



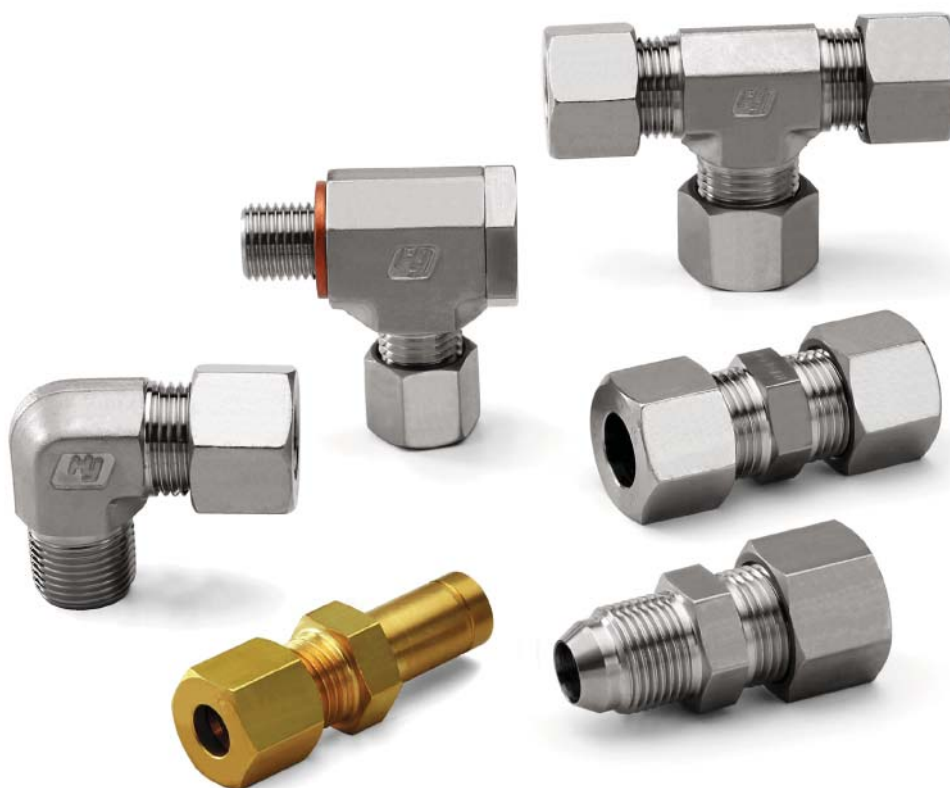
www.hy-lok.com

Catalog No. H - 220TF
Jan. 2011



Tube Fittings

for JIS B2351



HY-LOK CORPORATION

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Tube Fittings

Straight Union
BU



7

Male Connector (For Copper Gasket)
BMC-G



12

Female Connector
BFC



18

Union Elbow
BL



7

Male Connector (For O-Seal)
BOM



13

Bulkhead Female Connector
BBFC



18

Union Tee
BT



8

Male Elbow
BLM



14

Gauge Connector
BGC



19

Union Cross
BC



8

Long Male Elbow
BLLM



15

Female Elbow
BLF



19

Straight Bulkhead Union
BBU



9

O-Seal Male Elbow
BOLM



15

Female Branch Tee
BBTF



20

Bulkhead Elbow
BBL



9

Stud Elbow
BSLM



16

Female Run Tee
BRTF



20

Male Connector
BMC-R



10

Male Branch Tee
BBTM



16

Cap
BCA



21

Long Male Connector
BLMC



11

Male Run Tee
BRTM



17

Plug
BP



21

Jig
BJ



21

Hose Female Elbow
BHLF



25

Adjustable Elbow
BLA



29

Nut
BN



22

Hose Bulkhead Male Elbow
BHBLM



26

Adjustable Branch Tee
BBTA



30

Sleeve
BS



22

Hose Bulkhead Female Elbow
BHBLF



26

Adjustable Run Tee
BRTA



30

Hose Male Union
BHUM



23

Welding Connector
BCW



27

Air Purge Valve
BAP-1



31

Hose Female Union
BHUF



23

Welding Bulkhead Union
BBUW



27

Air Purge Valve
BAP-2



31

Hose Bulkhead Male Union
BHBM



24

Adapter
BA-R



28

Hose Bulkhead Female Union
BHBF



24

Adapter
BA-G



28

Hose Male Elbow
BHLM



25

Reducer
BR



29

Tube Fittings

General Information for JIS B2351 Tube Fittings.

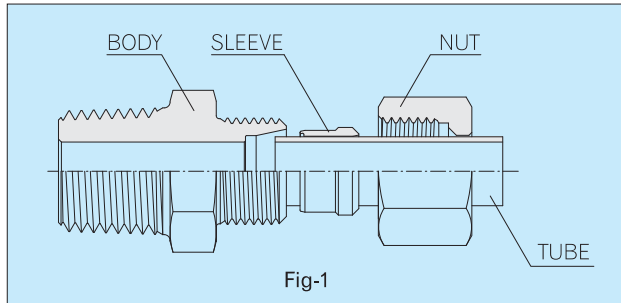
JIS B2351 tube fittings are precision machined, under strict quality control.

JIS B2351 tube fittings are the flareless tube fitting with the visible bite.

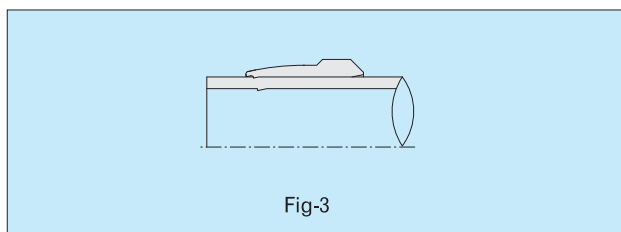
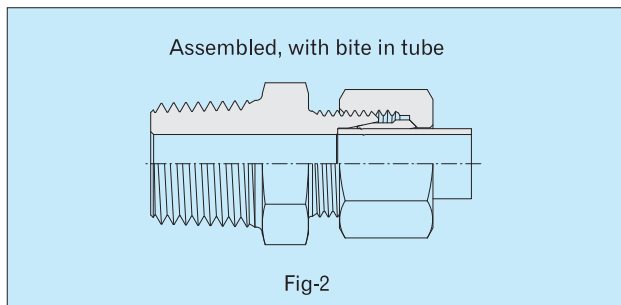
This added safety feature makes Hy-Lok Corp. JIS B2351 tube fittings the preferred fitting for non - flared tube connections.

How Do They Work?

The JIS B2351 tube fitting was designed to work on medium to heavy wall tubing which was hard to flare and has three parts : 1. body, 2. sleeve, 3. nut. (As shown in Fig-1)



The sleeve is driven forward on the tube by the nut. As the sleeve moves forward it meets the seal seat angle of the body which causes the sleeve to cam inward into the tube. The sleeve then bites into the tube causing a small ridge of tube material to be pushed up in front of the biting edge of the sleeve. (As shown in Fig - 2 & 3)



The make up of the fitting is critical in that the tube must be bottomed against the tube stop in the body or presetting tool during make up. If it is not bottomed the tube will move forward with the sleeve and a bite will not be achieved. Make sure the tube is bottomed.

A check is possible to see if the tube was bottomed during make up. To make this check look at the end of the tube, and notice if a circular appearing ring has been impressed into the tube end face. This impression will be caused by the tube stop which has a slight reverse angle rather than a flat face.

Material Specifications

	C. Steel	S. Steel	Brass
Forged Bodies	S20C - S48C	SUS316, 304	C3771
Cold Formed Bodies	S10C - S20C		
Barstock Bodies	S20C - S48C	SUS316, 304	C3604
Cold Formed Nuts	S10C - S20C		
Barstock Nuts	S20C - S48C	SUS316, 304	C3604
Sleeves	S10C	SUS316, 304	C3604

Applicable Pressure Rating

Our standard specifications of the fittings, which are shown in the catalog, are as below :

Fitting size (applicable Tube O.D.)	4 ~15	16 ~22	25 ~28	30 ~38	40 ~50	
Rated pressure (kgf/cm ²)	C. Steel	500	400	350	250	210
	S. Steel					
	Brass	250	210	170	150	120
Max. working temperature (°C)	300					

The Rated Pressure for the fittings are determined based on the results of severe repetitively conducted tests and the design calculation ; precisely, the rated pressures are determined for each size of fittings while the safety factor of as much as 4 is taken into account in the design.

Suitable Tubing Materials

Common material of tubing best suited for industrial service, and in accordance with various Industry Standards and recommendations of tubing manufactures, include :

Carbon Steel -

Seamless, fully annealed, also welded and redrawn type suitable for bending. Maximum hardness, Rockwell B72.

The Applicable Tubes to the fittings entered in the catalog and which we recommend are as follows :

Carbon Steel Precision Tubes for Hydraulic Line Service, JOHS - 102, OST - 2 (The Oil Hydraulic Association Standards) or Equivalent Refer to page 54 of this catalog for the comparison chart between this Standard and other Standards for easy selection.

Stainless Steel -

Seamless, fully annealed and welded redrawn, fully annealed suitable for bending. Maximum hardness, Rockwell B90.

Copper -

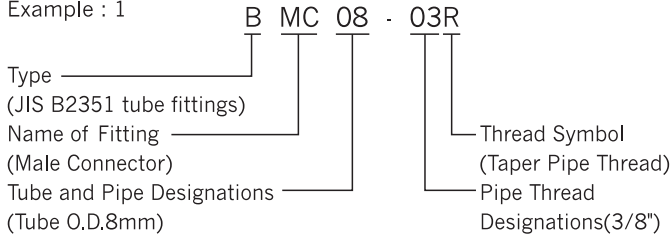
Seamless coils, soft or light annealed, maximum hardness Rockwell F55. Straight lengths, light drawn and general purpose, maximum hardness of 60 on Rockwell 30T scale.

Designation Part Number System

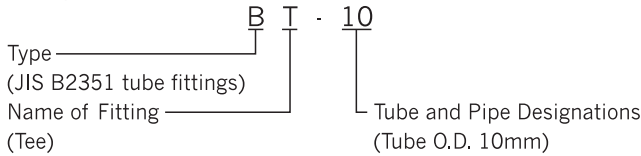
The symbols in the designation column on each page represent the shapes and sized of individual fittings.

Part Number Example

Example : 1



Example : 2



Tube and Pipe Designation

METRIC	Out dia.	4	6	8	10.....30.....50				
TUBE	Designation	04	06	08	10.....30.....50				
SCH PIPE	Nominal dia.	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2
	Out dia.	10.5	13.8	17.3	21.7	27.2	34.0	42.7	48.6
	Designation	81	82	83	84	85	86	87	88

Pipe Thread Designations

THREAD	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
DESIGNATION	01	02	03	04	06	08	10	12	16

Thread Symbols

R : Taper Pipe Threads (PT JIS B0203, ISO 7/1)
G : Parallel Pipe Threads (PF JIS B0202, ISO 228/1)
N : American National Standard Taper Pipe Threads (NPT ASME B1.20.1)

Material Indication System

Specify material by part number suffix letter :

• **STEL** = Carbon Steel • **S316** = 316 Stainless Steel • **BRAS** = Brass

Example : 1 BMC08 - 03R - STEL
Carbon Steel

Example : 2 BT - 08 - S316
316 Stainless Steel
(S304 : 304 Stainless Steel)

Example : 3 BU - 08 - BRAS
Brass

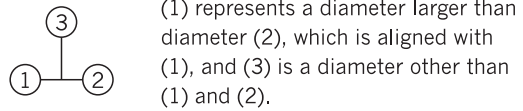
Part numbers listed are for complete fitting (body, nut and sleeve)

How to Order

1) When placing an order with us, be sure to specify the fittings with their symbols given in the designation column on each page.

Example : BMC08 - 03R - STEL

2) For the fittings with different sizes



3) For fittings other than those mentioned in the catalog, specify the following details :

- Type of fluid to be applied
- Working Pressure
- Working Temperature
- Material (Carbon Steel, Stainless Steel, Brass.)
- Shape (Union, Tee, Elbow, etc.)
- Size (Up to 50mm tube O.D. in metric or inch)
- Any other conditions in tubing

4) Gaskets mentioned in the catalog are not normally furnished for the fittings. If gaskets are required, these designation symbols shall be used to order.

5) The fittings specifications are sometimes subject to change due to continuous improvements of quality and performance.

Special Fittings

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

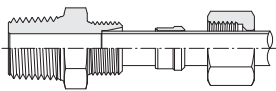
Assembly Instructions

Cutting The Tube

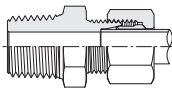
Cut tube squarely and lightly de-burr the end internally and externally.

Sleeve Placement

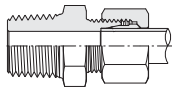
Slip nut and sleeve onto tubing. Be sure the long, straight end of the sleeve points toward tube end.



Nut and sleeve on tube



Tube bottomed in fitting



Assembled with bite on tube

Lubrication

Lightly lubricate threads on tool or body as well as the tail and lead end of the sleeve with an extreme friction lubricant.

Pre - Setting

Insert tube end into tool or fitting until it bottoms against the shoulder (to hold tube motionless during pre - setting operation) and screw net down finger tight.

Final Setting

Wrench nut down 1-1/4 turns to pre-set the sleeve (Reliable make up of all flareless tube fittings is dependent upon the sleeve traveling a prescribed distance into the tapered fitting throat in order to bite into the tube and effect a positive grip and seal.

Reassemble for Final Installation

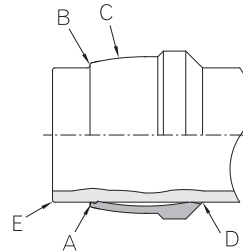
Insert the tube into the fitting body and wrench the nut down easily until a sudden increase in torque is evident. From this point turn the nut an additional 1/4 to 1/3 turn (1-1/2 to 2 wrench flats) to again spring the sleeve into place to seal against the tubing and the fitting body.

Inspection of Bite

All Hy-Lok's JIS B2351 type tube fittings must be disassembled and inspected for proper make-up before final assembly. Detailed inspection procedures are outlined below and must be followed regardless of the method used to pre-set the sleeve to the tube.

You Should Make Certain That

1. A ridge of metal has been raised above the tube surfaces, to a height of at least 50% of the thickness of the sleeve leading edge, completely around the tube (A).
2. While the leading edge of the sleeve may be coined flat (B) there is a slight bow to the balance of the pilot section (C).
3. The tail or back end of the sleeve is snug against the tube (D).
4. There is a slight indentation all around the end of the tube (E) that indicates the tube was bottomed in the tool or fitting during pre-setting (unless evidence of this complete contact is visible the sleeve cannot be considered properly pre-set).



5. Avoid rotating the sleeve. Steel sleeve should not be capable of moving back and forth along tube, beyond the bite area (stainless steel sleeve will move more than steel because of its spring back characteristics).

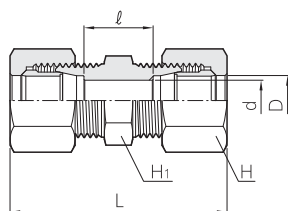
Trouble Shooting

Problems with JIS B2351 type tube fittings are most often traced to faulty make up procedures. Look for the following ;

1. Tube not bottomed - Check for the indentation on the tube end or compare length from end of tube to the front end of the sleeve of a known good assembly to that of the assembly in question.
2. Lack of bite - Inspect for turned up ridge of material. A failure to achieve this ridge can be traced either to the fact that the nut was not tightened enough or that the tube was not bottomed against the stop which allowed the tube to travel forward with the sleeve
3. Sleeve cocked on tube - The sleeve is cocked on the tube when the tube assembly is off axis with that of the body. Generally this condition is caused by faulty tube bending. All bent tube assemblies should drop into the fitting body prior to make up.
4. No bite - If all of the above checks have been made and the sleeve still shows no sign of biting the tube, it may be that the tube is too hard.

Straight Union

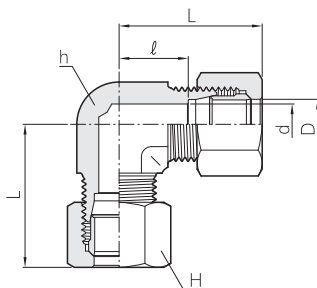
BU



Part No.	Tube O.D.		d	Width across flat		ℓ	Approx. L
	D			H ₁	H		
BU - 04	4		2.5	12	12	8	35
BU - 06	6		4.0	14	14	10	51
BU - 08	8		6.0	17	17	11	52
BU - 10	10		8.0	17	19	13	54
BU - 12	12		10.0	19	22	14	54
BU - 15	15		12.0	24	27	16	61
BU - 16	16		13.0	27	30	21	61
BU - 18	18		14.0	27	32	16	61
BU - 20	20		17.0	30	36	22	63
BU - 22	22		18.0	32	36	20	63
BU - 25	25		20.0	36	41	19	66
BU - 28	28		22.0	41	46	23	71
BU - 30	30		25.0	41	46	23	72
BU - 32	32		26.0	46	50	22	73
BU - 35	35		28.0	46	55	22	79
BU - 38	38		32.0	50	60	22	85
BU - 40	40		32.0	55	60	31	94
BU - 42	42		34.0	55	60	31	94
BU - 50	50		40.0	65	75	36	103
BU - 81	1/8	10.5	8.0	17	19	17	54
BU - 82	1/4	13.8	11.0	22	24	21	60
BU - 83	3/8	17.3	14.0	27	32	20	61
BU - 84	1/2	21.7	18.0	32	36	20	63
BU - 85	3/4	27.2	22.0	41	46	23	71
BU - 86	1	34.0	28.0	46	55	22	79
BU - 87	1 1/4	42.7	34.0	60	65	33	98
BU - 88	1 1/2	48.6	40.0	65	75	36	103

Union Elbow

BL



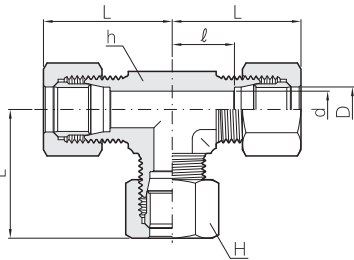
Part No.	Tube O.D.		d	Width across flat		ℓ	Approx. L
	D			h	H		
BL - 04	4		2.5	12	12	9.0	22.5
BL - 06	6		4.0	14 (12)*	14	12.0	30.5
BL - 08	8		6.0	17 (12)*	17	14.0	33.5
BL - 10	10		8.0	17 (14)*	19	15.0	34.5
BL - 12	12		10.0	19 (17)*	22	17.0	35.5
BL - 15	15		12.0	24 (19)*	27	21.0	41.5
BL - 16	16		13.0	27	30	24.5	44.5
BL - 18	18		14.0	27 (24)*	32	23.5	44.5
BL - 20	20		17.0	30	36	25.0	45.5
BL - 22	22		18.0	32	36	25.0	46.5
BL - 25	25		20.0	36	41	26.0	49.5
BL - 28	28		22.0	41	46	31.0	55.0
BL - 30	30		25.0	41	46	31.0	55.5
BL - 32	32		26.0	46	50	34.0	59.5
BL - 35	35		28.0	46	55	35.0	63.5
BL - 38	38		32.0	50	60	38.0	69.5
BL - 40	40		32.0	55	60	43.0	74.5
BL - 42	42		34.0	55	60	43.0	74.5
BL - 50	50		40.0	65	75	50.0	83.5
BL - 81	1/8	10.5	8.0	17	19	16.0	34.5
BL - 82	1/4	13.8	11.0	22	24	20.5	40.0
BL - 83	3/8	17.3	14.0	27	32	24.0	44.5
BL - 84	1/2	21.7	18.0	32	36	25.0	46.5
BL - 85	3/4	27.2	22.0	41	46	31.0	55.0
BL - 86	1	34.0	28.0	46	55	35.0	63.5
BL - 87	1 1/4	42.7	34.0	60	65	45.0	77.5
BL - 88	1 1/2	48.6	40.0	65	75	50.0	83.5

* Note : Later on, Some sizes will be supplied as changed sizes in parenthesis.

Tube Fittings

Union Tee

BT

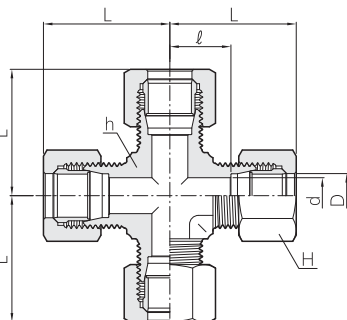


Part No.	Tube O.D.		d	Width across flat		ℓ	Approx. L
	D			h	H		
BT - 04	4		2.5	12	12	13.0	22.5
BT - 06	6		4.0	14(12) *	14	12.0	30.5
BT - 08	8		6.0	17(12) *	17	14.0	33.5
BT - 10	10		8.0	17(14) *	19	15.0	34.5
BT - 12	12		10.0	19(17) *	22	17.0	35.5
BT - 15	15		12.0	24(19) *	27	21.0	41.5
BT - 16	16		13.0	27	30	24.5	44.5
BT - 18	18		14.0	27(24) *	32	23.5	44.5
BT - 20	20		17.0	30	36	25.0	45.5
BT - 22	22		18.0	32	36	25.0	46.5
BT - 25	25		20.0	36	41	26.0	49.5
BT - 28	28		22.0	41	46	31.0	55.0
BT - 30	30		25.0	41	46	31.0	55.5
BT - 32	32		26.0	46	50	34.0	59.5
BT - 35	35		28.0	46	55	35.0	63.5
BT - 38	38		32.0	50	60	38.0	69.5
BT - 40	40		32.0	55	60	43.0	74.5
BT - 42	42		34.0	55	60	43.0	74.5
BT - 50	50		40.0	65	75	50.0	83.5
BT - 81	1/8	10.5	8.0	17	19	16.0	34.5
BT - 82	1/4	13.8	11.0	22	24	20.5	40.0
BT - 83	3/8	17.3	14.0	27	32	24.0	44.5
BT - 84	1/2	21.7	18.0	32	36	25.0	46.5
BT - 85	3/4	27.2	22.0	41	46	31.0	55.0
BT - 86	1	34.0	28.0	46	55	35.0	63.5
BT - 87	1 1/4	42.7	34.0	60	65	45.0	77.5
BT - 88	1 1/2	48.6	40.0	65	75	50.0	83.5

* Note : Later on, Some sizes will be supplied as changed sizes in parenthesis.

Union Cross

BC



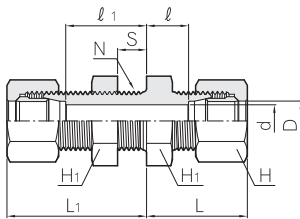
Part No.	Tube O.D.		d	Width across flat		ℓ	Approx. L
	D			h	H		
BC - 06	6		4	17(12) *	14	12.5	33.5
BC - 08	8		6	17(12) *	17	14.5	33.5
BC - 10	10		8	19(14) *	19	15.5	35.5
BC - 12	12		10	19(17) *	22	17.5	35.5
BC - 15	15		12	27(19) *	27	21.5	44.5
BC - 16	16		13	27	30	24.5	44.5
BC - 18	18		14	30(24) *	32	23.5	45.5
BC - 20	20		17	30	36	25.5	45.5
BC - 25	25		20	36	41	26.5	49.5
BC - 30	30		25	46	46	35.5	59.5
BC - 32	32		26	46	50	34.5	59.5

* Note : Later on, Some sizes will be supplied as changed sizes in parenthesis.

All dimensions are in millimeters. Dimensions are for reference only, subject to change.

Straight Bulkhead Union

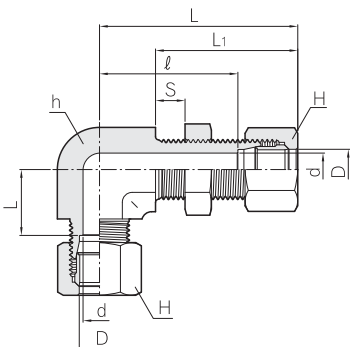
BBU



Designations	Tube O.D.		Width across flat		l_1	l	Approx.			Panel Hole Drill size N	Max. Panel thickness S
	D	d	H ₁	H			L ₁	L	L		
BBU - 04	4	2.5	14	12	19.0	8.0	32.5	21.5	10.5	13	
BBU - 06	6	4.0	17	14	25.0	12.0	42.5	29.5	12.5	13	
BBU - 08	8	6.0	19	17	25.0	12.0	42.5	29.5	14.5	13	
BBU - 10	10	8.0	22	19	25.0	13.0	43.5	31.5	16.5	13	
BBU - 12	12	10.0	24	22	25.0	13.0	43.5	31.5	18.5	13	
BBU - 15	15	12.0	27	27	29.5	14.5	49.5	34.5	22.5	15	
BBU - 16	16	13.0	30	30	29.5	16.5	49.5	36.5	24.5	15	
BBU - 18	18	14.0	32	32	31.0	16.0	51.5	36.5	26.5	15	
BBU - 20	20	17.0	32	36	31.0	16.0	51.5	36.5	28.5	15	
BBU - 22	22	18.0	36	36	30.0	16.0	51.5	37.5	30.5	15	
BBU - 25	25	20.0	41	41	29.0	15.0	52.5	38.5	35.5	15	
BBU - 28	28	22.0	46	46	31.0	18.0	55.0	42.0	38.5	15	
BBU - 30	30	25.0	46	46	31.0	18.0	55.5	42.5	40.5	15	
BBU - 32	32	26.0	50	50	32.0	19.0	57.5	44.5	42.5	15	
BBU - 35	35	28.0	50	55	32.0	19.0	60.5	47.5	45.5	15	
BBU - 38	38	32.0	55	60	33.0	19.0	64.5	50.5	48.5	15	
BBU - 40	40	32.0	60	60	38.0	25.0	69.5	56.5	52.5	15	
BBU - 50	50	40.0	70	75	38.0	31.0	71.5	64.5	64.5	15	
BBU - 81	1/8	10.5	8.0	22	19	25.0	13.0	43.5	31.5	16.5	13
BBU - 82	1/4	13.8	11.0	27	24	29.5	14.5	49.0	34.0	20.5	15
BBU - 83	3/8	17.3	14.0	32	32	31.0	16.0	51.5	36.5	26.5	15
BBU - 84	1/2	21.7	18.0	36	36	30.0	16.0	51.5	37.5	30.5	15
BBU - 85	3/4	27.2	22.0	46	46	31.0	18.0	55.0	42.0	38.5	15
BBU - 86	1	34.0	28.0	50	55	22.0	19.0	60.5	47.5	45.5	15
BBU - 87	1 1/4	42.7	34.0	65	65	38.0	28.0	70.5	60.5	56.5	15
BBU - 88	1 1/2	48.6	40.0	70	75	38.0	31.0	71.5	64.5	64.5	15

Bulkhead Elbow

BBL



Designations	Tube O.D. D	d	Width across flat			l_1	l	Approx.			Panel Hole Drill size N	Max. Panel thickness S
			h	H ₁	H			L ₁	L ₂	L		
BBL - 06	6	4	17(12)*	17	14	16.0	38.0	42.5	33.5	55.5	12.5	13
BBL - 08	8	6	19(12)*	19	17	17.0	39.0	42.5	34.5	56.5	14.5	13
BBL - 10	10	8	22(14)*	22	19	19.0	41.0	43.5	37.5	59.5	16.5	13
BBL - 12	12	10	24(17)*	24	22	20.0	42.0	43.5	38.5	60.5	18.5	13
BBL - 15	15	12	27(19)*	27	27	23.5	49.5	49.5	43.5	69.5	22.5	15
BBL - 16	16	13	30	30	30	25.5	51.5	49.5	45.5	71.5	24.5	15
BBL - 18	18	14	32(24)*	32	32	25.0	55.0	51.5	45.5	75.5	26.5	15
BBL - 20	20	17	32	32	36	25.0	57.0	51.5	45.5	77.5	28.5	15
BBL - 22	22	18	36	36	36	27.0	56.0	51.5	48.5	77.5	30.5	15
BBL - 25	25	20	41	41	41	29.0	58.0	52.5	52.5	81.5	35.5	15
BBL - 28	28	22	41	46	46	31.0	60.0	55.0	55.0	84.0	38.5	15
BBL - 30	30	25	46	46	46	36.0	64.0	55.5	60.5	88.5	40.5	15

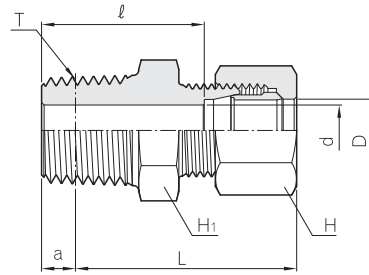
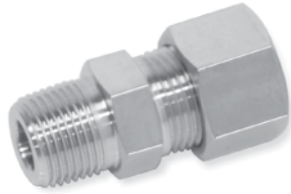
* Note : Later on, Some sizes will be supplied as changed sizes in parenthesis.

All dimensions are in millimeters. Dimensions are for reference only, subject to change.

Tube Fittings

Male Connector

BMC - R

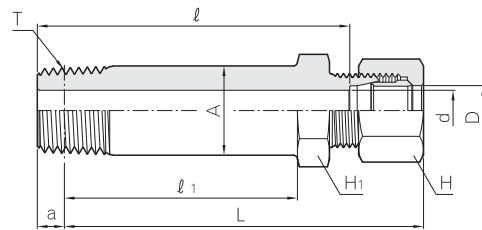


Part No.	Tube O.D.		(PT) T	d	Basic gauge length a	Width across flat		ℓ	Approx. L
	D					H ₁	H		
BMC 04 - 01R	4		1/8	2.5	3.97	12	12	16.0	25.5
BMC 06 - 01R	6		1/8	4.0	3.97	14	14	21.0	34.5
BMC 06 - 02R	6		1/4	4.0	6.01	17	14	26.0	37.5
BMC 08 - 01R	8		1/8	4.0	3.97	17	17	22.0	35.5
BMC 08 - 02R	8		1/4	6.0	6.01	17	17	26.0	37.5
BMC 10 - 02R	10		1/4	7.0	6.01	17	19	26.0	38.5
BMC 10 - 03R	10		3/8	8.0	6.35	19	19	27.0	39.0
BMC 10 - 04R	10		1/2	8.0	8.16	22	19	32.0	42.5
BMC 12 - 02R	12		1/4	7.0	6.01	19	22	26.0	38.5
BMC 12 - 03R	12		3/8	9.0	6.35	19	22	27.0	39.0
BMC 12 - 04R	12		1/2	10.0	8.16	24	22	32.0	42.5
BMC 15 - 03R	15		3/8	9.0	6.35	24	27	29.5	43.0
BMC 15 - 04R	15		1/2	12.0	8.16	24	27	33.5	45.5
BMC 16 - 03R	16		3/8	9.0	6.35	27	30	29.5	43.0
BMC 16 - 04R	16		1/2	12.0	8.16	27	30	33.5	45.5
BMC 18 - 03R	18		3/8	9.0	6.35	27	32	29.0	43.0
BMC 18 - 04R	18		1/2	12.0	8.16	27	32	33.0	45.5
BMC 20 - 04R	20		1/2	12.0	8.16	30	36	35.0	47.5
BMC 20 - 06R	20		3/4	16.0	9.53	30	36	37.0	48.0
BMC 22 - 04R	22		1/2	12.0	8.16	32	36	34.0	47.5
BMC 22 - 06R	22		3/4	16.0	9.53	32	36	36.0	48.0
BMC 25 - 06R	25		3/4	16.0	9.53	36	41	36.0	50.0
BMC 25 - 08R	25		1	20.0	10.39	36	41	39.0	52.0
BMC 28 - 06R	28		3/4	16.0	9.53	41	46	38.0	52.5
BMC 28 - 08R	28		1	22.0	10.39	41	46	41.0	54.5
BMC 30 - 08R	30		1	22.0	10.39	41	46	41.0	55.0
BMC 30 - 10R	30		1 1/4	25.0	12.70	46	46	45.0	57.0
BMC 32 - 10R	32		1 1/4	26.0	12.70	46	50	44.0	57.0
BMC 35 - 10R	35		1 1/4	28.0	12.70	46	55	44.0	60.0
BMC 38 - 12R	38		1 1/2	32.0	12.70	50	60	45.0	64.0
BMC 40 - 12R	40		1 1/2	32.0	12.70	55	60	50.0	69.0
BMC 42 - 12R	42		1 1/2	34.0	12.70	55	60	50.0	69.0
BMC 50 - 16R	50		2	40.0	15.88	65	75	59.0	76.5
BMC 81 - 01R	1/8	10.5	1/8	4.0	3.97	17	19	22.0	36.5
BMC 81 - 02R	1/8	10.5	1/4	7.0	6.01	17	19	26.0	38.5
BMC 82 - 02R	1/4	13.8	1/4	7.0	6.01	22	24	28.5	42.0
BMC 82 - 03R	1/4	13.8	3/8	9.0	6.35	22	24	29.5	42.5
BMC 83 - 03R	3/8	17.3	3/8	9.0	6.35	27	32	29.0	43.0
BMC 83 - 04R	3/8	17.3	1/2	12.0	8.16	27	32	33.0	45.5
BMC 84 - 04R	1/2	21.7	1/2	12.0	8.16	32	36	34.0	47.5
BMC 84 - 06R	1/2	21.7	3/4	16.0	9.53	32	36	36.0	48.0
BMC 85 - 06R	3/4	27.2	3/4	16.0	9.53	41	46	38.0	52.5
BMC 85 - 08R	3/4	27.2	1	22.0	10.39	41	46	41.0	54.5
BMC 86 - 08R	1	34.0	1	22.0	10.39	46	55	41.0	59.0
BMC 86 - 10R	1	34.0	1 1/4	28.0	12.70	46	55	44.0	60.0
BMC 87 - 10R	1 1/4	42.7	1 1/4	31.0	12.70	60	65	52.0	72.0
BMC 87 - 12R	1 1/4	42.7	1 1/2	34.0	12.70	60	65	52.0	72.0
BMC 88 - 12R	1 1/2	48.6	1 1/2	36.0	12.70	65	75	55.0	76.0
BMC 88 - 16R	1 1/2	48.6	2	40.0	15.88	65	75	59.0	76.5

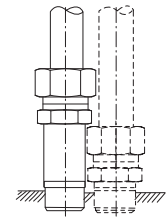
All dimensions are in millimeters. Dimensions are for reference only, subject to change.

Long Male Connector

BLMC



Applied View



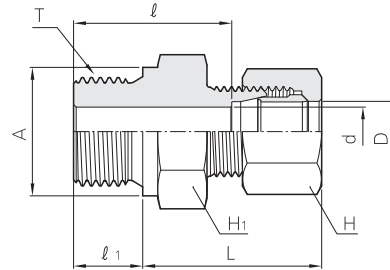
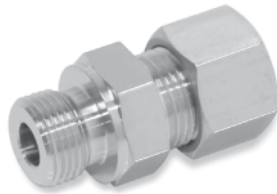
Part No.	Tube O.D.		(PT) T	d	Basic gauge length a	Width across flat		A	l	l ₁	Approx. L
	D					H ₁	H				
BLMC 04 - 01R	4		1/8	2.5	3.97	12	12	10.5	40.0	30.0	49.5
BLMC 06 - 01R	6		1/8	4.0	3.97	14	14	10.5	59.0	41.0	69.5
BLMC 08 - 02R	8		1/4	6.0	6.01	17	17	14.0	63.0	45.0	74.5
BLMC 10 - 02R	10		1/4	7.0	6.01	17	19	14.0	64.0	46.0	76.5
BLMC 10 - 03R	10		3/8	8.0	6.35	19	19	17.5	65.0	46.5	77.0
BLMC 12 - 02R	12		1/4	7.0	6.01	19	22	14.0	64.0	46.0	76.5
BLMC 12 - 03R	12		3/8	9.0	6.35	19	22	17.5	65.0	46.5	77.0
BLMC 15 - 03R	15		3/8	9.0	6.35	24	27	17.5	73.5	52.5	87.0
BLMC 15 - 04R	15		1/2	12.0	8.16	24	27	22.0	78.5	56.0	90.5
BLMC 16 - 04R	16		1/2	12.0	8.16	27	30	22.0	78.5	56.0	90.5
BLMC 18 - 04R	18		1/2	12.0	8.16	27	32	22.0	81.0	56.0	90.5
BLMC 20 - 06R	20		3/4	16.0	9.53	30	36	27.5	84.0	58.5	95.0
BLMC 22 - 06R	22		3/4	16.0	9.53	32	36	27.5	84.0	59.5	96.0
BLMC 25 - 08R	25		1	20.0	10.39	36	41	34.0	89.0	63.5	102.0
BLMC 28 - 08R	28		1	22.0	10.39	41	46	34.0	94.0	66.5	107.5
BLMC 30 - 10R	30		1 1/4	25.0	12.70	46	46	42.5	99.0	68.5	111.0
BLMC 32 - 10R	32		1 1/4	26.0	12.70	46	60	42.5	99.0	69.5	112.0
BLMC 81 - 02R	1/8	10.5	1/4	7.0	6.01	17	19	14.0	64.0	46.0	76.5
BLMC 82 - 03R	1/4	13.8	3/8	9.0	6.35	22	24	17.5	73.5	52.5	86.5
BLMC 82 - 03R	3/8	17.3	3/8	9.0	6.35	27	32	17.5	73.0	52.5	87.0
BLMC 83 - 04R	3/8	17.3	1/2	12.0	8.16	27	32	22.0	78.0	56.0	90.5
BLMC 84 - 06R	1/2	21.7	3/4	16.0	9.53	32	36	27.5	84.0	59.5	96.0
BLMC 85 - 08R	3/4	27.2	1	22.0	10.39	41	46	34.0	94.0	66.5	107.5

All dimensions are in millimeters. Dimensions are for reference only, subject to change.

Tube Fittings

Male Connector (For Copper Gasket)

BMC - G

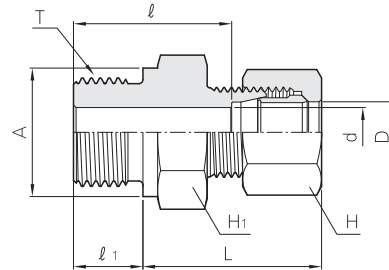


Part No.	Tube O.D.		(PT) T	d	Width across flat		A	l ₁	l	Approx. L
	D				H ₁	H				
BMC 04 - 01G		4	1/8	2.5	14	12	14.0	8	17.0	22.5
BMC 06 - 01G		6	1/8	4.0	14	14	14.0	8	21.0	30.5
BMC 06 - 02G		6	1/4	4.0	19	14	18.0	12	26.0	31.5
BMC 08 - 01G		8	1/8	4.0	17	17	14.0	8	21.0	30.5
BMC 08 - 02G		8	1/4	6.0	19	17	18.0	12	26.0	31.5
BMC 10 - 02G		10	1/4	6.0	19	19	18.0	12	26.0	32.5
BMC 10 - 03G		10	3/8	8.0	22	19	21.5	12	27.0	33.5
BMC 12 - 02G		12	1/4	6.0	19	22	18.0	12	26.0	32.5
BMC 12 - 03G		12	3/8	8.0	22	22	21.5	12	27.0	33.5
BMC 12 - 04G		12	1/2	10.0	27	22	25.5	14	32.0	36.5
BMC 15 - 03G		15	3/8	8.0	24	27	21.5	12	29.5	37.5
BMC 15 - 03G		15	1/2	12.0	27	27	25.5	14	33.5	39.5
BMC 15 - 04G		16	1/2	12.0	27	30	25.5	14	33.5	39.5
BMC 18 - 04G		18	1/2	12.0	27	32	25.5	14	33.0	39.5
BMC 20 - 06G		20	3/4	16.0	32	36	31.5	16	38.0	42.5
BMC 22 - 04G		22	1/2	12.0	32	36	25.5	14	34.0	41.5
BMC 22 - 06G		22	3/4	16.0	32	36	31.5	16	37.0	42.5
BMC 25 - 06G		25	3/4	16.0	36	41	31.5	16	36.0	43.5
BMC 25 - 08G		25	1	20.0	41	41	38.0	18	40.0	45.5
BMC 28 - 08G		28	1	22.0	41	46	38.0	18	42.0	48.0
BMC 30 - 08G		30	1	22.0	41	46	38.0	18	42.0	48.5
BMC 30 - 10G		30	1 1/4	25.0	50	46	48.5	20	47.0	51.5
BMC 32 - 10G		32	1 1/4	26.0	50	50	48.5	20	46.0	51.5
BMC 35 - 10G		35	1 1/4	28.0	50	55	48.5	20	46.0	54.5
BMC 38 - 12G		38	1 1/2	32.0	55	60	53.5	21	46.0	56.5
BMC 40 - 12G		40	1 1/2	32.0	55	60	53.5	21	50.0	60.5
BMC 42 - 12G		42	1 1/2	34.0	55	60	53.5	21	50.0	60.5
BMC 50 - 16G		50	2	40.0	70	75	66.0	25	61.0	69.5
BMC 81 - 01G	1/8	10.5	1/8	4.0	17	19	14.0	8	22.0	32.5
BMC 81 - 02G	1/8	10.5	1/4	6.0	19	19	18.0	12	26.0	32.5
BMC 82 - 02G	1/4	13.8	1/4	6.0	22	24	18.0	12	28.5	36.0
BMC 82 - 03G	1/4	13.8	3/8	8.0	22	24	21.5	12	28.5	36.0
BMC 83 - 03G	3/8	17.3	3/8	8.0	27	32	21.5	12	30.0	38.5
BMC 83 - 04G	3/8	17.3	1/2	12.0	27	32	25.5	14	33.0	39.5
BMC 84 - 04G	1/2	21.7	1/2	12.0	32	36	25.5	14	34.0	41.5
BMC 84 - 06G	1/2	21.7	3/4	16.0	32	36	31.5	16	37.0	42.5
BMC 85 - 06G	3/4	27.2	3/4	16.0	41	46	31.5	16	40.0	48.0
BMC 85 - 08G	3/4	27.2	1	22.0	41	46	38.0	18	42.0	48.0
BMC 86 - 08G	1	34.0	1	22.0	46	55	38.0	18	43.0	53.5
BMC 86 - 10G	1	34.0	1 1/4	28.0	50	55	48.5	20	46.0	54.5
BMC 87 - 10G	1 1/4	42.7	1 1/4	31.0	60	65	48.5	20	51.0	63.5
BMC 87 - 12G	1 1/4	42.7	1 1/2	34.0	60	65	53.5	21	52.0	63.5
BMC 88 - 12G	1 1/2	48.6	1 1/2	36.0	65	75	53.5	21	53.0	65.5
BMC 88 - 16G	1 1/2	48.6	2	40.0	70	75	66.0	25	61.0	69.5

All dimensions are in millimeters. Dimensions are for reference only, subject to change.

Male Connector (For O - Seal)

BOM

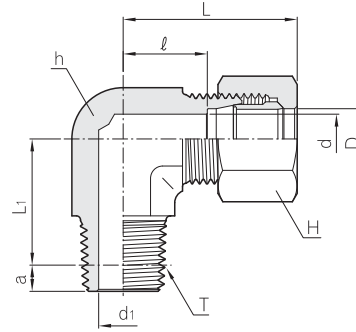


Part No.	Tube O.D.		(PT) T	d	Width across flat		A	l ₁	l	Approx. L
	D				H ₁	H				
BOM 04 - 01G	4		1/8	2.5	14	12	14	8	17.0	22.5
BOM 06 - 01G	6		1/8	4.0	14	14	14	8	21.0	30.5
BOM 06 - 02G	6		1/4	4.0	19	14	19	12	26.0	31.5
BOM 08 - 01G	8		1/8	4.0	17	17	14	8	21.0	30.5
BOM 08 - 02G	8		1/4	6.0	19	17	19	12	26.0	31.5
BOM 10 - 02G	10		1/4	6.0	19	19	19	12	26.0	32.5
BOM 10 - 03G	10		3/8	8.0	22	19	22	12	27.0	33.5
BOM 12 - 02G	12		1/4	6.0	19	22	19	12	26.0	32.5
BOM 12 - 03G	12		3/8	8.0	22	22	22	12	27.0	33.5
BOM 12 - 04G	12		1/2	10.0	27	22	27	14	32.0	36.5
BOM 15 - 03G	15		3/8	8.0	24	27	22	12	29.5	37.5
BOM 15 - 04G	15		1/2	12.0	27	27	27	14	33.5	39.5
BOM 16 - 04G	16		1/2	12.0	27	30	27	14	33.5	39.5
BOM 18 - 04G	18		1/2	12.0	27	32	27	14	33.0	39.5
BOM 20 - 06G	20		3/4	16.0	36	36	36	16	38.0	42.5
BOM 22 - 04G	22		1/2	12.0	32	36	27	14	34.0	41.5
BOM 22 - 06G	22		3/4	16.0	36	36	36	16	37.0	42.5
BOM 25 - 06G	25		3/4	16.0	36	41	36	16	36.0	43.5
BOM 25 - 08G	25		1	20.0	41	41	41	18	40.0	45.5
BOM 28 - 08G	28		1	22.0	41	46	41	18	42.0	48.0
BOM 30 - 08G	30		1	22.0	41	46	41	18	42.0	48.5
BOM 30 - 10G	30		1 1/4	25.0	50	46	50	20	47.0	51.5
BOM 32 - 10G	32		1 1/4	26.0	50	50	50	20	46.0	51.5
BOM 35 - 10G	35		1 1/4	28.0	50	55	50	20	46.0	54.5
BOM 38 - 12G	38		1 1/2	32.0	55	60	55	21	46.0	56.5
BOM 40 - 12G	40		1 1/2	32.0	55	60	55	21	50.0	60.5
BOM 42 - 12G	42		1 1/2	34.0	55	60	55	21	50.0	60.5
BOM 50 - 16G	50		2	40.0	70	75	75	25	61.0	69.5
BOM 81 - 01G	1/8	10.5	1/8	4.0	17	19	14	8	22.0	32.5
BOM 81 - 02G	1/8	10.5	1/4	6.0	19	19	19	12	26.0	32.5
BOM 82 - 02G	1/4	13.8	1/4	6.0	22	24	19	12	28.5	36.0
BOM 82 - 03G	1/4	13.8	3/8	8.0	22	24	22	12	28.5	36.0
BOM 83 - 03G	3/8	17.3	3/8	8.0	27	32	22	12	30.0	38.5
BOM 83 - 04G	3/8	17.3	1/2	12.0	27	32	27	14	33.0	39.5
BOM 84 - 04G	1/2	21.7	1/2	12.0	32	36	27	14	34.0	41.5
BOM 84 - 06G	1/2	21.7	3/4	16.0	36	36	36	16	37.0	42.5
BOM 85 - 06G	3/4	27.2	3/4	16.0	41	46	36	16	40.0	48.0
BOM 85 - 08G	3/4	27.2	1	22.0	41	46	41	18	42.0	48.0
BOM 86 - 08G	1	34.0	1	22.0	46	55	41	18	43.0	53.5
BOM 86 - 10G	1	34.0	1 1/4	28.0	50	55	50	20	46.0	54.5
BOM 87 - 10G	1 1/4	42.7	1 1/4	31.0	60	65	50	20	51.0	63.5
BOM 87 - 12G	1 1/4	42.7	1 1/2	34.0	60	65	55	21	52.0	63.5
BOM 88 - 12G	1 1/2	48.6	1 1/2	36.0	65	75	55	21	53.0	65.5
BOM 88 - 16G	1 1/2	48.6	2	40.0	75	75	75	25	73.0	69.5

All dimensions are in millimeters. Dimensions are for reference only, subject to change.

Tube Fittings

Male Elbow BLM

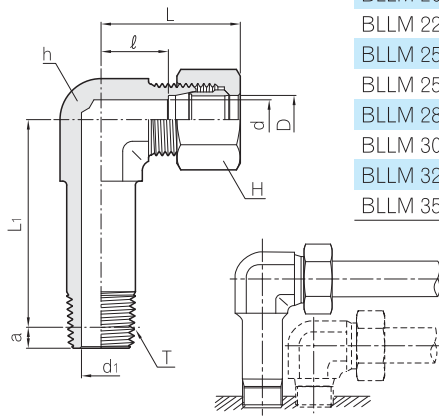


Part No.	Tube O.D.		(PT) T	d	d ₁	Basic gauge length a	Width across flat		ℓ	Approx.	
	D						h	H		L	L ₁
BLM 04 - 01R	4		1/8	2.5	4	3.97	12	12	9.0	22.5	13.0
BLM 06 - 01R	6		1/8	4.0	4	3.97	14	14	13.0	30.5	14.0
BLM 06 - 02R	6		1/4	4.0	7	6.01	17	14	16.0	33.5	17.0
BLM 08 - 01R	8		1/8	6.0	4	3.97	17	17	16.0	33.5	16.0
BLM 08 - 02R	8		1/4	6.0	7	6.01	17	17	16.0	33.5	18.0
BLM 10 - 02R	10		1/4	8.0	7	6.01	17	19	16.0	34.5	19.0
BLM 10 - 03R	10		3/8	8.0	9	6.35	19	19	17.0	35.5	19.5
BLM 10 - 04R	10		1/2	8.0	12	8.16	22	19	22.0	40.5	26.0
BLM 12 - 02R	12		1/4	10.0	7	6.01	19	22	17.0	35.5	20.0
BLM 12 - 03R	12		3/8	10.0	9	6.35	19	22	17.0	35.5	20.5
BLM 12 - 04R	12		1/2	10.0	12	8.16	24	22	22.0	40.5	26.0
BLM 15 - 03R	15		3/8	12.0	9	6.35	24	27	21.5	41.5	23.5
BLM 15 - 04R	15		1/2	12.0	12	8.16	24	27	21.5	41.5	26.0
BLM 16 - 03R	16		3/8	13.0	9	6.35	27	30	24.5	44.5	25.5
BLM 16 - 04R	16		1/2	13.0	12	8.16	27	30	24.5	44.5	27.0
BLM 18 - 03R	18		3/8	14.0	9	6.35	27	32	24.0	44.5	27.5
BLM 18 - 04R	18		1/2	14.0	12	8.16	27	32	24.0	44.5	30.0
BLM 20 - 04R	20		1/2	17.0	12	8.16	30	36	25.0	45.5	32.0
BLM 20 - 06R	20		3/4	17.0	16	9.53	30	36	25.0	45.5	30.5
BLM 22 - 04R	22		1/2	18.0	12	8.16	32	36	25.0	46.5	32.0
BLM 22 - 06R	22		3/4	18.0	16	9.53	32	36	25.0	46.5	32.5
BLM 25 - 06R	25		3/4	20.0	16	9.53	36	41	26.0	49.5	33.5
BLM 25 - 08R	25		1	20.0	22	10.39	36	41	26.0	49.5	35.5
BLM 28 - 06R	28		3/4	22.0	16	9.53	41	46	31.0	55.0	37.5
BLM 28 - 08R	28		1	22.0	22	10.39	41	46	31.0	55.0	39.5
BLM 30 - 08R	30		1	25.0	22	10.39	41	46	31.0	55.5	39.5
BLM 30 - 10R	30		1 1/4	25.0	31	12.70	46	46	36.0	60.5	42.5
BLM 32 - 10R	32		1 1/4	26.0	31	12.70	46	50	35.0	60.5	43.5
BLM 35 - 10R	35		1 1/4	28.0	31	12.70	46	55	35.0	63.5	45.5
BLM 38 - 12R	38		1 1/2	32.0	36	12.70	50	60	38.0	69.5	48.5
BLM 40 - 12R	40		1 1/2	32.0	36	12.70	55	60	43.0	74.5	49.5
BLM 42 - 12R	42		1 1/2	34.0	36	12.70	55	60	43.0	74.5	49.5
BLM 50 - 16R	50		2	40.0	46	15.88	65	75	50.0	83.5	58.0
BLM 81 - 01R	1/8	10.5	1/8	8.0	4	3.97	17	19	16.0	34.5	17.0
BLM 81 - 02R	1/8	10.5	1/4	8.0	7	6.01	17	19	16.0	34.5	19.0
BLM 82 - 02R	1/4	13.8	1/4	11.0	7	6.01	22	24	20.5	40.0	22.0
BLM 82 - 03R	1/4	13.8	3/8	11.0	9	6.35	22	24	20.5	40.0	22.5
BLM 83 - 03R	3/8	17.3	3/8	14.0	9	6.35	27	32	24.0	44.5	27.5
BLM 83 - 04R	3/8	17.3	1/2	14.0	12	8.16	27	32	24.0	44.5	30.0
BLM 84 - 04R	1/2	21.7	1/2	18.0	12	8.16	32	36	25.0	46.5	32.0
BLM 84 - 06R	1/2	21.7	3/4	18.0	16	9.53	32	36	25.0	46.5	32.5
BLM 85 - 06R	3/4	27.2	3/4	22.0	16	9.53	41	46	31.0	55.0	37.5
BLM 85 - 08R	3/4	27.2	1	22.0	22	10.39	41	46	31.0	55.0	39.5
BLM 86 - 08R	1	34.0	1	28.0	22	10.39	46	55	35.0	63.5	44.5
BLM 86 - 10R	1	34.0	1 1/4	28.0	31	12.70	46	55	35.0	63.5	45.5
BLM 87 - 10R	1 1/4	42.7	1 1/4	34.0	31	12.70	60	65	45.0	77.5	51.5
BLM 87 - 12R	1 1/4	42.7	1 1/2	34.0	36	12.70	60	75	45.0	77.5	51.5
BLM 88 - 12R	1 1/2	48.6	1 1/2	40.0	36	12.70	65	75	50.0	83.5	57.5
BLM 88 - 16R	1 1/2	48.6	2	40.0	46	15.88	65	75	50.0	83.5	58.0

All dimensions are in millimeters. Dimensions are for reference only, subject to change.

Long Male Elbow

BLLM

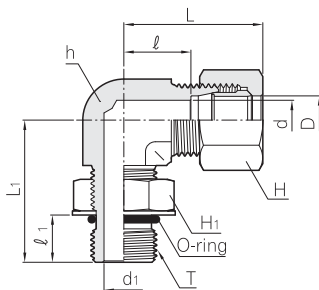


Applied View

Part No.	Tube O.D. D	(PT) T	d	d ₁	Basic gauge length a	Width across flat			ℓ	Approx.	
						h	H	L		L ₁	
BLLM 06 - 01R	6	1/8	4	4	3.97	14	14	13.0	30.5	36.0	
BLLM 08 - 02R	8	1/4	6	7	6.01	17	17	16.0	33.5	43.0	
BLLM 10 - 02R	10	1/4	8	7	6.01	17	19	16.0	34.5	46.0	
BLLM 12 - 02R	12	1/4	10	7	6.01	19	22	17.0	35.5	52.0	
BLLM 12 - 03R	12	3/8	10	9	6.35	19	22	17.0	35.5	53.0	
BLLM 15 - 03R	15	3/8	12	9	6.35	24	27	21.5	41.5	61.5	
BLLM 15 - 04R	15	1/2	12	12	8.16	24	27	21.5	41.5	67.0	
BLLM 16 - 04R	16	1/2	13	12	8.16	27	30	24.5	44.5	70.0	
BLLM 18 - 04R	18	1/2	14	12	8.16	27	32	24.0	44.5	77.0	
BLLM 20 - 06R	20	3/4	17	16	9.53	30	36	25.0	45.5	82.5	
BLLM 22 - 06R	22	3/4	18	16	9.53	32	36	25.0	46.5	83.5	
BLLM 25 - 06R	25	3/4	20	16	9.53	36	41	26.0	49.5	90.5	
BLLM 25 - 08R	25	1	20	22	10.39	36	41	26.0	49.9	91.5	
BLLM 28 - 08R	28	1	22	22	10.39	41	46	31.0	55.0	104.5	
BLLM 30 - 10R	30	1 1/4	25	31	12.70	46	46	36.0	60.5	104.5	
BLLM 32 - 10R	32	1 1/4	26	31	12.70	46	50	35.0	60.5	104.5	
BLLM 35 - 10R	35	1 1/4	28	31	12.70	46	55	35.0	63.5	121.5	

O - Seal Male Elbow

BOLM

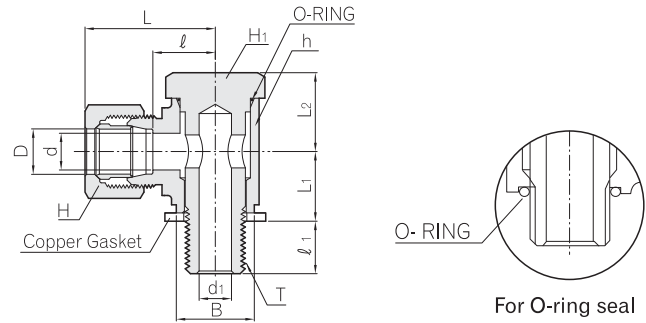


Part No.	Tube O.D. D	(PF) T	d	d ₁	Width across flat			ℓ ₁	ℓ	Approx.	
					h	H ₁	H			L ₁	L
BOLM 06 - 01G	6	1/8	4	4	14	14	14	10	13.0	30	30.5
BOLM 08 - 02G	8	1/4	6	6	17	19	17	12	16.0	34	33.5
BOLM 10 - 02G	10	1/4	8	6	17	19	19	12	16.0	35	34.5
BOLM 12 - 02G	12	1/4	10	6	19	19	22	12	17.0	36	35.5
BOLM 12 - 03G	12	3/8	10	9	19	22	22	12	17.0	36	35.5
BOLM 12 - 04G	12	1/2	10	12	24	27	22	16	17.0	46	35.5
BOLM 15 - 03G	15	3/8	12	9	24	22	27	12	21.5	40	41.5
BOLM 15 - 04G	15	1/2	12	12	24	27	27	16	21.5	46	41.5
BOLM 16 - 04G	16	1/2	13	12	24	27	30	16	24.5	46	44.5
BOLM 18 - 04G	18	1/2	14	12	30	27	32	16	24.0	52	44.5
BOLM 20 - 06G	20	3/4	17	16	30	36	36	17	25.0	52	45.5
BOLM 22 - 06G	22	3/4	18	16	32	36	36	17	25.0	52	46.5
BOLM 25 - 06G	25	3/4	20	16	36	36	41	17	26.0	60	49.5
BOLM 25 - 08G	25	1	20	22	36	41	41	21	26.0	62	49.5
BOLM 28 - 08G	28	1	22	22	41	41	46	21	31.0	62	55.0
BOLM 30 - 08G	30	1	25	22	41	41	46	21	31.0	66	55.5
BOLM 30 - 10G	30	1 1/4	25	31	46	50	46	21	34.0	66	58.5
BOLM 32 - 10G	32	1 1/4	26	31	46	50	50	21	35.0	66	60.5
BOLM 35 - 10G	35	1 1/4	28	31	46	50	55	21	35.0	66	63.5
BOLM 38 - 12G	38	1 1/2	32	36	50	50	60	21	38.0	73	69.5

All dimensions are in millimeters. Dimensions are for reference only, subject to change.

Tube Fittings

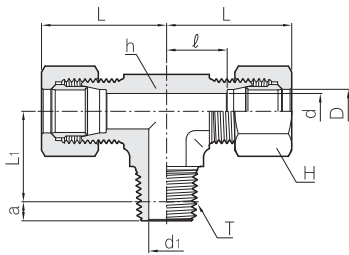
Stud Elbow BSLM



For O-ring seal

Part No.	Tube O.D.		(PF) T	d ₁	d	Width across flat			l ₁	l	Approx.			B	O-ring
	D					h	H ₁	H			L ₁	L ₂	L		
BSLM 06 - 01G	6		1/8	4	4	17	17	14	8	16.0	13	14	33.5	14.0	P10
BSLM 08 - 02G	8		1/4	7	6	22	22	17	12	18.0	16	17	35.5	18.0	P12
BSLM 10 - 02G	10		1/4	7	8	22	22	19	12	18.0	16	17	36.5	18.0	P12
BSLM 12 - 03G	12		3/8	9	10	27	27	22	12	22.0	19	22	40.5	21.5	P18
BSLM 15 - 04G	15		1/2	12	12	36	30	27	14	28.5	24	28	48.5	25.5	P22
BSLM 16 - 04G	16		1/2	12	13	36	30	30	14	28.5	24	28	48.5	25.5	P22
BSLM 18 - 04G	18		1/2	12	14	36	30	32	14	28.0	24	28	48.5	25.5	P22
BSLM 20 - 06G	20		3/4	16	17	41	41	36	16	30.0	28	32	50.5	31.5	P28
BSLM 22 - 06G	22		3/4	16	18	42	41	36	16	29.0	28	32	50.5	31.5	P28
BSLM 25 - 08G	25		1	22	20	50	50	41	18	32.0	37	38	55.5	38.0	P36
BSLM 28 - 08G	28		1	22	22	50	50	46	18	32.0	37	38	56.0	38.0	P36
BSLM 81 - 02G	1/8	10.5	1/4	7	8	22	22	19	12	18.0	16	17	36.5	18.0	P12
BSLM 82 - 03G	1/4	13.8	3/8	9	11	27	27	24	12	21.5	19	22	41.0	21.5	P18
BSLM 83 - 04G	3/8	17.3	1/2	12	14	36	30	32	14	28.0	24	28	48.5	25.5	P22
BSLM 84 - 06G	1/2	21.7	3/4	16	18	41	41	36	16	29.0	28	32	50.5	31.5	P28
BSLM 85 - 08G	3/4	27.2	1	22	22	50	50	46	18	32.0	37	38	56.0	38.0	P36

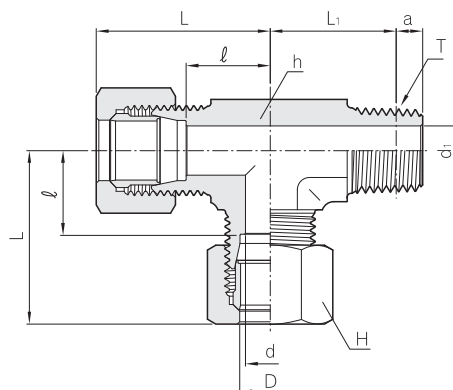
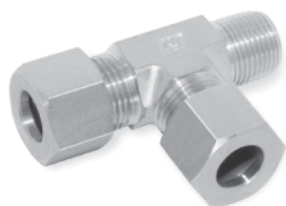
Male Branch Tee BBTM



Part No.	Tube O.D.		(PT) T	d	d ₁	Basic gauge length a	Width across flat		l	Approx.	
	D						h	H		L	L ₁
BBTM 04 - 01R	4		1/8	2.5	4	3.97	12	12	9.0	22.5	13.0
BBTM 06 - 01R	6		1/8	4.0	4	3.97	14	14	13.0	30.5	14.0
BBTM 06 - 02R	6		1/4	4.0	7	6.01	17	14	16.0	33.5	17.0
BBTM 08 - 01R	8		1/8	6.0	4	3.97	17	17	16.0	33.5	16.0
BBTM 08 - 02R	8		1/4	6.0	7	6.01	17	17	16.0	33.5	18.0
BBTM 10 - 02R	10		1/4	8.0	7	6.01	17	19	16.0	34.5	19.0
BBTM 10 - 03R	10		3/8	8.0	9	6.35	19	19	17.0	35.5	19.5
BBTM 12 - 02R	12		1/4	10.0	7	6.01	19	22	17.0	35.5	18.0
BBTM 12 - 03R	12		3/8	10.0	9	6.35	19	22	17.0	35.5	20.5
BBTM 15 - 03R	15		3/8	12.0	9	6.35	24	27	21.5	41.5	23.5
BBTM 15 - 04R	15		1/2	12.0	12	8.16	24	27	21.5	41.5	26.0
BBTM 16 - 04R	16		1/2	13.0	12	8.16	27	30	24.5	44.5	27.0
BBTM 18 - 04R	18		1/2	14.0	12	8.16	27	32	20.0	44.5	30.0
BBTM 20 - 06R	20		3/4	17.0	16	9.53	30	36	25.0	45.5	30.5
BBTM 22 - 06R	22		3/4	18.0	16	9.53	32	36	25.0	46.5	32.5
BBTM 25 - 06R	25		3/4	20.0	16	9.53	36	41	26.0	49.5	33.5
BBTM 25 - 08R	25		1	20.0	22	10.39	36	41	26.0	49.5	35.5
BBTM 28 - 08R	28		1	22.0	22	10.39	41	46	31.0	55.0	39.5
BBTM 30 - 08R	30		1	25.0	22	10.39	41	46	31.0	55.5	39.5
BBTM 30 - 10R	30		1 1/4	25.0	31	12.70	46	46	36.0	60.5	42.5
BBTM 32 - 10R	32		1 1/4	26.0	31	12.70	46	50	35.0	60.5	43.5
BBTM 35 - 10R	35		1 1/4	28.0	31	12.70	46	55	35.0	63.5	45.5
BBTM 38 - 12R	38		1 1/2	32.0	36	12.70	50	60	38.0	69.5	48.5
BBTM 40 - 12R	40		1 1/2	32.0	36	12.70	55	60	43.0	74.5	49.5
BBTM 50 - 16R	50		2	40.0	46	15.88	65	75	50.0	83.5	58.0
BBTM 81 - 02R	1/8	10.5	1/4	8.0	7	6.01	17	19	16.0	34.5	19.0
BBTM 82 - 03R	1/4	13.8	3/8	11.0	9	6.35	22	24	20.5	40.0	22.5
BBTM 83 - 04R	3/8	17.3	1/2	14.0	12	8.16	27	32	24.0	44.5	30.0
BBTM 84 - 06R	1/2	21.7	3/4	18.0	16	9.53	32	36	25.0	46.5	32.5
BBTM 85 - 08R	3/4	27.2	1	22.0	22	10.39	41	46	31.0	55.0	39.5
BBTM 86 - 10R	1	34.0	1 1/4	28.0	31	12.70	46	55	35.0	63.5	45.5
BBTM 87 - 12R	1 1/4	42.7	1 1/2	34.0	36	12.70	60	65	45.0	77.5	51.5
BBTM 88 - 16R	1 1/2	48.6	2	40.0	46	15.88	65	75	50.0	83.5	58.0

All dimensions are in millimeters. Dimensions are for reference only, subject to change.

Male Run Tee

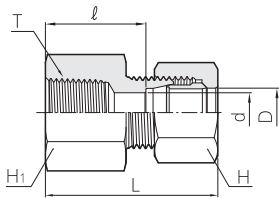
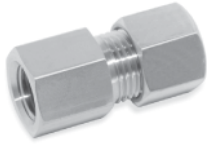
BRTM

Part No.	Tube O.D.		(PF) T	d	d ₁	Basic gauge length a	Width across flat		l	Approx.	
	D						h	H		L	L ₁
BRTM 04 - 01R	4		1/8	2.5	4	3.97	12	12	9.0	22.5	13.0
BRTM 06 - 01R	6		1/8	4.0	4	3.97	14	14	13.0	30.5	14.0
BRTM 06 - 02R	6		1/4	4.0	7	6.01	17	14	16.0	33.5	17.0
BRTM 08 - 01R	8		1/8	6.0	4	3.97	17	17	16.0	33.5	16.0
BRTM 08 - 02R	8		1/4	6.0	7	6.01	17	17	16.0	33.5	18.0
BRTM 10 - 02R	10		1/4	8.0	7	6.01	17	19	16.0	34.5	19.0
BRTM 10 - 03R	10		3/8	8.0	9	6.35	19	19	17.0	35.5	19.5
BRTM 12 - 02R	12		1/4	10.0	7	6.01	19	22	17.0	35.5	18.0
BRTM 12 - 03R	12		3/8	10.0	9	6.35	19	22	17.0	35.5	20.5
BRTM 15 - 03R	15		3/8	12.0	9	6.35	24	27	21.5	41.5	23.5
BRTM 15 - 04R	15		1/2	12.0	12	8.16	24	27	21.5	41.5	26.0
BRTM 16 - 04R	16		1/2	13.0	12	8.16	27	30	24.5	44.5	27.0
BRTM 18 - 04R	18		1/2	14.0	12	8.16	27	32	24.0	44.5	30.0
BRTM 20 - 06R	20		3/4	17.0	16	9.53	30	36	25.0	45.5	30.5
BRTM 22 - 06R	22		3/4	18.0	16	9.53	32	36	25.0	46.5	32.5
BRTM 25 - 06R	25		3/4	20.0	16	9.53	36	41	26.0	49.5	33.5
BRTM 25 - 08R	25		1	20.0	22	10.39	36	41	26.0	49.5	35.5
BRTM 28 - 08R	28		1	22.0	22	10.39	41	46	31.0	55.0	39.5
BRTM 30 - 08R	30		1	25.0	22	10.39	41	46	31.0	55.5	39.5
BRTM 30 - 10R	30		1 1/4	25.0	31	12.70	46	46	36.0	60.5	42.5
BRTM 32 - 10R	32		1 1/4	26.0	31	12.70	46	50	35.0	60.5	43.5
BRTM 35 - 10R	35		1 1/4	28.0	31	12.70	46	55	35.0	63.5	45.5
BRTM 38 - 12R	38		1 1/2	32.0	36	12.70	50	60	38.0	69.5	48.5
BRTM 40 - 12R	40		1 1/2	32.0	36	12.70	55	60	43.0	74.5	49.5
BRTM 50 - 16R	50		2	40.0	46	15.88	65	75	50.0	83.5	58.0
BRTM 81 - 02R	1/8	10.5	1/4	8.0	7	6.01	17	19	16.0	34.5	19.0
BRTM 82 - 03R	1/4	13.8	3/8	11.0	9	6.35	22	24	20.5	40.0	22.5
BRTM 83 - 04R	3/8	17.3	1/2	14.0	12	8.16	27	32	24.0	44.5	30.0
BRTM 84 - 06R	1/2	21.7	3/4	18.0	16	9.53	32	36	25.0	46.5	32.5
BRTM 85 - 08R	3/4	27.2	1	22.0	22	10.39	41	46	31.0	55.0	39.5
BRTM 86 - 10R	1	34.0	1 1/4	28.0	31	12.70	46	55	35.0	63.5	45.5
BRTM 87 - 12R	1 1/4	42.7	1 1/2	34.0	36	12.70	60	65	45.0	77.5	51.5
BRTM 88 - 16R	1 1/2	48.6	2	40.0	46	15.88	65	75	50.0	83.5	58.0

All dimensions are in millimeters. Dimensions are for reference only, subject to change.

Tube Fittings

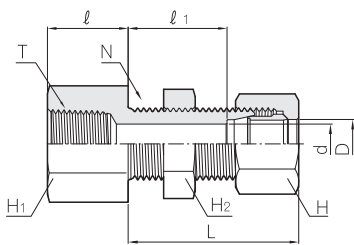
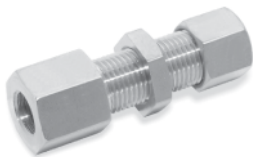
Female Connector **BFC**



Part No.	Tube O.D.		(PT) T	d	Width across flat		l	Approx. L
	D				H ₁	H		
BFC 06 - 01R	6		1/8	4	17	14	18.0	35.5
BFC 08 - 02R	8		1/4	6	19	17	23.0	40.5
BFC 10 - 02R	10		1/4	8	19	19	23.0	41.5
BFC 10 - 03R	10		3/8	8	24	19	25.0	43.5
BFC 12 - 02R	12		1/4	10	19	22	23.0	41.5
BFC 12 - 03R	12		3/8	10	24	22	25.0	43.5
BFC 15 - 03R	15		3/8	12	24	27	26.5	46.5
BFC 15 - 04R	15		1/2	12	30	27	31.5	51.5
BFC 16 - 04R	16		1/2	13	30	30	31.5	51.5
BFC 18 - 04R	18		1/2	14	30	32	31.0	51.5
BFC 20 - 06R	20		3/4	17	36	36	33.0	53.5
BFC 22 - 06R	22		3/4	18	36	36	32.0	53.5
BFC 25 - 06R	25		3/4	20	36	41	31.0	54.5
BFC 25 - 08R	25		1	20	46	41	35.0	58.5
BFC 28 - 08R	28		1	22	46	46	37.0	61.0
BFC 30 - 08R	30		1	25	46	46	37.0	61.5
BFC 30 - 10R	30		1 1/4	25	55	46	41.0	65.5
BFC 32 - 10R	32		1 1/4	26	55	50	40.0	65.5
BFC 35 - 10R	35		1 1/4	28	55	55	40.0	68.5
BFC 38 - 12R	38		1 1/2	32	65	60	39.0	70.5
BFC 40 - 12R	40		1 1/2	32	65	60	43.0	74.5
BFC 42 - 12R	42		1 1/2	34	65	60	43.0	74.5
BFC 50 - 16R	50		2	40	80	75	48.0	81.5
BFC 81 - 02R	1/8	10.5	1/4	8	19	19	23.0	41.5
BFC 82 - 03R	1/4	13.8	3/8	11	24	24	26.5	46.0
BFC 83 - 04R	3/8	17.3	1/2	14	30	32	31.0	51.5
BFC 84 - 06R	1/2	21.7	3/4	18	36	36	32.0	53.5
BFC 85 - 08R	3/4	27.2	1	22	46	46	37.0	61.0
BFC 86 - 10R	1	34.0	1 1/4	28	55	55	40.0	68.5
BFC 87 - 12R	1 1/4	42.7	1 1/2	34	65	65	43.0	78.5
BFC 88 - 16R	1 1/2	48.6	2	40	80	75	48.0	81.5

Bulkhead Female Connector

BBFC

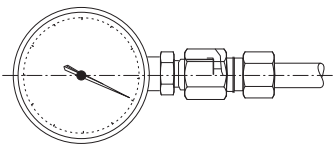
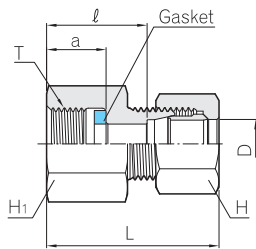
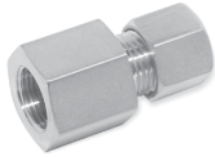


Part No.	Tube O.D. D	(PF) T	d	Width across flat			l	l ₁	Approx. L	Panel Hole Drill size N	Max Panel thickness S
				H	H ₁	H ₂					
BBFC 06 - 01R	6	1/8	4	14	17	17	13	25.0	42.5	12.5	13
BBFC 08 - 02R	8	1/4	6	17	19	19	18	25.0	42.5	14.5	13
BBFC 10 - 02R	10	1/4	8	19	19	22	18	25.0	43.5	16.5	13
BBFC 10 - 03R	12	3/8	8	22	24	22	20	25.0	43.5	16.5	13
BBFC 12 - 02R	12	1/4	10	22	19	24	18	25.0	43.5	18.5	13
BBFC 12 - 03R	12	3/8	10	22	24	24	20	25.0	43.5	18.5	13
BBFC 15 - 03R	15	3/8	12	27	24	27	20	29.5	49.5	22.5	15
BBFC 15 - 04R	15	1/2	12	27	30	27	25	29.5	49.5	22.5	15
BBFC 16 - 04R	16	1/2	13	30	30	30	25	29.5	49.5	24.5	15
BBFC 18 - 04R	18	1/2	14	32	30	32	25	31.0	51.5	26.5	15
BBFC 20 - 06R	20	3/4	17	36	36	32	27	31.0	51.5	28.5	15
BBFC 22 - 06R	22	3/4	18	36	36	36	27	30.0	51.5	30.5	15
BBFC 25 - 06R	25	3/4	20	41	41	41	27	29.0	52.5	35.5	15
BBFC 25 - 08R	25	1	20	41	46	41	31	29.0	52.5	35.5	15
BBFC 28 - 08R	28	1	22	46	46	46	31	31.0	55.0	38.5	15
BBFC 30 - 08R	30	1	25	46	46	46	31	31.0	55.5	40.5	15
BBFC 30 - 10R	30	1 1/4	25	46	55	46	35	31.0	55.5	40.5	15
BBFC 32 - 10R	32	1 1/4	26	50	55	46	35	32.0	57.5	42.5	15

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Gauge Connector

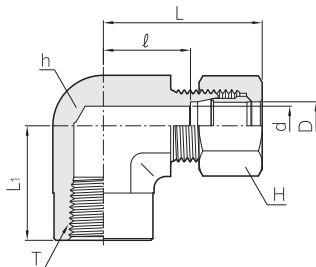
BGC



Part No.	Tube O.D. D	(PF) T	a	Width across flat		l	Approx. L	Gasket part No
				H	H ₁			
BGC 04 - 02G	4	1/4	14	12	19	23	36.5	- 01
BGC 04 - 03G	4	3/8	15	12	24	24	37.5	- 02
BGC 06 - 02G	6	1/4	14	14	19	25	42.5	- 01
BGC 06 - 03G	6	3/8	15	14	24	27	44.5	- 02
BGC 06 - 04G	6	1/2	16	14	30	29	46.5	- 03
BGC 08 - 02G	8	1/4	14	17	19	25	42.5	- 01
BGC 08 - 03G	8	3/8	15	17	24	27	44.5	- 02
BGC 08 - 04G	8	1/2	16	17	30	29	46.5	- 03
BGC 10 - 02G	10	1/4	14	19	19	25	43.5	- 01
BGC 10 - 03G	10	3/8	15	19	24	27	45.5	- 02
BGC 10 - 04G	10	1/2	16	19	30	29	47.5	- 03
BGC 12 - 02G	12	1/4	14	22	19	25	43.5	- 01
BGC 12 - 03G	12	3/8	15	22	24	27	45.5	- 02
BGC 12 - 04G	12	1/2	16	22	30	29	47.5	- 03

Female Elbow

BLF



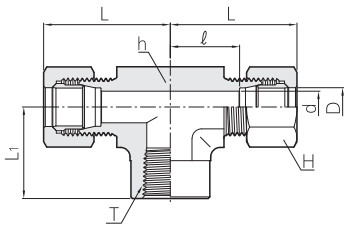
Part No.	Tube O.D. D	(PF) T	d	Width across flat		l	Approx.	
				h	H		L	L ₁
BLF 08 - 02R	8	1/4	6	19	17	17.0	34.5	24
BLF 10 - 02R	10	1/4	8	19	19	17.0	35.5	24
BLF 12 - 02R	12	1/4	10	19	22	17.0	35.5	24
BLF 12 - 03R	12	3/8	10	24	22	22.0	40.5	29
BLF 15 - 03R	15	3/8	12	24	27	21.5	41.5	29
BLF 15 - 04R	15	1/2	12	30	27	25.5	45.5	33
BLF 16 - 04R	16	1/2	13	30	30	25.5	45.5	33
BLF 18 - 04R	18	1/2	14	30	32	25.0	45.5	33
BLF 20 - 06R	20	3/4	17	36	36	28.0	48.5	36
BLF 22 - 06R	22	3/4	18	36	36	27.0	48.5	36
BLF 25 - 06R	25	3/4	20	36	41	26.0	49.5	36
BLF 25 - 08R	25	1	20	46	41	36.0	59.5	46
BLF 28 - 08R	28	1	22	46	46	36.0	60.0	46
BLF 30 - 10R	30	1 1/4	25	55	46	45.0	69.5	55
BLF 32 - 10R	32	1 1/4	26	55	50	44.0	69.5	55
BLF 35 - 10R	35	1 1/4	28	55	55	44.0	72.5	55

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Tube Fittings

Female Branch Tee

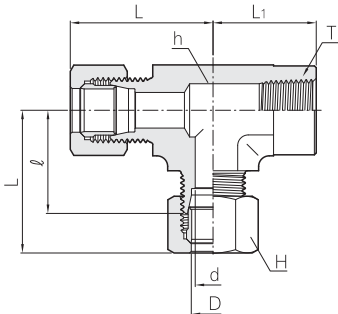
BBTF



Part No.	Tube O.D.		(PF) T	d	Width across flat		ℓ	Approx.	
	D				h	H		L	L ₁
BBTF 08 - 02R	8		1/4	6	19	17	17.0	34.5	24
BBTF 10 - 02R	10		1/4	8	19	19	17.0	35.5	24
BBTF 12 - 02R	12		1/4	10	19	22	17.0	35.5	24
BBTF 12 - 03R	12		3/8	10	24	22	22.0	40.5	29
BBTF 15 - 03R	15		3/8	12	24	27	21.5	41.5	29
BBTF 15 - 04R	15		1/2	12	30	27	23.5	45.5	33
BBTF 16 - 04R	16		1/2	13	30	30	25.5	45.5	33
BBTF 18 - 04R	18		1/2	14	30	32	25.0	45.5	33
BBTF 20 - 06R	20		3/4	17	36	36	28.0	48.5	36
BBTF 22 - 06R	22		3/4	18	36	36	27.0	48.5	36
BBTF 25 - 06R	25		3/4	20	36	41	26.0	49.5	36
BBTF 25 - 08R	25		1	20	46	41	36.0	59.5	46
BBTF 28 - 08R	28		1	22	46	46	36.0	60.0	46
BBTF 30 - 08R	30		1	25	46	46	36.0	60.5	46
BBTF 30 - 10R	30		1 1/4	25	55	46	45.0	69.5	55
BBTF 32 - 10R	32		1 1/4	26	55	50	44.0	69.5	55
BBTF 35 - 10R	35		1 1/4	28	55	55	44.0	72.5	55
BBTF 81 - 02R	1/8	10.5	1/4	8	19	19	17.0	35.5	24
BBTF 82 - 03R	1/4	13.8	3/8	11	24	24	21.5	41.0	29
BBTF 83 - 04R	3/8	17.3	1/2	14	30	32	25.0	45.5	33
BBTF 84 - 06R	1/2	21.7	3/4	18	36	36	27.0	48.5	36
BBTF 85 - 08R	3/4	27.2	1	22	46	46	36.0	60.0	46
BBTF 86 - 10R	1	34.0	1 1/4	28	55	55	44.0	72.5	55

Female Run Tee

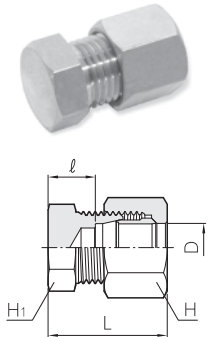
BRTF



Part No.	Tube O.D.		(PF) T	d	Width across flat		ℓ	Approx.	
	D				h	H		L	L ₁
BRTF 08 - 02R	8		1/4	6	19	17	17.0	34.5	24
BRTF 10 - 02R	10		1/4	8	19	19	17.0	35.5	24
BRTF 12 - 02R	12		1/4	10	19	22	17.0	35.5	24
BRTF 12 - 03R	12		3/8	10	24	22	22.0	40.5	29
BRTF 15 - 03R	15		3/8	12	24	27	21.5	41.5	29
BRTF 15 - 04R	15		1/2	12	30	27	25.5	45.5	33
BRTF 16 - 04R	16		1/2	13	30	30	25.5	45.5	33
BRTF 18 - 04R	18		1/2	14	30	32	25.0	45.5	33
BRTF 20 - 06R	20		3/4	17	36	36	28.0	48.5	36
BRTF 22 - 06R	22		3/4	18	36	36	27.0	48.5	36
BRTF 25 - 06R	25		3/4	20	36	41	26.0	49.5	36
BRTF 25 - 08R	25		1	20	46	41	36.0	59.5	46
BRTF 28 - 08R	28		1	22	46	46	36.0	60.0	46
BRTF 30 - 08R	30		1	25	46	46	36.0	60.5	46
BRTF 30 - 10R	30		1 1/4	25	55	46	45.0	69.5	55
BRTF 32 - 10R	32		1 1/4	26	55	50	44.0	69.5	55
BRTF 35 - 10R	35		1 1/4	28	55	55	44.0	72.5	55
BRTF 81 - 02R	1/8	10.5	1/4	8	19	19	17.0	35.5	24
BRTF 82 - 03R	1/4	13.8	3/8	11	24	24	21.5	41.0	29
BRTF 83 - 04R	3/8	17.3	1/2	14	30	32	25.0	45.5	33
BRTF 84 - 06R	1/2	21.7	3/4	18	36	36	27.0	48.5	36
BRTF 85 - 08R	3/4	27.2	1	22	46	46	36.0	60.0	46
BRTF 86 - 10R	1	34.0	1 1/4	28	55	55	44.0	72.5	55

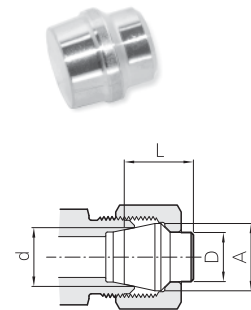
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Cap
BCA



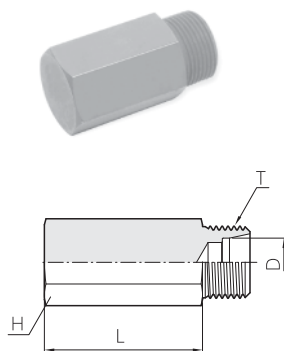
Part No.	Tube O.D. D	Width across flat		ℓ	Approx. L
		H ₁	H		
BCA - 06	6	14	14	11.0	28.5
BCA - 08	8	17	17	12.0	29.5
BCA - 10	10	17	19	13.0	31.5
BCA - 12	12	19	22	13.0	31.5
BCA - 15	15	24	27	14.5	34.5
BCA - 16	16	27	30	16.5	36.5
BCA - 18	18	27	32	16.0	36.5
BCA - 20	20	30	36	16.0	36.5
BCA - 22	22	32	36	16.0	37.5
BCA - 25	25	36	41	15.0	38.5
BCA - 28	28	41	46	18.0	42.0
BCA - 30	30	41	46	18.0	42.5
BCA - 32	32	46	50	19.0	44.5

Plug
BP



Part No.	Tube O.D. D	d	A	ℓ
BP - 06	6	8.0	9.0	13.5
BP - 08	8	10.0	11.0	13.5
BP - 10	10	12.0	13.0	14.5
BP - 12	12	14.0	15.0	14.5
BP - 15	15	17.0	18.0	16.0
BP - 16	16	18.0	19.0	16.0
BP - 18	18	20.0	21.0	17.5
BP - 20	20	22.0	23.0	17.5
BP - 22	22	24.0	25.0	17.5
BP - 25	25	27.4	28.5	19.0
BP - 28	28	30.4	31.5	19.0
BP - 30	30	32.4	33.5	20.0
BP - 32	32	34.4	35.5	20.0

Jig
BJ



Part No.	Tube O.D.		L	H	T
	D				
BJ - 06	6		40	17	M12 X 1.5
BJ - 08	8		40	17	M14 X 1.5
BJ - 10	10		40	17	M16 X 1.5
BJ - 12	12		40	27	M18 X 1.5
BJ - 15	15		40	27	M22 X 1.5
BJ - 16	16		40	27	M24 X 1.5
BJ - 18	18		40	27	M26 X 1.5
BJ - 20	20		40	41	M28 X 1.5
BJ - 22	22		40	41	M30 X 1.5
BJ - 25	25		40	41	M35 X 1.5
BJ - 28	28		40	41	M38 X 1.5
BJ - 30	30		40	41	M40 X 1.5
BJ - 32	32		40	55	M42 X 1.5
BJ - 35	35		40	55	M45 X 1.5
BJ - 38	38		50	55	M48 X 1.5
BJ - 40	40		50	55	M52 X 2.0
BJ - 42	42		50	55	M52 X 2.0
BJ - 50	50		50	65	M64 X 2.0
BJ - 81	1/8	10.5	40	17	M16 X 1.5
BJ - 82	1/4	13.8	40	27	M20 X 1.5
BJ - 83	3/8	17.3	40	27	M26 X 1.5
BJ - 84	1/2	21.7	40	41	M30 X 1.5
BJ - 85	3/4	27.2	40	41	M38 X 1.5
BJ - 86	1	34.0	40	55	M45 X 1.5
BJ - 87	1 1/4	42.7	50	65	M46 X 2.0
BJ - 88	1 1/2	48.6	50	65	M64 X 2.0

All dimensions are in millimeters. Dimensions are for reference only, subject to change.

Tube Fittings

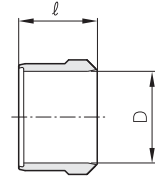
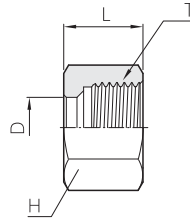
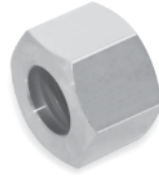
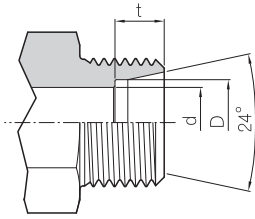
Tube end Dimensions

Nut

BN

Sleeve

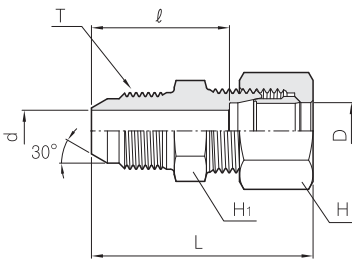
BS



Part No.	Part No.	Tube O.D. D		d	t	T	L	ℓ	Width across flat H
BN - 04	BS - 04	4		2.5	6.0	M10 X 1.25	10.5	7	12
BN - 06	BS - 06	6		4.0	7.0	M12 X 1.5	15.0	9	14
BN - 08	BS - 08	8		6.0	7.0	M14 X 1.5	15.0	9	17
BN - 10	BS - 10	10		8.0	7.0	M16 X 1.5	16.0	10	19
BN - 12	BS - 12	12		10.0	7.0	M18 X 1.5	16.0	10	22
BN - 15	BS - 15	15		12.0	7.5	M22 X 1.5	17.5	10	27
BN - 16	BS - 16	16		13.0	7.5	M24 X 1.5	19.0	10	30
BN - 18	BS - 18	18		14.0	8.0	M26 X 1.5	18.0	10	32
BN - 20	BS - 20	20		17.0	8.0	M28 X 1.5	19.0	10	36
BN - 22	BS - 22	22		18.0	9.0	M30 X 1.5	19.0	10	36
BN - 25	BS - 25	25		20.0	10.0	M35 X 1.5	20.0	11	41
BN - 28	BS - 28	28		22.0	10.0	M38 X 1.5	21.0	11	46
BN - 30	BS - 30	30		25.0	10.0	M40 X 1.5	22.0	11	46
BN - 32	BS - 32	32		26.0	11.0	M42 X 1.5	22.0	11	50
BN - 35	BS - 35	35		28.0	11.0	M45 X 1.5	25.0	14	50
BN - 38	BS - 38	38		32.0	12.0	M48 X 1.5	27.0	14	60
BN - 40	BS - 40	40		32.0	12.0	M52 X 2.0	29.5	14	60
BN - 42	BS - 42	42		34.0	12.0	M52 X 2.0	29.5	14	60
BN - 50	BS - 50	50		40.0	12.0	M64 X 2.0	31.5	14	75
BN - 81	BS - 81	1/8	10.5	8.0	7.0	M16 X 1.5	16.0	10	19
BN - 82	BS - 82	1/4	13.8	11.0	7.5	M20 X 1.5	18.0	10	24
BN - 83	BS - 83	3/8	17.3	14.0	8.0	M26 X 1.5	19.0	10	32
BN - 84	BS - 84	1/2	21.7	18.0	9.0	M30 X 1.5	19.0	10	36
BN - 85	BS - 85	3/4	27.2	22.0	10.0	M38 X 1.5	21.0	11	46
BN - 86	BS - 86	1	34.0	28.0	11.0	M45 X 1.5	25.0	14	55
BN - 87	BS - 87	1 1/4	42.7	34.0	12.0	M56 X 2.0	30.5	14	65
BN - 88	BS - 88	1 1/2	48.6	40.0	12.0	M64 X 2.0	31.5	14	75

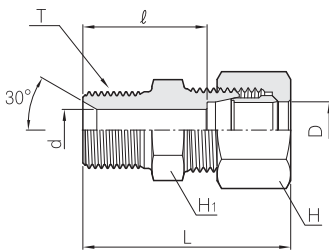
All dimensions are in millimeters. Dimensions are for reference only, subject to change.

Hose Male Union
BHUM



Part No.	Tube O.D. D	(PF) T	d	Width across flat		ℓ	Approx. L
				H	H ₁		
BHUM 08 - 02G	8	1/4	6	17	17	28.0	45.5
BHUM 08 - 03G	8	3/8	6	17	19	30.0	47.5
BHUM 10 - 02G	10	1/4	6	19	17	28.0	46.5
BHUM 10 - 03G	10	3/8	8	19	19	30.0	48.5
BHUM 10 - 04G	10	1/2	8	19	22	33.0	51.5
BHUM 12 - 02G	12	1/4	6	22	19	28.0	46.5
BHUM 12 - 03G	12	3/8	9	22	19	30.0	48.5
BHUM 12 - 04G	12	1/2	10	22	22	33.0	51.5
BHUM 15 - 03G	15	3/8	9	27	24	32.5	52.5
BHUM 15 - 04G	15	1/2	12	27	24	34.5	54.5
BHUM 16 - 03G	16	3/8	9	30	27	32.5	52.5
BHUM 16 - 04G	16	1/2	12	30	27	34.5	54.5
BHUM 18 - 04G	18	1/2	12	32	27	34.0	54.5
BHUM 20 - 06G	20	3/4	16	36	30	38.0	58.5
BHUM 22 - 04G	22	1/2	12	36	32	35.0	56.5
BHUM 22 - 06G	22	3/4	16	36	32	37.0	58.5
BHUM 25 - 06G	25	3/4	16	41	36	37.0	60.5
BHUM 25 - 08G	25	1	20	41	36	39.0	62.5
BHUM 28 - 06G	28	3/4	16	46	41	39.0	63.0
BHUM 28 - 08G	28	1	22	46	41	41.0	65.0
BHUM 30 - 06G	30	3/4	16	46	41	39.0	63.5
BHUM 30 - 08G	30	1	22	46	41	41.0	65.5
BHUM 32 - 08G	32	1	22	50	46	41.0	66.5
BHUM 32 - 10G	32	1 1/4	28	50	46	45.0	70.5

Hose Female Union
BHUF



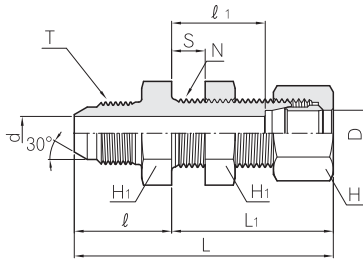
Part No.	Tube O.D. D	(PF) T	d	Width across flat		ℓ	Approx. L
				H	H ₁		
BHUF 08 - 02G	8	1/4	6	17	17	26.0	43.5
BHUF 08 - 03G	8	3/8	6	17	19	27.0	44.5
BHUF 10 - 02G	10	1/4	6	19	17	26.0	44.5
BHUF 10 - 03G	10	3/8	8	19	19	27.0	45.5
BHUF 10 - 04G	10	1/2	8	19	22	31.0	49.5
BHUF 12 - 02G	12	1/4	6	22	19	26.0	44.5
BHUF 12 - 03G	12	3/8	9	22	19	27.0	45.5
BHUF 12 - 04G	12	1/2	10	22	22	31.0	49.5
BHUF 15 - 03G	15	3/8	9	27	24	29.5	49.5
BHUF 15 - 04G	15	1/2	12	27	24	32.5	52.5
BHUF 16 - 03G	16	3/8	9	30	27	29.5	49.5
BHUF 16 - 04G	16	1/2	12	30	27	32.5	52.5
BHUF 18 - 04G	18	1/2	12	32	27	32.0	52.5
BHUF 20 - 06G	20	3/4	16	36	30	35.0	55.5
BHUF 22 - 04G	22	1/2	12	36	32	33.0	54.5
BHUF 22 - 06G	22	3/4	16	36	32	34.0	55.5
BHUF 25 - 06G	25	3/4	16	41	36	34.0	57.5
BHUF 25 - 08G	25	1	20	41	36	36.0	59.5
BHUF 28 - 06G	28	3/4	16	46	41	36.0	60.0
BHUF 28 - 08G	28	1	22	46	41	38.0	62.0
BHUF 30 - 06G	30	3/4	16	46	41	36.0	60.5
BHUF 30 - 08G	30	1	22	46	41	38.0	62.5
BHUF 32 - 08G	32	1	22	50	46	38.0	63.5
BHUF 32 - 10G	32	1 1/4	28	50	46	44.0	69.5
BHUF 38 - 12G	38	1 1/2	32	60	50	45.0	76.5
BHUF 40 - 12G	40	1 1/2	32	60	55	50.0	81.5
BHUF 50 - 16G	50	2	40	75	65	58.0	91.5

All dimensions are in millimeters. Dimensions are for reference only, subject to change.

Tube Fittings

Hose Bulkheadmale Union

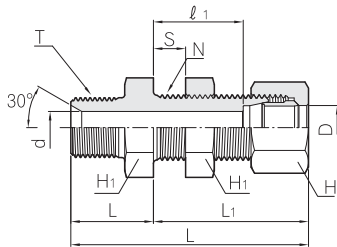
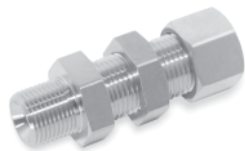
BHBM



Part No.	Tube O.D. D	(PF) T	d	Width across flat		l	l ₁	Approx.		Panel Hole Drill size	Max. Panel thickness S
				H	H ₁			L	L ₁		
BHBM 08 - 02G	8	1/4	6	17	19	23	32	65.5	42.5	14.5	13
BHBM 08 - 03G	8	3/8	6	17	19	25	32	67.5	42.5	14.5	13
BHBM 10 - 02G	10	1/4	6	19	22	24	32	67.5	43.5	16.5	13
BHBM 10 - 03G	10	3/8	8	19	22	26	32	69.5	43.5	16.5	13
BHBM 10 - 04G	10	1/2	8	19	22	28	32	71.5	43.5	16.5	13
BHBM 12 - 02G	12	1/4	6	22	24	24	32	67.5	43.5	18.5	13
BHBM 12 - 03G	12	3/8	9	22	24	26	32	69.5	43.5	18.5	13
BHBM 12 - 04G	12	1/2	10	22	24	28	32	71.5	43.5	18.5	13
BHBM 15 - 03G	15	3/8	9	27	27	26	37	75.5	49.5	22.5	15
BHBM 15 - 04G	15	1/2	12	27	27	28	37	77.5	49.5	22.5	15
BHBM 16 - 03G	16	3/8	9	30	30	28	37	77.5	49.5	24.5	15
BHBM 16 - 04G	16	1/2	12	30	30	30	37	79.5	49.5	24.5	15
BHBM 18 - 04G	18	1/2	12	32	32	30	39	81.5	51.5	26.5	15
BHBM 20 - 06G	20	3/4	16	36	32	32	39	83.5	51.5	28.5	15
BHBM 22 - 04G	22	1/2	12	36	36	31	39	82.5	51.5	30.5	15
BHBM 22 - 06G	22	3/4	16	36	36	33	39	84.5	55.0	30.5	15
BHBM 25 - 06G	25	3/4	16	41	41	33	39	87.5	52.5	35.5	15
BHBM 25 - 08G	25	1	20	41	41	35	39	89.5	52.5	35.5	15
BHBM 28 - 06G	28	3/4	16	46	46	34	41	89.0	55.0	38.5	15
BHBM 28 - 08G	28	1	22	46	46	36	41	91.0	55.0	38.5	15
BHBM 30 - 06G	30	3/4	16	46	46	34	41	89.5	55.5	40.5	15
BHBM 30 - 08G	30	1	22	46	46	36	41	91.5	55.5	40.5	15
BHBM 32 - 08G	32	1	22	50	50	38	43	95.5	57.5	42.5	15
BHBM 32 - 10G	32	1 1/4	28	50	50	42	43	99.5	57.5	42.5	15

Hose Bulkhead Female Union

BHBF

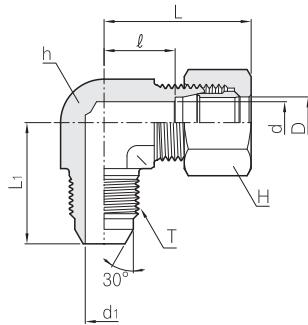


Part No.	Tube O.D. D	(PF) T	d	Width across flat		l	l ₁	Approx.		Panel Hole Drill size	Max Panel thickness S
				H	H ₁			L	L ₁		
BHBF 08 - 02G	8	1/4	6	17	19	21	25.0	63.5	42.5	14.5	13
BHBF 08 - 03G	8	3/8	6	17	19	22	25.0	64.5	42.5	14.5	13
BHBF 10 - 02G	10	1/4	6	19	22	22	25.0	65.5	43.5	16.5	13
BHBF 10 - 03G	10	3/8	8	19	22	23	25.0	66.5	43.5	16.5	13
BHBF 10 - 04G	10	1/2	8	19	22	26	25.0	69.5	43.5	16.5	13
BHBF 12 - 02G	12	1/4	6	22	24	22	25.0	65.5	43.5	18.5	13
BHBF 12 - 03G	12	3/8	9	22	24	23	25.0	66.5	43.5	18.5	13
BHBF 12 - 04G	12	1/2	10	22	24	26	25.0	69.5	43.5	18.5	13
BHBF 15 - 03G	15	3/8	9	27	27	23	29.5	72.5	49.5	22.5	15
BHBF 15 - 04G	15	1/2	12	27	27	26	29.5	75.5	49.5	22.5	15
BHBF 16 - 03G	16	3/8	9	30	30	25	29.5	74.5	49.5	24.5	15
BHBF 16 - 04G	16	1/2	12	30	30	28	29.5	77.5	49.5	24.5	15
BHBF 18 - 04G	18	1/2	12	32	32	28	31.0	79.5	51.5	26.5	15
BHBF 20 - 06G	20	3/4	16	36	32	29	31.0	80.5	51.5	28.5	15
BHBF 22 - 04G	22	1/2	12	36	36	29	31.0	80.5	51.5	30.5	15
BHBF 22 - 06G	22	3/4	16	36	36	30	30.0	81.5	51.5	30.5	15
BHBF 25 - 06G	25	3/4	16	41	41	30	29.0	82.5	52.5	35.5	15
BHBF 25 - 08G	25	1	20	41	41	32	29.0	84.5	52.5	35.5	15
BHBF 28 - 06G	28	3/4	16	46	46	31	31.0	86.0	55.0	38.5	15
BHBF 28 - 08G	28	1	22	46	46	33	31.0	88.0	55.0	38.5	15
BHBF 30 - 06G	30	3/4	16	46	46	31	31.0	86.5	55.5	40.5	15
BHBF 30 - 08G	30	1	22	46	46	33	31.0	88.5	55.5	40.5	15
BHBF 32 - 08G	32	1	22	50	50	35	32.0	92.5	57.5	42.5	15
BHBF 32 - 10G	32	1 1/4	28	50	50	41	32.0	98.5	57.5	42.5	15
BHBF 38 - 12G	38	1 1/2	31	60	55	42	33.0	106.5	64.5	48.5	15
BHBF 40 - 12G	40	1 1/2	32	60	60	44	38.0	113.5	69.5	52.5	15
BHBF 50 - 16G	50	2	40	75	70	53	38.0	124.5	71.5	64.5	15

All dimensions are in millimeters. Dimensions are for reference only, subject to change.

Hose Male Elbow

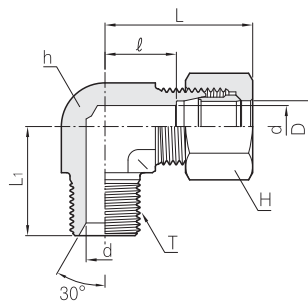
BHLM



Part No.	Tube O.D. D	(PF) T	d	d ₁	Width across flat		ℓ	ℓ ₁	Approx. L
					h ₁	H			
BHLM 08 - 02G	8	1/4	6	6	17	17	16.0	25	33.5
BHLM 08 - 03G	8	3/8	6	9	19	17	17.0	28	34.5
BHLM 10 - 02G	10	1/4	8	6	19	19	17.0	28	35.5
BHLM 10 - 03G	10	3/8	8	9	19	19	17.0	28	35.5
BHLM 10 - 04G	10	1/2	8	12	24	19	22.0	34	40.5
BHLM 12 - 02G	12	1/4	10	6	19	22	17.0	28	35.5
BHLM 12 - 03G	12	3/8	10	9	19	22	17.0	28	35.5
BHLM 12 - 04G	12	1/2	10	12	24	22	22.0	34	40.5
BHLM 15 - 03G	15	3/8	12	9	24	27	21.5	33	41.5
BHLM 15 - 04G	15	1/2	12	12	24	27	21.5	34	41.5
BHLM 16 - 03G	16	3/8	13	9	27	30	24.5	36	44.5
BHLM 16 - 04G	16	1/2	13	12	27	30	24.5	38	44.5
BHLM 18 - 04G	18	1/2	14	12	27	32	24.0	38	44.5
BHLM 20 - 06G	20	3/4	17	16	30	36	25.0	41	45.5
BHLM 22 - 04G	22	1/2	18	12	32	36	25.0	40	46.5
BHLM 22 - 06G	22	3/4	18	16	32	36	25.0	42	46.5
BHLM 25 - 06G	25	3/4	20	16	36	41	26.0	44	49.5
BHLM 25 - 08G	25	1	20	20	36	41	26.0	46	49.5
BHLM 28 - 06G	28	3/4	22	16	41	46	31.0	47	55.0
BHLM 28 - 08G	28	1	22	22	41	46	31.0	49	55.0
BHLM 30 - 06G	30	3/4	25	16	41	46	31.0	47	55.5
BHLM 30 - 08G	30	1	25	22	41	46	31.0	49	55.5
BHLM 32 - 08G	32	1	26	22	46	50	35.0	54	60.5
BHLM 32 - 10G	32	1 1/4	26	28	46	50	35.0	56	60.5

Hose Female Elbow

BHLF



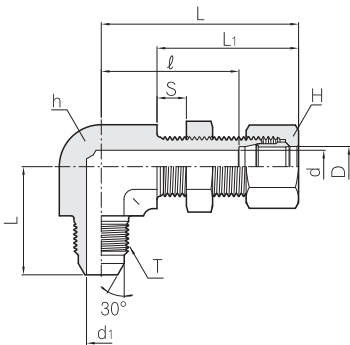
Part No.	Tube O.D. D	(PF) T	d ₁	d	Width across flat		ℓ	ℓ ₁	Approx. L
					H	H ₁			
BHLF 08 - 02G	8	1/4	6	6	17	17	16.0	25	33.5
BHLF 08 - 03G	8	3/8	9	6	17	19	17.0	27	34.5
BHLF 10 - 02G	10	1/4	6	8	19	19	17.0	26	35.5
BHLF 10 - 03G	10	3/8	9	8	19	19	17.0	27	35.5
BHLF 10 - 04G	10	1/2	12	8	19	24	22.0	33	40.5
BHLF 12 - 02G	12	1/4	6	10	22	19	17.0	26	35.5
BHLF 12 - 03G	12	3/8	9	10	22	19	17.0	27	35.5
BHLF 12 - 04G	12	1/2	12	10	22	24	22.0	33	40.5
BHLF 15 - 03G	15	3/8	9	12	27	24	21.5	30	41.5
BHLF 15 - 04G	15	1/2	12	12	27	24	21.5	33	41.5
BHLF 16 - 03G	16	3/8	9	13	30	27	24.5	33	44.5
BHLF 16 - 04G	16	1/2	12	13	30	27	24.5	36	44.5
BHLF 18 - 04G	18	1/2	12	14	32	27	24.0	36	44.5
BHLF 20 - 06G	20	3/4	16	17	36	30	25.0	38	45.5
BHLF 22 - 04G	22	1/2	12	18	36	32	25.0	38	46.5
BHLF 22 - 06G	22	3/4	16	18	36	32	25.0	39	46.5
BHLF 25 - 06G	25	3/4	16	20	41	36	26.0	41	49.5
BHLF 25 - 08G	25	1	20	20	41	36	26.0	43	49.5
BHLF 28 - 06G	28	3/4	16	22	46	41	31.0	44	55.0
BHLF 28 - 08G	28	1	22	22	46	41	31.0	46	55.0
BHLF 30 - 06G	30	3/4	16	25	46	41	31.0	44	55.5
BHLF 30 - 08G	30	1	22	25	46	41	31.0	46	55.5
BHLF 32 - 08G	32	1	22	26	50	46	35.0	51	60.5
BHLF 32 - 10G	32	1 1/4	28	26	50	46	35.0	57	60.5
BHLF 38 - 12G	38	1 1/2	34	32	60	50	38.0	61	69.5
BHLF 40 - 12G	40	1 1/2	34	32	60	55	43.0	62	74.5
BHLF 50 - 16G	50	2	46	40	75	65	50.0	72	83.5

All dimensions are in millimeters. Dimensions are for reference only, subject to change.

Tube Fittings

Hose Bulkhead Male Elbow

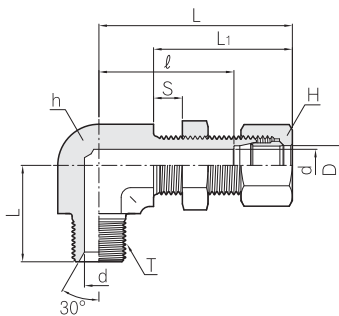
BHBLM



Part No.	Tube O.D. D	(PF) T	d	d ₁	Width across flat			ℓ	ℓ ₁	Approx.		Panel Hole Drill size	Max Panel thickness S
					h	H	H ₁			L	L ₁		
BHBLM 08 - 02G	8	1/4	6	6	19	17	19	39.0	28	56.5	42.5	14.5	13
BHBLM 08 - 03G	8	3/8	6	9	19	17	19	39.0	30	56.5	42.5	14.5	13
BHBLM 10 - 02G	10	1/4	8	6	22	19	22	41.0	28	59.5	43.5	16.5	13
BHBLM 10 - 03G	10	3/8	8	9	22	19	22	41.0	30	59.5	43.5	16.5	13
BHBLM 10 - 04G	10	1/2	8	12	24	19	22	42.0	35	60.5	43.5	16.5	13
BHBLM 12 - 02G	12	1/4	10	6	24	22	24	42.0	31	60.5	43.5	18.5	13
BHBLM 12 - 03G	12	3/8	10	9	24	22	24	42.0	33	60.5	43.5	18.5	13
BHBLM 12 - 04G	12	1/2	10	10	24	22	24	42.0	35	60.5	43.5	18.5	13
BHBLM 15 - 03G	15	3/8	12	9	27	27	27	49.5	36	69.5	49.5	22.5	15
BHBLM 15 - 04G	15	1/2	12	12	27	27	27	49.5	37	69.5	49.5	22.5	15
BHBLM 16 - 03G	16	3/8	13	9	30	30	30	51.5	37	71.5	49.5	24.5	15
BHBLM 16 - 04G	16	1/2	13	12	30	30	30	51.5	38	71.5	49.5	24.5	15
BHBLM 18 - 04G	18	1/2	14	12	32	32	32	55.0	39	75.5	51.5	26.5	15
BHBLM 20 - 06G	20	3/4	16	16	32	36	32	57.0	40	77.5	51.5	28.5	15
BHBLM 22 - 04G	22	1/2	18	12	36	36	36	56.0	40	77.5	51.5	30.5	15
BHBLM 22 - 06G	22	3/4	18	16	36	38	36	66.0	40	77.5	51.5	30.5	15
BHBLM 25 - 06G	25	3/4	20	16	41	41	41	58.0	43	81.5	52.5	35.5	15
BHBLM 25 - 08G	25	1	20	20	41	41	41	58.0	43	81.5	52.5	35.5	15
BHBLM 28 - 06G	28	3/4	22	16	46	46	46	64.0	48	88.0	55.0	38.5	15
BHBLM 28 - 08G	28	1	22	22	46	46	46	64.0	48	88.0	55.0	38.5	15
BHBLM 30 - 06G	30	3/4	25	16	46	46	46	64.0	48	88.5	55.5	40.5	15
BHBLM 30 - 08G	30	1	25	22	46	46	46	64.0	48	88.5	55.5	40.5	15

Hose Bulkhead Female Elbow

BHBLF

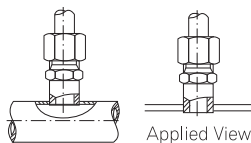
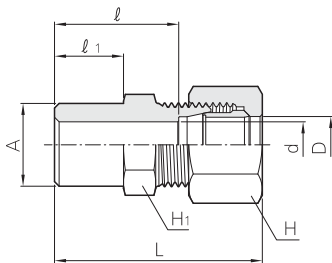
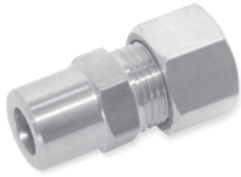


Part No.	Tube O.D. D	(PF) T	d ₁	d	Width across flat			ℓ	ℓ ₁	Approx.		Panel Hole Drill size	Max Panel thickness S
					h	H	H ₁			L	L ₁		
BHBLF 08 - 02G	8	1/4	6	6	19	17	19	39.0	26	56.5	42.5	14.5	13
BHBLF 08 - 03G	8	3/8	9	6	19	17	19	39.0	27	56.5	42.5	14.5	13
BHBLF 10 - 02G	10	1/4	6	8	22	19	22	41.0	28	59.5	43.5	16.5	13
BHBLF 10 - 03G	10	3/8	9	8	22	19	22	41.0	29	59.5	43.5	16.5	13
BHBLF 10 - 04G	10	1/2	12	8	24	19	22	42.0	33	60.5	43.5	16.5	13
BHBLF 12 - 02G	12	1/4	6	10	24	22	24	42.0	30	60.5	43.5	18.5	13
BHBLF 12 - 03G	12	3/8	9	10	24	22	24	42.0	30	60.5	43.5	18.5	13
BHBLF 12 - 04G	12	1/2	10	10	24	22	24	42.0	33	60.5	43.5	18.5	13
BHBLF 15 - 03G	15	3/8	9	12	27	27	27	49.5	33	69.5	49.5	22.5	15
BHBLF 15 - 04G	15	1/2	12	12	27	27	27	49.5	36	69.5	49.5	22.5	15
BHBLF 16 - 03G	16	3/8	9	13	30	30	30	51.5	34	71.5	49.5	24.5	15
BHBLF 16 - 04G	16	1/2	12	13	30	30	30	51.5	37	71.5	49.5	24.5	15
BHBLF 18 - 04G	18	1/2	12	14	32	32	32	55.0	37	75.5	51.5	26.5	15
BHBLF 20 - 06G	20	3/4	16	16	32	36	32	57.0	40	77.5	51.5	28.5	15
BHBLF 22 - 04G	22	1/2	12	18	36	36	36	56.0	40	77.5	51.5	30.5	15
BHBLF 22 - 06G	22	3/4	16	18	36	36	36	56.0	40	77.5	51.5	30.5	15
BHBLF 25 - 06G	25	3/4	16	20	41	41	41	58.0	43	81.5	52.5	35.5	15
BHBLF 25 - 08G	25	1	20	20	41	41	41	58.0	43	81.5	52.5	35.5	15
BHBLF 28 - 06G	28	3/4	16	22	46	46	46	64.0	48	88.0	55.0	38.5	15
BHBLF 28 - 08G	28	1	22	22	46	46	46	64.0	48	88.0	55.0	38.5	15
BHBLF 30 - 06G	30	3/4	16	25	46	46	46	64.0	48	88.5	55.5	40.5	15
BHBLF 30 - 08G	30	1	22	25	46	46	46	64.0	48	88.5	55.5	40.5	15

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Welding Connector

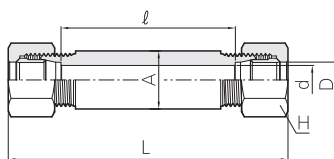
BCW



Part No.	Tube O.D.		A	d	Width across flat		ℓ	ℓ ₁	Approx. L
	D				H	H ₁			
BCW - 06	6		12	4	14	14	22.0	11	39.5
BCW - 08	8		14	6	17	17	27.0	15	44.5
BCW - 10	10		16	8	19	17	27.0	15	45.5
BCW - 12	12		18	10	22	19	27.0	15	45.5
BCW - 15	15		21	12	27	24	32.5	18	52.5
BCW - 16	16		22	13	30	27	36.5	22	56.5
BCW - 18	18		25	14	32	27	36.0	22	56.5
BCW - 20	20		28	17	36	30	38.0	22	58.8
BCW - 22	22		28	18	36	32	37.0	22	58.5
BCW - 25	25		33	20	41	36	41.0	26	64.5
BCW - 28	28		36	22	46	41	45.0	28	69.0
BCW - 30	30		39	25	46	41	45.0	28	69.5
BCW - 32	32		40	26	50	46	45.0	28	70.5
BCW - 35	35		43	28	55	46	45.0	28	73.5
BCW - 38	38		45	32	60	50	46.0	28	77.5
BCW - 40	40		46	32	60	55	53.0	30	84.5
BCW - 50	50		57	40	75	65	58.0	30	91.5
BCW - 81	1/8	10.5	16	8	19	17	27.0	15	45.5
BCW - 82	1/4	13.8	19	11	24	22	32.5	18	52.0
BCW - 83	3/8	17.3	24	14	32	27	36.0	22	56.5
BCW - 84	1/2	21.7	28	18	36	32	37.0	22	58.5
BCW - 85	3/4	27.2	33	22	46	41	42.0	25	66.0
BCW - 86	1	34.0	40	28	55	46	45.0	28	73.5
BCW - 87	1 1/4	42.7	47	34	65	60	43.0	28	85.5
BCW - 88	1 1/2	48.6	55	40	75	65	58.0	30	91.5

Welding Bulkhead Union

BBUW

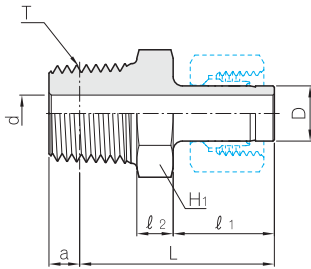


Part No.	Tube O.D.		d	A	Width across flat H	ℓ	Approx. L
	D						
BBUW - 06	6		4	16	14	60	95
BBUW - 08	8		6	16	17	60	95
BBUW - 10	10		8	19	19	60	97
BBUW - 12	12		10	20	22	60	97
BBUW - 15	15		12	25	27	63	103
BBUW - 16	16		13	28	30	63	103
BBUW - 18	18		14	28	32	62	103
BBUW - 20	20		17	32	36	62	103
BBUW - 22	22		18	32	36	60	103
BBUW - 25	25		20	38	41	58	105
BBUW - 28	28		22	39	46	62	110
BBUW - 30	30		25	46	46	62	111
BBUW - 32	32		26	46	50	60	111
BBUW - 35	35		28	46	55	60	117
BBUW - 38	38		32	55	60	58	121
BBUW - 40	40		32	55	60	66	129
BBUW - 50	50		40	65	75	66	133
BBUW - 81	1/8	10.5	8	19	19	60	97
BBUW - 82	1/4	13.8	11	22	24	63	102
BBUW - 83	3/8	17.3	14	28	32	62	103
BBUW - 84	1/2	21.7	18	32	36	60	103
BBUW - 85	3/4	27.2	22	39	46	62	110
BBUW - 86	1	34.0	28	46	55	60	117
BBUW - 87	1 1/4	42.7	34	58	65	66	131
BBUW - 88	1 1/2	48.6	40	65	75	66	133

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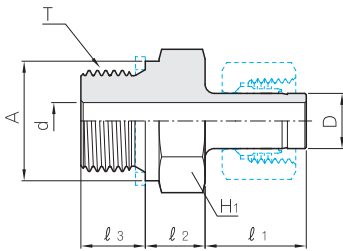
Tube Fittings

Adapter BA-R

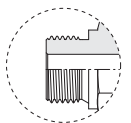


Part No.	Tube O.D.		(PT) T	d	Basic Gauge length a	Width across flat H	ℓ	ℓ ₁	Approx. L
	D								
BA 06 - 01R	6		1/8	3	3.97	12	6	20	32.0
BA 08 - 02R	8		1/4	5	6.01	14	7	20	35.0
BA 10 - 02R	10		1/4	6	6.01	14	7	21	36.0
BA 10 - 03R	10		3/8	6	6.35	19	7	21	36.5
BA 12 - 02R	12		1/4	7	6.01	14	7	22	37.0
BA 12 - 03R	12		3/8	8	6.35	19	7	22	37.5
BA 15 - 03R	15		3/8	8	6.35	19	8	24	40.5
BA 15 - 04R	15		1/2	10	8.16	22	8	24	43.0
BA 16 - 04R	16		1/2	11	8.16	22	8	24	43.0
BA 18 - 04R	18		1/2	12	8.16	22	8	24	43.0
BA 20 - 06R	20		3/4	14	9.53	27	10	25	46.5
BA 22 - 06R	22		3/4	14	9.53	27	10	26	47.5
BA 25 - 06R	25		3/4	16	9.53	27	10	28	49.5
BA 25 - 08R	25		1	17	10.39	36	11	28	52.5
BA 28 - 08R	28		1	18	10.39	36	11	28	52.5
BA 30 - 08R	30		1	20	10.39	36	11	29	53.5
BA 30 - 10R	30		1 1/4	20	12.70	46	12	29	55.0
BA 32 - 10R	32		1 1/4	22	12.70	46	12	30	56.0
BA 38 - 12R	38		1 1/2	26	12.70	50	14	36	64.5
BA 40 - 12R	40		1 1/2	28	12.70	50	14	36	64.0
BA 50 - 16R	50		2	34	15.88	65	20	37	72.0
BA 81 - 02R	1/8	10.5	1/4	6	6.01	14	7	21	36.0
BA 82 - 03R	1/4	13.8	3/8	9	6.35	19	8	22	38.5
BA 83 - 04R	3/8	17.3	1/2	11	8.16	22	8	24	43.0
BA 84 - 06R	1/2	21.7	3/4	14	9.53	27	10	26	47.5
BA 85 - 08R	3/4	27.2	1	18	10.39	36	11	28	52.5
BA 86 - 10R	1	34.0	1 1/4	23	12.70	46	12	33	59.0
BA 87 - 12R	1 1/4	42.7	1 1/2	29	12.70	50	17	36	67.0
BA 88 - 16R	1 1/2	48.6	2	33	15.88	65	20	37	72.0

Adapter BA-G



Male stud form B
sealing by copper
gasket.

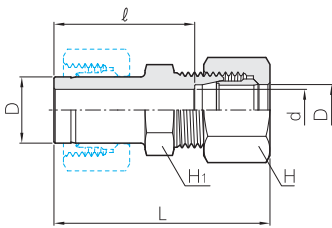


Male stud form A
sealing by o-ring
and bonded seal

Part No.	Tube O.D.		(PF) T	d	Width across flat H	A	Approx.		
	D						ℓ ₁	ℓ ₂	ℓ ₃
BA 06 - 01G	6		1/8	3	14	14.0	20	8	8
BA 08 - 02G	8		1/4	5	19	18.0	20	9	12
BA 10 - 02G	10		1/4	6	19	18.0	21	9	12
BA 10 - 03G	10		3/8	6	22	21.5	21	10	12
BA 12 - 02G	12		1/4	7	19	18.0	22	9	12
BA 12 - 03G	12		3/8	8	22	21.5	22	10	12
BA 15 - 03G	15		3/8	8	22	21.5	24	10	12
BA 15 - 04G	15		1/2	10	27	25.5	24	13	14
BA 16 - 04G	16		1/2	11	27	25.5	24	13	14
BA 18 - 04G	18		1/2	12	27	25.5	24	13	14
BA 20 - 06G	20		3/4	14	32	31.5	25	16	16
BA 22 - 06G	22		3/4	14	32	31.5	26	16	16
BA 25 - 06G	25		3/4	16	32	31.5	28	16	16
BA 25 - 08G	25		1	17	41	38.0	28	18	18
BA 28 - 08G	28		1	18	41	38.0	28	18	18
BA 30 - 08G	30		1	20	41	38.0	29	21	18
BA 30 - 10G	30		1 1/4	20	50	48.5	29	21	20
BA 32 - 10G	32		1 1/4	22	50	48.5	30	21	20
BA 38 - 12G	38		1 1/2	26	55	53.5	36	21	21
BA 40 - 12G	40		1 1/2	28	55	53.5	36	21	21
BA 50 - 16G	50		2	34	70	66.0	37	28	24
BA 81 - 02G	1/8	10.5	1/4	6	19	18.0	21	9	12
BA 82 - 03G	1/4	13.8	3/8	9	22	21.5	22	10	12
BA 83 - 04G	3/8	17.3	1/2	11	27	25.5	24	13	14
BA 84 - 06G	1/2	21.7	3/4	14	32	31.5	26	16	16
BA 85 - 08G	3/4	27.2	1	18	41	38.0	28	18	18
BA 86 - 10G	1	34.0	1 1/4	23	50	48.5	33	21	20
BA 87 - 12G	1 1/4	42.7	1 1/2	29	55	53.5	36	23	21
BA 88 - 16G	1 1/2	48.6	2	33	70	66.0	37	28	24

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Reducer
BR

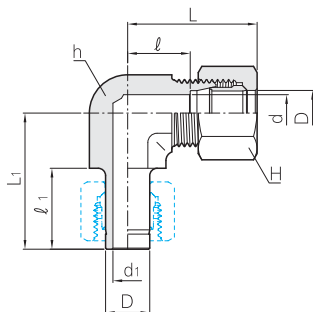


Applied view



Part No.	D ₁	Tube O.D.		d	Width across flat		ℓ	Approx. L	
		D			H	H ₁		L ₁	L
BR 08 X 06	8		6	4	14	14	32.0		49.5
BR 10 X 06	10		6	4	14	14	33.0		50.5
BR 10 X 08	10		8	6	17	17	33.0		50.5
BR 12 X 06	12		6	4	14	14	34.0		51.5
BR 12 X 08	12		8	6	17	17	34.0		51.5
BR 12 X 10	12		10	8	19	17	34.0		52.5
BR 15 X 08	15		8	6	17	17	36.0		53.5
BR 15 X 10	15		10	8	19	17	36.0		54.5
BR 16 X 06	16		6	4	14	17	36.0		53.5
BR 16 X 10	16		10	8	19	17	36.0		54.5
BR 16 X 12	16		12	10	22	19	36.0		54.5
BR 18 X 10	18		10	8	19	19	37.0		55.5
BR 18 X 15	18		15	12	27	24	36.5		57.5
BR 20 X 06	20		6	4	14	22	38.0		55.5
BR 20 X 12	20		12	10	22	22	38.0		56.5
BR 20 X 16	20		16	13	30	27	39.5		59.5
BR 22 X 15	22		15	12	27	24	40.5		60.5
BR 22 X 18	22		18	14	32	27	40.0		60.5
BR 25 X 16	25		16	13	30	27	42.5		62.5
BR 25 X 20	25		20	17	36	30	44.0		64.5
BR 28 X 18	28		18	14	32	30	44.0		64.5
BR 28 X 22	28		22	18	36	32	43.0		64.5
BR 30 X 20	30		20	17	36	32	45.0		65.5
BR 30 X 25	30		25	20	41	36	44.0		67.5
BR 32 X 25	32		25	20	41	36	45.0		68.5
BR 35 X 22	35		22	18	36	36	48.0		70.5
BR 35 X 28	35		28	22	46	41	50.0		74.0
BR 38 X 25	38		25	20	41	41	51.0		74.5
BR 35 X 30	38		30	25	46	41	53.0		77.5
BR 82 X 81	1/4	13.8	1/8	10.5	8	19	17	34.0	52.5
BR 83 X 81	3/8	17.3	1/8	10.5	8	19	19	37.0	55.5
BR 83 X 82	3/8	17.3	1/4	13.8	11	24	22	38.5	58.0
BR 84 X 82	1/2	21.3	1/4	13.8	11	24	24	40.5	60.0
BR 84 X 83	1/2	21.7	3/8	17.3	14	32	27	40.0	60.5
BR 85 X 83	3/4	27.2	3/8	17.3	14	32	30	44.0	64.5
BR 85 X 84	3/4	27.2	1/2	21.7	18	36	32	43.0	64.5
BR 86 X 84	1	34.0	1/2	21.7	18	36	36	49.0	70.5
BR 86 X 85	1	34.0	3/4	27.2	22	46	41	50.0	74.0

Adjustable Elbow
BLA



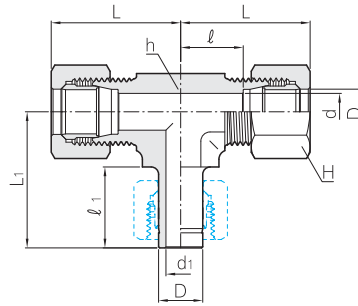
Part No.	Tube O.D. D	d	d ₁	Width across flat		ℓ	ℓ ₁	Approx.	
				h	H			L ₁	L
BLA - 10	10	8	6	17	19	16.0	21	35	34.5
BLA - 12	12	10	8	19	22	17.0	22	37	35.5
BLA - 15	15	12	10		27	21.5	24	40	44.5
BLA - 16	16	13	11		30	24.5	24	43	44.5
BLA - 18	18	14	12	27	32	24.0	24	43	44.5
BLA - 20	20	17	14	30	36	25.0	25	45	45.5
BLA - 22	22	18	14	32	36	25.0	26	46	46.5
BLA - 25	25	20	17	36	41	26.0	28	49	49.5
BLA - 28	28	22	18	41	46	31.0	28	53	55.0
BLA - 30	30	25	20	41	46	31.0	29	54	55.5
BLA - 32	32	26	22	46	50	39.0	30	66	64.5
BLA - 38	38	32	26	50	60	38.0	36	72	69.5

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Tube Fittings

Adjustable Branch Tee

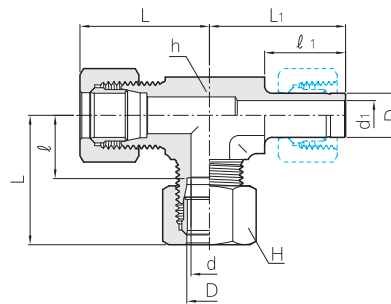
BBTA



Part No.	Tube O.D. D	d	d ₁	Width across flat		l	l ₁	Approx.	
				H	H ₁			L	L ₁
BBTA - 10	10	8	6	19	17	16.0	21	34.5	35
BBTA - 12	12	10	8	22	19	17.0	22	35.5	37
BBTA - 15	15	12	10	27	24	24.5	24	44.5	43
BBTA - 16	16	13	11	30	27	24.5	24	44.5	43
BBTA - 18	18	14	12	32	27	24.0	24	44.5	43
BBTA - 20	20	17	14	36	30	25.0	25	45.5	45
BBTA - 22	22	18	14	36	32	25.0	26	46.5	46
BBTA - 25	25	20	17	41	36	26.0	28	49.5	49

Adjustable Run Tee

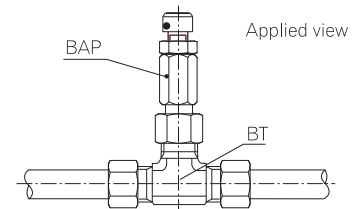
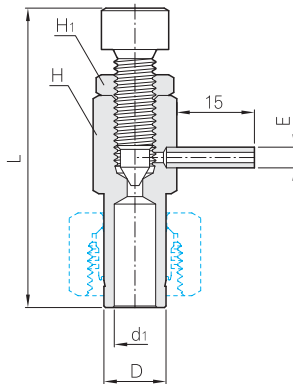
BRTA



Part No.	Tube O.D. D	d	d ₁	Width across flat		l	l ₁	Approx.	
				h	H			L	L ₁
BRTA - 10	10	8	6	17	19	16.0	21	34.5	35
BRTA - 12	12	10	8	19	22	17.0	22	35.5	37
BRTA - 15	15	12	10	24	27	24.5	24	44.5	43
BRTA - 16	16	13	11	27	30	24.5	24	44.5	43
BRTA - 18	18	14	12	27	32	24.0	24	44.5	43
BRTA - 20	20	17	14	30	36	25.0	25	45.5	45
BRTA - 22	22	18	14	32	36	25.0	26	46.5	46
BRTA - 25	25	20	17	36	41	26.0	28	49.5	49

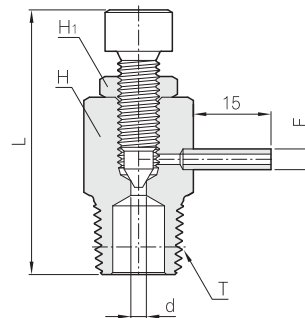
All dimensions are in millimeters. Dimensions are for reference only, subject to change.

Air Purge Valve BAP - 1



Part No.	D	E	d	Width across flat		L	Ball
				H	H ₁		
BAP - 06	6	4	3	14	13	56	7/32
BAP - 08	8	4	3	14	13	56	7/32
BAP - 10	10	4	3	14	13	57	7/32
BAP - 12	12	4	3	14	13	58	7/32
BAP - 15	15	6	4	27	19	74	5/16
BAP - 16	16	6	4	27	19	74	5/16
BAP - 18	18	6	4	27	19	74	5/16
BAP - 20	20	6	4	27	19	75	5/16
BAP - 22	22	6	4	27	19	76	5/16
BAP - 25	25	6	4	27	19	78	5/16
BAP - 28	28	6	4	30	19	78	5/16
BAP - 81	10.5	4	3	14	13	57	7/32
BAP - 82	13.8	6	4	27	19	72	5/16
BAP - 83	17.3	6	4	27	19	74	5/16
BAP - 84	21.7	6	4	27	19	76	5/16
BAP - 85	27.2	6	4	30	19	79	5/16

Air Purge Valve BAP - 2



Part No.	(PT) T	D	d	Width across flat		L	Ball
				H	H ₁		
BAP - 01R	1/8	4	3	14	13	51	7/32
BAP - 02R	1/4	4	3	14	13	53	7/32
BAP - 03R	3/8	6	4	19	13	54	7/32
BAP - 04R	1/2	6	4	27	19	69	5/16

All dimensions are in millimeters. Dimensions are for reference only, subject to change.

Tube Fittings

Material Comparison List

Material	Chemical Compositions					Mechanical Properties			
	C%	Si%	Mn%	P%	S%	Tensile Strength Kgf/mm ²	Yield Point Kgf/mm ²	Elongation %	Hardness HB
JIS G4051 S45C	0.42 ~ 0.48	0.15 ~ 0.45	0.60 ~ 0.90	0.030 MAX.	0.035 MAX.	58(MIN.)	35(MIN.)	20(MIN.)	167 ~ 229 Normalizing
AISI G1045& SAE 1045	0.43 ~ 0.50	0.10 ~ 0.20	0.60 ~ 0.90	0.040 MAX.	0.050 MAX.	56	49	15	163
DIN 1652 C45	0.42 ~ 0.50	0.15 ~ 0.35	0.50 ~ 0.80	0.045 MAX.	0.045 MAX.	60(MIN)	34(MIN)	18(MIN)	206(MIN.) Normalizing

Products from hexagon bars are cold drawn, while forged ones are forged.

Applicable Tube List : Selection from those listed below is recommended.

Thickness	Basic dimension	Tolerance	0.5	1.0	1.5	2.0	2.5	3.0	3.3	3.5	4.0	4.5	5.0	5.5	6.0	7.0	8.0	9.0	
			±0.1	±0.15	±0.2	±0.2	±0.25	±0.3	±0.33	±0.35	±0.4	±0.45	±0.5	±0.55	±0.6	±0.7			
Outer dia. of tube																			
Basic dimension	Tolerance																		
4	±0.1		○	○															
6				○	○														
8				○	○														
10				○	○	○													
12				○	○		○												
15					○		○												
16					○	○		○											
18							○		○										
20						○	○			○									
22						○			○		○								
25								○				○							
28		±0.15					○			○			○						
30							○				○			○					
35									○		○				○				
38							○				○	○				○			
42	±0.2					○				○			○				○		
50								○			○			○				○	

Remarks 1. The area enclosed by thick line indicates the specified range of tube thickness against the outer diameters.(JOHS - 102 - 1964)

2. Without for some particular reasons, it is recommended to use thickness indicated by ○ mark.

1) Japanese standards

Relevant standards		for JOHS hydraulic line service		for JIS B2351 bite type fitting		for JIS G3455 carbon steel pipes for high pressure service	
Quality characteristic		OST · 1	OST · 2	STPS · 1	STPS · 2	STS · 35	STS · 38
Chemical composition (%)	C	<0.20	0.08~0.18	<0.20	0.08~0.18	0.08~0.18	<0.25
	Si	<0.035	0.10~0.35	<0.035	0.10~0.35	0.10~0.35	0.10~0.35
	Mn	0.25~0.60	0.30~0.60	0.25~0.60	0.30~0.60	0.30~0.60	0.30~0.90
	P	<0.040	<0.035	<0.040	<0.035	<0.035	<0.035
	S	<0.040	<0.035	<0.040	<0.035	<0.035	<0.035
	Cu		<0.20		<0.20	<0.20	<0.20
Mechanical property	Tensile strength (kg/mm ²)	<45	<45	<45	<45	<35	<38
	Yield point (kg/mm ²)	>18	>20	>18	>18	>18	>22
	Elongation (%)	>35	>35	>30	>30	>35	>30
	Hardness						
	Bending test	4D x 180°	4D x 180°	4D x 180°	4D x 180°	6D x 90°	6D x 90°
	Flattening test					>20 $H = \frac{(1+e)t}{e+t/D}$	>20 $H = \frac{(1+e)t}{e+t/D}$
Flaring test	1.2 x D	1.2 x D					
Dimensional tolerance	Outside diameter (mm)	$\pm 0.10 \leq 22$	$\pm 0.10 \leq 22$	$\pm 0.10 \leq 25$	$\pm 0.10 \leq 25$	$\pm 0.8\%$, but minimum value is 0.3mm	$\pm 0.8\%$, but minimum value is 0.3mm
		28~35 ± 0.15	28~35 ± 0.15	30~38 ± 0.15	30~38 ± 0.15		
	42~50 ± 0.20	42~50 ± 0.20					
	Wall thickness (mm)	0.5 $\pm 20\%$	0.5 $\pm 20\%$	1.0 ± 0.15	1.0 ± 0.15	For smaller than 2mm ± 0.20 mm For over 2mm $\pm 10\%$	For smaller than 2mm ± 0.20 mm For over 2mm $\pm 10\%$
Length (mm)	≤ 6000	≤ 6000	≤ 6000	≤ 6000	greater than specified length	greater than specified length	
	≥ 6000	≥ 6000	≥ 6000	≥ 6000			
Inspection and test	Eddy current flaw detection	O	O	O	O	O	O
	Water pressure test (kg/cm ²)	50	50	50	50	P=200S t/D	P=200S t/D

Note : In place of the water pressure test, the eddy current test shall be conducted and the result shall be equally guaranteed.

Tube Fittings

2) Foreign Standards

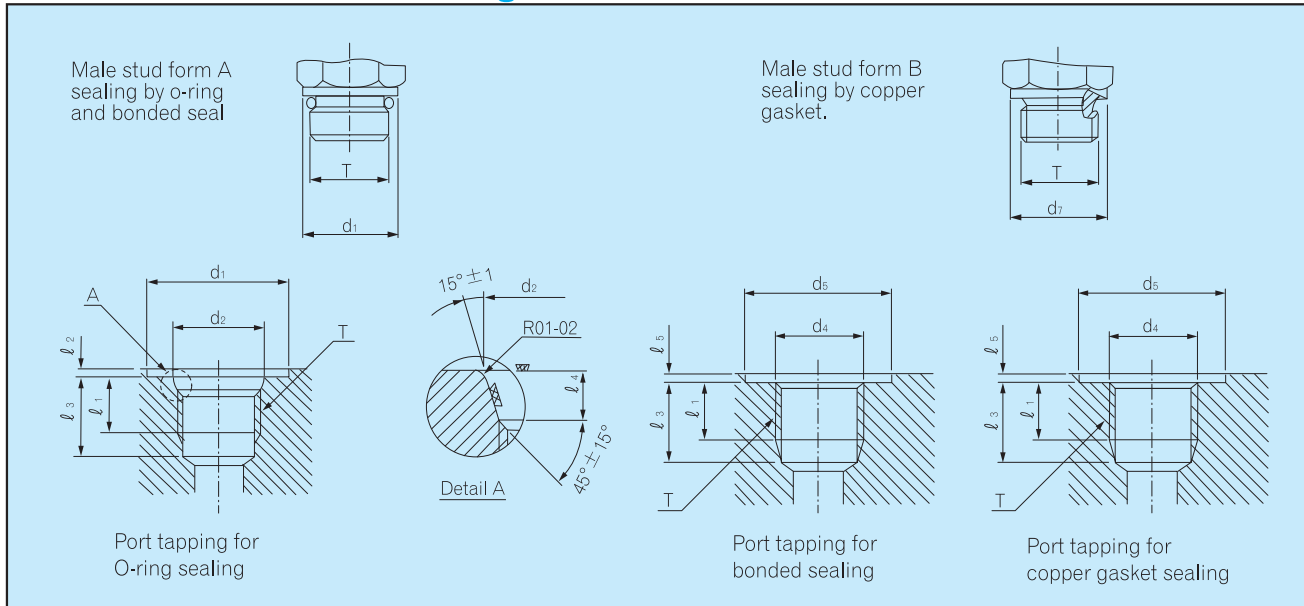
	SAE J524b	AMS 5050F(E)	JIC APPENDIX-D	ANSI(NFPA) SMLS	DIN 2391
C	<0.18	<0.15	0.08~0.18	<0.18	0.10
Si					
Mn	0.30~0.60	0.30~0.60	0.30~0.60	0.60~0.60	
P	<0.040	<0.040	<0.050	<0.040	
S	<0.050	<0.050	<0.055	<0.050	
Cu					
Tensile strength (kg/mm ²)	>31.6		<38.7	<38.7	35~45
Yield point (kg/mm ²)	>17.6			>17.6	>20.0
Elongation (%)	>35	OD≥12.7>32 OD>12.7>35	>35	>35	>25.0
Hardness	<65		<65	<65	
Flattening test	H = 3 x t		H = 3 x t	H = 3 x t	
Flaring test	1.25 x D	t<7% x D 35% t>7% x D 45%	1.30 x D	1.30 x D	
Development test				○	
Lengthwise pressure test					
	≤ 25.4 ± 0.102		6.35~12.7 ± 0.076	≤ 12.7 ± 0.076	<10.00 ± 0.10
Outside diameter (mm)	OVER 25.4~ 38.1±0.152	AMS2253	OVER 12.7~ 38.1±0.127	OVER 12.7~ 38.1±0.127	11.00~30.0 ± 0.08
	OVER 38.1~ 50.8±0.203		OVER 38.1~ 88.9±0.254	OVER 38.1~ 88.9±0.254	32~40 ± 0.15
Inside diameter	± 15%	AMS2253	6.35~12.7 OVER 12.7~ 38.1±0.127 OVER 38.1~ 88.9±0.254	≤ 12.7 OVER 12.7~ 38.1±0.127 OVER 38.1~ 88.9±0.254	
Eddy current flaw detection	○			○	○
Water pressure test (kg/cm ²)					

SAE : Society of Automotive Engineers.
ANSI : American National Standards Institute.

AMS : Aerospace Material Specification.
DIN : German Industry Standards

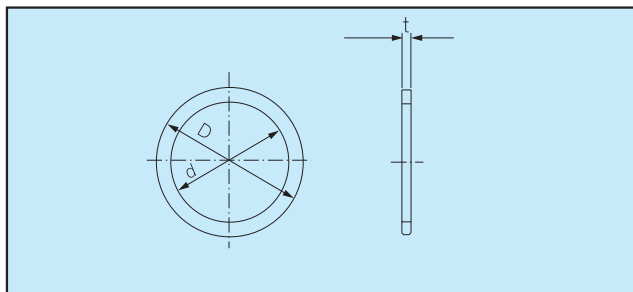
JIC : The Joint Industrial Congress (JIC Hydraulic STD.)

Male Stud Form and Sealing



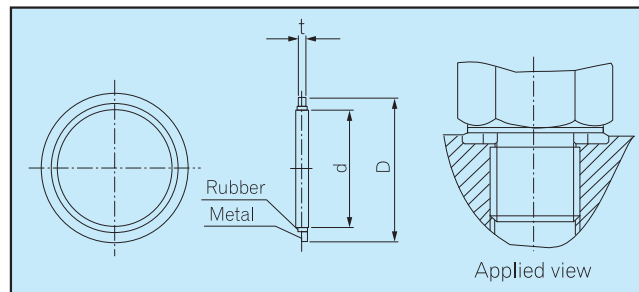
T	d ₁	d ₂ ^{+0.1} ₀	d ₃ ^{+0.3} ₀	Max d ₄	d ₅ ^{+0.3} ₀	d ₆	d ₇	Min l ₁	Max l ₂	Min l ₃	l ₄ ^{+0.4} ₀	l ₁₅	Suitable Seal		
													O - Ring	Bonded Seal	Copper Gasket
PF 1/8	18	11.6	17.4	9.7	18.2	14	14.0	10	1.0	15	2.0	1	P 8	KP-C-01	KP-A-01
PF 1/4	24	15.6	20.9	13.1	22.2	19	18.0	14	1.5	20	2.5	1	P11	KP-C-02	KP-A-03
PF 3/8	28	18.6	24.4	16.6	26.2	22	21.5	14	2.0	20	2.5	1	P14	KP-C-03	KP-A-05
PF 1/2	34	22.6	29.4	20.9	32.2	27	25.5	17	2.5	25	2.5	1	P18	KP-C-04	KP-A-07
PF 3/4	45	29.8	34.9	26.4	38.2	36	31.5	19	2.5	27	3.5	1	P24	KP-C-05	KP-A-11
PF 1	51	35.8	41.9	33.2	42.3	41	38.0	22	2.5	31	3.5	1	P29	KP-C-06	KP-A-16
PF 1 1/4	62	44.8	50.9	41.9	53.3	50	48.5	24	2.5	33	3.5	1	P38	KP-C-07	KP-A-20
PF 1 1/2	68	50.8	57.4	47.8	60.3	55	53.5	25	2.5	34	3.5	1	P44	KP-C-08	KP-A-23
PF 2	76	67.2	69.4	59.6	72.3	75	66.0	29	2.5	38	3.5	1	P56	KP-C-09	KP-A-28

Copper Gasket



Part No.	Male Thread	d	D	t
KP-A-01	PF 1/8	10	16.0	2
KP-A-03	PF 1/4	14	19.5	2
KP-A-05	PF 3/8	17	24.0	2
KP-A-07	PF 1/2	22	29.0	2
KP-A-11	PF 3/4	27	34.5	2
KP-A-16	PF 1	34	42.0	2
KP-A-20	PF 1 1/4	43	53.0	2
KP-A-23	PF 1 1/2	49	60.0	2
KP-A-28	PF 2	61	72.0	2

Bonded Seal



Part No.	Male Thread	d	D	t
KP-C-01	PF 1/8	9.9	17.0	2.0
KP-C-02	PF 1/4	13.3	20.5	2.0
KP-C-03	PF 3/8	16.8	24.0	2.0
KP-C-04	PF 1/2	21.1	29.0	2.0
KP-C-05	PF 3/4	26.6	34.5	2.0
KP-C-06	PF 1	33.4	41.5	2.3
KP-C-07	PF 1 1/4	42.1	50.5	2.3
KP-C-08	PF 1 1/2	48.0	57.0	2.3
KP-C-09	PF 2	59.8	69.0	2.3



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