84	21.3	.56	14.2
6-4 CQ	1/4	3/4	1.12	28.5	.97	24.6	.56	14.2
6-6 CQ	3/8	3/4	1.12	28.5	.97	24.6	.56	14.2
8-6 CQ	3/8	7/8	1.25	31.8	1.03	26.2	.56	14.2
8-8 CQ	1/2	7/8	1.31	33.3	1.03	26.2	.75	19.1

### UltraSeal to Female Connector GQ



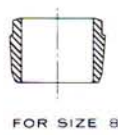
PART NO.	PIPE TH'D	W HEX	D	
			IN	MM
4-4 GQ	1/4	3/4	1.19	30.2
6-6 GQ	3/8	7/8	1.25	31.8
8-8 GQ	1/2	1-1/8	1.44	36.6

**CPI  
Tube Nut  
BZ**



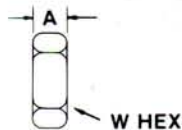
PART NO.	INCHES	A		W HEX	
	TUBE O.D.	IN	MM	IN	MM
4 BZ	1/4	.50	12.7	9/16	14.3
6 BZ	3/8	.56	14.2	11/16	17.5
8 BZ	1/2	.69	17.5	7/8	22.2

**CPI  
Ferrules  
TZ**



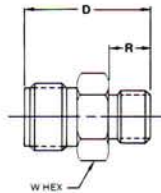
PART NO.	INCHES
	TUBE O.D.
4 TZ	1/4
6 TZ	3/8
8 TZ	1/2

**Bulkhead Locknut  
WLZ**



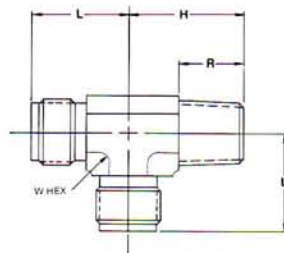
PART NO.	INCHES	A		W HEX	
	TUBE O.D.	IN	MM	IN	MM
4 WLZ	1/4	.22	5.6	5/8	15.8
6 WLZ	3/8	.25	6.4	3/4	19.0
8 WLZ	1/2	.28	7.1	15/16	23.8

**UltraSeal to Male Connector  
Straight Thread  
QHA**



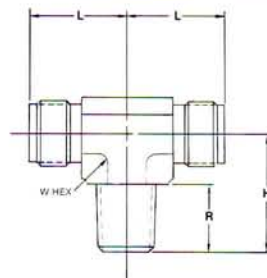
PART NO.	STRAIGHT TH'D SIZE	W HEX	D		R	
			IN	MM	IN	MM
4-4 QHA	7/16-20	5/8	1.09	27.7	.36	9.1
6-6 QHA	9/16-18	7/8	1.14	29.0	.39	9.9
8-8 QHA	3/4-16	15/16	1.31	3.33	.44	11.2

**UltraSeal to Male Run Tee  
RQ**



PART NO.	PIPE TH'D	W HEX	H		L		R	
			IN	MM	IN	MM	IN	MM
4-4-4 RQ	1/4	9/16	1.00	25.4	.84	21.3	.56	14.2

**UltraSeal to Male Branch Tee  
SQ**



PART NO.	PIPE TH'D	W HEX	H		L		R	
			IN	MM	IN	MM	IN	MM
4-4-4 SQ	1/4	9/16	1.00	25.4	.84	21.3	.56	14.2



## THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

### Quality System Certificate (Materials)

Number QSC - 408

This is to certify that the Quality Control Program of

PARKER HANNIFIN CORPORATION  
INSTRUMENTATION CONNECTORS DIVISION  
9400 S. MEMORIAL PARKWAY  
HUNTSVILLE, ALABAMA 35802

has been reviewed and they are hereby authorized by The American Society of Mechanical Engineers as a Material

MANUFACTURER OF FERROUS & NONFERROUS FITTINGS AT THE ABOVE LOCATION ONLY

in accordance with the applicable rules of the Boiler and Pressure Vessel Code of The American Society of Mechanical Engineers. The authority granted by this certificate is subject to the provisions of the agreement set forth in the application. Any material produced under this Certificate shall have been manufactured strictly in accordance with the provisions of the Boiler and Pressure Vessel Code of The American Society of Mechanical Engineers.

THIS AUTHORIZATION expires on JULY 29, 1983

Authorized on JULY 29, 1980 for

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS  
by the BOILER AND PRESSURE VESSEL COMMITTEE

Chairman *Walter A. Harding*

Secretary *JM Eisenberg*

Director,  
Certification *Alvin L. Spadofino*



UltraSeal fittings are manufactured to a Quality Control program certified by the American Society of Mechanical Engineers, Number QSC-408.

**Parker**  
FluidConnectors

Parker Hannifin Corporation  
Instrumentation Connectors Division  
P.O. Box 4288  
Huntsville, Alabama 35802  
205/881-2040



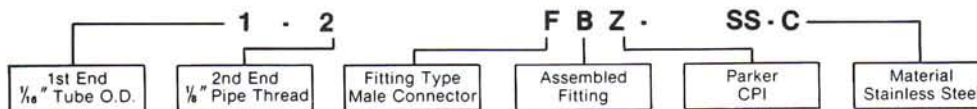


## PARKER CPI FITTING DESCRIPTION

column end fitting		tube to female pipe		plug and cap	
Z2HBZ7 low internal volume with frit page 5	Z2HBZ with frit page 7	GBZ female connector page 11	MBZ female run tee page 12	FNZ plug page 17	PNBZ cap page 17
ZHBZ7 low internal volume (without frit) page 6	ZHBZ (without frit) page 7	GH2BZ female bulkhead connector page 11	OBZ female branch tee page 12	<b>components</b>	
Z3HBZ7 low internal volume page 5		DBZ female elbow page 12			
low dead volume union		tube to tube unions		BZP knurled nut page 18	T2H2BZ tube end bulkhead adapter page 15
Z7HBZ7 union connector page 8		HBZ union page 13	JBZ union tee page 14	TZ ferrules page 18	ZPC port connector page 16
low dead volume male connector		WBZ bulkhead union page 13	KBZ union cross page 14	TIZ insert page 19	T2HF tube end male adapter page 16
FBZ7 male connector page 8		EBZ union elbow page 13		WLZ bulkhead locknut page 19	T2HG tube end female adapter page 16
tube to male pipe				BZI inverted nut page 19	
FBZ male connector page 9	VBZ male 45° elbow page 10				
FH2BZ male bulkhead connector page 9	RBZ male run tee page 10				
CBZ male elbow page 9	SBZ male branch tee page 10				

### nomenclature

Parker CPI fittings part numbers are constructed from symbols that identify the size and style of the fitting and material used.  
**example:** The part number shown below is for a Parker CPI stainless steel male connector for 1/16" O.D. tube (-1) and 1/8" male pipe thread (-2).



### how to order

Parker CPI Tube Fittings are ordered by part number as listed in this catalog.

**size:** Tube and pipe thread sizes are designated by the number of sixteenths of an inch (1/16" tube = 1/16" = 1), (1/8" pipe thread = 2/16" = 2).

**straights & elbows:** Call out largest CPI tube end size first followed by the smaller CPI tube end or pipe thread size.

**tees & crosses:** For tees - first size the run (1 to 2) and then the branch (3). Example - the size designator for a male run tee for 1/16" O.D. tube and 1/8" male pipe thread would be 2-4-2. For crosses - first size the run (1 to 2) and then the branch (3 to 4).

**type:** A letter or combination of letters and numbers are used to designate the type of fitting. (i.e. F = male connector, H = union connector, etc.) See the visual index for other type fittings.

**BZ:** This is the standard CPI designator for assembled fitting with nut and ferrules.

**material:** Basic material type (B = brass, SS-C = stainless steel, type 316).

Parker CPI tube fittings, for special applications, can be furnished in almost any material suitable for machining.

**special fittings:** If there is any question as to the fitting desired, particularly for special fitting configurations, it is suggested that a sketch be submitted with the fitting order.

**availability:** Only items priced in current price list 4232 are carried in stock. Price and delivery for non-stock items furnished on request for quantity specified.



The Parker CPI tube fittings shown in this catalog have been designed to meet the most stringent demands of modern chromatography and other analytical applications.

**design**

The Parker CPI single ferrule system requires only two metal to metal seal points to effect a leak tight seal. These seals are to the fitting body and to the tubing. The Parker CPI design reduces potential leak paths by having fewer components.

The single ferrule also puts the seal where it belongs, at the leading edge of the ferrule. This eliminates the ferrule as a potential entrapment zone.

**sealing**

The Parker CPI tube fitting, when properly made-up on high quality tubing, can provide a seal which exceeds  $5 \times 10^{-10}$  cc/sec helium leak. Note that the quality of the tubing plays an important role in the performance of the seal.

**remake**

The Parker CPI tube fitting is designed in such a manner that repeated remakes will not affect sealing performance. Even in the over-made condition sealing ability is excellent. The single ferrule design is responsible for this performance.

**temperature cycling**

The Parker CPI single ferrule design allows the ferrule to bow during make-up. The bowing action of the ferrule creates an active element that can expand and contract with temperature cycling and maintain a leak-tight seal.

**no distortion**

In make-up, the single ferrule design exerts no undue force in an outward direction to distort the fitting body or cause interference between the ferrule and nut. This assures that the nut will back-off freely for disassembly and permits a greater number of remakes.

**no tube twist**

No rotational forces are imparted to the tubing during assembly. The tube is not prestressed by twisting and a better seal is assured.

**packaging**

Parker CPI tube fittings are packaged to insure cleanliness. Plastic thread protectors are used and the fittings are mounted in plastic trays. The trays are shrink wrapped, then boxed and shrink wrapped again.

**materials**

In this catalog the chromatography fittings are standard in 316 stainless steel. Fittings for other analytical applications are available in 316 stainless steel and brass.

Straight fittings are machined from bar stock and shaped bodies are machined from close grain forgings.

**table 1 — typical raw material specifications**

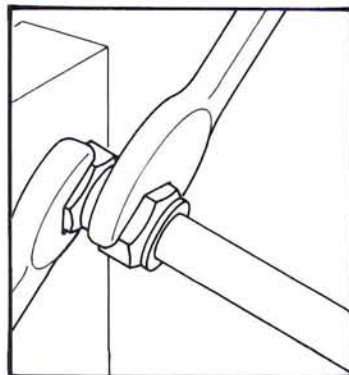
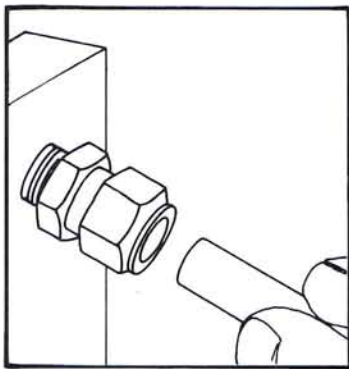
BASIC FITTING MATERIAL	BAR STOCK	FORGING	COMMON TUBING SPECIFICATIONS
BRASS	CA-360 QQ-B 626 Alloy 360 ASTM-B16 Alloy 360 CA-345 ASTM-B-453 Alloy 345	CA-377 QQ-B 626 Alloy 377 ASTM-B-124 Alloy 377	ASTM-B75 ASME-SB75
STAINLESS STEEL (Type 316) <sup>(1)</sup>	ASTM-A-479 Type 316	ASME-SA-182 F316	ASME-SA-213 ASTM-A-213 ASTM-A-249 ASTM-A-269 <sup>(2)</sup> MIL-T-8504 MIL-T-8506

(1) If more specific information, including heat code traceability, is required, your Parker-Hannifin CPI distributor will provide details.

(2) Stainless Steel CPI fittings work reliably on both seamless and welded-redrawn, fully annealed type 304 and 316 tubing.

# 4 Parker CPI Fittings for Chromatography and Analytical Applications

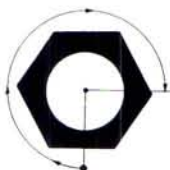
## assembly instructions



1. Parker CPI fittings are sold completely assembled and ready for immediate use. Simply insert the tube as illustrated until it bottoms in the fitting body. (If the fitting is disassembled, note that the small tapered end of the Ferrule goes into the fitting body.)

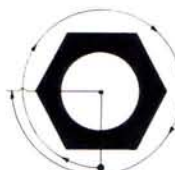
2. Tighten nut finger tight. Then tighten nut with wrench to the specification indicated below. Hold fitting body with a second wrench to prevent body from turning. It is helpful to mark the nut to facilitate counting the number of turns.

SIZE 1 thru 3  
( $\frac{1}{16}$ " -  $\frac{3}{16}$ " )



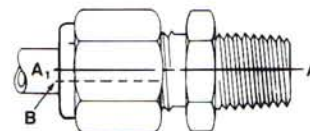
$\frac{3}{4}$  Turn from  
Finger Tight

SIZE 4 thru 8  
( $\frac{1}{4}$ " -  $\frac{1}{2}$ " )



$1\frac{1}{4}$  Turns from  
Finger Tight

For maximum number of remakes, mark the fitting and nut (scribe or ink) before disassembly. Remake by tightening until marks line up again. A slight torque rise will be felt indicating the ferrule is being re-sprung into sealing position. Only after several remakes may it become necessary to advance the nut slightly past original position. This advance (indicated by B) need only be  $10^{\circ}$ - $20^{\circ}$  (less than  $\frac{1}{3}$  of a hex flat).

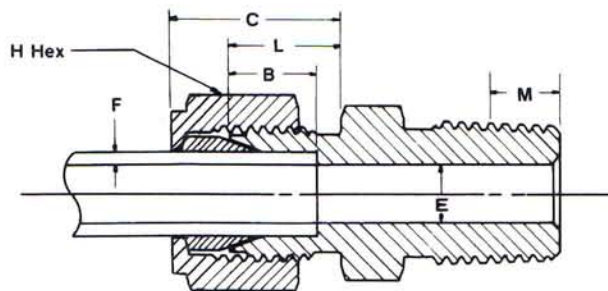


**NOTE:** All assembled fittings in this catalog are shown in the Finger Tight Position.

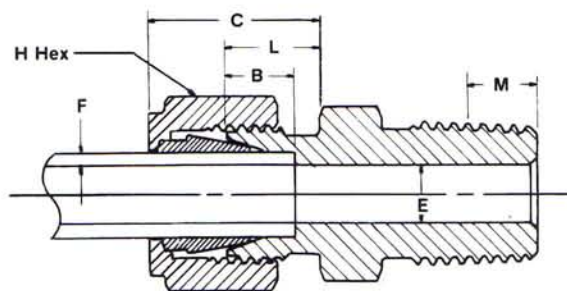
## tube end dimensional data

Size No.	Tube O.D.	NPT Pipe Thread	Straight Thread	†L		†B		†C		H Hex		M Min. Thrd. Engagement		E Dia.		F Recom. Min. Tube Wall	
				in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
1	$\frac{1}{16}$	$\frac{1}{16}$ -27	10-32	.288	7.32	.190	4.83	.47	11.94	$\frac{5}{16}$	7.13	.16	4.06	.052	1.32	.010	.25
2	$\frac{1}{8}$	$\frac{1}{8}$ -27	$\frac{5}{16}$ -20	.350	8.89	.250	6.35	.61	15.49	$\frac{7}{16}$	11.11	.18	4.57	.093	2.36	.016	.41
4	$\frac{1}{4}$	$\frac{1}{8}$ -27	$\frac{7}{16}$ -20	.404	10.26	.302	7.67	.70	17.78	$\frac{9}{16}$	14.29	—	4.57	.187	4.75	.020	.51
6	$\frac{3}{8}$	$\frac{1}{4}$ -18	$\frac{9}{16}$ -20	.466	11.84	.365	9.27	.78	19.81	$1\frac{1}{16}$	17.46	.20	5.08	.281	7.14	.028	.71
8	$\frac{1}{2}$	$\frac{3}{8}$ -18	$\frac{3}{4}$ -20	.476	12.09	.500	12.70	.91	23.11	$\frac{7}{8}$	22.23	.24	6.10	.406	10.31	.028	.71

†Average Value



Sizes 1 to 6

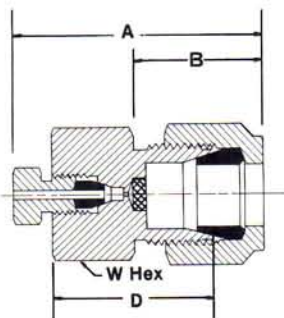


Size 8

**NOTE:** Dimension C is shown in the finger tight position.

**column end fitting — low internal volume with frit**  
**Z2HBZ7-\***

includes body, nut, ferrule and frit



**features:**

- inverted 1/16" end substantially reduces internal volume
- flow stream contacts entire frit surface reducing plugging and eliminating unswept volume
- can be used as a low volume final filter

PART NO.	T <sub>1</sub> TUBE O.D.	T <sub>2</sub> TUBE O.D.	†A	†B	D	W hex size	minimum opening	internal volume
2-1 Z2HBZ7	1/8"	1/16"	1.27	.61	.78	7/16"	.013	5.4 x 10 <sup>-4</sup> cc
4-1 Z2HBZ7	1/4"	1/16"	1.37	.70	.84	1/2"	.013	1.2 x 10 <sup>-3</sup> cc
6-1 Z2HBZ7	3/8"	1/16"	1.47	.78	.92	5/8"	.013	3.8 x 10 <sup>-3</sup> cc

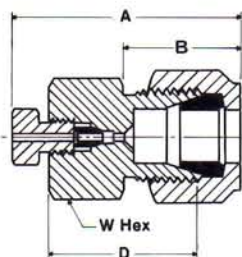
†Average Value

FRIT DESIGNATOR	
*	MICRON SIZE
-1	0.5μ
-2	2 μ
-3	5 μ
-4	10 μ

HOW TO ORDER
EXAMPLE: 4-1Z2HBZ7-2-SS-C To order with 2μ frit for 1/4" O.D. column

**column end fitting — low internal volume**  
**Z3HBZ7-\***

includes body, nut, ferrule, and frit



**features:**

- inverted 1/16" end substantially reduces internal volume
- Drop in frit for use with L.C. columns or G.C. columns
- Conical angle below frit directs flow over more frit surface
- Available for up to 1" columns

PART NO.	T <sub>1</sub> TUBE O.D.	T <sub>2</sub> TUBE O.D.	†A	†B	D	W hex size	minimum opening	internal volume
4-1 Z3HBZ7	1/4"	1/16"	1.29	.70	.76	1/2"	.013	6.1 x 10 <sup>-4</sup> cc
6-1 Z3HBZ7	3/8"	1/16"	1.39	.78	.86	5/8"	.013	8.1 x 10 <sup>-4</sup> cc
8-1 Z3KBZ7	1/2"	1/16"	1.63	.91	1"	13/16"	.030	2.8 x 10 <sup>-3</sup> cc
16-1 Z3HBZ7	1"	1/16"	2.00	1.06	1 1/16"	1 3/8"	.030	2 x 10 <sup>-2</sup> cc

†Average Value

FRIT DESIGNATOR	
*	MICRON SIZE
-3	2μ
-3	5μ
-4	10μ

HOW TO ORDER
EXAMPLE: 4-1Z3HBZ7-2-SS-C To order with 2μ frit for 1/4" O.D. column

## column end fitting—low internal volume (without frit)

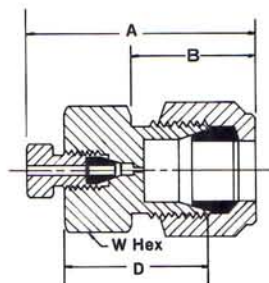
### ZHBZ7

Includes body, nut and ferrule



#### features:

- inverted  $\frac{1}{16}$ " end substantially reduces internal volume
- no frit for use with G.C. columns or L.C. columns with screens
- can be used as a low volume reducing union



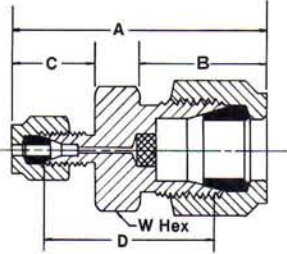
PART NO.	T <sub>1</sub> TUBE O.D.	T <sub>2</sub> TUBE O.D.	†A	†B	D	W hex size	minimum opening	internal volume
2-1 ZHBZ7	$\frac{1}{8}$ "	$\frac{1}{16}$ "	1.19	.61	.70	$\frac{7}{16}$ "	.013	$1.0 \times 10^{-4}$ cc
4-1 ZHBZ7	$\frac{1}{4}$ "	$\frac{1}{16}$ "	1.29	.70	.76	$\frac{1}{2}$ "	.013	$1.1 \times 10^{-4}$ cc
6-1 ZHBZ7	$\frac{3}{8}$ "	$\frac{1}{16}$ "	1.39	.78	.86	$\frac{5}{8}$ "	.013	$1.3 \times 10^{-4}$ cc

†Average Value

**Note:** When ordering in 316 S.S. suffix part no. with C. Example 4-1-ZHBZ7-SS-C

**column end fitting—with frit**  
**Z2HBZ-\***

includes body, nut, ferrule and frit



**\*features:**

- flow stream contacts entire frit surface reducing plugging and eliminating unswept volume
- can be used as a low volume final filter

PART NO.	T <sub>1</sub> TUBE O.D.	T <sub>2</sub> TUBE O.D.	†A	†B	†C	D	minimum opening	W hex size	internal volume
2-1 Z2HBZ	1/8"	1/16"	1.29	.61	.47	13/16"	.020	7/16"	2.1 x 10 <sup>-3</sup> cc
4-1 Z2HBZ	1/4"	1/16"	1.39	.70	.47	29/32"	.020	1/2"	1.8 x 10 <sup>-3</sup> cc
6-1 Z2HBZ	3/8"	1/16"	1.49	.78	.47	1"	.020	5/8"	5.4 x 10 <sup>-3</sup> cc

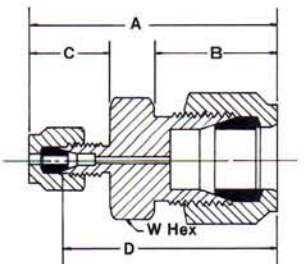
†Average Value

FRIT DESIGNATOR	
*	MICRON SIZE
-1	0.5μ
-2	2 μ
-3	5 μ
-4	10 μ

HOW TO ORDER
EXAMPLE: 4-1Z2HBZ-2-SS-C To order with 2 μ frit for 1/4" O.D. column

**column end fitting—(without frit)**  
**ZHBZ**

includes body, nut, and ferrule



**features:**

- flat bottom on column end for use with screens
- can be used as a low volume reducing union

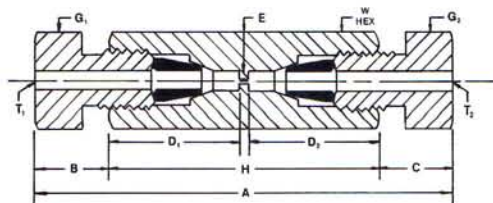
PART NO.	T <sub>1</sub> TUBE O.D.	T <sub>2</sub> TUBE O.D.	†A	†B	†C	D	minimum opening	W hex size	internal volume
2-1 ZHBZ	1/8"	1/16"	1.29	.61	.47	13/16"	.020	7/16"	2.1 x 10 <sup>-3</sup> cc
4-1 ZHBZ	1/4"	1/16"	1.39	.70	.47	29/32"	.020	1/2"	2.1 x 10 <sup>-3</sup> cc
6-1 ZHBZ	3/8"	1/16"	1.49	.78	.47	1"	.020	5/8"	2.3 x 10 <sup>-3</sup> cc

†Average Value

**Note:** When ordering in 316 S.S. suffix part no. with C. Example 4-1-ZHBZ-SS-C.

## union connector—low dead volume Z7HBZ7-SS

includes body, nut and ferrule

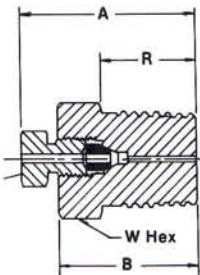


PART NO.	T <sub>1</sub> TUBE O.D.	T <sub>2</sub> TUBE O.D.	†A	†B	†C	D <sub>1</sub>	D <sub>2</sub>	E minimum opening	W HEX SIZE	G <sub>1</sub>	G <sub>2</sub>	H	Internal volume
1-1 Z7HBZ7-SS	1/16"	1/16"	1.24	.20	.20	.41	.41	.013	.25	.25	.25	.84	8.7 x 10 <sup>-5</sup> cc
2-1 Z7HBZ7-SS	1/8"	1/8"	1.44	.23	.20	.56	.41	.013	.44	.38	.25	1.01	8.7 x 10 <sup>-5</sup> cc
2-2 Z7HBZ7-SS	1/8"	1/8"	1.64	.23	.23	.56	.56	.052	.44	.38	.38	1.19	9.7 x 10 <sup>-2</sup> cc

†Average Value

## male connector—low dead volume FBZ7

includes body, nut, and ferrule

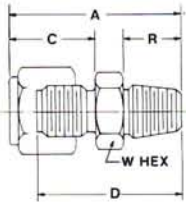


PART NO.	TUBE O.D.	PIPE THREAD	†A	B	R	minimum opening	W hex size	Internal volume
1-1 FBZ7	1/16"	1/16"	.75	.55	.38	.013	5/16"	3.1 x 10 <sup>-4</sup> cc
1-2 FBZ7	1/8"	1/8"	.79	.59	.38	.013	7/16"	4.4 x 10 <sup>-4</sup> cc
1-4 FBZ7	1/8"	1/4"	1.01	.81	.56	.013	9/16"	8.8 x 10 <sup>-4</sup> cc

†Average Value

**male connector  
FBZ**

includes body, nut and ferrule



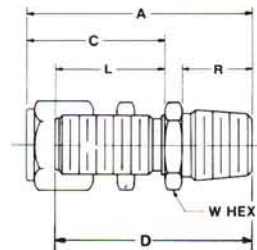
**Note:** When ordering in 316 S.S. suffix part no. with C.  
Example 1-1 FBZ-SS-C

PART NO.	INCHES			†A		†C		D		R	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm
1-1 FBZ	1/16	1/16	5/16	.97	24.6	.47	11.9	.78	19.8	.38	9.7
1-2 FBZ	1/16	1/8	7/16	1.03	26.1	.47	11.9	.84	21.3	.38	9.7
1-4 FBZ	1/16	1/4	9/16	1.25	31.8	.47	11.9	1.06	26.9	.56	14.2
2-1 FBZ	1/8	1/16	3/8	1.18	30.0	.61	15.5	.91	23.1	.38	9.7
2-2 FBZ	1/8	1/8	7/16	1.18	30.0	.61	15.5	.91	23.1	.38	9.7
2-4 FBZ	1/8	1/4	9/16	1.40	35.6	.61	15.5	1.13	28.7	.56	14.2
4-2 FBZ	1/4	1/8	1/2	1.29	32.8	.70	17.8	1.00	25.4	.38	9.7
4-4 FBZ	1/4	1/4	9/16	1.48	37.6	.70	17.8	1.19	30.2	.56	14.2
4-6 FBZ	1/4	3/8	11/16	1.51	38.4	.70	17.8	1.22	31.0	.56	14.2
4-8 FBZ	1/4	1/2	7/8	1.73	43.9	.70	17.8	1.44	36.6	.75	19.1
6-2 FBZ	3/8	1/8	5/8	1.40	35.6	.78	19.8	1.09	27.7	.38	9.7
6-4 FBZ	3/8	1/4	5/8	1.59	40.4	.78	19.8	1.28	32.5	.56	14.2
6-6 FBZ	3/8	3/8	11/16	1.59	40.4	.78	19.8	1.28	32.5	.56	14.2
6-8 FBZ	3/8	1/2	7/8	1.81	46.0	.78	19.8	1.50	38.1	.75	19.1
8-4 FBZ	1/2	1/4	13/16	1.75	44.5	.91	23.1	1.31	33.3	.56	14.2
8-6 FBZ	1/2	3/8	13/16	1.75	44.5	.91	23.1	1.31	33.3	.56	14.2
8-8 FBZ	1/2	1/2	7/8	1.94	49.3	.91	23.1	1.50	38.1	.75	19.1

†Average Value

**male bulkhead connector  
FH2BZ**

includes body, nut, ferrule, and locknut



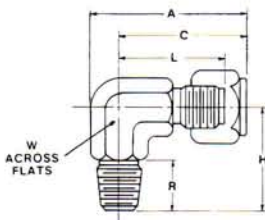
PART NO.	INCHES			†A		†C		D		L		R	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm
1-1 FH2BZ	1/16	1/16	3/8	1.60	40.6	1.03	26.2	1.41	35.8	.84	21.3	.38	9.7
1-2 FH2BZ	1/16	1/8	7/16	1.60	40.6	1.03	26.2	1.41	35.8	.84	21.3	.38	9.7
2-2 FH2BZ	1/8	1/8	1/2	1.83	46.4	1.24	31.5	1.56	39.6	.97	24.6	.38	9.7
4-2 FH2BZ	1/4	1/8	5/8	1.95	49.5	1.32	33.5	1.66	42.2	1.03	26.2	.38	9.7
4-4 FH2BZ	1/4	1/4	5/8	2.17	55.1	1.32	33.5	1.88	47.8	1.03	26.2	.56	14.2
4-6 FH2BZ	1/4	3/8	11/16	2.18	55.4	1.32	33.5	1.89	48.0	1.03	26.2	.56	14.2
4-8 FH2BZ	1/4	1/2	7/8	2.48	63.0	1.32	33.5	2.19	55.6	1.03	26.2	.75	19.1
6-2 FH2BZ	3/8	1/8	3/4	2.12	53.8	1.47	37.3	1.81	45.9	1.16	29.5	.38	9.7
6-4 FH2BZ	3/8	1/4	3/4	2.31	58.7	1.47	37.3	2.00	50.8	1.16	29.5	.56	14.2
6-6 FH2BZ	3/8	3/8	3/4	2.33	59.2	1.47	37.3	2.02	51.3	1.16	29.5	.56	14.2
6-8 FH2BZ	3/8	1/2	7/8	2.62	66.5	1.47	37.3	2.31	58.7	1.16	29.5	.75	19.1
8-4 FH2BZ	1/2	1/4	15/16	2.58	65.5	1.69	42.9	2.14	54.4	1.25	31.8	.56	14.2
8-6 FH2BZ	1/2	3/8	15/16	2.58	65.5	1.69	42.9	2.14	54.4	1.25	31.8	.56	14.2
8-8 FH2BZ	1/2	1/2	15/16	2.86	72.6	1.69	42.9	2.42	61.5	1.25	31.8	.75	19.1

†Average Value

**Note:** When ordering in 316 S.S. suffix part no. with C. Example 2-2 FH2BZ-SS-C

**male elbow  
CBZ**

includes body, nut and ferrule



PART NO.	INCHES			†A		†C		H		L		R	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm
1-1 CBZ	1/16	1/16	5/16	.92	23.4	.75	19.1	.72	18.3	.56	14.2	.38	9.7
1-2 CBZ	1/16	1/8	5/16	.92	23.4	.75	19.1	.72	18.3	.56	14.2	.38	9.7
2-2 CBZ	1/8	1/8	5/16	1.10	27.9	.93	23.6	.72	18.3	.66	16.8	.38	9.7
2-4 CBZ	1/8	1/4	9/16	1.31	33.3	.99	25.2	.94	23.9	.72	18.3	.56	14.2
4-2 CBZ	1/4	1/8	7/16	1.25	31.8	1.01	25.7	.78	19.8	.72	18.3	.38	9.7
4-4 CBZ	1/4	1/4	9/16	1.38	35.0	1.07	27.1	.94	23.9	.78	19.8	.56	14.2
4-6 CBZ	1/4	3/8	3/4	1.58	40.1	1.17	29.7	1.12	28.5	.88	22.4	.56	14.2
4-8 CBZ	1/4	1/2	7/8	1.74	44.2	1.26	32.0	1.31	33.3	.97	24.6	.75	19.1
6-2 CBZ	3/8	1/8	9/16	1.47	37.3	1.15	29.2	.88	22.4	.84	21.3	.38	9.7
6-4 CBZ	3/8	1/4	9/16	1.47	37.3	1.15	29.2	1.00	25.4	.84	21.3	.56	14.2
6-6 CBZ	3/8	3/8	3/4	1.69	42.9	1.28	32.5	1.12	28.5	.97	24.6	.56	14.2
6-8 CBZ	3/8	1/2	7/8	1.82	46.2	1.34	34.0	1.31	33.3	1.03	26.2	.75	19.1
8-4 CBZ	1/2	1/4	3/4	1.82	46.2	1.41	35.8	1.12	28.5	.97	24.6	.56	14.2
8-6 CBZ	1/2	3/8	3/4	1.82	46.2	1.41	35.8	1.12	28.5	.97	24.6	.56	14.2
8-8 CBZ	1/2	1/2	7/8	1.95	49.5	1.47	37.3	1.31	33.3	1.03	26.2	.75	19.1

†Average Value

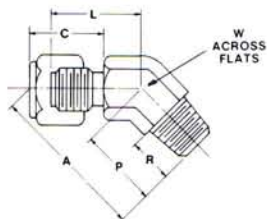
**Note:** When ordering in 316 S.S. suffix part no. with C. Example 2-4 CBZ-SS-C



# 10 Parker CPI Fittings for Chromatography and Analytical Applications

## male 45° elbow VBZ

includes body, nut and ferrule



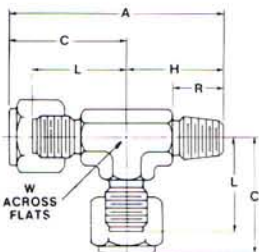
PART NO.	INCHES			†A		†C		L		P		R	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm
1-1 VBZ	1/16	1/16	5/16	1.01	25.7	.47	11.9	.44	11.2	.56	14.2	.38	9.7
2-2 VBZ	1/8	1/8	5/16	1.13	28.7	.61	15.5	.53	13.5	.52	13.2	.38	9.7
4-2 VBZ	1/4	1/8	7/16	1.24	31.5	.70	17.8	.56	14.2	.64	16.3	.38	9.7
4-4 VBZ	1/4	1/4	9/16	1.53	38.9	.70	17.8	.66	16.8	.86	21.8	.56	14.2
6-4 VBZ	3/8	1/4	9/16	1.59	40.4	.78	19.8	.72	18.3	.86	21.8	.56	14.2
8-6 VBZ	1/2	3/8	3/4	1.79	45.5	.91	23.1	.75	19.1	.95	24.1	.56	14.2

†Average Value

**Note:** When ordering in 316 S.S. suffix part no. with C.  
Example 4-2 VBZ-SS-C

## male run tee RBZ

includes body, nut and ferrule



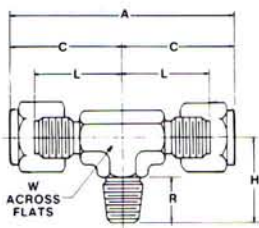
PART NO.	INCHES			†A		†C		H		L		R	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm
2-2-2 RBZ	1/8	1/8	5/16	1.68	42.6	.93	23.6	.75	19.1	.66	16.8	.38	9.7
4-2-4 RBZ	1/4	1/8	7/16	1.79	45.5	1.01	25.7	.78	19.8	.72	18.3	.38	9.7
4-4-4 RBZ	1/4	1/4	9/16	2.01	51.1	1.07	27.2	.94	23.9	.78	19.8	.56	14.2
6-4-6 RBZ	3/8	1/4	9/16	2.16	54.9	1.16	29.5	1.00	25.4	.84	21.3	.56	14.2
8-6-8 RBZ	1/2	3/8	3/4	2.53	64.3	1.41	35.8	1.12	28.5	.97	24.6	.56	14.2
8-8-8 RBZ	1/2	1/2	7/8	2.78	70.6	1.47	37.3	1.31	33.3	1.03	26.2	.75	19.1

†Average Value

**Note:** When ordering in 316 S.S. suffix part no. with C.  
Example 2-2-2 RBZ-SS-C

## male branch tee SBZ

includes body, nut and ferrule



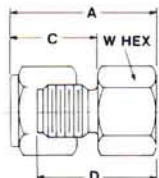
PART NO.	INCHES			†A		†C		H		L		R	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm
2-2-2 SBZ	1/8	1/8	5/16	1.86	47.2	.93	23.6	.75	19.1	.66	16.8	.38	9.7
4-4-2 SBZ	1/4	1/8	7/16	2.02	51.3	1.01	25.7	.78	19.8	.72	18.3	.38	9.7
4-4-4 SBZ	1/4	1/4	9/16	2.14	54.4	1.07	27.2	1.00	25.4	.78	19.8	.56	14.2
6-6-4 SBZ	3/8	1/4	9/16	2.32	58.9	1.16	29.5	1.00	25.4	.84	21.3	.56	14.2
8-8-6 SBZ	1/2	3/8	3/4	2.82	71.6	1.41	35.8	1.12	28.5	.97	24.6	.56	14.2
8-8-8 SBZ	1/2	1/2	7/8	2.94	74.7	1.47	37.3	1.31	33.3	1.03	26.2	.75	19.1

†Average Value

**Note:** When ordering in 316 S.S. suffix part no. with C.  
Example 4-4-4 SBZ-SS-C

**female connector  
GBZ**

includes body, nut and ferrule



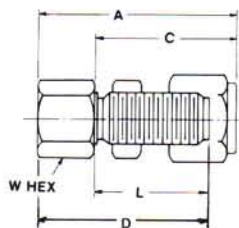
PART NO.	INCHES			†A		†C		D	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm
1-1 GBZ	1/16	1/16	7/16	.97	24.6	.47	11.9	.78	19.8
2-2 GBZ	1/8	1/8	9/16	1.15	29.2	.61	15.5	.88	22.4
2-4 GBZ	1/8	1/4	3/4	1.33	33.8	.61	15.5	1.06	26.9
4-2 GBZ	1/4	1/8	9/16	1.23	31.2	.70	17.8	.94	23.9
4-4 GBZ	1/4	1/4	3/4	1.42	36.1	.70	17.8	1.13	28.7
4-8 GBZ	1/4	1/2	1 1/8	.73	43.9	.70	17.8	1.44	36.6
6-2 GBZ	3/8	1/8	5/8	1.31	33.3	.78	19.8	1.00	25.4
6-4 GBZ	3/8	1/4	3/4	1.50	38.1	.78	19.8	1.19	30.2
6-6 GBZ	3/8	3/8	7/8	1.55	39.6	.78	19.8	1.25	31.8
6-8 GBZ	3/8	1/2	1 1/8	1.75	44.5	.78	19.8	1.44	36.6
8-4 GBZ	1/2	1/4	1 3/16	1.69	42.9	.91	23.1	1.25	31.8
8-6 GBZ	1/2	3/8	7/8	1.69	42.9	.91	23.1	1.25	31.8
8-8 GBZ	1/2	1/2	1 1/8	1.88	47.8	.91	23.1	1.44	36.6

†Average Value

**Note:** When ordering in 316 S.S. suffix part no. with C.  
Example 2-2 GBZ-SS-C

**female bulkhead  
connector  
GH2BZ**

includes body, nut, ferrule, and locknut



PART NO.	INCHES			†A		†C		D		L	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm
2-2 GH2BZ	1/8	1/8	9/16	1.77	45.0	1.24	31.5	1.50	38.1	.97	24.6
4-2 GH2BZ	1/4	1/8	5/8	1.85	47.0	1.32	33.5	1.56	39.6	1.03	26.2
4-4 GH2BZ	1/4	1/4	3/4	2.04	51.8	1.32	33.5	1.75	44.4	1.03	26.2
6-4 GH2BZ	3/8	1/4	3/4	2.19	55.6	1.47	37.3	1.88	47.8	1.16	29.5
8-6 GH2BZ	1/2	3/8	1 5/16	2.47	62.7	1.69	42.9	2.03	51.6	1.25	31.8
8-8 GH2BZ	1/2	1/2	1 1/8	2.66	67.6	1.69	42.9	2.25	57.2	1.25	31.8

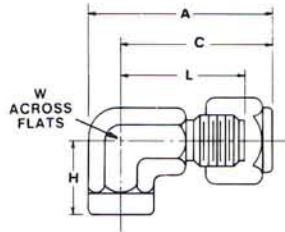
†Average Value

**Note:** When ordering in 316 S.S. suffix part no. with C.  
Example 4-2 GH2BZ-SS-C

# 12 Parker CPI Fittings for Chromatography and Analytical Applications

## female elbow DBZ

includes body, nut and ferrule



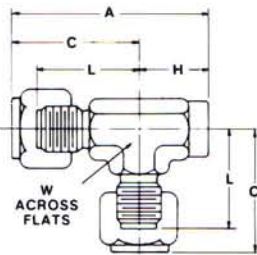
PART NO.	INCHES			†A		†C		H		L	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm
1-1 DBZ	1/16	1/16	7/16	1.00	25.4	.75	19.1	.56	14.2	.56	14.2
1-2 DBZ	1/16	1/8	1/2	1.16	29.5	.85	21.6	.75	19.1	.66	16.8
2-2 DBZ	1/8	1/8	1/2	1.30	33.0	.99	25.1	.75	19.1	.72	18.3
2-4 DBZ	1/8	1/4	3/4	1.52	38.6	1.11	28.2	.84	21.3	.84	21.3
4-2 DBZ	1/4	1/8	1/2	1.38	35.0	1.07	27.2	.75	19.1	.78	19.8
4-4 DBZ	1/4	1/4	3/4	1.63	41.4	1.20	30.4	.84	21.3	.91	23.1
6-2 DBZ	3/8	1/8	9/16	1.46	37.1	1.15	29.2	.75	19.1	.84	21.3
6-4 DBZ	3/8	1/4	9/16	1.71	43.4	1.28	32.5	.84	21.3	.97	24.6
6-6 DBZ	3/8	3/8	7/8	1.84	46.7	1.34	34.0	.84	21.3	1.03	26.2
8-4 DBZ	1/2	1/4	3/4	1.84	46.7	1.41	35.8	.91	23.1	.97	24.6
8-6 DBZ	1/2	3/8	3/4	1.97	50.0	1.47	37.3	.91	23.1	1.03	26.2
8-8 DBZ	1/2	1/2	1 1/16	2.19	55.6	1.57	39.9	1.13	28.7	1.13	28.7

†Average Value

**Note:** When ordering in 316 S.S. suffix part no. with C.  
Example 1-1 DBZ-SS-C

## female run tee MBZ

includes body, nut and ferrule



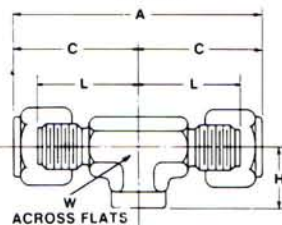
PART NO.	INCHES			†A		†C		H		L	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm
2-2-2 MBZ	1/8	1/8	1/2	1.74	44.2	.99	25.1	.75	19.1	.72	18.3
4-2-4 MBZ	1/4	1/8	1/2	1.85	47.0	1.07	27.2	.75	19.1	.78	19.8
4-4-4 MBZ	1/4	1/4	3/4	2.11	53.6	1.20	30.4	.84	21.3	.91	23.1
6-4-6 MBZ	3/8	1/4	3/4	2.25	57.2	1.28	32.5	.84	21.3	.97	24.6
8-6-8 MBZ	1/2	3/8	7/8	2.50	63.5	1.47	37.3	.91	23.1	1.03	26.6

†Average Value

**Note:** When ordering in 316 S.S. suffix part no. with C.  
Example 2-2-2 MBZ-SS-C

## female branch tee OBZ

includes body, nut and ferrule



PART NO.	INCHES			†A		†C		H		L	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm
2-2-2 OBZ	1/8	1/8	1/2	1.98	50.3	.99	25.1	.75	19.1	.72	18.3
4-4-2 OBZ	1/4	1/8	1/2	2.14	54.4	1.07	27.2	.75	19.1	.78	19.8
4-4-4 OBZ	1/4	1/4	3/4	2.40	61.0	1.20	30.4	.84	21.3	.91	23.1
6-6-4 OBZ	3/8	1/4	3/4	2.56	65.0	1.28	32.5	.84	21.3	.97	24.6
8-8-6 OBZ	1/2	3/8	7/8	2.94	74.7	1.47	37.3	.91	23.1	1.03	26.6

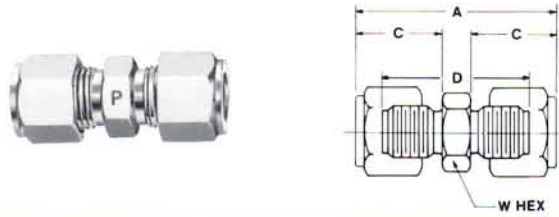
†Average Value

**Note:** When ordering in 316 S.S. suffix part no. with C.  
Example 4-4-2 OBZ-SS-C

Parker CPI Fittings for Chromatography and Analytical Applications

**union  
HBZ**

includes body, nut and ferrule

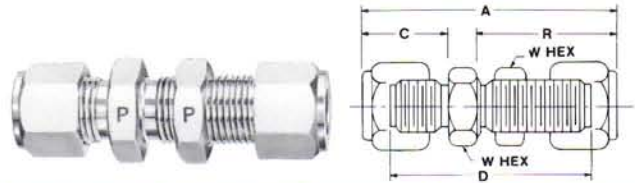


PART NO.	INCHES		†A		†C		D	
	TUBE O.D.	W HEX	in	mm	in	mm	in	mm
1-1 HBZ	1/16	5/16	1.07	27.2	.47	11.9	.69	17.5
2-1 HBZ	1/8 -1/16	7/16	1.27	32.2	.61-.47	15.5-11.9	.81	20.6
2-2 HBZ	1/8	7/16	1.42	36.1	.61	15.5	.88	22.4
4-1 HBZ	1/4 -1/16	1/2	1.39	35.3	.70-.47	17.8-11.9	.91	23.1
4-2 HBZ	1/4 -1/8	1/2	1.53	38.9	.70-.61	17.8-15.5	.97	24.6
4-4 HBZ	1/4	1/2	1.61	40.9	.70	17.8	1.03	26.2
6-4 HBZ	3/8 -1/4	5/8	1.72	43.7	.78-.70	19.8-17.8	1.12	28.5
6-6 HBZ	3/8	5/8	1.81	46.0	.78	19.8	1.19	30.2
8-4 HBZ	1/2 -1/4	13/16	1.89	48.0	.91-.70	23.1-17.8	1.16	29.5
8-6 HBZ	1/2 -3/8	13/16	1.97	50.0	.91-.78	23.1-19.8	1.22	31.0
8-8 HBZ	1/2	13/16	2.10	53.3	.91	23.1	1.22	31.0

†Average Value **Note:** When ordering in 316 S.S. suffix part no. with C. Example 2-2 HBZ-SS-C

**bulkhead union  
WBZ**

includes body, nut, ferrule, and locknut



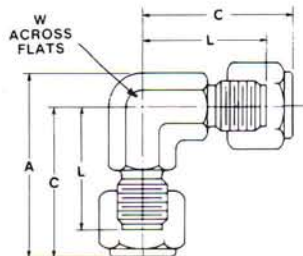
PART NO.	INCHES		BULKHEAD HOLE DRILL SIZE		MAXIMUM BULKHEAD THICKNESS		†A		†C		D		†R	
	TUBE O.D.	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
2-2 WBZ	1/8	1/2	21/64	8.3	1/2	12.7	2.04	51.8	.61	15.5	1.50	38.1	1.24	31.5
4-4 WBZ	1/4	5/8	29/64	11.5	17/32	13.5	2.27	57.7	.70	17.8	1.69	42.9	1.32	33.5
6-6 WBZ	3/8	3/4	37/64	14.7	9/16	14.3	2.50	63.5	.78	19.8	1.88	47.8	1.47	37.3
8-8 WBZ	1/2	15/16	49/64	19.5	19/32	15.1	2.88	73.2	.91	23.1	2.00	50.8	1.69	42.9

†Average Value **Note:** When ordering in 316 S.S. suffix part no. with C. Example 4-4 WBZ-SS-C

**NOTE:** For reducer sizes call out short end first.

**union elbow  
EBZ**

includes body, nut and ferrule



PART NO.	INCHES		†A		†C		L	
	TUBE O.D.	W HEX	in	mm	in	mm	in	mm
1-1 EBZ	1/16	5/16	.92	23.4	.75	19.1	.56	14.2
2-2 EBZ	1/8	5/16	1.10	27.9	.93	23.6	.66	16.8
4-4 EBZ	1/4	7/16	1.25	31.8	1.01	25.7	.72	18.3
6-6 EBZ	3/8	9/16	1.47	37.3	1.15	29.2	.84	21.3
8-8 EBZ	1/2	3/4	1.82	46.2	1.41	35.8	.97	24.6

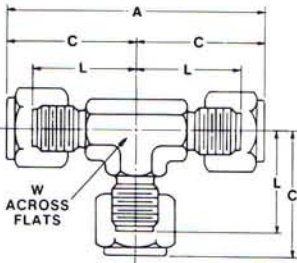
†Average Value

**Note:** When ordering in 316 S.S. suffix part no. with C. Example 2-2 EBZ-SS-C

## union tee

### JBZ

includes body, nut and ferrule



PART NO.	INCHES		†A		†C		L	
	TUBE O.D.	W HEX	in	mm	in	mm	in	mm
1-1-1 JBZ	1/16	5/16	1.50	38.1	.75	19.1	.56	14.2
2-2-2 JBZ	1/8	5/16	1.86	47.2	.93	23.6	.66	16.8
4-4-4 JBZ	1/4	7/16	2.02	51.3	1.01	25.7	.72	18.3
6-6-6 JBZ	3/8	9/16	2.30	58.4	1.15	29.2	.84	21.3
8-8-8 JBZ	1/2	3/4	2.82	71.6	1.41	35.8	.97	24.6

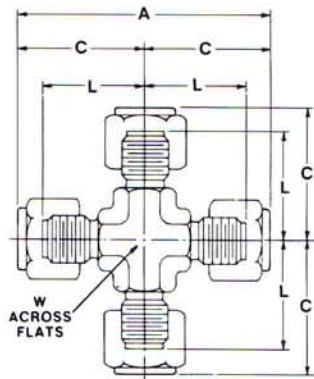
†Average Value

**Note:** When ordering in 316 S.S. suffix part no. with C.  
Example 2-2-2 JBZ-SS-C

## union cross

### KBZ

includes body, nut and ferrule



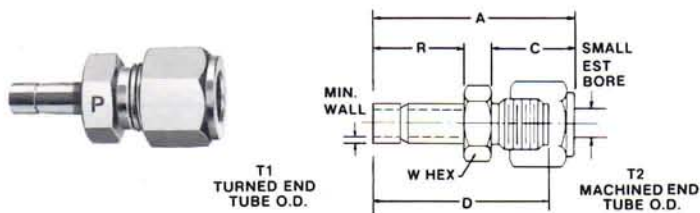
PART NO.	INCHES		†A		†C		L	
	TUBE O.D.	W HEX	in	mm	in	mm	in	mm
2 KBZ	1/8	5/16	1.86	47.2	.93	23.6	.66	16.8
4 KBZ	1/4	7/16	2.02	51.3	1.01	25.7	.72	18.3
6 KBZ	3/8	9/16	2.30	58.4	1.15	29.2	.84	21.3
8 KBZ	1/2	3/4	2.82	71.6	1.41	35.8	.97	24.6

†Average Value

**Note:** When ordering in 316 S.S. suffix part no. with C.  
Example 2 KBZ-SS-C

**tube end reducer  
TRBZ**

includes body, nut and ferrule



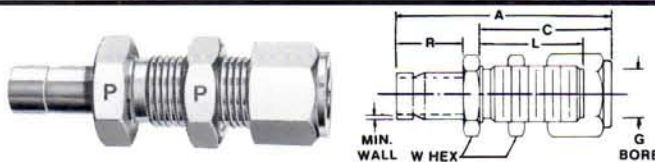
PART NO.	INCHES			MIN. WALL		SMALLEST BORE		†A		†C		D		R	
	T1 TURNED END TUBE O.D.	T2 MACHINED END TUBE O.D.	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
2-1 TRBZ	1/8	1/16	5/16	.023	.6	.052	1.3	1.19	30.2	.47	11.9	1.00	25.4	.53	13.5
4-2 TRBZ	1/4	1/8	7/16	.031	.8	.094	2.4	1.43	36.3	.61	15.5	1.16	29.5	.63	16.0
6-2 TRBZ	3/8	1/8	7/16	.047	1.2	.094	2.4	1.49	37.8	.61	15.5	1.22	30.9	.69	17.5
6-4 TRBZ	3/8	1/4	1/2	.047	1.2	.188	4.8	1.60	40.6	.69	17.5	1.31	33.3	.69	17.5
8-4 TRBZ	1/2	1/4	9/16	.055	1.4	.188	4.8	1.82	46.2	.69	17.5	1.53	38.9	.91	23.1
8-6 TRBZ	1/2	3/8	5/8	.055	1.4	.281	7.1	1.94	49.3	.77	19.6	1.63	41.4	.91	23.1

†Average Value

**Note:** When ordering in 316 S.S. suffix part no. with C.  
Example 2-1 TRBZ-SS-C

**tube end bulkhead adapter  
T2H2BZ**

includes body, nut, ferrule, and locknut



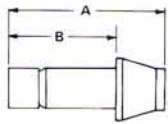
PART NO.	INCHES		MIN. WALL		†A		†C		G BORE		L		R	
	TUBE O.D.	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
2-2 T2H2BZ	1/8	1/2	.023	.6	1.95	49.5	1.24	31.5	.078	2.0	.97	24.6	.53	13.5
4-4 T2H2BZ	1/4	5/8	.031	.8	2.20	55.8	1.31	33.3	.188	4.8	1.02	25.9	.62	15.7
6-6 T2H2BZ	3/8	3/4	.047	1.2	2.40	61.0	1.46	37.1	.281	7.1	1.15	29.2	.69	17.5
8-8 T2H2BZ	1/2	15/16	.055	1.4	2.88	73.2	1.69	42.9	.391	9.9	1.25	31.8	.91	23.1

†Average Value

**Note:** When ordering in 316 S.S. suffix part no. with C. Example 2-2 T2H2BZ-SS-C.

# 16 Parker CPI Fittings for Chromatography and Analytical Applications

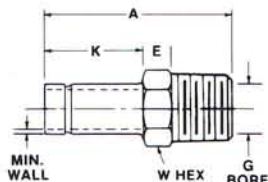
## port connector ZPC



PART NO.	INCHES	A		B	
	TUBE O.D.	in	mm	in	mm
2-2 ZPC	1/8	.97	24.6	.61	15.5
4-4 ZPC	1/4	1.09	27.8	.73	18.7
6-6 ZPC	3/8	1.16	29.4	.80	20.2
8-8 ZPC	1/2	1.70	43.3	1.03	26.2

**Note:** When ordering in 316 S.S. suffix part no. with C. Example: 2-2 ZPC-SS-C.  
**Note:** The Machined Ferrule End requires only 1/4 turn from finger tight to assemble.

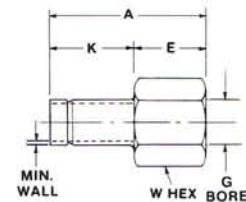
## tube end male adapter T2HF



PART NO.	INCHES			MIN. WALL		A		E		G BORE		K	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm
1-2 T2HF	1/16	1/8	7/16	.016	.4	.91	23.1	.12	3.0	.031	.78	.41	10.4
2-2 T2HF	1/8	1/8	7/16	.023	.6	1.13	28.7	.22	.56	.078	2.0	.53	13.5
2-4 T2HF	1/8	1/4	9/16	.023	.6	1.31	33.2	.22	5.6	.078	2.0	.53	13.5
4-2 T2HF	1/4	1/8	7/16	.031	.8	1.22	30.9	.22	5.6	.188	4.8	.63	16.0
4-4 T2HF	1/4	1/4	9/16	.031	.8	1.41	35.8	.22	5.6	.188	4.8	.63	16.0
4-6 T2HF	1/4	3/8	1 1/16	.031	.8	1.44	36.5	.25	6.4	.188	4.8	.62	15.7
4-8 T2HF	1/4	1/2	7/8	.031	.8	1.66	42.1	.28	7.1	.188	4.8	.62	15.7
6-2 T2HF	3/8	1/8	7/16	.047	1.2	1.31	33.2	.25	6.4	.188	4.8	.69	17.5
6-4 T2HF	3/8	1/4	9/16	.047	1.2	1.50	38.1	.25	6.4	.281	7.1	.69	17.5
6-6 T2HF	3/8	3/8	1 1/16	.047	1.2	1.50	38.1	.25	6.4	.281	7.1	.69	17.5
6-8 T2HF	3/8	1/2	7/8	.047	1.2	1.72	43.6	.28	7.1	.281	7.1	.69	17.5
8-4 T2HF	1/2	1/4	9/16	.055	1.4	1.72	43.6	.25	6.4	.390	9.9	.91	23.1
8-6 T2HF	1/2	3/8	1 1/16	.055	1.4	1.75	44.4	.28	7.1	.390	9.9	.91	23.1
8-8 T2HF	1/2	1/2	7/8	.055	1.4	1.94	49.2	.28	7.1	.390	9.9	.91	23.1

**Note:** When ordering in 316 S.S. suffix part no. with C. Example: 2-4 T2HF-SS-C.

## tube end female adapter T2HG



PART NO.	INCHES			MIN. WALL		A		E		G BORE		K	
	TUBE O.D.	PIPE THREAD	W HEX	in	mm	in	mm	in	mm	in	mm	in	mm
2-2 T2HG	1/8	1/8	9/16	.023	.6	1.06	26.9	.53	13.5	.078	2.0	.53	13.5
2-4 T2HG	1/8	1/4	3/4	.023	.6	1.25	31.7	.72	18.3	.078	2.0	.53	13.5
4-2 T2HG	1/4	1/8	9/16	.031	.8	1.16	29.4	.53	13.5	.188	4.8	.63	16.0
4-4 T2HG	1/4	1/4	3/4	.031	.8	1.34	34.0	.72	18.3	.188	4.8	.63	16.0
4-6 T2HG	1/4	3/8	7/8	.031	.8	1.41	35.8	.78	19.8	.188	4.8	.63	16.0
4-8 T2HG	1/4	1/2	1 1/16	.031	.8	1.59	40.3	.97	24.6	.188	4.8	.63	16.0
6-2 T2HG	3/8	1/8	9/16	.047	1.2	1.41	35.8	.72	18.3	.281	7.1	.69	17.5
6-4 T2HG	3/8	1/4	3/4	.047	1.2	1.47	37.3	.78	19.8	.281	7.1	.69	17.5
6-6 T2HG	3/8	3/8	7/8	.047	1.2	1.66	42.2	.97	24.6	.281	7.1	.69	17.5
6-8 T2HG	3/8	1/2	1 1/16	.047	1.2	1.63	41.4	.72	18.3	.381	7.1	.91	23.1
8-4 T2HG	1/2	1/4	3/4	.055	1.4	1.69	43.0	.78	19.8	.391	9.9	.91	23.1
8-6 T2HG	1/2	3/8	7/8	.055	1.4	1.88	47.7	.97	24.6	.391	9.9	.91	23.1
8-8 T2HG	1/2	1/2	1 1/16	.055	1.4	1.75	44.4	.78	19.8	.391	9.9	.97	24.6

**Note:** When ordering in 316 S.S. suffix part no. with C. Example: 4-8 T2HG-SS-C.

**plug  
FNZ**

**HOW TO ASSEMBLE**

Wrench tighten only ¼ turn from finger tight position.



PART NO.	INCHES		A		W HEX	
	TUBE O.D.		in	mm	in	mm
1 FNZ	1/16	.31	7.9	5/16	7.9	
2 FNZ	1/8	.47	11.9	7/16	11.1	
4 FNZ	1/4	.50	12.7	9/16	14.3	
6 FNZ	3/8	.56	14.2	11/16	17.5	
8 FNZ	1/2	.69	17.5	7/8	22.2	

**Note:** When ordering in 316 S.S. suffix part no. with C.  
Example 1 FNZ-SS-C

**cap  
PNBZ**

includes body, nut and ferrule



PART NO.	INCHES		A	
	TUBE O.D.	W HEX	in	mm
1 PNBZ	1/16	5/16	.41	10.4
2 PNBZ	1/8	7/16	.53	13.5
4 PNBZ	1/4	1/2	.62	15.8
6 PNBZ	3/8	5/8	.72	18.3
8 PNBZ	1/2	13/16	.75	19.1

**Note:** When ordering in 316 S.S. suffix part no. with C.  
Example 1 PNBZ-SS-C

Parker CPI Plugs and Caps can be used to conveniently provide for future expansion of the tubing circuit. Additional hook-ups can be easily accommodated when they are required.



# 18 Parker CPI Fittings for Chromatography and Analytical Applications

## tube nut BZ



PART NO.	INCHES		A		W HEX	
	TUBE O.D.	in	mm	in	mm	
1 BZ	1/16	.31	7.9	5/16	7.9	
2 BZ	1/8	.47	11.9	7/16	11.1	
4 BZ	1/4	.50	12.7	9/16	14.3	
6 BZ	3/8	.56	14.2	11/16	17.5	
8 BZ	1/2	.69	17.5	7/8	22.2	

**Note:** When ordering in 316 S.S suffix part no. with C.  
Example 2 BZ-SS-C

## knurled nut BZP



PART NO.	INCHES		A	
	TUBE O.D.	in	mm	
2 BZP	1/8	.47	11.9	
4 BZP	1/4	.47	12.7	
6 BZP	3/8	.56	14.2	
8 BZP	1/2	.69	17.5	

Replace BZ nut and TZ ferrule on Parker CPI fitting body with BZP nut and nylon or teflon ferrule.

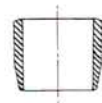
The knurled nut is designed for use with soft plastic tubing on low pressure applications where a finger tight assembly procedure is satisfactory.

Example: Laboratory test hook-ups. Nylon ferrules are frequently used instead of metal ferrules in this type of application.

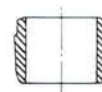
### HOW TO ASSEMBLE

1. Replace BZ nut with BZP nut and desired ferrule on Parker CPI fitting body.
2. Insert plastic tubing until it bottoms in fitting body.
3. Tighten finger tight.

## ferrules TZ



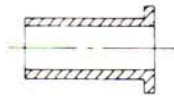
FOR SIZES  
1 TO 6



FOR SIZE 8

PART NO.	INCHES	
	TUBE O.D.	
1 TZ	1/16	
2 TZ	1/8	
4 TZ	1/4	
6 TZ	3/8	
8 TZ	1/2	

**insert  
TIZ**

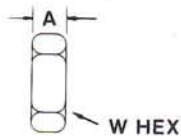


**NOTE:** The TIZ insert is designed to be used with soft plastic tubing. Tubing wall thickness and corresponding minimum I.D. flow paths are listed so the system designer can properly match the insert to the tubing.

**Example:** 4 TIZ (.125) is used with tubing having a wall thickness of .062 and I.D. of .125.

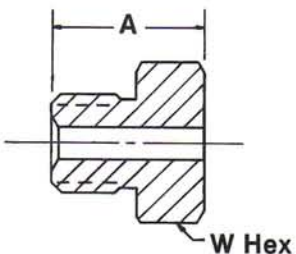
PART NO.	INCHES		
	TUBE O.D.	TUBE I.D.	TUBE WALL
4 TIZ (.170)	1/4	.170	.040
4 TIZ (.125)	1/4	.125	.062
4 TIZ (.188)	1/4	.188	.031
6 TIZ (.250)	3/8	.250	.062
6 TIZ (.188)	3/8	.188	.094
8 TIZ (.375)	1/2	.375	.062
8 TIZ (.250)	1/2	.250	.125

**bulkhead locknut  
WLZ**



PART NO.	INCHES	A		W HEX	
	TUBE O.D.	in	mm	in	mm
1 WLZ	1/16	.19	4.8	3/8	9.5
2 WLZ	1/8	.19	4.8	1/2	12.7
4 WLZ	1/4	.22	5.6	5/8	15.8
6 WLZ	3/8	.25	6.4	3/4	19.0
8 WLZ	1/2	.28	7.1	15/16	23.8


**inverted tube nut  
BZI**



PART NO.	INCHES		A	
	TUBE O.D.	W HEX	in	mm
1-BZI	1/16	1/4	.38	9.7
2-BZI	1/8	3/8	.44	11.2

For the complete line of Parker instrumentation and process fittings and tube fabricating equipment ask your Parker representative for the following descriptive literature.

- Catalog 4230** Parker CPI Fittings
- Catalog 4240** Parker CPI UltraSeal
- Catalog 4250** Parker CPI Valves
- Catalog 4260** Instrument Pipe Fittings
- Catalog 4270** Weld-lok Socket Type Permanent Tube Fittings
- Catalog 4280** Automatic Buttweid



**THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS**  
*Quality System Certificate (Materials)*

Number **QSC** - 408

This is to certify that the Quality Control Program of

PARKER HANNIFIN CORPORATION  
INSTRUMENTATION CONNECTORS DIVISION  
9400 S. MEMORIAL PARKWAY  
HUNTSVILLE, ALABAMA 35802

has been reviewed and they are hereby authorized by The American Society of Mechanical Engineers as a Material

MANUFACTURER OF FERROUS & NONFERROUS FITTINGS AT THE ABOVE LOCATION ONLY

in accordance with the applicable rules of the Boiler and Pressure Vessel Code of The American Society of Mechanical Engineers. The authority granted by this certificate is subject to the provisions of the agreement set forth in the application. Any material produced under this Certificate shall have been manufactured strictly in accordance with the provisions of the Boiler and Pressure Vessel Code of The American Society of Mechanical Engineers.

THIS AUTHORIZATION expires on JULY 29, 1983


Authorized on JULY 29, 1980 for

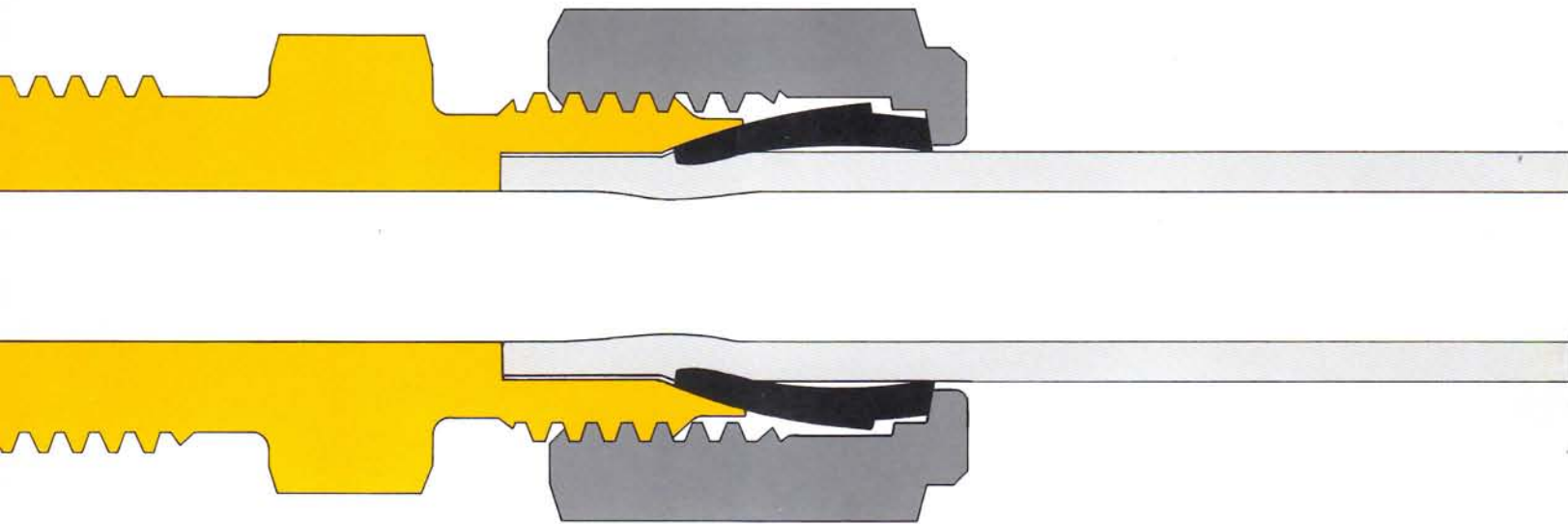
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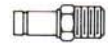
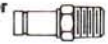







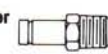



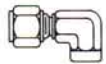










# Parker CPI Metric Tube Fittings

for Process, Power  
and Instrumentation

Catalog No. 4235  
Revised April, 1979

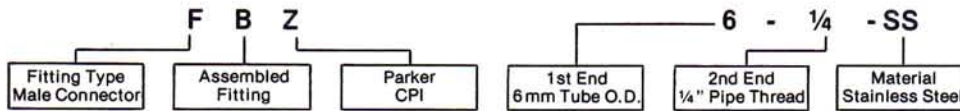


Parker CPI Metric Fitting Description

tube to tube unions		tube to male pipe—cont.		stub tube connectors—cont.	
<b>HBZ union</b>  page 5	<b>JBZ union tee</b>  page 6	<b>SBZ male branch tee</b>  page 9		<b>T2HF tube end male adapter</b>  page 11	<b>T2HF3 tube end male adapter metric tube to BSPT</b>  page 12
<b>WBZ bulkhead union</b>  page 5	<b>KBZ union cross</b>  page 6	<b>tube to female pipe</b>		<b>T2HG tube end female adapter</b>  page 12	<b>T2HG4 tube end female adapter Inch tube to BSPP</b>  page 13
<b>EBZ union elbow</b>  page 6		<b>GBZ female connector</b>  page 9	<b>MBZ female run tee</b>  page 10	<b>T2HF3 tube end male adapter Inch to BSPT</b>  page 12	<b>T2HG4 tube end female adapter metric tube to BSPP</b>  page 13
<b>tube to male pipe</b>				<b>plug and cap</b>	
<b>FBZ male connector</b>  page 7	<b>CBZ male elbow</b>  page 8	<b>DBZ female elbow</b>  page 10		<b>FNZ plug</b>  page 14	<b>PNBZ cap</b>  page 14
<b>FH2BZ male bulkhead connector</b>  page 7	<b>VBZ male 45° elbow</b>  page 8	<b>stub tube connectors</b>		<b>components</b>	
<b>FH4BZ thermocouple connector</b>  page 7	<b>RBZ male run tee</b>  page 8	<b>TRBZ tube end reducer</b>  page 11	<b>T2H2BZ tube end bulkhead adapter</b>  page 11	<b>BZ tube nut</b>  page 15	<b>TZ ferrules</b>  page 15

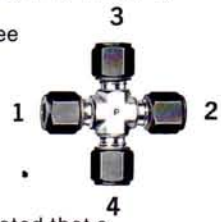
nomenclature

Parker CPI metric fittings part numbers are constructed from symbols that identify the size and style of the fitting and material used.  
**example:** The part number shown below is for a Parker CPI stainless steel male connector for 6 O.D. tube (-6 mm) and 1/4" male pipe thread (1/4 NPT)



how to order

Parker CPI Metric Tube Fittings are ordered by part number as listed in this catalog.  
**size:** Tube and pipe thread sizes are designated by millimeters at the tube end (6 mm) and fractions of an inch at pipe end (1/4 NPT, BSPT)  
**straights & elbows:** Call out largest CPI tube end size first followed by the smaller CPI tube end or pipe thread size.  
**tees & crosses:** For tees - first size the run (1 to 2) and then the branch (3). Example - the size designator for a male run tee for 6 mm O.D. tube and 1/4" male pipe thread would be 6-1/4-6. For crosses - first size the run (1 to 2) and then the branch (3 to 4).  
**type:** A letter or combination of letters and numbers are used to designate the type of fitting. (i.e. F = male connector, H = union connector, etc.) See the visual index for other type fittings.  
**Bz:** This is the standard CPI designator for assembled fitting with nut and ferrules.  
**material:** Basic material type (SS = stainless steel, type 316)  
 Parker CPI metric tube fittings, for special applications, can be furnished in almost any material suitable for machining.  
**special fittings:** If there is any question as to the fitting desired, particularly for special fitting configurations, it is suggested that a sketch be submitted with the fitting order.  
**availability:** Only items priced in current price list 4235 are carried in stock. Price and delivery for non-stock items furnished on request for quantity specified.



## features

The Parker CPI metric tube fitting has been specifically designed for use on Instrumentation, Process and Control systems and equipment employed in Chemical, Petroleum, Power Generating and Pulp and Paper plants. The CPI metric tube fitting has also found extensive application in other fields where a very high quality tube fitting is required.

## materials

Parker CPI metric fittings are available as standard in Stainless Steel (type 316). Straight fittings are machined from cold finished bar stock and shaped bodies are machined from close grain forgings. The raw materials used fully conform to the chemical requirements of one or more of the specifications listed in Table 1. For nuclear and other critical applications, stainless steel CPI is readily available with documented heat code traceability.

## tubing

Parker CPI metric tube fittings can be used with a wide variety of tubing materials, including copper, stainless steel, steel, aluminum, and Monel. Tubing should be selected to be compatible with the process media, temperature and pressures.

## torque

All Parker CPI metric tube fittings feature a prelubricated nut to reduce assembly torque by as much as 50%. Stainless steel CPI fittings offer the unique Parker "Black-Nut" using a bonded, inert dry-film lubricant approved per MIL-L-8937.

As a true advantage, prelubrication of Parker CPI metric fittings eliminates the need for any additional thread lubricants or anti-galling compounds thereby minimizing the possibility of contaminating the fluid system.

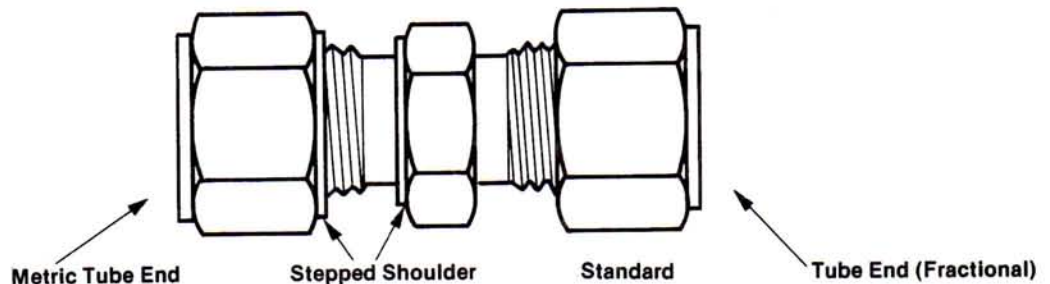
## no distortion

In make-up, there is no undue force in an outward direction to distort the fitting body or ferrule to cause interference between the ferrule and nut. This assures that the nut will back-off freely for disassembly and permits a greater number of easy remakes.

## no twisting

Since no rotational force is imparted to the tubing during assembly, there is no tendency for the tube to turn or loosen completed joints in the same line. The tube is not prestressed by twisting: thus, better fatigue resistance is assured.

## identification of metric fittings



## sealing

Positive, reliable connections with PARKER CPI metric fittings have been qualified by exhaustive tests and over four decades of experience in the manufacture of quality tube fittings. In tests after repeated remakes, PARKER CPI metric fittings effected a helium seal at over 3000 psi. Vibration stand and impulse equipment tests in the multi-million cycle range prove outstanding, leakproof, fatigue resistance.

## how to identify metric fittings

The Parker CPI Metric Tube Fitting has been designed to fill the void for a reliable tube fitting for use with metric tubing.

It is identified by a 1/32 wide shoulder on both the body and the large end of the BZ nut as indicated in the illustration below.

The following chart has been included for ease of conversion from millimeters to inch size dimensions.

**NOTE:** The 8mm equivalent inch dimension is the same as a standard size 5(5/16) fitting. The 16mm equivalent inch dimension is the same as a standard size 10(5/8) fitting.

6mm = .236 inch
*8mm = .315 inch
10mm = .394 inch
12mm = .472 inch
*16mm = .630 inch

size 5 = .312; size 10 = .625

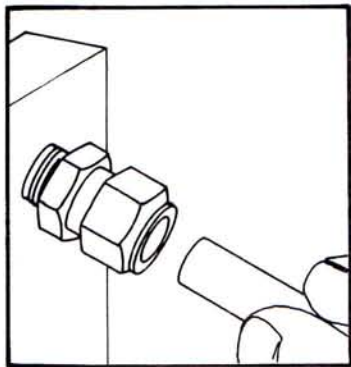
**NOTE:** Ferrules also marked on largest outside diameter!

**table 1 — typical raw material specifications**

BASIC FITTING MATERIAL	BAR STOCK	FORGING	COMMON TUBING SPECIFICATIONS
STAINLESS STEEL (Type 316) (1)	ASME-SA-276 Type 316 ASTM-A-276 Type 316 ASME-SA-479 Type 316 ASTM-A-479 Type 316	ASME-SA-182 F316	ASME-SA-213 ASTM-A-213 ASTM-A-249 ASTM-A-269 (2)

(1) If more specific information, including heat code traceability, is required, your Parker-Hannifin CPI distributor will provide details.  
 (2) Stainless Steel CPI metric fittings work reliably on both seamless and welded-redrawn, fully annealed type 304 and 316 tubing.

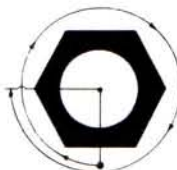
## assembly instructions



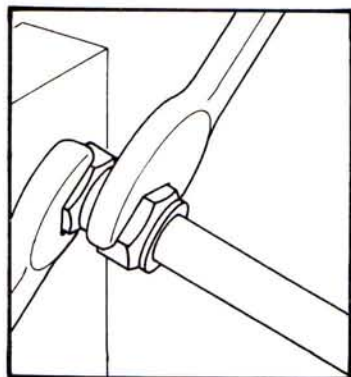
1. Parker CPI metric fittings are sold completely assembled and ready for immediate use. Simply insert the tube as illustrated until it bottoms in the fitting body. (If the fitting is disassembled, note that the small tapered end of the Ferrule goes into the fitting body.)

2. Tighten nut finger tight. Then tighten nut with wrench an additional 1 1/4 turns indicated below. Hold fitting body with a second wrench to prevent body from turning. It is helpful to mark the nut to facilitate counting the number of turns.

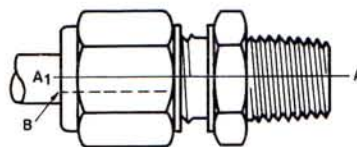
Size 6 thru 16mm



1 1/4 Turns from  
Finger Tight



For maximum number of remakes, mark the fitting and nut (scribe or ink) before disassembly. Remake by tightening until marks line up again. A slight torque rise will be felt indicating the ferrule is being re-sprung into sealing position. Only after several remakes may it become necessary to advance the nut slightly past original position. This advance (indicated by B) need only be 10°-20° (less than 1/3 of a hex flat).

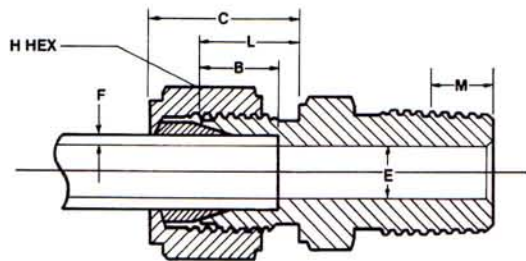


**NOTE:** All assembled fittings in this catalog are shown in the Finger Tight Position.

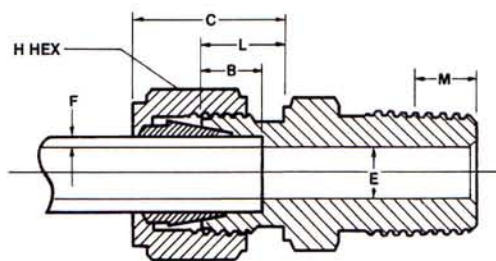
## tube end dimensional data

Size No.	Tube O.D.	NPT Pipe Thread	Straight Thread	†L	†B	†C	H Hex	M	E	F
				mm	mm	mm	mm	†Min. Thrd. Engagement	mm	mm
6	6	1/8-27	7/16-20	10.09	7.94	17.78	14.29	4.57	4.76	.51
8	8	1/8-27	1/2-30	10.73	8.43	19.05	15.88	4.57	4.76	.71
10	10	1/4-18	5/8-20	11.91	9.53	19.81	19.05	5.08	7.14	.71
12	12	3/8-18	3/4-20	11.91	12.70	23.11	22.23	5.08	10.31	.81
16	16	1/2-14	7/8-20	12.09	14.28	22.61	25.40	6.10	12.7	.81

† Average Value



Sizes 6 to 10mm

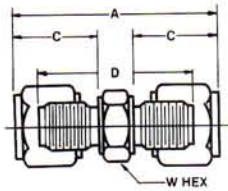


Sizes 12 to 16mm

**NOTE:** Dimension C is shown in the finger tight position.

**union  
HBZ**

includes body, nut and ferrule  
metric tube to metric tube

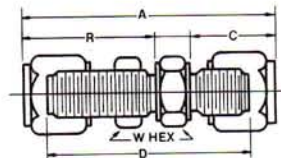


PART NO.	mm	W	†A	†C	D
	TUBE O.D.	mm	mm	mm	mm
HBZ 6-6	6	12.7	40.9	17.8	26.2
HBZ 8-6	8-6	14.2	42.7	19.1-17.8	27.4
HBZ 8-8	8	14.2	43.9	19.1	28.2
HBZ 10-6	10-6	15.9	43.7	19.8-17.8	28.5
HBZ 10-8	10-8	15.9	45.2	19.8-19.1	29.5
HBZ 10-10	10	15.9	46.0	19.8	30.2
HBZ 12-6	12-6	20.6	48.0	23.1-17.8	29.5
HBZ 12-10	12-10	20.6	50.0	23.1-19.8	31.0
HBZ 12-12	12	20.6	53.3	23.1	31.0
HBZ 16-12	16-12	23.8	53.6	22.6-23.1	31.8
HBZ 16-16	16	23.8	53.1	22.6	31.8

†Average Value

**bulkhead union  
WBZ**

includes body, nut, ferrule, and locknut  
metric tube to metric tube



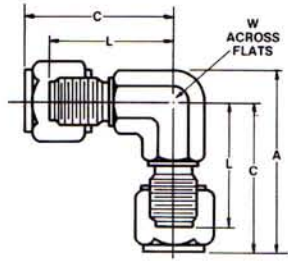
PART NO.	mm	W	BULKHEAD HOLE DRILL SIZE	MAXIMUM BULKHEAD THICKNESS	†A	†C	D	†R
	TUBE O.D.	mm	mm	mm	mm	mm	mm	mm
WBZ 6-6	6	15.9	11.5	13.5	57.7	17.8	42.9	33.5
WBZ 8-8	8	17.4	13.1	14.3	61.7	19.1	46.0	36.6
WBZ 10-10	10	19.0	14.7	14.3	63.5	19.8	47.8	37.3
WBZ 12-12	12	23.8	19.5	15.1	73.2	23.1	50.8	42.9
WBZ 16-16	16	26.9	22.6	15.1	73.7	22.6	52.3	43.2

†Average Value



**union elbow****EBZ**

includes body, nut and ferrule  
metric tube to metric tube

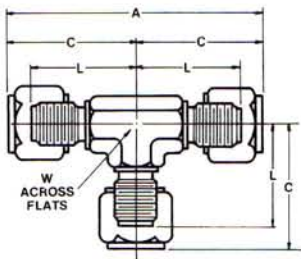


PART NO.	mm	W	†A	†C	L
	TUBE O.D.	mm	mm	mm	mm
EBZ 6-6	6	11.1	32.6	26.5	19.1
EBZ 8-8	8	12.7	36.4	29.3	21.4
EBZ 10-10	10	14.2	41.4	33.3	25.4
EBZ 12-12	12	19.0	47.0	36.6	27.0
EBZ 16-16	16	22.2	49.8	37.4	27.0

†Average Value

**union tee****JBZ**

includes body, nut and ferrule  
metric tube to metric tube

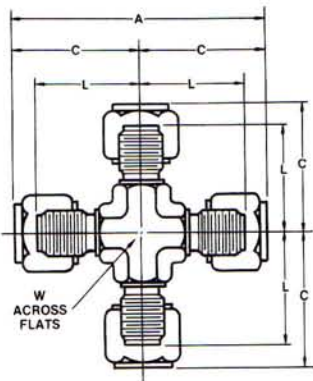


PART NO.	mm	W	†A	†C	L
	TUBE O.D.	mm	mm	mm	mm
JBZ 6-6-6	6	11.1	52.1	26.5	19.1
JBZ 8-8-8	8	12.7	57.7	29.3	21.4
JBZ 10-10-10	10	14.2	66.6	33.3	25.4
JBZ 12-12-12	12	19.0	73.2	36.6	25.4
JBZ 16-16-16	16	22.2	75.2	37.6	27.0

†Average Value

**union cross****KBZ**

includes body, nut and ferrule  
metric tube to metric tube



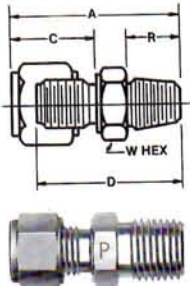
PART NO.	mm	W	†A	†C	L
	TUBE O.D.	mm	mm	mm	mm
KBZ 6	6	11.1	52.1	26.5	19.1
KBZ 8	8	12.7	58.6	29.3	21.4
KBZ 10	10	14.2	66.6	33.3	25.4
KBZ 12	12	19.0	73.2	36.6	25.4
KBZ 16	16	22.2	75.2	37.6	27.0

†Average Value

**male connector**

**FBZ**

includes body, nut and ferrule  
metric tube to inch size male pipe (NPT)



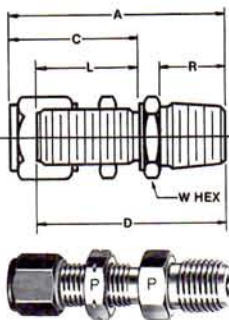
PART NO.	mm	INCHES NPT	W	†A	†C	D	R
	TUBE O.D.	PIPE THREAD	mm	mm	mm	mm	mm
FBZ 6-1/8	6	1/8-27	12.7	32.8	17.8	25.4	9.7
FBZ 6-1/4	6	1/4-18	14.2	37.6	17.8	30.2	14.2
FBZ 8-1/8	8	1/8-27	14.2	34.5	19.1	26.7	9.7
FBZ 8-1/4	8	1/4-18	14.2	29.1	19.1	31.2	14.2
FBZ 10-1/4	10	1/4-18	15.9	40.4	19.8	32.5	14.2
FBZ 10-3/8	10	3/8-18	17.4	40.4	19.8	32.5	14.2
FBZ 10-1/2	10	1/2-14	22.2	46.0	19.8	38.1	19.1
FBZ 12-1/4	12	1/4-18	20.6	44.5	23.1	33.3	14.2
FBZ 12-3/8	12	3/8-18	20.6	44.5	23.1	33.3	14.2
FBZ 12-1/2	12	1/2-14	22.2	49.3	23.1	38.1	19.1
FBZ 16-1/2	16	1/2-14	23.8	49.5	22.6	38.9	19.1

†Average Value

**male bulkhead connector**

**FH2BZ**

includes body, nut, ferrule, and locknut  
metric tube to inch size male pipe (NPT)



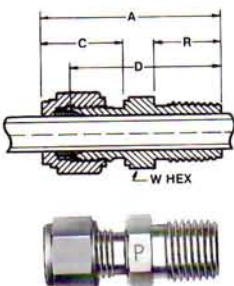
PART NO.	mm	INCHES NPT	W	A	†C	D	L	R
	TUBE O.D.	PIPE THREAD	mm	mm	mm	mm	mm	mm
FH2BZ 6-1/8	6	1/8-27	15.9	49.5	33.5	42.2	26.2	9.7
FH2BZ 6-1/4	6	1/4-18	15.9	55.1	33.5	47.8	26.2	14.2
FH2BZ 8-1/8	8	1/8-27	17.4	52.8	36.6	45.0	28.7	9.7
FH2BZ 8-1/4	8	1/4-18	17.4	57.9	36.6	50.0	28.7	14.2
FH2BZ 10-1/4	10	1/4-18	19.0	58.7	37.3	50.8	29.5	14.2
FH2BZ 10-3/8	10	3/8-18	19.0	59.2	37.3	51.3	29.5	14.2
FH2BZ 10-1/2	10	1/2-14	26.9	66.5	37.3	58.7	19.5	19.1
FH2BZ 12-1/4	12	1/4-18	23.8	65.5	52.9	54.4	31.8	14.2
FH2BZ 12-3/8	12	3/8-18	23.8	65.5	42.9	54.4	31.8	14.2
FH2BZ 12-1/2	12	1/2-14	23.8	72.6	42.9	61.5	31.8	19.1
FH2BZ 16-1/2	16	1/2-14	26.9	71.1	43.2	60.5	32.5	19.1

†Average Value

**thermocouple connector**

**FH4BZ**

includes body, nut and ferrule  
metric tube to inch size male pipe (NPT)

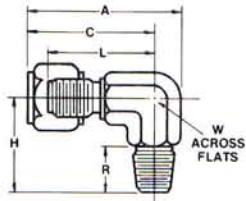


PART NO.	mm	INCHES NPT	W	†A	†C	D	R
	TUBE O.D.	PIPE THREAD	mm	mm	mm	mm	mm
FH4BZ 6-1/8	6	1/8-27	12.70	32.8	17.8	25.4	9.7
FH4BZ 6-1/4	6	1/4-18	14.29	37.6	17.8	30.2	14.2
FH4BZ 8-1/4	8	1/4-18	14.29	39.1	19.1	31.2	14.2
FH4BZ 10-1/4	10	1/4-18	17.46	40.4	19.8	32.5	14.2
FH4BZ 10-3/8	10	3/8-18	17.46	40.4	19.8	32.5	14.2
FH4BZ 10-1/2	10	1/2-14	17.46	46.0	19.8	38.1	19.1
FH4BZ 12-1/2	12	1/2-14	22.23	49.3	23.1	38.1	19.1
FH4BZ 16-3/4	16	3/4-14	23.81	51.1	22.6	40.4	19.1

†Average Value

**male elbow****CBZ**

includes body, nut and ferrule  
metric tube to inch size  
male pipe (NPT)

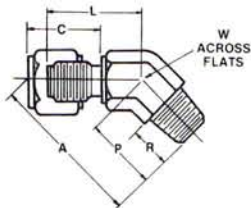


PART NO.	mm	INCHES NPT	W	†A	†C	H	L	R
	TUBE O.D.	PIPE THREAD	mm	mm	mm	mm	mm	mm
CBZ 6-1/8	6	1/8-27	11.1	31.8	25.7	19.8	18.3	9.7
CBZ 6-1/4	6	1/4-18	14.2	35.8	27.9	23.9	20.6	14.2
CBZ 8-1/8	8	1/8-27	12.7	36.4	29.3	20.6	21.4	9.7
CBZ 8-1/4	8	1/4-18	14.2	37.4	29.3	25.4	21.4	14.2
CBZ 10-1/4	10	1/4-18	14.2	38.1	30.0	25.4	22.1	14.2
CBZ 10-3/8	10	3/8-18	19.0	43.7	33.3	28.5	25.4	14.2
CBZ 10-1/2	10	1/2-14	22.2	47.7	34.8	33.3	27.0	19.1
CBZ 12-1/4	12	1/4-18	19.0	47.0	36.6	28.5	25.4	14.2
CBZ 12-3/8	12	3/8-18	19.0	47.0	36.6	28.5	25.4	14.2
CBZ 12-1/2	12	1/2-14	22.2	50.3	38.1	33.3	27.0	19.1
CBZ 16-1/2	16	1/2-14	22.2	49.8	37.6	35.1	27.0	19.1

†Average Value

**male 45° elbow****VBZ**

includes body, nut and ferrule  
metric tube to inch size  
male pipe (NPT)

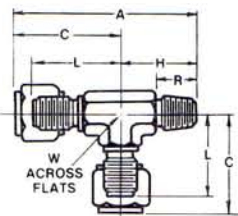


PART NO.	mm	INCHES NPT	W	†A	†C	L	P	R
	TUBE O.D.	PIPE THREAD	mm	mm	mm	mm	mm	mm
VBZ 6-1/8	6	1/8-27	11.1	32.1	17.8	15.0	16.3	9.7
VBZ 6-1/4	6	1/4-18	14.2	38.5	17.8	17.6	21.8	14.2
VBZ 8-1/8	8	1/8-27	12.7	33.1	19.1	15.8	16.3	9.7
VBZ 10-1/4	10	1/4-18	14.2	41.0	19.8	19.1	21.8	14.2
VBZ 12-3/8	12	3/8-18	19.0	46.1	23.1	19.9	24.1	14.2
VBZ 16-1/2	16	1/2-14	22.2	52.4	22.4	21.4	29.7	19.1

†Average Value

**male run tee****RBZ**

includes body, nut and ferrule  
metric tube to inch size  
male pipe (NPT)

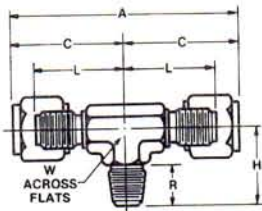


PART NO.	mm	INCHES NPT	W	†A	†C	H	L	R
	TUBE O.D.	PIPE THREAD	mm	mm	mm	mm	mm	mm
RBZ 6-1/8-6	6	1/8-27	11.1	46.3	26.5	19.8	19.1	9.7
RBZ 6-1/4-6	6	1/4-18	14.2	51.9	28.0	23.9	20.6	14.2
RBZ 8-1/8-8	8	1/8-27	12.7	49.9	29.3	20.6	21.4	9.7
RBZ 10-1/4-10	10	1/4-18	14.2	55.7	30.3	25.4	22.1	14.2
RBZ 12-3/8-12	12	3/8-18	19.0	65.1	36.6	28.5	25.4	14.2
RBZ 12-1/2-12	12	1/2-14	22.2	71.4	38.1	33.3	27.0	19.1
RBZ 16-1/2-16	16	1/2-14	22.2	72.7	37.6	35.1	28.0	19.1

†Average Value

**male branch tee  
SBZ**

includes body, nut and ferrule  
metric tube to inch size  
male pipe (NPT)

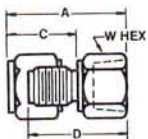


PART NO.	mm	INCHES NPT	W	†A	†C	H	L	R
	TUBE O.D.	PIPE THREAD	mm	mm	mm	mm	mm	mm
SBZ 6-6-1/8	6	1/8-27	11.1	53.0	26.5	19.8	19.1	9.7
SBZ 6-6-1/4	6	1/4-18	14.2	56.0	28.0	25.4	20.6	14.2
SBZ 8-8-1/8	8	1/8-27	12.7	58.6	29.3	20.6	21.4	9.7
SBZ 10-10-1/4	10	1/4-18	14.2	60.6	30.3	25.4	22.1	14.2
SBZ 12-12-3/8	12	3/8-18	19.0	73.2	36.6	28.5	25.4	14.2
SBZ 12-12-1/2	12	1/2-14	22.2	76.2	38.1	33.3	27.0	19.1
SBZ 16-16-1/2	16	1/2-14	22.2	75.2	37.6	35.1	27.0	19.1

†Average Value

**female connector  
GBZ**

includes body, nut and ferrule  
metric tube to inch size female  
pipe (NPT)

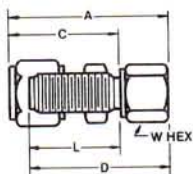


PART NO.	mm	INCHES NPT	W	†A	†C	D
	TUBE O.D.	PIPE THREAD	mm	mm	mm	mm
GBZ 6-1/8	6	1/8-27	14.2	31.2	17.8	23.9
GBZ 6-1/4	6	1/4-18	19.0	36.1	17.8	28.7
GBZ 8-1/8	8	1/8-27	14.2	32.5	19.1	24.6
GBZ 8-1/4	8	1/4-18	19.0	37.3	19.1	29.5
GBZ 10-1/4	10	1/4-18	19.0	38.1	19.8	30.2
GBZ 10-3/8	-10	3/8-18	22.2	39.6	19.8	31.8
GBZ 10-1/2	10	1/2-14	28.6	44.5	19.8	36.6
GBZ 12-1/4	12	1/4-18	20.6	42.9	23.1	31.8
GBZ 12-3/8	12	3/8-18	22.2	42.9	23.1	31.8
GBZ 12-1/2	12	1/2-14	28.6	47.8	23.1	36.6
GBZ 16-1/2	16	1/2-14	28.6	47.2	22.6	36.6

†Average Value

**female bulkhead  
connector  
GH2BZ**

includes body, nut, ferrule, and locknut  
metric tube to inch size female  
pipe (NPT)

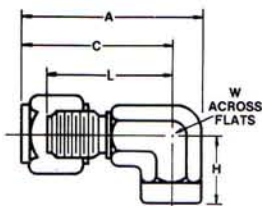


PART NO.	mm	INCHES NPT	W	†A	†C	D	L
	TUBE O.D.	PIPE THREAD	mm	mm	mm	mm	mm
GH2BZ 6-1/8	6	1/8-27	15.9	47.0	33.5	39.6	26.2
GH2BZ 6-1/4	6	1/4-18	19.0	51.8	33.5	44.4	26.2
GH2BZ 8-1/8	8	1/8-27	17.5	50.0	36.6	42.2	28.7
GH2BZ 10-1/4	10	1/4-18	19.0	55.6	37.3	47.8	29.5
GH2BZ 12-3/8	12	3/8-18	23.8	62.7	42.9	51.6	31.8
GH2BZ 12-1/2	12	1/2-14	28.6	67.6	42.9	57.2	31.8
GH2BZ 16-1/2	16	1/2-14	28.6	67.8	43.2	57.2	32.5

†Average Value

**female elbow****DBZ**

includes body, nut and ferrule  
metric tube to inch size  
female pipe (NPT)

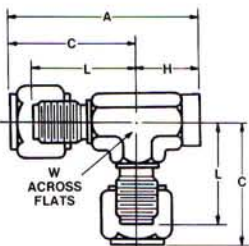


PART NO.	mm	INCHES NPT	W	†A	†C	H	L
	TUBE O.D.	PIPE THREAD	mm	mm	mm	mm	mm
DBZ 6-1/8	6	1/8-27	12.7	35.8	28.0	19.1	20.6
DBZ 6-1/4	6	1/4-18	19.0	42.2	31.2	21.3	23.9
DBZ 8-1/8	8	1/8-27	14.2	37.1	29.3	19.1	21.4
DBZ 8-1/4	8	1/4-18	19.0	43.7	32.6	22.4	24.7
DBZ 10-1/4	10	1/4-18	14.2	44.2	33.3	21.3	25.4
DBZ 10-3/8	10	3/8-18	22.2	47.5	34.8	21.3	27.0
DBZ 12-1/4	12	1/4-18	19.0	47.5	36.6	23.1	25.4
DBZ 12-3/8	12	3/8-18	19.0	50.8	38.1	23.1	27.0
DBZ 12-1/2	12	1/2-14	26.9	56.4	40.7	28.7	29.5
DBZ 16-1/2	16	1/2-14	22.2	55.9	40.1	28.7	29.5

†Average Value

**female run tee****MBZ**

includes body, nut and ferrule  
metric tube to inch size  
female pipe (NPT)

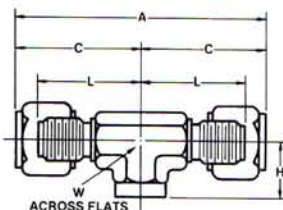


PART NO.	mm	INCHES NPT	W	†A	†C	H	L
	TUBE O.D.	PIPE THREAD	mm	mm	mm	mm	mm
MBZ 6-1/8-6	6	1/8-27	12.7	47.1	28.0	19.1	20.6
MBZ 6-1/4-6	6	1/4-18	19.0	52.5	31.2	21.3	23.9
MBZ 8-1/8-8	8	1/8-27	14.2	48.4	29.3	19.1	21.4
MBZ 10-1/4-10	10	1/4-14	19.0	54.6	33.3	21.3	25.4
MBZ 12-3/8-12	12	3/8-18	22.2	61.2	38.1	23.1	27.4
MBZ 16-1/2-16	16	1/2-14	26.9	68.8	40.1	28.7	29.5

†Average Value

**female branch tee****OBZ**

includes body, nut and ferrule  
metric tube to inch size  
female pipe (NPT)

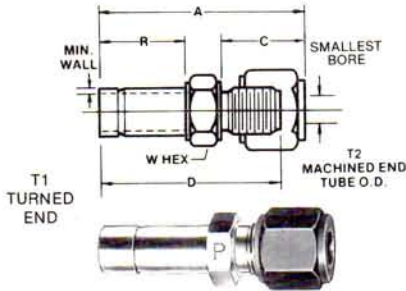


PART NO.	mm	INCHES NPT	W	†A	†C	H	L
	TUBE O.D.	PIPE THREAD	mm	mm	mm	mm	mm
OBZ 6-6-1/8	6	1/8-27	12.7	56.0	28.0	19.1	20.6
OBZ 6-6-1/4	6	1/4-18	19.0	62.4	31.2	21.3	23.9
OBZ 8-8-1/8	8	1/8-27	14.2	58.6	29.3	19.1	21.4
OBZ 10-10-1/4	10	1/4-18	19.0	66.6	33.3	21.3	25.4
OBZ 12-12-3/8	12	3/8-18	22.2	76.2	38.1	23.1	27.4
OBZ 16-16-1/2	16	1/2-14	26.9	80.2	40.1	28.7	29.5

†Average Value

**tube end reducer  
TRBZ**

includes body, nut and ferrule  
metric tube to metric tube

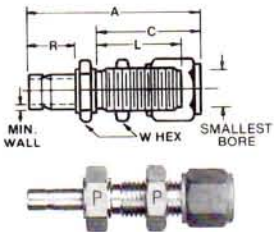


PART NO.	mm		W	MIN. WALL	SMALLEST BORE	†A	†C	D	R
	T1 TURNED END TUBE O.D.	T2 MACHINE END TUBE O.D.	mm	mm	mm	mm	mm	mm	mm
TRBZ 8-6	8	6	12.7	.81	4.8	39.9	17.5	32.5	16.8
TRBZ 10-6	10	6	12.7	1.42	4.8	40.6	17.5	33.3	17.5
TRBZ 12-6	12	6	14.2	1.42	4.8	46.2	17.5	38.9	23.1
TRBZ 16-6	16	6	17.4	1.65	4.8	47.7	17.5	40.3	24.6
TRBZ 10-8	10	8	14.2	1.42	6.4	42.4	19.1	34.5	17.5
TRBZ 12-8	12	8	14.2	1.42	6.4	47.5	19.1	39.6	23.1
TRBZ 16-8	16	8	17.4	1.65	6.4	50.0	19.1	42.2	24.6
TRBZ 12-10	12	10	15.8	1.42	7.9	49.3	19.6	41.4	23.1
TRBZ 16-10	16	10	17.4	1.65	7.9	50.8	19.6	42.9	24.6
TRBZ 16-12	16	12	20.6	1.65	10.3	54.9	23.1	43.7	24.6

†Average Value

**tube end bulkhead adapter  
T2H2BZ**

includes body, nut,  
ferrule, and locknut  
metric tube to metric tube

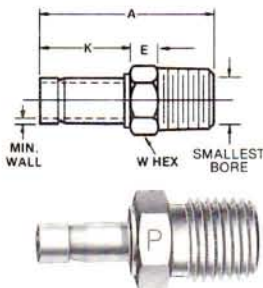


PART NO.	mm	W	MIN. WALL	†A	†C	SMALLEST BORE	L	R
	TUBE O.D.	mm	mm	mm	mm	mm	mm	mm
T2H2BZ 6	6	15.8	.81	55.8	33.3	4.4	25.9	15.7
T2H2BZ 8	8	17.4	.81	59.4	36.3	6.4	28.5	16.8
T2H2BZ 10	10	19.0	1.42	61.0	37.1	7.1	29.2	17.5
T2H2BZ 12	12	23.8	1.42	73.2	42.9	9.1	31.8	23.1
T2H2BZ 16	16	26.9	1.65	75.7	43.2	12.7	32.5	24.6

†Average Value

**tube end male adapter  
T2HF**

(metric tube to inch size  
male pipe (NPT))

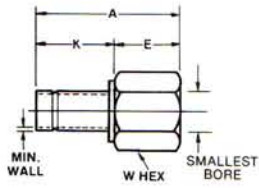


PART NO.	mm	INCHES NPT	W	MIN. WALL	A	E	SMALLEST BORE	K
	TUBE O.D.	PIPE THREAD	mm	mm	mm	mm	mm	mm
T2HF 6-1/8	6	1/8-27	11.1	.81	30.9	5.6	4.4	16.0
T2HF 6-1/4	6	1/4-18	14.2	.81	35.8	5.6	4.4	16.0
T2HF 8-1/8	8	1/8-27	11.1	.81	31.7	5.6	4.8	16.8
T2HF 8-1/4	8	1/4-18	14.2	.81	37.3	6.4	6.4	16.8
T2HF 10-1/4	10	1/4-18	14.2	1.42	38.1	6.4	7.1	17.5
T2HF 10-3/8	10	3/8-18	17.4	1.42	38.1	6.4	7.1	17.5
T2HF 10-1/2	10	1/2-14	22.2	1.42	43.6	7.1	7.1	17.5
T2HF 12-1/4	12	1/4-18	14.2	1.42	43.6	6.4	7.1	23.1
T2HF 12-3/8	12	3/8-18	17.4	1.42	44.4	7.1	9.1	23.1
T2HF 12-1/2	12	1/2-14	22.2	1.42	49.2	7.1	9.1	23.1
T2HF 16-1/2	16	1/2-14	22.2	1.65	50.8	7.1	12.7	24.6

**NOTE:** Tube end is in millimeters,  
pipe end is in inches.

### tube end female adapter T2HG

(metric tube to inch size female pipe (NPT))

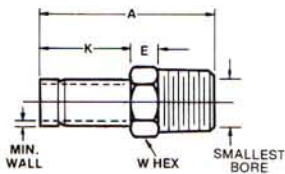


PART NO.	mm	INCHES NPT	W	MIN. WALL	A	E	SMALLEST BORE	K
	TUBE O.D.	PIPE THREAD	mm	mm	mm	mm	mm	mm
T2HG 6-1/8	6	1/8-27	14.2	.81	29.4	13.5	4.4	16.0
T2HG 6-1/4	6	1/4-18	19.0	.81	34.0	18.3	4.4	16.0
T2HG 8-1/8	8	1/8-27	14.2	.81	30.2	13.5	6.4	16.8
T2HG 8-1/4	8	1/4-18	19.0	.81	35.0	18.3	6.4	16.8
T2HG 10-1/4	10	1/4-18	19.0	1.42	37.3	19.8	7.1	17.5
T2HG 10-3/8	10	3/8-18	22.2	1.42	42.2	24.6	7.1	17.5
T2HG 10-1/2	10	1/2-13	26.9	1.42	41.4	18.3	7.1	23.1
T2HG 12-1/4	12	1/4-18	19.0	1.42	43.0	19.8	9.1	23.1
T2HG 12-3/8	12	3/8-18	22.2	1.42	47.7	24.6	9.1	23.1
T2HG 12-1/2	12	1/2-14	26.9	1.42	44.4	19.8	9.1	24.6
T2HG 16-1/2	16	1/2-14	26.9	1.65	50.8	26.2	12.7	24.6

NOTE: Tube end is in millimeters, pipe end is in inches.

### tube end male adapter T2HF3

(inch size tube to BSPT)

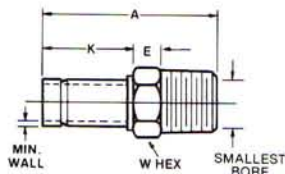


PART NO.	INCHES BSPT		W	MIN. WALL	A	E	SMALLEST BORE	K
	TUBE O.D.	PIPE THREAD	mm	mm	mm	mm	mm	mm
4-2 T2HF3	1/4	1/8-28	11.1	.78	30.9	5.6	4.8	16.0
4-4 T2HF3	1/4	1/4-19	14.2	.78	35.8	5.6	4.8	16.0
5-2 T2HF3	5/16	1/8-28	11.1	.78	31.7	5.6	4.8	16.8
5-4 T2HF3	5/16	1/4-19	14.2	.78	37.3	6.4	6.4	16.8
6-4 T2HF3	3/8	1/4-19	14.2	1.19	38.1	6.4	7.1	17.5
6-6 T2HF3	3/8	3/8-19	17.4	1.19	36.1	6.4	7.1	17.5
6-8 T2HF3	3/8	1/2-14	22.2	1.19	43.6	7.1	7.1	17.5
8-4 T2HF3	1/2	1/4-19	14.2	1.40	43.6	6.4	7.1	23.1
8-6 T2HF3	1/2	3/8-19	17.4	1.40	44.4	7.1	9.9	23.1
8-8 T2HF3	1/2	1/2-14	22.2	1.40	49.2	7.1	9.9	23.1
10-8 T2HF3	5/8	1/2-14	22.2	1.57	50.8	7.1	12.7	24.6

NOTE: Tube end is in inches, pipe end is British standard pipe tapered. (I.S.O. #R7)

### tube end male adapter T2HF3

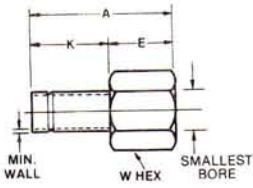
(metric size tube to BSPT)



PART NO.	mm	IN. BSPT	W	MIN. WALL	A	E	SMALLEST BORE	K
	TUBE O.D.	PIPE THREAD	mm	mm	mm	mm	mm	mm
T2HF3 6-1/8	6	1/8-28	11.1	.81	30.9	5.6	4.4	16.0
T2HF3 6-1/4	6	1/4-19	14.2	.81	35.8	5.6	4.4	16.0
T2HF3 8-1/8	8	1/8-28	11.1	.81	31.7	5.6	4.8	16.8
T2HF3 8-1/4	8	1/4-19	14.2	.81	37.3	6.4	6.4	16.8
T2HF3 10-1/4	10	1/4-19	14.2	1.42	38.1	6.4	7.1	17.5
T2HF3 10-3/8	10	3/8-19	17.4	1.42	38.1	6.4	7.1	17.5
T2HF3 10-1/2	10	1/2-14	22.2	1.42	43.6	7.1	7.1	17.5
T2HF3 12-1/4	12	1/4-19	14.2	1.42	43.6	6.4	7.1	23.1
T2HF3 12-3/8	12	3/8-19	17.4	1.42	44.4	7.1	9.1	23.1
T2HF3 12-1/2	12	1/2-14	22.2	1.42	49.2	7.1	9.1	23.1
T2HF3 16-1/2	16	1/2-14	22.2	1.65	50.8	7.1	12.7	24.6

NOTE: Tube end is in millimeters, pipe end is British standard pipe tapered. (I.S.O. #R7)

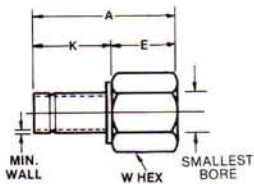
**tube end female adapter  
T2HG4**  
(inch size tube to BSPP)



PART NO.	INCHES BSPP		W mm	MIN. WALL mm	A mm	E mm	SMALLEST BORE mm	K mm
	TUBE O.D.	PIPE THREAD						
4-2 T2HG4	1/4	1/8-28	14.2	.78	29.4	13.5	4.8	16.0
4-4 T2HG4	1/4	1/4-19	19.0	.78	34.0	18.3	4.8	16.0
5-2 T2HG4	5/16	1/8-28	14.2	.78	30.2	13.5	6.4	16.8
5-4 T2HG4	5/16	1/4-19	19.0	.78	35.0	18.3	6.4	16.8
6-4 T2HG4	3/8	1/4-19	19.0	1.19	37.3	19.8	7.1	17.5
6-6 T2HG4	3/8	3/8-19	22.2	1.19	42.2	24.6	7.1	17.5
6-8 T2HG4	3/8	1/2-14	26.9	1.19	41.4	18.3	7.1	23.1
8-4 T2HG4	1/2	1/4-19	19.0	1.40	43.0	19.8	9.9	23.1
8-6 T2HG4	1/2	3/8-19	22.2	1.40	47.7	24.6	9.9	23.1
8-8 T2HG4	1/2	1/2-14	26.9	1.40	44.4	19.8	9.9	24.6
10-8 T2HG4	5/8	1/2-14	26.9	1.57	50.8	26.2	12.7	24.6

**NOTE:** Tube end is in inches, pipe end is British standard pipe parallel. (I.S.O. #R228)

**tube end female adapter  
T2HG4**  
(metric size tube to BSPP)



PART NO.	mm	IN. BSPP	W mm	MIN. WALL mm	A mm	E mm	SMALLEST BORE mm	K mm
	TUBE O.D.	PIPE THREAD						
T2HG4-6-1/8	6	1/8-28	14.2	.81	29.4	13.5	4.4	16.0
T2HG4-6-1/4	6	1/4-19	19.0	.81	34.0	18.3	4.4	16.0
T2HG4-8-1/8	8	1/8-28	14.2	.81	30.2	13.5	6.4	16.8
T2HG4-8-1/4	8	1/4-19	19.0	.81	35.0	18.3	6.6	16.8
T2HG4-10-1/4	10	1/4-19	19.0	1.42	37.3	19.8	7.1	17.5
T2HG4-10-3/8	10	3/8-19	22.2	1.42	42.2	24.6	7.1	17.5
T2HG4-10-1/2	10	1/2-14	26.9	1.42	41.4	18.3	7.1	23.1
T2HG4-12-1/4	12	1/4-19	19.0	1.42	43.0	19.8	9.1	23.1
T2HG4-12-3/8	12	3/8-19	22.2	1.42	47.7	24.6	9.1	23.1
T2HG4-12-1/2	12	1/2-14	26.9	1.42	44.4	19.8	9.1	24.6
T2HG4-16-1/2	16	1/2-14	26.9	1.65	50.8	26.2	12.7	24.6

**NOTE:** Tube end is in millimeters, pipe end is British standard pipe parallel. (I.S.O. #R228)

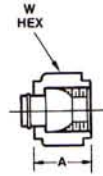


### plug FNZ

for metric tube

#### HOW TO ASSEMBLE

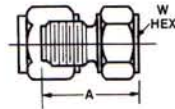
Wrench tighten only ¼ turn from finger tight position.



PART NO.	mm	A	W
	TUBE O.D.	mm	mm
FNZ 6	6	12.7	14.3
FNZ 8	8	13.5	15.9
FNZ 10	10	14.2	17.5
FNZ 12	12	17.5	22.2
FNZ 16	16	17.5	25.4

### cap PNBZ

includes body, nut and ferrule  
for metric tube



PART NO.	mm	W	A
	TUBE O.D.	mm	mm
PNBZ 6	6	12.7	15.8
PNBZ 8	8	14.3	17.0
PNBZ 10	10	15.9	18.4
PNBZ 12	12	20.6	19.1
PNBZ 16	16	23.8	20.6

Parker CPI Metric Plugs and Caps can be used to conveniently provide for future expansion of the tubing circuit. Additional hook-ups can be easily accommodated when they are required.

**tube nut**  
**BZ**  
for metric tube



PART NO.	mm	A	W HEX
	TUBE O.D.	mm	mm
BZ 6	6	12.7	14.3
BZ 8	8	13.5	15.9
BZ 10	10	14.2	17.5
BZ 12	12	17.5	22.2
BZ 16	16	17.5	25.4

**ferrules**  
**TZ**  
for metric tube



FOR SIZES  
6 to 10mm



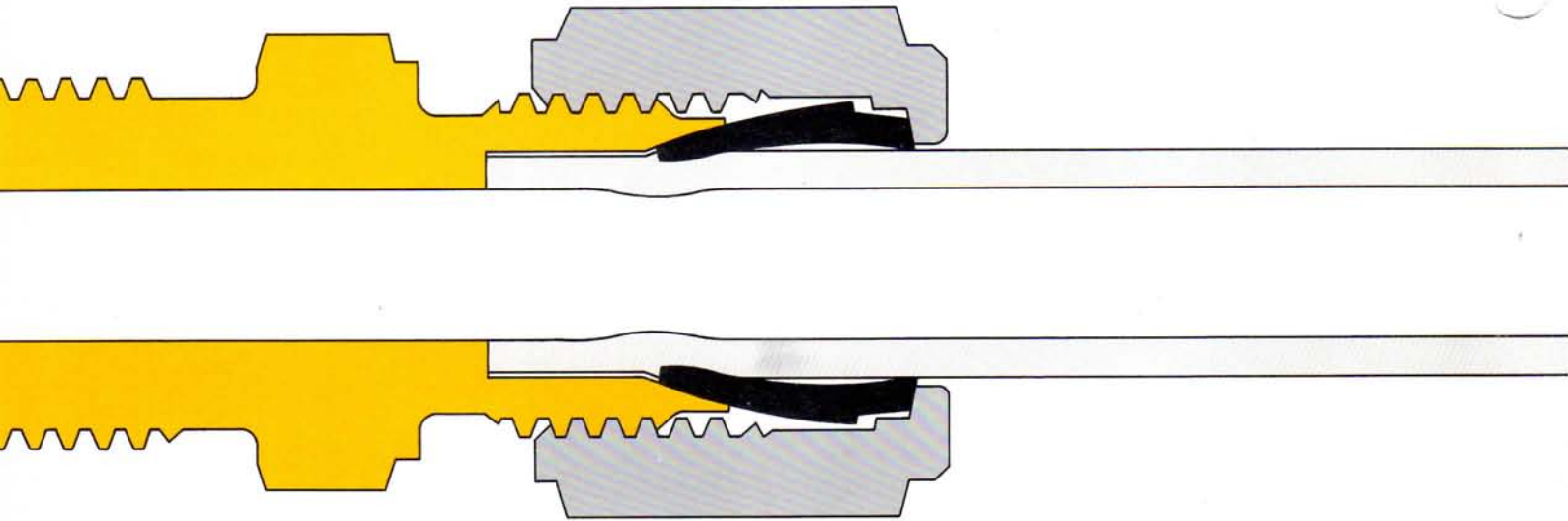
FOR SIZES  
12 to 16mm



PART NO.	mm
	TUBE O.D.
TZ 6	6
TZ 8	8
TZ 10	10
TZ 12	12
TZ 16	16

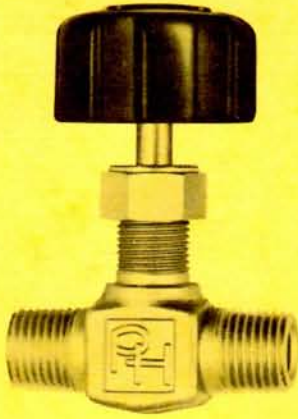
For information on the Parker "instrumentation family" of products ask your Parker representative for the following descriptive literature:

- Catalog 4230 Parker CPI Tube Fittings
- Catalog 4232 CPI Fittings for Chromatography and Analytical Applications
- Catalog 4250 Parker CPI Valves
- Catalog 4260 Instrument Pipe Fittings
- Catalog 4270 Weld-lok Socket Type Permanent Tube Fittings
- Catalog 4280 Automatic Buttweld Fitting
- Catalog 4290 Parker Tube Fabricating Tools



Parker Hannifin Corporation  
**Instrumentation Connectors Division**  
9400 S. Memorial Parkway  
Huntsville, Alabama 35802

CPI VALVES



MATERIALS: Brass • Type 316 Stainless Steel • Steel

CPI VALVES

**PARKER CPI**

**Fittings &**  
**Valves**

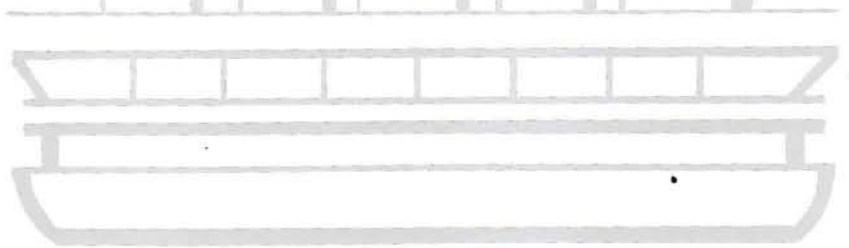
**FOR PROCESS, POWER  
& INSTRUMENTATION**









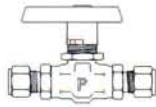


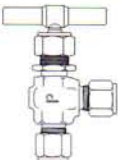

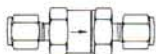



# Parker CPI Valves

For process, power  
and instrumentation

Catalog No. 4250  
January, 1978



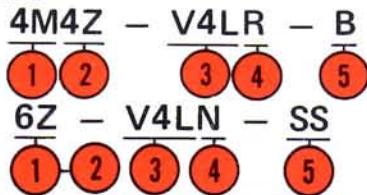
## Parker CPI valve description

<b>General Service Size 4</b> page 4		<b>Toggle valves</b> page 12	
V4L 	V4A 	V4LQ 	V4AQ 
<b>General Service Size 6</b> page 6		<b>2-Way ball valves</b> 14	<b>3-Way ball valves</b> 16
V6L 	V6A 	V6LJ 	V6XJ 
<b>General Service Size 8 &amp; 12</b> page 8		<b>Checks</b> 20	<b>Filters</b> 22
V8L and V12L 	V8A and V12A 	C2L C4L C6L C8L 	F4L F6L 
<b>PBT valves for Critical Service Size 6</b> page 10		<b>Union Bonnet for Severe Service</b> 18	<b>Components</b> 24
V6LP 	V6AP 	U12L 	Liquid flow rate 26 Gas flow rate 27 Conversion tables 28

### How to order

The correct part number is easily arrived at by following the number dot sequence. The five product characteristics needed are coded as shown below.

#### Examples



Describes V4L Series valve, brass, blunt stem, 1/4" male pipe inlet port, 4-CPI (1/4" tube) outlet port.

Describes V4L Series valve, stainless steel, needle stem, 6-CPI (3/8" tube) inlet and outlet ports.

Size	Inlet Port ①	Outlet Port ②	Valve Series ③	Stem Type ④	Material ⑤
	Machining				
2	Z—CPI (tube)		V4L	R—Blunt	SS—316 Stainless
4	M—Male pipe (NPT)			N—Needle	B—brass
6	F—Female pipe (NPT)			K—Kel-F®	S—Steel
8	X—37° Flare				

**Note:** Port sizes are in sixteenths of an inch—O.D. for tube and nominal I.D. for pipe. If both ports are same size and machining, only inlet port is called out.

### Panel mount

Panel mounting nuts available for all series of valves. On all Ball, Toggle and PBT valves a panel mounting nut will be included at no extra charge. Panel nuts are shipped unassembled when ordered for needle valves. See spare parts price list.

### Handles

See valve series page for handle size.

**Note:** Teflon and Viton are registered trademarks of E. I. DuPont. Kel-F is a registered trademark of 3M Co.

## General Features

### Purpose

With a wide range of patterns, sizes, end connections and stem types available, Parker Forged Body Valves provide complete flexibility in any layout from miniaturized tubing to piping systems up to 1/2". All can be supplied with Parker CPI Tube Fitting connections as well as male and female pipe connections.

Interchangeable stems offer fine flow control combined with metal-to-metal or soft seat shut-off. Kel-F stems are recommended for positive, repetitive shut-off with low density gases and non-lubricating fluids, where operating conditions will permit.

Rugged, compact Parker Forged Body Valves afford exceptional versatility for ease of installation and exacting service with documented heat code traceability on stainless steel bodies for nuclear and other critical applications.

### Applications

- General purpose valves for regulating and shut-off of many gases and liquids
- Non-critical vacuum to high pressure
- Test benches
- Instrument air lines
- Flow meters
- Manifolds
- Natural gas lines
- Gas sampling lines
- Gas chromatographs
- Test stand work
- Control panels
- Cooling systems
- Sampling service
- Drains
- Vents
- Pressure gauges
- Laboratory and research applications
- Non-critical cylinder valves

### Features

- Variety of materials—316-SS, brass, steel
- Parker exclusive angle design packing provides a leak-tight seal and low operating torque at pressures to 5000 psig
- Compact body installs in space-restricted areas
- Orifice sizes .078—.313
- Choice of three stem points for exact flow requirements—hard seat shut-off, metering, and soft seat shut-off
- Replaceable Kel-F stem disc (soft seating models) provides long valve life
- All valve stems are precision finished 316 Stainless Steel
- Wide temperature range: -65° to 450°F
- Broad selection of end connections—CPI, NPT Male Pipe, and NPT Female Pipe are available as standard
- All models are panel mountable
- Packing adjustments may be made from outside the panel
- Easy to grip black nylon handle standard with blue, red, green, yellow and white available
- Globe and angle flow patterns
- Flat wrench pads on body simplifies valve installation.

### Special Features

- Machined, pure TFE tapered seal packing
- Adjustable packing that can be replaced without removing valve from system
- Stainless steel stems in all valves as standard
- Rugged, compact forged body
- Color-coded handles
- Low operating torque
- 100% factory tested
- Documented heat code traceability available for 316 Stainless Steel valves
- Precision finished stems with rolled threads
- Optional O-Ring stem packing

## Technical Data

### Operating Pressure

Parker CPI needle valves are designed for the following operating pressures:

Material	Psig	MPa
Stainless Steel	5000	(34.5)
Brass	3000	(20.7)
Steel	5000	(34.5)

(Maximum operating pressures shown are for temperatures from -65°F to 100°F; -54°C to 38°C). Elevated temperature/pressure ratings are shown for each valve series.

### Operating Temperatures

The temperature rating is normally set by seal limitations. Teflon stem packing may be used over a range of -65° to +450°F (-54°C to +232°C). Kel-F stems are limited to 350°F (177°C).

### Materials of Construction

Part Description	316SS Valves	Brass Valves	Steel Valves
Body (forged)	316 SS	Brass	Carbon Steel
Stem	316 SS	316 SS	316 SS
Soft Seat (K stem)	Kel-F	Kel-F	Kel-F
Packing			
—Standard	TFE	TFE	TFE
—Optional	Viton A	Viton A	Viton A
Packing Washer	316 SS	316 SS	316 SS
Packing Nut	316 SS	Brass	Stainless Steel
Handle			
—Round	Black nylon with SS insert and set screw	Black nylon with SS insert and set screw	Black nylon with SS insert and set screw
—Bar	Aluminum (anodized) with SS set screw	Aluminum (anodized) with SS set screw	Aluminum (anodized) with SS set screw
Panel Nut	Brass-nickel plated	Brass-nickel plated	Brass-nickel plated

Other materials available by special order. Consult your CPI distributor for details.

### Typical raw material specifications

Basic Valve Material	Bar Stock Components	Forged Body
Brass	CA-360 QQ-B 626 Alloy 360 ASTM-B16 Alloy 360 CA-345 ASTM-B-453 Alloy 345	CA-377 QQ-B 626 Alloy 377 ASTM-B-124 Alloy 377
Stainless Steel (Type 316)*	ASTM-A-276 Type 316 QQ-S-763 Class 316	ASME-SA-182 F316
Steel	ASTM-A-108 QQ-S-637	ASTM-A-576
Monel	ASTM-B-164 QQ-N-281	ASTM-B-164 QQ-N-281

\* If more specific information, including heat code traceability, is required, your Parker-Hannifin CPI distributor will provide details.

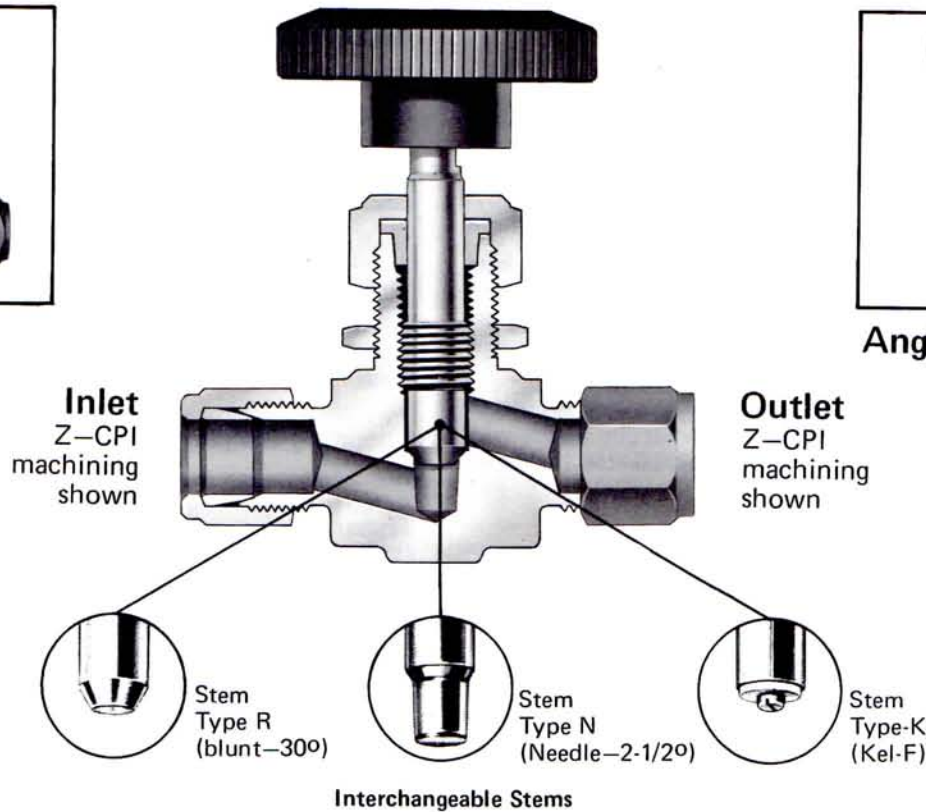




**Inline, V4L**



**Angle, V4A**



### How to order

The correct part number is easily arrived at by following the number dot sequence. The five product characteristics needed are coded as shown below.

### Examples

**4M4Z - V4LR - B**  
 ① ②      ③ ④      ⑤  
**6Z - V4AN - SS**  
 ① ②      ③ ④      ⑤

Describes V4L Series valve, brass, blunt stem, 1/4" male pipe inlet port, 4-CPI (1/4" tube) outlet port.

Describes V4A Series valve, stainless steel, needle stem, 6-CPI (3/8" tube) inlet and outlet ports.

Size	Inlet Port ①	Outlet Port ②	Valve Series ③	Stem Type ④	Material ⑤
	Machining				
2	Z-CPI (tube)		V4L	R-Blunt (30°)	SS-316 Stainless
4	M-Male pipe (NPT)		V4A	N-Needle (2-1/2°)	B-Brass
6	F-Female pipe (NPT)			K-Kel-F	S-Steel

**Note:** Port sizes are in sixteenths of an inch—O.D. for tube and nominal I.D. for pipe. If both ports are same size and machining, only inlet port is called out.

### General Features and Materials—see page 3

#### Panel mount

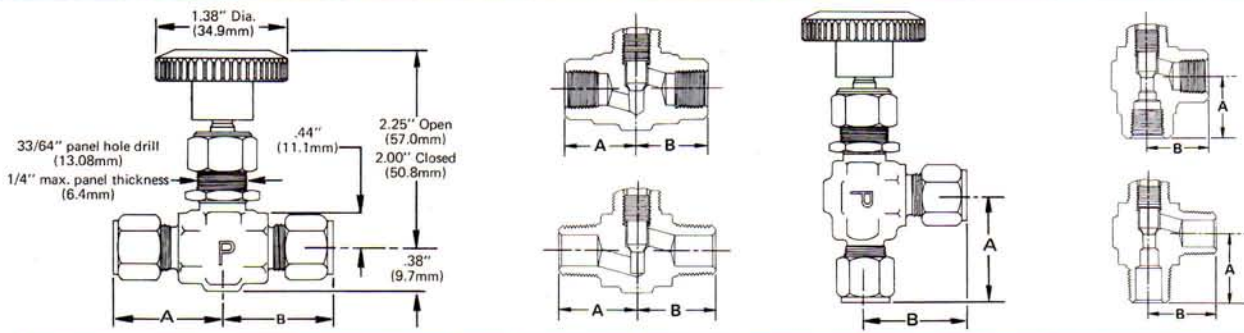
All Parker CPI Valves can be directly mounted in a panel. Panel mounting nuts are available for V4L/V4A Series of valves by ordering separately and will be shipped unassembled and boxed separately. Panel mount hole diameter is 33/64".

#### Handles

Standard handles for Size-4 needle valves for all stems are black molded nylon. Color-coded handles are available in yellow, white, blue, green and red. Self-sticking labels (identification discs) are also available for all size 4 round handles. An optional T-bar handle can be ordered for all size 4 needle valves.

#### Notice

Only items priced in current Supplementary Price List 4250 are carried in stock. Price and delivery of non-stock items furnished on request and will depend on quantity ordered.

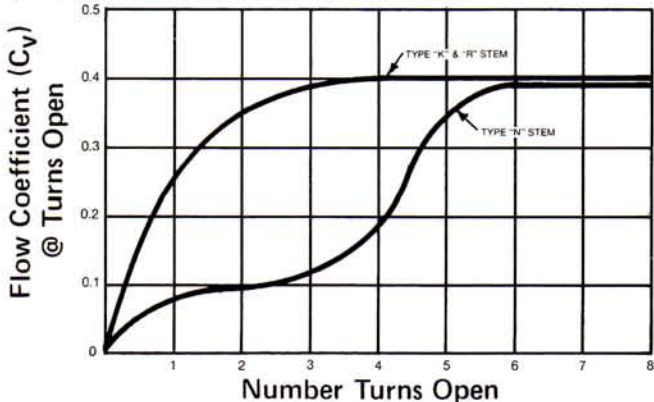


Port Size Identical Ends Inlet and Outlet	Part No. Inline	Part No. Angle	Stem	Orifice		C <sub>v</sub>		A		B		
				in.	mm	Inline	Angle	in.	mm	in.	mm	
2-CPI (1/8 tube)	2Z-V4LR-* 2Z-V4LN-* 2Z-V4LK-*	2Z-V4AR-* 2Z-V4AN-* 2Z-V4AK-*	Blunt Needle Kel-F	.078	1.98	.08	.09	1.13	28.7	1.13	28.7	
1/8 Male NPT	2M-V4LR-* 2M-V4LN-* 2M-V4LK-*	2M-V4AR-* 2M-V4AN-* 2M-V4AK-*	Blunt Needle Kel-F	.125	3.18	.21	.30	.75	19.0	.75	19.0	
1/8 Female NPT	2F-V4LR-* 2F-V4LN-* 2F-V4LK-*	2F-V4AR-* 2F-V4AN-* 2F-V4AK-*	Blunt Needle Kel-F	.176	4.47	.40	.44	.81	20.5	.81	20.6	
4-CPI (1/4 tube)	4Z-V4LR-* 4Z-V4LN-* 4Z-V4LK-*	4Z-V4AR-* 4Z-V4AN-* 4Z-V4AK-*	Blunt Needle Kel-F	.176	4.47	.40	.44	1.13	28.7	1.13	28.7	
1/4 Male NPT	4M-V4LR-* 4M-V4LN-* 4M-V4LK-*	4M-V4AR-* 4M-V4AN-* 4M-V4AK-*	Blunt Needle Kel-F	.176	4.47	.40	.44	.94	23.9	.94	23.9	
6-CPI (3/8 tube)	6Z-V4LR-* 6Z-V4LN-* 6Z-V4LK-*	6Z-V4AR-* 6Z-V4AN-* 6Z-V4AK-*	Blunt Needle Kel-F	.176	4.47	.40	.44	1.19	30.2	1.19	30.2	
Combination Ends												
Inlet	Outlet											
1/8 Male NPT	1/8 Female NPT	2M2F-V4LR-* 2M2F-V4LN-* 2M2F-V4LK-*	2M2F-V4AR-* 2M2F-V4AN-* 2M2F-V4AK-*	Blunt Needle Kel-F	.125	3.18	.21	.30	.75	19.0	.81	20.6
1/4 Male NPT	4-CPI	4M4Z-V4LR-* 4M4Z-V4LN-* 4M4Z-V4LK-*	4M4Z-V4AR-* 4M4Z-V4AN-* 4M4Z-V4AK-*	Blunt Needle Kel-F	.176	4.47	.40	.44	.94	23.9	1.13	28.7
1/4 Male NPT	6-CPI	4M6Z-V4LR-* 4M6Z-V4LN-* 4M6Z-V4LK-*	4M6Z-V4AR-* 4M6Z-V4AN-* 4M6Z-V4AK-*	Blunt Needle Kel-F	.176	4.47	.40	.44	.94	23.9	1.19	30.2

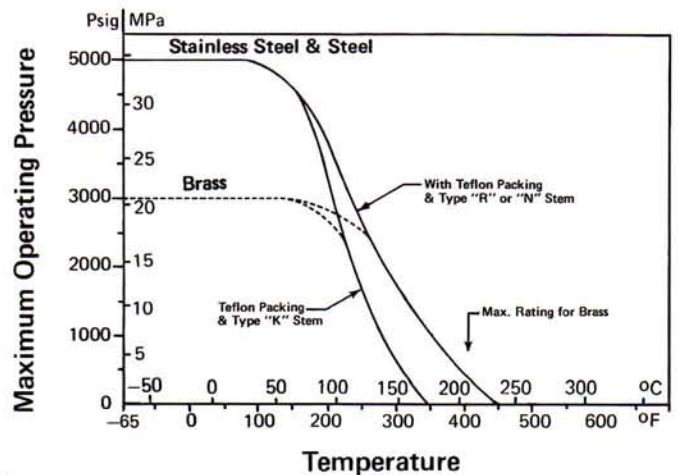
\*Materials: SS-316 Stainless; B-Brass; S-Steel

Water and Air Flow for C <sub>v</sub> = .40					
Pressure Drop Across Valve (ΔP)		Air Flow at 70°F (21°C) Outlet to Atmosphere		Water Flow at 70°F (21°C)	
PSID	MPa	SCFM	Std. cc/sec.	GPM	Liter/Min.
10	0.07	5.52	2 600	1.27	4.80
50	0.34	15.63	7 380	2.82	10.69
100	0.69	27.73	13 085	4.00	15.14

## V-4 Series flow characteristics



## Pressure-temperature ratings



## Terms

C<sub>v</sub> factor is a flow rate coefficient expressed in gpm of water @ 70°F for 1 psi pressure drop across the valve.

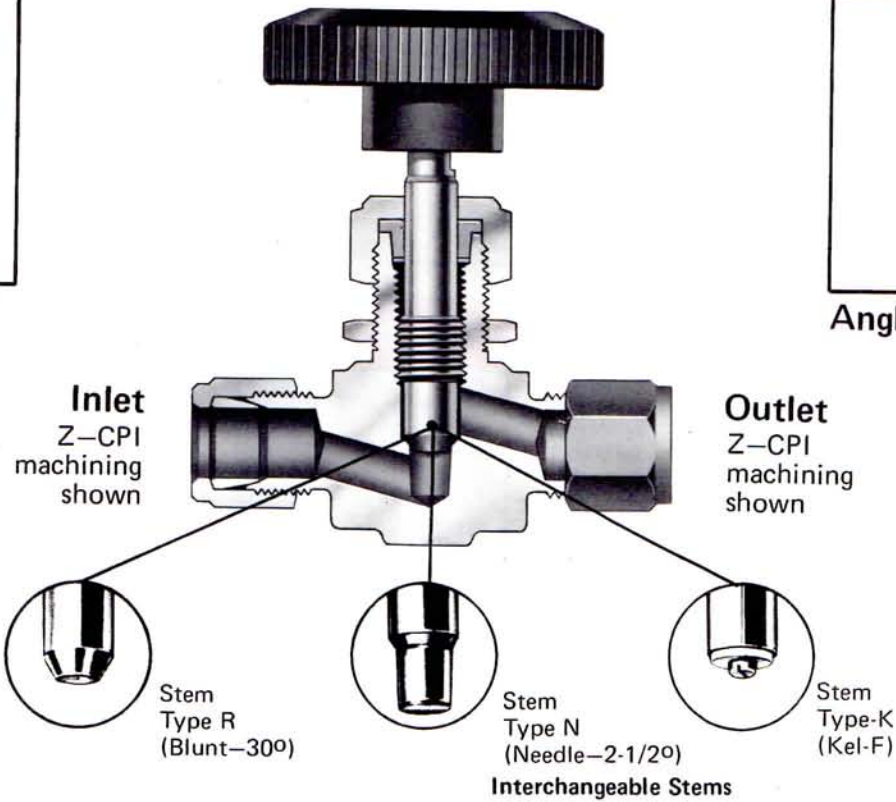
ISO Pressure Units; 1 MPa = 1 Mega Pascal = Bar x 10<sup>-1</sup> = 145 psi



**Inline V6L**

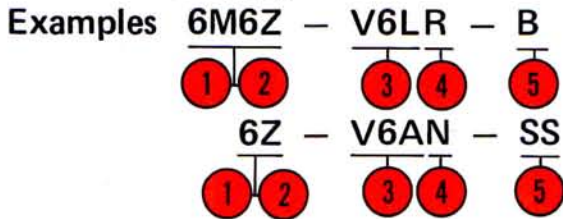


**Angle V6A**



### How to order

The correct part number is easily arrived at by following the number dot sequence. The five product characteristics needed are coded as shown below.



Describes V6L Series valve, brass, blunt stem, 3/8" male pipe inlet port, 6-CPI (3/8" tube) outlet port.

Describes V6A Series valve, stainless steel, needle stem, 6-CPI (3/8" tube) inlet and outlet ports.

Size	Inlet Port ①	Outlet Port ②	Valve Series ③	Stem Type ④	Material ⑤
	Machining				
4	Z—CPI (tube)		V6L	R—Blunt (30°)	B—Brass
6	M—Male pipe (NPT)		V6A	N—Needle (2-1/2°)	SS—316 Stainless
8	F—Female pipe (NPT)			K—Kel-F	S—Steel

**Note:** Port sizes are in sixteenths of an inch—O.D. for tube and nominal I.D. for pipe. If both ports are same size and machining, only inlet port is called out.

### General Features and Materials—see page 3

#### Panel Mount

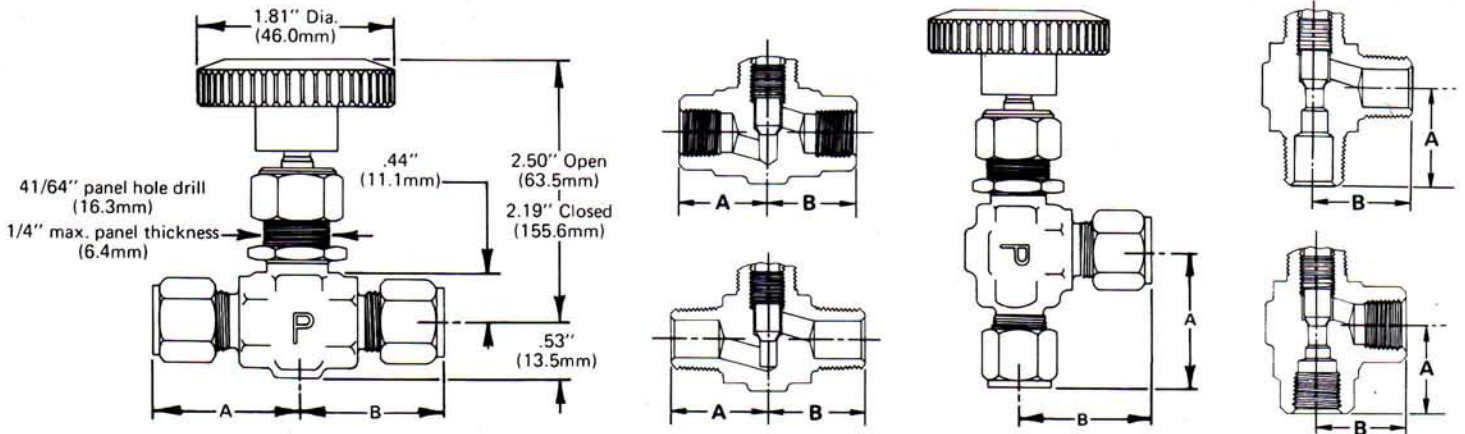
All Parker CPI Valves can be directly mounted in a panel. Panel mounting nuts are available for V6L/V6A Series of valves by ordering separately and will be shipped unassembled and boxed separately. Panel mount hole diameter is 41/64".

#### Handles

Standard handles for Size—6 needle valves for all stems are black molded nylon. Color-coded handles are available in yellow, white, blue, green and red. Self-sticking labels (identification discs) are also available for all size 6 round handles. An optional T-bar handle can be ordered for all size 6 needle valves.

#### Notice

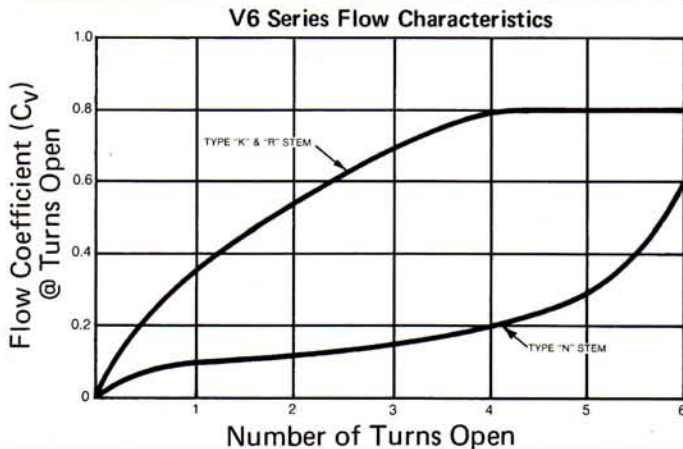
Only items priced in current Price List 4250 are carried in stock. Price and delivery of non-stock items furnished on request and will depend on quantity ordered.



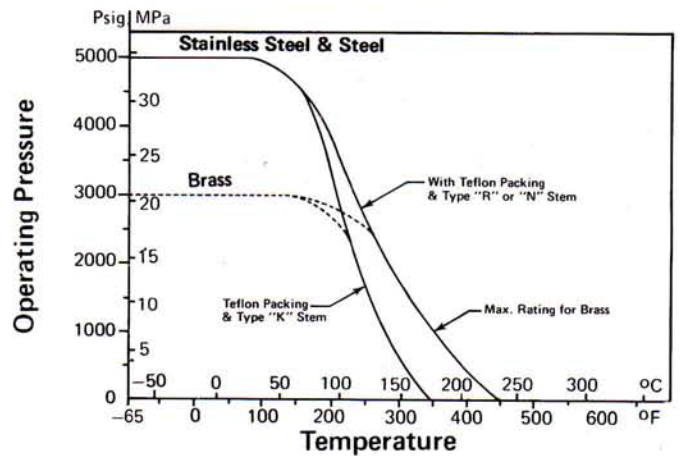
Port Size Identical Ends Inlet and Outlet	Part No. Inline	Part No. Angle	Stem	Orifice		C <sub>v</sub>		A		B		
				in.	mm	Inline	Angle	in.	mm	in.	mm	
1/4 Female NPT	4F-V6LR-*	4F-V6AR-*	Blunt	.228	5.79	.80	.84	.94	23.9	.94	23.9	
	4F-V6LN-*	4F-V6AN-*	Needle			.60	.65					
	4F-V6LK-*	4F-V6AK-*	Kel-F			.80	.84					
6-CPI (3/8 tube)	6Z-V6LR-*	6Z-V6AR-*	Blunt	.228	5.79	.80	.84	1.31	33.3	1.31	33.3	
	6Z-V6LN-*	6Z-V6AN-*	Needle			.60	.65					
	6Z-V6LK-*	6Z-V6AK-*	Kel-F			.80	.84					
3/8 Male NPT	6M-V6LR-*	6M-V6AR-*	Blunt	.228	5.79	.80	.84	1.03	26.2	1.03	26.2	
	6M-V6LN-*	6M-V6AN-*	Needle			.60	.65					
	6M-V6LK-*	6M-V6AK-*	Kel-F			.80	.84					
8-CPI (1/2 tube)	8Z-V6LR-*	8Z-V6AR-*	Blunt	.228	5.79	.80	.84	1.43	36.3	1.43	36.3	
	8Z-V6LN-*	8Z-V6AN-*	Needle			.65	.69					
	8Z-V6LK-*	8Z-V6AK-*	Kel-F			.80	.84					
<b>Combination Ends</b>												
<b>Inlet</b>	<b>Outlet</b>											
1/4 Male	1/4 Female	4M4F-V6LR-*	4M4F-V6AR-*	Blunt	.228	5.79	.80	.84	1.03	26.2	.94	23.9
		4M4F-V6LN-*	4M4F-V6AN-*	Needle			.60	.65				
		4M4F-V6LK-*	4M4F-V6AK-*	Kel-F			.80	.84				

\*Materials: SS-316 Stainless; B-Brass; S-Steel

Water and Air Flow for C <sub>v</sub> = 0.80					
Pressure Drop Across Valve (ΔP)		Air Flow at 70°F (21°C) Outlet to Atmosphere		Water Flow at 70°F (21°C)	
PSID	MPa	SCFM	Std. cc/sec.	GPM	Liter/Min.
10	0.07	11.1	5 210	2.53	9.59
50	0.34	31.3	14 760	5.65	21.40
100	0.69	55.4	26 160	8.00	30 27



## Pressure-temperature ratings



## Terms

ISO Pressure Units; 1 MPa = 1 Mega Pascal = Bar x 10<sup>-1</sup> = 145 psi

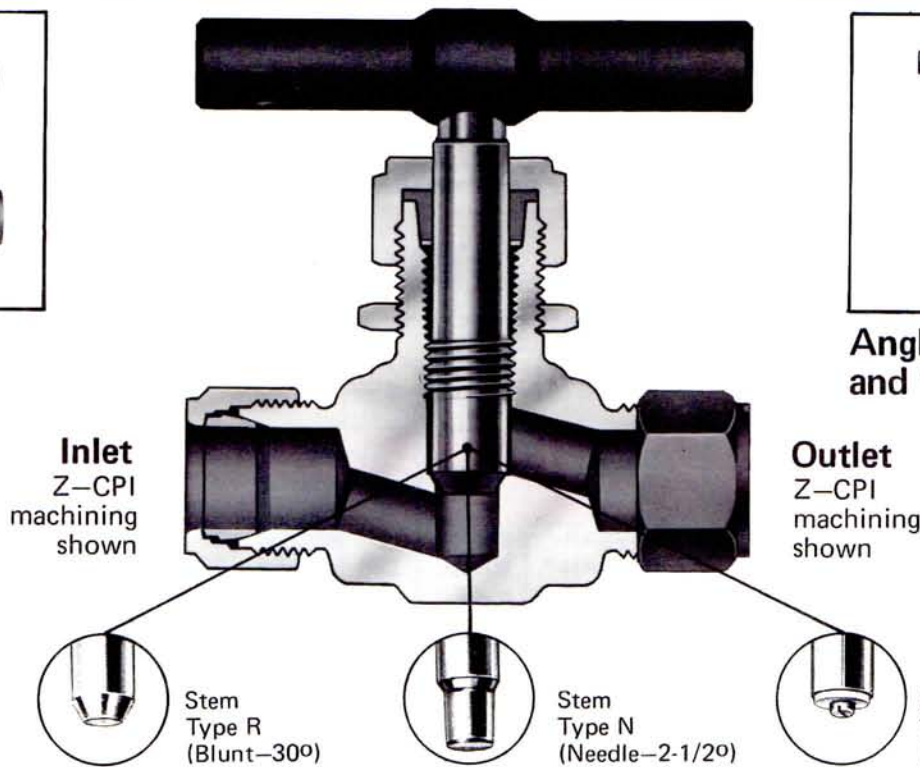
C<sub>v</sub> factor is a flow rate coefficient expressed in gpm of water @ 70°F for a 1 psi pressure drop across the valve.



**Inline V8L and V12L**



**Angle V8A and V12A**



### How to order

The correct part number is easily arrived at by following the number dot sequence. The five product characteristics needed are coded as shown below.

### Examples

**8M8Z - V8LR - B**  
 (1) (2) (3) (4) (5)  
**8Z - V8AN - SS**  
 (1) (2) (3) (4) (5)

Describes V8L Series valve, brass, blunt stem, 1/2" male pipe inlet port. 8-CPI (1/2" tube) outlet port.

Describes V8A Series valve, stainless steel, needle stem, 8-CPI (1/2" tube) inlet and outlet ports.

Size	Inlet Port (1)	Outlet Port (2)	Valve Series (3)	Stem Type (4)	Material (5)
	Machining				
6	Z-CPI (tube)		V8L	R-Blunt (30°)	SS-316 Stainless
8	M-Male pipe-NPT		V8A	N-Needle (2-1/2°)	B-Brass
	F-Female pipe-NPT		V12L	K-Kel-F	S-Steel
			V12A		

**Note** :Port sizes are in sixteenths of an inch—O.D. for tube and nominal I.D. for pipe. If both ports are same size and machining, only inlet port is called out.

### General Features and Materials— see page 3

#### Panel Mount

All Parker CPI Valves can be directly mounted in a panel. Panel mounting nuts are available for both V8L/V12L and V8A/V12A Series of valves by ordering separately. Nuts will be shipped unassembled and boxed separately. Panel mount hole diameter is 49/64".

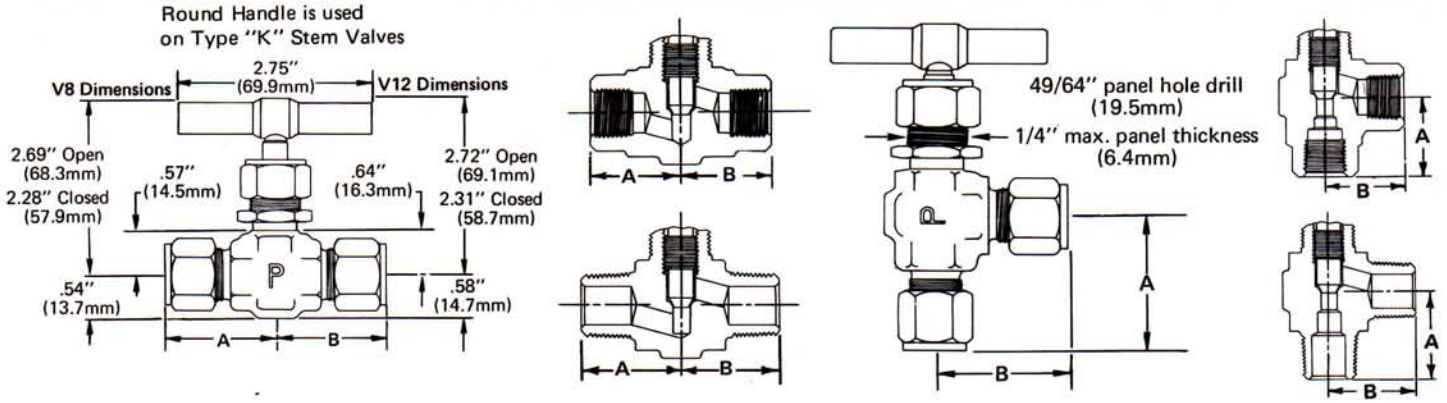
#### Handles

Standard handles for both series of needle valves with "R" or "N" stem would be black anodized aluminum bar stock. For "K" stem type valves a round black molded nylon handle is standard.

#### Notice

Only items priced in current Price List 4250 are carried in stock. Price and delivery of non-stock items furnished on request and will depend on quantity ordered.

Round Handle is used on Type "K" Stem Valves



Port Size Identical Ends Inlet and Outlet	Part No. Inline	Part No. Angle	Stem	Orifice		C <sub>v</sub>		A		B	
				in.	mm	Inline	Angle	in.	mm	in.	mm
3/8 Female NPT	6F-V8LR-*	6F-V8AR-*	Blunt	.312	7.94	1.20	1.66	1.34	34.0	1.34	34.0
	6F-V8LN-*	6F-V8AN-*	Needle			1.02	1.35				
	6F-V8LK-*	6F-V8AK-*	Kel-F			1.20	1.66				
8-CPI (1/2 tube)	8Z-V8LR-*	8Z-V8AR-*	Blunt	.312	7.94	1.20	1.66	1.56	39.6	1.56	39.6
	8Z-V8LN-*	8Z-V8AN-*	Needle			1.02	1.35				
	8Z-V8LK-*	8Z-V8AK-*	Kel-F			1.20	1.66				
1/2 Male NPT	8M-V8LR-*	8M-V8AR-*	Blunt	.312	7.94	1.20	1.66	1.34	34.0	1.34	34.0
	8M-V8LN-*	8M-V8AN-*	Needle			1.02	1.35				
	8M-V8LK-*	8M-V8AK-*	Kel-F			1.20	1.66				

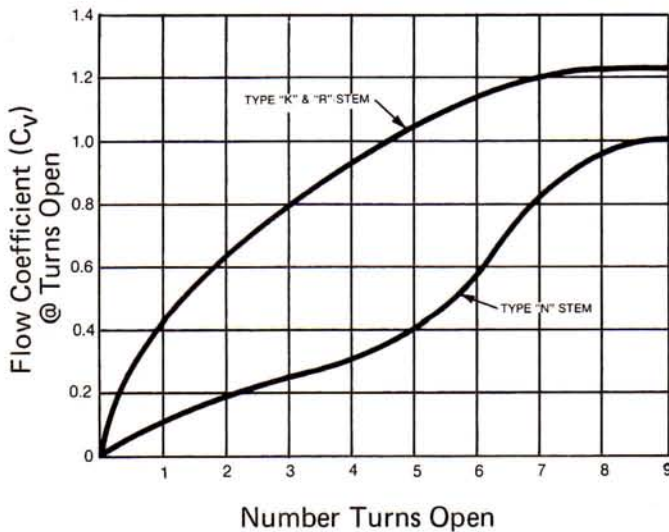
### V12-Series

Port Size Identical Ends Inlet and Outlet	Part No. Inline	Part No. Angle	Stem	Orifice		C <sub>v</sub>	C <sub>v</sub>	A		B	
				in.	mm	Inline	Angle	in.	mm	in.	mm
1/2 Female NPT	8F-V12LR-*	8F-V12AR-*	Blunt	.312	7.94	1.20	1.66	1.38	35.1	1.38	35.1
	8F-V12LN-*	8F-V12AN-*	Needle			1.02	1.35				
	8F-V12LK-*	8F-V12AK-*	Kel-F			1.20	1.66				

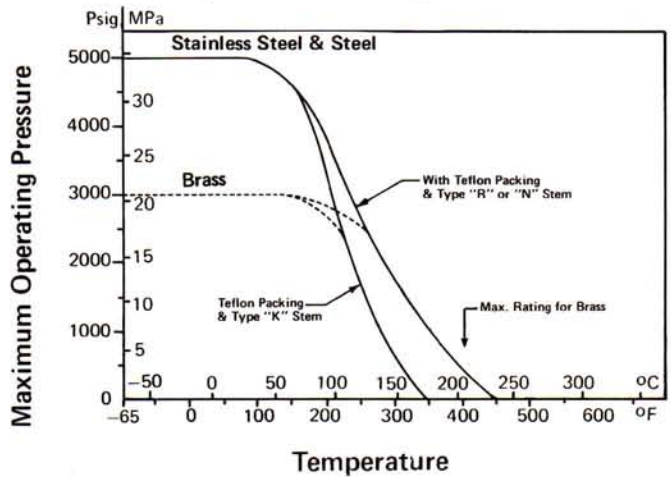
\*Materials: SS-316 Stainless; B-Brass; S-Steel

Water and Air Flow for C <sub>v</sub> = 1.2					
Pressure Drop Across Valve (ΔP)		Air Flow at 70°F (21°C) Outlet to Atmosphere		Water Flow at 70°F (21°C)	
PSID	MPa	SCFM	Std. cc/sec.	GPM	Liter/Min.
10	0.07	16.6	7 830	3.8	14.4
50	0.34	46.2	21 800	8.5	32.2
100	0.69	80.8	38 130	12.0	45.4

### V8 and V12 Series flow characteristics



### Pressure-temperature ratings



### Terms

ISO Pressure Units; 1 MPa = 1 Mega Pascal = Bar x 10<sup>-1</sup> = 145 psi  
 C<sub>v</sub> factor is a flow rate coefficient expressed in gpm of water @ 70°F for a 1-psi pressure drop across the valve.



**Inline, V6LP**

**Inlet**  
Z-CPI  
machining  
shown

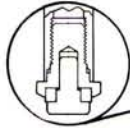


**Outlet**  
Z-CPI  
machining  
shown

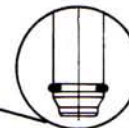


**Angle, V6AP**

Stem  
Type-K  
(Kel-F)



Stem  
Type-R  
(Blunt)



### How to order

The correct part number is easily arrived at by following the number dot sequence. The five product characteristics needed are coded as shown below.

### Examples

**4M4Z — V6LPR — SSP**  
1 2    3 4    5

**6Z — V6APK — SSP**  
1 2    3 4    5

Describes V6LP Series valve, stainless steel, blunt stem, 1/4" male pipe inlet port, 4-CPI (1/4" tube) outlet port.

Describes V6AP Series valve, stainless steel, soft seat stem, 6-CPI (3/8" tube) inlet and outlet ports.

Size	Inlet Port <span style="color: red;">①</span>	Outlet Port <span style="color: red;">②</span>	Valve Series <span style="color: red;">③</span>	Stem Type <span style="color: red;">④</span>	Material <span style="color: red;">⑤</span>
	Machining				
4	Z-CPI (tube)		V6LP	R-Blunt (30°) with anti-surge metering K-Kel-F	SS-316 Stainless
6	M-Male pipe-NPT		V6AP		
8	F-Female pipe-NPT				

**Note:** Port sizes are in sixteenths of an inch—O.D. for tube and nominal I.D. for pipe. If both ports are same size and machining, only inlet port is called out.

### General features

The Parker PBT Valve is specially designed to provide reliable on/off and regulating control in systems where high purity must be maintained.

#### Typical applications

- Chemical processing/sampling
- High purity gas
- High pressure gas
- Pollution analysis
- Semi-conductor manufacturing
- Deionized and R.O. water systems
- Corrosives and solvents
- Moderate vacuum
- General applications in all types of research labs.

#### Design features

The Packing Below Thread design separates the power threads from the system media. This way the threads are protected from the fluid media and the thread lubricant cannot wash away to contaminate the system. Proper thread lubricant stays with the stem as the stem threads are never exposed outside the packing bonnet. The packing bonnet which houses the mating system threads provides additional thread life with a baked on dry film lubricant.

The rugged 316SS stem features cold formed threads for increased life and smooth operation. An anti-surge stem throttling design combines the advantages of both a regulating stem and a throttling stem. It provides fine metering and sensitivity for the first 1 turn with full flow capacity at 4 turns giving a control range of better than 20:1. The soft seat "K" stem also

provides this same dual flow characteristic along with reliable bubble-tight shut-off.

The one-piece stem design eliminates the backlash and chatter in the metering range as well as corrosion and contamination traps of common ball-tip designs.

All wetted parts are 316 SS and TFE.

The PBT Valve directly panel mounts by simply removing the handle and inserting the valve through an 45/64" panel hole. Then secure the valve with panel nut and replace the handle. Packing adjustments and servicing can be accomplished without disturbing the panel connection or piping behind the panel.

### Panel Mount

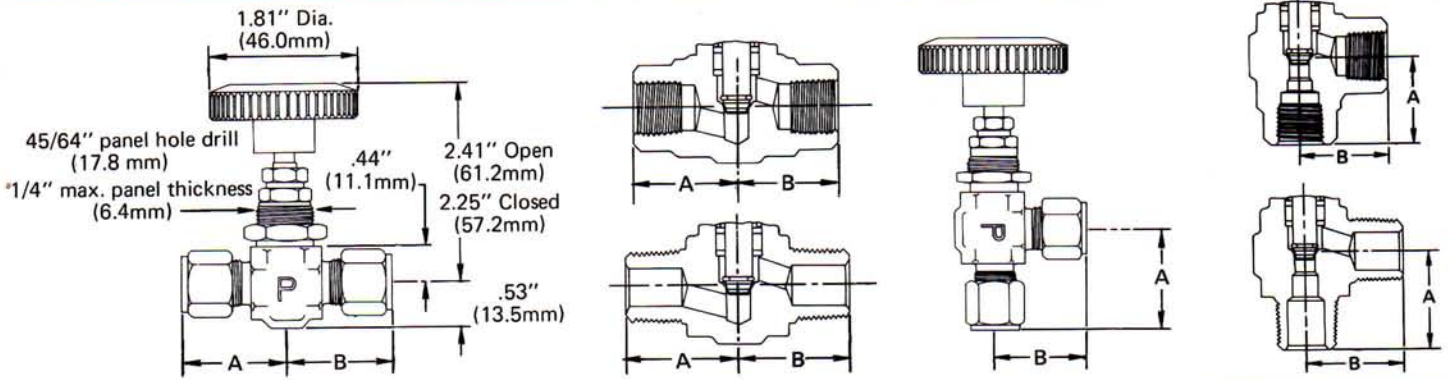
Panel mounting nuts are included at no charge as standard. Panel mount hole diameter is 45/64" (17.8 mm)

### Handles

Standard handles for Size-6 needle valves, all stems are black molded nylon. Color-coded handles available in yellow, white, blue, green and red.

### Notice

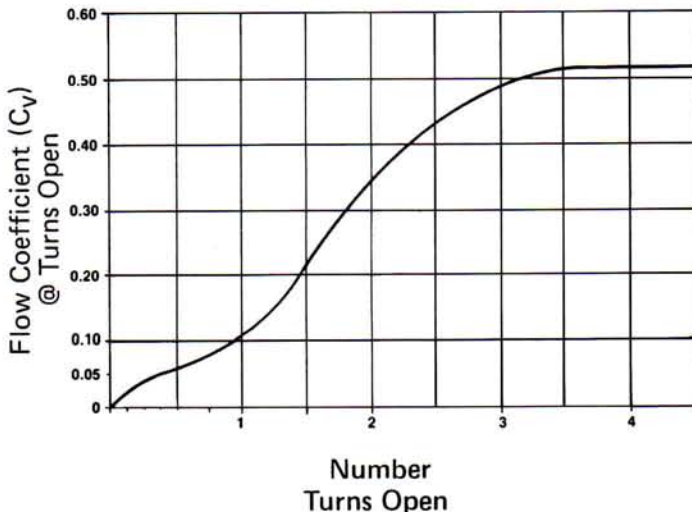
Only items priced in current Price List 4250 are carried in stock. Price and delivery of non-stock items furnished on request and will depend on quantity ordered.



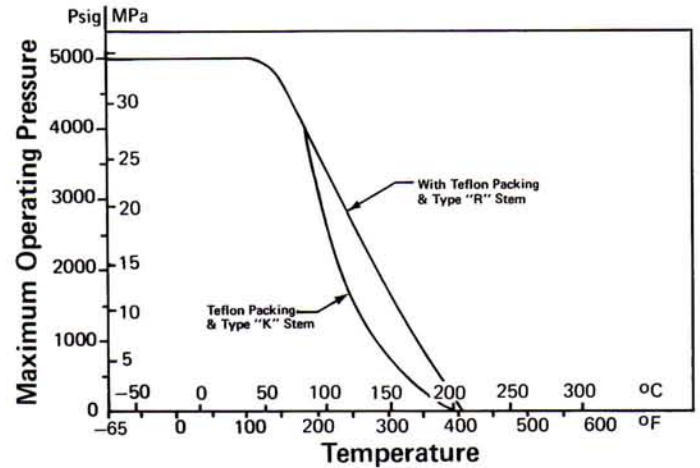
Port Size Identical Ends Inlet and Outlet	Part No. Inline	Part No. Angle	Stem	Orifice		C <sub>v</sub>		A		B		
				in.	mm	Inline	Angle	in.	mm	in.	mm	
4-CPI (1/4 tube)	4Z-V6LPR-SS 4Z-V6LPK-SS	4Z-V6APR-SS 4Z-V6APK-SS	Blunt Kel-F	.187	4.76	0.40	0.44	1.13	28.7	1.13	28.7	
6-CPI (3/8 tube)	6Z-V6LPR-SS 6Z-V6LPK-SS	6Z-V6APR-SS 6Z-V6APK-SS	Blunt Kel-F	.218	5.54	0.52	0.56	1.19	30.2	1.19	30.2	
1/4 Female NPT	4F-V6LPR-SS 4F-V6LPK-SS	4F-V6APR-SS 4F-V6APK-SS	Blunt Kel-F	.218	5.54	0.52	0.56	0.94	23.9	0.94	23.9	
1/4 Male NPT	4M-V6LPR-SS 4M-V6LPK-SS	4M-V6APR-SS 4M-V6APK-SS	Blunt Kel-F	.218	5.54	0.52	0.56	1.03	26.2	1.03	26.2	
3/8 Male NPT	6M-V6LPR-SS 6M-V6LPK-SS	6M-V6APR-SS 6M-V6APK-SS	Blunt Kel-F	.218	5.54	0.52	0.56	1.03	26.2	1.03	26.2	
Combination Ends												
Inlet	Outlet											
1/4 Male NPT	4-CPI (1/4 tube)	4M4Z-V6LPR-SS 4M4Z-V6LPK-SS	4M4Z-V6APR-SS 4M4Z-V6APK-SS	Blunt Kel-F	.187	4.76	0.40	0.44	1.03	26.2	1.13	28.7
1/4 Male NPT	6-CPI (3/8 tube)	4M6Z-V6LPR-SS 4M6Z-V6LPK-SS	4M6Z-V6APR-SS 4M6Z-V6APK-SS	Blunt Kel-F	.218	5.54	0.52	0.56	1.03	26.2	1.19	30.2
1/4 Male NPT	1/4 Female NPT	4M4F-V6LPR-SS 4M4F-V6LPK-SS	4M4F-V6APR-SS 4M4F-V6APK-SS	Blunt Kel-F	.218	5.54	0.52	0.56	1.03	26.2	0.94	23.9

Water and Air Flow for C <sub>v</sub> = .52					
Pressure Drop Across Valve (ΔP)		Air Flow at 70°F (21°C) Outlet to Atmosphere		Water Flow at 70°F (21°C)	
PSID	MPa	SCFM	Std. cc/sec.	GPM	Liter/Min.
10	0.07	7.2	3 400	1.64	6.21
50	0.34	20.3	9 580	3.68	13.93
100	0.69	36.0	16 990	5.20	19.68

### V6LP Series flow characteristics



### Pressure-temperature ratings



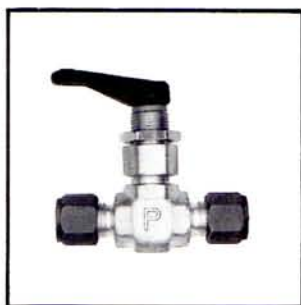
### Terms

C<sub>v</sub> factor is a flow rate coefficient expressed in gpm of water @ 70°F for a 1-psi pressure drop across the valve.  
 ISO Pressure Units; 1 MPa = 1 Mega Pascal = Bar x 10<sup>-1</sup> = 145 psi

### Material

- Teflon packing standard with Viton available
- Kel-F stem seal for soft seat stem
- Nylon handle
- All remaining parts are 316 Stainless Steel

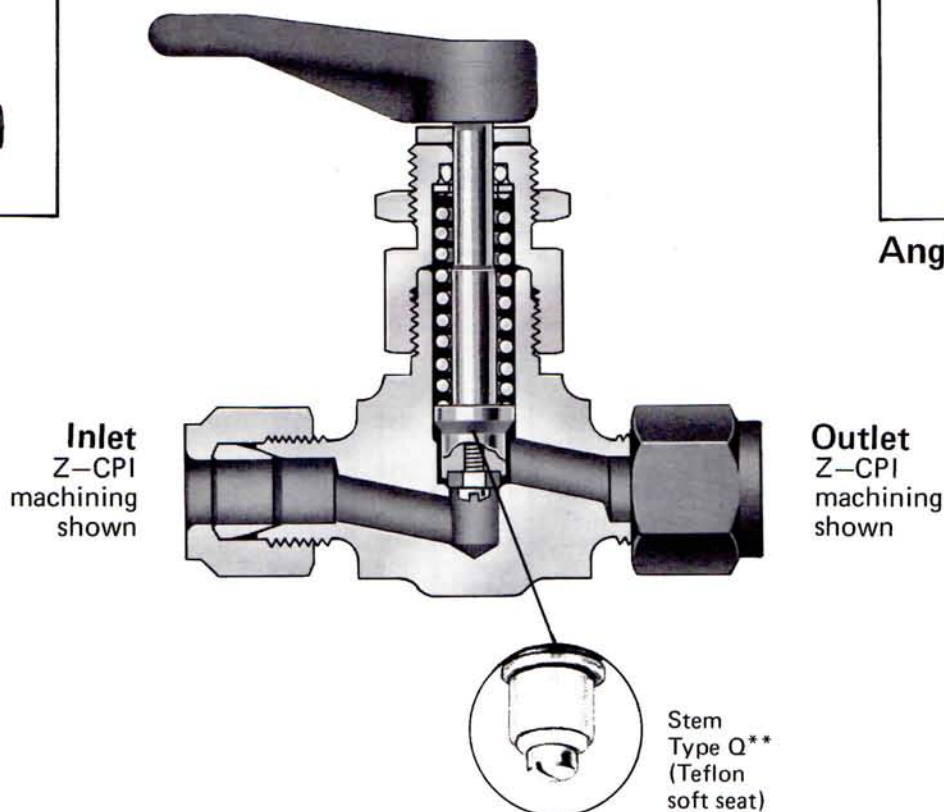




Inline, V4LQ



Angle, V4AQ



### How to order

The correct part number is easily arrived at by following the number dot sequence. The four product characteristics needed are coded as shown below.

### Example

4M4Z — V4LQ — SS

① ②      ③      ④

Describes V4LQ Series valve, 1/4" male pipe inlet, 4-CPI (1/4" tube) outlet, inline, stainless steel.

Size	Inlet Port ①	Outlet Port ②	Valve Series ③	Material ④
	Machining			
2	Z—CPI (tube)		V4LQ V4AQ	SS—316 Stainless B—Brass
4	M—Male pipe—NPT F—Female pipe—NPT			

**Note:** Port sizes are in sixteenths of an inch—O.D. for tube and nominal I.D. for pipe. If both ports are same size and machining, only inlet port is called out.

### Panel mount

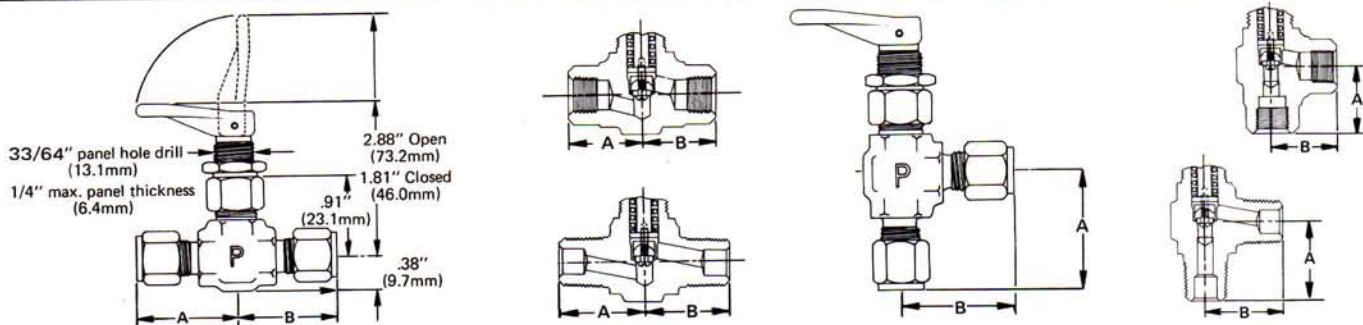
Panel mounting nuts are included at no charge as standard. Panel mount hole diameter is 33/64".

### Handle

Standard handles for toggle valve are black molded nylon color coded handles available in yellow, white, blue, green and red.

### Notice

Only items priced in current Price List 4250 are carried in stock. Price and delivery of non-stock items furnished on request and will depend on quantity ordered.



Port Size Identical Ends Inlet and Outlet	Part No. Inline	Part No. Angle	Stem	Orifice		C <sub>v</sub>		A		B		
				in.	mm	Inline	Angle	in.	mm	in.	mm	
2-CPI (1/8 tube)	2Z-V4LQ-*	2Z-V4AQ-*	soft	.078	1.98	.05	.05	1.13	28.7	1.13	28.7	
1/8 Male NPT	2M-V4LQ-*	2M-V4AQ-*	soft	.125	3.18	.20	.24	.75	19.1	.75	19.1	
1/8 Female NPT	2F-V4LQ-*	2F-V4AQ-*	soft	.176	4.47	.30	.35	.81	20.6	.81	20.6	
4-CPI (1/4 tube)	4Z-V4LQ-*	4Z-V4AQ-*	soft	.176	4.47	.30	.35	1.15	29.2	1.15	29.2	
1/4 Male NPT	4M-V4LQ-*	4M-V4AQ-*	soft	.176	4.47	.30	.35	.94	23.9	.94	23.9	
<b>Combination Ends</b>												
<b>Outlet</b>	<b>Outlet</b>											
1/4 Male	4-CPI	4M4Z-V4LQ-*	4M4Z-V4AQ-*	soft	.176	4.47	.30	.35	.94	23.9	1.15	29.2

\*Materials: SS—316 Stainless; B—Brass

### General Features

#### Purpose

Toggle Operated Forged Body Valves are positive, soft seat shut-off valves designed for quick opening or closing. They are offered in a variety of patterns and end connections making them suitable for many low pressure instrument and control systems.

Since it is the spring load that closes the valve, shut-off force is constant and the stem cannot be over-tightened or galled.

#### Operation

A 90° movement of the handle opens the valve to full flow. The valve handle locks firmly in the open position and will not close by an accidental touch or through vibration. When the handle is lowered to the closed position, a TFE stem tip seats against tapered orifice for a positive leak-tight shut-off under all rated pressure conditions.

Maximum working pressure is 250 psi. Maximum operating temperature is 200°F (93°C).

#### Applications

- Quick on-off operation • Pneumatics • Test benches • Control panels • Instrumentation • Air lines • Gauges • Manometers • Coolant lines • Sampling lines • Vents • Chromatographs

#### Material

- Body (forged) and packing nut are brass or 316 Stainless Steel
- Teflon stem seat • Nylon handle • Viton packing • All remaining parts are 316 Stainless Steel

#### Special features

- Quick opening or closing • Cannot be over-tightened
- Positive, repetitive shut-off • Rugged, compact forged body
- Stainless spring • Straight and angle patterns • Stainless steel stems • Color coded handles • Universal mounting nut standard
- 100% factory tested • Integral CPI end connections • Male and female pipe connections

#### Handle positioner



Positioner prevents handle from rotating and improves panel appearance. Handle positioner is available for use with all toggle valves. See page 25 for ordering instructions.

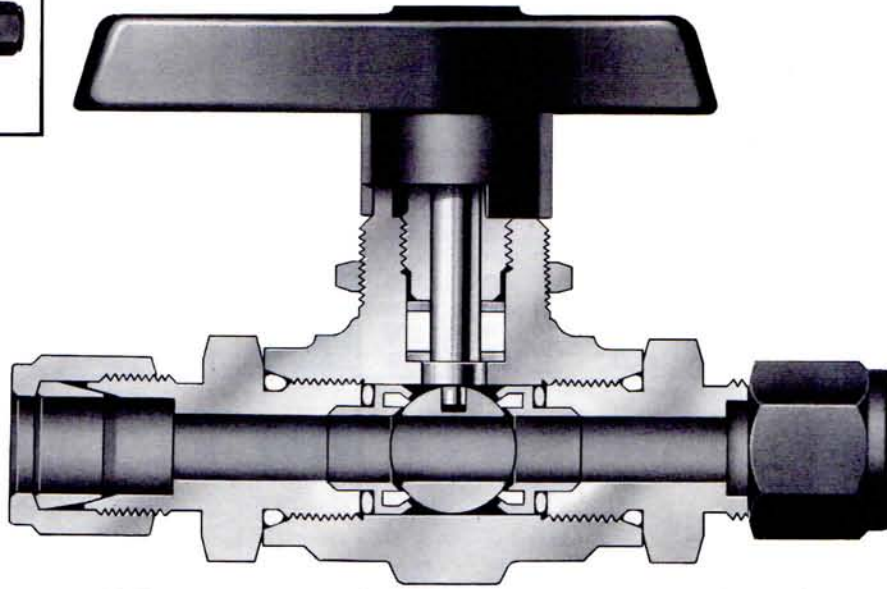
#### Notice

Only items priced in current Supplementary Price List 4250 are carried in stock. Price and delivery of non-stock items furnished on request and will depend on quantity ordered.

Water and Air Flow for C <sub>v</sub> = 0.30					
Pressure Drop Across Valve (ΔP)		Air Flow at 70°F (21°C) Outlet to Atmosphere		Water Flow at 70°F (21°C)	
PSID	MPa	SCFM	Std. cc/sec.	GPM	Liter/Min.
10	0.07	4.14	1 955	0.95	3.60
50	0.34	11.73	5 535	2.12	8.02
100	0.69	20.79	9 810	3.00	11.36



**V6LJ**  
**V6LJ2**



**Inlet Port**  
Z-CPI  
machining  
shown

**Outlet Port**  
Z-CPI  
machining  
shown

### How to order

The correct part number is easily arrived at by following the number dot sequence. The four product characteristics needed are coded as shown below.

### Examples

4M4F — V6LJ — B  
1 2      3      4

6Z — V6LJ2 — SS  
1 2      3      4

Describes a V6LJ Series valve, brass, with one 1/4" male pipe port and one 1/4" female pipe port.

Describes a V6LJ2 Series valve, stainless steel, with 6-CPI (3/8" tube) ports at each end.

Size	Inlet Port <span style="color: red;">❶</span>	Outlet Port <span style="color: red;">❷</span>	Valve Series <span style="color: red;">❸</span>	Material <span style="color: red;">❹</span>
	Machining			
2	Z-CPI (tube)		V6LJ—(no code - all Teflon seals)	SS-316 Stainless
4	M—Male pipe		V6LJ2—(Kel-F ball seals, Viton O-rings)	B—Brass
6	F—Female pipe			

**Note:** Port sizes are in sixteenths of an inch—O.D. for tube and nominal I.D. for pipe. If both ports are same size and machining, only one port is called out.

### Kel-F seats for high pressure

To order valves with Kel-F ball seats add a "2" to the part number after the J—example: 4Z-V6LJ2-SS.

### Handles

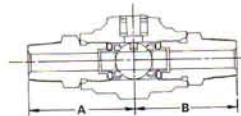
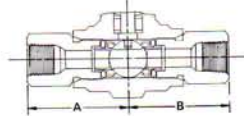
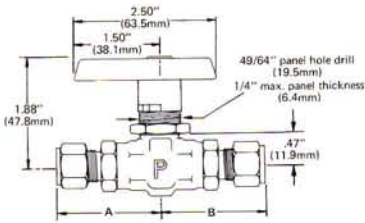
Color-coded handles are available in black (standard), yellow, white, blue, green, red, and a 316-SS all metal handle.

### Panel mounting

Panel nuts are included at no charge as standard. Panel mount hole diameter is 49/64".

### End Adapters

See page 25 for details on replaceable end adapters.



### OPERATING PRESSURES

MATERIAL	TEFLON SEAT	KEL-F SEAT
Stainless Steel	1500 PSI	5000 PSI
Brass	1500 PSI	3000 PSI

Port Size Identical Ends Inlet and Outlet		Part Number	Orifice		C <sub>v</sub>	A		B	
			in.	mm		in.	mm	in.	mm
4-CPI (1/4 tube)		4Z-V6LJ-*	.187	4.75	.80	1.75	44.5	1.75	44.5
6-CPI (3/8 tube)		6Z-V6LJ-*	.250	6.35	1.40	1.82	46.2	1.82	46.2
1/4 Female NPT		4F-V6LJ-*	.250	6.35	1.40	1.50	38.1	1.50	38.1
1/4 Male NPT		4M-V6LJ-*	.250	6.35	1.40	1.61	40.9	1.61	40.9
3/8 Male NPT		6M-V6LJ-*	.250	6.35	1.40	1.61	40.9	1.61	40.9
Combination Ends									
Inlet	Outlet								
1/4 Male NPT	4-CPI (1/4 tube)	4M4Z-V6LJ-*	.187	4.75	.80	1.61	40.9	1.75	44.5
1/4 Male NPT	6-CPI (3/8 tube)	4M6Z-V6LJ-*	.250	6.35	1.40	1.61	40.9	1.82	46.2
1/4 Female NPT	4-CPI (1/4 tube)	4F4Z-V6LJ-*	.187	4.75	.80	1.50	38.1	1.50	38.1
1/4 Female NPT	6-CPI (3/8 tube)	4F6Z-V6LJ-*	.250	6.35	1.40	1.50	38.1	1.82	46.2
1/4 Male NPT	1/4 Female NPT	4M4F-V6LJ-*	.250	6.35	1.40	1.61	40.9	1.50	38.1

\*Materials: SS—316 Stainless; B—Brass

## General features

### Purpose

Parker CPI miniature ball valves are rugged, long-life units that feature fully contained heavier seal seat sections allowing higher pressure rating than other small ball valves of similar design. The unique double stop handle design results in a strong system that will not rotate past the designed 90% rotation—handles are available in six color-coding systems, plus a 316-SS all metal handle.

### Applications

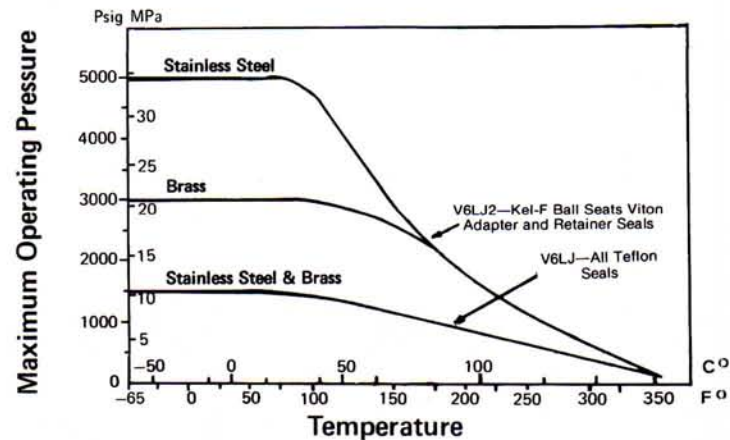
- All types of instruments • Laboratories and shops • Refineries
- Hydraulic and pneumatic piping • Chromatography • Gauge shut-off and vent • Shop air • Control panels • High purity systems
- Moderate vacuum systems • Vacuum equipment
- Chemical research • Pilot plants • Food processing • High pressure systems • Gas analysis • Test stands • Many other areas of instrumentation and research

### Special features

- Forged body with interchangeable port adapters • Maximum operating pressure stainless: 5000 psig; brass: 3000 psig • Temperature range: -65°F to +350°F in TFE seals and 0°F to +300°F in Kel-F seals • Maximum orifice size: .250 dia.
- Flow capacity C<sub>v</sub> = 1.4 • Free-floating ball allowing pressure actuation in closed position • Seat wear compensation • Low operating torque • Color-coded directional handles • Parker CPI and NPT pipe (male and female) end connections • 100% factory tested

Water and Air Flow for C <sub>v</sub> = 1.4					
Pressure Drop Across Valve (ΔP)		Air Flow at 70°F (21°C) Outlet to Atmosphere		Water Flow at 70°F (21°C)	
PSID	MPa	SCFM	Std. cc/sec.	GPM	Liter/Min.
10	0.07	19.3	9 100	4.43	16.77
50	0.34	54.7	25 800	9.90	37.47
100	0.69	97.0	45 775	14.00	53.00

## Pressure-temperature ratings

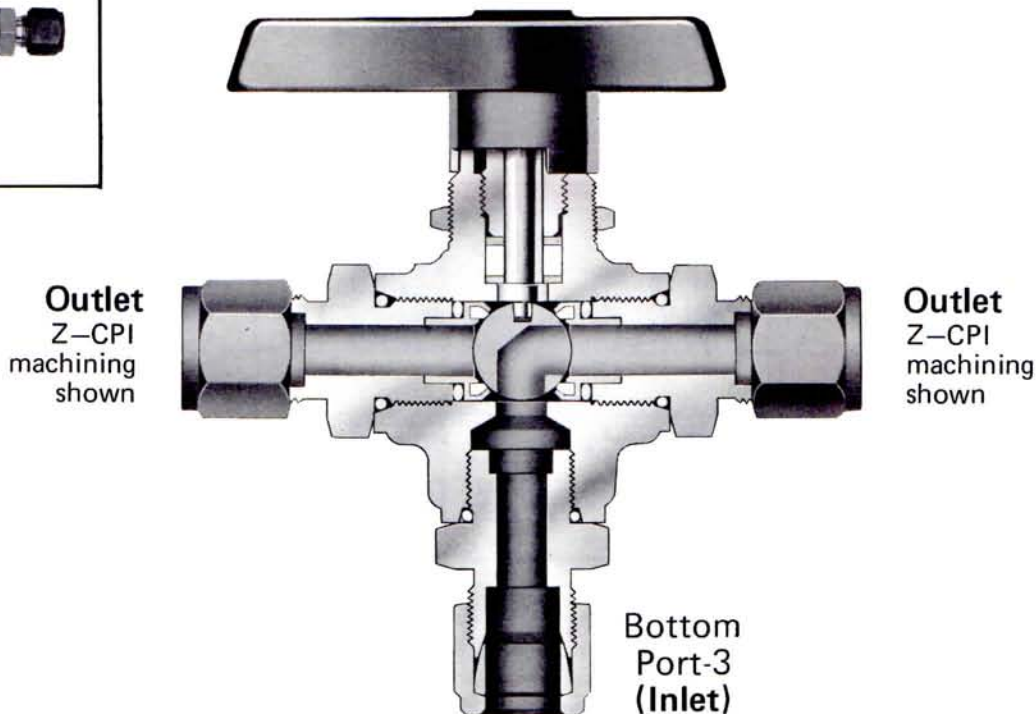


## Materials of Construction

Parts	Brass Valves	Stainless Steel Valves
Body (forged)	Brass	316 SS
Ball, stem, packing washers, seat retainers	316 SS	316 SS
Port adapters, packing nut	Brass	316 SS
Handle	Nylon	Nylon
Handle set screw	18-8 SS	18-8 SS
Ball seats (standard)	Teflon®	Teflon®
Ball seats (optional for high pressure)	Kel-F	Kel-F
Stem packing	Teflon	Teflon
Adapter and retainer seals (standard)	Teflon	Teflon
Adapter and retainer seals (optional for high pressure)	Viton	Viton



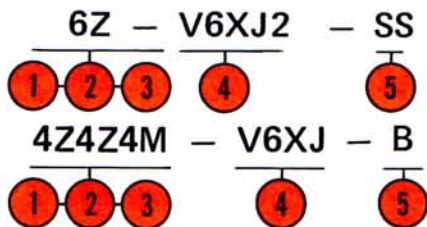
V6XJ  
V6XJ2



### How to order

The correct part number is easily arrived at by following the number dot sequence. The five product characteristics needed are coded as shown below.

### Examples



Describes a V6XJ Series valve, stainless steel, with all ports 6-CPI (3/8" tube) and high pressure Kel-F ball seats and Viton O-rings.

Describes a V6XJ Series valve, brass with inline 4-CPI (1/4" tube) ports, 1/4" male pipe bottom port and all Teflon packing, ball seats and O-rings.

Size	Outlet Port ①	Outlet Port ②	Inlet Port ③	Valve Series ④	Material ⑤
	Machining				
2	Z—CPI (tube)			V6XJ (No Code) All Teflon seals	SS—316 Stainless
4	M—Male pipe			V6XJ2 Kel-F ball seats, Viton O-rings	B—Brass
6	F—Female pipe				

**Note:** Port sizes in sixteenths of an inch—O.D. for tube and nominal I.D. for pipe. If all three ports are identical only one port is called out. If not, call out in sequence.

### Panel mounting

Panel nuts are included at no charge as standard. Panel mount hole diameter is 49/64".

### Kel-F seats for high pressure

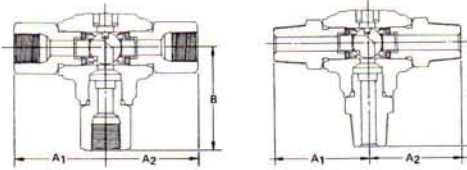
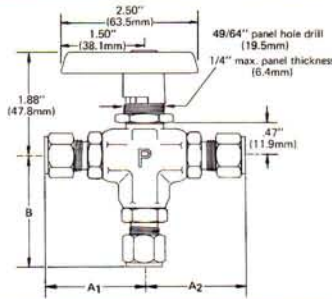
To order valves with Kel-F ball seats add a "2" to the part number after the J—example: 4Z-V6XJ2-SS.

### Handles

Color-coded handles are available in black (standard), yellow, white, blue, green, red, and a 316-SS all metal handle.

### End Adapters

See page 25 for details on replaceable end adapters.



### OPERATING PRESSURES USING BOTTOM INLET

MATERIAL	TEFLON SEAT	KEL-F SEAT
Stainless Steel	1500 PSI	5000 PSI
Brass	1500 PSI	3000 PSI

Port Size			Part Number	Min. Orifice		C <sub>v</sub>	A <sub>1</sub>		A <sub>2</sub>		B	
Identical Ends				in.	mm		in.	mm	in.	mm	in.	mm
4-CPI (1/4" tube)			4Z-V6XJ*	.187	4.75	.60	1.75	44.5	1.75	44.5	1.87	47.5
6-CPI (3/8" tube)			6Z-V6XJ*	.191	4.85	.60	1.82	46.2	1.82	46.2	1.94	49.3
1/4 Female NPT			4F-V6XJ*	.191	4.85	.60	1.50	38.1	1.50	38.1	1.62	41.1
1/4 Male NPT			4M-V6XJ*	.191	4.85	.60	1.61	40.9	1.61	40.9	1.73	43.9
3/8 Male NPT			6M-V6XJ*	.191	4.85	.60	1.61	40.9	1.61	40.9	1.73	43.9
Combination Ends												
Outlet	Outlet	Inlet										
4-CPI (1/4" tube)	4-CPI (1/4" tube)	1/4 Male NPT	4Z4Z4M-V6XJ*	1.87	4.75	.60	1.75	44.5	1.75	44.5	1.73	43.9

\*MATERIALS: SS—316 Stainless, B—Brass

## General features

### Purpose

Parker CPI miniature ball valves are rugged, long-life units that feature fully contained heavier seal seat sections allowing higher pressure rating than other small ball valves of similar design. Handles are available in six color-coding systems, plus a 316-SS all metal handle.

### Applications

- All types of instruments • Laboratories and shops • Refineries
- Hydraulic and pneumatic piping • Chromatography • Gauge shut-off and vent • Shop air • Control panels • High purity systems • Moderate vacuum systems • Vacuum equipment
- Chemical research • Pilot plants • Food processing • High pressure systems • Gas analysis • Test stands • Many other areas of instrumentation and research

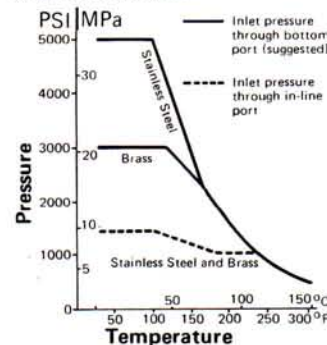
### Special features

- Forged body with interchangeable port adapters • Maximum operating pressure stainless steel: 5000 psig; brass: 3000 psig
- Temperature range: -0°F to +350°F in TFE seals and 0°F to 300°F in Kel-F seals • Maximum orifice size: .191 dia.
- Flow capacity C<sub>v</sub> = .60 • Seat wear compensation • Low operating torque • Color-coded directional handles • Parker CPI and NPT pipe male and female end connections • 100% factory tested

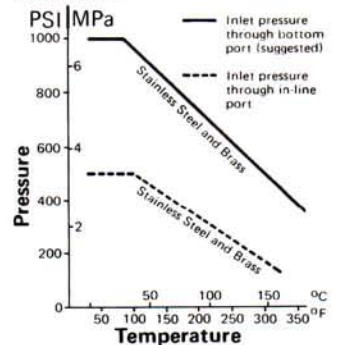
Water and Air Flow for C <sub>v</sub> = 0.60					
Pressure Drop Across Valve (ΔP)		Air Flow at 70°F (21°C) Outlet to Atmosphere		Water Flow at 70°F (21°C)	
PSID	MPa	SCFM	Std. cc/sec.	GPM	Liter/Min.
10	0.07	8.28	3 900	1.90	7.19
50	0.34	23.46	11 070	4.24	16.05
100	0.69	41.58	19 620	6.00	22.71

## Technical data

### Pressure-Temperature Ratings with high pressure (Viton & Kel-F) seals



### Pressure-Temperature Ratings with low pressure (Teflon) seals



## Materials of Construction

Parts	Brass Valves	Stainless Steel Valves
Body (forged)	Brass	316 SS
Ball, stem, packing washers, seat retainers	316 SS	316 SS
Port adapters, packing nut	Brass	316 SS
Handle	Nylon	Nylon
Handle set screw	18-8 SS	18-8 SS
Ball seats (standard)	Teflon®	Teflon®
Ball seats (optional for high pressure)	Kel-F	Kel-F
Stem packing	Teflon	Teflon
Adapter and retainer seals (standard)	Teflon	Teflon
Adapter and retainer seals (optional for high pressure)	Viton	Viton

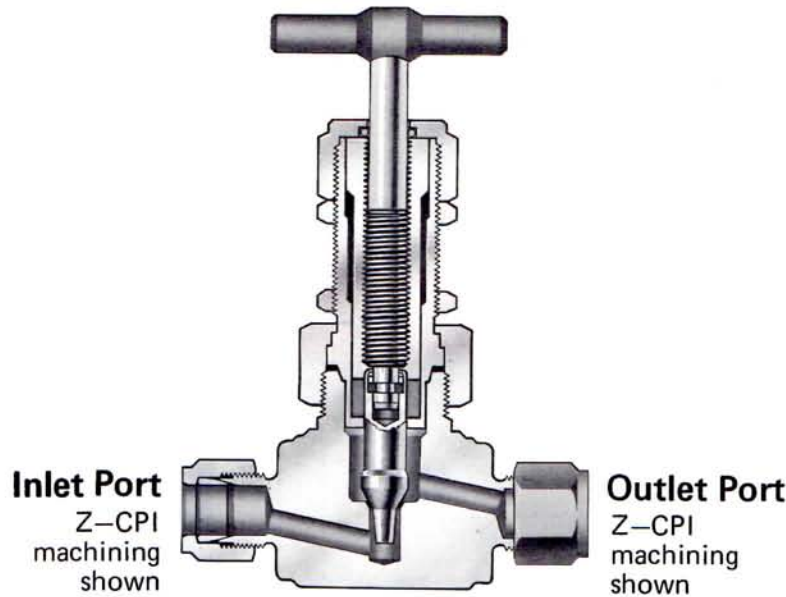
®DuPont registered trademark



**U12LR**



**U12LR with  
Automatic  
Buttweld ports**



### How to order

The correct part number is easily arrived at by following the number dot sequence. The four product characteristics needed are coded as shown below.

**Examples**    8Z - U12LR - G - SS  
1    2    3    4

Size	Ports Identical Machining <span style="color: red; border: 1px solid red; border-radius: 50%; padding: 2px;">1</span>	Valve Series <span style="color: red; border: 1px solid red; border-radius: 50%; padding: 2px;">2</span>	Packing and Lower Stem <span style="color: red; border: 1px solid red; border-radius: 50%; padding: 2px;">3</span>	Material <span style="color: red; border: 1px solid red; border-radius: 50%; padding: 2px;">4</span>
4	Z-CPI (tube)	U12LR	G-Grafoil and 17-4 PH T-Teflon and 316 SS	SS-316 Stainless Steel
6	F-Female NPT			
8	W-Weldlok Y-Automatic Buttweld			

**Note:** Port sizes in sixteenths of an inch—O.D. for tube and nominal I.D. for pipe. If all three ports are identical only one port is called out. If not, call out in sequence.

### General

The Parker CPI Union Bonnet Valves are designed to provide reliability, positive shut-off and long life in a severe service type application.

### Applications

Systems where higher pressure, higher temperature, and corrosive fluids cause galling of seats, thread lubrication, or purity problems.

### Panel Mount

Panel mounting nuts may be ordered separately.

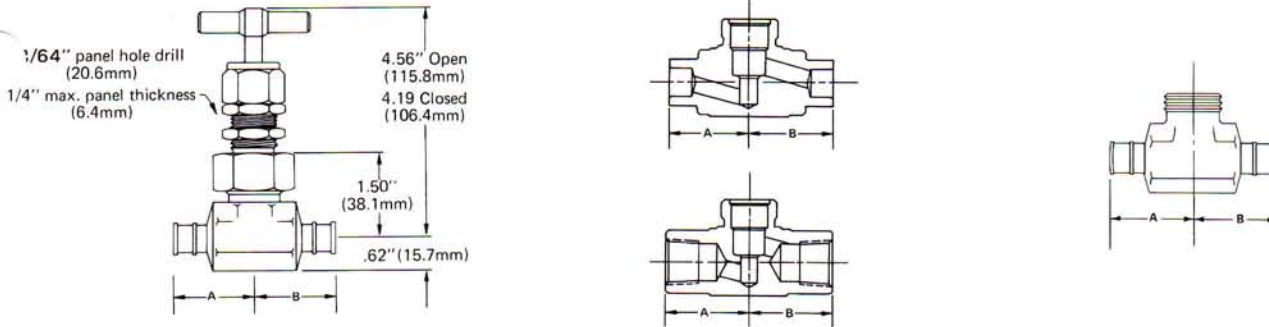
### Features

The Parker CPI Union Bonnet Valve is designed with stem swivel and power threads above the packing which allows full lubrication and protection from the system media. The addition of a lube seal above the threads eliminates external

contamination and retains the lubrication. The swivel action of the stem assures long packing and seat life. Grafoil packings and 17-4 PH lower stems are standard for severe service applications. Teflon packing with reinforced back-up rings and 316 SS lower stems available for corrosive and high purity systems.

The Union Bonnet design assures maximum safety over screwed bonnet types without the high cost of bellows sealed valves. The stem is designed with back seating to eliminate the chance of stem removal under pressure and to provide a secondary metal-to-metal packing seal.

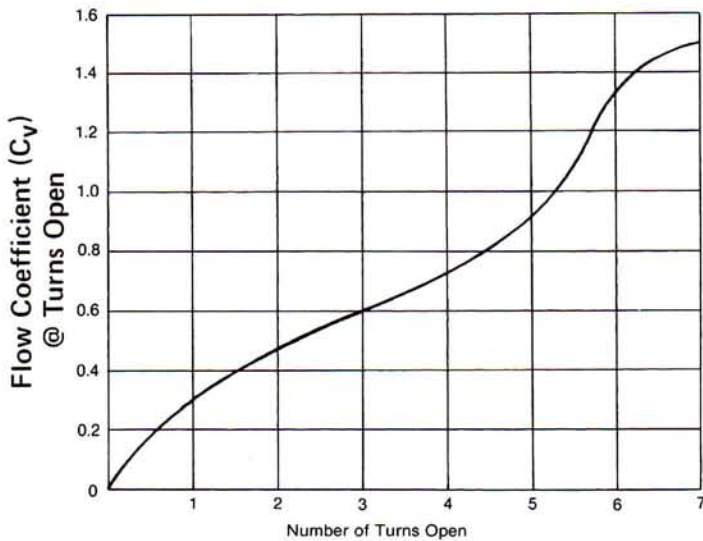
Parker CPI tube fitting and NPT ports are standard with Weldlok and Automatic Buttweld fitting ends available as specials. Automatic Buttweld fitting system allows the system tubing to be welded directly to the valve body without disassembly of the valve or the use of tube extensions.



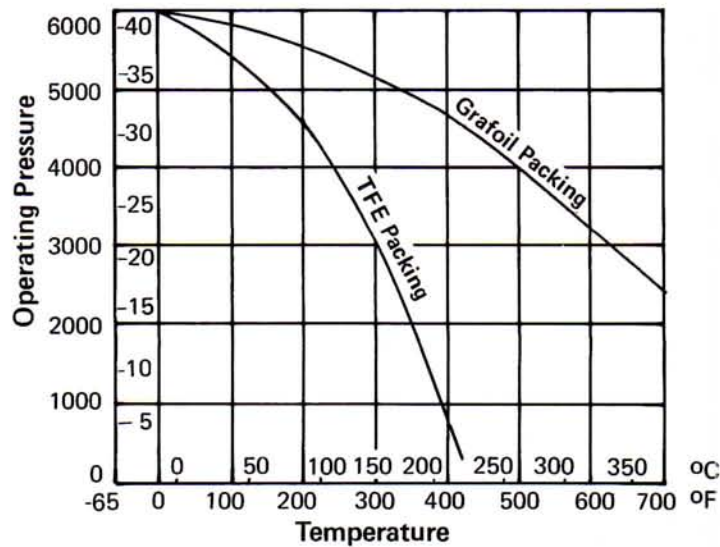
Port Size Combination Inlet and Outlet	Part No.	Orifice		C <sub>v</sub>	A		B	
		in.	mm.		in.	mm.	in.	mm.
6 CPI-3/8 Tube	6Z-U12L-G-SS	.187	4.75	0.7	1.65	41.9	1.65	41.9
3/8 Female NPT	6F-U12L-G-SS	.312	7.93	1.5	1.30	33.0	1.30	33.0
3/8 Weldlok	6W-U12L-G-SS	.228	5.79	0.8	1.31	33.3	1.31	33.3
8 CPI-1/2 Tube	8Z-U12L-G-SS	.312	7.93	1.5	2.05	52.1	2.05	52.1
1/2 Female NPT	8F-U12L-G-SS	.312	7.93	1.5	1.50	38.1	1.50	38.1
1/2 Weldlok	8W-U12L-G-SS	.312	7.93	1.5	1.50	38.1	1.50	38.1
3/8 Butt weld	6Y-U12L-G-SS	.156	3.96	0.3	1.50	38.1	1.50	38.1
1/2 Butt weld	8Y-U12L-G-SS	.218	5.54	0.6	1.45	36.8	1.45	36.8

Maximum Flow for C <sub>v</sub> = 1.5		
Pressure Drop at Atmosphere (ΔP psi)	Air SCFM @ 70°	Water GPM @ 70°
10	22	4.7
50	72	10.5
100	128	15.0

Union bonnet flow curve



Pressure-temperature ratings



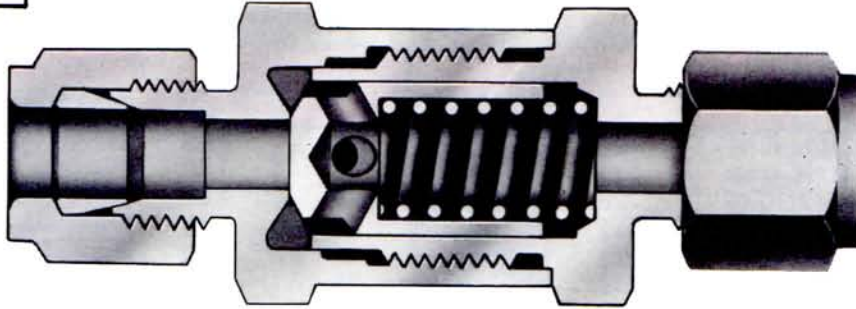
Materials of Construction

- Body (forged), Bonnet, Bonnet Nut and Packing Nut 316-SS
- Stem Guide—Hardened 416-SS • Stem 17—4 PH (with 316-SS lower stem available) • Packings Grafoil (with Teflon available)





Inline check



## How to order

The correct part number is easily arrived at by following the numbered sequence. The four product characteristics needed are coded as shown below.

## Examples

**4M** — **C4L** — **5** — **SS**

①      ②      ③      ④

Describes a check with both ports 1/4" male pipe, size 4 inline configuration with stainless steel construction.

Size	① Port Identical Mating	② Valve Series	③ Crack Pressure	④ Material
2	Z—CPI (tubing)	C2L	1/3, psi	B—Brass
4	M—Male Pipe	C4L	1, psi	SS—316 Stainless Steel
6	F—Female Pipe	C6L	5, psi	
8		C8L	10, psi	

**Note:** Port sizes are in sixteenths of an inch—O.D. for tube and nominal I.D. for pipe. If both ports are same size and machining, only inlet port is called out.

## General features

### Purpose

Parker CPI Check Valves are available with integral Parker CPI tube fitting, female and male NPT pipe fittings for direct connection into system lines. Poppet and soft O-Ring seat design assures leak-tight sealing and maximum flow capacity.

### Applications

Check Valves can be used in all material compatible gas or liquid services where unidirectional flow is required.

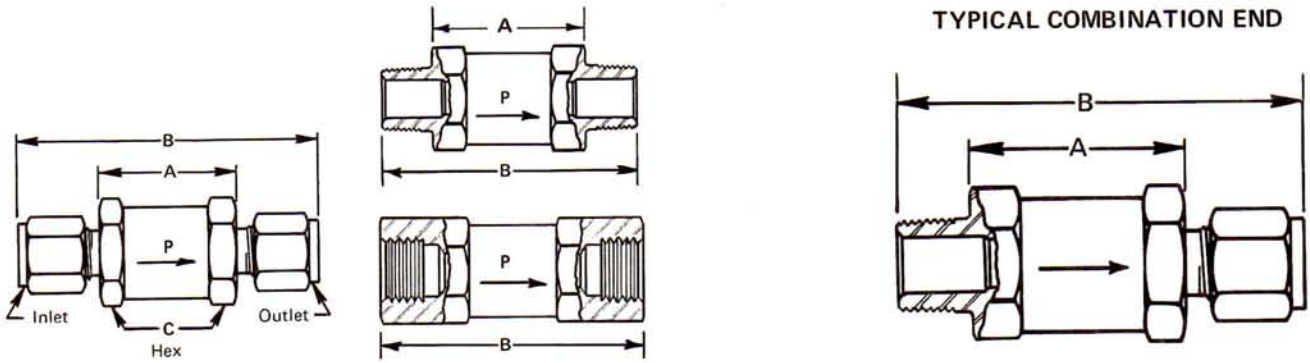
### Materials

• Brass or 316 Stainless Steel body • Viton seat standard with Buna-N or other elastomers available • Poppet and springs 316 Stainless Steel.

### Special features

• Soft, resilient O-Ring seat assures leak-tight seal, and no blow-out under high flow conditions • O-Ring easily replaced • Smooth flow path minimizes pressure drop • Back stopped poppet prevents overstressing spring • Chatter-free operation • Variety of CPI male and female pipe connections and combinations minimizes the need for additional fittings and reduces installation time. • Operating pressure to 5000 psi for 316 SS, and to 3000 psi for brass.

Only items priced in current Price List 4250 are carried in stock. Price and delivery of non-stock items furnished on request and will depend on quantity ordered.



Port Size Identical Ends Inlet and Outlet	Part No.	Orifice		C <sub>v</sub>	A		B		C Hex	
		in.	mm		in.	mm	in.	mm	in.	mm
2-CPI (1/8 tube)	2Z-C2L-*	.094	2.39	.16	.91	23.1	2.13	54.1	.62	15.7
1/8 Male	2M-C4L-*	.187	4.75	.53	.95	24.1	1.82	46.2	.75	19.1
1/8 Female	2F-C4L-*	.187	4.75	.53			1.92	48.8	.75	19.1
4-CPI (1/4 tube)	4Z-C4L-*	.187	4.75	.53	1.44	36.6	2.53	64.3	.75	19.1
1/4 Male	4M-C4L-*	.187	4.75	.53	1.04	26.4	2.17	55.1	.75	19.1
1/4 Female	4F-C4L-*	.187	4.75	.53			2.25	57.2	.75	19.1
6-CPI (3/8 tube)	6Z-C4L-*	.187	4.75	.53	1.05	26.7	2.89	73.4	.75	19.1
6-CPI (3/8 tube)	6Z-C6L-*	.281	7.14	1.36	1.42	36.1	3.03	77.0	1.00	25.4
3/8 Male	6M-C6L-*	.359	9.12	1.36	1.41	35.8	2.53	64.3	1.00	25.4
3/8 Female	6F-C6L-*	.359	9.12	1.36			2.71	68.8	1.00	25.4
8-CPI (1/2 tube)	8Z-C6L-*	.359	9.12	1.36	1.39	35.3	3.22	81.8	1.00	25.4
1/2 Male	8M-C8L-*	.375	9.53	2.0	1.66	42.2	3.18	80.8	1.09	27.8
1/2 Female	8F-C8L-*	.375	9.53	2.0			3.36	85.3	1.09	27.8
8-CPI (1/2 tube)	8Z-C8L-*	.375	9.53	2.0	1.64	41.7	3.47	88.1	1.09	27.8

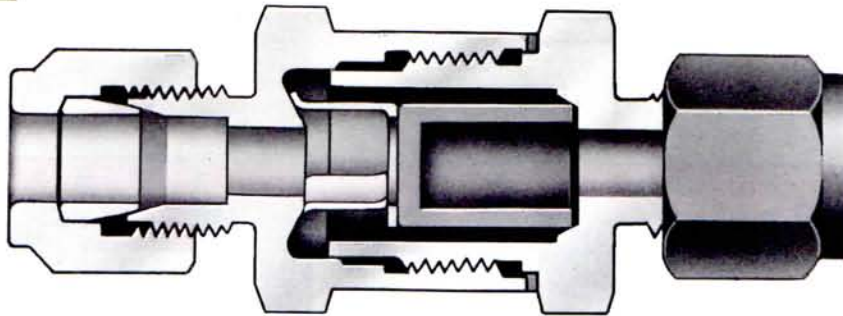
Combination Ends		Part No.	C <sub>v</sub>	A		B		C Hex	
Inlet	Outlet			in.	mm	in.	mm	in.	mm
1/4 Male	4-CPI	4M4Z-C4L-*	.50	1.03	26.2	1.99	50.5	.75	19.1
1/4 Male	6-CPI	4M6Z-C4L-*	.50	1.09	27.7	2.05	52.1	.75	19.1
1/4 Male	1/4 Female	4M4F-C4L-*	.50	.82	20.8	2.23	56.6	.75	19.1
3/8 Male	6-CPI	6M6Z-C6L-*	1.50	1.75	44.5	2.77	70.4	1.0	25.4
3/8 Male	8-CPI	6M8Z-C6L-*	1.80	1.80	45.72	2.83	71.9	1.0	25.4

Air Flow for Check Valves (1 psig Spring)—Outlet to Atmosphere									
Inlet Pressure		C <sub>v</sub> = 0.16		C <sub>v</sub> = 0.50		C <sub>v</sub> = 1.80		C <sub>v</sub> = 2.00	
Psig	MPa	SCFM	Std. cc/sec.	SCFM	Std. cc/sec.	SCFM	Std. cc/sec.	SCFM	Std. cc/sec.
10	0.07	2.21	1 040	6.90	3 255	24.84	11 720	27.6	13 020
50	0.34	6.26	2 955	19.55	9 225	70.38	33 200	78.2	36 900
100	0.69	11.09	5 235	34.65	16 350	124.74	58 860	138.6	65 400

Water Flow for Check Valves (1 psig Spring)									
Pressure Drop Across Valve (ΔP)		C <sub>v</sub> = 0.16		C <sub>v</sub> = 0.50		C <sub>v</sub> = 1.80		C <sub>v</sub> = 2.00	
Psig	MPa	GPM	Liter/min.	GPM	Liter/min.	GPM	Liter/min.	GPM	Liter/min.
10	0.07	0.51	1.93	1.58	5.98	5.69	21.54	6.32	23.92
50	0.34	1.13	4.28	3.54	13.40	12.73	48.18	14.14	53.52
100	0.69	1.60	6.06	5.00	18.93	18.00	68.13	20.00	75.70



Inline filter



## How to order

The correct part number is easily arrived at by following the numbered sequence. The four product characteristics needed are coded as shown below.

## Examples

**4M** — **F4L** — **5** — **SS**

①      ②      ③      ④

Describes a filter with both ports 1/4" male pipe size 4 inline configuration with 5 micron element and stainless steel construction.

Size	Port Identical Mating ①	Valve Series ②	Nominal Micron Rating ③	Material ④
2	Z—CPI (tubing)	F4L	1 micron	B—Brass
4	M—Male Pipe	F6L	5 micron	SS—316 Stainless Steel
6	F—Female Pipe		10 micron	
8			50 micron	
			100 micron	

**Note:** Port sizes are in sixteenths of an inch—O.D. for tube and nominal I.D. for pipe. If both ports are same size and machining, only inlet port is called out.

## Purpose

The Parker Inline Filter is designed to remove contaminants from process fluids to protect metering valves and analytical equipment

Parker Inline Filters are all metal filters designed for use with compatible fluids, gases and high temperatures. They can be used where there is limited space available and minimum element change required.

## Applications

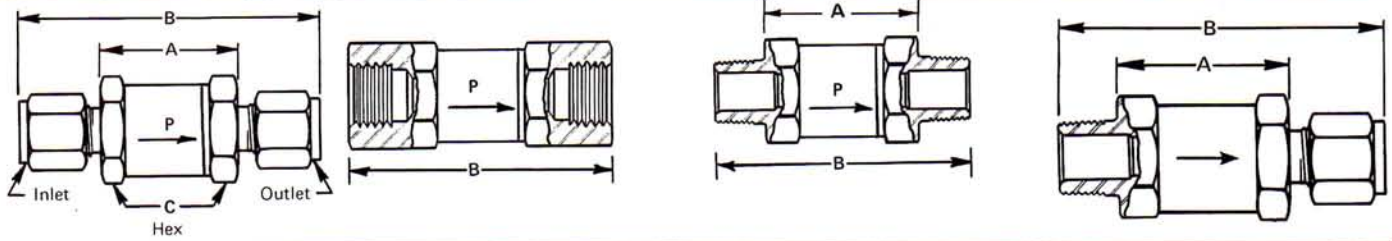
Parker Inline Filters are used to protect fine metering equipment and systems required to be free of dirt and contamination when installed in inlet side.

## Design features

- The Parker Inline Filters are compact with large filter element area
- All metal construction with special element retainer that positively forces element into tapered bore to eliminate possibility of filter bypass
- Choice of element micron ratings for removal of various particle size
- 316 Stainless Steel body material with annealed 316 Stainless Steel gasket assures compatibility with process fluids, high temperatures and high pressures
- Annealed copper gasket with brass filters minimizes galvanic corrosion potential
- Replaceable filter elements.

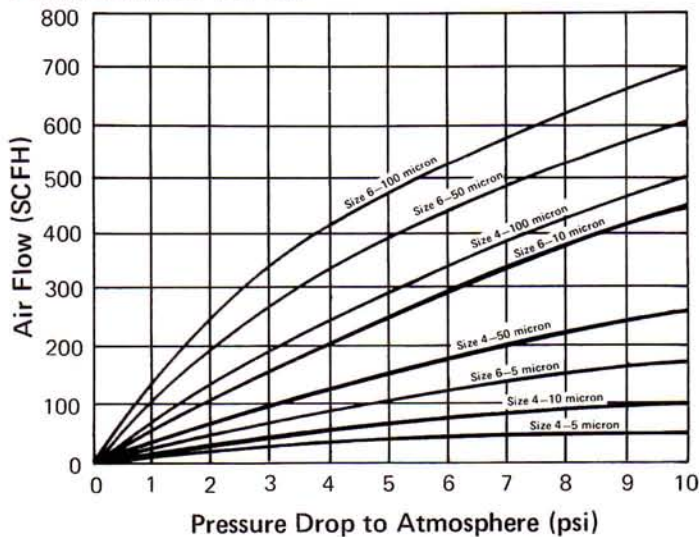
## Materials

- Brass or 316 Stainless Steel body
- Copper gasket (brass body) and 316 Stainless Steel gasket (stainless steel body)
- 316 Stainless Steel filter element and filter retainer

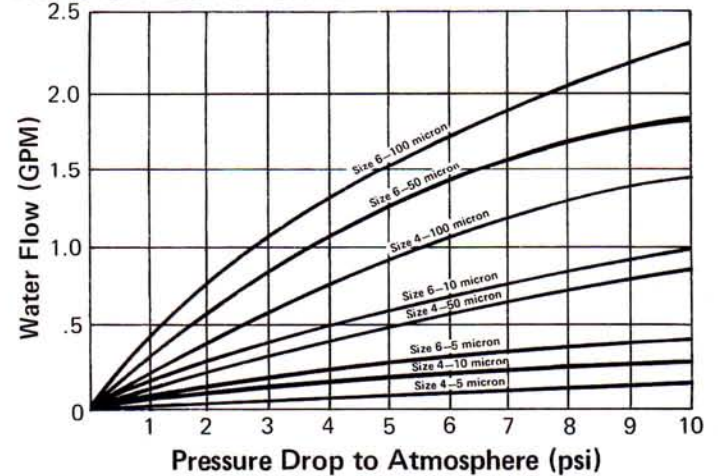


Port Size Identical Ends Inlet and Outlet		Part No.	A		B		C Hex	
			in.	mm	in.	mm	in.	mm
1/8 Male		2M-F4L-*	.98	24.9	1.85	47.0	.75	19.1
1/8 Female		2F-F4L-*			1.95	49.5	.75	19.1
4-CPI (1/4 tube)		4Z-F4L-*	1.47	37.4	2.56	65.0	.75	19.1
1/4 Male		4M-F4L-*	1.07	27.2	2.20	55.9	.75	19.1
1/4 Female		4F-F4L-*			2.28	57.9	.75	19.1
6-CPI (3/8 tube)		6Z-F4L-*	1.08	27.4	2.92	74.2	.75	19.1
6-CPI (3/8 tube)		6Z-F6L-*	1.45	36.8	3.06	77.7	1.00	25.4
3/8 Male		6M-F6L-*	1.44	36.6	2.56	65.0	1.00	25.4
3/8 Female		6F-F6L-*			2.74	69.6	1.00	25.4
8-CPI (1/2 tube)		8Z-F6L-*	1.42	36.1	3.25	82.6	1.00	25.4
Combination Ends								
Inlet	Outlet							
1/4 Male	4-CPI	4M4Z-F4L-*	1.06	26.9	2.02	51.3	.75	19.1
1/4 Male	6-CPI	4M6Z-F4L-*	1.12	28.4	2.08	52.8	.75	19.1
1/4 Male	1/4 Female	4M4F-F4L-*	.85	21.6	2.26	57.4	.75	19.1

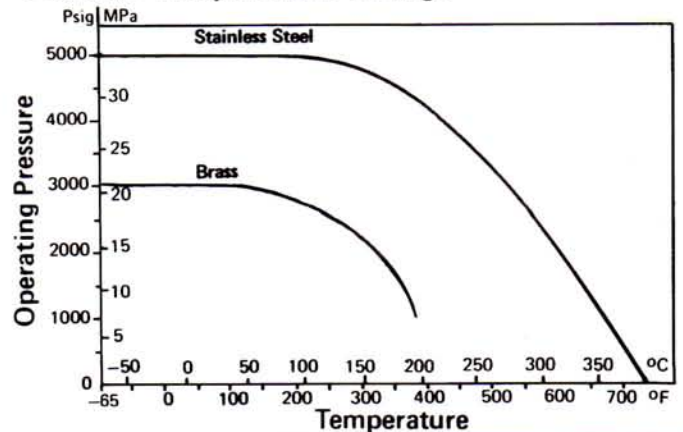
Flow curves for air



Flow curves for water



Pressure-temperature ratings



### Features

The Parker CPI tube fitting has been specifically designed for use on Instrumentation Process and Control systems and equipment employed in Chemical, Petroleum, Power Generating and Pulp and Paper plants. The CPI tube fitting has also found extensive application in other fields where a very high quality tube fitting is required. Parker CPI tube fitting ends, machined on Parker CPI Valves, allow interchangeability with valves using the common two ferrule design.

### Tubing

Parker CPI tube fittings can be used with a wide variety of tubing materials, including copper, stainless steel, steel, aluminum, glass, plastic and Monel. Teflon and nylon ferrules are available for use on glass and plastic tubing. Tubing should be selected to be compatible with the process media, temperature and pressures.

### Torque

All Parker CPI tube fittings feature a prelubricated nut to reduce assembly torque by as much as 50%. Stainless steel CPI fittings offer the unique Parker "Black-Nut" using a bonded, inert dry-film lubricant approved per MIL-L-8937. On brass CPI fittings a clear, dry paraffin base lubricant is precisely applied to each nut. Steel CPI fittings employ a special close grained corrosion protective finish applied to bodies, nuts and ferrules to provide smooth, low torque assembly. Corrosion resistance meets or exceeds MIL-P-16232D.

As a true advantage, prelubrication of Parker CPI fittings eliminates the need for any additional thread lubricants or anti-galling compounds thereby minimizing the possibility of contaminating the fluid system.

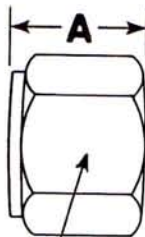
### No distortion

In make-up, there is no undue force in an outward direction to distort the valve body or ferrule to cause interference between the ferrule and nut. This assures that the nut will back-off freely for disassembly and permits a greater number of easy remakes.

### No twisting

Since no rotational force is imparted to the tubing during assembly there is no tendency for the tube to turn or loosen completed joints in the same line. The tube is not prestressed by twisting; thus, better fatigue resistance is assured.

### Tube nut BZ



W HEX

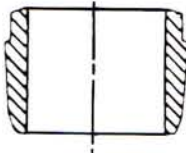
Part No.	Inches Tube O.D.	A		W Hex	
		in	mm	in	mm
2 BZ	1/8	.47	11.9	7/16	11.1
4 BZ	1/4	.50	12.7	9/16	14.3
6 BZ	3/8	.56	14.2	11/16	17.5
8 BZ	1/2	.69	17.5	7/8	22.2

\*SS-316 Stainless Steel; B-Brass; S-Steel

### CPI Ferrules TZ



for sizes  
2-6



for size  
8

Part No.	Inches Tube O.D.
2 TZ*	1/8
4 TZ*	1/4
6 TZ*	3/8
8 TZ*	1/2

\*SS-316 Stainless Steel; B-Brass; S-Steel

### Panel mount nut

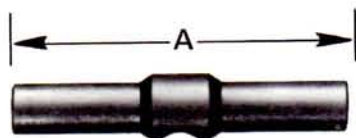


W Hex

Panel nuts are shipped unassembled. Panel nut will be included at no charge with all ball, toggle and PBT valves. Panel nuts for needle valves must be purchased separately.

Size	Valve Use	W Hex		T	
		in.	mm	in.	mm
# 4 Panel Nut	V4 & toggle	11/16	17.5	1/8	3.2
# 6 Panel Nut	V6	13/16	20.6	1/8	3.2
# 8 Panel Nut	V8/V12 & ball valve	15/16	23.8	5/32	4.0
# 6P Panel Nut	PBT valve	7/8	22.2	5/32	4.0

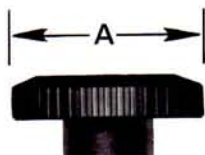
Bar handle



Black anodized aluminum bar handles are standard for both series of V8 and V12 needle valves with "R" or "N" stem. An optional bar handle is also available for all V4, V6, and PBT valves.

Handle	Part No.	A	
		in.	mm
Bar handle—Size 4, 6, and PBT	BH-4/6	2.00	50.8
Bar handle—Size 8 and 12	BH-8/12	2.75	70.0

Plastic handle



Standard handles for needle valves, size 4 and 6, for all stems and size 8 and 12 "K" stem, are black molded nylon. Color-coded handles are available in yellow, white, blue, green and red.

Handle	Part No.	A	
		in.	mm
Size 4	PH-4	1.38	34.9
Size 6 and Size 8 "K" Stem	PH-6/8	1.81	46.0

Toggle valve handle positioner



Valve positioners prevent toggle handles from rotating and improve overall panel appearance. Handle positioners are available for use with all toggle valves.

Part No.	Hex Size
HP-Q4	5/8" (15.9mm)

Ball valve end adapters



Separate end adapters include proper o-ring. Nut and ferrule are assembled on CPI ends. The suffix "2" denotes Viton in place of Teflon o-ring.

Port Size	Adapter Part Number	
	Teflon	Viton
1/4 Male NPT	A4M*	A4M2*
3/8 Male NPT	A6M*	A6M2*
1/4 Female NPT	A4F*	A4F2*
4Z (1/4 tube)	A4Z*	A4Z2*
6Z (3/8 tube)	A6Z*	A6Z2*

Note:

\*Materials: SS—316 Stainless; B—Brass

The same end adapters are usable with both two and three-way ball valves.

## How to determine liquid flow rates

Known factors:

- A.  $C_v$  factor of valve from this catalog
- B. Pressure drop (psig) across valve
- C. Medium

1. On Graph 1 draw a horizontal line from the known  $C_v$  factor to intercept the known pressure drop. At this point draw a vertical line down to the horizontal scale.
2. Read the flow in gpm.
3. If medium is other than water, multiply the gpm by the correction factor in Table 1 (back cover). Contact Parker Hannifin for factors not listed.

Example:

- A.  $C_v$  for 6Z-V6LR-SS valve = 0.80
  - B. Pressure Drop = 500 psid
  - C. Ethyl Alcohol (correction factor 1.125)
1. Read across 0.8  $C_v$  to 500 psi Pressure Drop.
  2. Read down to 18 gpm.
  3.  $18 \times 1.125 = 20.2$  gpm.

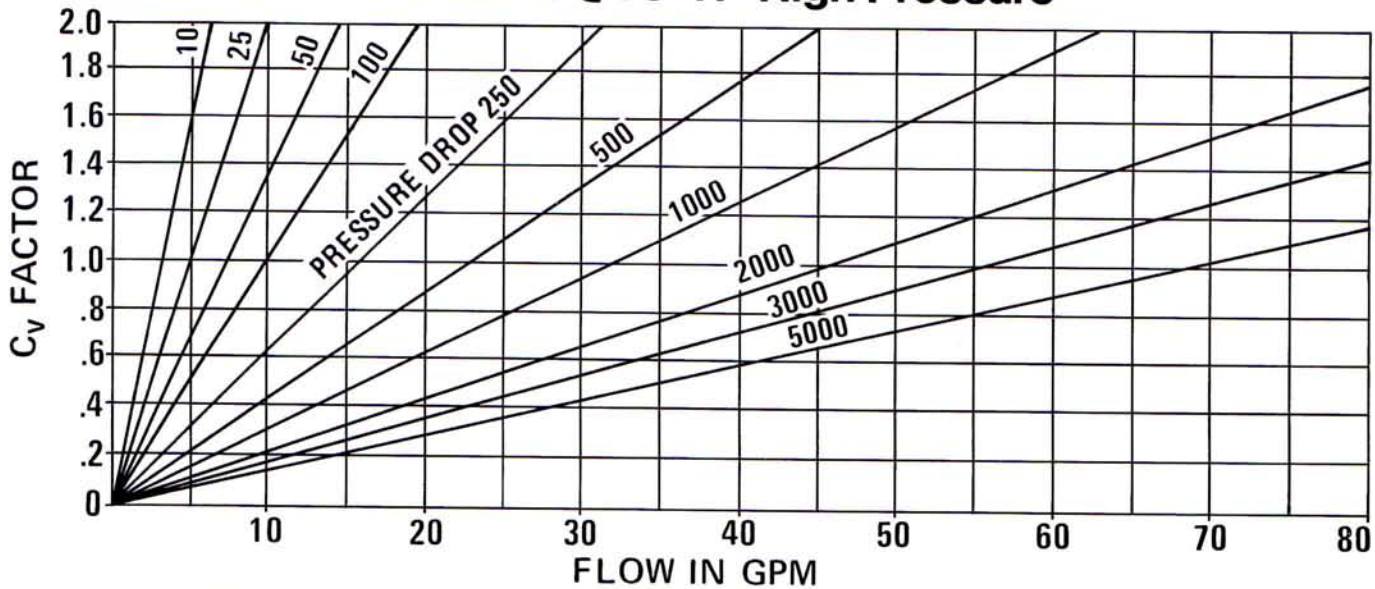
### Equation for liquid flow

$$\text{gpm} = C_v \times C_F \times \sqrt{\Delta P}$$

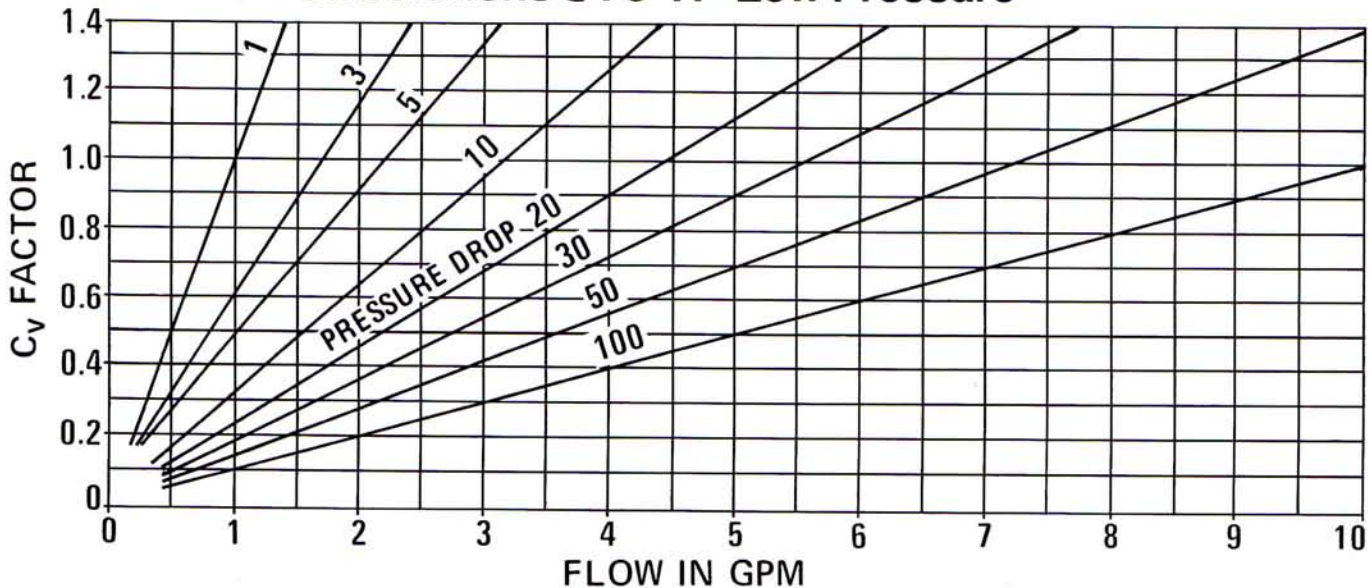
where:

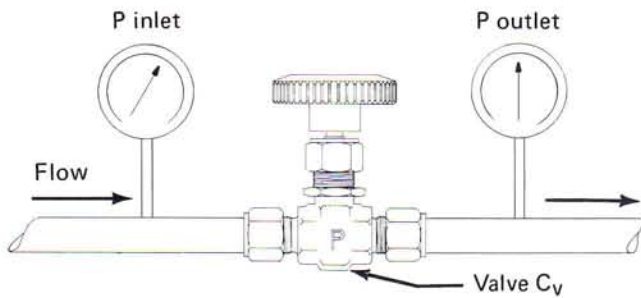
- gpm = Flow in Gallons Per Minute
- $C_v$  = Flow Coefficient
- $C_F$  = Correction Factor—see Table 1 (back cover)
- $\Delta P$  = Pressure Drop in psid (P inlet-P outlet)

## Water Flow Calculations @ 70°F. - High Pressure



## Water Flow Calculations @ 70°F. - Low Pressure





## How to determine gas flow rates

Known factors:

- A.  $C_v$  Factor of valve from this catalog
- B. Inlet Pressure in psig
- C. Pressure Drop across valve in psig (P inlet–P outlet)
- D. Gas Correction Factor (Air = 1.0)

1. Locate known Inlet Pressure in appropriate table.
2. Read across to locate the Air Flow Rate in SCFM (for a valve with  $C_v$  Factor = 1.0) in the appropriate Pressure Drop column.
3. Multiply this value by the actual  $C_v$  Factor of the valve from this catalog.
4. If gas is other than air, multiply this value by the Correction Factor  $C_F$  in Table 2 (back cover).

Example

- A.  $C_v$  for 4Z – V4LR - SS = 0.40
- B. Inlet Pressure = 80 psig
- C. Desired Pressure Drop Across Valve = 20 psig max. (outlet pressure = 80–20 = 60 psig)
- D. Gas is argon

1. Locate 80 psig in Inlet Pressure column.
2. Read across to the 20 psig Pressure Drop column to find Flow Rate 40.6 SCFM.
3.  $40.6 \times 0.40 = 16.24$  SCFM (if gas was air)
4.  $16.24 \times 0.852 = 13.84$  SCFM of argon

The following tables show calculated Air Flow in Standard Cubic Feet Per Minute through a valve with a Flow Coefficient  $C_v = 1.0$ . These figures are based upon a commonly used equation:

$$Q = 16.05 \times C_v \times C_F \times \sqrt{\frac{(P_1 - P_2)(P_1 + P_2)}{(T_1 + 460)}}$$

where:

- Q = Standard Cubic Feet Per Minute
- $C_v$  = Flow Coefficient
- $C_F$  = Correction Factor—see Table 2 (back cover)
- $P_1$  = Inlet Pressure—psia
- $P_2$  = Outlet Pressure—psia (with  $P_2 \geq 0.5$  Psi)
- $T_1$  = Temperature—°F

**Note:** These charts should be used for estimating purposes only as Actual Gas Flow Rates can vary due to other factors not considered in this equation.

Air Flow Tables for  $C_v = 1.0$

Inlet Press. psig	Flow in SCFM									
	Pressure Drop in psig									
	1	2	3	4	5	6	7	8	9	10
1	3.84	5.35	6.44	7.30	8.01	8.61	9.11	9.48	9.48	9.48
2	3.97	5.52	6.66	7.56	8.31	8.94	9.48	9.94	10.08	10.08
3	4.09	5.70	6.87	7.81	8.60	9.26	9.83	10.32	10.69	10.69
4	4.21	5.87	7.08	8.06	8.87	9.57	10.17	10.69	11.15	11.29
5	4.32	6.03	7.29	8.30	9.14	9.87	10.50	11.05	11.53	11.89
6	4.43	6.19	7.48	8.53	9.41	10.16	10.82	11.40	11.91	12.35
7	4.54	6.34	7.68	8.75	9.66	10.44	11.13	11.73	12.27	12.74
8	4.65	6.50	7.86	8.97	9.91	10.72	11.43	12.06	12.62	13.12
9	4.75	6.64	8.05	9.19	10.15	10.99	11.72	12.38	12.96	13.48
10	4.85	6.79	8.23	9.39	10.39	11.25	12.01	12.69	13.29	13.84

Note: Shaded area denotes outlet pressure is below atmospheric.

Inlet Press. psig	Flow in SCFM									
	Pressure Drop in psig									
	1	2	5	10	15	20	30	40	50	100
10	4.9	6.8	10.4	13.8						
20	5.8	8.1	12.5	17.0	19.9	21.0				
30	6.6	9.2	14.3	19.6	23.3	26.0	27.0			
40	7.3	10.2	15.9	22.0	26.2	29.5	33.0	33.0		
50	7.9	11.1	17.4	24.1	28.9	32.6	38.1	39.1	39.1	
60	8.5	12.0	18.7	26.0	31.3	35.5	41.7	45.1	45.1	
70	9.0	12.8	20.0	27.8	33.6	38.1	45.1	50.2	51.1	
80	9.6	13.5	21.2	29.5	35.7	40.6	48.2	53.9	57.2	
90	10.1	14.2	22.3	31.1	37.6	42.9	51.1	57.4	62.2	
100	10.5	14.9	23.4	32.7	39.5	45.1	53.9	60.7	66.0	69.3

Inlet Press. psig	Flow in SCFM									
	Pressure Drop in psig									
	1	2	5	10	20	50	100	200	500	
100	11	15	23	33	45	66	69			
200	14	20	32	45	63	96	127	130		
300	17	25	39	55	77	119	160	190		
400	20	28	45	63	89	138	188	247		
500	22	32	50	70	99	154	213	284	311	
600	24	35	55	77	108	169	234	316	371	
700	26	37	59	83	117	183	254	346	432	
800	28	40	63	89	125	196	273	373	492	
900	30	42	67	94	133	208	290	398	552	
1000	31	44	70	99	140	219	306	422	610	

1 SCFM = 471.9 std. cc/sec.

1 SCFM = 60 std. cubic feet per hour

1 SCFM = 0.472 std. decimeter cubed/sec.



## Pressure Conversion Chart

Multiply GIVEN UNITS

by factor to obtain DESIRED UNITS →

GIVEN UNITS	Psi (lb./in <sup>2</sup> )	MPa (Mega Pascal)	bar (10 <sup>5</sup> Pascal)	in. Hg (at 0°C)	Torr (mm Hg at 0°C)	ft. H <sub>2</sub> O (at 4°C)	in. H <sub>2</sub> O (at 4°C)	dtm (A <sub>N</sub> )
Psi (lb./in <sup>2</sup> )	1.0	6.8948 × 10 <sup>-3</sup>	6.8947 × 10 <sup>-2</sup>	2.0360	51.715	2.3067	27.68	6.8045 × 10 <sup>-2</sup>
*MPa (Mega Pascal)	145.04	1.0	10.0	2.9350 × 10 <sup>2</sup>	7.5006 × 10 <sup>3</sup>	334.56	4.0147 × 10 <sup>3</sup>	9.8692
bar (10 <sup>5</sup> Pascal)	14.504	0.10	1.0	29.530	7.5006 × 10 <sup>2</sup>	33.456	4.0147 × 10 <sup>2</sup>	0.9869
in. Hg (at 0°C)	0.4912	3.3864 × 10 <sup>-3</sup>	3.3864 × 10 <sup>-2</sup>	1.0	25.40	1.133	13.596	3.342 × 10 <sup>-2</sup>
Torr (mm Hg at 0°C)	1.9337 × 10 <sup>-2</sup>	1.3332 × 10 <sup>-4</sup>	1.3332 × 10 <sup>-3</sup>	3.9370 × 10 <sup>-2</sup>	1.0	4.4605 × 10 <sup>-2</sup>	0.5353	1.3158 × 10 <sup>-3</sup>
ft. Water (at 4°C)	0.4335	2.9890 × 10 <sup>-3</sup>	2.9890 × 10 <sup>-2</sup>	0.8826	22.419	1.0	12.0	2.950 × 10 <sup>-2</sup>
in. Water (at 4°C)	3.6127 × 10 <sup>-2</sup>	2.4908 × 10 <sup>-4</sup>	2.4908 × 10 <sup>-3</sup>	7.3554 × 10 <sup>-2</sup>	1.8683	8.33 × 10 <sup>-2</sup>	1.0	2.4582 × 10 <sup>-3</sup>
Atmosphere (A <sub>N</sub> )	14.696	0.10133	1.0133	29.921	760.0	33.90	406.79	1.0

\*NOTE: 1 MPa = (newton/m<sup>2</sup>) × 10<sup>-6</sup>

Table 1. Correction Factors—C<sub>F</sub>—Liquid Flow

LIQUID	C <sub>F</sub>	LIQUID	C <sub>F</sub>
Acetic Acid	0.976	Isopropyl Alcohol	1.132
Acetone	1.125	Linseed Oil	1.037
Acetaldehyde	1.131	Magnesium Chloride*	0.905
Alcohol, Ethyl	1.125	Mercury	0.271
Alcohol, Methyl	1.125	Methyl Bromide	0.760
Ammonium Chloride*	0.967	Naphthalene	0.937
Ammonium Hydroxide*	1.048	Nitric Acid	0.816
Ammonium Sulfate*	0.933	Oil, Vegetable	1.040
Aniline	0.990	Phosgene	0.848
Beer	0.995	Phosphoric Acid	0.739
Benzol	1.067	Potassium Carbonate*	0.898
Calcium Chloride*	0.902	Potassium Chloride*	0.928
Carbolic Acid	0.962	Potassium Hydroxide*	0.898
Carbon Disulfide	0.880	Sodium Chloride*	0.917
Carbon Tetrachloride	0.793	Sodium Hydroxide*	0.887
Chromic Acid	0.909	Sodium Sulfate*	0.898
Citric Acid	0.806	Sodium Thiosulfate*	0.902
Copper Sulfate*	0.925	Starch	0.816
Ether	1.162	Sugar Solutions*	0.953
Ferric Chloride*	0.902	Sulfuric Acid	0.739
Formic Acid	0.902	Turpentine	1.072
Furfural	0.928	Water	1.000
Glycerine	0.891	Zinc Chloride*	0.898
Glycol	0.949	Zinc Sulfate*	0.874
Hydrofluoric Acid	1.043		

\*Aqueous Solution—25% by weight of compound

$$C_F = \sqrt{\frac{1}{SG}} \quad SG = \text{Specific Gravity—Water} = 1.0$$

Table 2. Correction Factors—C<sub>F</sub>—Gas Flow

GAS	C <sub>F</sub>	GAS	C <sub>F</sub>
Acetylene	1.056	Hydrogen	3.793
Air	1.000	Methane	1.345
Ammonia	1.305	Methyl Chloride	0.759
Argon	0.852	Nitrogen	1.017
Carbon Dioxide	0.812	Nitric Oxide	0.983
Carbon Monoxide	1.018	Nitrous Oxide	0.812
Ethylene	1.017	Oxygen	0.952
Helium	2.692	Sulphur Dioxide	0.673
Hydrogen Chloride	0.892		

$$C_F = \sqrt{\frac{1}{SG}} \quad SG = \text{Specific Gravity—Air} = 1.0 \text{ at } 60^\circ\text{F} (16^\circ\text{C})$$

## Other Parker CPI Products

CPI Tube Fittings	See Catalog No. 4230
Instrument Pipe Fittings	See Catalog No. 4260
Weld-Jok Fittings	See Catalog No. 4270
Automatic Butt weld Fittings	See Catalog No. 4280
Tube Fabricating Equipment	See Catalog No. 4290
Dual Heat Transfer Coils	See Catalog No. 4295

Temperature Conversion Table

°C	-60 to 43		44 to 93		94 to 510			
	°C	°F	°C	°F	°C	°F		
-51	-60	-76	6.7	44	111.2	34.4	94	201.2
-46	-50	-58	7.2	45	113.0	35.0	95	203.0
-40	-40	-40	7.8	46	114.3	35.6	96	204.8
-34	-30	-22	8.3	47	116.6	36.1	97	206.6
-29	-20	-4	8.9	48	118.4	36.7	98	208.4
-23	-10	14	9.4	49	120.2	37.2	99	210.2
-17.8	0	32	10.0	50	122.0	37.8	100	212.0
-17.2	1	33.8	10.5	51	123.8	38	100	212
-16.7	2	35.6	11.1	52	125.6	43	110	230
-16.1	3	37.4	11.7	53	127.4	49	120	248
-15.6	4	39.2	12.2	54	129.2	54	130	266
-15.0	5	41.0	12.8	55	131.0	60	140	284
-14.4	6	42.8	13.3	56	132.8	66	150	302
-13.9	7	44.6	13.9	57	134.6	71	160	320
-13.3	8	46.4	13.4	58	136.4	77	170	338
-12.8	9	48.2	15.0	59	138.2	82	180	356
-12.2	10	50.0	15.6	60	140.0	88	190	374
-11.7	11	51.8	16.1	61	141.8	93	200	392
-11.1	12	53.6	16.7	62	143.6	99	210	410
-10.6	13	55.4	17.2	63	145.4	100	212	413.6
-10.0	14	57.2	17.8	64	147.2	104	220	428
-9.4	15	59.9	18.3	65	149.0	110	230	446
-8.9	16	60.8	18.9	66	150.8	116	240	464
-8.3	17	62.6	19.4	67	152.6	121	250	482
-7.8	18	64.4	20.0	68	154.4	127	260	500
-7.2	19	66.2	20.6	69	156.2	132	270	518
-6.7	20	68.0	21.1	70	158.0	138	280	536
-6.1	21	69.8	21.7	71	159.8	143	290	554
-5.6	22	71.6	22.2	72	161.6	149	300	572
-5.0	23	73.4	22.8	73	163.4	154	310	590
-4.4	24	75.2	23.3	74	165.2	160	320	608
-3.9	25	77.0	23.9	75	167.0	166	330	626
-3.3	26	78.8	24.4	76	168.8	171	340	644
-2.8	27	80.6	25.0	77	170.6	177	350	662
-2.3	28	82.4	25.6	78	172.4	182	360	680
-1.7	29	84.2	26.1	79	174.3	188	370	698
-1.1	30	86.0	26.7	80	176.0	193	380	716
-0.6	31	87.8	27.2	81	177.8	199	390	734
0.0	32	89.6	27.8	82	179.6	204	400	752
0.6	33	91.4	28.3	83	181.4	210	410	
1.1	34	93.2	28.9	84	183.2	216	420	788
1.7	35	95.0	28.4	85	185.0	221	430	806
2.2	36	96.8	30.0	86	186.8	227	440	824
2.8	37	98.6	30.6	87	188.6	232	450	842
3.3	38	100.4	31.1	88	190.4	238	460	860
3.9	39	102.2	31.7	89	192.2	243	470	878
4.4	40	104.0	32.2	90	194.0	249	480	896
5.0	41	105.8	32.8	91	195.8	254	490	914
5.6	42	107.6	33.3	92	197.6	260	500	932
6.1	43	109.4	33.9	93	199.4	266	510	950

Look up known temperature in middle column—find °C at left or °F at right.

$$T_F = \frac{9}{5}(T_C + 32)$$

$$T_C = \frac{5}{9}(T_F - 32)$$

## Instrumentation Connectors Division

CPI Valve Department  
P.O. Box Drawer D  
Jacksonville, Alabama 36265

10M 5/82 GL

PERMANENT FITTINGS



**MATERIALS:** Type 316 Stainless Steel • Steel

**NOTE:** Not all of the fittings shown in Catalog 4270 are carried in standard stock. Please check current price lists for standard items.

Price and delivery of non-stock items will be furnished on request. These prices and delivery will depend on quantity ordered.

**PARKER CPI**

  
**Fittings &**  
**Valves**

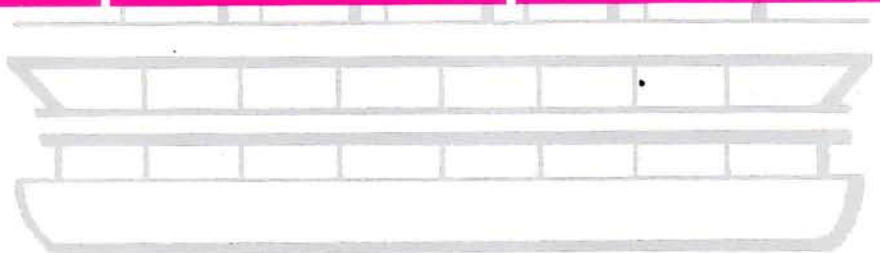
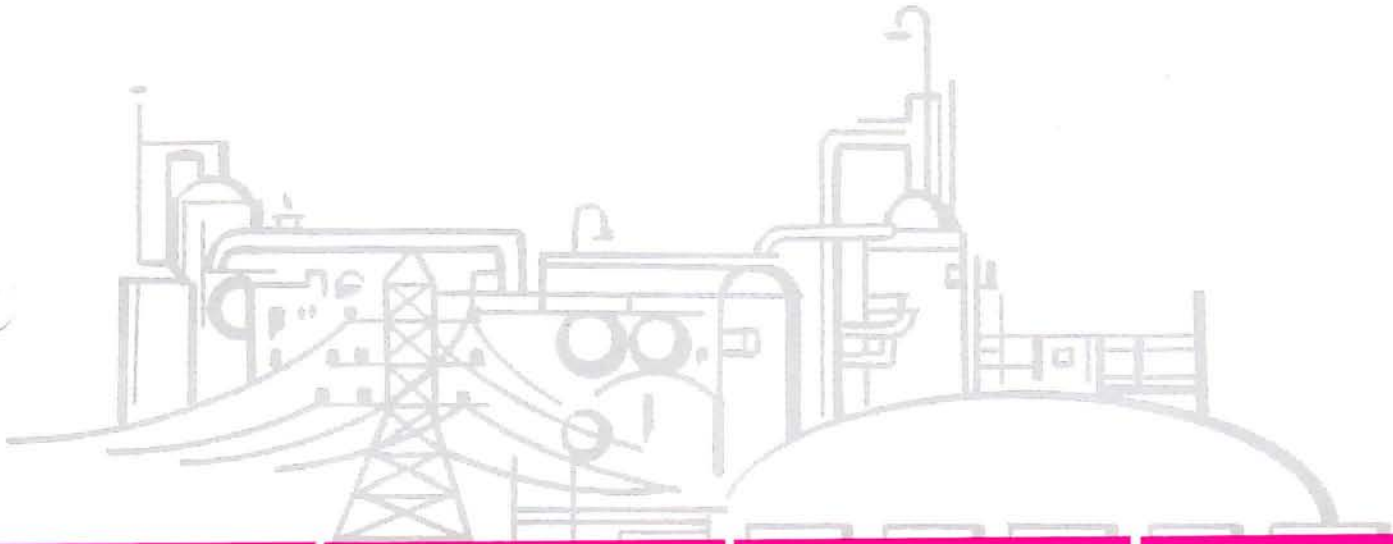
**FOR PROCESS, POWER  
& INSTRUMENTATION**





















# Weld-lok Fittings

For Process, Power  
and Instrumentation

Catalog 4270  
June, 1980



	ADAPTER	CONNECTOR	ELBOW	REDUCER	UNION	TEE/CROSS
<b>SOCKET WELD</b>	 AW page 6 Adapter		 EW page 9 Elbow  NW page 11 45° elbow  ZEBW page 11 CPI—socket weld	 TRW page 9 Tube reducer connector—pipe	 HW page 8 Union connector  ZHBW page 8 CPI—socket weld union	 KW page 13 Cross  JW page 12 Tee
<b>BUTT WELD</b>	 AW2 page 6 Butt weld adapter		 ZEBW2 page 11 CPI—butt weld		 ZHBW2 page 8 CPI—butt weld union	
<b>WELD-LOK TO PIPE</b>	 FW page 7 Connector—pipe  GW page 7 Connector—pipe		 CW page 10 Male elbow—pipe  DW page 10 Female elbow—pipe			 RW page 12 Male run tee  SW page 13 Male branch tee

## HOW TO ORDER PERMANENT TUBE FITTINGS

ORDER WELD-LOK FITTINGS BY PART NUMBER AS LISTED IN THIS CATALOG.

**NOMENCLATURE:** Weld-lok fittings part numbers are constructed from symbols that identify the size and style of the fitting and material used.

**SIZES:** 2 through 32. (Tube sizes are determined by the number of sixteenths of an inch in the tube O.D.)

**MATERIALS:** See page 2.

**EXAMPLE:** **Fitting needed**—Weld-lok stainless steel male connector for 1/4" O.D. tube and 1/4" male pipe thread.

**PART NUMBER:** 4-4-FW-SS

**CROSSES AND TEES:** For tees: first size the run (1 to 2) and then the branch (3).

For crosses: first size the run (1 to 2) and then the branch (3 to 4).



**SPECIAL FITTINGS:** If there is any possibility of question as to the fitting desired, particularly for special fitting configurations, please submit a sketch with order.

**PRICING:** Only items priced in current supplementary Price Lists are carried in stock. Price and delivery for non-stock items furnished on request and will depend on quantity ordered.

<b>4-4</b>	<b>F</b>	<b>W</b>	<b>SS</b>
Size tube O.D. in 1/16"–1/4" male pipe thread	Male connector	Weld-lok	Material stainless steel

# Weld-lok

## THE PERMANENT TUBE FITTINGS

### INTRODUCTION

In the chemical industry, process pressures are climbing higher and higher. The utility field, with its high steam pressures and hydraulic and pneumatic shutdown systems, demands the utmost in reliability. Nuclear power plants with their "hot" materials also have massive reliability problems. Such problem areas have given rise to the increased use of the permanent-weld-type tube fittings which provide a sturdy, tight integral line system that remains unaffected by shock, vibration or thermal distortion.

The Parker Hannifin Weld-lok line of permanent socket weld tube fittings meets the most exacting requirements of any system. Starting with precise basic raw material requirements which include source physical and chemical analysis and ending with a filtered and pressurized environment for inspection, packaging and storage, the Parker Hannifin process of manufacture assures the user of the ultimate in quality and reliability.

### DESIGN SPECIFICATION

Presently, there is no USAS design specification covering O.D. tube size socket weld fittings. Therefore, the Weld-lok fitting has been designed and tested in accordance with ANSI B16.11, which covers "Forged Steel Fittings Socket Welded and Threaded." Our design parallels the Schedule 80, 3000-pound fitting pressure class, and is compatible with O.D. tube wall thickness meeting the related (3000-psi pipe class) pressure requirements. Strong, full section forgings are used for all "shape" fittings.

### USER SPECIFICATION REQUIREMENTS

The 316 Stainless Steel Weld-lok fitting as produced by Parker Hannifin fully conforms to the applicable specifications covered in:

ANSI B31.1.0 "Power Piping"  
ANSI B31.7 "Nuclear Power Piping"  
Section III, "Nuclear Power Plant Component," ASME Boiler and Pressure Vessel Code

### HEAT CODE TRACEABILITY

All stainless steel Weld-lok fittings are inventoried as standard with a *Heat Traceability Code* either stamped or etched on each individual fitting.

This allows each fitting to be traced back to the physical and chemical analysis of the original raw material. Where the material properties are altered, such as in forging, a physical analysis of each forging run is also performed. This *heat traceability* procedure fully conforms to source conditions of the above user specifications. *There is no extra charge for this heat traceability code.*

## DOCUMENTATION

Documentation of heat traceability will be provided upon request. Normal procedure requires the user to request documentation by referring to the heat traceability code number on each fitting or group of fittings as they are received. It should be noted that different size and shape fittings may share the same heat traceability code number as they may be machined from one run of barstock or forgings.

## MATERIAL

Standard material is stainless steel. Steel and other materials are quoted as requested.

*Stainless Steel Material* is 316 with restricted chemistry requirements for improved corrosion resistance and strength. As called for in SA-403, "Factory Made Wrought Austenitic Steel Welded Fittings," fittings machined from barstock conform to ASME SA-479, and fittings manufactured from forged shapes conform to SA-182, "Specifications for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High Temperature Service," Conformance to SA-182 includes solution anneal requirements to prevent continuous intergranular carbide precipitation.

*Steel Material* is C1018 welding material conforming to ASTM A-108, combining good strength and weldability.

## WORKING PRESSURE AND STRESS INFORMATION

Full working pressures and stress information may be found on the following catalog pages.

## WELDING INFORMATION

Welding recommendations covering stick, TIG, and MIG welding methods are included in this catalog on pages 14 and 15.

## NUCLEAR CODE CLARIFICATION

To fully comply with Section III, "Nuclear Power Plant Components," ASME Boiler and Pressure Vessel Code all socket weld tube fittings (SA-403) for Class I, II, and III Nuclear Service must be individually heat traceable and therefore must bear an etched or stamped heat code.

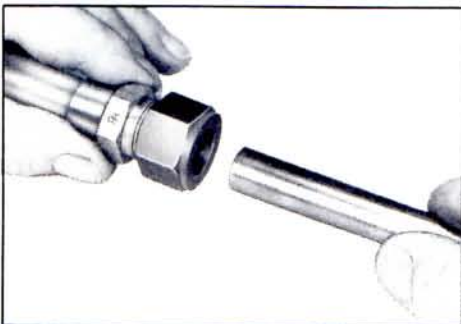
Further, socket weld tube fittings for use in Class I Nuclear Service must be additionally dye-penetrant inspected. (This inspection is available for a small additional charge. Please be sure purchase order states "Dye-Penetrant Inspection Required." when applicable.) All Parker Weld-lok socket weld tube fittings are inventoried as standard with the individual heat code.

## SPECIFICATION GUIDE

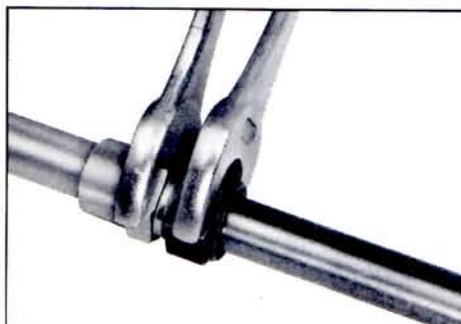
To insure compliance with Nuclear Codes we suggest that the following specification be included in all purchase orders and requests for quotations:

"316 Stainless Steel Socket Weld Tube Fittings to be designed in accordance with ANSI B16.11, 3000 PSI pipe class practice. All fittings to be individually stamped or etched with a heat traceability code to fully conform to Section III, "Nuclear Power Plant Components," ASME Boiler and Pressure Vessel Code. Material and manufacturing practice to also conform to the above code. Fittings for Class I Nuclear Service, as indicated. Documentation pertaining to heat traceability codes to be maintained by Vendor and to be available upon request."

## ASSEMBLY INSTRUCTIONS FOR CPI to Weld-lok style fittings



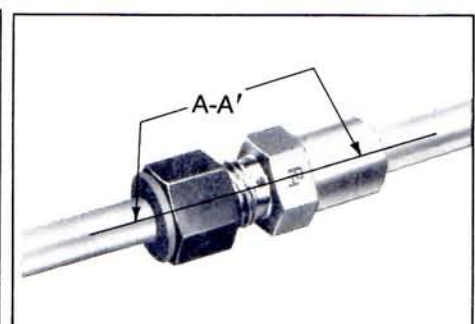
Insert tube as illustrated until the tube bottoms against the shoulder in the fitting body. Care should be taken to insure that the tube is in proper alignment with fitting body.



Tighten nut finger-tight. Then tighten with wrench an additional 1-1/4 turns. It is recommended that the nut be marked to facilitate counting the 1-1/4 turns.\*

\*Except for 1/16" and 1/8" O.D. tube, use 3/4 turn from finger-tight.




## REMAKE INSTRUCTIONS



Mark the fitting with a line (A-A') to show the relationship of the nut and fitting body before disassembly. Remake by retightening until marks line up and then tighten a slight additional amount. The highest number of remakes will result, if these instructions are followed.

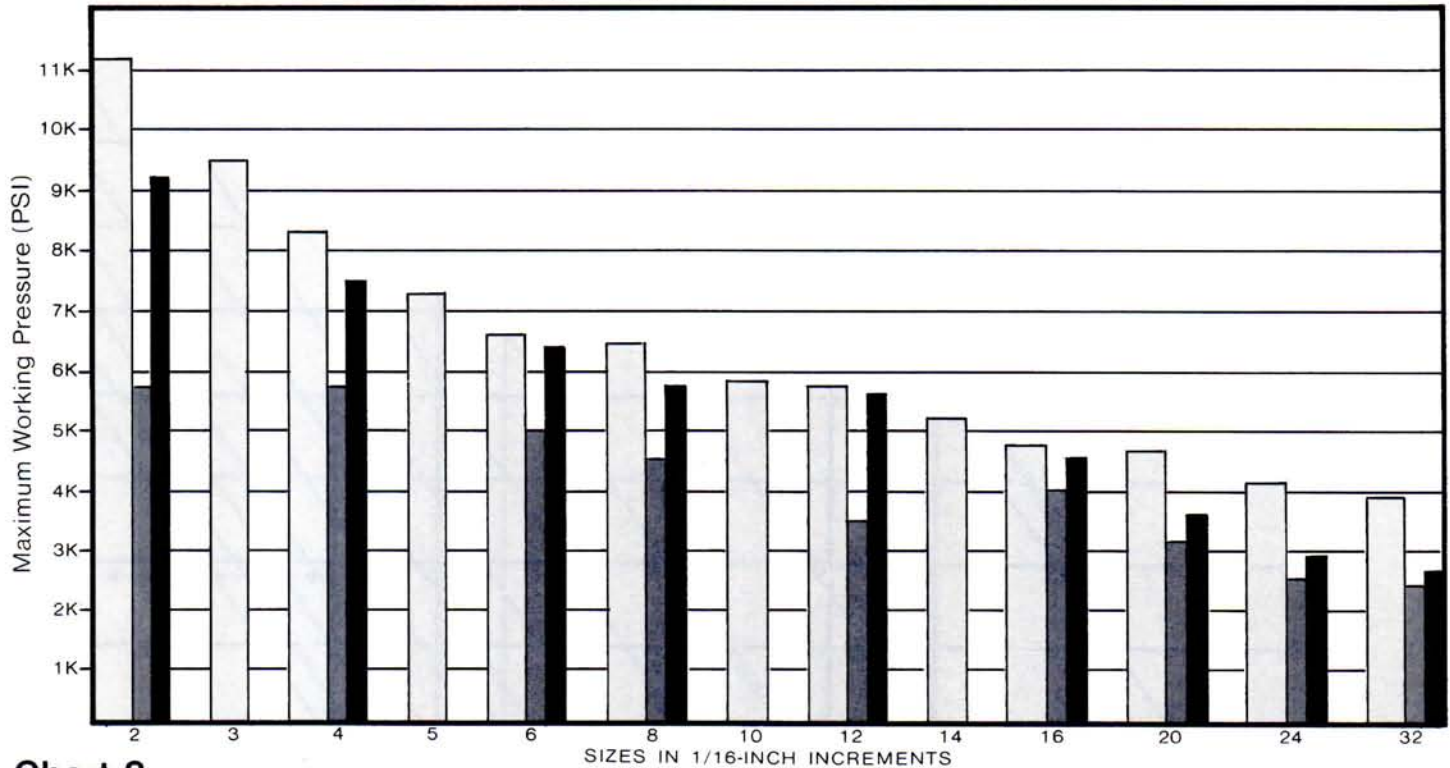
## Working pressure socket weld steel & stainless steel fittings

(at room temperature 72° F, 4-to-1 safety factor from minimum calculated burst pressure)

For all socket weld end fittings use  bars  
 For combination socket weld and male pipe   
 or female pipe  apply smallest value for entire fitting

For high-temperature application  
 check Chart No. 2  
 for derating percentage.

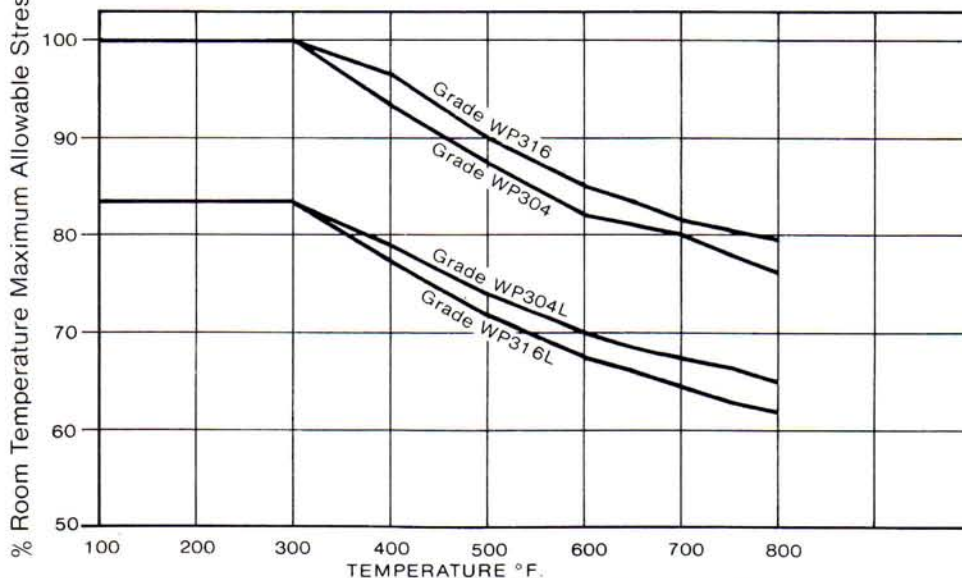
For fittings with CPI tube ends, consult "Instrument Tube Fitters Manual (4206)."



**Chart 2**  
**Temperature effect upon maximum working pressure**

These percentage values are based upon "Design Stress-Intensity Values,  $S_m$ , for Austenitic Steels and High-Nickel Alloys for Class I Components"—Table I, 1.2, Appendix I of Section III.

Based on Grade WP316 at Room Temperature=100% (20,000 psi)



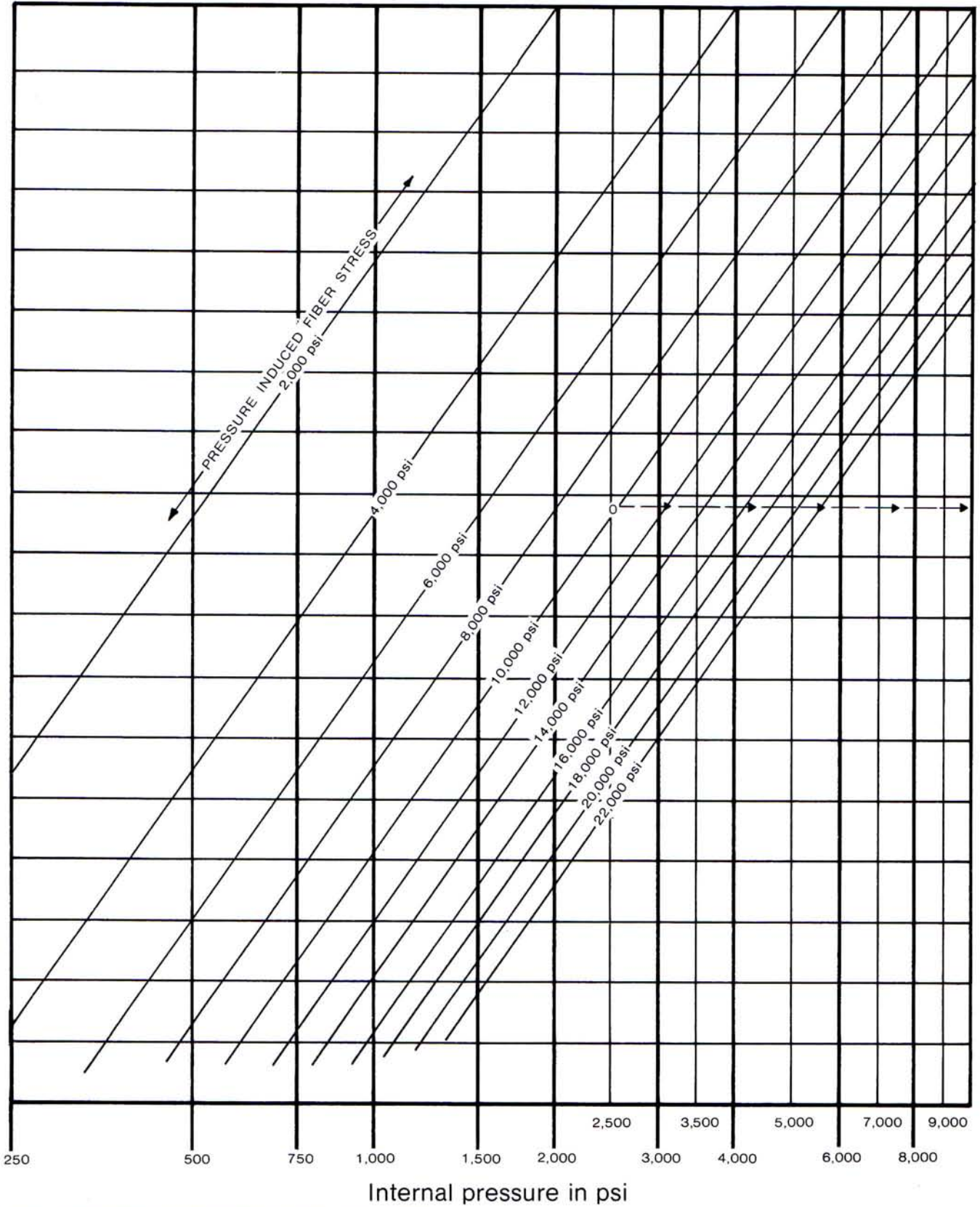
Find application temperature on bottom scale, extend upward to intersect with material desired. Read % of room temperature maximum working pressure at left and derate working pressure on Weld-lok bar chart above.



### Tube Strength and Pressure Relationship

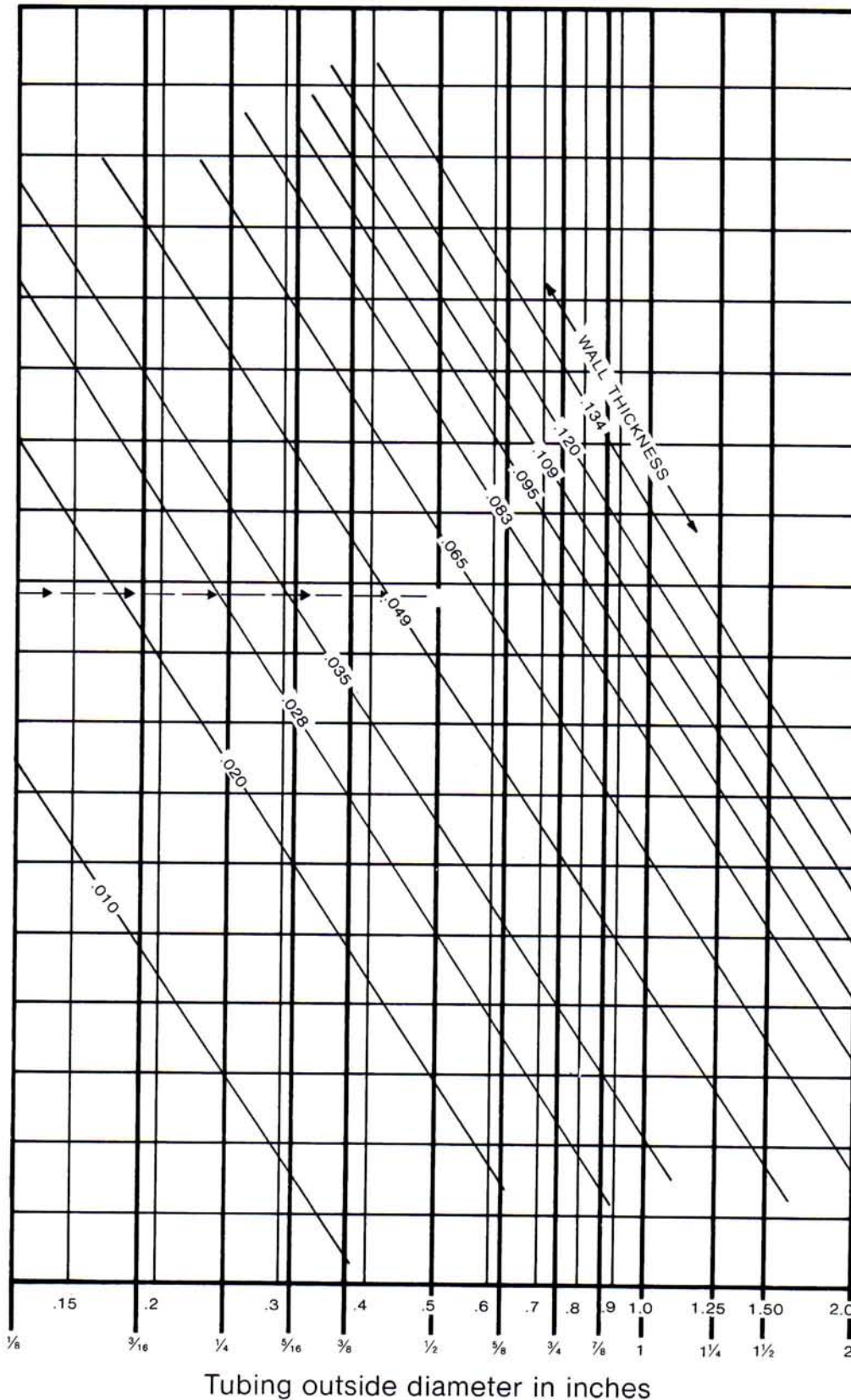
#### Tube fiber stress

For internal pressure range 250 to 10,000 psi



## Relative tube strength

For common O.D. and wall thickness combinations



These charts are based upon Equation (2) of Section NB-3641-1 "Straight Pipe Under Internal Pressure" of Section III, "Nuclear Power Plant Components," ASME Boiler and Pressure Vessel Code.

$$P = \frac{2S_m(t_m - a)}{D_o - 2y(t_m - a)}$$

For these charts, assume  $a = 0$ .

**Where:**

- $t_m$  = the minimum required wall thickness, in.;
- $P$  = internal design pressure, psi;
- $D_o$  = outside diameter of the pipe, in.;
- $S_m$  = maximum allowable stress in material caused by internal pressure at the design temperature, psi;
- $a$  = an additional thickness to: (1) compensate for material removed in threading, (2) provide for corrosion and/or erosion, and (3) to provide for structural strength of the pipe during erection, in.;
- $y = 0.4$

**(Example)**

Find the tube wall thickness that will allow a 1/2" O.D. tube to contain 2500 psi fluid pressure with a pressure induced fiber stress of 10,000 psi maximum.

1. On the Tube Fiber Stress Chart find the intersection of "2500 psi internal pressure" and "10,000 psi fiber stress."
2. Draw a horizontal line across to the Relative Tube Strength Chart until it intersects the "1/2 inch tubing outside diameter" line.
3. Note that this point falls between the ".049" and ".065" inch "Tube Wall Thickness." Choose the higher of the two (.065 inch) for a safe design.

**Note:** Following the intersection point of "1/2 inch O.D. Tubing" and ".065 inch wall thickness" back to the 2500 psi Internal Pressure on the Tube Fiber Stress Chart shows the pressure induced fiber stress to be approximately 8600 psi.

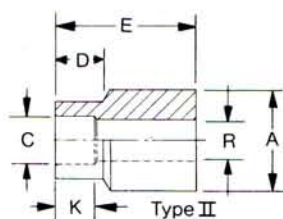
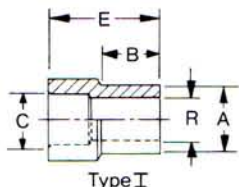
**ADAPTER**

AW • tube socket end—adapter end for welding into a female iron pipe size welding boss

Specify material by part number suffix letter: -SS=Stainless Steel; -S=Steel

\*The fitting in the example would be for 1/4" tubing, suitable for insertion in 1/4" female iron pipe socket

MATERIAL	*PART No. EXAMPLE
Type 316 STAINLESS STEEL	4-1/4-AW-SS
STEEL	4-1/4-AW-S



Part No.	Type	Tube O.D.	I.P.S. Dia.	A	B	C	D	E	K	R Min. Bore
4-1/8-AW	I	1/4	1/8	.415	.53	.258	—	.88	.250	.188
4-1/4-AW	II	1/4	1/4	.545	—	.258	.33	.97	.250	.188
4-3/8-AW	II	1/4	3/8	.685	—	.258	.33	1.06	.250	.188
4-1/2-AW	II	1/4	1/2	.850	—	.258	.33	1.28	.250	.188
4-3/4-AW	II	1/4	3/4	1.060	—	.258	.33	1.39	.250	.188
4-1"-AW	II	1/4	1"	1.325	—	.258	.33	1.45	.250	.188
5-1/8-AW	I	5/16	1/8	.415	.53	.320	—	.97	.313	.250
6-1/4-AW	I	3/8	1/4	.545	.53	.383	—	.97	.344	.313
6-3/8-AW	II	3/8	3/8	.685	—	.383	.42	1.13	.344	.313
6-1/2-AW	II	3/8	1/2	.850	—	.383	.42	1.33	.344	.313
6-3/4-AW	II	3/8	3/4	1.060	—	.383	.42	1.44	.344	.313
6-1"-AW	II	3/8	1"	1.325	—	.383	.42	1.55	.344	.313
8-3/8-AW	I	1/2	3/8	.685	.59	.510	—	1.13	.406	.438
8-1/2-AW	II	1/2	1/2	.850	—	.510	.50	1.36	.406	.438
8-3/4-AW	II	1/2	3/4	1.060	—	.510	.50	1.47	.406	.438
8-1"-AW	II	1/2	1"	1.325	—	.510	.50	1.64	.406	.438
10-1/2-AW	I	5/8	1/2	.850	.72	.635	—	1.31	.469	.500
12-1/2-AW	I	3/4	1/2	.850	—	.760	.72	1.41	.500	.531
12-3/4-AW	I	3/4	3/4	1.060	.78	.760	—	1.41	.500	.656
12-1"-AW	II	3/4	1"	1.325	—	.760	.61	1.66	.500	.656
16-1"-AW	I	1"	1"	1.325	.88	1.010	—	1.56	.563	.906
16-1-1/4-AW	II	1"	1-1/4	1.670	—	1.010	.67	1.83	.563	.906
20-1-1/4-AW	I	1-1/4	1-1/4	1.670	—	1.262	.94	1.75	.625	1.063
20-1-1/2-AW	II	1-1/4	1-1/2	1.910	—	1.262	.78	1.97	.625	1.063
24-1-1/2-AW	I	1-1/2	1-1/2	1.910	—	1.515	1.00	1.84	.670	1.313
32-2"-AW	I	2"	2"	2.401	—	2.015	1.16	2.19	.781	1.813

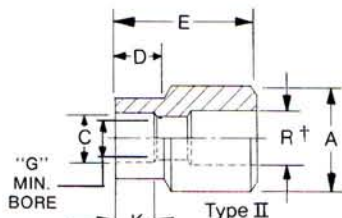
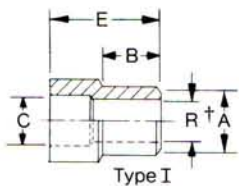
**ADAPTER**

AW2 • tube socket—butt weld other end for iron pipe size

Specify material by part number suffix letter: -SS=Stainless Steel; -S=Steel

\*The fitting in the example would be for 1/4" tubing to 1/4" iron pipe, butt weld.

MATERIAL	*PART No. EXAMPLE
Type 316 STAINLESS STEEL	4-1/4-AW2-SS
STEEL	4-1/4-AW2-S



Part No.	Type	Tube O.D.	I.P.S. Dia.	A	B	C	D	E	K	R†	G Min. Bore
4-1/8-AW2	I	1/4	1/8	.415	.53	.258	—	.88	.250		.188
4-1/4-AW2	II	1/4	1/4	.545	—	.258	.33	.97	.250		.188
4-3/8-AW2	II	1/4	3/8	.685	—	.258	.33	1.06	.250		.188
4-1/2-AW2	II	1/4	1/2	.850	—	.258	.33	1.28	.250		.188
4-3/4-AW2	II	1/4	3/4	1.060	—	.258	.33	1.39	.250		.188
4-1"-AW2	II	1/4	1"	1.325	—	.258	.33	1.45	.250		.188
5-1/8-AW2	I	5/16	1/8	.415	.53	.320	—	.97	.250		.188
6-1/4-AW2	I	3/8	1/4	.545	.53	.383	—	.97	.344		.297
6-3/8-AW2	II	3/8	3/8	.685	—	.383	.42	1.13	.344		.313
6-1/2-AW2	II	3/8	1/2	.850	—	.383	.42	1.33	.344		.313
6-3/4-AW2	II	3/8	3/4	1.060	—	.383	.42	1.44	.344		.313
6-1"-AW2	II	3/8	1"	1.325	—	.383	.42	1.55	.344		.313
8-3/8-AW2	I	1/2	3/8	.685	.59	.510	—	1.13	.406		.438
8-1/2-AW2	II	1/2	1/2	.850	—	.510	.50	1.36	.406		.438
8-3/4-AW2	II	1/2	3/4	1.060	—	.510	.50	1.47	.406		.438
8-1"-AW2	II	1/2	1"	1.325	—	.510	.50	1.64	.406		.438
10-1/2-AW2	I	5/8	1/2	.850	.72	.635	—	1.31	.469		.500
12-1/2-AW2	I	3/4	1/2	.850	—	.760	.72	1.41	.500		.531
12-3/4-AW2	I	3/4	3/4	1.060	.78	.760	—	1.41	.500		.656
12-1"-AW2	II	3/4	1"	1.325	—	.760	.61	1.66	.500		.656
16-1"-AW2	I	1"	1"	1.325	.88	1.010	—	1.56	.563		.906
16-1-1/4-AW2	II	1"	1-1/4	1.670	—	1.010	.67	1.83	.563		.906

† "R" bore diameter will conform to Schedule 80 pipe wall thickness unless otherwise noted.

MATERIAL	*PART No. EXAMPLE
Type 316 STAINLESS STEEL	4-4-FW-SS
STEEL	4-4-FW-S

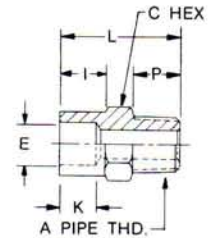
Specify material by part number suffix letter: -SS=Stainless Steel; -S=Steel

\*The fitting in the example would be for 1/4" tubing with 1/4" male pipe on the other end.

Part No.	Tube O.D.	A Male Pipe	C Hex	D Min. Bore	E Dia.	I	L	K	P Ref.
2-FW	1/8	1/8	7/16	.094	.131	.23	.81	.156	.38
3-FW	3/16	1/8	7/16	.140	.195	.30	.88	.203	.38
4-FW	1/4	1/8	1/2	.188	.258	.30	.88	.250	.38
4-4-FW	1/4	1/4	5/8	.188	.258	.30	1.12	.250	.56
5-FW	5/16	1/8	9/16	.188	.320	.33	.94	.313	.38
6-FW	3/8	1/4	3/4	.281	.383	.41	1.25	.344	.56
6-6-FW	3/8	3/8	3/4	.281	.383	.42	1.31	.344	.56
6-8-FW	3/8	1/2	7/8	.281	.383	.42	1.50	.344	.75
8-FW	1/2	3/8	13/16	.406	.510	.55	1.44	.406	.56
8-8-FW	1/2	1/2	7/8	.406	.510	.55	1.66	.406	.75
10-FW	5/8	1/2	15/16	.500	.635	.53	1.63	.469	.75
12-FW	3/4	3/4	1-1/8	.656	.760	.58	1.69	.500	.75
16-FW	1"	1"	1-3/8	.906	1.010	.67	2.00	.563	.94
20-FW	1-1/4	1-1/4	1-3/4	1.063	1.262	.81	2.22	.625	.97
24-FW	1-1/2	1-1/2	2"	1.313	1.515	.88	2.38	.670	1.00

## MALE CONNECTOR

FW • tube socket end—male pipe end



MATERIAL	*PART No. EXAMPLE
Type 316 STAINLESS STEEL	4-GW-SS
STEEL	4-GW-S

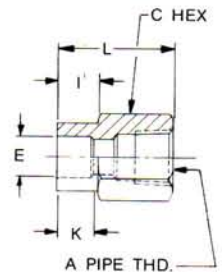
Specify material by part number suffix letter: -SS=Stainless Steel; -S=Steel

\*The fitting in the example would be for 1/4" tubing with 1/8" female pipe on the other end.

Part No.	Tube O.D.	A Female Pipe	C Hex	D Min. Bore	E Dia.	I	L	K
2-GW	1/8	1/8	9/16	.094	.131	.23	.88	.156
3-GW	3/16	1/8	9/16	.141	.195	.28	.94	.203
4-GW	1/4	1/8	9/16	.188	.258	.31	.97	.250
4-4-GW	1/4	1/4	3/4	.188	.258	.31	1.13	.250
5-GW	5/16	1/8	9/16	.250	.320	.38	1.03	.313
6-GW	3/8	1/4	3/4	.313	.383	.41	1.22	.344
6-6-GW	3/8	3/8	15/16	.313	.383	.41	1.31	.344
8-GW	1/2	3/8	15/16	.438	.510	.44	1.41	.406
8-8-GW	1/2	1/2	1-1/8	.438	.510	.50	1.63	.406
10-GW	5/8	1/2	1-1/8	.500	.635	.50	1.63	.469
12-GW	3/4	3/4	1-3/8	.656	.760	.66	1.78	.500

## FEMALE CONNECTOR

GW • tube socket end—female pipe end for gage connection

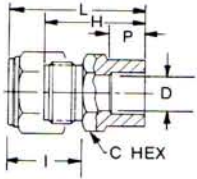


### NOTICE

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**CONNECTOR**

ZHBW • CPI fitting end—socket weld tube end



Specify material by part number suffix letter: -SS=Stainless Steel; -S=Steel

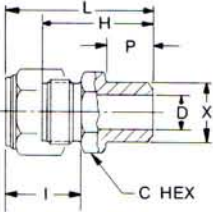
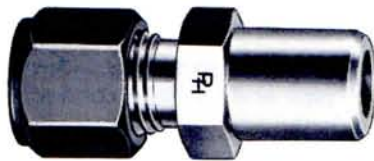
\*The fitting in the example would be for 1/4" tubing with 1/4" socket weld fitting on the other end.

MATERIAL	*PART No. EXAMPLE
Type 316 STAINLESS STEEL	4-4-ZHBW-SS
STEEL	4-4-ZHBW-S

Part No.	Tube O.D.	C Hex	D Min. Bore	H	I	L	P
2-2-ZHBW	1/8	7/16	.094	.88	.61	1.16	.34
3-3-ZHBW	3/16	7/16	.125	.95	.65	1.23	.38
4-4-ZHBW	1/4	1/2	.188	1.03	.70	1.34	.41
6-6-ZHBW	3/8	5/8	.281	1.19	.78	1.50	.47
8-8-ZHBW	1/2	13/16	.406	1.22	.91	1.63	.47
10-10-ZHBW	5/8	15/16	.500	1.25	.89	1.66	.47
12-12-ZHBW	3/4	1-1/8	.625	1.31	.89	1.72	.47
16-16-ZHBW	1"	1-3/8	.875	1.59	1.06	2.06	.56

**CONNECTOR**

ZHBW2 • CPI fitting—butt weld pipe



Specify material by part number suffix letter: -SS=Stainless Steel; -S=Steel

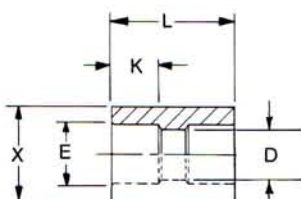
\*The fitting in the example would be for 1/4" tubing on one end with 1/8" pipe on the other end.

MATERIAL	*PART No. EXAMPLE
Type 316 STAINLESS STEEL	4-1/8-ZHBW2-SS
STEEL	4-1/8-ZHBW2-S

Part No.	CPI Tube O.D.	Butt Weld Pipe Size	X Butt Weld O.D.	C Hex	D Min. Bore	H	I	L	P
2-1/8-ZHBW2	1/8	1/8	.405	7/16	.094	.91	.61	1.19	.38
3-1/8-ZHBW2	3/16	1/8	.405	7/16	.125	.95	.65	1.23	.38
4-1/8-ZHBW2	1/4	1/8	.405	1/2	.187	1.00	.70	1.31	.38
4-1/4-ZHBW2	1/4	1/4	.540	9/16	.187	1.19	.70	1.50	.56
6-1/4-ZHBW2	3/8	1/4	.540	5/8	.281	1.28	.78	1.59	.56
6-3/8-ZHBW2	3/8	3/8	.675	3/4	.281	1.28	.78	1.59	.56
6-1/2-ZHBW2	3/8	1/2	.840	7/8	.281	1.50	.78	1.81	.75
8-3/8-ZHBW2	1/2	3/8	.675	13/16	.406	1.31	.91	1.72	.56
8-1/2-ZHBW2	1/2	1/2	.840	7/8	.406	1.50	.91	1.91	.75
10-1/2-ZHBW2	5/8	1/2	.840	15/16	.500	1.53	.89	1.94	.75
12-3/4-ZHBW2	3/4	3/4	1.050	1-1/16	.625	1.59	.89	2.00	.75
16-1"-ZHBW2	1"	1"	1.315	1-3/8	.875	1.97	1.06	2.44	.94

**UNION**

HW • tube socket end—both ports



Specify material by part number suffix letter: -SS=Stainless Steel; -S=Steel

\*The fitting in the example would be for 1/4" tubing on both ends.

MATERIAL	*PART No. EXAMPLE
Type 316 STAINLESS STEEL	4-HW-SS
STEEL	4-HW-S

Part No.	Tube O.D.	D Min. Bore	E Dia.	K	L	X Dia.
2-HW	1/8	.094	.131	.156	.56	.375
3-HW	3/16	.141	.195	.203	.66	.438
4-HW	1/4	.188	.258	.250	.75	.500
5-HW	5/16	.250	.320	.313	.88	.562
6-HW	3/8	.313	.383	.344	.97	.625
8-HW	1/2	.438	.510	.406	1.06	.813
10-HW	5/8	.500	.635	.469	1.25	.938
12-HW	3/4	.657	.760	.500	1.31	1.125
16-HW	1"	.906	1.010	.563	1.56	1.375
20-HW	1-1/4	1.063	1.262	.625	1.69	1.750
24-HW	1-1/2	1.313	1.515	.670	1.75	2.000

MATERIAL	*PART No. EXAMPLE
Type 316 STAINLESS STEEL	6-4-TRW-SS
STEEL	6-4-TRW-S

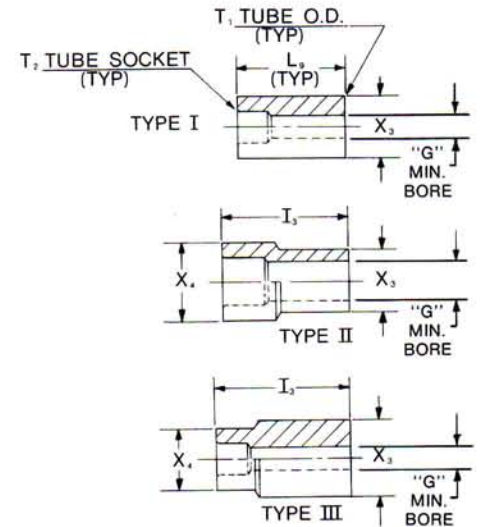
Specify material by part number suffix letter: -SS=Stainless Steel; -S=Steel

\*The fitting in the example would be inserted and welded into an existing 3/8" tube socket (T<sub>1</sub> end), thereby providing a 1/4" socket for tubing.

Part No.	T <sub>1</sub> Size	T <sub>2</sub> Tube Socket	Type	L <sub>1</sub>	X <sub>3</sub> Dia.	X <sub>4</sub> Dia.	I <sub>3</sub>	G Min. Bore
6-4-TRW	3/8	1/4	II	.83	.375	.50	.47	.188
8-4-TRW	1/2	1/4	I	.88	.500	—	—	.188
8-6-TRW	1/2	3/8	II	1.00	.500	.63	.56	.313
10-4-TRW	5/8	1/4	III	1.09	.625	.50	.72	.188
10-6-TRW	5/8	3/8	I	1.03	.625	—	—	.313
10-8-TRW	5/8	1/2	II	1.17	.625	.81	.63	.438
12-4-TRW	3/4	1/4	III	1.19	.750	.50	.78	.188
12-6-TRW	3/4	3/8	III	1.25	.750	.63	.78	.313
12-8-TRW	3/4	1/2	II	1.19	.750	.81	.69	.438
12-10-TRW	3/4	5/8	II	1.33	.750	.94	.69	.500
16-4-TRW	1"	1/4	III	1.31	1.000	.50	.84	.188
16-6-TRW	1"	3/8	III	1.38	1.000	.63	.84	.313
16-8-TRW	1"	1/2	III	1.41	1.000	.81	.84	.438
16-10-TRW	1"	5/8	III	1.42	1.000	.94	.84	.500
16-12-TRW	1"	3/4	II	1.39	1.000	1.13	.75	.656
20-4-TRW	1-1/4	1/4	III	1.45	1.250	.50	1.00	.188
20-6-TRW	1-1/4	3/8	III	1.56	1.250	.63	1.00	.313
20-8-TRW	1-1/4	1/2	III	1.63	1.250	.81	1.00	.438
20-12-TRW	1-1/4	3/4	III	1.63	1.250	1.13	1.00	.656
20-16-TRW	1-1/4	1"	II	1.59	1.250	1.38	.88	.906
24-12-TRW	1-1/2	3/4	III	1.75	1.500	1.13	1.03	.656
24-16-TRW	1-1/2	1"	III	1.75	1.500	1.38	1.03	.906
24-20-TRW	1-1/2	1-1/4	II	1.66	1.500	1.75	.81	1.062

## TUBE REDUCER

TRW • tube socket reducer



MATERIAL	*PART No. EXAMPLE
Type 316 STAINLESS STEEL	4-EW-SS
STEEL	4-EW-S

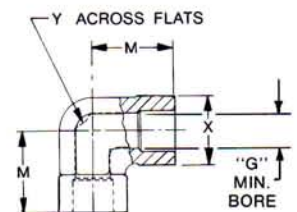
Specify material by part number suffix letter: -SS=Stainless Steel; -S=Steel

\*The fitting in the example would be for 1/4" tubing on both ends.

Part No.	Tube O.D.	G Min. Bore	M	X Dia.	Y
2-EW	1/8	.094	.63	.375	.312
3-EW	3/16	.141	.66	.438	.375
4-EW	1/4	.188	.69	.500	.438
5-EW	5/16	.250	.75	.562	.500
6-EW	3/8	.313	.91	.625	.563
8-EW	1/2	.438	1.03	.813	.750
10-EW	5/8	.500	1.16	.938	.875
12-EW	3/4	.657	1.31	1.125	1.063
16-EW	1"	.906	1.47	1.375	1.313
20-EW	1-1/4	1.063	1.75	1.750	1.625
24-EW	1-1/2	1.313	1.88	2.000	1.875

## ELBOW

EW • tube socket end—both ports

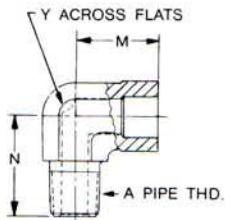


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**MALE ELBOW**

CW • tube socket end—male pipe end



Specify material by part number suffix letter: -SS=Stainless Steel; -S=Steel

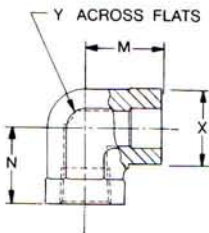
\*The fitting in the example would be for 1/4" tubing with 1/4" male pipe on the other end.

MATERIAL	*PART No. EXAMPLE
Type 316 STAINLESS STEEL	4-4-CW-SS
STEEL	4-4-CW-S

Part No.	Tube O.D.	A Male Pipe	D Min. Bore	M	N	Y
2-CW	1/8	1/8	.094	.63	.72	.312
3-CW	3/16	1/8	.140	.66	.72	.375
4-CW	1/4	1/8	.188	.69	.78	.438
4-4-CW/	1/4	1/4	.188	.66	1.09	.562
5-CW	5/16	1/8	.188	.75	.78	.500
6-CW	3/8	1/4	.281	.91	1.09	.562
6-6-CW	3/8	3/8	.281	.91	1.22	.750
6-8-CW	3/8	1/2	.281	.97	1.47	.875
8-CW	1/2	3/8	.406	1.03	1.22	.750
8-8-CW	1/2	1/2	.406	1.06	1.47	.875
10-CW	5/8	1/2	.500	1.16	1.47	.875
12-CW	3/4	3/4	.656	1.31	1.59	1.063
16-CW	1"	1"	.906	1.47	1.97	1.313

**FEMALE ELBOW**

DW • tube socket end—female pipe end for gage connection



Specify material by part number suffix letter: -SS=Stainless Steel; -S=Steel

\*The fitting in the example would be for 1/4" tubing with 1/8" female pipe on the other end.

MATERIAL	*PART No. EXAMPLE
Type 316 STAINLESS STEEL	4-DW-SS
STEEL	4-DW-S

Part No.	Tube O.D.	A Female Pipe	D Min. Bore	M	N	X Dia.	Y
2-DW	1/8	1/8	.094	.63	.66	.375	.562
3-DW	3/16	1/8	.141	.66	.66	.438	.562
4-DW	1/4	1/8	.188	.69	.66	.500	.562
4-4-DW	1/4	1/4	.188	.69	.88	.500	.750
5-DW	5/16	1/8	.250	.75	.66	.562	.562
6-DW	3/8	1/4	.313	.91	.88	.625	.750
6-6-DW	3/8	3/8	.313	.91	.97	.625	.875
8-DW	1/2	3/8	.438	1.03	.97	.813	.875
8-8-DW	1/2	1/2	.438	1.03	1.23	.813	1.063
10-DW	5/8	1/2	.500	1.16	1.23	.938	1.063
12-DW	3/4	3/4	.656	1.44	1.36	1.125	1.313
16-DW	1"	1"	.906	1.63	1.63	1.375	1.625

MATERIAL	*PART No. EXAMPLE
Type 316 STAINLESS STEEL	4-NW-SS
STEEL	4-NW-S

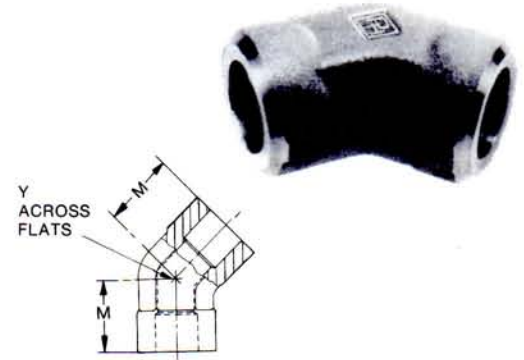
Specify material by part number suffix letter: -SS=Stainless Steel; -S=Steel

\*The fitting in the example would be for 1/4" tubing on both ends.

Part No.	Tube O.D.	D Min. Bore	M	Y
2-NW	1/8	.094	.47	.312
3-NW	3/16	.141	.53	.375
4-NW	1/4	.188	.59	.438
5-NW	5/16	.250	.59	.500
6-NW	3/8	.313	.75	.563
8-NW	1/2	.438	.84	.750
10-NW	5/8	.500	1.06	.875
12-NW	3/4	.657	1.13	1.063
16-NW	1"	.906	1.25	1.313

### 45° ELBOW

NW • tube socket—both ends



MATERIAL	*PART No. EXAMPLE
Type 316 STAINLESS STEEL	4-4-ZEBW-SS
STEEL	4-4-ZEBW-S

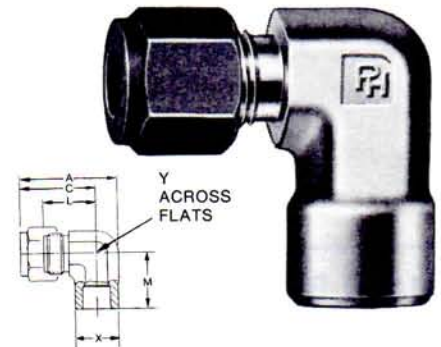
Specify material by part number suffix letter: -SS=Stainless Steel; -S=Steel

\*The fitting in the example would be a 1/4" CPI connection on one end with a 1/4" tube socket for welding on the other end.

Part No.	Tube O.D.	A	C	L	M	X	Y	Min. Bore
2-2-ZEBW	1/8	1.10	.93	.66	.63	.38	.312	.094
3-3-ZEBW	3/16	1.17	.96	.69	.66	.44	.375	.125
4-4-ZEBW	1/4	1.25	1.01	.72	.69	.50	.438	.188
6-6-ZEBW	3/8	1.47	1.15	.84	.91	.63	.563	.281
8-8-ZEBW	1/2	1.82	1.41	.97	1.03	.81	.750	.406
10-10-ZEBW	5/8	1.93	1.45	1.03	1.16	.94	.875	.500
12-12-ZEBW	3/4	2.17	1.58	1.16	1.31	1.13	1.063	.625
16-16-ZEBW	1"	2.53	1.81	1.31	1.47	1.38	1.313	.875

### ELBOW

ZEBW • CPI fitting—socket weld tube end



MATERIAL	*PART No. EXAMPLE
Type 316 STAINLESS STEEL	4-1/8-ZEBW2-SS
STEEL	4-1/8-ZEBW2-S

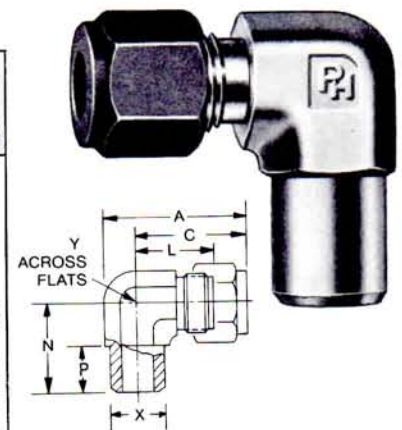
Specify material by part number suffix letter: -SS=Stainless Steel; -S=Steel

\*The fitting in the example would be for 1/4" tubing with 1/8" butt weld pipe on the other end.

Part No.	Tube O.D.	Butt Weld Pipe Size	X Butt Weld O.D.	A	C	L	N	P	Y	Min. Bore
2-1/8-ZEBW2	1/8	1/8	.405	1.10	.93	.66	.72	.38	.313	.094
3-1/8-ZEBW2	3/16	1/8	.405	1.17	.96	.69	.75	.38	.375	.125
4-1/8-ZEBW2	1/4	1/8	.405	1.25	1.01	.72	.78	.38	.438	.188
4-1/4-ZEBW2	1/4	1/4	.540	1.33	1.07	.78	.94	.56	.563	.188
6-1/4-ZEBW2	3/8	1/4	.540	1.47	1.15	.84	1.00	.56	.563	.281
8-3/8-ZEBW2	1/2	3/8	.675	1.82	1.41	.97	1.12	.56	.750	.406
8-1/2-ZEBW2	1/2	1/2	.840	1.95	1.47	1.03	1.31	.75	.875	.406
10-1/2-ZEBW2	5/8	1/2	.840	1.93	1.45	1.03	1.38	.75	.875	.500
12-3/4-ZEBW2	3/4	3/4	1.050	2.17	1.58	1.16	1.50	.75	1.063	.625
16-3/4-ZEBW2	1"	3/4	1.050	2.53	1.81	1.31	1.66	.75	1.313	.875
16-1"-ZEBW2	1"	1"	1.315	2.53	1.81	1.31	1.84	.94	1.313	.875

### ELBOW

ZEBW2 • CPI fitting—butt weld pipe end



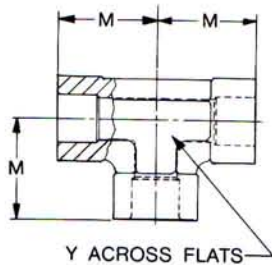
### NOTICE

Only items priced in current supplementary Price List are carried in stock. Price and delivery of non-stock items furnished on request and will depend on quantity ordered.



**TEE**

JW • tube socket end—all 3 ports



Specify material by part number suffix letter: -SS=Stainless Steel; -S=Steel

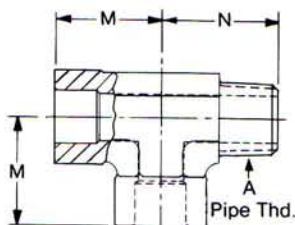
MATERIAL	*PART No. EXAMPLE
Type 316 STAINLESS STEEL	4-JW-SS
STEEL	4-JW-S

\*The fitting in the example would be for 1/4" tubing on all three ends.

Part No.	Tube O.D.	D Min. Bore	M	Y
2-JW	1/8	.094	.63	.312
3-JW	3/16	.141	.66	.375
4-JW	1/4	.188	.69	.438
5-JW	5/16	.250	.75	.500
6-JW	3/8	.313	.91	.563
8-JW	1/2	.438	1.03	.750
10-JW	5/8	.500	1.16	.875
12-JW	3/4	.657	1.31	1.063
16-JW	1"	.906	1.47	1.313
20-JW	1-1/4	1.063	1.75	1.625
24-JW	1-1/2	1.313	1.88	1.875

**MALE RUN TEE**

RW • socket weld—male run tee



Specify material by part number suffix letter: -SS=Stainless Steel; -S=Steel

MATERIAL	*PART No. EXAMPLE
Type 316 STAINLESS STEEL	4-RW-SS
STEEL	4-RW-S

\*The fitting in the example would be for 1/4" tubing, 1/8" male pipe, 1/4" tubing.

Part No.	Tube O.D.	A Male Pipe	D Min. Bore	M	N	Y
2-RW	1/8	1/8	.094	.63	.72	.312
3-RW	3/16	1/8	.140	.66	.72	.375
4-RW	1/4	1/8	.188	.69	.78	.438
5-RW	5/16	1/8	.188	.75	.78	.500
6-RW	3/8	1/4	.281	.91	1.09	.563
8-RW	1/2	3/8	.406	1.03	1.22	.750
10-RW	5/8	1/2	.500	1.16	1.47	.875
12-RW	3/4	3/4	.656	1.31	1.59	1.063
14-RW	7/8	3/4	.719	1.34	1.69	1.188
16-RW	1"	1"	.906	1.47	1.97	1.313
20-RW	1-1/4	1-1/4	1.063	1.75	2.38	1.625
24-RW	1-1/2	1-1/2	1.313	1.88	2.64	1.875
32-RW	2"	2"	1.813	2.38	3.00	2.500

MATERIAL	*PART No. EXAMPLE
Type 316 STAINLESS STEEL	4-SW-SS
STEEL	4-SW-S

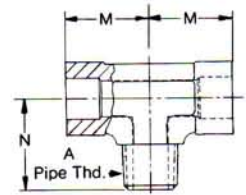
Specify material by part number suffix letter: -SS=Stainless Steel; -S=Steel

\*The fitting in the example would be for 1/4" tubing on the run and 1/8" male pipe thread on the branch.

Part No.	Tube O.D.	A Male Pipe	D Min. Bore	M	N	Y
2-SW	1/8	1/8	.094	.63	.72	.312
3-SW	3/16	1/8	.140	.66	.72	.375
4-SW	1/4	1/8	.188	.69	.78	.438
5-SW	5/16	1/8	.188	.75	.78	.500
6-SW	3/8	1/4	.281	.91	1.09	.563
8-SW	1/2	3/8	.406	1.03	1.22	.752
10-SW	5/8	1/2	.500	1.16	1.47	.875
12-SW	3/4	3/4	.656	1.31	1.59	1.063
14-SW	7/8	3/4	.719	1.34	1.69	1.188
16-SW	1"	1"	.906	1.47	1.97	1.313
20-SW	1-1/4	1-1/4	1.063	1.75	2.38	1.625
24-SW	1-1/2	1-1/2	1.313	1.88	2.64	1.875
32-SW	2"	2"	1.813	2.38	3.00	2.500

## MALE BRANCH TEE

SW • socket weld—male outlet tee



MATERIAL	*PART No. EXAMPLE
Type 316 STAINLESS STEEL	4-KW-SS
STEEL	4-KW-S

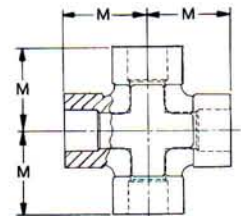
Specify material by part number suffix letter: -SS=Stainless Steel; -S=Steel

\*The fitting in the example would be for 1/4" tubing on all four ends.

Part No.	Tube O.D.	D Min. Bore	M	Y
2-KW	1/8	.094	.63	.312
3-KW	3/16	.141	.66	.375
4-KW	1/4	.188	.69	.438
5-KW	5/16	.250	.75	.500
6-KW	3/8	.313	.91	.563
8-KW	1/2	.438	1.03	.750
10-KW	5/8	.500	1.16	.875
12-KW	3/4	.657	1.31	1.063
16-KW	1"	.906	1.47	1.313

## CROSS

KW • tube socket end—all 4 ports



### NOTICE

Only items priced in current supplementary Price List are carried in stock. Price and delivery of non-stock items furnished on request and will depend on quantity ordered.

**GENERAL**

The weld used in joining a tube to a socket weld tube fitting is like any other type of "tee" weld. The root (i.e., the point of intersection of the outside of the tube and annular end area of the fitting) must be included in the weld zone.

Careful welding procedures are normally followed to assure that this root area is included in the weld. If penetration is not achieved, the joint will have two built-in stress risers which may greatly reduce the strength of the weld. Upon application of an extreme load, these stress risers could result in cracks which could propagate out through the weld or tube depending upon the direction of the greatest load.

Often to achieve full root penetration in TIG welding of stainless steels, a fusion pass will be made first, followed by a final pass utilizing a filler rod to achieve the desired fillet size.

**ASSEMBLY**

The codes applicable to the welding of socket weld fittings require that the tube be inserted into the socket until bottomed against the stop. The tube is then to be backed out approximately 1/16 of an inch and then welded.

If the tube is not backed out, but welded when against a flat bottom stop, the contraction of the weld fillet and fitting socket can combine to produce a static stress on the weld. During thermal transients, the fitting and the portion of the tube within the fitting may experience a differential rate of heating or cooling, again adding to the stress level in the weld.

**TACKING**

If the weld joint is to be "tacked" before welding, it is recommended that the "tack" weld buildup be held to a minimum.

Excessive weld buildup on the "tack" may cause an interrupted final bead and a stress riser or lack of complete fusion.

**BACKING GAS**

Backing gas is an inert gas used to flood the interior of the fittings and tube system during welding. It serves the same purpose internally as the shielding gas used in TIG or MIG welding. By reducing the interior oxygen level to as low as practicable, it also serves to control the combustion of contaminants that could affect weld quality.

When a backing gas is not used and nearly 100% weld penetration is achieved, blisters will tend to form on the internal tube wall. This will result in scale which may later break loose. Therefore, in 0.050 wall or thinner tube or where the wall thickness is such that the selected weld process may burn through, the use of a backing gas is mandatory.

In most cases the backing gas will be argon or helium connected to the system through a control regulator. Flow rates, while small, should be high enough to purge the system. Welds should be made in downstream sequence from the gas connection.

Note that the entire system should be purged to insure that there are no openings that will allow air to be drawn into the system.

The use of backing gas, while often not mandatory, will give a better weld joint. This is because the effects of contaminate combustion by-products are eliminated and because the welds are made and cooled under a shielded atmosphere, thus eliminating internal scaling or blistering.

**WELDING METHODS****300 SERIES STAINLESS STEELS**

may be welded by the TIG, MIG, or stick arc-weld process.

TIG welding is recommended as being best for welding Weld-lok systems because it allows better operator control of heat penetration and filler material deposition.

Stick arc welding is not recommended in many cases because of the likelihood of excessive burn-through and improper root penetration. In all cases where stick welding is used, it is recommended that backing gas be used.

MIG welding gives the same characteristics as stick electrode welding with faster deposition of the filler material. As this process runs "hotter" than the stick process, the use of a backing gas is mandatory. It should be noted that in welding the relatively small fitting sizes found in the Weld-lok line, filler deposition rate economies are not a factor and therefore the MIG method is not commonly applied.

**C1018 STEEL FITTINGS**

may be welded by the TIG, MIG, stick and oxyacetylene methods. As scale formation remains a problem, the use of a backing gas is still recommended.

**CARBIDE PRECIPITATION**

When unstabilized stainless steels are heated to 800-1500 degrees F. during welding, the chromium in the steel combines with the carbon to form chrome carbides which tend to form along the grain boundaries of the metal (carbide precipitation). This lowers the dissolved chromium content in these areas and thus lowers their corrosion resistance, making them vulnerable to intergranular corrosion. Carbide precipitation is reduced by holding the carbon content of the material to a very low value. This limits the amount of carbon available to combine with the chromium. The "L" series (extra low carbon) stainless steels are often used for this purpose, but their use reduces system design stress by approximately 15%. Parker Weld-lok fittings are made from a select 316 series with carbon content in the low range of 0.04 to 0.07 percent. This results in a welded fitting with good corrosion resistance and a high strength factor.

All Parker Weld-lok fittings in stainless steel are supplied in the solution-treated condition, capable of passing ASTM-A-262 Tests for Detecting Susceptibility to Intergranular Corrosion.

**ARC POLARITY**

When welding Weld-lok fittings, best results will be obtained by the following arc polarities:

- TIG —Direct Current, straight polarity
- MIG —Direct Current, reverse polarity
- STICK—Polarity dependent on rod used.

(-) Not recommended

## WELDING RECOMMENDATIONS FOR WELD-LOK FITTINGS

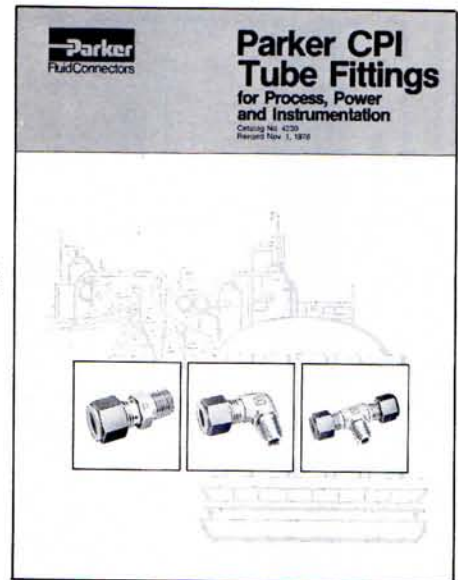
These are typical values and may vary with different equipment and operator skill.

Fitting Size		.035-.049 Wall Tube			.065-.083 Wall Tube			.095-.120 Wall Tube			.120-.188 Wall Tube						
No.	In.	Wire Size	No. Passes	Amps	Volts	Wire Size	No. Passes	Amps	Volts	Wire Size	No. Passes	Amps	Volts	Wire Size	No. Passes	Amps	Volts
<b>TIG METHOD</b>																	
2	1/8	.030	1	30	10	-	-	-	-	-	-	-	-	-	-	-	-
3	3/16	.030	1	30	10	.030	1	40	10	-	-	-	-	-	-	-	-
4	1/4	.030	1	30	10	.030	1	40	10	-	-	-	-	-	-	-	-
5	5/16	.030	1	30	10	.030	1	40	10	-	-	-	-	-	-	-	-
6	3/8	.030	1	30	10	.030	1	40	10	-	-	-	-	-	-	-	-
8	1/2	.030	1	40	10	.035	2	50	10	.035	2	50	10	.035	2	50	10
10	5/8	.030	1	40	10	.035	2	50	10	.035	2	50	10	.035	2	50	10
12	3/4	-	-	-	-	.045	2	55	10	.045	2	55	10	.045	2	55	10
14	7/8	-	-	-	-	.045	2	55	10	.045	2	55	10	.045	2	55	10
16	1"	-	-	-	-	.045	2	55	10	.045	2	55	10	.045	2	55	10
20	1-1/4	-	-	-	-	.045	2	55	10	.045	2	55	10	.060	3	75	11
24	1-1/2	-	-	-	-	.045	2	55	10	.045	2	55	10	.060	3	75	11
32	2"	-	-	-	-	.045	2	55	10	.045	2	55	10	.060	3	75	11
<b>MIG METHOD</b>																	
2-10	1/8-5/8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	3/4	-	-	-	-	-	-	-	-	-	-	-	-	.035	1	175	21
14	7/8	-	-	-	-	-	-	-	-	-	-	-	-	.035	1	175	21
16	1"	-	-	-	-	.035	1	140	19	.035	1	150	20	.035	1	175	21
20	1-1/4	-	-	-	-	.035	1	140	19	.035	1	150	20	.035	2	175/150	21/20
24	1-1/2	-	-	-	-	.035	1	140	19	.035	1	150	20	.035	2	175/150	21/20
32	2"	-	-	-	-	.035	1	140	19	.035	1	150	20	.035	2	175	21
<b>STICK METHOD</b>																	
2-6	1/8-3/8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	1/2	-	-	-	-	5/64	1	40	-	3/32	1	55	-	-	-	-	-
10	5/8	-	-	-	-	5/64	1	40	-	3/32	1	55	-	-	-	-	-
12	3/4	-	-	-	-	3/32	1	55	-	3/32	2	55	-	3/32	3	55	-
14	7/8	-	-	-	-	3/32	1	55	-	3/32	2	55	-	3/32	3	55	-
16	1"	-	-	-	-	3/32	1	55	-	3/32	2	55	-	1/8	2	85	-
20	1-1/4	-	-	-	-	3/32	2	55	-	3/32	3	55	-	1/8	2	85	-
24	1-1/2	-	-	-	-	3/32	2	55	-	3/32	3	55	-	1/8	2	85	-
32	2"	-	-	-	-	3/32	2	55	-	3/32	3	55	-	1/8	3	85	-

## CPI TUBE FITTINGS

(Catalog 4230)

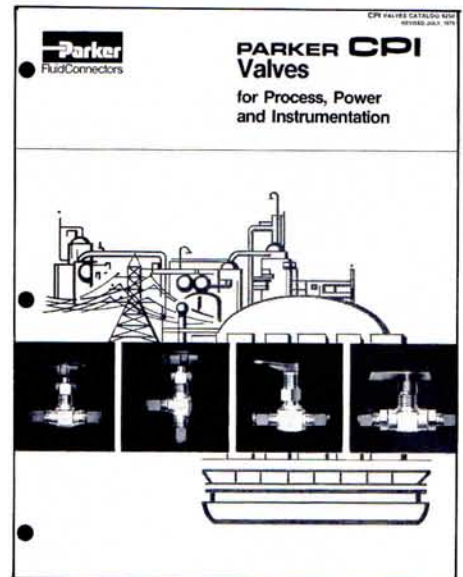
Designed specifically for use by the Chemical Process Industries, CPI Fittings are also used to meet high-quality tube fitting requirements. Catalog includes a complete visual index, ordering information, assembly instructions, drawings and sizing information, plus brief descriptions of tube working tools.



## CPI VALVES

(Catalog 4250)

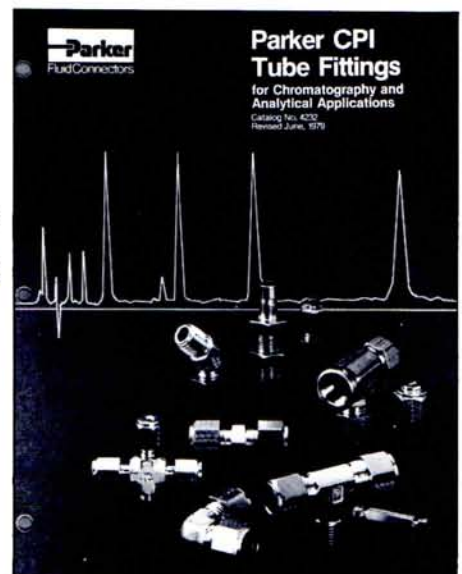
Complete information concerning water and airflow characteristics is combined with general feature information, sizing and dimension drawings, ordering information and installation procedures for CPI Valves, which feature positive performance and rugged simplicity, assuring long maintenance-free life. Included in the line are regular (shutoff and gross metering), needle (shutoff and metering) and Kel-F (for low-viscosity gases and vacuum) valves.



## ANALYTICAL & CHROMATOGRAPHY TUBE FITTINGS

(Catalog 4232)


Complete information on Parker CPI fittings design specifically to meet the most stringent demands of modern chromatography and other analytical applications.



ADAPTERS CATALOG 4260  
REVISED 1971

## Pipe Thread Adapters

FOR PROCESS, POWER & INSTRUMENTATION



**PARKER HANNIFIN**

## PIPE THREAD ADAPTERS

(Catalog 4260)

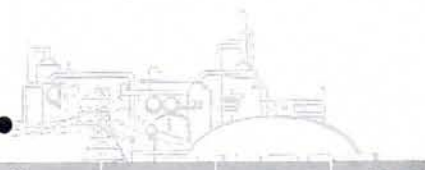

Pipe thread and straight adapters precision machined from forgings and bar stock of brass, steel or stainless steel. Sizing information, O-ring dimensions and suitability charts, complete line selection chart of connectors, nipples, reducers, plugs, elbows, tees and crosses, plus ordering information.

Catalog No. 4290

**Parker**  
FluidConnectors

## PARKER CPI Tube Fabricating Equipment

FOR PROCESS, POWER  
& INSTRUMENTATION

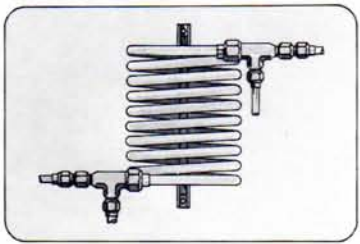
## TUBE FABRICATING EQUIPMENT

(Catalog 4290)

Tube fabricating equipment and accessories designed to meet strong, accurate tubing systems easier and surer, are explained. Use and operation of equipment are described for cutters, benders and a pre-setting tool.

Catalog 4295  
Revised May, 1975

## PARKER DUAL HEAT TRANSFER COILS



Parker Dual Heat Transfer Coils are rugged, high efficiency, counter-flow heat exchangers for cooling high temperature, high pressure fluid samples such as boiler steam, boiler feed water, superheat steam, hot chemical solutions and other process fluids.

They allow the operator to withdraw uncontaminated samples of a process fluid for laboratory testing at room temperature. Coils can also be used in continuous sampling systems for on-line process control.

**RUGGED CONSTRUCTION** — The sturdy tube within a tube design features heavy duty tapered internal fittings.

**SIMPLE INSTALLATION** — Convenient two-hole mounting bracket permits coil to be located near the point of measurement.

**NO PIPE THREAD JOINTS** — Terminal fittings are designed for flared, flared or welded spherical tube connections. Contamination of sample from pipe thread sealants is eliminated.

**FORCED COUNTERFLOW** — Insures maximum thermal efficiency.

**ASME CODE DESIGN** — Pressure and temperature ratings conform to the applicable ASME Boiler Code allowable stress values.

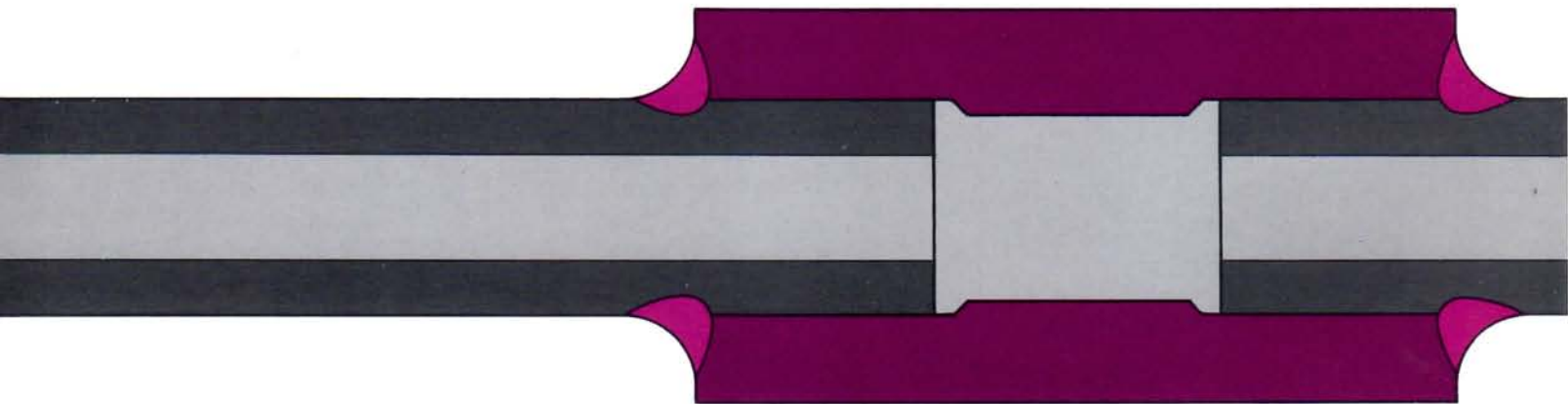
TUBE FITTINGS DIVISION

## DUAL HEAT TRANSFER COILS

(Catalog 4295)

Parker Dual Heat Transfer Coils are rugged, high efficiency, counter-flow heat exchangers for cooling high temperature, high pressure fluid samples such as boiler steam, boiler feed water, superheat steam, hot chemical solutions and other process fluids.

They allow the operator to withdraw uncontaminated samples of a process fluid for laboratory testing at room temperature. Coils can also be used in continuous sampling systems for on-line process control.



**Parker Hannifin Corporation  
Instrumentation Connectors Division**

9400 S. Memorial Pkwy.  
Huntsville, Alabama 35802








MATERIALS: Brass • Type 316 Stainless Steel • Steel

**NOTE:** Not all of the fittings shown in Catalog 4260 are carried in standard stock. Please check current price lists for standard items.

Price and delivery of non-stock items will be furnished on request. These prices and delivery will depend on quantity ordered.

**PARKER CPI**

**Fittings &**  
**Valves**



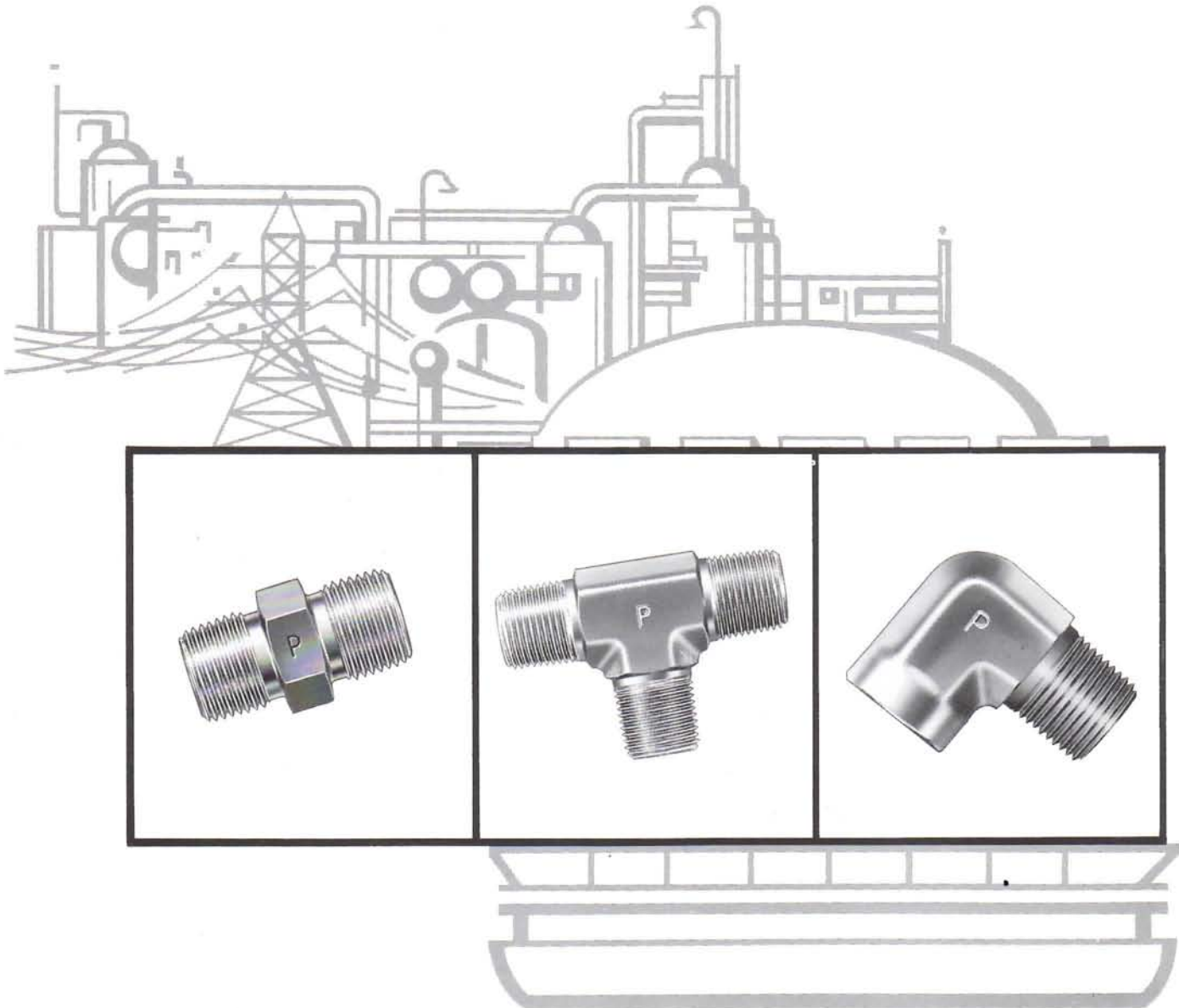
**FOR PROCESS, POWER  
& INSTRUMENTATION**



# Parker CPI Instrument Pipe Fittings

for Process, Power  
and Instrumentation

Catalog 4260  
Revised January, 1982



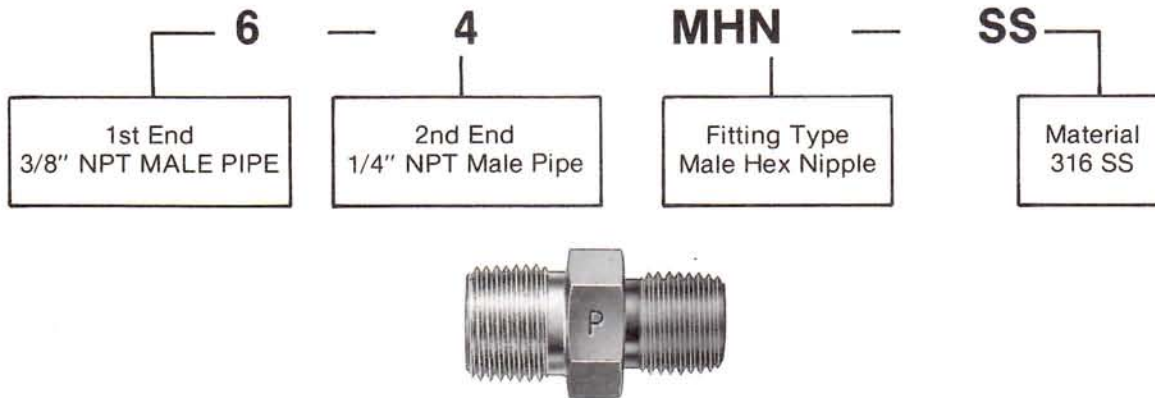
## Parker Instrument Pipe Fittings Description

<p><b>MHLN</b> male hex long nipple</p>  <p>page 4</p>	<p><b>FHC</b> female hex coupling</p>  <p>page 6</p>	<p><b>FVE</b> female elbow 45°</p>  <p>page 7</p>	<p><b>FT</b> female tee</p>  <p>page 9</p>	<p><b>CP</b> pipe cap</p>  <p>page 11</p>
<p><b>RA</b> adapter</p>  <p>page 4</p>	<p><b>RB</b> reducing bushing</p>  <p>page 6</p>	<p><b>SE</b> street elbow</p>  <p>page 8</p>	<p><b>ST</b> street tee</p>  <p>page 9</p>	<p><b>PH</b> hex head plug</p>  <p>page 11</p>
<p><b>MCN</b> male close nipple</p>  <p>page 5</p>	<p><b>ME</b> male elbow</p>  <p>page 7</p>	<p><b>SVE</b> street elbow 45°</p>  <p>page 8</p>	<p><b>MBT</b> male branch tee</p>  <p>page 10</p>	<p><b>PHH</b> hollow hex plug</p>  <p>page 11</p>
<p><b>MHN</b> male hex nipple</p>  <p>page 5</p>	<p><b>FE</b> female elbow</p>  <p>page 7</p>	<p><b>FX</b> female cross</p>  <p>page 9</p>	<p><b>MT</b> male tee</p>  <p>page 10</p>	

### Nomenclature

Parker Instrument Pipe Fittings part numbers are constructed from symbols that identify the size and style of the fitting and

material used. Example: The part number shown below is for a male hex nipple for 3/8" NPT male pipe and 1/4" NPT male pipe in 316 stainless steel.



## How To Order

Parker Instrument Pipe Fittings are ordered by part number as listed in this catalog.

**Size:** Pipe thread sizes are designated by the number of sixteenths of an inch. (3/8 NPT pipe = 6/16 = 6)

**Thread Type:** All pipe threads are National Pipe Taper (NPT) unless otherwise designated.

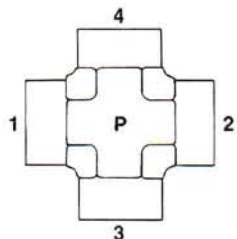
**Straights and Elbows:** Call out the largest pipe end first followed by the smaller pipe size. See MHN example on page 2.

**Tees and Crosses:** For tees that are the same pipe sizes on all ends the size designation is as follows: 6-6-6 FT-B would be a 3/8" NPT Female Tee in brass.

A 1/4" NPT Female Cross in 316 SS would be a 4FX-SS.

If a reducing tee or cross were specified, each size must be in sequence. First size the largest run (1 to 2) and then the branch (3 to 4).

Example: 6-6-6-4 FX-SS



**Material:** Basic Material Type (B= Brass, SS= 316 Stainless Steel, S = Steel)

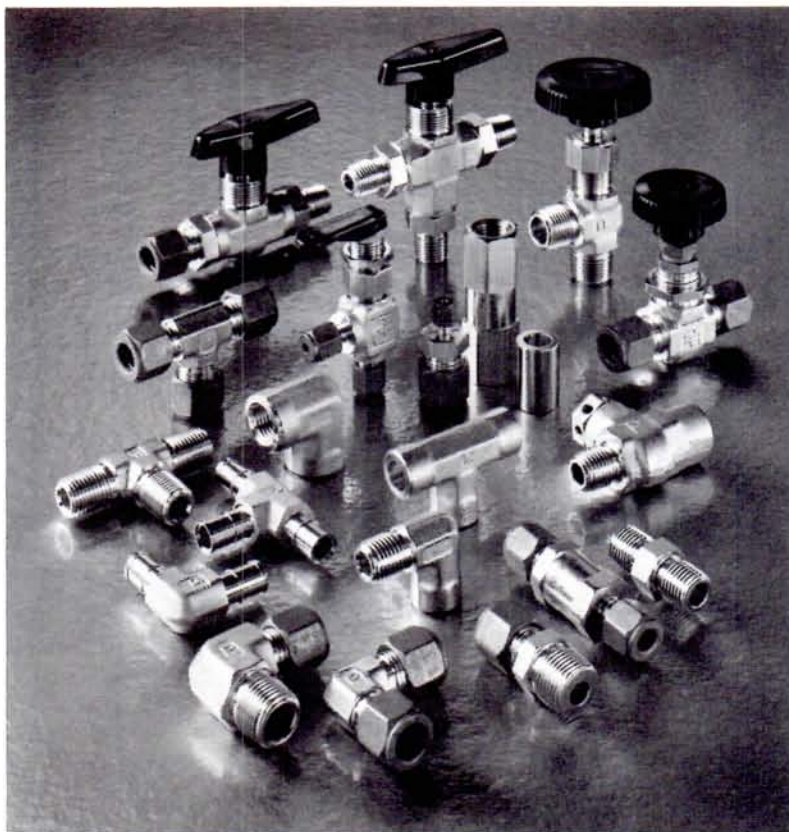
**Availability:** Only items priced in current price list 4260 are carried in stock. Price and delivery for special configurations or materials furnished on request for quantity specified.

## Features and Technical Data

Parker Instrument Pipe Fittings are precision machined from forgings for elbows, tees and crosses and from bar stock for straight connectors. They are designed to be used for process control and instrumentation connections between pipe sizes and tube sizes.

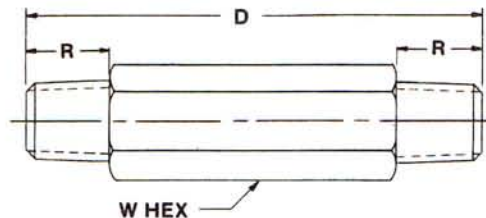
### Features:

- Quality engineered for instrumentation applications
- Packaged in sealed, clear plastic shrink wrapped boxes for cleanliness.
- Working pressures calculated in accordance with Power Piping Code ANSI B31.1 and Refiner Piping Code ANSI B31.3.
- All pipe threads are National Pipe Taper (NPT) and exceed the requirements of ANSI B2.1 (1968).
- Rolled male threads for extra strength
- Straight bodies machined from applicable ASTM bar stock specifications.
- Shapes machined from close grain forgings.
- Size ranges from 1/16" through 2" NPT
- Materials—316 Stainless Steel, Brass and Steel. (Other materials by special order)
- All exposed threads protected to prevent damage.



Contact your local Parker Instrumentation Products Distributor for our complete line.

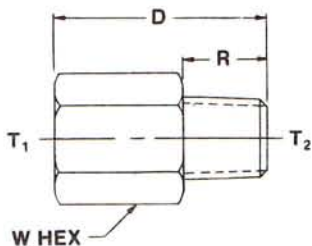
### male hex long nipple MHLN



Part No.	NPT Thread Male		W Hex	D		R		Working Pressures (PSIG)		
	T <sub>1</sub>	T <sub>2</sub>		in.	mm	in.	mm	Brass	Stainless Steel	Steel
1-1 MHLN-(*)	1/16	1/16	7/16	*		.38	9.7	6000	9800	10500
2-2 MHLN-(*)	1/8	1/8	7/16	*		.38	9.7	5600	9100	9700
2-2 MHLN-1½	1/8	1/8	7/16	1.50	35.10	.38	9.7	5600	9100	9700
2-2 MHLN-2	1/8	1/8	7/16	2.00	50.8	.38	9.7	5600	9100	9700
2-2 MHLN-2½	1/8	1/8	7/16	2.50		.38	9.7	5600	9100	9700
4-4 MHLN-(*)	1/4	1/4	5/8	*		.56	14.2	4100	7500	8000
4-4 MHLN-1½	1/4	1/4	5/8	1.50	35.10	.56	14.2	4100	7500	8000
4-4 MHLN-2	1/4	1/4	5/8	2.00	50.8	.56	14.2	4100	7500	8000
4-4 MHLN-2½	1/4	1/4	5/8	2.50	64.00	.56	14.2	4100	7500	8000
4-4 MHLN-3	1/4	1/4	5/8	3.00	76.20	.56	14.2	4100	7500	8000
4-4 MHLN-4	1/4	1/4	5/8	4.00	102.0	.56	14.2	4100	7500	8000
6-6 MHLN-(*)	3/8	3/8	3/4	*		.56	14.2	4000	7200	7600
8-8 MHLN-(*)	1/2	1/2	7/8	*		.75	19.1	3900	6600	7000
8-8 MHLN-2	1/2	1/2	7/8	2.00	50.8	.75	19.1	3900	6600	7000
8-8 MHLN-3	1/2	1/2	7/8	3.00	76.20	.75	19.1	3900	6600	7000

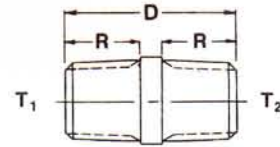
\*Specify Length

### adapter RA



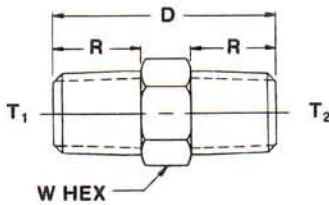
Part No.	NPT Thread		W Hex	D		R		Working Pressures (PSIG)		
	Female T <sub>1</sub>	Male T <sub>2</sub>		in.	mm	in.	mm	Brass	Stainless Steel	Steel
2-1 RA	1/8	1/16	5/8	1.03	26.20	.38	9.7	4000	6400	6800
2-2 RA	1/8	1/8	5/8	1.03	26.20	.38	9.7	4000	6400	6800
4-1 RA	1/4	1/16	3/4	1.22	31.00	.38	9.7	4300	6300	6800
4-2 RA	1/4	1/8	3/4	1.22	31.00	.38	9.7	4300	6600	7000
4-4 RA	1/4	1/4	3/4	1.40	35.60	.38	9.7	4300	6600	7000
6-1 RA	3/8	1/16	7/8	1.50	38.10	.38	9.7	3500	5000	5400
6-2 RA	3/8	1/8	7/8	1.44	36.60	.38	9.7	3500	5300	5600
6-4 RA	3/8	1/4	7/8	1.44	36.60	.56	14.2	3500	5300	5600
6-6 RA	3/8	3/8	7/8	1.44	36.60	.38	9.7	3500	5300	5600
8-2 RA	1/2	1/8	1-1/8	1.50	38.10	.38	9.7	3600	5200	5500
8-4 RA	1/2	1/4	1-1/8	1.69	43.00	.56	14.2	3600	5200	5500
8-6 RA	1/2	3/8	1-1/8	1.69	43.00	.56	14.2	3600	5200	5500
8-8 RA	1/2	1/2	1-1/8	1.88	47.80	.56	14.2	3600	5200	5500
12-2 RA	3/4	1/8	1-3/8	1.66	42.20	.38	9.7	3000	4300	4600
12-4 RA	3/4	1/4	1-3/8	1.78	45.21	.56	14.2	3000	4300	4600
12-6 RA	3/4	3/8	1-3/8	1.78	45.21	.56	14.2	3000	4300	4600
12-8 RA	3/4	1/2	1-3/8	1.94	49.30	.75	19.1	3000	4300	4600
16-2 RA	1	1/8	1-5/8	1.94	49.30	.38	9.7	3100	4500	4800
16-4 RA	1	1/4	1-5/8	2.13	54.10	.38	9.7	3100	4500	4800
16-6 RA	1	3/8	1-5/8	2.00	50.8	.56	14.2	3100	4500	4800
16-8 RA	1	1/2	1-5/8	2.16	54.90	.75	19.1	3100	4500	4800
16-12 RA	1	3/4	1-5/8	2.19	55.70	.75	19.1	3100	4500	4800
20-16 RA	1-1/4	1	2	2.47	62.8	.94	23.9	2300	3500	3700

male close nipple  
MCN

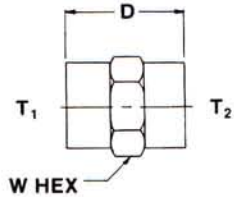


Part No.	NPT Thread Male	D		R		Working Pressures (PSIG)		
		in.	mm	in.	mm	Brass	Stainless Steel	Steel
1-1 MCN	1/16	.75	19.1	.38	9.7	6000	9800	10500
2-2 MCN	1/8	.75	19.1	.38	9.7	5600	9100	9700
4-4 MCN	1/4	1.13	28.6	.56	14.2	4100	7500	8000
6-6 MCN	3/8	1.13	28.6	.56	14.2	4000	7200	7600
6-6 MCN	1/2	1.50	38.1	.56	14.2	3900	6600	7000
12-12 MCN	3/4	1.50	38.1	.75	19.1	6400	6400	6800
16-16 MCN	1	1.88	47.6	.94	23.9	2700	4600	4900

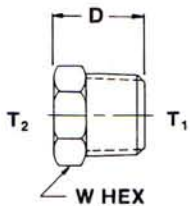
male hex nipple  
MHN



Part No.	NPT Thread		W Hex	D		R		Working Pressures (PSIG)		
	Male T <sub>1</sub>	Male T <sub>2</sub>		in.	mm	in.	mm	Brass	Stainless Steel	Steel
1-1 MHN	1/16	1/16	7/16	1.06	27.00	.38	9.7	6000	10000	10700
2-1 MHN	1/8	1/16	7/16	1.06	27.00	.38	9.7	5600	9100	9700
2-2 MHN	1/8	1/8	7/16	1.06	27.00	.38	9.7	5600	9100	9700
4-1 MHN	1/4	1/16	5/8	1.25	31.80	.56/.38	14.2/9.7	4100	7500	8000
4-2 MHN	1/4	1/8	5/8	1.25	31.80	.56/.38	14.2/9.7	4100	7500	8000
4-4 MHN	1/4	1/4	5/8	1.45	37.00	.56	14.2	4100	7500	8000
6-1 MHN	3/8	1/16	3/4	1.27	32.30	.56/.38	14.2/9.7	4000	7200	7600
6-2 MHN	3/8	1/8	3/4	1.27	32.30	.56/.38	14.2/9.7	4000	7200	7600
6-4 MHN	3/8	1/4	3/4	1.45	37.00	.56	14.2	4000	7200	7600
6-6 MHN	3/8	3/8	3/4	1.45	37.00	.56	14.2	4000	7200	7600
8-2 MHN	1/2	1/8	7/8	1.51	38.40	.75/.38	19.1/9.7	3900	6600	7000
8-4 MHN	1/2	1/4	7/8	1.70	43.20	.75/.56	19.1/14.2	3900	6600	7000
8-6 MHN	1/2	3/8	7/8	1.70	43.20	.75/.56	19.1/14.2	3900	6600	7000
8-8 MHN	1/2	1/2	7/8	1.89	48.00	.75	19.1	3900	6600	7000
12-2 MHN	3/4	1/8	1-1/8	1.50	38.10	.75/.38	19.1/9.7	3800	6400	6800
12-4 MHN	3/4	1/4	1-1/8	1.78	45.21	.75/.38	19.1/9.7	3800	6400	6800
12-6 MHN	3/4	3/8	1-1/8	1.78	45.21	.75/.56	19.1/14.2	3800	6400	6800
12-8 MHN	3/4	1/2	1-1/8	1.97	50.03	.75	19.1	3800	6400	6800
12-12 MHN	3/4	3/4	1-1/8	1.97	50.03	.75	19.1	3800	6400	6800
16-2 MHN	1	1/8	1-3/8	1.78	45.21	.94/.38	23.9/9.7	2700	4600	4900
16-4 MHN	1	1/4	1-3/4	1.97	50.03	.94/.38	23.9/9.7	2700	4600	4900
16-6 MHN	1	3/8	1-3/4	1.97	50.03	.94/.56	23.9/14.2	2700	4600	4900
16-8 MHN	1	1/2	1-3/4	2.16	54.90	.94/.75	23.9/19.1	2700	4600	4900
16-12 MHN	1	3/4	1-3/4	2.16	54.90	.94/.75	23.9/19.1	2700	4600	4900
16-16 MHN	1	1	1-3/8	2.34	59.43	.94	23.9	2700	4600	4900
20-16 MHN	1-1/4	1	1-3/4	2.45	62.23	.97/.94	24.6/23.9	2000	3500	3700
20-20 MHN	1-1/4	1-1/4	1-3/4	2.48	63.00	.97	24.6	2000	3500	3700
24-24 MHN	1-1/2	1-1/2	2	2.61	66.30	1.00	25.4	1800	2900	3100

female hex coupling  
FHC

Part No.	NPT Thread Female		W Hex	D		Working Pressures (PSIG)		
	T <sub>1</sub>	T <sub>2</sub>		in.	mm	Brass	Stainless Steel	Steel
1-1 FHC	1/16	1/16	7/16	.75	19.1	4500	7500	8000
2-1 FHC	1/8	1/16	5/8	.75	19.1	4000	6000	6300
2-2 FHC	1/8	1/8	5/8	.75	19.1	4000	6400	6800
4-1 FHC	1/4	1/16	3/4	.94	23.90	4300	6300	6800
4-2 FHC	1/4	1/8	3/4	.94	23.90	4300	6600	7000
4-4 FHC	1/4	1/4	3/4	1.13	28.70	4300	6600	7000
6-1 FHC	3/8	1/16	7/8	1.03	26.20	3500	5000	5400
6-2 FHC	3/8	1/8	7/8	1.03	26.20	3500	5000	5400
6-4 FHC	3/8	1/4	7/8	1.13	28.70	3500	5300	5600
6-6 FHC	3/8	3/8	7/8	1.13	28.70	3500	5300	5600
8-2 FHC	1/2	1/8	1-1/8	1.56	39.70	3600	5200	5500
8-4 FHC	1/2	1/4	1-1/8	1.38	35.10	3600	5200	5500
8-6 FHC	1/2	3/8	1-1/8	1.50	38.10	3600	5200	5500
8-8 FHC	1/2	1/2	1-1/8	1.50	38.10	3600	5200	5500
12-2 FHC	3/4	1/8	1-3/8	1.63	41.40	3000	4300	4600
12-4 FHC	3/4	1/4	1-3/8	1.75	44.50	3000	4300	4600
12-6 FHC	3/4	3/8	1-3/8	1.75	44.50	3000	4300	4600
12-8 FHC	3/4	1/2	1-3/8	1.88	47.80	3000	4300	4600
12-12 FHC	3/4	3/4	1-3/8	1.53	38.90	3000	4300	4600
16-2 FHC	1	1/8	1-5/8	1.31	33.30	3100	4500	4800
16-4 FHC	1	1/4	1-5/8	1.44	36.60	3100	4500	4800
16-6 FHC	1	3/8	1-5/8	1.44	36.60	3100	4500	4800
16-8 FHC	1	1/2	1-5/8	1.66	42.20	3100	4500	4800
16-12 FHC	1	3/4	1-5/8	1.66	42.20	3100	4500	4800
16-16 FHC	1	1	1-5/8	1.89	48.00	3100	4500	4800
20-16 FHC	1-1/4	1	2	1.94	49.30	2300	3500	3700
20-20 FHC	1-1/4	1-1/4	2	1.94	49.30	2300	3500	3700
24-24 FHC	1-1/2	1-1/2	2-3/8	1.94	49.30	2100	3200	3400

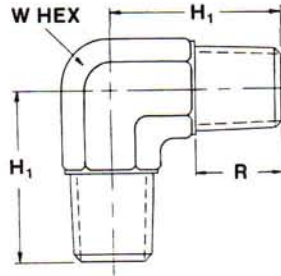
reducing bushing  
RB

Part No.	NPT Thread		W Hex	D		Working Pressures (PSIG)		
	Male T <sub>1</sub>	Female T <sub>2</sub>		in.	mm	Brass	Stainless Steel	Steel
2-1 RB	1/8	1/16	7/16	.63	16.00	2900	6400	6800
4-1 RB	1/4	1/16	5/8	.84	21.33	5600	9000	9600
4-2 RB	1/4	1/8	5/8	.84	21.33	3600	6000	6400
6-1 RB	3/8	1/16	3/4	.84	21.33	6900	11500	12200
6-2 RB	3/8	1/8	3/4	.84	21.33	4900	8000	8500
6-4 RB	3/8	1/4	3/4	.84	21.33	3000	5300	5600
8-2 RB	1/2	1/8	7/8	1.09	27.70	6900	11500	12200
8-4 RB	1/2	1/4	7/8	1.09	27.70	4900	8000	8500
8-6 RB	1/2	3/8	7/8	1.09	27.70	2800	4600	4900
12-2 RB	3/4	1/8	1-1/8	1.17	29.71	7400	12500	13300
12-4 RB	3/4	1/4	1-1/8	1.17	29.71	6400	11100	11800
12-6 RB	3/4	3/8	1-1/8	1.17	29.71	4700	7700	8200
12-8 RB	3/4	1/2	1-1/8	1.17	29.71	2800	4900	5200
16-2 RB	1	1/8	1-3/8	1.36	35.54	8000	13500	14400
16-4 RB	1	1/4	1-3/8	1.36	35.54	7300	13000	14000
16-6 RB	1	3/8	1-3/8	1.36	35.54	6400	11000	11800
16-8 RB	1	1/2	1-3/8	1.36	35.54	4700	7500	8000
16-12 RB	1	3/4	1-3/8	1.36	35.54	2500	4200	4500
20-12 RB	1-1/4	3/4	1-3/4	1.48	37.60	4700	7500	8000
20-16 RB	1-1/4	1	1-3/4	1.48	37.60	2800	4500	4800
24-16 RB	1-1/2	1	2	1.56	39.60	3900	6200	6600
24-20 RB	1-1/2	1-1/4	2	1.56	39.60	1700	2700	2800

male elbow  
ME



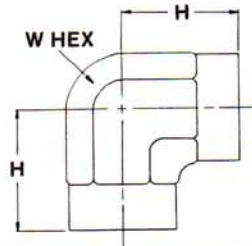
Part No.	NPT Thread Male	W Hex	H		R		Working Pressures (PSIG)		
			in.	mm	in.	mm	Brass	Stainless Steel	Steel
1-1 ME	1/16	5/16	.72	18.30	.38	9.7	5500	9500	10100
2-2 ME	1/8	7/16	.78	19.81	.38	9.7	5000	9100	9700
4-4 ME	1/4	9/16	1.09	27.70	.56	14.2	4100	7500	8000
6-6 ME	3/8	3/4	1.22	31.00	.56	14.2	4000	7200	7600
8-8 ME	1/2	7/8	1.47	37.33	.75	19.1	3100	5800	6200
12-12 ME	3/4	1-1/16	1.59	40.40	.75	19.1	3400	6400	6800
16-16 ME	1	1-5/16	1.97	50.03	.94	23.9	2700	4600	4900



female elbow  
FE



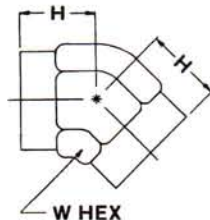
Part No.	NPT Thread Female	W Hex	H		Working Pressures (PSIG)		
			in.	mm	Brass	Stainless Steel	Steel
1-1 FE	1/16	7/16	.50	12.70	3800	7000	7500
2-2 FE	1/8	9/16	.66	16.80	2900	5500	5900
4-4 FE	1/4	3/4	.88	22.40	3000	5600	6000
6-6 FE	3/8	7/8	1.02	26.00	2700	5000	5300
8-8 FE	1/2	1-1/16	1.23	31.24	2500	4500	4800
12-12 FE	3/4	1-5/16	1.36	34.54	2000	3500	3700
16-16 FE	1	1-5/8	1.63	41.40	2300	3900	4200
20-20 FE	1-1/4	1-7/8	1.70	43.20	1900	3100	3300
24-24 FE	1-1/2	2-1/2	2.08	52.83	1700	2500	2600



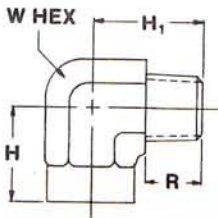
female elbow 45°  
FVE



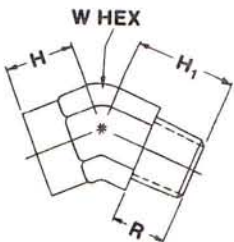
Part No.	NPT Thread Female	W Hex	H		Working Pressures (PSIG)		
			in.	mm	Brass	Stainless Steel	Steel
1-1 FVE	1/16	7/16	.47	11.9	3800	7000	7500
2-2 FVE	1/8	9/16	.50	12.70	2900	5500	5900
4-4 FVE	1/4	3/4	.69	17.52	3000	5600	6000
6-6 FVE	3/8	7/8	.75	19.1	2700	5000	5300
8-8 FVE	1/2	1-1/16	.94	23.90	2500	4500	4800
12-12 FVE	3/4	1-5/16	1.00	25.4	2000	3500	3700
16-16 FVE	1	1-5/8	1.19	30.22	2300	3900	4200





street elbow  
SE

Part No.	NPT Thread		W Hex	H		H <sub>1</sub>		R		Working Pressures (PSIG)		
	Male	Female		in.	mm	in.	mm	in.	mm	Brass	Stainless Steel	Steel
1-1 SE	1/16	1/16	9/16	.50	12.70	.72	18.30	.38	9.7	3800	7000	7500
2-1 SE	1/8	1/16	9/16	.61	16.80	.78	19.81	.38	9.7	2900	5500	5900
2-2 SE	1/8	1/8	9/16	.66	16.80	.78	19.81	.38	9.7	2900	5500	5900
4-1 SE	1/4	1/16	9/16	.88	22.40	.91	23.11	.38	9.7	3000	5600	6000
4-2 SE	1/4	1/8	9/16	.88	22.40	.91	23.11	.38	9.7	3000	5600	6000
4-4 SE	1/4	1/4	3/4	.88	22.40	1.09	27.70	.56	14.2	3000	5600	6000
6-1 SE	3/8	1/16	3/4	1.02	26.00	1.03	26.20	.38	9.7	2700	5000	5300
6-2 SE	3/8	1/8	3/4	1.02	26.00	1.03	26.20	.38	9.7	2700	5000	5300
6-4 SE	3/8	1/4	3/4	1.02	26.00	1.22	31.00	.56	14.2	2700	5000	5300
6-6 SE	3/8	3/8	7/8	1.02	26.00	1.22	31.00	.56	14.2	2700	5000	5300
8-2 SE	1/2	1/8	7/8	1.23	31.24	1.09	27.70	.38	9.7	2500	4500	4800
8-4 SE	1/2	1/4	7/8	1.23	31.24	1.25	31.80	.38	9.7	2500	4500	4800
8-6 SE	1/2	3/8	7/8	1.23	31.24	1.25	31.80	.56	14.2	2500	4500	4800
8-8 SE	1/2	1/2	1-1/16	1.23	31.24	1.47	37.33	.75	19.1	2500	4500	4800
12-2 SE	3/4	1/8	1-1/16	1.36	34.54	1.22	26.00	.38	9.7	2000	3500	3700
12-4 SE	3/4	1/4	1-1/16	1.36	34.54	1.38	35.10	.38	9.7	2000	3500	3700
12-6 SE	3/4	3/8	1-1/16	1.36	34.54	1.38	35.10	.56	14.2	2000	3500	3700
12-8 SE	3/4	1/2	1-1/16	1.36	34.54	1.59	40.40	.75	19.1	2000	3500	3700
12-12 SE	3/4	3/4	1-5/16	1.36	34.54	1.59	40.40	.75	19.1	2000	3500	3700
16-2 SE	1	1/8	1-5/16	1.63	41.40	1.41	35.81	.38	9.7	2300	3900	4200
16-4 SE	1	1/4	1-5/16	1.63	41.40	1.59	40.40	.38	9.7	2300	3900	4200
16-6 SE	1	3/8	1-5/16	1.63	41.40	1.59	40.40	.56	14.2	2300	3900	4200
16-8 SE	1	1/2	1-5/16	1.63	41.40	1.72	43.70	.75	19.1	2300	3900	4200
16-12 SE	1	3/4	1-5/16	1.63	41.40	1.72	43.70	.75	19.1	2300	3900	4200
16-16 SE	1	1	1-5/8	1.63	41.40	1.97	50.03	.94	23.9	2300	3900	4200
16-20 SE	1-1/4	1-1/4	1-7/8	1.70	43.20	2.38	60.50	.97	24.6	1900	3100	3300

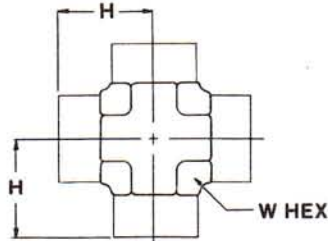
street elbow 45°  
SVE

Part No.	NPT Thread		W Hex	H		H <sub>1</sub>		R		Working Pressures (PSIG)		
	Male	Female		in.	mm	in.	mm	in.	mm	Brass	Stainless Steel	Steel
1-1 SVE	1/16	1/16	7/16	.47	11.9	.77	18.30	.38	9.7	3800	7000	7500
2-2 SVE	1/8	1/8	9/16	.50	12.70	.72	18.30	.38	9.7	2900	5500	5900
4-4 SVE	1/4	1/4	3/4	.69	17.52	1.05	26.70	.38	9.7	3000	5600	6000
6-6 SVE	3/8	3/8	7/8	.75	19.1	1.06	27.00	.56	14.2	2700	5000	5300
8-8 SVE	1/2	1/2	1-1/16	.94	23.90	1.34	34.03	.75	19.1	2500	4500	4800
12-12 SVE	3/4	3/4	1-5/16	1.00	25.4	1.38	35.10	.75	19.1	2000	3500	3700
16-16 SVE	1	1	1-5/8	1.19	30.22	1.72	43.70	.94	23.9	2300	3900	4200

female cross  
FX



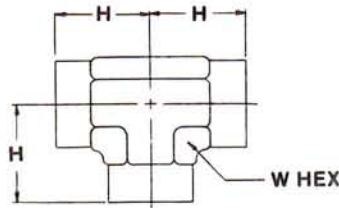
Part No.	NPT Thread Female	W Hex	H		Working Pressures (PSIG)		
			in.	mm	Brass	Stainless Steel	Steel
1-1 FX	1/16	7/16	.50	12.70	3800	7000	7500
2-2 FX	1/8	9/16	.66	16.80	2900	5500	5900
4-4 FX	1/4	3/4	.88	22.40	3000	5600	6000
6-6 FX	3/8	7/8	1.02	26.00	2700	5000	5300
8-8 FX	1/2	1-1/16	1.23	31.24	2500	4500	4800
12-12 FX	3/4	1-5/16	1.36	34.54	2000	3500	3700
16-16 FX	1	1-5/8	1.63	41.40	2300	3900	4200



female tee  
FT



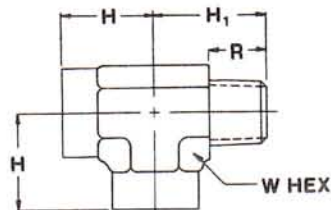
Part No.	NPT Thread Female	W Hex	H		Working Pressures (PSIG)		
			in.	mm	Brass	Stainless Steel	Steel
1-1-1 FT	1/16	7/16	.50	12.70	3800	7000	7500
2-2-2 FT	1/8	9/16	.66	16.80	2900	5500	5900
4-4-4 FT	1/4	3/4	.88	22.40	3000	5600	6000
6-6-6 FT	3/8	7/8	1.02	26.00	2700	5000	5300
8-8-8 FT	1/2	1-1/16	1.23	31.24	2500	4500	4800
12-12-12 FT	3/4	1-5/16	1.36	34.54	2000	3500	3700
16-16-16 FT	1	1-5/8	1.63	41.40	2300	3900	4200
20-20-20 FT	1-1/4	1-7/8	1.70	43.20	1900	3100	3300
24-24-24 FT	1-1/2	2-1/2	2.08	52.83	1700	2500	2600



street tee  
ST



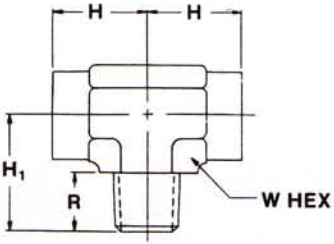
Part No.	NPT Thread		W Hex	H		H <sub>1</sub>		R		Working Pressures (PSIG)		
	Male	Female		in.	mm	in.	mm	in.	mm	Brass	Stainless Steel	Steel
1-1-1 ST	1/16	1/16	7/16	.50	12.70	.72	18.30	.38	9.7	3800	7000	7500
2-2-2 ST	1/8	1/8	9/16	.66	16.80	.78	19.81	.38	9.7	2900	5500	5900
4-4-4 ST	1/4	1/4	3/4	.88	22.40	1.09	27.70	.38	9.7	3000	5600	6000
6-6-6 ST	3/8	3/8	7/8	1.02	26.00	1.22	31.00	.56	14.2	2700	5000	5300
8-8-8 ST	1/2	1/2	1-1/16	1.23	31.24	1.47	37.33	.75	19.1	2500	4500	4800
12-12-12 ST	3/4	3/4	1-5/16	1.36	34.54	1.59	40.40	.75	19.1	2000	3500	3700
16-16-16 ST	1	1	1-5/8	1.63	41.40	1.97	50.03	.94	23.9	2300	3900	4200



### male branch tee MBT



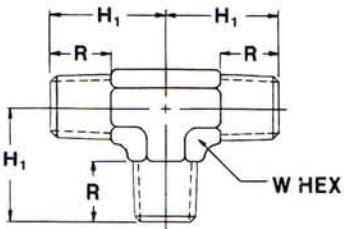
Part No.	NPT Thread		W Hex	H		H <sub>1</sub>		R		Working Pressures (PSIG)		
	Male	Female		in.	mm	in.	mm	in.	mm	Brass	Stainless Steel	Steel
1-1-1 MBT	1/16	1/16	7/16	.50	12.70	.72	18.30	.38	9.7	3800	7000	7500
2-2-2 MBT	1/8	1/8	9/16	.66	16.80	.78	19.81	.38	9.7	2900	5500	5900
4-4-4 MBT	1/4	1/4	3/4	.88	22.40	1.09	27.70	.38	9.7	3000	5600	6000
6-6-6 MBT	3/8	3/8	7/8	1.02	26.00	1.22	31.00	.56	14.2	2700	5000	5300
8-8-8 MBT	1/2	1/2	1-1/16	1.23	31.24	1.47	37.33	.75	19.1	2500	4500	4800
12-12-12 MBT	3/4	3/4	1-5/16	1.36	34.54	1.59	40.40	.75	19.1	2000	3500	3700



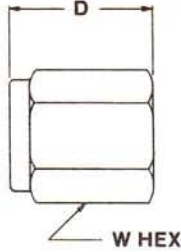
### male tee MT



Part No.	NPT Thread	W Hex	H <sub>1</sub>		R		Working Pressure (PSIG)		
	Male		in.	mm	in.	mm	Brass	Stainless Steel	Steel
1-1-1 MT	1/16	5/16	.72	18.30	.38	9.7	5500	9500	10100
2-2-2 MT	1/8	7/16	.78	19.81	.38	9.7	5000	9100	9700
4-4-4 MT	1/4	9/16	1.09	27.70	.38	9.7	4100	7500	8000
6-6-6 MT	3/8	3/4	1.22	31.00	.56	14.2	4000	7200	7600
8-8-8 MT	1/2	7/8	1.47	37.33	.75	19.1	3100	5800	6200
12-12-12 MT	3/4	1-1/16	1.59	40.40	.87		3400	6400	6800
16-16-16 MT	1	1-5/16	1.97	50.03	1.06		2700	4600	4900
20-20-20 MT	1-1/4	1-5/8	2.38	60.50	1.88		2000	3500	3700
24-24-24 MT	1-1/2	1-7/8	2.64	67.10	1.44		1800	2900	3100

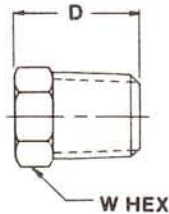


pipe cap  
CP



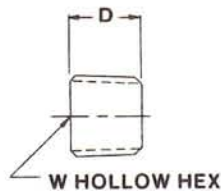
Part No.	NPT Thread Female	W Hex	A		Working Pressures (PSIG)		
			in.	mm	Brass	Stainless Steel	Steel
1 CP	1/16	7/16	.50	12.70	4500	7500	8000
2 CP	1/8	9/16	.75	19.1	4000	6400	6800
4 CP	1/4	3/4	.91	23.11	4300	6600	7000
6 CP	3/8	7/8	1.03	26.20	3500	5300	5600
8 CP	1/2	1-1/16	1.34	34.03	3600	5200	5500

hex head plug  
PH



Part No.	NPT Male Pipe Thread	W Hex	D	
			in.	mm
1/16 HP	1/16	5/16	.54	13.7
1/8 HP	1/8	7/16	.56	14.2
1/4 HP	1/4	9/16	.75	19.1
3/8 HP	3/8	11/16	.78	19.8
1/2 HP	1/2	7/8	.97	24.6
3/4 HP	3/4	1-1/16	1.15	29.2
1 HP	1	1-5/16	1.34	34.0

hollow hex plug  
PHH

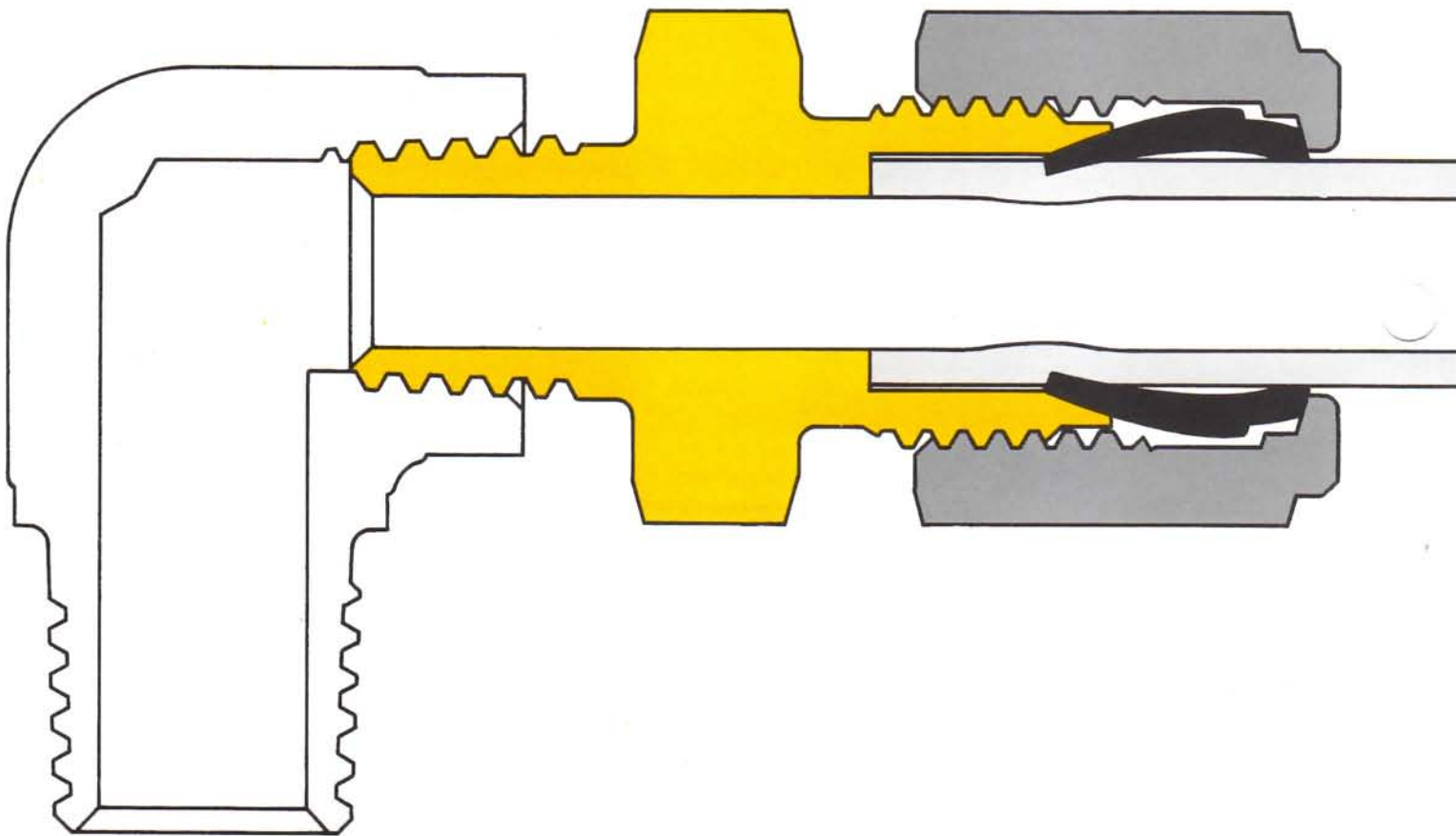


Part No.	NPT Male Thread	W Hex	D	
			in.	mm
1/16 HHP	1/16	5/32	.30	7.6
1/8 HHP	1/8	3/16	.30	7.6
1/4 HHP	1/4	1/4	.47	11.9
3/8 HHP	3/8	5/16	.47	11.9

Specify Material by part number suffix letters:  
 B = Brass      S = Steel  
 SS = Stainless Steel

For the complete line of Parker instrumentation and process fittings and tube fabricating equipment ask your Parker representative for the following descriptive literature.

- Catalog 4230** Parker CPI Tube Fittings
- Catalog 4232** For Chromatograph Fitting
- Catalog 4240** Ultraseal
- Catalog 4250** Parker CPI Valves
- Catalog 4260** Instrument Pipe Fittings
- Catalog 4270** Weld-lok Socket Type Permanent Tube Fitting
- Catalog 4280** Automatic Buttweid
- Catalog 4290** Parker Tube Fabricating Tools



Parker Hannifin Corporation  
**Instrumentation Connectors Division**  
9400 S. Memorial Parkway - P.O. Box 4288  
Huntsville, AL 35802

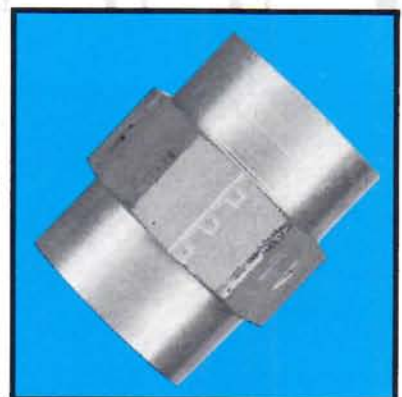


FluidConnectors

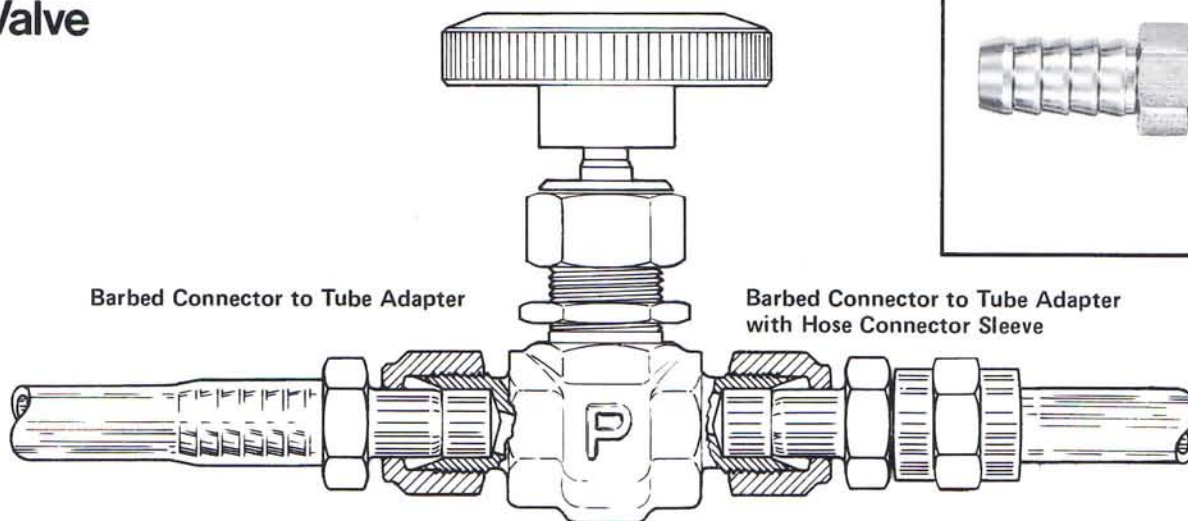
# Parker CPI Barbed Connectors

for laboratory  
and instrumentation use

Catalog 4261  
September, 1977



# Tube Adapter Hose Connectors on Valve



## Purpose

Parker developed instrument grade barbed connectors for use with soft plastic tubing like PVC or rubber low-pressure hose.

## Features

- Easy installation—"push-on" design
- Designed for soft plastic tubing and hose
- Tapered barbs with flats properly hold tubing I.D.
- Usable with or without hose connector sleeve
- Hose connector sleeve does not cut tubing O.D.
- All parts are reusable
- Available in a variety of materials and sizes

## Applications—low-pressure systems

- Research laboratories
- Temporary test hook-ups for control circuits
- Gravity feed lines, such as drain lines, reservoir transfer, level indicators, etc.
- Low vacuum
- Medical equipment
- Food processing
- Beverage processing
- Portable equipment requiring line flexibility and repeated connect/disconnect

## Installation

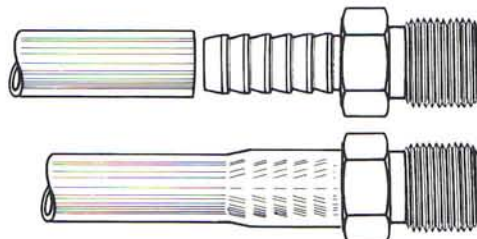
### Barbed Connector to Male Pipe:

1. Cut the tubing or hose squarely with a sharp knife.

2. Push the tubing or hose over barbed shanks until they are covered.

### To remove:

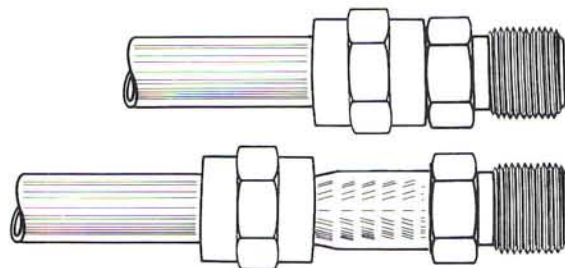
1. Cut off tubing or hose slightly beyond the end of the barbs.
2. Slice carefully without cutting all the way through to prevent nicking of barbs. Spread the cut section until it splits through and remove from the barbed end.



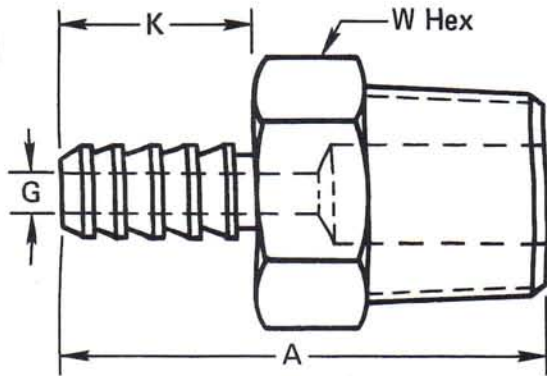
## Installation

### Hose Connector Sleeve on Barbed Connector:

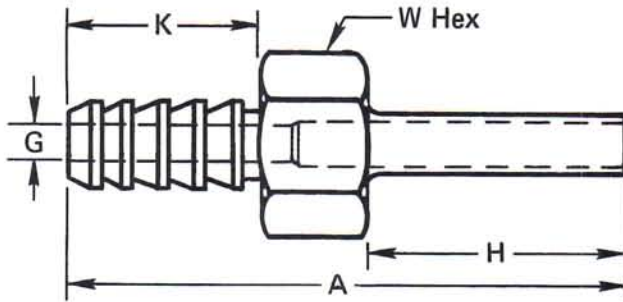
1. Place the HCS socket over the tube or hose before pushing over barbed connector.
2. Push the tubing or hose over barbed shanks until they are covered.
3. Turn the HCS socket by hand or wrench until it bottoms against the hex flat of the barbed connector.
4. To disassemble, simply unscrew the HCS socket and cut the tubing as described previously.



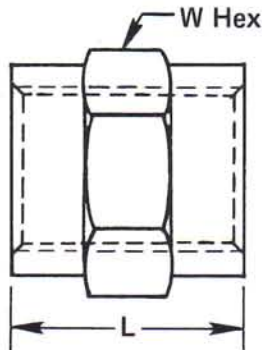
**B2HF**  
barbed connector to male pipe



**B2HT2**  
barbed connector to tube adapter



**HCS**  
hose connector sleeve



**Materials**

- Barbed fittings are manufactured as standard in 316 SS and brass
- Hose connector sleeves are manufactured in aluminum as a standard material.

Other materials available and quoted by request. Consult your Parker CPI distributor.

**Nomenclature**

The part numbers for Parker barbed connectors are constructed from symbols that identify the size and style of the fitting and material used.

Example: The part number shown below is for a 316 Stainless Steel barbed connector for 1/8 I.D. tubing on the barbed end

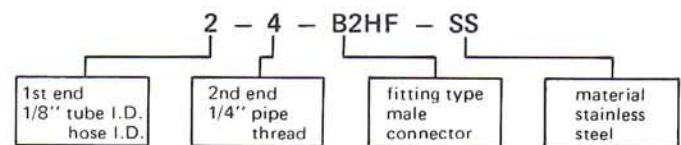
Part No.	Hose I.D.	Male Pipe Size	A	G Min. Bore	K	W Hex
2-2 B2HF	1/8	1/8	1.00	.078	.41	7/16
2-4	1/8	1/4	1.22	.078	.41	9/16
4-2	1/4	1/8	1.41	.188	.78	7/16
4-4	1/4	1/4	1.59	.188	.78	9/16
5-2 B2HF	5/16	1/8	1.50	.188	.88	7/16
5-4	5/16	1/4	1.69	.250	.88	9/16
6-4	3/8	1/4	1.72	.297	.88	9/16
6-6	3/8	3/8	1.72	.297	.88	11/16
6-8 B2HF	3/8	1/2	1.81	.297	.88	7/8
8-8	1/2	1/2	2.00	.375	.94	7/8
12-12	3/4	3/4	2.13	.625	1.03	1-1/16

Part No.	Hose I.D.	Tube O.D.	A	G Min. Bore	H	K	W Hex
2-2 B2HT2	1/8	1/8	1.16	.078	.53	.41	5/16
2-4 B2HT2	1/8	1/4	1.25	.078	.63	.41	3/8
4-4 B2HT2	1/4	1/4	1.66	.188	.63	.78	3/8
4-6 B2HT2	1/4	3/8	1.72	.188	.69	.78	7/16

**Note:** Tube adapter end is designed for use with Parker CPI fittings or valves. Simply insert the tube adapter end until it bottoms and tighten the Parker CPI nut 1/4 turns from finger tight.

Part No.	Hose I.D.	Hose O.D.	L	W Hex
HCS 2-4	1/8	1/4	.41	3/8
HCS 4-6	1/4	3/8	.78	9/16
HCS 4-7	1/4	7/16	.78	5/8
HCS 4-8	1/4	1/2	.78	11/16
HCS 4-9	1/4	9/16	.78	3/4
HCS 5-7	5/16	7/16	.88	5/8
HCS 6-8	3/8	1/2	.88	11/16
HCS 6-9	3/8	9/16	.88	3/4
HCS 8-11	1/2	11/16	.94	7/8
HCS 12-16	3/4	1"	1.06	1-1/4

and 1/4" male pipe. All tube and pipe sizes are designated by the number of sixteenths of an inch (1/8 tube I.D. = -2; 1/4" pipe thread = -4).



The Hose Connector Sleeve (HCS) is a one-piece accessory item used when maximum tubing pressure ratings are desired, and is ordered by the part numbers shown for the tubing O.D. Example: Part No. HCS - 2 - 4 will be used for tubing sizes ranging from 1/8" I.D. to 1/4" O.D.



For the complete line of Parker instrumentation and process fittings and tube fabricating equipment ask your Parker representative for the following descriptive literature.

Catalog 4224	Intru-lok Instrumentation Tube Fittings
Catalog 4230	Parker CPI Tube Fittings
Catalog 4231	Parker CPI Metric Tube Fittings
Bulletin 4230-B12	For Chromatograph Fittings and Valves
Catalog 4250	Parker CPI Valves
Catalog 4260	Instrument Pipe Fittings
Catalog 4270	Weld-lok Socket Type Permanent Tube Fittings
Catalog 4280	Parker Automatic Buttweld Tube Fittings
Catalog 4290	Parker Tube Fabricating Tools

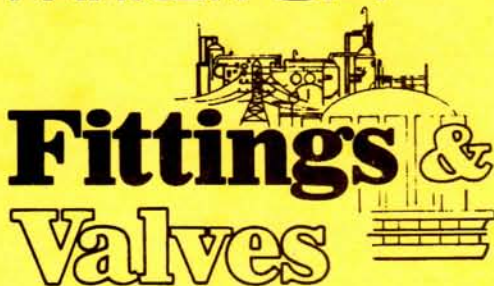


**Parker Hannifin Corporation**  
**Instrumentation Connectors Division**  
9400 South Memorial Parkway  
Huntsville, Alabama 35802



# PARKER CPI

**PARKER CPI**



**FOR PROCESS, POWER  
& INSTRUMENTATION**

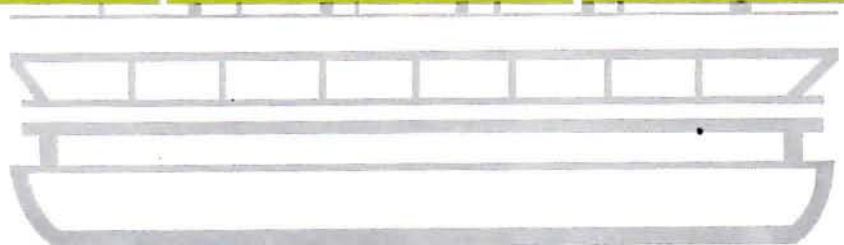
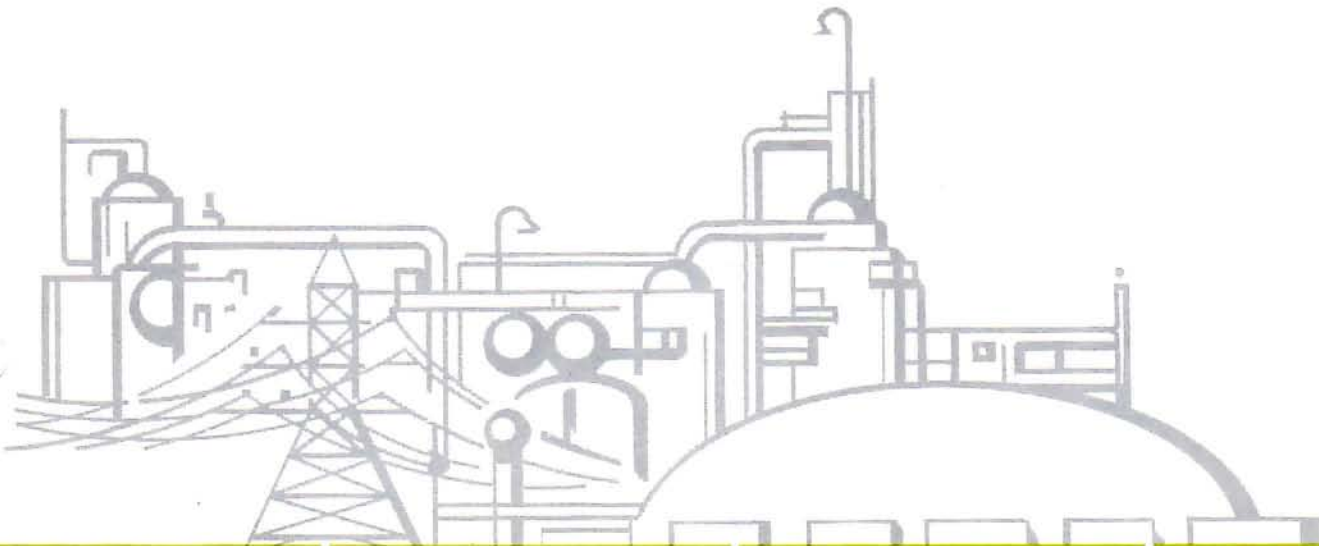
**Tube Fabricating  
Equipment**

**NOTE:** Only the tools as priced in P.L. 4290 are carried by Parker Hannifin Process, Power & Instrumentation Distributors. For other tools designed for the industrial market contact your Parker Hannifin Industrial Fittings Distributor.

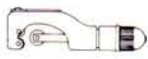













# PARKER CPI Tube Fabricating Equipment

FOR PROCESS, POWER  
& INSTRUMENTATION



Accessories are shown with equipment on each page.

CUTTERS	BENDERS	BENDERS	PRE-SETTING TOOLS
<p>KLOSKUT*</p>  <p>Medium (sizes 2 to 18) page 2</p>	 <p>1/8" Hand Tube Bender page 3</p>	<p>EXACTOL* 412 &amp; 420</p>  <p>Medium and Large, crank (sizes 4 to 20) page 4</p>	<p>PARKER CPI</p>  <p>(sizes 2 to 16) Ferrule pre-setter page 1</p>
<p>KLOSKUT*</p>  <p>Large (sizes 12 to 32) page 2</p>	 <p>Medium Hand Tube Bender page 3</p>	<p>H624</p>  <p>Medium Bench Bender (Sizes 6 to 24) page 5</p>	
<p>TRU-KUT SAWING VISE</p>  <p>Saw guide (sizes 3 to 32) page 2</p>	 <p>Ratchet Hand Tube Bender page 3</p>	<p>HB632</p>  <p>Hydraulic Tube Bender &amp; Accessories (Sizes 6 to 32) page 5 to 8</p>	
<p>IN-EX*</p>  <p>Burring tool (sizes 2 to 26) page 2</p>	 <p>1" Hand Tube Bender page 3</p>		

## HOW TO ORDER PARKER TUBE FABRICATING EQUIPMENT

ORDER FABRICATING TOOLS BY SPECIFICATION AND PART NUMBER AS LISTED IN THIS CATALOG.

**NOMENCLATURE:** Most Parker Tube Fabricating Tools carry simple 3-, 4- or 6-digit part numbers. In some cases part numbers for accessories are constructed from numbers which, where applicable, identify the size or sizes of tubing they are intended to handle. Size number may either precede or follow basic part number. In other cases (as for sealers and lubricants) simple identification by name is used.

**SIZES** vary from 2 through 32. (Sizes are determined by the number of sixteenths of an inch in the O.D. of the tubing being fabricated.)

**EXAMPLES: 1. Equipment to be ordered:**

Large hand bender, for size 14 (7/8" O.D.)  
tubing: Part Number: 14-2829-A  
Size tubing            Hand tube  
tool will bend        bender  
14                        2829-A

**2. Equipment to be ordered:**

Replacement cutter wheel for No.218B medium  
Kloskut hand cutter: Part Number: 218B Wheel.

**PRICING:** Only items priced in current supplementary CPI Price List 4290 are carried in stock. Price and delivery of non-stock items furnished on request.

## PARKER CPI

## PARKER-HANNIFIN TUBE FABRICATING EQUIPMENT

### Designed to Make Strong, Accurate Tubing Systems Easier and Surer for You

Every time you make up a tubing circuit you want to be sure you get strong dependable joints, accurate kink-free bends and a neat system that will stand up to years of hard service. You want to fabricate the system with the least effort and risk of errors.

Parker tube fabricating equipment is designed to help you get all these benefits. Parker has been leading the

way in use of tubing and in fittings design for over 50 years. All this experience has shown Parker engineers a host of ways to make tube fabricating equipment more efficient and trouble free. You'll find them all in the equipment featured here—from improvements that help you cut tubing more accurately, to bender designs that make kink-free bending easier. They'll all help you get better tubing systems, less work and less risk of mistakes in fabrication.

#### TUBE CUTTERS



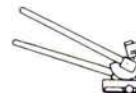
Designed to make uniform clean square cuts easier. Made to cut tubing with least possible burring. Built-in de-burring tools on larger cutters, or the In-Ex® de-burring tool to remove any burrs that appear.

#### TOOLS FOR FLARELESS FITTINGS



Parker CPI flareless fittings are easy to make up in a vise. Parker supplies special tools for pre-setting these fittings on the tube.

#### TUBE BENDERS



Parker hand benders include built-in features to help you make accurate bends without kinks or wrinkling and with minimum flattening in tubing, from size 2 (1/8" O.D.) to 16 (1" O.D.). Parker's larger benders include manual and hydraulic models, to meet any operating need for production or maintenance in the shop or in the field. Accessories are available to handle any kind of bend in every tubing material.

### PRE-SETTING TOOL

#### FOR PARKER CPI FLARELESS TUBE FITTINGS

Pre-setting should be considered if tubing is in a cramped or overhead area where normal assembly procedures would be inconvenient. After pre-setting the ferrule, follow normal re-tightening instructions to attach tubing to fitting body.

**HOW TO USE:** To form the pre-set, use pre-setting tool sized for the fitting. Slide nut and ferrule onto tube. Set tube into pre-setting tool, to bottom against shoulder in tool. Bring down nut and ferrule; screw finger tight; tighten with wrench 1 1/4 turns. Remove tube from tool.

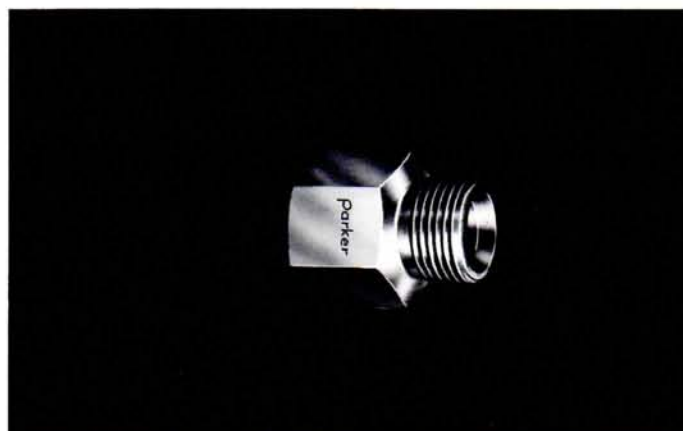
#### SPECIFICATION

#### Part No.

CPI Pre-setting Tool (for 1/8" to 1" O.D.) . . . See chart below

#### ORDER PRE-SETTING TOOLS USING PART NUMBERS FROM THIS CHART

Fitting Size	Tube O.D.	Part No.	Fitting Size	Tube O.D.	Part No.
2	1/8	680219	10	5/8	790320
4	1/4	680105	12	3/4	790321
5	5/16	680104	14	7/8	790322
6	3/8	670364	16	1	790323
8	1/2	790319			





## KLOSKUT® TUBE CUTTERS

Adjustable tube cutters to produce clean, square ends with no external burr and minimum internal burring in soft copper, brass, aluminum, and steel tubing. Features a hardened and burnished tool-steel cutting wheel, flare cut-off grooves in rollers for removal of old flares, swing-away reamer for removing internal burrs, and a spare cutting wheel included with each tool.

Handle feeds and adjusts cutting wheel to uniformly cut tubing as the cutter is rotated. Note: Tube cutters are not recommended for use with stainless steel tubing because of the work hardening effect. The use of a hacksaw with a "Tru-Kut" Sawing Vise or an abrasive wheel is recommended for stainless steel.

\* See Below

### MEDIUM KLOSKUT — 218B

For tubing sizes -2 (1/8"/3 mm. O.D.) to -18 (1 1/8"/27 mm. O.D.).  
Black anodized die-cast aluminum frame.

### LARGE KLOSKUT — 1232

For tubing sizes -12 (3/4"/18 mm. O.D.) to -32 (2"/50 mm. O.D.)  
Anodized die-cast aluminum frame.

PART NAME	Part No.
MEDIUM KLOSKUT (for 1/8" O.D. to 1 1/8" O. D.) (3-27 mm.)	218B
LARGE KLOSKUT (for 3/4" O.D. to 2" O.D. (18-50 mm.)	1232

REPLACEMENT PARTS	Part No.
Cutter wheel for No. 218B tube cutter	218B Wheel
Cutter wheel for No. 1232 tube cutter	1232 Wheel
Cutter shaft for No. 1232 tube cutter	1232 Shaft



## TRU-KUT SAWING VISE

Hacksaw guide to accommodate tube, pipe and hose in sizes 3 (3/16" O.D.) to 32 (2" O.D.). (5 mm. to 50 mm. O.D.) Assures square cut-offs, clean ends, minimum bending.

**HOW TO USE:** Mount in vise or bolt to bench. Clamp tubing, pipe or hose to be cut in Tru-Kut and cut off; guide gives accurate square cuts every time.

PART NAME	Part No.
Tru-Kut (for 3/16" O.D. to 2" O.D.) (5-50 mm)	710439



## IN-EX® TUBE DE-BURRING TOOL

De-burrs both inside and outside of copper, brass, aluminum or annealed steel tubing. Takes sizes from 2 (1/8" O. D.) to 26 (1 5/8" O.D.). (3 mm. thru 41 mm. O.D. tubing) Tool has two special cutting blades arranged to present four cutting edges for either internal or external de-burring.

**HOW TO USE:** Insert tube in one end of IN-EX for inside de-burring and opposite end for outside de-burring. Rotate in either direction. Tool centers itself in tubing.

PART NAME	Part No.
IN-EX De-Burring Tool (for 1/8" O.D. to 1 5/8" O.D.) (3-41 mm.)	226

REPLACEMENT PART	Part No.
Replacement blade	226 Blades

## HAND TUBE BENDERS

Sturdy, easy-to-use hand tools for fast accurate bending without kinks or visible flattening. Individual sizes in four models from size 2 (1/8" O.D.) to 16 (1" O.D.).

### 1/8" HAND TUBE BENDER

For tubing size 1/8" in copper, steel, aluminum or stainless steel.

**HOW TO USE:** Use in Hands. Bend tube to desired angle (up to 180°) by rotating slide block arm. Angles are calibrated on radius block. (Instructions included with tool.)

**PART NAME** **Part No.**  
 1/8" Hand Tube Bender ..... 2 - 2829-I

1/8" HAND TUBE BENDER



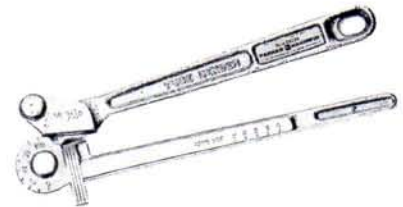
### MEDIUM HAND TUBE BENDERS

Five models for tubing sizes 3/16", 1/4", 5/16", 3/8" and 1/2" in copper, steel, aluminum or stainless steel.

**HOW TO USE:** Use in hands or mount in bench vise for heavier wall thicknesses. Simply align marks on link and radius block handle and bend tube to desired angle (up to 180°) by pulling steadily on slide block handle. Angles are calibrated on radius block handle. (Instructions included with tool.)

**PART NAME** **Part No.**  
 3/16" - 1/2" Hand Tube Bender ..... See chart below

MEDIUM HAND TUBE BENDER



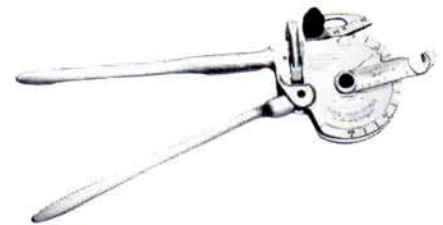
### RATCHET HAND TUBE BENDERS

Three models for tubing sizes 5/8", 3/4" and 7/8" in copper, steel, aluminum or stainless steel.

**HOW TO USE:** Use in hands or mount in bench vise for heavier wall thicknesses. Position tube in bender, close latch and pull ratchet handle away from radius block handle until desired angle (up to 180°) is formed. Angles are calibrated on radius block handle. (Instructions included with tool.)

**PART NAME** **Part No.**  
 5/8", 3/4", 7/8" Hand Tube Bender ..... See chart below

RATCHET HAND TUBE BENDER



### 1" HAND TUBE BENDER

For tubing size 1" in annealed copper and annealed aluminum.

**HOW TO USE:** Can be used in hands, but suggest mounting in bench vise—especially for heavier wall thicknesses. Align marks and bend tube to desired angle (up to 180°) by pulling steadily on operating handle. Handle may be re-positioned for maximum leverage. Angles are calibrated on radius block. (Instructions included with tool.)

**PART NAME** **Part No.**  
 1" Hand Tube Bender ..... 16 - 2829-I

1" HAND TUBE BENDER

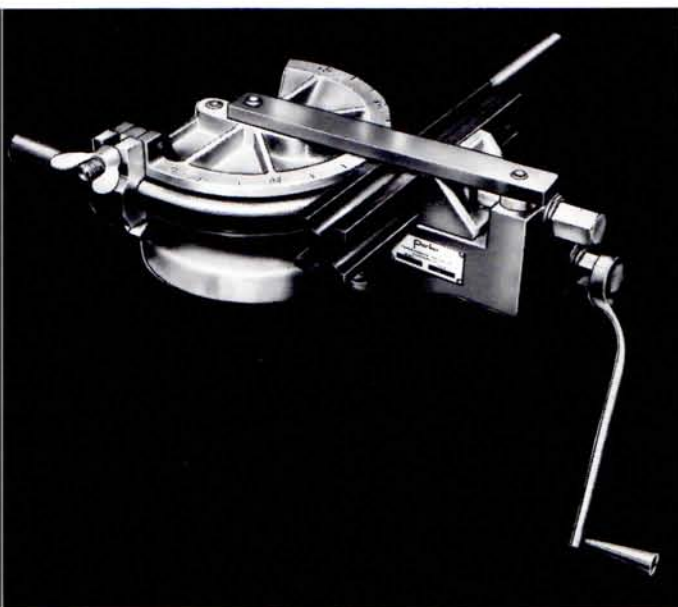


SIZE	TUBE O.D.		PART NO.	MINIMUM WALL WITHOUT FLATTENING		RECOMMENDED MAXIMUM WALL THICKNESS						RADIUS TO TUBE CENTERLINE		WEIGHT	
	In.	mm		In.	mm	Copper		Aluminum		Steel		In.	mm	lbs	kg
						In.	mm	In.	mm	In.	mm				
2	1/8	3.2	2-2829I	.012	.3	—	—	—	—	.032	.8	3/8	9.5	1/4	.1
3	3/16	4.8	3-2829R	.020	.5	—	—	—	—	.032	.8	7/16	11.1	1/2	.2
4	1/4	6.4	4-2829R	.028	.7	.083	2.1	.083	2.1	.032	.8	9/16	14.3	1	.5
5	5/16	7.9	5-2829R	.032	.8	.095	2.4	.083	2.1	.035	.9	11/16	17.5	1 1/2	.7
6	3/8	9.5	6-2829R	.032	.8	.109	2.8	.083	2.1	.049	1.2	15/16	23.8	2 1/4	1.0
8	1/2	12.7	8-2829R	.042	1.1	.109	2.8	.083	2.1	.049	1.2	1 1/2	37.5	4 1/2	2.0
10	5/8	15.9	10-2829R	.042	1.1	.109	2.8	.095	2.4	.049	1.2	3	75.0	7 1/2	3.4
12	3/4	19.0	12-2829R	.049	1.3	.109	2.8	.095	2.4	.065	1.7	3 3/4	93.8	14 1/2	6.6
14	7/8	22.2	14-2829R	.049	1.3	.109	2.8	.109	2.8	.065	1.7	3 3/4	93.8	13 1/2	6.1
16	1	25.4	16-2829I	.065	1.7	.109	2.8	.109	2.8	.065	1.7	3 1/2	87.5	30 1/2	13.8





EXACTOL MODEL 412



EXACTOL MODEL 420

## EXACTOL® CRANK-OPERATED MANUAL BENDER

(Models 412/420)

For easy action and fast accurate bending to 180°. Two models to bend tube sizes 4 through 20. Exactol benders are designed with a worm-gear drive and 60-to-1 gear ratio to allow extremely close tolerances with least possible effort. Bends aluminum, copper, annealed steel and annealed stainless steel without kinks or wrinkles; flattening not over 5% of tube O.D.

Model 412 (smaller) handles tubing from size 4 (1/4" O.D.) through size 12 (3/4" O.D.) inclusive; model 420 (larger) bends tubing from size 4 (1/4" O.D.) through size 20 (1-1/4" O.D.). Easy crank operation permits steady production without operator fatigue; for use in small tube fabricating shops, in the field or in factory maintenance departments.

**HOW TO USE:** Exactol is easy to use clamped in a bench vise. Or, mount it in an adapter fastened to the work bench and use with mandrels for smooth bends in thin wall tubing. Use with small or large radius blocks.

### SPECIFICATION

Exactol Tube Bender (Model 412) for 1/4" O.D. to 3/4" O.D.) ..... 560569  
Exactol Tube Bender (Model 420) for 1/4" O.D. to 1 1/4" O.D.) ..... 621044

### ACCESSORIES

Slide Block (for sizes 4-5-6-8-10-12) ..... 550585  
Slide BLOCK (for sizes 14-16-18-20) ..... 621045  
Carrying Case (Model 412 only) (for bender, slide block, and large radius blocks) ..... 550572  
Bench-mounting Adapter (Model 412 only) ..... 550570  
Bench-mounting Adapter (Model 420) ..... 631156  
Mandrel Rod Stop Assembly ..... 550571  
Stop Assembly Adapter (Model 420) ..... 631154

### ORDER RADIUS BLOCKS USING PART NUMBERS FROM THIS CHART

Size	Tube O.D.	Tube Wall Thickness		RADIUS BLOCK small		RADIUS BLOCK large	
		Min.**	Max.†	Part No.	radius*	Part No.	radius*
4	1/4	.020	.049	550573	9/16	550579	3/4
5	5/16	.020	.065	550574	11/16	550580	1
6	3/8	.028	.083	550575	15/16	550581	1-1/4
8	1/2	.035	.083	550576	1- 1/4	550582	2
10	5/8	.049	.083	550577	1- 1/2	550583	2-1/2
12	3/4	.049	.083	550578	1- 3/4	550584	3
14	7/8	.065	.095			621046	3-1/2
16	1	.065	.095			621047	4
18†	1-1/8	.072	.095			621048	4-1/2
20†	1-1/4	.083	.095			621049	5

\*Radius to tube centerline. †Annealed steel or brass only. Heavier walls possible with copper and aluminum; thinner in stainless steel.

\*\*Thinner wall tubing can be used with mandrels. Mandrels available in sizes 4 x .020; 5 x .035; 6 x .028; 6 x .035; 8 x .035; 8 x .049; 10 x .035; 10 x .049; 12 x .035; 12 x .049. (For explanation of mandrel use, see page 8: Mandrels.)

### Instrumentation Connectors Division

9400 S. Memorial Pkwy.  
Huntsville, Alabama 35802

**Parker** FluidConnectors

## MEDIUM BENCH BENDER

(Model H624)

Easy operation, simple design and strong construction make the Parker H624 Bender an ideal piece of equipment for shop, factory, maintenance or field service where tubing from size 6 (3/8" O.D.) through size 24 (1 1/2" O.D.) of soft annealed copper, aluminum, fully annealed steel, or thin wall stainless steel must be fabricated.

Quick and easy manual operation is provided through the 4-in-1 gear ratio. Readily interchangeable radius and clamp blocks provide for a great variety of bends — right and left hand, U, offset and bends in the middle of tubes. The H624 is ideal when thin wall tubing must be bent using mandrels.

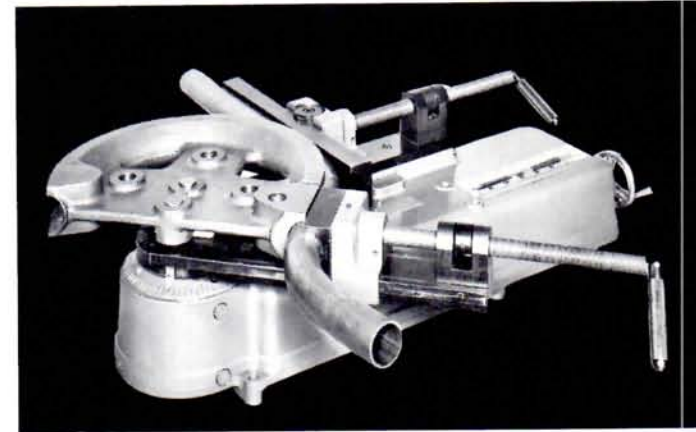
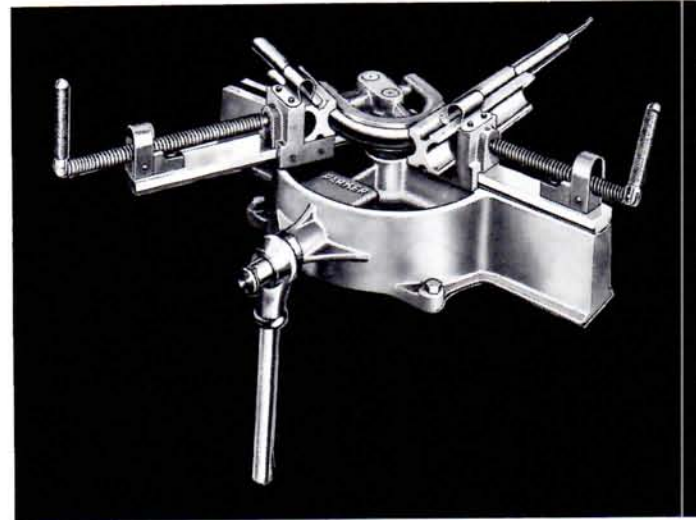
**HOW TO USE:** The Clamp Vise has half nuts on the clamp yokes which enable the speed screws to be lifted from their threads and moved quickly into clamping position. If using the clamp vise type, a slide block, a clamp block and a radius block are also required.

Bender should be mounted on a solid base (such as Parker Bender Table #520515) to insure accurate alignment. This is required if mandrels are used to support the tube wall of thin walled tubing and thus prevent wrinkling, collapsing and kinking during bending.

PART NAME	Part No.
Medium Bench Bender Model H624 (for 3/8" O.D. to 1 1/2" O.D.)	522171
Shipping Weight	162 lbs. (72 kg)
Instruction Sheet	Bulletin 4391-B24

ACCESSORIES	Part No.
Clamp Vise Arm (without blocks)	540504
Mandrel Rod Stop Assembly	522367

**NOTE:** Special blocks for non-standard bend radius up to 7 1/2" available on order. With standard radius blocks, tube with wall thickness greater than 7% of O.D. dimension will not normally require a mandrel.



MODEL HB632 WITH CLAMP VISE ARM



HYDRAULIC POWER UNIT FOR  
MODEL HB632 BENDER

## HYDRAULIC TUBE BENDER

(Model HB632)

Hydraulic power does the work in bending tubing of all materials in sizes from size 6 (3/8" O.D.) through size 32 (2" O.D.), and tube wall thicknesses up to .120 in stainless steel. Maximum bend angle with standard blocks is 180°; radii from 1-1/2" to 8". Easily interchangeable radius and clamp blocks. Allows close second bends in either direction. Indicator graduated in 1° increments, on positive mechanical stop, makes precision bending easy. Radius block that bends tube is mounted on spindle driven by electrically powered hydraulic pump. Simple design. Heavy long-life construction. Use with either clamp arm or clamp yoke. Speed of rotation of 1 to 3 rpm depending on power unit used.

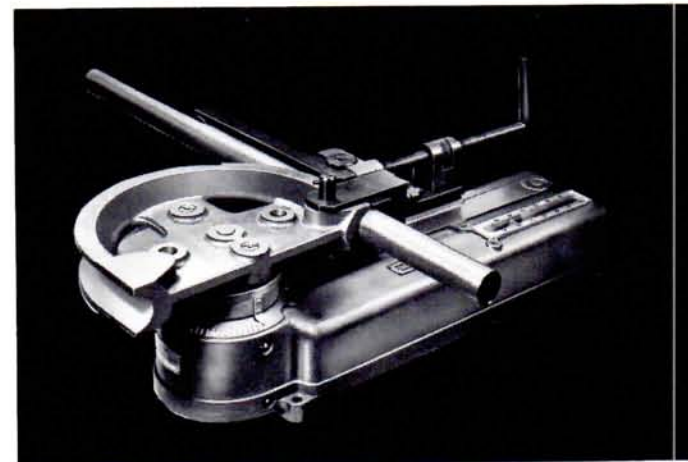
**HOW TO USE:** Needs no bench mounting except when mandrels are required. Move from place to place in your plant, or mount in truck bed, car trunk or any convenient location in the field. To operate, connect to any separate power source producing up to 10,000 psi hydraulic pressure and delivering 25 to 60 cu. in./min. To make short radius bends or bend thin wall tubing, attach to table and use with mandrels.

SPECIFICATION	Part No.
Hydraulic Bender (Model HB632) (without pump, for 3/8" to 2" O.D.)	631050
Shipping weight	180 lbs.

ACCESSORIES	Part No.
Clamp Arm	660223
Pump, hydraulic (10,000 psi; driven by 1-1/2 H.P. electric motor, 110/120 volt, A.C. single phase)	631096
Hose assembly (6' long)	3010101-4-4-4-72
Pipe thread reducer	3/8-1/4-PTR-S
Coupler, quick disconnect	611043
Mandrel rod stop assembly	631141
Radius block adapter plate (necessary for sizes over 1-1/2" O.D. only.)	660221
*Clamp yoke (for 1/2" to 7/8" O.D.)	631052
*Clamp yoke (for 1" to 1-1/2" O.D.)	631053
*Clamp yoke (for 1-3/4" to 2" O.D.)	631054

See pages 6 and 7 for radius blocks, clamp blocks and slide blocks; page 8 for mandrels and mandrel rods.

\*Not required if clamp arm (660223) is ordered with bender.



MODEL HB632 WITH CLAMP YOKE



## RADIUS BLOCKS

For use with H624 and HB632 Model Benders

You will find the radius blocks for every size of standard tubing from size 6 (3/8" O.D.) to size 32 (2" O.D.) in this list. These fixed radii blocks conform to both Mil Standard MS33611 and Army-Navy Specification MIL-H-5540, as applicable.

**HOW TO USE:** For medium bench bender (Model 624), standard radius blocks for tube sizes 6 (3/8" O.D.) to 24 (1 1/2" O.D.), come with 2-hole mountings (3rd hole, as illustrated, is for toggle clamp). For sizes 28 (1-3/4" O.D.) through 48 (3" O.D.), blocks have 5-hole mountings.

**SPECIAL SIZE RADIUS BLOCKS:** Available on special order for most radii. (Consult factory)

### SPECIFICATION

Radius Block ..... See chart below

Part No.

### ORDER RADIUS BLOCKS USING PART NUMBERS FROM THIS CHART

Size	Tube O.D.	Mounting	OLD AND10111 Standard		NEW MS33611 Standard	
			Part No.	Radius	Part No.	Radius
			6	3/8	2-hole	540502
8	1/2	2-hole	530763	1-1/4	590515-24	1-1/2
10	5/8	2-hole	530764	1-1/2	590518-30	1-7/8
12	3/4	2-hole	530765	1-3/4	590521-36	2-1/4
14	7/8	2-hole	530766	2	590523-42	2-5/8
16	1	2-hole			590524-48	3
18	1-1/8	2-hole	530768	3-1/2	590526-54	3-3/8
20	1-1/4	2-hole			590527-60	3-3/4
24	1-1/2	2-hole	630770	5	590530-72	4-1/2
†28	1-3/4	5-hole	631057-112	7		
†32	2	5-hole	631060-128	8		

† For HB632 Hydraulic  
Tube Bender only

## CLAMP BLOCKS

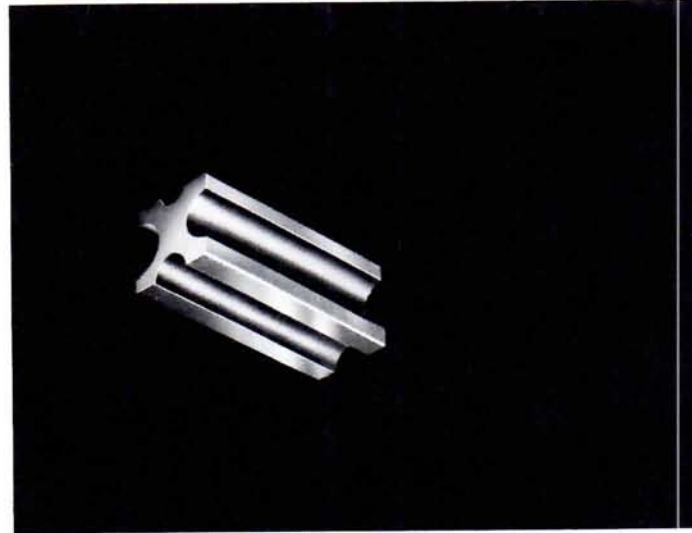
Part No. See chart below.

For use with H624 and HB632 Model benders.

Clamp block shown at right is type used with clamp vise arm on medium bench bender (Model H624) and with hydraulic bender (Model HB632).

ORDER CLAMP BLOCKS USING PART NUMBERS FROM THIS CHART

Size	Tube O.D.		Part No.
	in	mm	
6	3/8	9.5	8-642-6-6
8-12-16-24	1/2, 3/4, 1, 1 1/2	12.7, 19.0, 25.4, 38.1	631092
10-14-18-20	5/8, 7/8, 1 1/8, 1 1/4	15.9, 22.2, 28.6, 31.8	631093
28	1 3/4	44.4	2-741-8-28
32	2	50.8	2-741-8-32

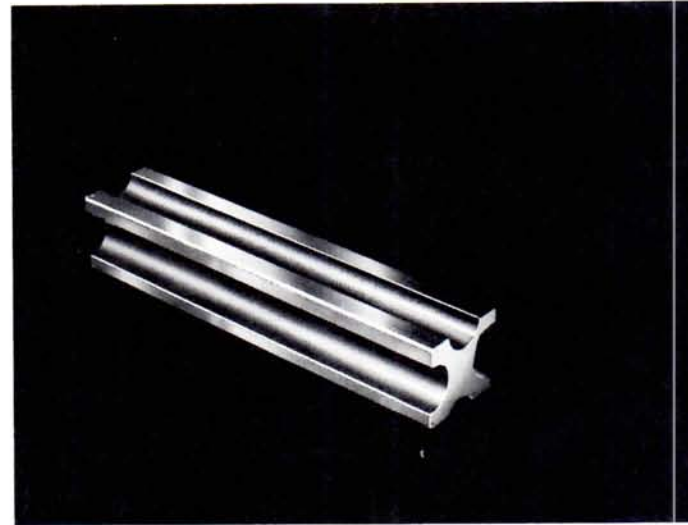


## SLIDE BLOCKS

For use with 412 and 420 Model benders.  
Supports O.D. of tube during bending.

NOTE: The Model 412 and 420 benders do not require clamp blocks.

Size	Tube O.D.		Part No.
	in	mm	
4-5-6-8	1/4, 5/16, 3/8	—	550585
10-12	1/2, 5/8, 3/4	—	—
14-16-18-20	7/8, 1, 1 1/8, 1 1/4	—	621045



## SLIDE BLOCKS

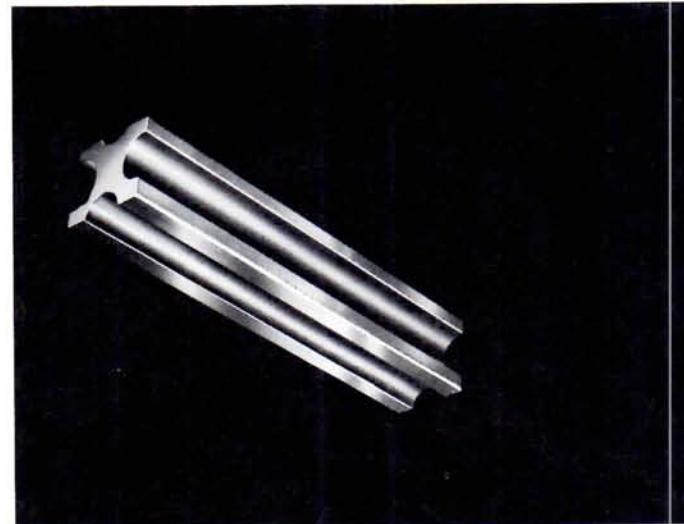
Part No. See chart below.

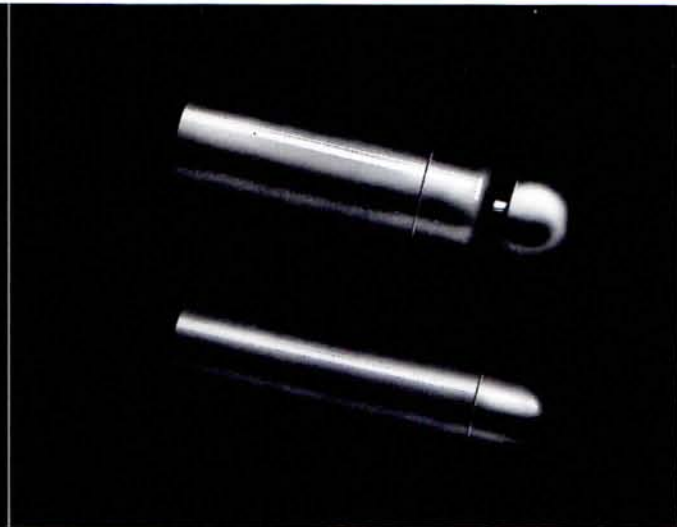
For use with H624 and HB632 Model benders.

Follows tubing around radius block. Prevents O.D. flattening. Sizes and styles shown here are used with medium (Model H624) bench benders and hydraulic bender (Model HB632).

ORDER SLIDE BLOCKS USING PART NUMBERS FROM THIS CHART

Size	Tube O.D.		Part No.
	in	mm	
6	3/8	9.5	8-642-7-6
8-12-16-24	1/2, 3/4, 1, 1 1/2	12.7, 19.0, 25.4, 38.1	520516
10-14-18-20	5/8, 7/8, 1 1/8, 1 1/4	15.9, 22.2, 28.6, 31.8	520518
+28	1 3/4	44.4	631063
+32	2	50.8	631066





## MANDRELS

Mandrels insure smooth bends without kinking or wrinkling when you are bending thin-walled or harder tubing, or when making short-radius bends. Mandrels support the tube wall from inside to keep the tube fully open for a smooth bend. Not used for heavy wall tubing.

**HOW TO USE:** Insert mandrel into end of tube to point of bend and draw out after bend is formed. Use standard solid-type mandrel for smaller tubing sizes; swivel ball-nose mandrel for larger tubing.

The rule that is generally followed to determine whether or not a mandrel is necessary is as follows: When the wall thickness of the tube to be bent is 7% or more of the tube O.D., a mandrel is usually not necessary. On wall thicknesses that range between 4-6% of the tube O.D., it is necessary to use a mandrel to avoid wrinkling and flattening in the bend area. These calculations are based on a bend radii of between three and four times the tube O.D.

**SPECIAL SIZE MANDRELS:** Available on special order for most sizes, (consult factory).

### SPECIFICATION

### Part No.

Mandrel..... See chart below

#### TO ORDER MANDRELS, SPECIFY SIZE, TYPE AND WALL THICKNESS:

Size	Tube O.D.	Part No.	Type	Wall Thickness					
6	3/8	924417	solid	.035	.042				
8	1/2	924417	solid	.035	.042	.049			
10	5/8	924417	solid	.035	.042	.049	.058	.065	
12	3/4	924417	solid	.035	.042	.049	.058	.065	
14	7/8	924417	solid	.035	.042	.049	.058	.065	
16	1	924417	solid	.035	.042	.049	.058	.065	
18	1-1/8	924417	solid		.049	.058	.065		
20	1-1/4	924417	solid		.049	.058	.065		
24	1-1/2	924417	solid	.049	.058	.065	.083		
28	1-3/4		ball nose						
32	2		ball nose						

**WHEN ORDERING MANDRELS:** Be sure to specify tube O.D., wall thickness, material and hardness.



## MANDREL RODS

Mandrel rods (as well as a mandrel rod stop assembly) are required when using mandrels. Mandrel rod lengths are determined by bender model, type of rod stop and length of table. Mandrel rod diameters are determined by tube I.D. (see chart below).

### SPECIFICATION

### Part No.

Mandrel Rod..... See chart below

#### TO ORDER MANDREL RODS, SPECIFY MANDREL ROD SIZE AND MANDREL TYPE:

Mandrel Rod Size	Mandrel Rod Dia.	Tube I.D.	Part No.	Use Mandrel Type
1/4	1/4	.283 to .362	520506	solid
5/16	5/16	.363 to .484	520507	solid
13/32	13/32	.485 to 1.489	520508	solid
5/8	5/8	1.490 and up	520509	ball nose

**WHEN ORDERING MANDREL RODS:** Be sure to specify bender model, part number, type of extractor or rod stop and length of table.

## MANDREL ROD STOP ASSEMBLY

For use with 412 and 420 Model benders.

When bending thin walled tubing it may be necessary to insert a mandrel inside of the tube to prevent excessive distortion or flattening. To accomplish such bending, a Mandrel, Mandrel Rod, and a Mandrel Rod Stop Assembly are all required. The Rod Stop Assembly holds the end of the Mandrel Rod in proper alignment with the tube while the Mandrel, which is threaded onto the other end of the Mandrel Rod, supports the tube on its I.D. thus preventing tube kinking or flattening during bending.

PART NAME	Part No.
Mandrel Rod Stop Assembly .....	550571
Adapter Riser for 420 .....	631154



## MANDREL ROD STOP ASSEMBLY

For use with H624 and HB632 Model benders.

Holds and supports end of mandrel rod in alignment with tubing. Bolt assembly down at back of table holding bender.

**HOW TO USE:** Use this assembly to keep mandrel and rod in alignment when you are mandrel bending. Adjust stop screws on side for correct length and positioning of mandrel in tubing.

PART NAME	Part No.
Mandrel Rod Stop Assembly (for bender Model H624) .	522367
Mandrel Rod Stop Assembly (for bender Model HB632)	631141

Weight 44.5 Lbs.

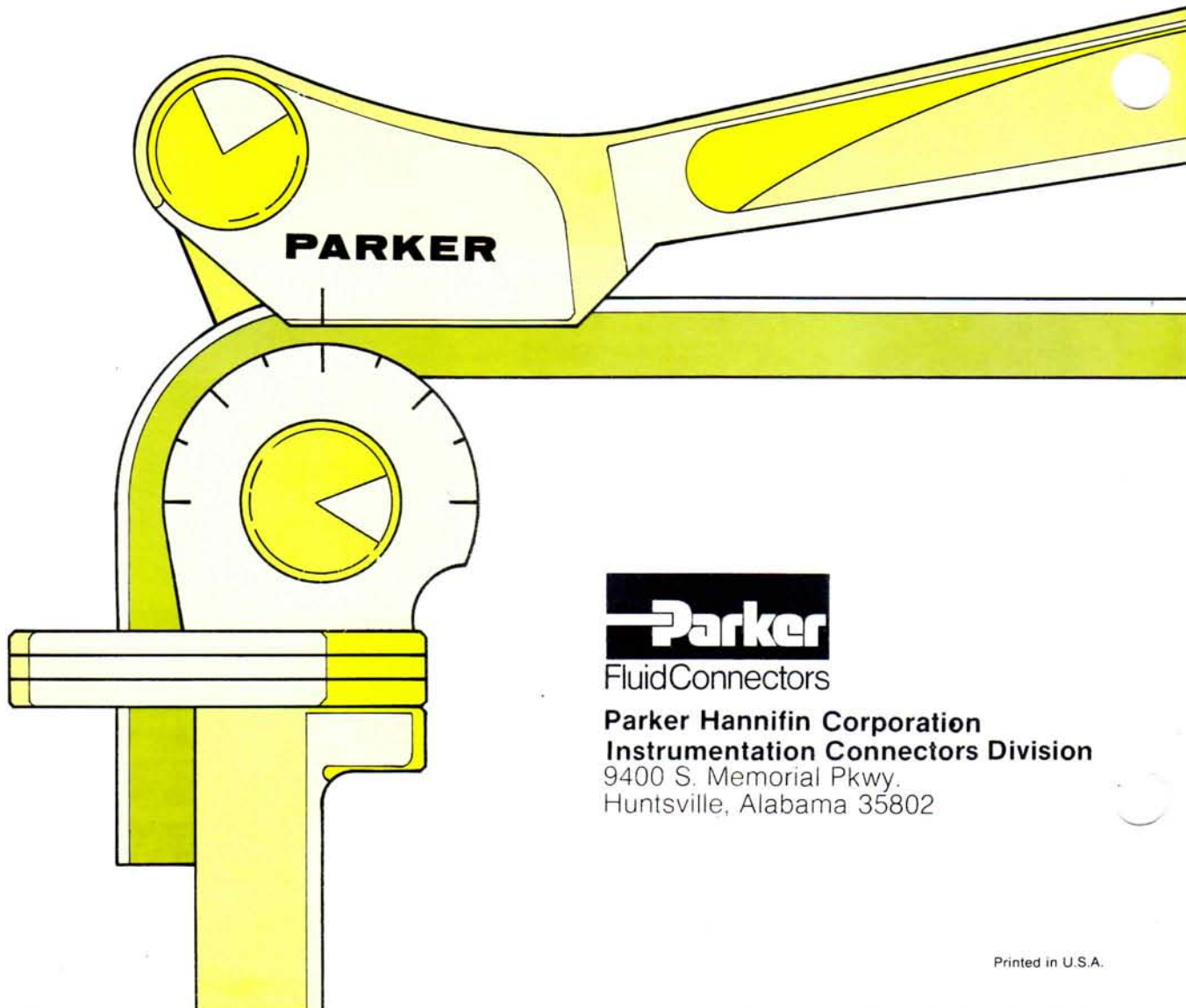


Typical Examples of Mandrel Bending Set-Ups

For the complete line of Parker instrumentation and process fittings and tube fabricating equipment ask your Parker representative for the following descriptive literature:

**Product Manual 4200 contains all the individual catalogs listed below:**

- Catalog 4230 Parker CPI Instrumentation Tube Fittings
- Catalog 4232 Parker CPI Fittings for Chromatography and Analytical Application
- Catalog 4250 Parker CPI Valves
- Catalog 4252 Sampling Cylinders
- Catalog 4260 Instrument Pipe Fittings
- Catalog 4261 Barbed Connectors
- Catalog 4270 Weld-lok Socket Type Permanent Tube Fittings
- Catalog 4280 Automatic Butt weld
- Catalog 4290 Parker Tube Fabricating Tools
- Catalog 4295 Dual Heat Transfer Coils

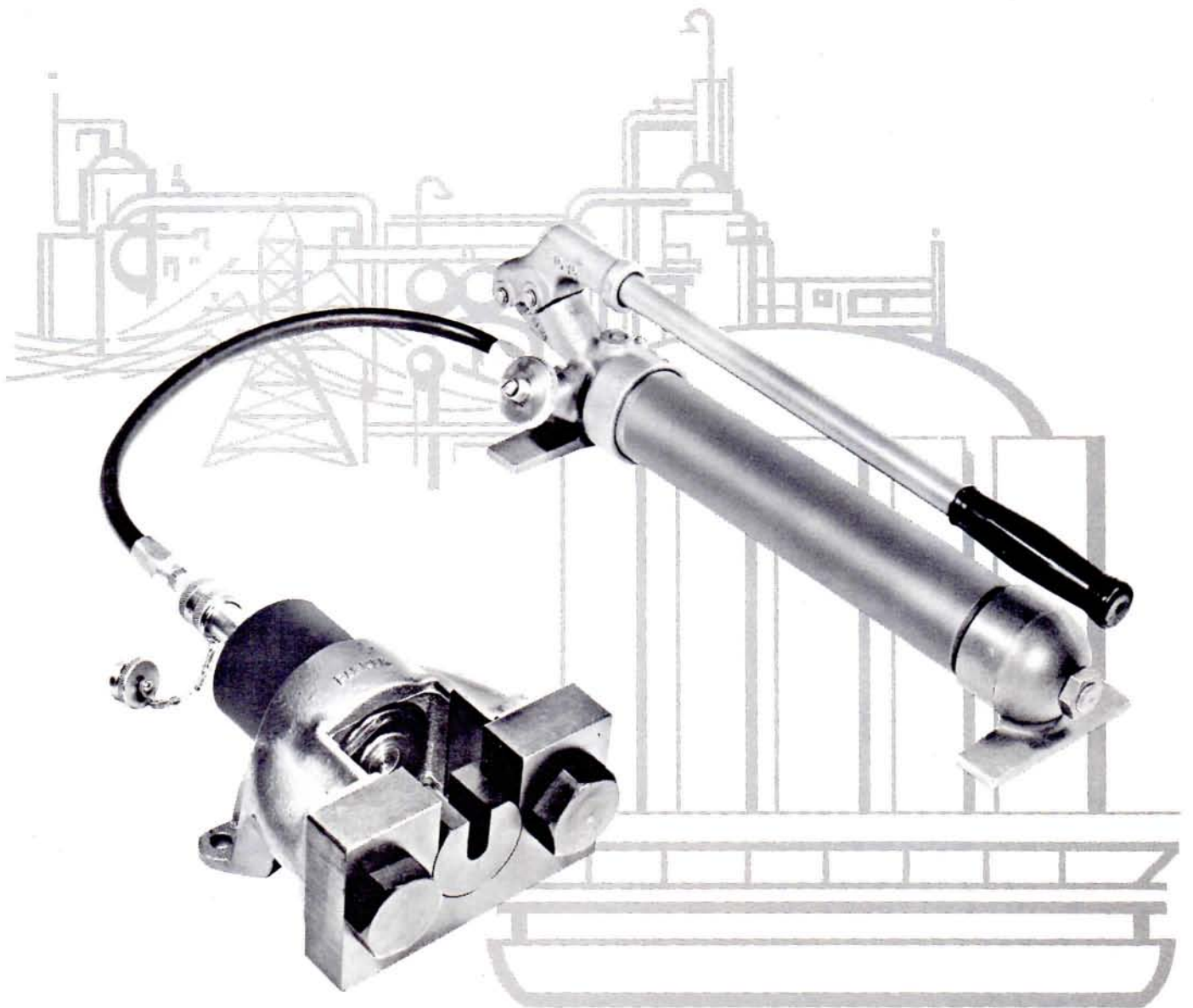


**Parker Hannifin Corporation**  
**Instrumentation Connectors Division**  
9400 S. Memorial Pkwy.  
Huntsville, Alabama 35802



# Parker CPI Hydraulic Presetting Tool

Bulletin 4290-B1  
Issued December, 1977



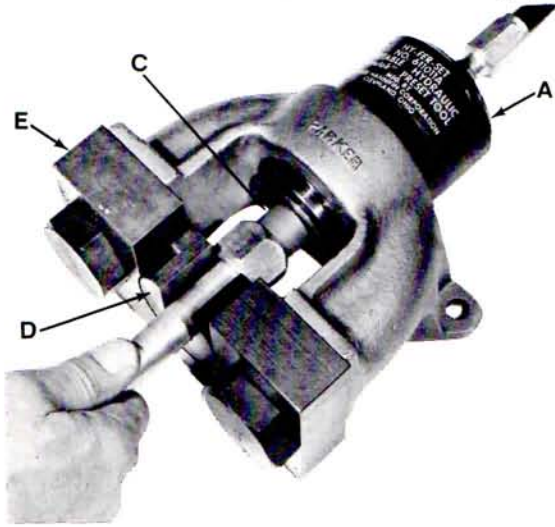


## Presetting CPI Tube Fittings

The CPI hydraulic presetting tool simplifies installation by preswaging ferrules to the tubing.

Although not required in making up the CPI fitting with the famous "Black Nut", it would be useful in making up "silver plated nuts" or in locations with limited wrenching space.

- A Hydraulic Tool for Presetting
- B Hand Pump & Hose Assembly
- C Body Die
- D Nut Support
- E Back-up Plate



CPI Tooling

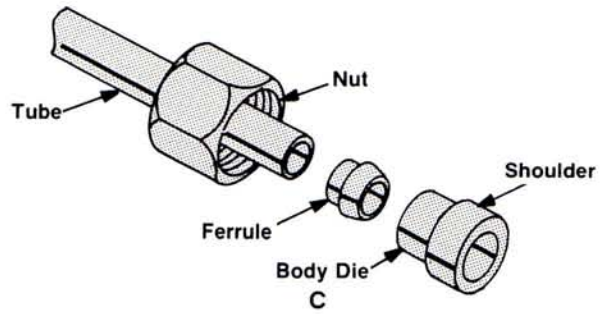


Fig. (2)



\*NOTE: Instructions for operating hydraulic presetting pump included with tool.

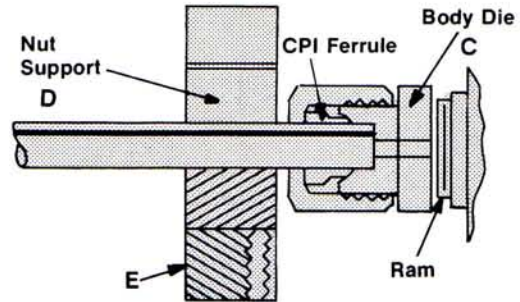


Fig. (3)

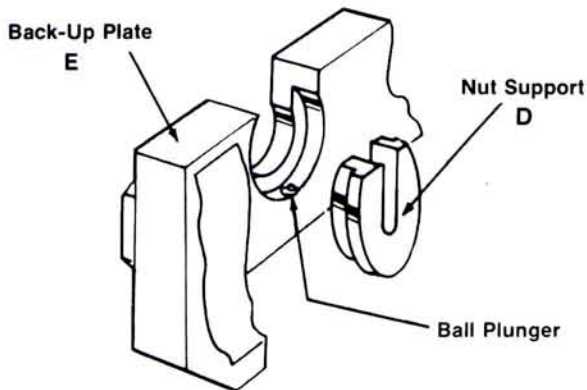


Fig. (1)

## Presetting CPI Tube Fittings

1. The first step in presetting the CPI Tube Fitting is to select the proper size nut support (D) and body die (C).
2. (See figure 1) Insert nut support in the back-up plate (E) opening from inside so that the nut support shoulder seats squarely in the counterbore in the back-up plate hole.
3. Slip the fitting nut and then the ferrule (with leading edge toward the tube end) over the tube (see figure 2).
4. Slip on body die and push ferrule and nut forward. The body die will enter the base of the nut, and the parts will then be in the correct position to properly set the ferrule. (See figure 2).
5. Place the tube within the slot in the nut support and apply hydraulic pressure to advance the ram. (See figure 3).
6. The presetting of the ferrule is completed when the shoulder on the body die physically stops against the nut. The hydraulic pressure applied to the presetting tool is not critical and need only be sufficient to bring the body die in contact with the nut.
7. After the hydraulic ram has advanced the required distance (the shoulder on the body die and the nut are in physical contact), release the hydraulic pressure by opening the on-off valve. The ram is spring loaded to return automatically to the original starting position.
8. After presetting, the final assembly into the body is made by tightening the nut finger-tight and then tighten the nut with a wrench  $\frac{1}{4}$  to  $\frac{1}{3}$  of a hex flat (or approximately 10-20 degrees of a turn).

For basic unit including hand hydraulic pump, hose, couplers etc., order part number 611049A.

Nut supports and body dies are ordered from chart below.

### CPI Components

Order nut support and body dies from this chart.

Size	Tube O.D.	Part No.	
		Nut Support	Body Die
8	$\frac{1}{2}$	680370-8	A750268-8
10	$\frac{5}{8}$	680370-10	A770321-10
12	$\frac{3}{4}$	680370-12	A750269-12
14	$\frac{7}{8}$	680370-14	A770322-14
16	1	680370-16	A750270-16

For the complete line of Parker Instrumentation and process fittings and tube fabricating equipment ask your Parker representative for the following descriptive literature.

**Catalog 4230** Parker CPI Tube Fittings

**Bulletin 4230-B12** for Chromatograph Fitting and Valves

**Catalog 4250** Parker CPI Valves

**Catalog 4260** Instrument Pipe Fittings

**Catalog 4270** Weld-Lok Socket Type Permanent Tube Fittings

**Catalog 4280** Automatic Butt Weld

**Catalog 4290** Parker Tube Fabricating Tools

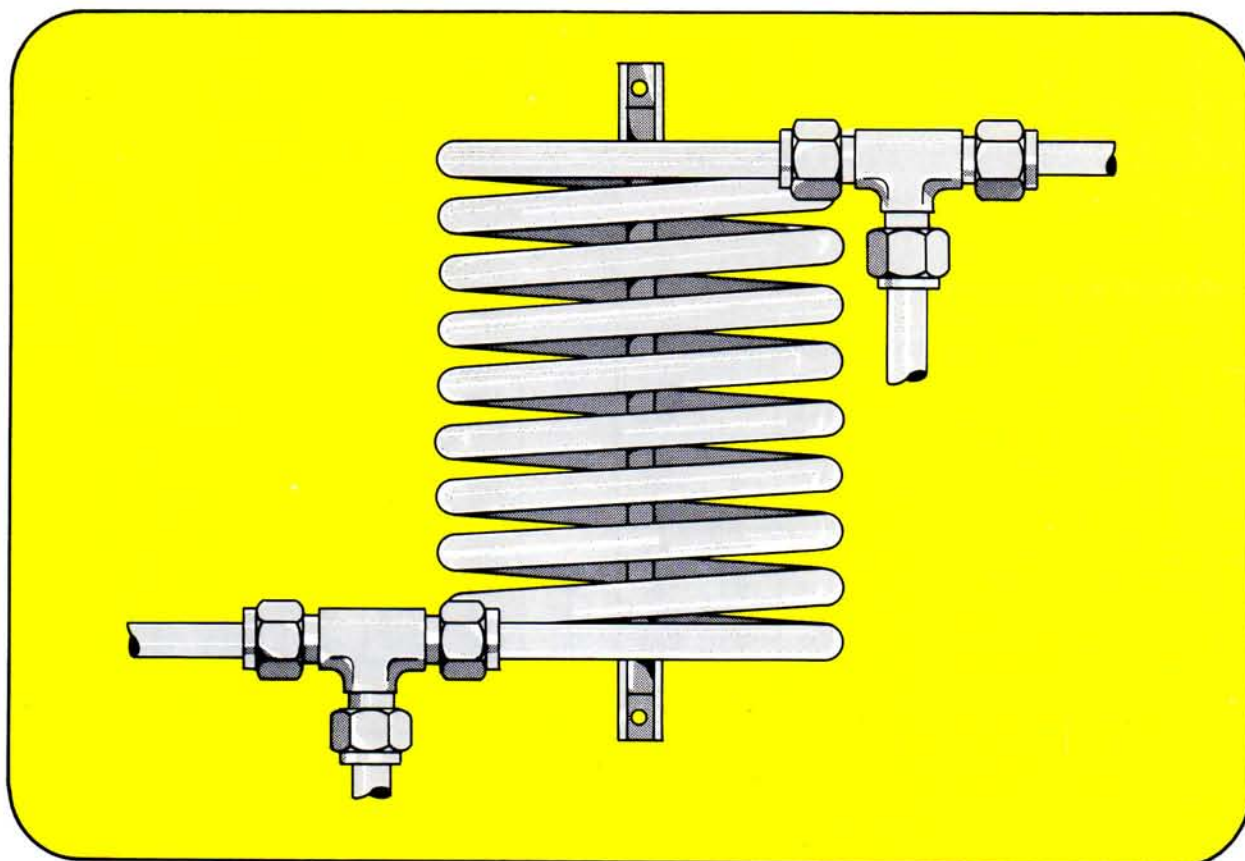


Parker Hannifin Corporation  
**Instrumentation Connectors Division**  
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Huntsville, Alabama 35802

FLUID SYSTEM SPECIALTIES

FLUID SYSTEM SPECIALTIES

# PARKER DUAL HEAT TRANSFER COILS



Parker Dual Heat Transfer Coils are rugged, high efficiency, counter-flow heat exchangers for cooling high temperature, high pressure fluid samples such as boiler steam, boiler feed water, superheat steam, hot chemical solutions and other process fluids.

They allow the operator to withdraw uncontaminated samples of a process fluid for laboratory testing at room temperature. Coils can also be used in continuous sampling systems for on-line process control.

**RUGGED CONSTRUCTION** — The sturdy tube within a tube design features heavy duty forged terminal fittings.

**SIMPLE INSTALLATION** — Convenient two-hole mounting bracket permits coil to be located near the point of measurement.

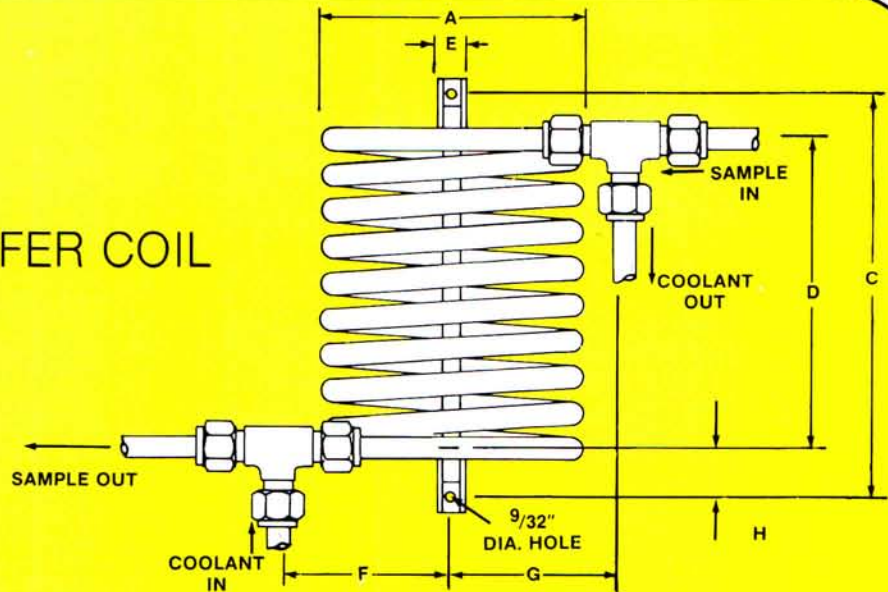
**NO PIPE THREAD JOINTS** — Terminal fittings are designed for flared, flareless or welded (optional) tube connections. Contamination of sample from pipe thread sealants is eliminated.

**FORCED COUNTERFLOW** — Insures maximum thermal efficiency.

**ASME CODE DESIGN** — Pressure and temperature ratings conform to the applicable ASME Boiler Code allowable stress values.

# Dimensions

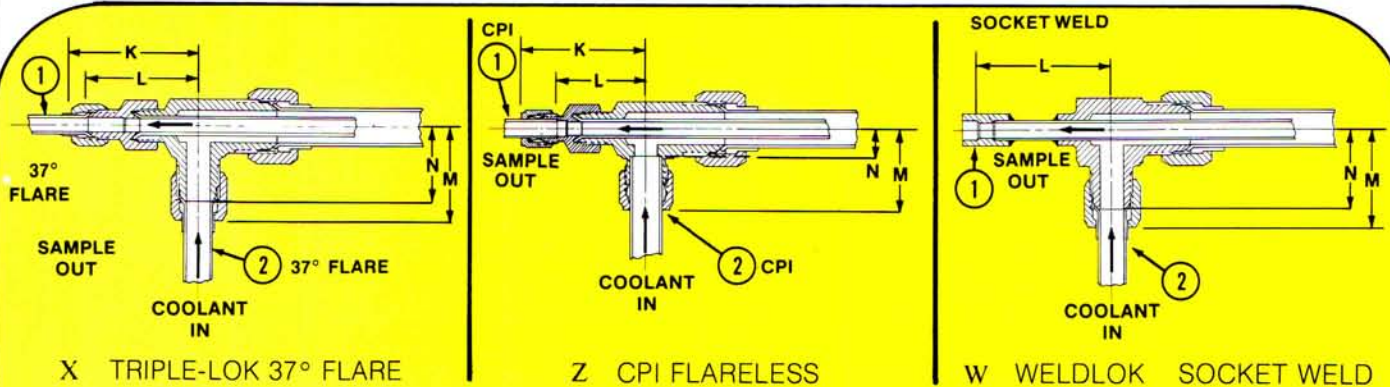
## DHTC DUAL HEAT TRANSFER COIL



### INSTALLATION DIMENSIONS

	Size	Internal Tube			External Tube		Coolant Tube		Number Of Coils	Wgt. Lbs.	Dimensions						
		O.D.	Wall Thick.	Area Sq. Ft.	O.D.	Wall Thick.	O.D.	Max. Wall			A†	C	D†	E	F†	G†	H†
INCH	-4	1/4	.049	.80	1/2	.049	3/8	.065	15	12	5	13 1/16	11 1/4	1	5	5	7/8
	-6	3/8	.049	1.44	3/4	.065	5/8	.083	9	16	8 1/2	13	9	1	7	7	2
	-8	1/2	.065	1.93	1	.083	3/4	.095	10	30	8	16 7/16	13 3/4	1 1/2	7 3/4	7 3/4	1 7/8
METRIC	-4	6.4	1.24	0.074	12.7	1.24	9.5	1.65	15	5.5	12.7	33.2	28.6	2.5	12.7	12.7	2.2
	-6	9.5	1.24	0.134	19.1	1.65	15.9	2.11	9	7.3	21.6	33.0	22.9	2.5	17.8	17.8	5.1
	-8	12.7	1.65	0.179	25.4	2.11	19.1	2.41	10	13.6	20.3	41.7	34.9	3.8	19.7	19.7	4.8

### TERMINAL CONNECTOR DIMENSIONS



Type Of Connection	Size	① Sample Tube O.D.		② Coolant Tube O.D.		K†		L		M†		N	
		inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
X TRIPLE-LOK 37° FLARE	-4	1/4	6.4	3/8	9.5	2.19	56	2.00	51	1.47	37	1.16	29
	-6	3/8	9.5	5/8	15.9	2.59	66	2.31	59	1.88	48	1.50	38
	-8	1/2	12.7	3/4	19.1	3.13	80	2.81	71	2.16	55	1.78	45
Z CPI FLARELESS	-4	1/4	6.4	3/8	9.5	2.07	53	1.76	45	1.28	33	.97	25
	-6	3/8	9.5	5/8	15.9	2.44	62	2.13	54	1.51	38	1.09	28
	-8	1/2	12.7	3/4	19.1	2.97	75	2.53	64	1.70	43	1.28	33
W WELDLOK SOCKET WELD	-4	1/4	6.4	3/8	9.5	—	—	2.44	62	1.47	37	1.16	29
	-6	3/8	9.5	5/8	15.9	—	—	2.72	69	1.88	48	1.50	38
	-8	1/2	12.7	3/4	19.1	—	—	3.38	86	2.16	55	1.78	45

†Average value

# Sizing & Design Data

**HOW TO ORDER** — The correct part number is easy to arrive at by following the procedure below.

Part No. **DHTC-** \*\* \* \*

**\*\*MATERIAL**

CU = Copper coils — both inner and outer  
 SS = Type 304 Stainless Steel inner coil — Copper outer coil  
 IN = Inconel 600 inner coil — Copper outer coil

**\* SIZE OF SAMPLE (Inner) COIL**

-4 = 1/4" O.D.  
 -6 = 3/8" O.D.  
 -8 = 1/2" O.D.

**\* TYPE OF END CONNECTION**

X = Triple-Lok 37° Flare  
 Z = CPI Flareless  
 W = Weldlok Socket Weld

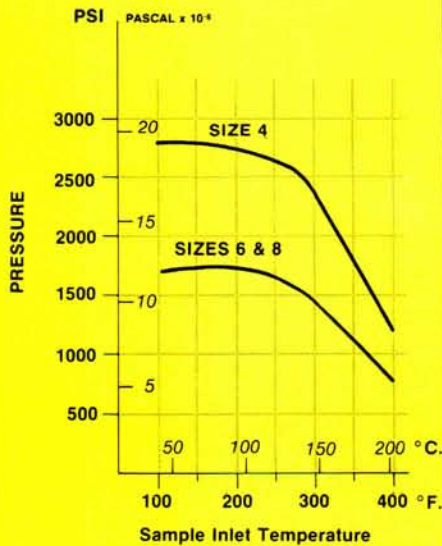
**TYPICAL SAMPLE CAPACITY OF SATURATED STEAM**

DHTC Size	Lbs./Hr. Steam Sample					Cooling Water Flow, GPM ΔP=15 psi	Max. Outer Coil Pressure Psi (Up to 200°F)
	Inner Coil Material						
	Copper	Stainless Steel & Inconel					
	200 Psia 390°F	200 Psia 390°F	1000 Psia 540°F	2500 Psia 665°F	3500 Psia 730°F		
4	80	80	81	89	94	1.8	1200
6	202	188	203	223	236	4.5	1100
8	305	100	270	496	525	10	1000

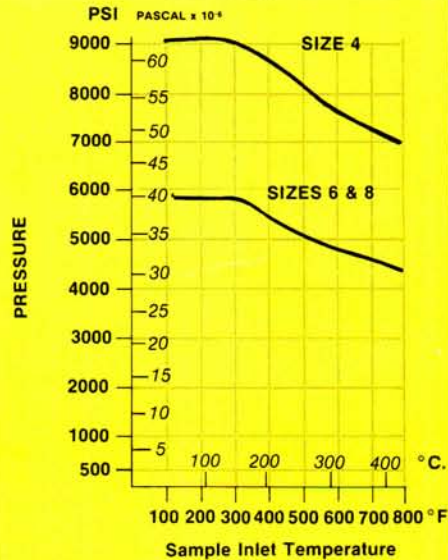
**MAXIMUM PRESSURE/TEMPERATURE RATING OF SAMPLE SIDE TUBE**

Based on ASME Section VIII Allowable Stress Values

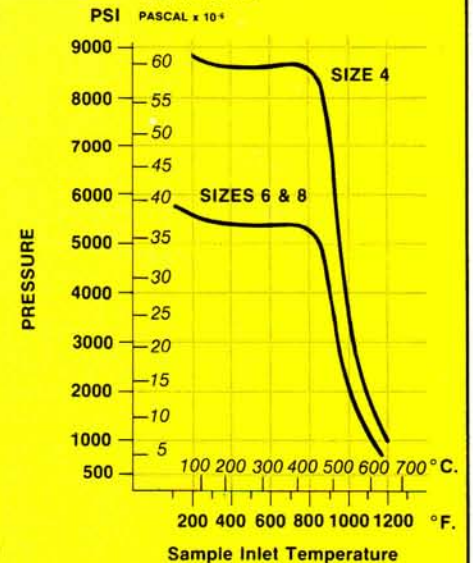
**COPPER  
ASTM B-75**



**TYPE 304 STAINLESS STEEL  
ASTM A-269**



**INCONEL 600  
ASTM B-167**

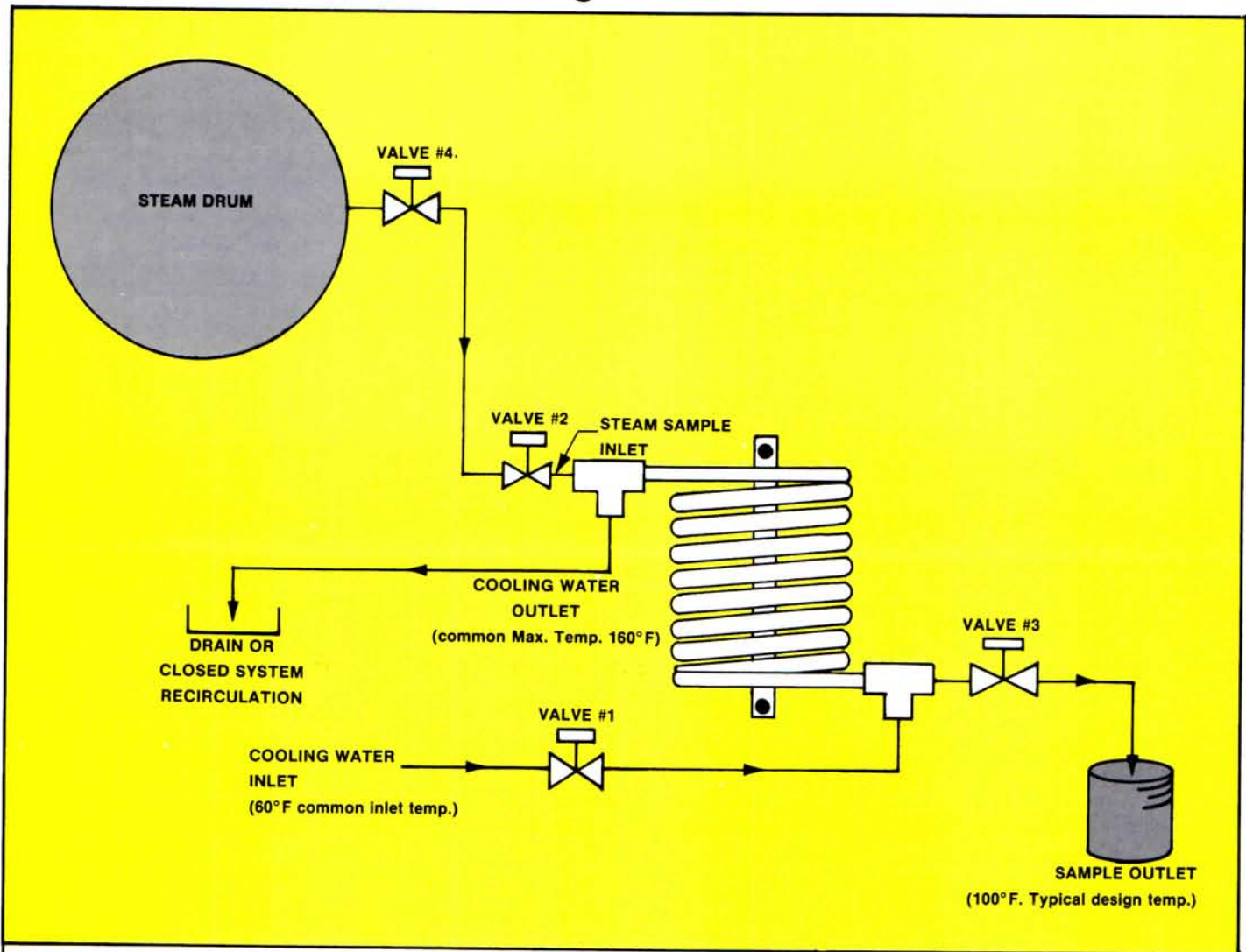


**AVAILABILITY**

Sample Tube	Part Number	Type of Sample Connection		
		X TRIPLE-LOK 37°	Z CPI FLARELESS	W WELDLOK
Copper	DHTC-CU-4	Standard	Standard	Not Available
	DHTC-CU-6	Standard	Standard	Not Available
	DHTC-CU-8	Standard	Standard	Not Available
Stainless Steel	DHTC-SS-4	Standard	Standard	Special
	DHTC-SS-6	Standard	Standard	Special
	DHTC-SS-8	Standard	Standard	Special
Inconel	DHTC-IN-4	Standard	Not Available	Special
	DHTC-IN-6	Standard	Not Available	Special
	DHTC-IN-8	Standard	Not Available	Special



# Typical Installation Diagram



## START UP SEQUENCE (All Valves Closed)

- A. Open cooling water valve #1.
- B. After adequate cooling water flow is established, gradually open valve #4, then sample inlet valve #2.
- C. Gradually open sample outlet valve #3 until desired sample flow rate is obtained (without exceeding suitable sample temperature).
- D. The position of sample outlet valve #3 should be maintained for all future sampling.

## SHUT-OFF SEQUENCE

- A. Close sample inlet valve #2.
- B. Close cooling water inlet valve #1.

## SAMPLING SEQUENCE

- A. Open cooling water inlet valve #1.
- B. After adequate cooling water flow is established, gradually open sample inlet valve #2 (keeping sample outlet valve #3 at its previously determined setting).

NOTE: Always open cooling water first and shut it off last. (It is good practice to occasionally cycle valve #4 so that when needed, it will be operable.)

"Inconel tubing is recommended for DHTC applications where halides may be present in the media."



**Instrumentation Connectors Division**

9400 S. Memorial Pkwy.  
Huntsville, Alabama 35802

TECHNICAL MATERIAL

TECHNICAL MATERIAL

# CPI Tube Fittings

## Installation Procedure

Bulletin 4230-B10  
Revised April-1979

### Tube End Preparation

1. ENDS MUST BE CUT SQUARE for best results. Tube cutters are satisfactory for most tube materials but tend to work harden stainless steel. Use of a hacksaw with a suitable guide for squareness is preferred.

2. BURRS MUST BE REMOVED inside and outside for proper entry into fitting and to prevent system contamination and/or restricted flow.
3. TUBE END MUST BE CLEAN. Remove all filings, chips, and grit before attachment of fittings.



It is not necessary to disassemble the fitting. If the fitting is disassembled, note that the small tapered end of the ferrule goes into the fitting body.

Insert tube as illustrated until the tube bottoms against the shoulder in the fitting body. Care should be taken to insure the tube is in proper alignment with fitting body.

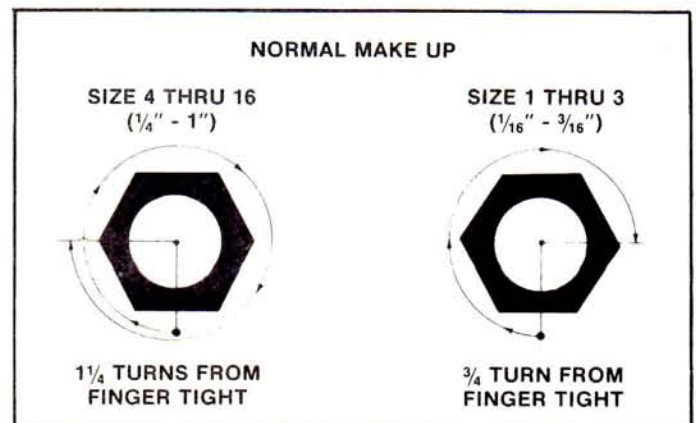
Tighten nut finger tight. Then tighten with wrench an additional  $\frac{1}{4}$  turns. Hold fitting body with a second wrench to prevent body from turning. Often it is helpful to mark the nut to facilitate counting the number of turns.

### Assembly

1. ALWAYS MAKE SURE TUBE IS IN ALIGNMENT WITH FITTING.  
Tube line fabrication (bend angles and measured lengths) must be accurate so that the tube end easily enters the fitting in proper alignment. Do not force an improperly fitted tube line into the fittings.
2. ALWAYS MAKE SURE TUBE END IS BOTTOMED AGAINST THE SHOULDER IN THE FITTING BODY.  
This is necessary to prevent movement of the tube while the nut forces the ferrule to grip the tube and to seal through any imperfections that may exist on the outside tube surface.
3. NEVER PERMIT THE FITTING BODY TO ROTATE DURING TUBE END MAKE-UP. USE TWO WRENCHES.  
Assemble port connectors to components first and hold with a wrench while making up the tube joint. All types of union bodies must be held while each of the tube ends is made up.
4. NEVER ATTEMPT TO MAKE UP BY TORQUE OR "FEEL".  
All instrumentation fittings are designed so that the ferrule(s) must move a prescribed distance in relation to

the tube to effectively grip and seal. The force required to accomplish this can vary a great deal with size, tube wall thickness, and normal manufacturing variables of tube and fittings.

5. ALWAYS TURN THE NUT THE PRESCRIBED AMOUNT REGARDLESS OF TORQUE REQUIRED.

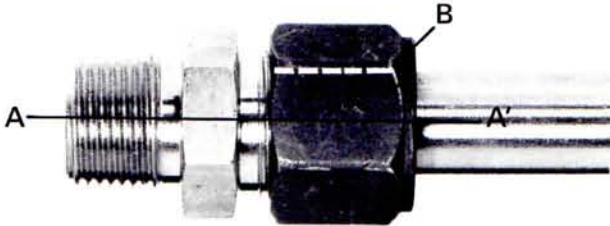


If you mark the nut before you start, you will know when you have finished that you did it right.

**NOTE: FITTING END PLUGS (FNZ) REQUIRE ONLY  $\frac{1}{4}$  TURN FROM FINGER TIGHT MAKE UP IN ALL SIZES.**

## Remake Instructions

A disassembled joint can be remade simply by retightening the nut to the position of the original make up. For maximum number of remakes, mark the fitting and nut (scribe or ink) before disassembly. Remake by tightening until marks line up again. A slight torque rise will be felt indicating the ferrule is being re-sprung into sealing position. Only after several remakes will it become necessary to advance the nut slightly past original position. This advance (indicated by B) need only be 10° - 20° (less than 1/3 of a hex flat).



## Alternate Instructions — Special Cases

In some cases it is desirable to alter the standard make up procedure for Parker CPI tube fittings. An example would be a thermo couple fitting (FH4BZ) in a vacuum or low pressure system. To minimize deformation of probe use 3/4 turn for size 4 (1/4") and 1 turn for size 6 (3/8") and up.

## Tube Selection

Tube and fittings should always be of like materials. The following recommendations will produce the best results. Care in handling should be used to avoid scratching or abrading the surface of the tube.

**Stainless Steel:** Use type 304 or 316 stainless steel seamless, or welded redrawn, fully annealed and pickled (e.g. ASTM A269). Maximum hardness should not exceed Rockwell B90.

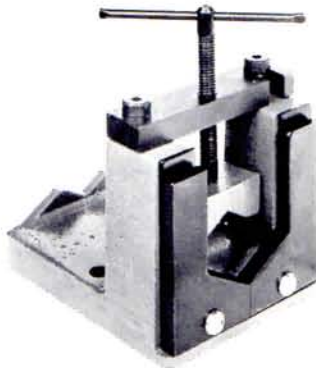
**Steel:** Use seamless or welded and cold drawn low carbon steel tubing annealed for bending and flaring (e.g. SAE J524 and SAE J525). Maximum hardness not to exceed Rockwell B65.

**Copper & Aluminum:** These materials can be used up to the quarter hard condition although fully annealed material will give the best results.

**Monel:** Use annealed Monel 400 tubing in accordance with ASTM-B-165. Rockwell RB75 MAX.



Hand Tube Cutter



TRU-KUT Hacksaw Guide



IN-EX Tube Burring Tool



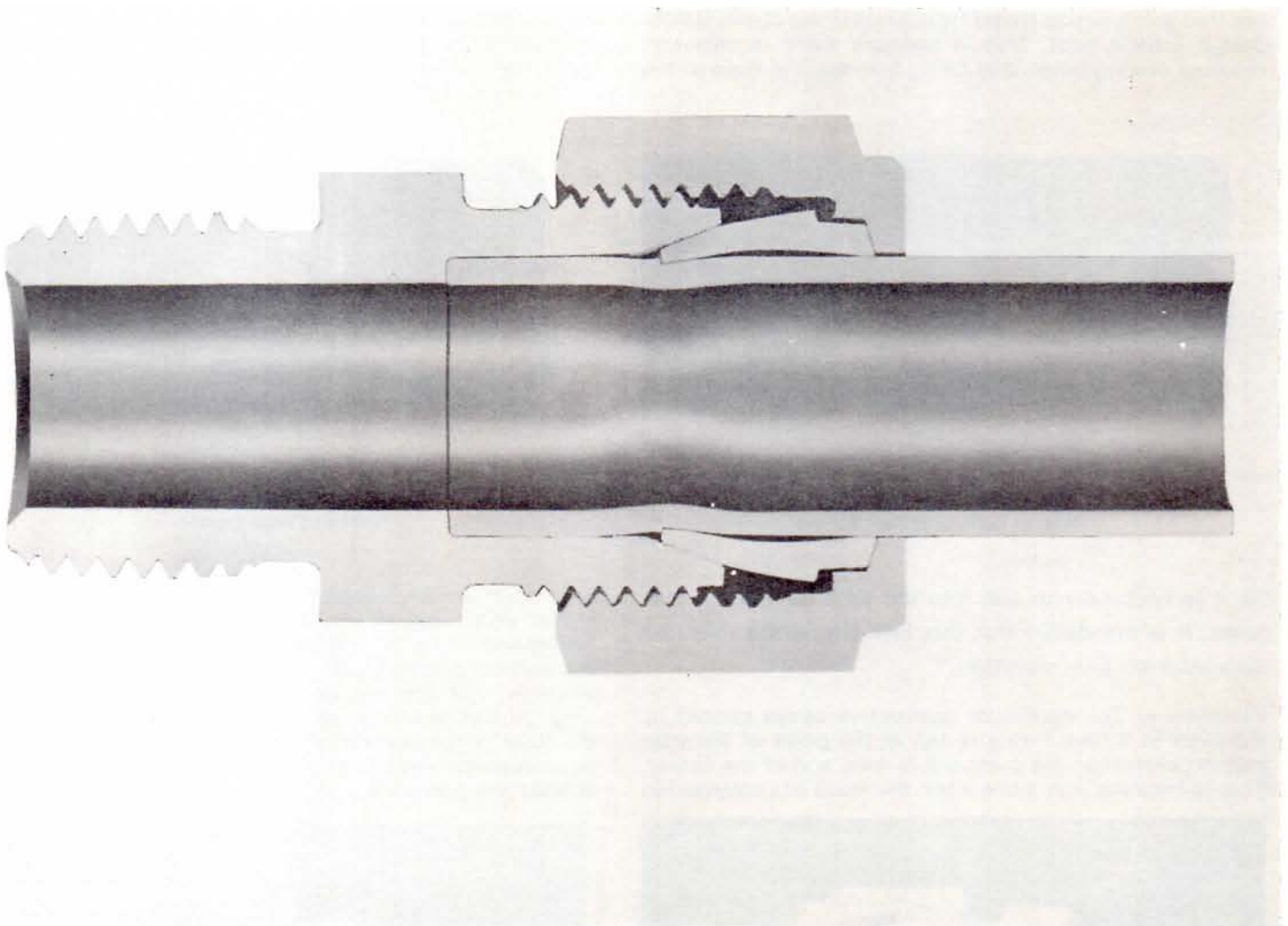
Hand Tube Benders

**Parker**  
FluidConnectors

Parker Hannifin Corporation  
Instrumentation Connectors Division  
9400 S. Memorial Parkway  
Huntsville, AL 35802 USA

# PARKER

## INSTRUMENTATION TUBE FITTING DESIGN NOTES



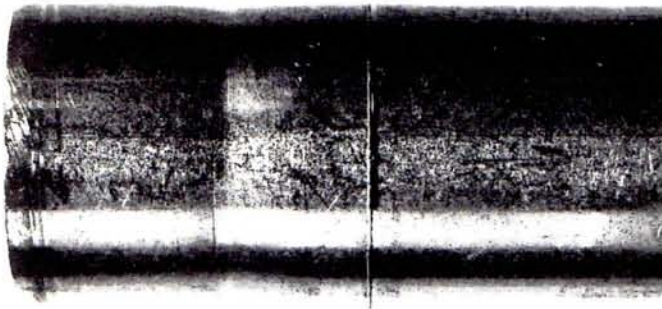
# INSTRUMENTATION TUBE FITTING DESIGN NOTES

"In reducing the number of necessary sealing points (i.e. potential leak paths) in any containment system, you increase the system reliability."

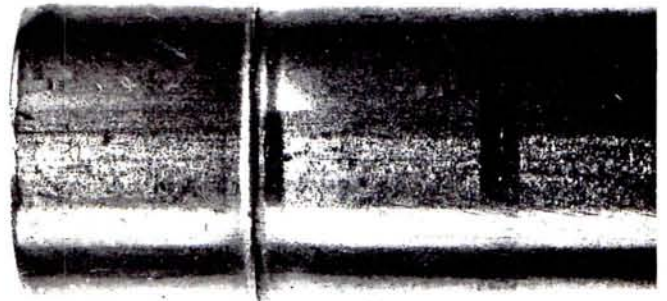
**Sealing Points** — One of the original reasons for using tube fittings and tubing in constructing a fluid handling system was to eliminate the many extra potential leak paths that existed in using threaded pipe. For example, in substituting just one bend in the tubing for a 90° elbow fitting, two threaded joints and hence two potential leak paths are eliminated. We feel that this same goal of eliminating potential leak paths should be carried into fitting design wherein the fitting is designed to have as few sealing points as possible and therefore, as few potential leak paths as possible.

If we disregard the problem of flaring the tube, we can see that the common flared fitting meets the above simple design criteria best. This is because there is only one required sealing point, that being between the nose of the

flared fitting and the flare of the tube itself. In any flareless instrumentation tube fitting, however, it is always necessary to achieve at least two metal to metal sealing points because of the introduction of the third part, this being the ferrule. These two metal to metal seal points are the seal point between the outside of the ferrule and the fitting body and between the ferrule and the tube. In a two ferrule fitting it is further necessary to achieve an additional seal point between the front and rear ferrules as the front ferrule is designed to seal to the tube fitting body and further serve as an anvil for the action of the rear ferrule in its seal to the tube. In fact, the sealing function of the rear ferrule to the tube is further shown by the small photographs of the tubing itself. Here it can be seen that the hardened rear ferrule of the two ferrule fitting has actually penetrated the tube surface in order to achieve a small bite. This *biting* action can also be seen at the front edge of the single ferrule fitting. The bite is necessary because the ferrule must penetrate through any tube surface imperfections or abrasions in order to insure a gas tight seal.



Two Ferrule Tube — Bite is at Point of Contact of Rear Ferrule

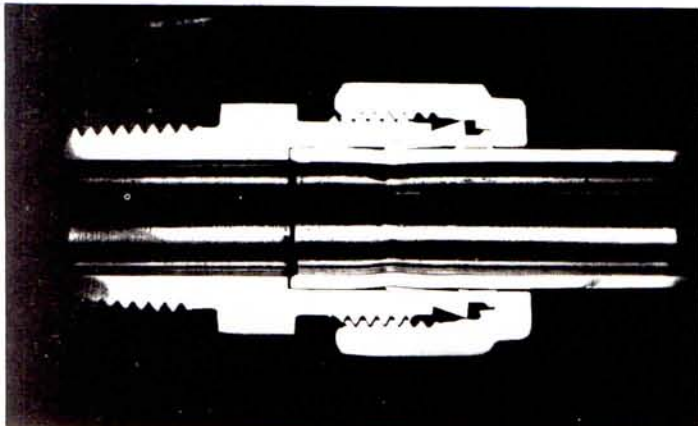


Single Ferrule Tube — Bite is at Front of Single Ferrule

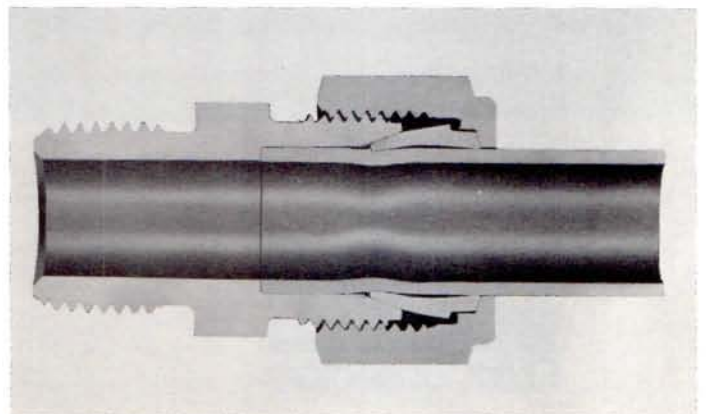
"If it is necessary to bite into the tube for sealing purposes, it is mandatory that this bite (i.e. stress riser) be isolated from tube vibration."

**Vibration** — The maximum destructive stress caused by vibration in a tube fitting is felt at the point of the tube support closest to the outboard or tube end of the fitting. This is because it is more often the mass of unsupported

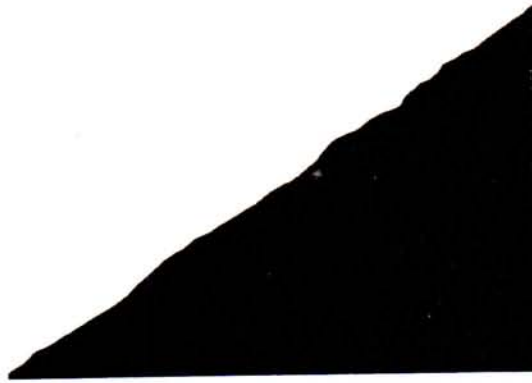
or at least weakly supported tubing that tends to have a higher amplitude of vibration than that of the attached fitting end. If a bite, and therefore a stress riser, exists at the outboard support all stress caused by the incoming vibration will concentrate at this point. Two ferrule fittings all bite at this point. A single ferrule fitting bites at the front while the rear of the ferrule grips the tube and thus absorbs incoming vibration. This gripping action shields the bite area.



Two Ferrule Fitting



Single Ferrule Fitting



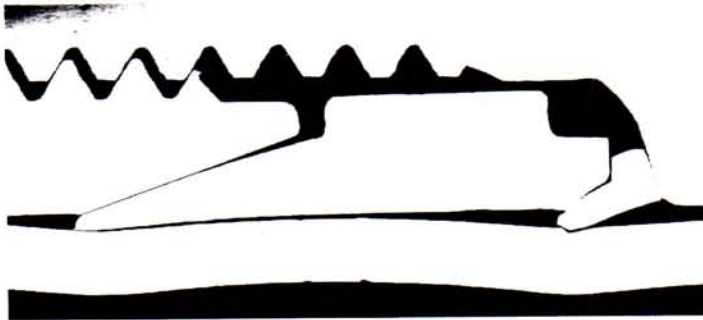
32 Rms Surface Finish, 400X

"To a light gas molecule the best production surface finish on a part appears as a series of hills and valleys. To eliminate these hills and valleys, and thus block the light gas molecule, it is necessary to 'coin' the contact points of any two fitting parts together. Because the 'coined' contact is established as an intimate relationship, movement of one point in relation to the other will eliminate total contact. As it is highly unlikely that the exact point of original contact may be returned to after movement, it will be necessary to 'coin' the two surfaces into a new intimate relationship."

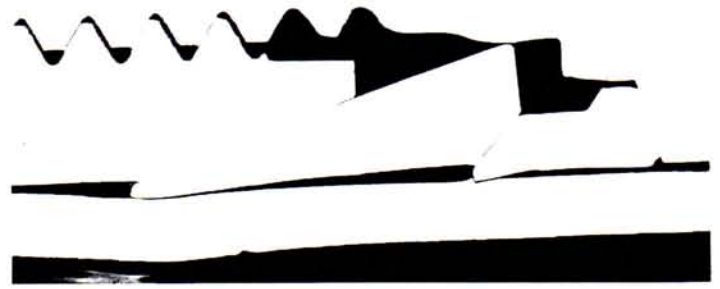
*Remakes* — One of the design criteria of a flareless instrumentation fitting is that it will have a reasonable amount of remakes available to the user after the initial fitting make-up. In allowing for these additional remakes, the fitting designer must arrive at one compatible solution to two design problems. First, he must allow for additional

movement of the component parts to insure that each component can be slightly loaded an additional amount upon each successive remake, and therefore, establish new sealing points. He must however, limit this additional movement to insure that too much stress is not imparted to the tube to the point wherein the tube collapses or compresses at a rate greater than that of the ferrule. This is especially important in the design of instrumentation tube fittings wherein the fitting will be used with thin wall tubing which has a very low resistance to collapse.

In most cases a two ferrule fitting design does a very good job in allowing for the additional movement needed for remakes. However, the designer of the two ferrule fitting must steer clear of a design which allows one of the two ferrules to bottom out and therefore, not allow additional movement, and he must also control his internal clearances as the wedging action of the two ferrules may cause interference between the ferrules and the nut making disassembly difficult if not impossible.



One Type of Two Ferrule Fitting. Note how Rear Ferrule is almost bottomed out against Front Ferrule.



Another Type of Two Ferrule Fitting. Note that the O.D. Front Ferrule is about to contact I.D. of Nut.

In a single ferrule fitting, on the other hand, the ferrule becomes a "live" spring like component. This spring like action unlike that of the "dead" two ferrule approach al-

lows the necessary movement for remake, but restricts excessive movement by storing any excessive force in the bowing action or "spring" of the single ferrule.

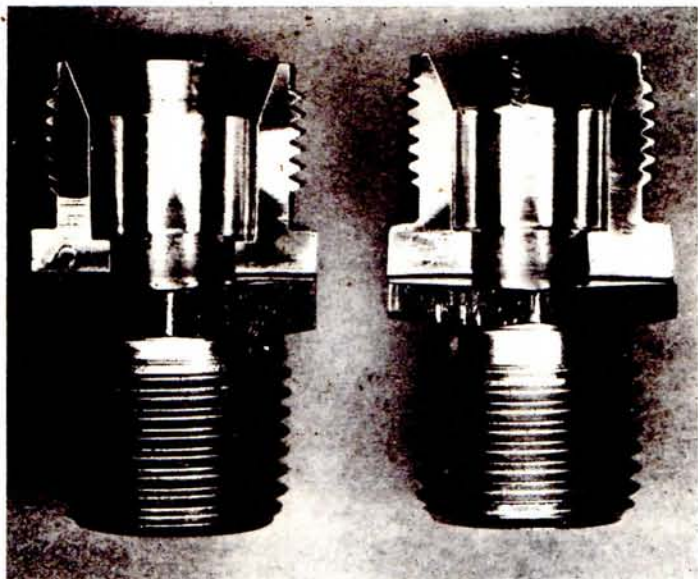


Single Ferrule Fitting

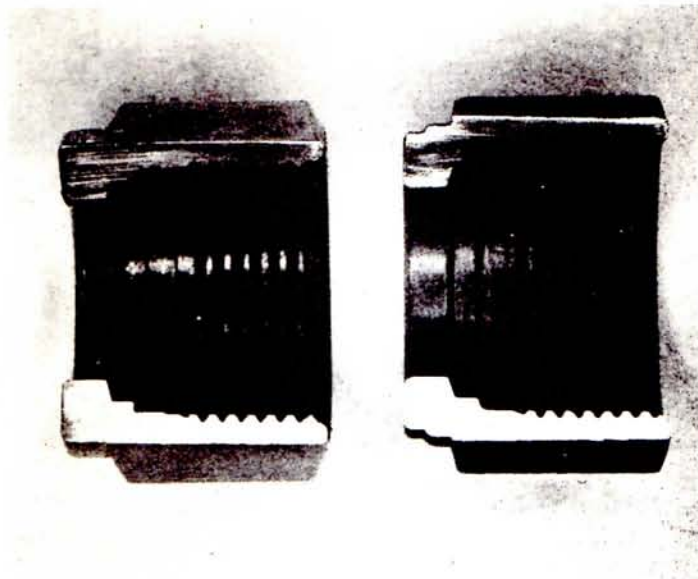


"If a ferrule system is designed to function within its own certain body and nut configuration, and this nut and body configuration is identical to the nut and body configuration of a second manufacture, then it is logical that the

first ferrule system will function in the second body and nut as well as it would in the first; and therefore, the two fittings could be said to be fully interchangeable in use and function."



Body of a Single Ferrule Fitting  
and that of a Double  
Ferrule Fitting.




Nut of a Single Ferrule Fitting  
and that of a Double  
Ferrule Fitting.

*Interchangeability* — Interchangeability, while not a necessary design criteria, has a definite advantage to the fitting user in that it allows him to utilize dual source procurement procedures. This dual source procurement is especially important wherein a special program or major new construction project may be delayed by delivery problems. Here the second source may well be able to provide the necessary fittings. Interchangeability, therefore, is at least a desirable feature, and should be employed if it will not affect the functioning of the final product.

Naturally there are numerous other criteria dealing with the design of a tube fitting. Those mentioned above, however, have been singled out as most important from the user standpoint. Should you wish to discuss other design points please contact us.

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