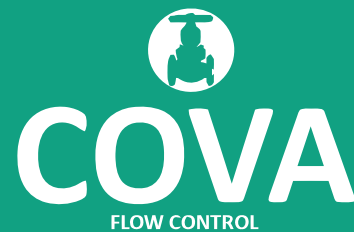




COVA FLOW CONTROL INC.

WEB: <http://www.covaflow.com>
email: sales@covaflow.com

STAINLESS STEEL TUBE FITTINGS, VALVES AND TUBING



COVA FLOW CONTROL INC.

933 E.Airtex Dr.Houston,TX 77073,USA

TEL: +1-281-784-2477

FAX: +1-281-784-2619

WEB: <http://www.covaflow.com/>

email: sales@covaflow.com



Straight Configuration

	CF01 MALE CONNECTOR	06
	CF02 AN UNION	07
	CF03 FEMALE CONNECTOR	08
	CF04 UNION	09
	CF05 REDUCING UNION	10
	CF06 BULKHEAD MALE CONNECTOR	11
	CF07 BULKHEAD FEMALE CONNECTOR	12
	CF08 BULKHEAD UNION	13
	CF09 REDUCER	14
	CF10 PIPE BUTT WELD CONNECTOR	15
	CF11 PIPE SOCKET WELD CONNECTOR	16
	CF12 MALE ADAPTER	17
	CF13 FEMALE ADAPTER	18
	CF14 PLUG	19
	CF15 CAP	20

	CF16 NUT	21
	CF17 TUBE INSERT	21
	CF18 BACK FERRULE	22
	CF19 FRONT FERRULE	22

Elbow

	CF20 MALE ELBOW	23
	CF21 FEMALE ELBOW	24
	CF22 UNION ELBOW	25

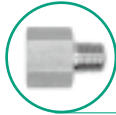
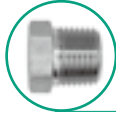
Tee

	CF23 MALE BRANCH TEE	26
	CF24 MALE RUN TEE	27
	CF25 FEMALE BRANCH TEE	28
	CF26 FEMALE RUN TEE	29
	CF27 UNION TEE	30

Cross

	CF28 UNION CROSS	31
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Straight Configuration

	IF01 HEX NIPPLE	33
	IF02 REDUCING HEX NIPPLE	33
	IF03 HEX COUPLING	34
	IF04 REDUCING HEX COUPLING	34
	IF05 REDUCING ADAPTER	35
	IF06 REDUCING BUSHING	35
	IF07 MALE PLUG	36

Elbow

	IF08 MALE ELBOW	37
	IF09 FEMALE ELBOW	37
	IF10 STREET ELBOW	38
	IF11 REDUCING STREET ELBOW	38

Tee



IF12 MALE TEE

39



IF13 FEMALE TEE

39



IF14 BRANCH TEE

40



IF15 STREET TEE

40

3-piece Instrument Ball Valves



H-3BV 2-Way Pattern: 2000 psig / 725 psig

43



H-3BVT 3-Way Pattern: 2000 psig

44

Instrument Needle Valves



H-NV/H-NVL Integral Bonnet Instrument Needle Valves

45



H-NV Straight Pattern

47



H-NVL Angle Pattern

48



H-NVS Union Bonnet Instrument Needle Valves

49

Inline Ball Poppet Check Valves



H-CV Inline Ball Poppet Check Valves

52

Stainless Steel Tubing



Stainless Steel Tubing

54

Introduction

COVA Tube Fittings are designed to provide a reliable leak-tight connection and suitable for petrochemical, chemical processing, oil refineries, laboratory, power generation, electronic, semiconductor, shipbuilding, as well as other major industries. With precision machined and strict quality control, COVA Tube Fittings achieve torque-free installation and leak-free performance.

Features

- Two-ferrule design
- Silver-plated nut threads eliminate the attrition of body threads.
- A variety of configurations increase system versatility
- Each body is stamped with size and material
- Easy to assembly and no special tools required
- Designed for use on instrumentation, process and control systems, and analyzer

Tubing Selection and Handling

Selecting and handling the tubing properly is necessary to achieve reliable tubing system. The following 4 factors should be considered when you order the tubing for COVA tube fittings.

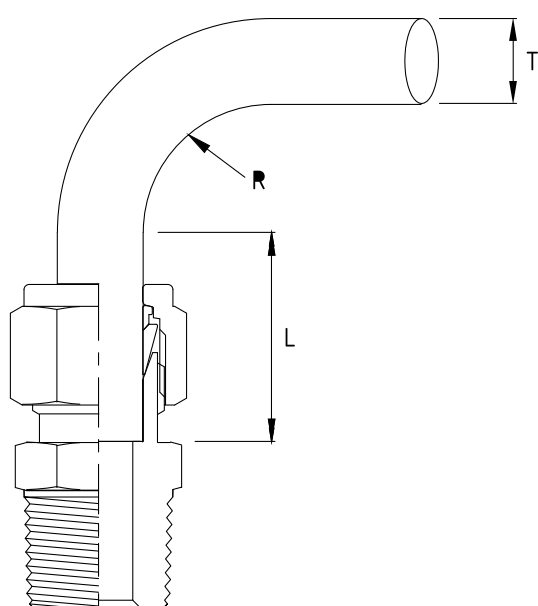
- **Wall thickness:**
 - Please refer to "tubing working pressure table" for suitable wall thickness.
 - For gas service, do not use thin wall tubing.
- **Hardness:**
 - Metal tubing material must be softer than the fitting material.
 - When tubing and fittings are made of the same material, tubing must be fully annealed.
 - In general, it is recommended to a fully annealed 304 or 316 stainless steel tubing meeting ASTM A269, A213, A249 or equivalent with hardness HRB 90 or less.
 - Always use an insert in extremely soft or flexible plastic tubing.
- **Surface:**
 - Tubing with any depression, scratch, raised portion, or other surface defect will be difficult to seal, especially in gas service.
 - Oval tubing which is not easily fit through fitting nuts, ferrules, and bodies should never be forced into the fitting
- **Handling:**
 - During transportation and storage, cap the tubing end to prevent from dirt.
 - Do not haul tubing since it will cause surface damage on tubing.
 - Deburr the tube ends before installation.

Gas Service

Gases (air, hydrogen, helium, nitrogen, etc.) have very tiny molecules that can flee through even the most minute leak path cause by the defects on tubing surface. Thick wall tubings resist ferrule compression action more than thin wall tubings. Please refer to "tubing working pressure table" and assembling correctly will compensate the leakage from minor surface defects of tubings.

Tube Bending Dimensions

When installing COVA tube fittings near tube bends, a sufficient straight length of tubing is necessary.



T: Tube OD

R: Radius of tubing bend

L: Required straight tube length (see the table)

(Fractional)	
Tube O.D.T T	Required straight tube length L (inch)
1/16	1/2
1/8	23/32
3/16	3/4
1/4	13/16
5/16	7/8
3/8	15/16
1/2	1-3/16
5/8	1-1/4
3/4	1-1/4
7/8	1-5/16
1	1-1/2

(Metric)	
Tube O.D.T T	Required straight tube length L (mm)
3	19
6	21
8	23
10	25
12	31
14	32
15	32
16	32
18	32
20	34
22	34
25	40

Pressure Conversion Table

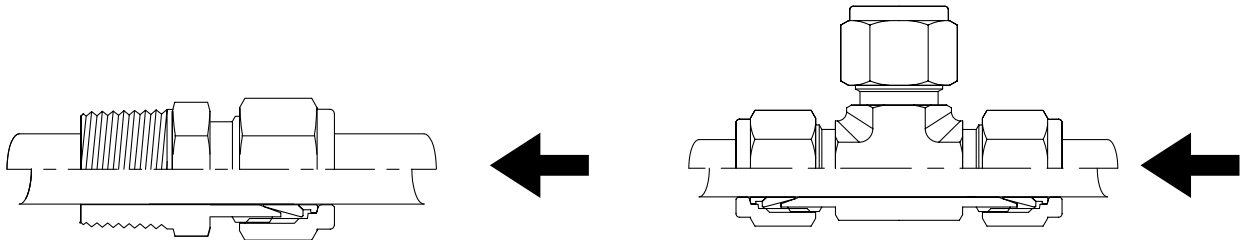
From \ To	psi	mbar	bar	atm	Pa	kPa	Mpa	mmH ₂ O	in.H ₂ O	mmHG	in.Hg	kg/cm ²
psi	1	68.95	0.0689	0.0681	6895	6.895	0.006895	703.8	27.71	51.715	2.036	0.0704
mbar	0.0145	1	0.001	0.000967	100	0.100	0.0001	10.21	0.402	0.75	0.0295	0.00102
bar	14.504	1000	1	0.987	100000	100	0.1	10210	401.9	750.1	29.53	1.02
atm	14.7	1013.25	1.01325	1	101325	101.325	0.1013	10343	407.2	760.0	29.92	1.033
Pa	0.000145	0.01	0.00001	0.00001	1	0.001	0.000001	0.102	0.00402	0.0075	0.000295	0.00001
kPa	0.14504	10.0	0.01	0.00987	1000	1	0.001	102.07	4.019	7.5	0.295	0.0102
Mpa	145.04	10000	10	9.87	1000000	1000	1	101971.6	4014.6	7500.6	295.3	10.2
mmH ₂ O	0.001421	0.098	0.000098	0.000097	9.8	0.0098	0.0000098	1	0.0394	0.0735	0.00289	0.0001
in.H ₂ O	0.0361	2.488	0.002488	0.00246	248.8	0.2488	0.00025	25.4	1	1.866	0.0735	0.00254
mmHG	0.01934	1.333	0.001333	0.001316	133.3	0.1333	0.00013	13.61	0.536	1	0.0394	0.00136
in.Hg	0.4912	33.86	0.03386	0.03342	3386	3.386	0.00386	345.7	13.61	25.4	1	0.0345
kg/cm ²	14.22	980.7	0.9807	0.968	98067	98.067	0.0981	10010	394.1	735.6	28.96	1

Safety in Product Selection

The system designer and user have the sole responsibility for selecting a product for their use. The total system design, application details, material compatibility, function, adequate ratings, proper installation, operation, and maintenance must be considered to ensure safe and trouble-free performance.

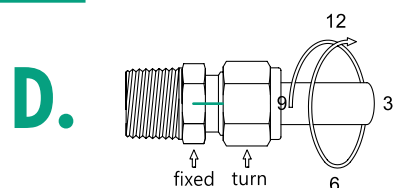
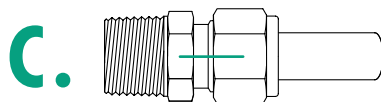
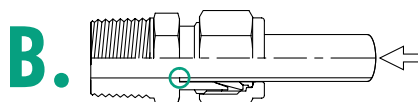
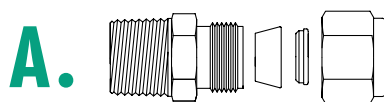
Bored Through Fittings for Thermocouples, Dip Tubes, and Heat Exchanger Tees

COVA bored through fittings have no shoulder in the fittings, so they handle thermocouples or dip tubes with ease. Most fittings with male thread are available as bore-through fittings. However, male connectors whose pipe thread end is smaller than the tube fitting end, such as TF01-4x1/8, can not be bored through. Standard COVA union tees are also available for bored through fittings.



Installation Instructions - for 1" / 25 mm and Smaller Fittings (include caps)

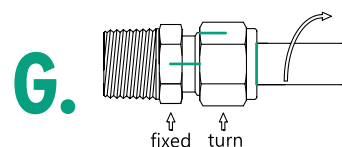
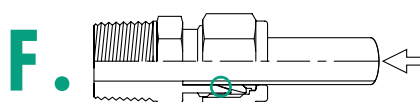
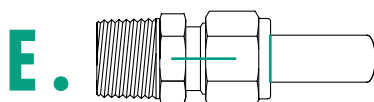
- A.** Confirm all the components are in correct order and direction.
- B.** Fully insert tubing into the COVA Tube Fitting and firmly against the shoulder in the fitting, then turn the nut finger-tight (for high-pressure applications and high safety-factor systems, tighten the nut until the tubing will not turn by hand or move axially in the fitting).
Remark: While installing bored through fittings, just pass the length of the thermocouple or dip tube you need through fitting's thread end and hold it to prevent shifting during assembly. After that, turn the nut finger-tight.
- C.** Mark the nut at the 9 o'clock position.
- D.** Holding the fitting body steady, then tighten the nut 1-1/4 turn to the 12 o'clock position by wrench (for 1/16", 1/8", and 3/16", 3 mm and 4mm tube fittings, just tighten the nut 3/4 turn to the 6 o'clock position).



Reassembly- All Sizes

COVA Tube Fittings may be disassembled and reassembled many times.

- E.** Before disconnecting, mark the tube at the edge of the nut. Additionally, mark a line along the nut and fitting body hex.
- F.** Insert the tube with preswaged ferrules into the fitting until the front ferrule seats against the fitting body.
- G.** While holding the fitting body steady, tighten the nut by a wrench to the previously pulled-up position (the marks made in step E). At this moment, you will feel a significant increase in resistance. Then tighten the nut slightly.



Install Plugs

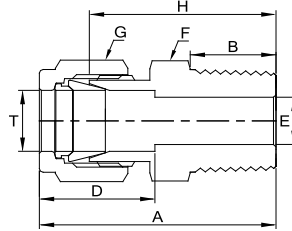
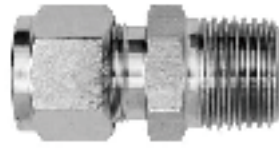
Hold fitting body steady, then tighten the plug 1/4 turn from the finger-tight position with wrench (for 1/16", 1/8", and 3/16", 3 mm and 4 mm fittings, tighten the plug 1/8 turn).

Reassembly Plugs

You can disassemble and reassemble COVA plugs many times. Just make slightly tightening by a wrench after fastening the plug by hand.

Safety Precautions

- Do not bleed system by releasing nut or plug.
- Do not mix materials or fitting parts from various manufacturers, including tubing, ferrules, nuts, and fitting bodies.
- Do not assemble, tighten, or disassemble fittings when system is pressurized.
- Before fastening the nut, make sure the tubing rests firmly on the shoulder in the tube fitting body
- Never turn fitting body during assembly and disassembly. Instead, hold fitting body and turn nut.
- Always use proper thread sealants on threads.
- Avoid unnecessary disassembly of unused fitting.



FOR METRIC TUBES								
T TUBE O.D.	MALE BSPT / NPT PIPE SIZE	DIMENSION						
		A	B	D	E	F	G	H
3	1/8	32.0	10	12.9	2.5	12	7/16	25.0
3	1/4	35.0	13	12.9	2.5	14	7/16	28.0
4	1/8	31.5	10	13.7	2.5	12	12	24.6
4	1/4	35.5	13	13.7	2.5	14	12	28.7
6	1/8	33.0	10	15.3	5.0	12	9/16	25.4
6	1/4	37.0	13	15.3	5.0	14	9/16	29.2
6	3/8	38.5	14	15.3	5.0	17	9/16	30.0
6	1/2	42.0	17	15.3	5.0	22	9/16	34.6
8	1/8	34.5	10	16.2	6.0	14	5/8	26.7
8	1/4	38.0	13	16.2	6.0	14	5/8	30.2
8	3/8	39.5	14	16.2	6.0	17	5/8	31.8
8	1/2	44.0	17	16.2	6.0	22	5/8	35.3
10	1/8	36.5	10	17.2	6.0	17	19	28.7
10	1/4	40.0	13	17.2	7.0	17	19	32.3
10	3/8	41.0	14	17.2	8.0	17	19	33.3
10	1/2	44.0	17	17.2	8.0	22	19	36.1
12	1/8	39.0	10	22.8	6.0	20	7/8	28.7
12	1/4	42.5	13	22.8	7.0	20	7/8	32.3
12	3/8	43.5	14	22.8	10.0	20	7/8	33.3
12	1/2	46.5	17	22.8	10.0	22	7/8	36.1
12	3/4	49.0	19	22.8	10.0	27	7/8	40.0
12	1	56.0	22	22.8	10.0	35	7/8	46.0
14	3/8	44.5	14	24.4	9.5	24	25	34.0
14	1/2	47.5	17	24.4	12.0	24	25	37.0
14	3/4	50.5	19	24.4	12.0	27	25	40.0
15	3/8	44.5	14	24.4	9.5	24	25	34.0
15	1/2	47.0	17	24.4	12.0	24	25	36.9
15	3/4	50.5	19	24.4	12.0	27	25	40.0
16	3/8	44.5	14	24.4	10.0	24	25	34.0
16	1/2	47.0	17	24.4	12.0	24	25	36.9
16	3/4	49.0	19	24.4	12.0	27	25	38.9
18	1/2	48.5	17	24.4	12.0	27	30	38.0
18	3/4	50.5	19	24.4	15.0	27	30	40.0
18	1	56.5	22	24.4	16.0	35	30	46.0
20	1/2	48.0	17	26.0	12.0	30	32	39.0
20	3/4	50.0	19	26.0	15.0	30	32	41.0
20	1	55.0	22	26.0	18.0	35	32	46.0
22	1/2	48.5	17	26.0	12.0	30	32	39.0
22	3/4	50.5	19	26.0	15.0	30	32	41.0
22	1	55.5	22	26.0	18.0	35	32	46.0
25	1/2	55.5	17	31.3	12.0	35	1-1/2	43.0
25	3/4	57.5	19	31.3	15.0	35	1-1/2	45.0
25	1	60.5	22	31.3	20.0	35	1-1/2	48.0

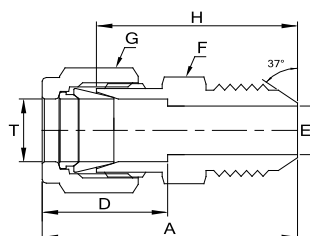
FOR FRACTIONAL TUBES								
T TUBE O.D.	MALE BSPT / NPT PIPE SIZE	DIMENSION						
		A	B	D	E	F	G	H
1/16	1/8	27.0	10	8.6	1.5	10	10	23.0
1/16	1/4	30.0	13	8.6	1.5	14	10	26.0
1/8	1/8	30.5	10	12.7	2.5	12	7/16	23.9
1/8	1/4	34.5	13	12.7	2.5	14	7/16	28.0
1/8	3/8	37.0	14	12.7	2.5	17	7/16	30.0
1/8	1/2	41.0	17	12.7	2.5	22	7/16	34.0
3/16	1/8	32.0	10	13.7	2.5	12	12	25.0
3/16	1/4	35.0	13	13.7	2.5	14	12	28.0
1/4	1/8	33.0	10	15.2	5.0	12	9/16	25.4
1/4	1/4	37.0	13	15.2	5.0	14	9/16	29.5
1/4	3/8	38.5	14	15.2	5.0	17	9/16	30.0
1/4	1/2	43.0	17	15.2	5.0	22	9/16	34.0
3/8	1/8	35.5	10	16.8	6.0	16	11/16	28.0
3/8	1/4	39.0	13	16.8	7.0	16	11/16	31.5
3/8	3/8	40.0	14	16.8	8.0	17	11/16	32.5
3/8	1/2	44.5	17	16.8	8.0	22	11/16	36.9
3/8	3/4	48.0	19	16.8	8.0	27	11/16	40.4
1/2	1/8	39.0	10	22.9	6.0	20	7/8	28.7
1/2	1/4	42.5	13	22.9	7.0	20	7/8	32.3
1/2	3/8	43.5	14	22.9	10.0	20	7/8	33.3
1/2	1/2	47.0	17	22.9	10.0	22	7/8	36.9
1/2	3/4	50.5	19	22.9	10.0	27	7/8	40.4
1/2	1	56.5	22	22.9	10.0	35	7/8	44.0
5/8	3/8	44.5	14	24.4	10.0	24	25	34.0
5/8	1/2	47.0	17	24.4	12.0	24	25	36.9
5/8	3/4	50.5	19	24.4	12.0	27	25	40.4
3/4	1/2	49.0	17	24.4	12.0	27	1-1/8	38.4
3/4	3/4	50.5	19	24.4	16.0	27	1-1/8	41.0
3/4	1	55.5	22	24.4	16.0	35	1-1/8	45.0
1	1/2	55.5	17	31.2	12.0	35	1-1/2	42.0
1	3/4	57.5	19	31.2	16.0	35	1-1/2	44.0
1	1	60.5	22	31.2	22.0	35	1-1/2	47.0

* The A and D dimensions are in finger-tight.

* The E dimension is the minimum nominal opening.

* Fraction numbers are in inch size; the others are in mm size.

* Dimensions are for reference only, and are subject to change without notice.



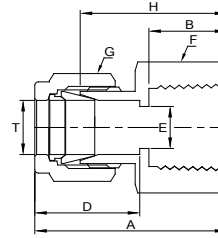
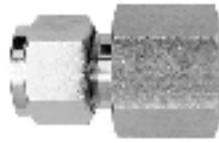
FOR METRIC TUBES								
T TUBE O.D.	MALE BSPT / NPT PIPE SIZE	DIMENSION						
		A	B	D	E	F	G	H
1/4	1/4	38.0	15.2	5	12	9/16	30.0	25.0
1/4	3/8	38.0	15.2	5	14	9/16	30.0	28.0
3/8	1/4	40.0	16.8	5	14	11/16	32.0	24.6
3/8	3/8	40.0	16.8	7	14	11/16	32.0	28.7
1/2	3/8	44.0	22.9	7	19	7/8	34.0	25.4
1/2	1/2	47.0	22.9	10	19	7/8	36.7	29.2
3/4	1/2	49.0	24.4	10	27	1-1/8	37.7	30.0
3/4	3/4	52.0	24.4	14	27	1-1/8	41.0	34.6
1	1	61.5	31.2	20	35	1-1/2	49.0	26.7

* The A and D dimensions are in finger-tight.

* The E dimension is the minimum nominal opening.

* Fraction numbers are in inch size; the others are in mm size.

* Dimensions are for reference only, and are subject to change without notice.



FOR METRIC TUBES								
T TUBE O.D.	MALE BSPT / NPT PIPE SIZE	DIMENSION						
		A	B	D	E	F	G	H
4	1/8	30.0	12	13.7	2.5	12	12	24.1
4	1/4	32.5	13	13.7	2.5	17	12	25.0
6	1/8	31.5	12	15.3	5.0	14	9/16	24.9
6	1/4	36.0	13	15.3	5.0	17	9/16	28.4
6	3/8	37.0	14	15.3	5.0	22	9/16	29.5
6	1/2	42.5	17	15.3	5.0	27	9/16	34.1
8	1/8	32.5	12	16.2	6.0	14	5/8	24.6
8	1/4	37.0	13	16.2	6.0	17	5/8	29.5
8	3/8	37.0	14	16.2	6.0	22	5/8	29.5
8	1/2	43.5	17	16.2	6.0	27	5/8	35.8
10	1/8	33.0	12	17.2	8.0	17	19	25.4
10	1/4	38.0	13	17.2	8.0	17	19	30.2
10	3/8	39.0	14	17.2	8.0	22	19	31.0
10	1/2	44.5	17	17.2	8.0	27	19	36.6
10	3/4	42.0	18	17.2	8.0	32	19	34.0
12	1/8	39.0	12	22.8	8.0	20	7/8	28.4
12	1/4	40.5	13	22.8	10.0	20	7/8	30.2
12	3/8	41.5	14	22.8	10.0	22	7/8	31.0
12	1/2	47.0	17	22.8	10.0	27	7/8	36.6
12	3/4	49.0	18	22.8	10.0	32	7/8	37.9
12	1	51.0	24	22.8	10.0	41	7/8	41.0
14	3/8	41.5	14	24.4	12.0	24	25	31.0
14	1/2	42.5	17	24.4	12.0	27	25	32.0
14	3/4	44.5	18	24.4	12.0	32	25	34.0
15	3/8	41.5	14	24.4	12.0	24	25	31.0
15	1/2	47.0	17	24.4	12.0	24	25	36.6
15	3/4	44.5	18	24.4	12.0	32	25	34.0
16	3/8	42.0	14	24.4	14.0	24	25	31.0
16	1/2	47.0	17	24.4	12.0	24	25	36.8
16	3/4	45.0	18	24.4	14.0	32	25	34.0
18	1/2	42.5	17	24.4	16.0	27	30	32.0
18	3/4	44.5	18	24.4	16.0	32	30	34.0
18	1	51.5	24	24.4	16.0	41	30	41.0
20	1/2	44.0	17	26.0	18.0	30	32	35.0
20	3/4	44.0	18	26.0	18.0	32	32	35.0
20	1	50.0	24	26.0	18.0	41	32	41.0
22	1/2	44.5	17	26.0	18.0	30	32	35.0
22	3/4	44.5	18	26.0	18.0	32	32	35.0
22	1	50.5	24	26.0	18.0	41	32	41.0
25	3/4	54.5	18	31.3	22.0	35	1-1/2	42.0
25	1	57.5	24	31.3	22.0	41	1-1/2	45.0

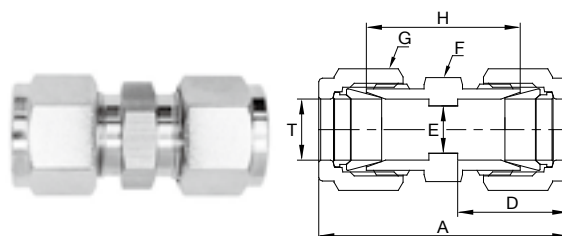
FOR FRACTIONAL TUBES								
T TUBE O.D.	MALE BSPT / NPT PIPE SIZE	DIMENSION						
		A	B	D	E	F	G	H
1/8	1/8	29.0	12	12.7	2.5	12	7/16	23.6
1/8	1/4	33.5	13	12.7	2.5	17	7/16	27.9
1/4	1/8	31.5	12	15.2	5.0	14	9/16	24.8
1/4	1/4	36.0	13	15.2	5.0	17	9/16	28.4
1/4	3/8	38.0	14	15.2	5.0	22	9/16	29.2
1/4	1/2	42.5	17	15.2	5.0	27	9/16	34.1
3/8	1/8	33.0	12	16.8	8.0	16	11/16	25.4
3/8	1/4	38.0	13	16.8	8.0	17	11/16	30.2
3/8	3/8	39.5	14	16.8	8.0	22	11/16	31.8
3/8	1/2	44.0	17	16.8	8.0	27	11/16	36.6
1/2	1/8	37.0	12	22.9	8.0	19	7/8	27.0
1/2	1/4	40.5	13	22.9	10.0	20	7/8	30.2
1/2	3/8	42.0	14	22.9	10.0	22	7/8	31.8
1/2	1/2	47.0	17	22.9	10.0	27	7/8	36.6
1/2	3/4	48.5	18	22.9	10.0	32	7/8	37.1
1/2	1	51.0	24	22.9	10.0	41	7/8	41.0
5/8	3/8	41.5	15	24.4	10.0	24	25	31.0
5/8	1/2	42.5	17	24.4	14.0	27	25	32.0
5/8	3/4	44.5	18	24.4	14.0	32	25	34.0
3/4	1/2	47.0	17	24.4	12.0	27	1-1/8	37.6
3/4	3/4	48.5	18	24.4	16.0	32	1-1/8	39.1
3/4	1	52.0	24	24.4	16.0	41	1-1/8	41.0
1	3/4	53.5	18	31.2	22.0	35	1-1/2	41.4
1	1	62.5	24	31.2	22.0	41	1-1/2	44.0

* The A and D dimensions are in finger-tight.

* The E dimension is the minimum nominal opening.

* Fraction numbers are in inch size; the others are in mm size.

* Dimensions are for reference only, and are subject to change without notice.



FOR METRIC TUBES

T TUBE O.D.	DIMENSION					
	A	D	E	F	G	H
3	35.5	12.9	2.5	10	10	22.1
4	37.5	13.7	2.5	12	12	24.1
6	41.0	15.3	5.0	12	9/16	26.2
8	43.5	16.2	6.0	14	5/8	28.2
10	46.5	17.2	8.0	17	19	31.0
12	51.5	22.8	10.0	20	7/8	31.0
14	53.0	24.4	12.0	24	25	32.0
15	52.0	24.4	12.0	24	25	31.8
16	52.0	24.4	12.0	24	25	31.8
18	54.0	24.4	16.0	27	30	33.0
20	52.0	26.0	18.0	30	32	34.0
22	53.0	26.0	18.0	30	32	34.0
25	65.0	31.3	22.0	35	1-1/2	40.0

FOR FRACTIONAL TUBES

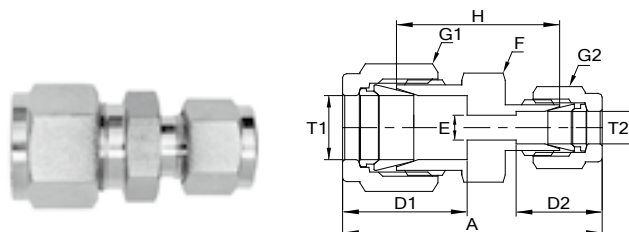
T TUBE O.D.	DIMENSION					
	A	D	E	F	G	H
1/16	28.0	8.6	1.3	10	10	20.0
1/8	36.0	12.7	2.5	12	7/16	22.4
3/16	38.0	13.7	2.5	12	12	24.0
1/4	41.0	15.2	5.0	12	9/16	26.2
3/8	45.0	16.8	8.0	16	11/16	30.2
1/2	51.5	22.9	10.0	20	7/8	31.0
5/8	53.0	24.4	14.0	24	25	32.0
3/4	54.0	24.4	16.0	27	1-1/8	35.0
1	65.0	31.2	22.0	35	1-1/2	40.4

* The A and D dimensions are in finger-tight.

* The E dimension is the minimum nominal opening.

* Fraction numbers are in inch size; the others are in mm size.

* Dimensions are for reference only, and are subject to change without notice.



FOR METRIC TUBES									
T1 TUBE O.D.	T2 TUBE O.D.	DIMENSION							
		A	D1	D2	E	F	G1	G2	H
4	3	38.0	13.7	12.9	2.5	12	12	7/16	24.0
6	4	40.0	15.3	13.7	2.5	12	9/16	12	25.0
8	6	42.5	16.2	15.3	5.0	14	5/8	9/16	27.4
10	6	44.5	17.2	13.7	5.0	17	19	9/16	29.5
10	8	45.5	17.2	16.2	6.0	17	19	5/8	30.0
12	6	47.0	22.8	15.3	5.0	20	7/8	9/16	29.5
12	8	48.0	22.8	16.2	6.0	20	7/8	5/8	30.2
12	10	49.0	22.8	17.2	8.0	20	7/8	19	31.0
16	12	52.0	24.4	22.8	10.0	24	25	7/8	31.8
18	12	53.5	24.4	22.8	10.0	27	30	7/8	33.0

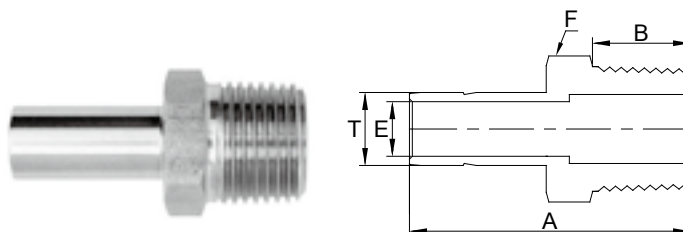
FOR FRACTIONAL TUBES									
T1 TUBE O.D.	T2 TUBE O.D.	DIMENSION							
		A	D1	D2	E	F	G1	G2	H
1/8	1/16	33.0	12.7	8.6	1.5	10	7/16	10	22.0
3/16	1/8	38.0	13.7	12.7	2.5	12	12	7/16	24.0
1/4	1/16	35.0	15.2	8.6	1.5	12	9/16	10	23.0
1/4	1/8	39.0	15.2	12.7	2.5	15.2	9/16	7/16	24.6
1/4	3/16	40.0	13.7	15.2	2.5	12	12	9/16	25.0
5/16	1/4	42.5	16.2	15.2	5.0	14	17	9/16	27.5
3/8	1/8	41.0	16.8	12.7	2.5	16	11/16	7/16	26.9
3/8	1/4	43.5	16.8	15.2	5.0	16	11/16	9/16	28.4
1/2	1/8	45.5	22.9	12.7	2.5	20	7/8	7/16	28.4
1/2	1/4	47.0	22.9	15.2	5.0	20	7/8	9/16	29.5
1/2	3/8	48.5	22.9	16.8	8.0	20	7/8	11/16	31.0
5/8	3/8	49.5	24.4	16.8	8.0	24	25	11/16	31.8
5/8	1/2	52.5	24.4	22.9	10.0	24	25	7/8	31.8
3/4	1/4	49.3	24.4	15.2	5.0	27	1-1/8	9/16	31.8
3/4	3/8	51.0	24.4	16.8	8.0	27	1-1/8	11/16	33.3
3/4	1/2	54.0	24.4	22.9	10.0	27	1-1/8	7/8	33.3
3/4	5/8	54.0	24.4	24.4	12.0	27	1-1/8	25	33.3
1	1/2	63.0	31.2	22.9	10.0	35	1-1/2	7/8	40.9
1	3/4	63.5	31.2	24.4	16.0	35	1-1/2	1-1/8	40.9

* The A and D dimensions are in finger-tight.

* The E dimension is the minimum nominal opening.

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FOR METRIC TUBES					
T TUBE O.D.	MALE BSPT / NPT PIPE SIZE	DIMENSION			
		A	B	E	F
6	1/8	36.0	10	4.0	12
6	1/4	39.0	13	4.0	14
6	3/8	37.0	14	4.0	17
6	1/2	41.0	17	4.0	22
8	1/8	34.5	10	5.0	12
8	1/4	41.0	13	5.0	14
8	3/8	39.5	14	5.0	17
8	1/2	43.5	17	5.0	22
10	1/4	41.0	13	8.0	14
10	3/8	42.0	14	8.0	17
10	1/2	46.0	17	8.0	22
12	1/4	45.0	13	10.0	14
12	3/8	46.0	14	10.0	17
12	1/2	50.0	17	10.0	22
14	3/8	47.5	14	10.0	14
14	1/2	51.5	17	10.0	17
14	3/4	54.0	19	10.0	22
16	1/2	51.5	17	12.0	22
16	3/4	54.5	19	12.0	27
18	1/2	52.0	17	14.0	22
20	1/2	52.5	17	15.0	22
22	1/2	54.0	17	18.0	24
22	3/4	57.0	19	18.0	27
25	1	67.0	22	20.0	35

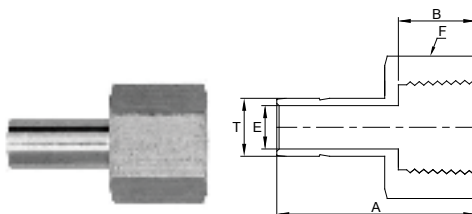
FOR FRACTIONAL TUBES					
T TUBE O.D.	MALE BSPT / NPT PIPE SIZE	DIMENSION			
		A	B	E	F
1/4	1/8	36.0	10	4.3	12
1/4	1/4	39.0	13	4.3	14
1/4	3/8	40.0	14	4.3	17
1/4	1/2	41.0	17	4.3	22
3/8	1/8	38.0	10	7.5	12
3/8	1/4	41.0	13	7.5	14
3/8	3/8	42.0	14	7.5	17
3/8	1/2	46.0	17	7.5	22
1/2	1/4	45.0	13	10.5	14
1/2	3/8	46.0	14	10.5	17
1/2	1/2	50.0	17	10.5	22
3/4	1/2	54.0	17	16.5	22
3/4	3/4	55.0	19	16.5	27
3/4	1	58.0	22	16.5	35
1	3/4	59.0	19	22.0	27
1	1	62.0	22	22.0	35

* The A and D dimensions are in finger-tight.

* The E dimension is the minimum nominal opening.

* Fraction numbers are in inch size; the others are in mm size.

* Dimensions are for reference only, and are subject to change without notice.



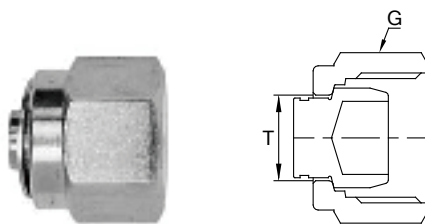
FOR METRIC TUBES					
T TUBE O.D.	FEMALE BSPT / NPT PIPE SIZE	DIMENSION			
		A	B	E	F
6	1/8	34.0	12	4.0	14
6	1/4	37.0	13	4.0	17
6	1/2	36.0	17	4.0	22
8	1/8	33.5	12	5.0	14
8	1/4	39.0	13	5.0	17
10	1/4	39.0	13	8.0	17
10	3/8	40.0	14	8.0	22
10	1/2	43.0	17	8.0	27
12	1/4	43.0	13	10.0	17
12	3/8	44.0	14	10.0	22
12	1/2	47.0	17	10.0	27
14	1/2	46.5	17	10.0	27
16	3/8	43.5	14	12.0	22
18	1/2	47.0	17	14.0	27

FOR FRACTIONAL TUBES					
T TUBE O.D.	FEMALE BSPT / NPT PIPE SIZE	DIMENSION			
		A	B	E	F
1/4	1/8	34.0	12	4.3	14
1/4	1/4	37.0	13	4.3	17
1/4	3/8	38.0	14	4.3	22
1/4	1/2	41.0	17	4.3	27
3/8	1/8	36.0	12	7.5	14
3/8	1/4	39.0	13	7.5	17
3/8	3/8	40.0	14	7.5	22
3/8	1/2	43.0	17	7.5	27
1/2	1/4	43.0	13	10.5	17
1/2	3/8	44.0	14	10.5	22
1/2	1/2	47.0	17	10.5	27
3/4	1/2	51.0	17	16.5	27
3/4	3/4	53.0	18	16.5	30
3/4	1	56.0	24	16.5	38
1	3/4	60.0	18	22.0	32
1	1	64.0	24	22.0	38

* The E dimension is the minimum nominal opening.

* Fraction numbers are in inch size; the others are in mm size.

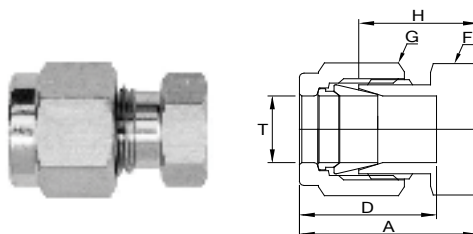
* Dimensions are for reference only, and are subject to change without notice.



FOR METRIC TUBES	
T TUBE O.D.	DIMENSION
	G
3	7/16
4	12
6	9/16
8	5/8
10	19
12	7/8
14	25
15	25
16	25
18	30
20	32
22	32
25	1-1/2

FOR FRACTIONAL TUBES	
T TUBE O.D.	DIMENSION
	G
1/16	10
1/8	7/16
3/16	12
1/4	9/16
3/8	11/16
1/2	7/8
5/8	25
3/4	1-1/8
1	1-1/2

- * Fraction numbers are in inch size; the others are in mm size.
- * Dimensions are for reference only, and are subject to change without notice.



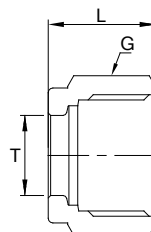
FOR METRIC TUBES					
T TUBE O.D.	DIMENSION				
	A	D	F	G	H
3	22.0	12.9	10	7/16	15.0
4	21.5	16.1	12	12	14.7
6	23.5	17.7	12	9/16	15.7
8	24.5	18.6	14	5/8	17.0
10	27.0	19.5	17	19	19.0
12	29.5	22.0	20	7/8	19.0
14	31.5	24.4	24	25	21.0
15	30.0	24.4	24	25	19.8
16	32.0	24.4	24	25	19.8
18	31.5	24.4	27	30	21.0
20	31.0	26.0	30	32	22.0
22	31.5	26.0	30	32	22.0
25	38.5	31.3	35	1-1/2	26.0

FOR FRACTIONAL TUBES					
T TUBE O.D.	DIMENSION				
	A	D	F	G	H
1/16	15.0	8.6	10	10	11.2
1/8	20.5	15.2	12	7/16	13.5
3/16	22.0	10.0	10	12	15.0
1/4	23.5	17.8	12	9/16	16.0
3/8	26.0	19.3	16	11/16	18.3
1/2	29.5	21.8	20	7/8	19.1
5/8	30.0	21.8	24	25	19.8
3/4	31.5	21.8	27	1-1/8	21.3
1	38.5	26.4	35	1-1/2	26.2

* The A, and D dimensions are in finger-tight.

* Fraction numbers are in inch size; the others are in mm size.

* Dimensions are for reference only, and are subject to change without notice.

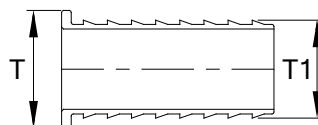


FOR METRIC TUBES		
T TUBE O.D.	DIMENSION	
	G	L
3	7/16	12.0
4	12	11.7
6	9/16	12.7
8	5/8	13.5
10	19	15.0
12	7/8	17.5
14	25	17.5
15	25	17.5
16	25	17.5
18	30	17.5
20	32	17.5
22	32	17.5
25	1-1/2	20.5

FOR FRACTIONAL TUBES		
T TUBE O.D.	DIMENSION	
	G	L
1/16	10	8.0
1/8	7/16	12.0
3/16	12	12.0
1/4	9/16	12.7
3/8	11/16	14.3
1/2	7/8	17.5
5/8	25	17.5
3/4	1-1/8	17.5
1	1-1/2	20.6

* Fraction numbers are in inch size; the others are in mm size.

* Dimensions are for reference only, and are subject to change without notice.

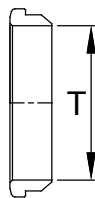


FOR METRIC TUBES	
T SOFT TUBE O.D.	T1 SOFT TUBE I.D.
6	4
8	6
10	8
12	10

FOR FRACTIONAL TUBES	
T SOFT TUBE O.D.	T1 SOFT TUBE I.D.
1/4	3/16
3/8	1/4
1/2	3/8
3/4	5/8
1	7/8

CF18

BACK FERRULE



FOR METRIC TUBES

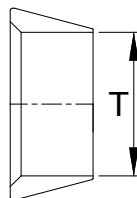
T TUBE O.D.
3
4
6
8
10
12
14
15
16
18
20
22
25

FOR FRACTIONAL TUBES

T TUBE O.D.
1/16
1/8
3/16
1/4
3/8
1/2
5/8
3/4
1

CF19

FRONT FERRULE

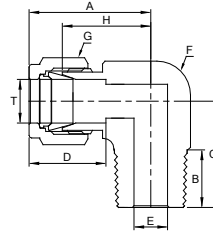


FOR METRIC TUBES

T TUBE O.D.
3
4
6
8
10
12
14
15
16
18
20
22
25

FOR FRACTIONAL TUBES

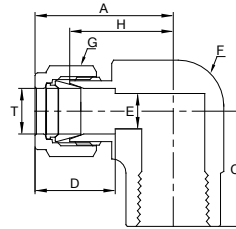
T TUBE O.D.
1/16
1/8
3/16
1/4
3/8
1/2
5/8
3/4
1



FOR METRIC TUBES									
T TUBE O.D.	MALE BSPT / NPT PIPE SIZE	DIMENSION							
		A	B	C	D	E	F	G	H
3	1/8	24.5	10	18.7	12.9	2.5	12	7/16	17.7
3	1/4	25.0	13	22.3	12.9	2.5	14	7/16	18.3
4	1/8	25.5	10	18.8	13.7	2.5	12	12	18.8
4	1/4	25.5	13	22.4	13.7	2.5	14	12	18.8
6	1/8	27.0	10	18.8	15.3	5.0	12	9/16	21.5
6	1/4	27.0	13	23.0	15.3	5.0	14	9/16	21.5
6	3/8	30.0	14	26.2	15.3	5.0	17	9/16	22.4
6	1/2	32.0	17	31.0	15.3	5.0	23	9/16	24.4
8	1/8	29.0	10	19.8	16.2	5.0	14	5/8	22.9
8	1/4	29.0	13	23.4	16.2	5.0	14	5/8	22.9
8	3/8	31.5	14	26.2	16.2	6.0	17	5/8	23.9
8	1/2	33.0	17	31.0	16.2	6.0	22	5/8	25.1
10	1/8	31.5	10	23.6	17.2	5.0	17	19	23.9
10	1/4	31.5	13	25.2	17.2	5.0	17	19	23.9
10	3/8	31.5	14	26.2	17.2	7.0	17	19	23.9
10	1/2	33.5	17	31.0	17.2	8.0	22	19	25.8
12	1/8	36.0	10	23.6	22.8	5.0	20	7/8	27.5
12	1/4	36.0	13	28.0	22.8	5.0	20	7/8	27.5
12	3/8	36.0	14	29.5	22.8	7.0	20	7/8	27.5
12	1/2	36.0	17	31.0	22.8	10.0	22	7/8	27.5
12	3/4	40.0	19	36.8	22.8	10.0	27	7/8	29.7
12	1	50.0	22	45.5	22.8	10.0	34	7/8	39.9
14	3/8	37.0	14	28.0	24.4	7.0	24	25	26.5
14	1/2	37.0	17	31.0	24.4	10.0	24	25	26.5
14	3/4	40.0	19	36.6	24.4	12.0	27	25	29.6
15	3/8	37.0	14	28.0	24.4	7.0	24	25	26.5
15	1/2	37.0	17	31.0	24.4	10.0	24	25	26.5
15	3/4	40.5	19	36.6	24.4	12.0	27	25	29.6
16	3/8	38.0	14	30.2	24.4	7.0	22	25	27.9
16	1/2	38.0	17	33.1	24.4	10.0	22	25	27.9
16	3/4	40.0	19	36.8	24.4	12.0	27	25	29.7
18	3/8	40.0	14	31.6	24.4	7.0	27	30	29.6
18	1/2	40.0	17	34.6	24.4	10.0	27	30	29.6
18	3/4	40.0	19	36.6	24.4	12.0	27	30	29.6
18	1	50.5	22	45.5	24.4	16.0	34	30	39.9
20	1/2	44.0	17	38.7	26.0	10.0	30	32	34.7
20	3/4	44.0	19	38.7	26.0	16.0	30	32	34.7
20	1	49.0	22	45.5	26.0	18.0	34	32	39.9
22	1/2	44.0	17	38.7	26.0	10.0	30	32	34.7
22	3/4	44.0	19	38.7	26.0	16.0	30	32	34.7
22	1	49.5	22	45.5	26.0	18.0	34	32	39.9
25	1/2	53.0	17	43.0	31.3	10.0	34	1-1/2	40.5
25	3/4	53.0	19	45.0	31.3	16.0	34	1-1/2	40.5
25	1	53.0	22	45.5	31.3	22.0	34	1-1/2	40.5

FOR FRACTIONAL TUBES									
T TUBE O.D.	MALE BSPT / NPT PIPE SIZE	DIMENSION							
		A	B	C	D	E	F	G	H
1/16	1/8	20.0	10	18.7	8.6	1.5	12	10	15.7
1/16	1/4	20.5	13	22.3	8.6	1.5	14	10	16.3
1/8	1/8	24.0	10	17.8	12.7	2.5	12	7/16	17.0
1/8	1/4	25.0	13	22.4	12.7	2.5	14	7/16	18.0
1/8	3/8	28.0	14	25.7	12.7	2.5	17	7/16	20.7
1/8	1/2	30.5	17	31.4	12.7	2.5	22	7/16	23.4
3/16	1/8	25.0	10	18.7	13.7	2.5	12	12	17.7
3/16	1/4	25.5	13	22.3	13.7	2.5	14	12	18.3
1/4	1/8	27.0	10	18.8	15.2	5.0	12	9/16	19.6
1/4	1/4	27.0	13	22.4	15.2	5.0	14	9/16	19.6
1/4	3/8	30.0	14	26.2	15.2	5.0	17	9/16	22.4
1/4	1/2	32.0	17	31.0	15.2	5.0	22	9/16	24.4
3/8	1/8	30.5	10	20.8	16.8	5.0	14	11/16	23.1
3/8	1/4	30.5	13	24.4	16.8	7.0	14	11/16	23.1
3/8	3/8	31.5	14	26.2	16.8	7.0	17	11/16	23.9
3/8	1/2	33.5	17	31.0	16.8	7.0	22	11/16	25.9
1/2	1/8	37.0	10	25.0	22.9	5.0	20	7/8	27.0
1/2	1/4	36.5	13	27.2	22.9	5.0	20	7/8	27.5
1/2	3/8	36.5	14	28.2	22.9	7.0	20	7/8	27.5
1/2	1/2	36.5	17	31.0	22.9	10.0	22	7/8	27.5
1/2	3/4	40.0	19	36.8	22.9	10.0	27	7/8	29.7
1/2	1	50.0	22	45.5	22.9	10.0	34	7/8	39.9
5/8	3/8	38.5	14	30.2	24.4	7.0	24	25	27.9
5/8	1/2	38.5	17	33.1	24.4	10.0	24	25	27.9
5/8	3/4	40.0	19	36.8	24.4	12.0	27	25	29.7
3/4	3/8	40.0	14	31.6	24.4	7.0	27	1-1/8	29.6
3/4	1/2	40.0	17	34.8	24.4	10.0	27	1-1/8	32.0
3/4	3/4	40.0	19	36.8	24.4	12.0	27	1-1/8	32.0
3/4	1	51.0	22	45.5	24.4	16.0	34	1-1/8	39.9
1	1/2	53.0	17	43.5	31.2	10.0	34	1-1/2	40.5
1	3/4	49.0	19	41.7	31.2	16.0	34	1-1/2	36.8
1	1	49.0	22	44.5	31.2	22.0	34	1-1/2	36.8

- * The A and D dimensions are in finger-tight.
- * The E dimension is the minimum nominal opening.
- * Fraction numbers are in inch size; the others are in mm size.
- * Dimensions are for reference only, and are subject to change without notice.



FOR METRIC TUBES								
T TUBE O.D.	FEMALE BSPT / NPT PIPE SIZE	DIMENSION						
		A	C	D	E	F	G	H
4	1/8	25.5	19.1	13.7	2.5	14	12	18.8
4	1/4	28.0	23.7	13.7	2.5	17	12	20.7
6	1/8	27.0	19.1	15.3	5.0	14	9/16	19.6
6	1/4	30.0	22.4	15.3	5.0	17	9/16	22.4
6	3/8	32.0	22.4	15.3	5.0	22	9/16	24.4
6	1/2	34.5	28.4	15.3	5.0	27	9/16	27.2
8	1/8	29.0	19.1	16.2	6.0	14	5/8	21.3
8	1/4	30.5	22.4	16.2	6.0	17	5/8	23.1
8	3/8	34.0	26.4	16.2	6.0	22	5/8	25.9
8	1/2	37.0	32.6	16.2	6.0	27	5/8	29.1
10	1/8	32.0	23.7	17.2	8.0	17	19	23.7
10	1/4	32.0	23.7	17.2	8.0	17	19	23.7
10	3/8	34.5	26.4	17.2	8.0	22	19	26.4
10	1/2	37.5	32.6	17.2	8.0	27	19	29.6
12	1/8	37.0	25.0	22.8	10.0	20	7/8	27.0
12	1/4	36.5	22.4	22.8	10.0	20	7/8	27.3
12	3/8	36.5	22.4	22.8	10.0	22	7/8	27.3
12	1/2	39.0	28.4	22.8	10.0	27	7/8	28.7
12	3/4	49.5	41.0	22.8	10.0	34	7/8	39.5
14	3/8	37.0	26.0	24.4	12.0	24	25	26.5
14	1/2	40.0	32.6	24.4	12.0	27	25	29.6
14	3/4	50.0	41.0	24.4	12.0	34	25	39.5
15	3/8	38.5	22.4	24.4	12.0	27	25	27.9
15	1/2	40.0	28.4	24.4	12.0	27	25	32.0
15	3/4	50.0	41.0	24.4	12.0	34	25	39.5
16	3/8	37.5	26.0	24.4	14.0	24	25	26.5
16	1/2	40.5	32.6	24.4	14.0	27	25	29.6
16	3/4	50.5	41.0	24.4	14.0	34	25	39.5
18	3/8	40.0	32.6	24.4	16.0	27	30	29.6
18	1/2	40.0	32.6	24.4	16.0	27	30	29.6
18	3/4	50.0	41.0	24.4	16.0	34	30	39.5
20	1/2	44.0	34.7	26.0	18.0	30	32	34.7
20	3/4	48.5	41.0	26.0	18.0	34	32	39.5
22	1/2	44.0	34.7	26.0	18.0	30	32	34.7
22	3/4	49.0	41.0	26.0	18.0	34	32	39.5
25	1/2	53.0	41.0	31.3	22.0	34	1-1/2	40.5
25	3/4	53.0	41.0	31.3	22.0	34	1-1/2	40.5

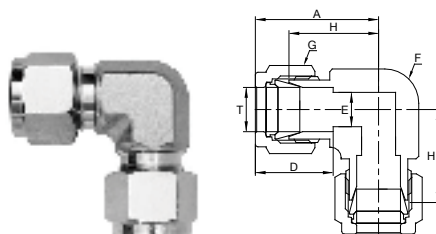
FOR FRACTIONAL TUBES								
T TUBE O.D.	FEMALE BSPT / NPT PIPE SIZE	DIMENSION						
		A	C	D	E	F	G	H
1/8	1/8	25.0	19.1	12.7	2.5	14	7/16	18.0
1/8	1/4	27.5	22.4	12.7	2.5	14	7/16	20.8
1/4	1/8	27.0	19.1	15.2	5.0	14	9/16	19.6
1/4	1/4	30.0	22.4	15.2	5.0	17	9/16	22.4
1/4	3/8	32.0	22.4	15.2	5.0	22	9/16	24.4
1/4	1/2	34.5	28.4	15.2	5.0	27	9/16	27.2
3/8	1/8	30.5	19.1	16.8	8.0	14	11/16	23.1
3/8	1/4	31.5	22.4	16.8	8.0	17	11/16	23.9
3/8	3/8	33.5	22.4	16.8	8.0	22	11/16	25.9
3/8	1/2	36.5	28.4	16.8	8.0	27	11/16	28.7
1/2	1/8	37.0	25.0	22.9	10.0	20	7/8	27.0
1/2	1/4	36.5	22.4	22.9	10.0	20	7/8	27.3
1/2	3/8	36.5	22.4	22.9	10.0	22	7/8	27.3
1/2	1/2	39.0	28.4	22.9	10.0	27	7/8	28.7
1/2	3/4	49.5	41.0	22.9	10.0	34	7/8	39.5
5/8	3/8	38.5	22.4	24.4	12.0	24	25	27.9
5/8	1/2	40.0	28.4	24.4	12.0	27	25	29.7
5/8	3/4	50.0	41.0	24.4	14.0	34	25	39.5
3/4	1/2	40.0	28.4	24.4	16.0	27	1-1/8	29.7
3/4	3/4	45.0	31.8	24.4	16.0	34	1-1/8	34.5
1	1/2	53.0	41.0	31.2	22.0	34	1-1/2	40.5
1	3/4	49.0	31.8	31.2	22.0	34	1-1/2	36.8

* The A and D dimensions are in finger-tight.

* The E dimension is the minimum nominal opening.

* Fraction numbers are in inch size; the others are in mm size.

* Dimensions are for reference only, and are subject to change without notice.



FOR METRIC TUBES

T TUBE O.D.	DIMENSION					
	A	D	E	F	G	H
3	24.5	12.9	2.5	12	7/16	17.7
4	25.5	13.7	2.5	12	12	18.8
6	27.0	15.3	5.0	12	9/16	19.6
8	29.0	16.2	6.0	14	5/8	21.3
10	31.5	17.2	8.0	17	19	23.9
12	36.0	22.8	10.0	20	7/8	27.5
14	37.0	24.4	12.0	24	25	26.5
15	39.0	24.4	12.0	24	25	28.7
16	39.0	24.4	12.0	24	25	28.7
18	40.0	24.4	16.0	27	30	29.6
20	44.0	26.0	18.0	30	32	34.7
22	44.0	26.0	18.0	30	32	34.7
25	53.0	31.3	22.0	34	1-1/2	40.5

FOR FRACTIONAL TUBES

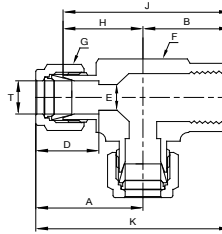
T TUBE O.D.	DIMENSION					
	A	D	E	F	G	H
1/16	20.0	8.6	1.5	12	10	15.7
1/8	22.5	12.7	2.5	12	7/16	15.7
3/16	25.0	13.7	2.5	12	12	17.7
1/4	27.0	15.2	5.0	12	9/16	19.6
3/8	30.5	16.8	7.0	14	11/16	23.1
1/2	36.5	22.9	10.0	20	7/8	27.5
5/8	39.0	24.4	12.0	24	25	28.7
3/4	40.0	24.4	16.0	27	1-1/8	32.0
1	49.0	31.2	22.0	34	1-1/2	36.8

* The A and D dimensions are in finger-tight.

* The E dimension is the minimum nominal opening.

* Fraction numbers are in inch size; the others are in mm size.

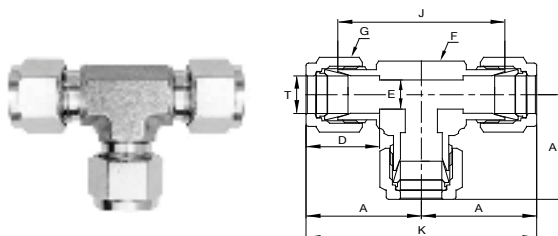
* Dimensions are for reference only, and are subject to change without notice.



FOR METRIC TUBES										
T TUBE O.D.	FEMALE BSPT / NPT PIPE SIZE	DIMENSION								
		A	B	D	E	F	G	H	J	K
4	1/8	25.5	19.3	13.7	2.5	14	12	18.3	37.6	45.0
4	1/4	28.0	23.6	13.7	2.5	17	12	20.7	44.3	51.5
6	1/8	27.0	19.1	15.3	5.0	14	9/16	19.6	38.7	46.0
6	1/4	30.0	22.4	15.3	5.0	17	9/16	22.4	44.8	52.5
6	3/8	32.0	26.4	15.3	5.0	22	9/16	24.4	50.8	58.5
6	1/2	35.0	32.0	15.3	5.0	27	9/16	27.0	59.0	67.0
8	1/8	30.0	19.0	16.2	6.0	14	5/8	23.0	42.0	49.0
8	1/4	31.0	22.5	16.2	6.0	17	5/8	23.0	45.5	53.5
8	3/8	32.5	22.5	16.2	6.0	23	5/8	25.0	47.5	55.0
8	1/2	36.0	32.0	16.2	6.0	27	5/8	28.0	60.0	68.0
10	1/8	31.5	19.0	17.2	8.0	17	19	24.0	43.0	50.5
10	1/4	33.5	22.5	17.2	8.0	17	19	26.0	48.5	56.0
10	3/8	33.5	22.5	17.2	8.0	23	19	26.0	48.5	56.0
10	1/2	33.5	28.5	17.2	8.0	27	19	26.5	55.0	62.0
12	1/4	36.5	22.4	22.8	10.0	20	7/8	27.5	49.9	58.5
12	3/8	36.5	22.4	22.8	10.0	23	7/8	27.5	49.9	58.5
12	1/2	39.0	28.4	22.8	10.0	27	7/8	28.7	57.1	67.5
12	3/4	50.0	41.0	22.8	10.0	34	7/8	40.0	81.0	91.0
14	3/8	38.0	27.5	24.4	12.0	24	25	27.5	55.0	65.5
14	1/2	39.5	32.0	24.4	12.0	27	25	29.0	61.0	71.5
14	3/4	50.5	41.0	24.4	12.0	34	25	40.0	81.0	91.5
15	3/8	38.0	27.5	24.4	12.0	24	25	27.5	55.0	65.5
15	1/2	39.0	28.4	24.4	12.0	27	25	28.7	57.1	67.5
15	3/4	50.5	41.0	24.4	12.0	34	25	40.0	81.0	91.5
16	3/8	38.5	27.5	24.4	14.0	24	25	27.5	55.0	66.0
16	1/2	40.0	28.0	24.4	12.5	27	25	30.0	58.0	68.0
16	3/4	51.0	41.0	24.4	14.0	34	25	40.0	81.0	92.0
18	3/8	39.5	32.0	24.4	16.0	27	30	29.0	61.0	71.5
18	1/2	39.5	32.0	24.4	16.0	27	30	29.0	61.0	71.5
18	3/4	50.5	41.0	24.4	16.0	34	30	40.0	81.0	91.5
20	1/2	47.0	37.5	26.0	18.0	30	32	37.6	75.1	84.5
20	3/4	49.0	41.0	26.0	18.0	34	32	40.0	81.0	90.0
22	1/2	47.0	37.5	26.0	18.0	30	32	37.6	75.1	84.5
22	3/4	49.5	41.0	26.0	18.0	34	32	40.0	81.0	90.5
25	1/2	52.5	41.0	31.3	22.0	34	1-1/2	40.0	81.0	93.5
25	3/4	52.5	41.0	31.3	22.0	34	1-1/2	40.0	81.0	93.5

FOR FRACTIONAL TUBES										
T TUBE O.D.	FEMALE BSPT / NPT PIPE SIZE	DIMENSION								
		A	B	D	E	F	G	H	J	K
1/8	1/8	25.0	19.1	12.7	2.5	14	7/16	18.0	37.1	44.0
1/8	1/4	28.0	23.6	12.7	2.5	17	7/16	20.7	44.3	51.5
1/4	1/8	27.0	19.1	15.2	5.0	14	9/16	19.6	38.7	46.0
1/4	1/4	30.0	22.4	15.2	5.0	17	9/16	22.9	45.3	52.5
1/4	3/8	32.5	26.4	15.2	5.0	22	9/16	24.4	50.8	59.0
1/4	1/2	35.0	32.6	15.2	5.0	27	9/16	27.0	59.6	67.5
3/8	1/8	30.5	19.0	16.8	8.0	14	11/16	23.0	42.0	49.5
3/8	1/4	31.5	22.4	16.8	8.0	17	11/16	23.9	46.3	54.0
3/8	3/8	33.0	22.4	16.8	8.0	23	11/16	26.0	48.4	55.5
3/8	1/2	37.0	32.0	16.8	7.7	27	11/16	29.0	61.0	69.0
1/2	1/4	36.0	22.4	22.9	10.0	20	7/8	26.0	48.4	58.5
1/2	3/8	36.5	22.4	22.9	10.0	23	7/8	27.5	49.9	58.5
1/2	1/2	40.0	28.4	22.9	10.0	27	7/8	29.7	58.1	68.5
1/2	3/4	50.0	41.0	22.9	10.0	34	7/8	40.0	81.0	91.0
5/8	3/8	38.0	27.5	24.4	14.0	24	25	27.5	55.0	65.5
5/8	1/2	39.5	32.0	24.4	14.0	27	25	29.0	61.0	72.0
5/8	3/4	50.5	41.0	24.4	14.0	34	25	40.0	81.0	92.0
3/4	1/2	40.0	32.0	24.4	16.0	27	1-1/8	29.0	61.0	72.0
3/4	3/4	45.0	31.8	24.4	16.0	35	1-1/8	34.5	66.3	76.5
1	1/2	52.5	41.0	31.2	22.0	34	1-1/2	40.0	81.0	93.5
1	3/4	52.5	41.0	31.2	22.0	34	1-1/2	40.0	81.0	93.5

- * The A, D, and K dimensions are in finger-tight.
- * The E dimension is the minimum nominal opening.
- * Fraction numbers are in inch size; the others are in mm size.
- * Dimensions are for reference only, and are subject to change without notice.



FOR METRIC TUBES

T TUBE O.D.	DIMENSION						
	A	D	E	F	G	J	K
3	24.0	12.9	2.5	12	7/16	34.0	47.5
4	25.5	13.7	2.5	12	12	37.6	51.0
6	27.0	15.3	5.0	12	9/16	39.2	54.0
8	29.0	16.2	6.0	14	5/8	42.6	58.0
10	31.5	17.2	8.0	17	19	47.8	63.0
12	36.0	22.8	10.0	20	7/8	55.0	72.0
14	38.0	24.4	12.0	24	25	55.0	76.0
15	39.0	24.4	12.0	24	25	57.4	78.0
16	39.0	24.4	12.0	24	25	57.4	78.0
18	40.0	24.4	16.0	27	30	59.1	80.0
20	47.0	26.0	18.0	30	32	75.1	93.5
22	47.0	26.0	18.0	30	32	75.1	94.0
25	52.5	31.3	22.0	34	1-1/2	80.0	105.0

FOR FRACTIONAL TUBES

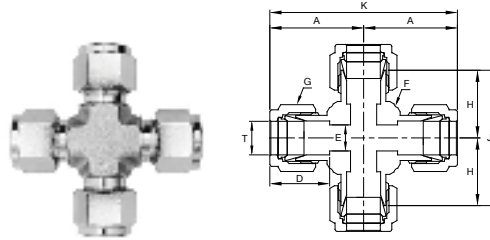
T TUBE O.D.	DIMENSION						
	A	D	E	F	G	J	K
1/16	19.0	8.6	1.5	12	10	30.0	38.0
1/8	22.5	12.7	2.5	12	7/16	31.4	45.0
3/16	24.0	13.7	2.5	12	12	34.0	48.0
1/4	27.0	15.2	5.0	12	9/16	42.0	54.0
3/8	30.5	16.8	8.0	14	11/16	46.2	61.0
1/2	36.5	22.9	10.0	20	7/8	55.0	75.0
5/8	39.0	24.4	12.0	24	25	57.4	78.0
3/4	40.0	24.4	16.0	27	1-1/8	64.0	80.0
1	49.0	31.2	22.0	34	1-1/2	73.6	98.0

* The A, D, and K dimensions are in finger-tight.

* The E dimension is the minimum nominal opening.

* Fraction numbers are in inch size; the others are in mm size.

* Dimensions are for reference only, and are subject to change without notice.



FOR METRIC TUBES								
T TUBE O.D.	DIMENSION							
	A	D	E	F	G	H	J	K
3	22.5	12.9	2.5	12	7/16	15.8	31.5	45.0
4	30.7	13.7	2.5	14	12	23.5	47.0	61.5
6	31.2	15.3	5.0	14	9/16	23.5	47.0	62.5
8	31.5	16.2	6.0	14	5/8	23.5	47.0	63.0
10	34.5	17.2	8.0	17	19	26.5	53.0	69.0
12	35.7	22.8	10.0	20	7/8	26.0	52.0	71.5

FOR METRIC TUBES								
T TUBE O.D.	DIMENSION							
	A	D	E	F	G	H	J	K
1/8	22.7	13.7	2.5	12	7/16	15.8	31.5	45.5
1/4	31.5	15.2	5.0	14	9/16	23.5	47.0	63.0
3/8	34.2	16.8	7.7	17	11/16	26.5	53.0	68.5
1/2	36.0	22.9	10.0	20	7/8	26.0	52.0	72.0

- * The A, D, and K dimensions are in finger-tight.
- * The E dimension is the minimum nominal opening.
- * Fraction numbers are in inch size; the others are in mm size.
- * Dimensions are for reference only, and are subject to change without notice.

Introduction

COVA 3-pieces Instrument Ball Valves provide reliable shut off and long-life service. The micro-floating ball design has seat wear compensation function and ensures leak proof shut off under pressure. The compact body with panel mounting nut achieve easier installation and suit for tight work areas. The COVA 3-pieces Instrument Ball Valves are divided into two types by working pressure: 2000 psig and 725 psig.



Features

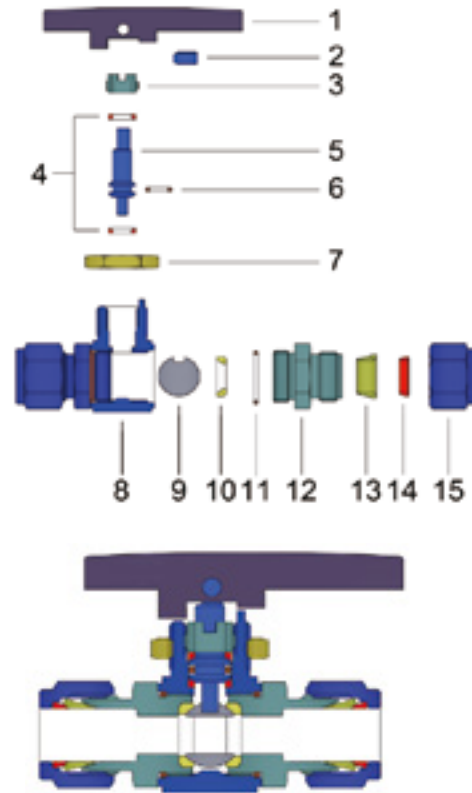
- Maximum working pressure: 2000 psig (138 bar) for square bar stock body; 725 psig (50 bar) for casting body
- Square bar stock body are available with 2-way and 3-way pattern.
- Bi-directional flow on/off service for 2-way pattern; switch service for 3-way pattern
- Low torque operation handle with arrow indicates flow direction
- Quick operation 1/4 turn on-off control of fluids utilized in process and instrumentation applications
- Material is available in SS316
- Panel mounted
- Variable end connection types with sizes from 1/4" to 3/4", 6mm to 12mm
- Each valve is stamped with size
- Working temperature range: -20°C ~ +180°C (-4°F ~ +356°F) with Viton O-ring
- 100% factory tested

3-piece Instrument Ball Valves



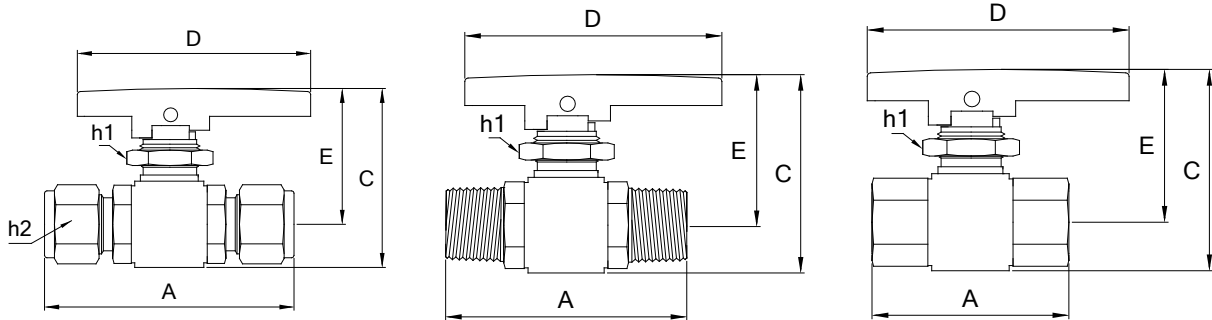
Standard Materials of Construction

Item	Components	Material
1	Handle	Nylon
2	Set Screw	SS304
3	Packing Bolt	SS316
4	Gland Packing	PTFE
5	Stem	SS316
6	Stem O-ring	Viton
7	Panel Nut	SS304
8	Body	SS316
9	Ball	SS316
10	Seat	PTFE
11	Body Seal O-ring	Viton
12	End Cap	SS316
13	Front Ferrule	SS316
14	Back Ferrule	SS316
15	Nut	SS316



Safety in Product Selection

The system designer and user have the sole responsibility for selecting a product for their use. The total system design, application details, material compatibility, function, adequate ratings, proper installation, operation, and maintenance must be considered to ensure safe and trouble-free performance.



End Connection		Inlet and Outlet Size	Orifice		Dimension						Panel Hole Size	Max Panel Thickness
			mm	in.	A	C	D	E	h1	h2		
Compression End	Metric	6mm	5.0	0.19	63.0	48.5	44.6	38.5	19	9/16	14	6
		8mm	5.0	0.19	70.0	55.5	60.0	43.7	22	5/8	16	7
		10mm	7.0	0.27	73.0	55.5	60.0	43.7	22	19	16	7
		12mm	9.2	0.36	80.0	61.0	67.5	47.0	24	7/8	19	9
		14mm	12.5	0.49	87.5	67.5	80.0	50.5	24	25	19	9
		18mm	12.5	0.49	87.5	67.5	80.0	50.5	24	30	19	9
	Fractional	1/8"	2.5	0.09	61.0	48.5	44.6	38.5	19	7/16	14	6
		1/4"	5.0	0.19	63.0	48.5	44.6	38.5	19	9/16	14	6
		3/8"	7.0	0.27	71.0	55.5	60.0	43.7	22	11/16	16	7
		1/2"	9.2	0.36	80.0	61.0	67.5	47.0	24	7/8	19	9
Male Thread	Fractional	3/4"	12.5	0.49	87.5	67.5	80.0	50.5	24	1-1/8	19	9
		1/8"	5.0	0.19	49.0	48.5	44.6	38.5	19	-	14	6
		1/4"	5.0	0.19	55.0	48.5	44.6	38.5	19	-	14	6
		3/8"	7.0	0.27	61.0	55.5	60.0	43.7	22	-	16	7
Female Thread	Fractional	1/2"	9.2	0.36	71.0	61.0	67.5	47.0	24	-	19	9
		1/8"	5.0	0.19	45.4	48.5	44.6	38.5	19	-	14	6
		1/4"	5.0	0.19	53.0	48.5	44.6	38.5	19	-	14	6
		3/8"	9.2	0.36	65.0	61.0	80.0	47.0	24	-	19	9
		1/2"	12.5	0.49	78.0	67.5	80.0	50.5	24	-	19	9

* For compression end ball valve, the A dimensions is in finger-tight.

* Fraction numbers are in inch size; the others are in mm size.

* Dimensions are for reference only, and are subject to change without notice.

Inline Ball Poppet Check Valves



Introduction

COVA Inline Ball Poppet Check Valve stops reversed flow in order to protect instrumentations. When the differential pressure between inlet and outlet is higher than the cracking pressure, the ball will be pushed and open the passage. On the contrary, when the differential pressure between inlet and outlet is lower than the cracking pressure, the ball will be pushed back and close the passage to stop the back-flow.

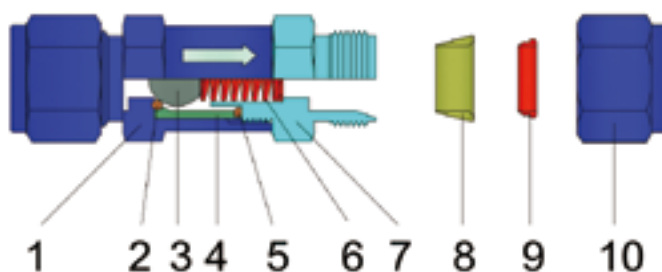


Features

- Ball design provides effective leak-free closure with minimum flow resistance
- Variable end connection types with sizes from 1/4" to 3/4", 6mm to 12mm
- Cracking pressures 1 psig
- Material is available in SS316
- Maximum working pressure: 2000 psig (138 bar)
- Temperature range: -20°C ~ +180°C (-4°F ~ +356°F) with Viton O-ring
- Each valve is stamped with size
- 100% factory tested

Standard Materials of Construction

Item	Components	Material
1	Inlet Body	SS316
2	O-ring	Viton
3	Ball	SS316
4	Ball Cage	SS316
5	O-ring	Viton
6	Spring	SS304
7	Outlet Body	SS316
8	Front Ferrule	SS316
9	Back Ferrule	SS316
10	Nut	SS316

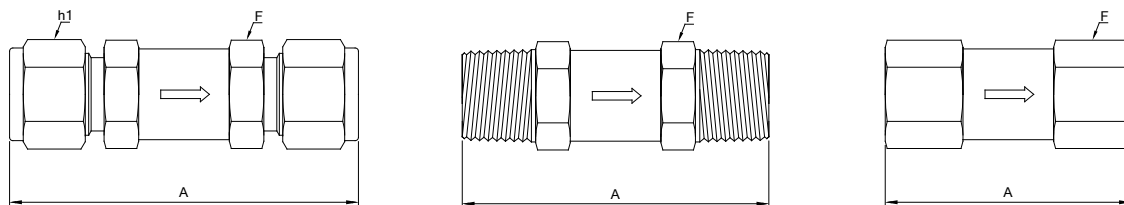


O-ring Material and Working Temperature Range

	Material	Temperature Range
Standard	Fluorocarbon FKM (Viton)	-20°C ~ +180°C (-4°F ~ +356°F)
	Buna N (NBR)	-20°C ~ +80°C (-4°F ~ +176°F)
Optional	Ethylene Propylene (EPDM)	-40°C ~ +150°C (-40°F ~ +302°F)
	Perfluoroelastomer (FFKM)	-25°C ~ +250°C (-13°F ~ +482°F)

Safety in Product Selection

The system designer and user have the sole responsibility for selecting a product for their use. The total system design, application details, material compatibility, function, adequate ratings, proper installation, operation, and maintenance must be considered to ensure safe and trouble-free performance.



End Connection		Inlet and Outlet Size	Orifice		Dimension		
			mm	in.	A	F	h1
Compression End	Metric	6 mm	5.0	0.19	64.5	17	9/16
		8 mm	5.0	0.19	67.0	17	5/8
		10 mm	7.5	0.29	76.0	22	19
		12 mm	7.5	0.29	80.7	22	7/8
	Fractional	1/8"	2.5	0.09	61.8	17	7/16
		1/4"	5.0	0.19	64.5	17	9/16
		3/8"	7.5	0.29	74.3	22	11/16
		1/2"	7.5	0.29	80.7	22	7/8
		3/4"	14.0	0.55	97.0	30	1-1/8
		1"	14.0	0.55	104.0	35	1-1/2
Male Thread	Fractional	1/8"	5.0	0.19	50.0	17	-
		1/4"	5.0	0.19	56.0	17	-
		3/8"	7.5	0.29	64.8	22	-
		1/2"	7.5	0.29	70.8	22	-
		3/4"	14.0	0.55	89.0	30	-
Female Thread	Fractional	1/8"	5.0	0.19	50.0	17	-
		1/4"	5.0	0.19	60.0	17	-
		3/8"	7.5	0.29	61.5	22	-
		1/2"	14.0	0.55	87.0	30	-
		3/4"	14.0	0.55	87.0	32	-

* For compression end ball valve, the A dimensions is in finger-tight.

* Fraction numbers are in inch size; the others are in mm size.

* Dimensions are for reference only, and are subject to change without notice.

TUBING WORKING PRESSURE TABLE - SEAMLESS

Table 2 - Wall Thickness of Tube (Inches)

TUBE OD (IN)	WORKING PRESSURE (Psi)													
	0.01	0.012	0.016	0.02	0.028	0.035	0.049	0.065	0.083	0.095	0.109	0.12	0.134	0.156
1/16"	5,587	6,861	9,593	12,185										
1/8"					8,565	10,829								
3/16"					5,474	7,039	10,116							
1/4"					4,020	5,132	7,500	10,135						
5/16"						4,037	5,848	8,071						
3/8"						3,326	4,791	6,566						
1/2"						2,611	3,741	5,092	6,696					
5/8"							2,951	3,998	2,552	6,075				
3/4"							2,436	3,289	4,283	4,966	5,785			
7/8"							2,073	2,793	3,628	4,199	4,881			
1"							1,804	2,427	3,146	3,637	4,220	4,688		
1-1/4"									2,485	2,867	3,321	3,682	4,149	4,900
1-1/2"									2,046	2,358	2,726	3,020	3,398	4,003

The allowable working pressures for 304 stainless steel and 316 stainless steel welded tubing to ASTM A269, ASTM/ASME A213 or equivalent based on the following data: Temperature: -20°F to 100°F. Ultimate tensile strength: 75,000 psi; allowable stress: 20,000 psi as specified by ASME B31.3-2002