

# FLUID CONVEYING PRODUCTS

## Technical Guide



# ABOUT US

Established in 1974 as a single bearing shop in Durban, South Africa; BMG's aggressive growth strategy has included acquisitions, supplemented by a steady organic growth discipline. BMG attracts best-of-breed talent resulting in technical expertise that differentiates BMG in the industry. Staff are truly part of the BMG family and its success.

BMG boasts an accredited in-house technical and commercial training academy which fosters a culture of staff development and career advancement; it's all about sustainability.

The net result, is a company that reliably supplies and supports 70 000 customers in 15 countries with the widest range of industrial engineered products and expert services in Africa via 105 branches.

BMG is positioned to deliver bespoke 360 degree solutions to its customers, and subsequently return on investment to its investors and shareholders. BMG plays a pivotal role in supporting the productivity and production targets of all Industrial, Manufacturing, Mining and Agricultural sectors of the economies in the countries it serves. With an enviable reputation as Africa's largest distributor, manufacturer and service provider of the highest quality engineering consumables and components; including

- Bearings & Seals
- Power Transmission Components
- Drives, Motors and Controllers
- Hydraulics, Pneumatics and Filtration
- Heavy and Light Duty Materials Handling
- Valves and Lubrication
- Fasteners, Gaskets and Tools

BMG is a level 4 BEE contributor with ISO 9001 Quality Assurance certification. Health and safety of its employees and customers is a paramount focus and the company adheres to ISO 45001. BMG is also committed to environmental care and sustainability and strictly follows the ISO 14001 charter.

As a key contributor to the Invicta Holdings stable, BMG has played a major part in Invicta's unique achievement of being rated in South Africa's Top 100 Companies for 21 consecutive years.



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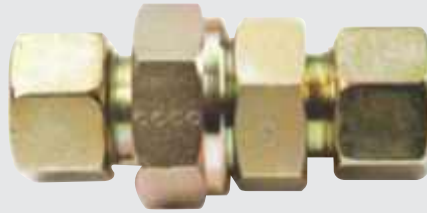
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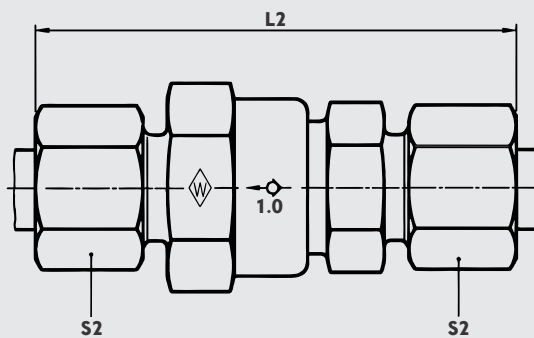
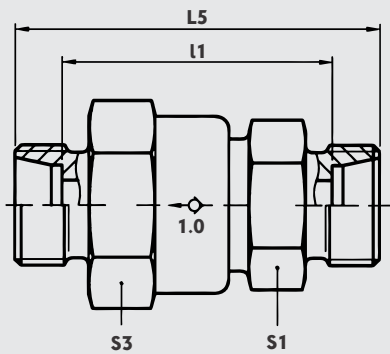


# CHECK VALVES

## In-line Check Valves - DIN 2353 Connection Type RHD - Equal Check Valves



Series	Bar	Tube	Part No	100 pcs kg par	L <sub>s</sub>	L <sub>i</sub>	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	Outlet Sage Correspondent
L	400 (5801)	6	RHD6L	12.0	52	38	22	14	27	4.0
		8	RHD8L	12.5	52	38	22	17	27	6.0
		10	RHD10L	11.5	52	38	22	19	27	7.5
		12	RHD12L	12.5	53	39	22	22	27	7.5
		15	RHD15L	18.5	58	44	27	27	32	11.0
		18	RHD18L	23.0	63	48	27	32	32	11.0
	250 (3626)	22	RHD22L	51.1	75	60	41	36	46	18.5
		28	RHD28L	57.0	81	66	41	41	46	18.5
		35	RHD35L	130.5	92	71	60	50	70	29.0
		42	RHD42L	123.4	87	65	60	60	70	29.0
S	400 (5801)	6	RHD6S	13.0	56	42	22	17	27	4.0
		8	RHD8S	12.0	52	38	22	19	27	5.0
		10	RHD10S	13.0	54	39	22	22	27	7.0
		12	RHD12S	14.0	55	40	22	24	27	7.5
		14	RHD14S	18.5	62	46	27	27	32	10.0
		16	RHD16S	22.0	65	48	27	30	32	11.0
		20	RHD20S	66.2	78	57	41	36	46	16.0
		25	RHD25S	53.0	81	57	41	46	46	18.5
	250 (3626)	30	RHD30S	81.0	91	64	50	50	55	24.0
		38	RHD38S	136.8	99	67	60	60	70	29.0

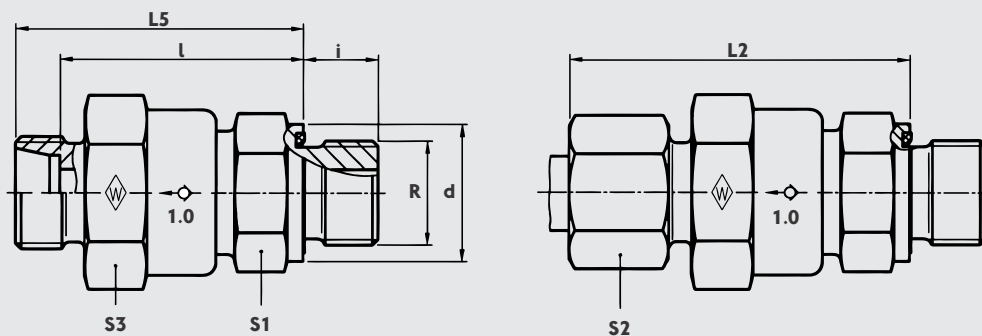


# IN-LINE - DIN 2353 CONNECTION

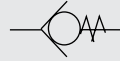
## Type RHV - Male Stud Check Valves (Flow from male stud end)



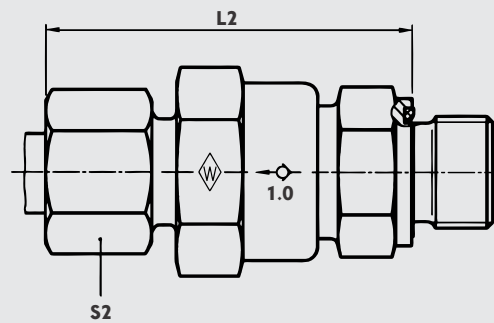
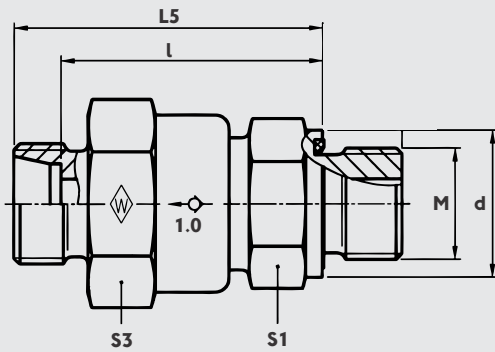
Bar	Tube	G	Part No	100 pcs kg par	d	L <sub>2</sub>	L <sub>5</sub>	l	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	Outlet Sage Correspondent
400 (5801) L	6	1/8 A	RHV6LR-ED	12.0	13.9	50.5	43	36	22	14	27	4.0
	8	1/4 A	RHV8LR-ED	12.0	18.9	50.5	43	36	22	17	27	6.0
	10	1/4 A	RHV10LR-ED	11.5	18.9	48.5	41	34	22	19	27	6.0
	12	3/8 A	RHV12LR-ED	14.0	21.9	53.5	46	39	22	22	27	7.5
	15	1/2 A	RHV15LR-ED	19.0	26.9	56	48	41	27	27	32	11.0
	18	1/2 A	RHV18LR-ED	23.0	26.9	61.5	53	45.5	27	32	32	11.0
250 (3626) L	22	3/4 A	RHV22LR-ED	47.0	31.9	69.5	61	53.5	41	36	46	18.0
	28	1 A	RHV28LR-ED	52.5	39.9	77	68	60.5	41	41	46	20.0
	35	1/4 A	RHV35LR-ED	137.0	49.9	88.5	77.5	67	60	50	70	29.0
	42	1/2 A	RHV42LR-ED	140.0	54.9	87.5	75.5	64.5	60	60	70	29.0
400 (5801) S	6	1/4 A	RHV6LR-ED	13.0	18.9	52.5	45	38	22	17	27	4.0
	8	1/4 A	RHV8LR-ED	12.0	18.9	50.5	43	36	22	19	27	5.0
	10	3/8 A	RHV10LR-ED	13.5	21.9	53.5	45	37.5	22	22	27	7.5
	12	3/8 A	RHV12LR-ED	14.5	21.9	55.5	47	39.5	22	24	27	7.5
	14	1/2 A	RHV14LR-ED	19.5	26.9	59.5	50	42	27	27	32	10.0
	16	1/2 A	RHV16LR-ED	23.0	26.9	62.5	53	44.5	27	30	32	11.0
	20	3/4 A	RHV20LR-ED	59.5	31.9	74	63	52.5	41	36	46	16.0
	25	1 A	RHV25LR-ED	54.0	39.9	77	65	53	41	46	46	20.0
250 (3626) S	30	1/4 A	RHV30LR-ED	86.0	49.9	87	74	60.5	50	50	55	24.0
	38	1/2 A	RHV38LR-ED	144.1	54.9	96	81.5	65.5	60	60	70	29.0



# IN-LINE - DIN 2353 CONNECTION



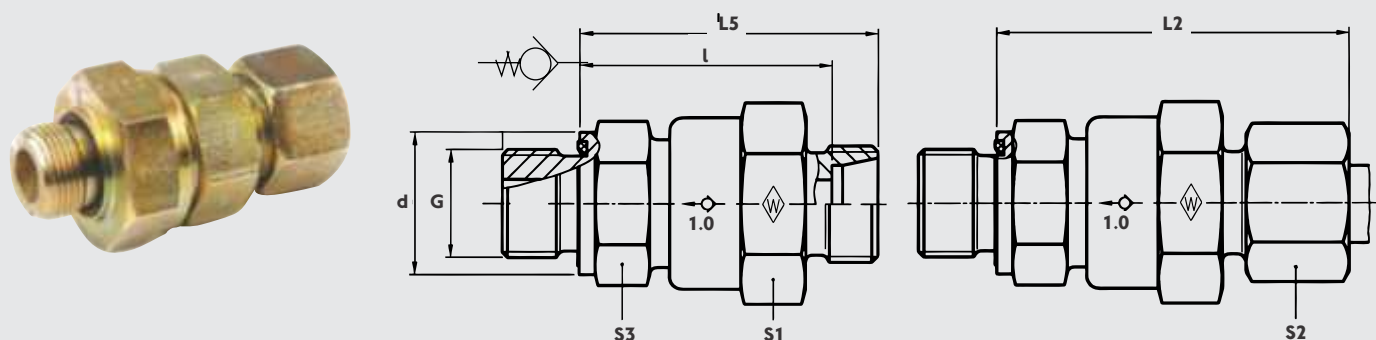
Bar	Tube	M	Part No	100 pcs kg par	d	L <sub>2</sub>	L <sub>3</sub>	l	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	Outlet Sage Correspondent
400 (5801) L	6	M10 X 1	RHV 6LM-ED	12.0	13.9	50.5	43	36	22	14	27	4.0
	8	M12 X 1.5	RHV 8LM-ED	12.1	16.9	50.5	43	36	22	17	27	6.0
	10	M14 X 1.5	RHV10LM-ED	11.0	18.9	48.5	41	34	22	19	27	7.0
	12	M16 X 1.5	RHV12LM-ED	14.0	21.9	53.5	46	39	22	22	27	7.5
	15	M18 X 1.5	RHV15LM-ED	18.0	23.9	56	48	41	27	27	32	11.0
	18	M22 X 1.5	RHV18LM-ED	23.0	29.9	61.5	53	45.5	27	32	32	11.0
250 (3626) L	22	M26 X 1.5	RHSV22LM-ED	47.0	31.9	69.5	61	53.5	41	36	46	18.0
	28	M33 X 2	RHV28LM-ED	52.5	39.9	77	68	60.5	41	41	46	18.5
	35	M42 X 2	RHV35LM-ED	132.0	49.9	88.5	77.5	67	60	50	70	29.0
	42	M48 X 2	RHV42LM-ED	140.0	54.9	87.5	75.5	64.5	60	60	70	29.0
400 (5801) S	6	M12 X 1.5	RHV 6SM-ED	13.0	16.9	52.5	45	38	22	17	27	4.0
	8	M14 X 1.5	RHV 8SM-ED	11.9	18.9	50.5	43	36	22	19	27	5.0
	10	M16 X 1.5	RHV10SM-ED	13.5	21.9	53.5	45	37.5	22	22	27	7.0
	12	M18 X 1.5	RHV12SM-ED	15.5	23.9	55.5	47	39.5	24	24	27	7.5
	14	M20 X 1.5	RHV14SM-ED	19.5	25.9	59.5	50	42	27	27	32	10.0
	16	M22 X 1.5	RHV16SM-ED	23.0	26.9	62.5	53	44.5	27	30	32	11.0
	20	M27 X 2	RHV20SM-ED	47.0	31.9	74	63	52.5	41	36	46	16.0
25	M33 X 2	RHV25SM-ED	54.0	39.9	77	65	53	41	46	46	18.5	
250 (3626) S	30	M42 X 2	RHV30SM-ED	86.0	49.9	87	74	60.5	50	50	55	24.0
	38	M48 X 2	RHV38SM-ED	143.5	54.9	96	81.5	65.5	60	60	70	29.0



# INDUSTRIAL VALVES - CHECK VALVES

## In-line Check Valves - DIN 2353 Connection

### Type RHZ - Male Stud Check Valves (Flow towards male stud end)



Bar	Tube	G	Part No	100 pcs kg par	d	L <sub>2</sub>	L <sub>5</sub>	l	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	Outlet Sage Correspondent
400 (5801) L	6	1/8 A	RHZ 6LR-ED	12.0	13.9	50.5	43	36	22	14	27	4.0
	8	1/4 A	RHZ 8LR-ED	12.0	18.9	50.5	43	36	22	17	27	6.0
	10	1/4 A	RHZ10LR-ED	10.4	18.9	48.5	41	34	22	19	27	6.0
	12	3/8 A	RHZ12LR-ED	14.0	21.9	53.5	46	39	22	22	27	7.5
	15	1/2 A	RHZ15LR-ED	19.5	26.9	56	48	41	27	27	32	11.0
	18	1/2 A	RHZ18LR-ED	23.0	26.9	61.5	53	45.5	27	32	32	11.0
250 (3626) L	22	3/4 A	RHZ22LR-ED	47.0	31.9	69.5	61	53.5	46	36	41	18.0
	28	1 A	RHZ28LR-ED	52.5	39.9	71	62	54.5	46	41	41	20.0
	35	1/4 A	RHZ35LR-ED	132.0	46.9	88.5	77.5	67	60	50	70	29.0
	42	1/2 A	RHZ42LR-ED	140.0	54.9	87.5	75.5	64.5	60	60	70	29.0
400 (5801) R	6	1/4 A	RHZ 6SR-ED	13.0	18.9	52.5	45	38	22	17	27	4.0
	8	1/4 A	RHZ 8SR-ED	12.0	18.9	50.5	43	36	22	19	27	5.0
	10	3/8 A	RHZ10SR-ED	13.5	21.9	53.5	45	37.5	22	22	27	7.0
	12	3/8 A	RHZ12SR-ED	14.5	21.9	55.5	47	39.5	22	24	27	7.5
	14	1/2 A	RHZ14SR-ED	19.5	26.9	59.5	50	42	27	27	32	10.0
	16	1/2 A	RHZ16SR-ED	23.0	26.9	62.5	53	44.5	27	30	32	11.0
	20	3/4 A	RHZ20SR-ED	47.0	31.9	73	62	51.5	46	36	41	16.0
250 (3626)	25	1 A	RHZ25SR-ED	54.0	39.9	77	65	53	46	46	41	20.0
	30	1/4 A	RHZ30SR-ED	86.0	49.9	87	74	60.5	50	50	55	24.0
	38	1/2 A	RHZ38SR-ED	143.5	54.9	96	81.5	65.5	50	60	70	29.0

Bar	Tube	M	Part No	100 pcs kg par	d	L <sub>2</sub>	L <sub>5</sub>	l	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	Outlet Sage Correspondent
400 (5801) L	6	10 X 1	RHZ 6LM-ED	12.0	13.9	50.5	43	36	22	14	27	4.0
	8	12 X 1.5	RHZ 8LM-ED	12.1	16.9	50.5	43	36	22	17	27	6.0
	10	14 X 1.5	RHZ10LM-ED	11.0	18.9	48.5	41	34	22	19	27	7.0
	12	16 X 1.5	RHZ12LM-ED	14.0	21.9	53.5	46	39	22	22	27	7.5
	15	18 X 1.5	RHZ15LM-ED	18.5	21.9	56	48	41	27	27	32	11.0
	18	22 X 1.5	RHZ18LM-ED	23.0	26.9	61.5	53	45.5	27	32	32	11.0
250 (3626) L	22	26 X 1.5	RHZ22LM-ED	47.0	31.9	70.5	62	54.5	46	36	41	18.0
	28	33 X 2	RHZ28LM-ED	52.5	39.9	71	62	54.5	46	41	41	18.5
	35	42 X 2	RHZ35LM-ED	132.0	49.9	88.5	77.5	67	60	50	70	29.0
	42	48 X 2	RHZ42LM-ED	140.0	54.9	87.5	75.5	64.5	60	60	70	29.0
400 (5801) S	6	12 X 1.5	RHZ 6SM-ED	13.0	16.9	52.5	45	38	22	17	27	4.0
	8	14 X 1.5	RHZ 8SM-ED	11.9	18.9	50.5	43	36	22	19	27	5.0
	10	16 X 1.5	RHZ10SM-ED	13.5	21.9	53.5	45	37.5	22	22	27	7.0
	12	18 X 1.5	RHZ12SM-ED	15.5	23.9	55.5	47	39.5	24	24	27	7.5
	14	20 X 1.5	RHZ14SM-ED	19.5	25.9	59.5	50	42	27	27	32	10.0
	16	22 X 1.5	RHZ16SM-ED	23.0	26.9	62.5	53	44.5	27	30	32	11.0
	20	27 X 2	RHZ20SM-ED	47.0	31.9	73	62	51.5	46	36	41	16.0
250 (3626) S	25	33 X 2	RHZ25SM-ED	54.0	39.9	77	65	53	46	46	41	18.5
	30	42 X 2	RHZ30SM-ED	86.0	49.9	87	74	60.5	50	50	55	24.0
	38	48 X 2	RHZ38SM-ED	143.5	54.9	96	81.5	65.5	60	60	70	29.0

# INDUSTRIAL VALVES - BALL VALVES

## Hydraulic Steel Line Tubing



- Manufactured in Carbon Steel
- Annealed, Phosphated, Oiled and Plugged
- Conforming to DIN 39/C ST37,4
- Available in 6 Meter Lengths

Part No	OD Size (mm)	ID Size (mm)	Wt (mm)	Kg/Meter	Designated Pressure (Bar)
6X1	6	4	1	0.123	389
6X1.5	6	3	1.5	0.166	549
6X2	6	2	2	0.197	692
8X1	8	6	1	0.173	333
8X1.5	8	5	1.5	0.24	431
8X2	8	4	2	0.296	549
10X1	10	8	1	0.222	282
10X1.5	10	7	1.5	0.314	373
10X2	10	6	2	0.395	478
12X1	12	10	1	0.271	235
12X1.5	12	9	1.5	0.388	353
12X2	12	8	2	0.493	409
14X1.5	14	11	1.5	0.462	302
14X2	14	10	2	0.592	403
15X1.5	15	12	1.5	0.499	282
15X2	15	11	2	0.641	376
16X1.5	16	13	1.5	0.563	264
16X2	16	12	2	0.691	353
16X3	16	10	3	0.962	452
18X1.5	18	15	1.5	0.61	235
18X2	18	14	2	0.789	313
20X2	20	16	2	0.888	282
20X2.5	20	15	2.5	1.079	353
20X3	20	14	3	1.258	373
20X4	20	12	4	1.578	478
22X2	22	18	2	0.986	256
25X2	25	21	2	1.134	226
25X2.5	25	20	2.5	1.387	282
25X3	25	19	3	1.682	338
25X4	25	17	4	1.935	394
28X2	28	24	2	1.282	201
28X3	28	22	3	1.85	302
30X2.5	30	25	2.5	1.695	235
30X3	30	24	3	1.998	282
30X4	30	22	4	2.565	376
35X3	35	29	3	2.367	242
35X4	35	27	4	3.06	322
38X3	38	32	3	2.589	223
38X4	38	30	4	3.354	297
38X5	38	28	5	4.069	371
42X3	42	36	3	2.885	201
42X4	42	34	4	3.749	269



## Zista Welded Brake Tube



- Manufactured in Carbon Steel
- White Zinc Passivated
- Conforming to DIN 7434B6
- Available in 6 Meter Lengths

Part No	OD Size (mm)	ID Size (mm)	Wt (mm)	Kg/Meter	Designated Pressure (Bar)
4.75X0.75	4.75	3.25	0.75	0.07	299
6.00X0.70	6	4.6	0.7	0.091	253
6.35X0.70	6.35	4.95	0.7	0.099	239
8.00X0.70	8	6.6	0.7	0.126	190
9.52X0.7	9.25	7.85	0.7	0.19	210
10.00X1.00	10	8	1	0.222	236
12.00X1.00	12	10	1	0.271	196
12.7X1.0	12.7	10.7	1	0.288	190

# STEEL TUBE FITTINGS - CONTENTS

## Steel Tube Hydraulic Compression Fittings - DIN 2353



- Manufactured in Carbon Steel
- Zinc Passivated
- Conforming to DIN 353
- Also Available in Stainless Steel

Category	Type	Description
Nuts and Cutting Rings	D	Cutting Rings B
	DPR	Cutting Rings B3
	M	Metric Threaded Tightening Nuts
Equal Couplings	G	Equal Straight Couplings
	K	Equal Cross Couplings
	T	Equal Tee Couplings
	W	Equal Elbow Couplings
Stud Couplings	GE-R	Straight Male Stud Couplings BSPP (Standard Sizes)
	GE-R	Straight Male Stud Couplings BSPP (Jump Sizes)
	GE-M	Straight Male Stud Couplings Metric (Standard and Jump Sizes)
	GE	Straight Male Stud Couplings NPT (Standard Sizes)
	GE-R-ED	Straight Male Stud Couplings complete with Elastomer Seal BSPP (Standard Sizes)
	GE-R-ED	Straight Male Stud Couplings complete with Elastomer Seal BSPP (Jump Sizes)
	GE-M-ED	Straight Male Stud Couplings Metric with Elastomer Seal (Standard and Jump Sizes)
	GE-UNF	Straight Male Stud Couplings UNF with Elastomer Seal (SAE O-Ring) (Standard and Jump Sizes)
	GAI-R	Straight Female Stud Couplings BSPP
	TE-R	Male Stud Branch Tees BSPT
	LE-R	Male Stud Barrel Tees BSPT
	WE-R	Male Stud Elbows BSPP
	WE	Male Stud Elbows NPT
WHO	Banjo Couplings Complete with Elastomer Seal	

## Blago Hydraulic Compression Fittings

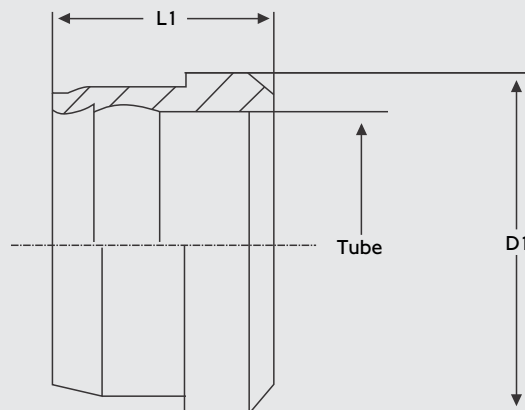
Category	Type	Description
Adjustable Fittings	EVGE	Adjustable Stud Standpipe Couplings NPT Threads
	EVW	Adjustable Equal Elbow Couplings
	EVL	Adjustable Male Stud Barrel Tee Couplings
	EVT	Adjustable Equal Branch Tee Couplings
Reducers	RI-ED	Male to Female Straight Reducing Thread Adapters
	KOR	Adjustable Reducing Standpipe L Series (Light-Duty)
	KOR	Adjustable Reducing Standpipe S Series (Heavy-Duty)
Blanking Plugs	BUZ	Blanking Plugs
	VSTI-ED	Threaded Blanking Plugs with Internal Hex BSP
	VSTI-ED	Threaded Blanking Plugs with Internal Hex Metric
Weldon Fittings	AS	Welding Bosses
	SKO	Weld Nipples with Seal
Bulkhead Couplings	ESV	Weld Bulkhead Couplings
	WSV	Elbow Bulkhead Couplings with Locknut
	SV	Straight Bulkhead Couplings with Locknut
Gauge Adapters	MAV-EV	Adjustable Pressure Gauge Connectors and Adaptors
Test Points	MA3	Test point connectors
Minimess Hose	SMS	Minimess hose and fittings

# NUTS & CUTTING RINGS

## Cutting Rings Type - B1 and B3



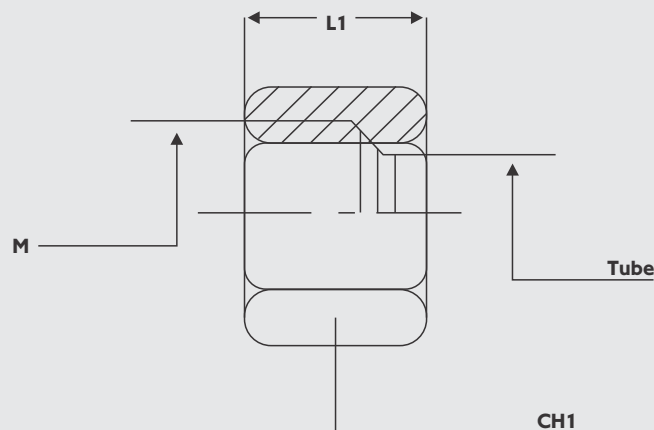
Series	Bar	Part No	Tube (mm)	L1	D
LL	100	DPR4LL	4	6	6
		DPR6LL	6	7	8
		DPR8LL	8	7	10
L	315	DPR6L/S	6	9.5	10
		DPR8L/S	8	9.5	12
		DPR10L/S	10	10	14
		DPR12L/S	12	10	16
		DPR15L	15	10	19
		DPR18L	18	10	23
	60	DPR22L	22	10.5	27
		DPR28L	28	11	33
		DPR35L	35	13	41
		DPR42L	42	13	48
S	630	DPR6L/S	6	9.5	10
		DPR8L/S	8	9.5	12
		DPR10L/S	10	10	14
		DPR12L/S	12	10	16
		DPR14S	14	10	19
	400	DPR16S	16	10.5	21
		DPR20S	20	12	26
		DPR25S	25	12	32
		DPR30S	30	13	36
		DPR38S	38	13	44



## Metric Threaded Tightening Nuts - Type M

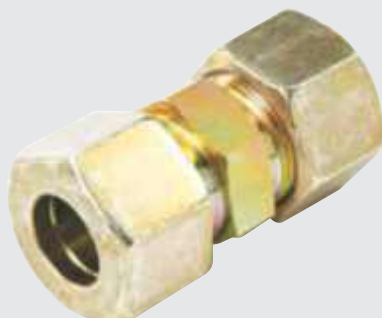


Series	Bar	Part No	Tube	M	L1	CH1
LL	100	M4LL	4	8x1	11	10
		M6LL	6	10x1	11.5	12
		M8LL	8	12x1	12	14
L	315	M6L	6	12x1.5	14.5	14
		M8L	8	14x1.5	14.5	17
		M10L	10	16x1.5	15.5	19
		M12L	12	18x1.5	15.5	22
		M15L	15	22x1.5	17	27
		M18L	18	26x1.5	18	32
	160	M22L	22	30x2	20	36
		M28L	28	36x2	21	41
		M35L	35	45x2	24	50
		M42L	42	52x2	24	60
S	630	M6S	6	14x1.5	16.5	17
		M8S	8	16x1.5	16.5	19
		M10S	10	18x1.5	17.5	22
		M12S	12	20x1.5	17.5	24
	400	M16S	16	24x1.5	20.5	30
		M20S	20	30x2	24	36
		M25S	25	36x2	27	46
		M30S	30	42x2	29	50
	315	M38S	38	52x2	32.5	60

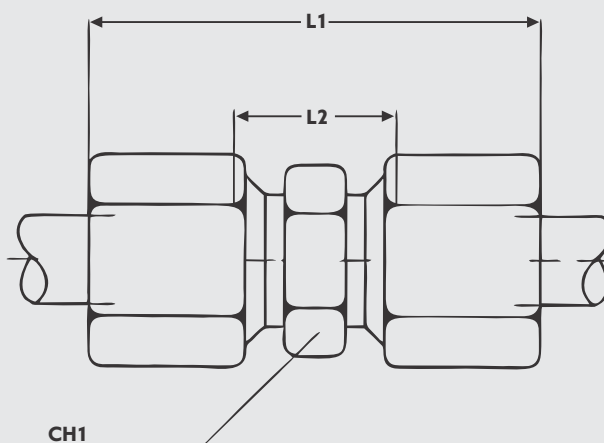


# EQUAL COUPLINGS

## Equal Straight Couplers - Type G



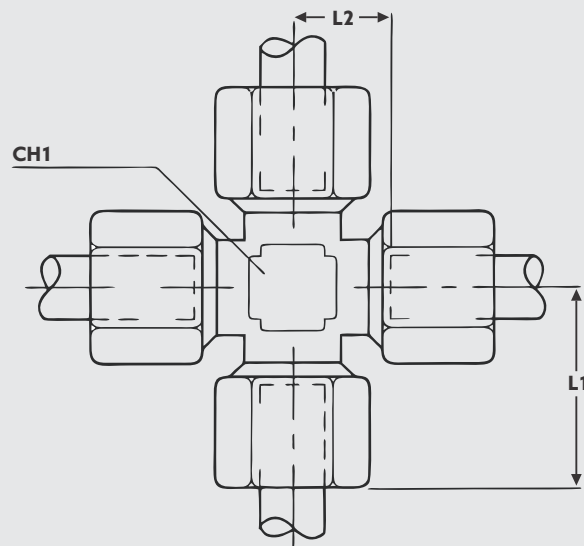
Series	Bar	Part No	Tube	L1	L2	CH1
LL	100	G4LL	4	31	12	12
		G6LL	6	32	12	12
		G8LL	8	35	12	12
L	315	G6L	6	39	10	12
		G8L	8	40	11	14
		G10L	10	42	13	17
		G12L	12	43	14	19
		G15L	15	46	16	24
		G18L	18	48	16	27
		G22L	22	52	20	32
	160	G28L	28	54	21	41
		G35L	35	63	20	46
		G42L	42	66	21	55
		G6S	6	45	16	14
S	630	G8S	8	47	18	17
		G10S	10	49	17	19
		G12S	12	51	19	22
		G16S	16	57	21	27
	400	G20S	20	66	23	32
		G25S	25	74	26	41
		G30S	30	80	27	46
		G38S	38	90	29	55
	315					



## Equal Cross Couplers - Type K



Series	Bar	Part No	Tube	L1	L2	CH1
LL	100	K4LL	4	21	11	9
		K6LL	6	21	9.5	9
		K8LL	8	23	11.5	12
L	315	K6L	6	27	12	12
		K8L	8	29	14	12
		K10L	10	30	15	14
		K12L	12	32	17	17
		K15L	15	36	21	19
		K18L	18	40	23.5	24
	160	K22L	22	44	27.5	27
		K28L	28	47	30.5	36
		K35L	35	56	34.5	41
		K42L	42	63	40	50
S	630	K6S	6	31	16	12
		K8S	8	32	17	14
		K10S	10	34	17.5	17
		K12S	12	38	21.5	17
	400	K16S	16	43	24.5	24
		K20S	20	48	26.5	27
		K25S	25	54	30	36
		K30S	30	62	35.5	41
	315	K38S	38	72	41	50

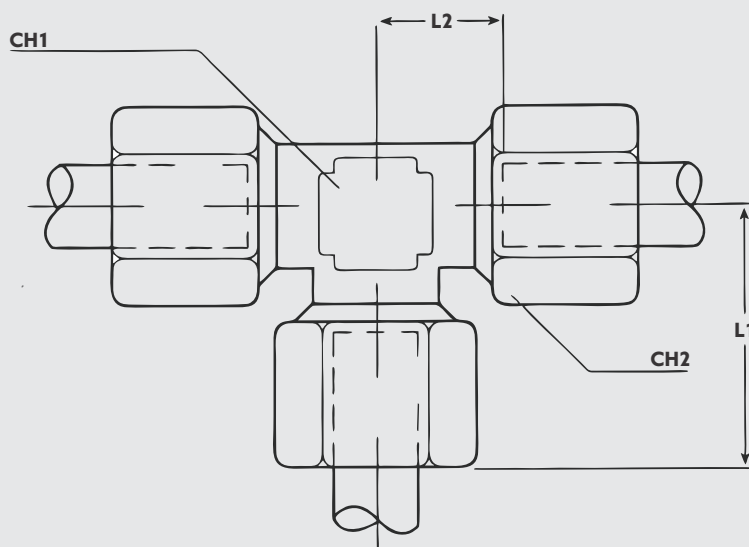


# EQUAL COUPLINGS

## Equal Tee Couplers - Type T



Series	Bar	Part No	Tube	CH1	CH2	L1	L2
LL	100	T4LL	4	9	10	21	11
		T6LL	6	9	12	21	9.5
		T8LL	8	12	14	23	11.5
L	315	T6L	6	12	14	27	12
		T8L	8	12	17	29	14
		T10L	10	14	19	30	15
		T12L	12	17	22	32	17
		T15L	15	19	27	36	21
		T18L	18	24	32	40	23.5
		T22L	22	27	36	44	27.5
	60	T28L	28	36	41	47	30.5
		T35L	35	41	50	56	34.5
		T42L	42	50	60	63	40
T6S		6	12	17	31	16	
S	630	T8S	8	14	19	32	17
		T10S	10	17	22	34	17.5
		T12S	12	17	24	38	21.5
		T16S	16	24	30	43	24.5
	400	T20S	20	27	36	48	26.5
		T25S	25	36	46	54	30
		T30S	30	41	50	62	35.5
		T38S	38	50	60	72	41
	315						

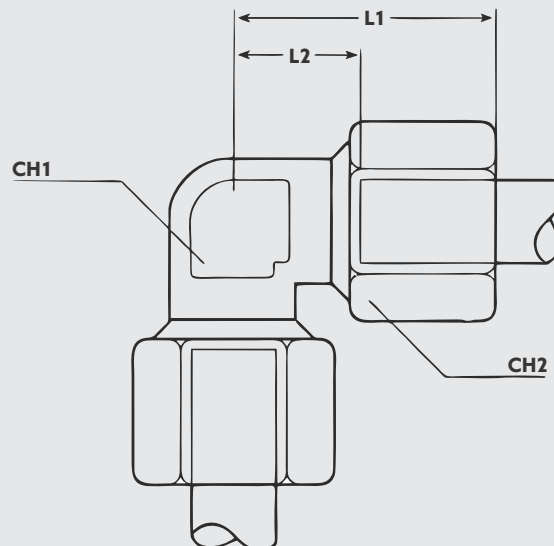




## Equal Elbow Couplers - Type W



Series	Bar	Part No	Tube	CH1	CH2	L1	L2
LL	100	W4LL	4	9	10	21	11
		W6LL	6	9	12	21	9.5
		W8LL	8	12	14	23	11.5
L	315	W6L	6	12	14	27	12
		W8L	8	12	17	29	14
		W10L	10	14	19	30	15
		W12L	12	17	22	32	17
		W15L	15	19	27	36	21
		W18L	18	24	32	40	23.5
	160	W22L	22	27	36	44	27.5
		W28L	28	36	41	47	30.5
		W35L	35	41	50	56	34.5
		W42L	42	50	60	63	40
S	630	W6S	6	12	17	31	16
		W8S	8	14	19	32	17
		W10S	10	17	22	34	17.5
		W12S	12	17	24	38	21.5
	400	W16S	16	24	30	43	24.5
		W20S	20	27	36	48	26.5
		W25S	25	36	46	54	30
		W30S	30	41	50	62	35.5
	315	W38S	38	50	60	72	41



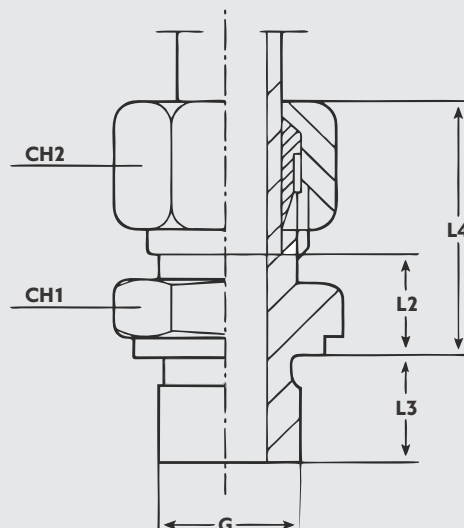
# STUD COUPLINGS

## Straight Male Stud Couplings - Type GE-R



### BSP Parallel Threads (Standard Sizes)

Series	Bar	Part No	Tube	Stud Thread (BSP)	CH1	L4
LL	100	GE4LLR	4	1/8	14	20
		GE6LLR	6	1/8	14	20
		GE8LLR	8	1/8	14	21
L	315	GE6LR	6	1/8	14	23
		GE8LR	8	1/4	19	25
		GE10LR	10	1/4	19	26
		GE12LR	12	3/8	22	27
		GE15LR	15	1/2	27	29
		GE18LR	18	1/2	27	31
	160	GE22LR	22	3/4	32	33
		GE28LR	28	1	41	34
		GE35LR	35	1 1/4	50	39
		GE42LR	42	1 1/2	55	42
S	630	GE6SR	6	1/4	19	28
		GE8SR	8	1/4	19	30
		GE10SR	10	3/8	22	31
		GE12SR	12	3/8	22	33
	400	GE16SR	16	1/2	27	37
		GE20SR	20	3/4	32	42
		GE25SR	25	1	41	47
	315	GE30SR	30	1 1/4	50	50
	315	GE38SR	38	1 1/2	55	57

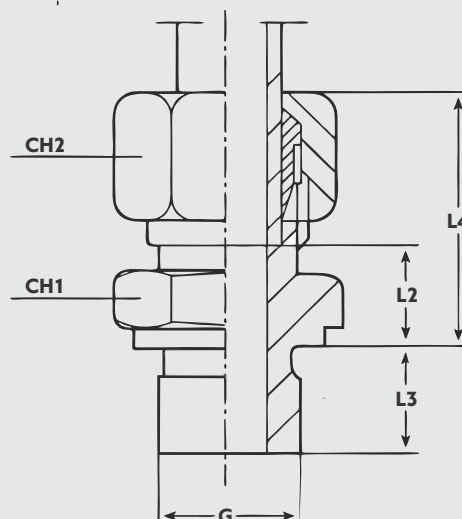


## Straight Male Stud Couplings - Type GE-R



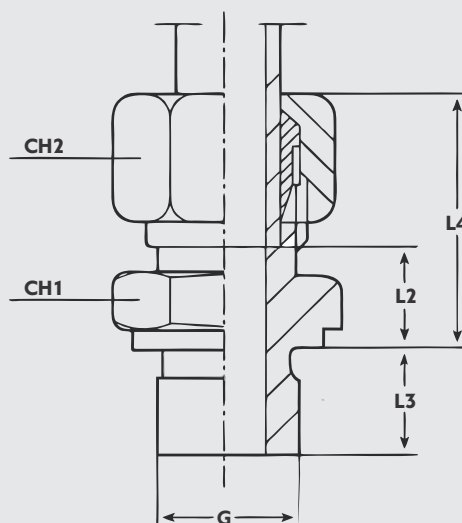
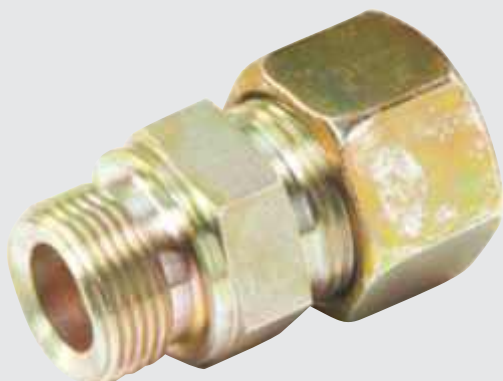
### BSP Parallel Threads (Jump Sizes)

Series	Bar	Part No	Tube	Stud Thread (BSP)	CH1	L4
L	315	GE6LR1/4	6	1/4	19	24.5
		GE8LR1/8	8	1/8	17	24.5
		GE8LR3/8	8	3/8	22	26.5
		GE8LR1/2	8	1/2	27	27
		GE10LR1/8	10	1/8	17	25.5
		GE10L3/8	10	3/8	22	27.5
		GE10LR1/2	10	1/2	27	28
		GE12LR1/4	12	1/4	19	26.5
		GE12LR1/2	12	1/2	27	27.5
		GE15LR3/8	15	3/8	24	28.5
		GE18LR3/4	18	3/4	32	31
		GE15LR3/4	15	3/4	27	33.5
	160	GE22LR1/2	22	1/2	27	36.5
	160	GE28LR3/4	28	3/4	32	42
315	GE6LR3/8	6	3/8	41	47	
160	GE42LR11/4	42	11/4	50	50	
S	630	GE12SR1/2	12	1/2	22	30.5
	400	GE16SR3/8	16	3/8	19	30.5
		GE20SR1/2	20	1/2	27	33.5
		GE25SR3/4	25	3/4	22	32.5
		GE30SR1"	30	1	32	39
	630	GE8SR3/8	8	3/8	55	57
		GE10SR1/4	10	1/4	32	30
		GE10SR1/2	10	1/2	32	33
		GE12SR1/4	12	1/4	41	34
	400	GE16SR3/4	16	3/4	22	26
	315	GE38SR11/4	38	11/4	55	42



# STUD COUPLINGS

## Straight Male Stud Couplings - Type GE-M



## Metric Threads (Standard and Jump Sizes)

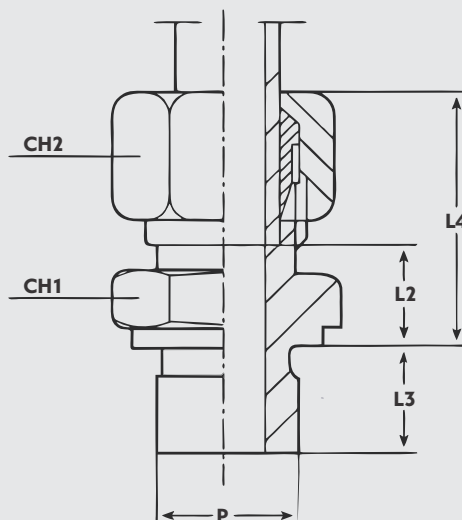
Series	Bar	Part No	Tube	Stud Thread (M)	CH1	L4	
LL	100	GE4LLM	4	8x1	12	20	
		GE6LLM	6	10x1	14	20	
		GE8LLM	8	10x1	14	21	
L	315	GE6LM	6	10x1	14	23	
		GE8LM	8	12x1.5	17	25	
		GE10LM	10	14x1.5	19	26	
		GE12LM	12	16x1.5	22	27	
		GE15LM	15	18x1.5	24	29	
		GE18LM	18	22x1.5	27	31	
	160	GE22LM	22	26x1.5	32	33	
		GE28LM	28	33x2	41	34	
		GE35LM	35	42x2	50	39	
		GE42LM	42	48x2	55	42	
S	630	GE6SM	6	12x1.5	17	28	
		GE8SM	8	14x1.5	19	30	
		GE10SM	10	16x1.5	22	31	
		GE12SM	12	18x1.5	24	33	
	400	GE16SM	16	22x1.5	27	37	
		GE20SM	20	27x2	32	42	
		GE25SM	25	33x2	41	47	
		GE30SM	30	42x2	50	50	
315	GE38SM	38	48x2	55	57		
L	315	GE8LM10X1	8	10x1	24	26.5	
		GE8LM18X1.5	8	18x1.5	22	27.5	
		GE10LM16X1.5	10	16x1.5	24	27.5	
		GE10LM18X1.5	10	18x1.5	27	29	
		GE10LM22X1.5	10	22x1.5	19	27	
		GE12LM14X1.5	12	14x1.5	24	27	
		GE12LM18X1.5	12	18x1.5	27	28.5	
		GE12LM22X1.5	12	22x1.5	24	28	
		GE15LM16X1.5	15	16x1.5	27	30	
		GE15LM22X1.5	15	22x1.5	27	30.5	
		GE18LM18X1.5	18	18x1.5	32	33	
		160	GE22LM22X1.5	22	22x1.5	37	33.5
		S	400	GE12SM22X1.5	12	22x1.5	27
	GE16SM18X1.5			16	18x1.5	27	42
	GE20SM22X1.5			20	22x1.5	32	47
	GE25SM27X2			25	27x2	41	50
	GE30SM33X2			30	33x2	46	24.5

## Straight Male Stud Couplings - Type GE



### NPT Threads (Standard Sizes)

Series	Bar	Part No	Tube	Stud Thread (NPT)	CH1	L4
LL	100	GE4LL	4	1/8	14	20
		GE6LL	6	1/8	14	20
		GE8LL	8	1/8	14	21
		GE6L	6	1/8	14	23
L	315	GE8L	8	1/4	19	25
		GE10L	10	1/4	19	26
		GE12L	12	3/8	22	27
		GE15L	15	1/2	27	29
	160	GE18L	18	1/2	27	31
		GE22L	22	3/4	32	33
		GE28L	28	1	41	34
		GE35L	35	1 1/4	50	39
S	630	GE42L	42	1 1/2	55	42
		GE6S	6	1/4	19	28
		GE8S	8	1/4	19	30
		GE10S	10	3/8	22	31
	400	GE12S	12	3/8	22	33
		GE16S	16	1/2	27	37
		GE20S	20	3/4	32	42
		GE25S	25	1	41	47
315	GE30S	30	1 1/4	50	50	
315	GE38S	38	1 1/2	55	57	



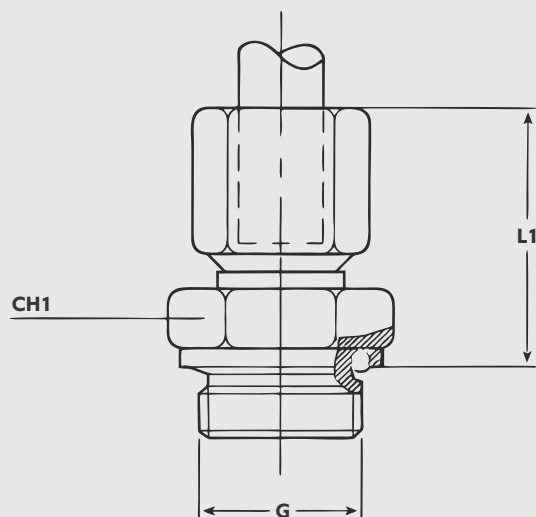
# STUD COUPLINGS

**Straight Male Stud Couplings Complete with Elastomer Seal**  
**Type GE - RED**



## BSP Parallel Threads (Standard Sizes)

Series	Bar	Part No	Tube	Thread G (BSP)	CH1	L1
LL	100	GE4LLR-ED	4	1/8	14	20
		GE6LLR-ED	6	1/8	14	20
		GE8LLR-ED	8	1/8	14	21
L	315	GE6LR-ED	6	1/8	14	23
		GE8LR-ED	8	1/4	19	25
		GE10LR-ED	10	1/4	19	26
		GE12LR-ED	12	3/8	22	27
		GE15LR-ED	15	1/2	27	29
		GE18LR-ED	18	1/2	27	31
	160	GE22LR-ED	22	3/4	32	33
		GE28LR-ED	28	1	41	34
		GE35LR-ED	35	1 1/4	50	39
		GE42LR-ED	42	1 1/2	55	42
S	630	GE6SR-ED	6	1/4	19	28
		GE8SR-ED	8	1/4	19	30
		GE10SR-ED	10	3/8	22	31
		GE12SR-ED	12	3/8	22	33
	400	GE16SR-ED	16	1/2	27	37
		GE20SR-ED	20	3/4	32	42
		GE25SR-ED	25	1	41	47
		GE30SR-ED	30	1 1/4	50	50
315	GE38SR-ED	38	1 1/2	55	57	

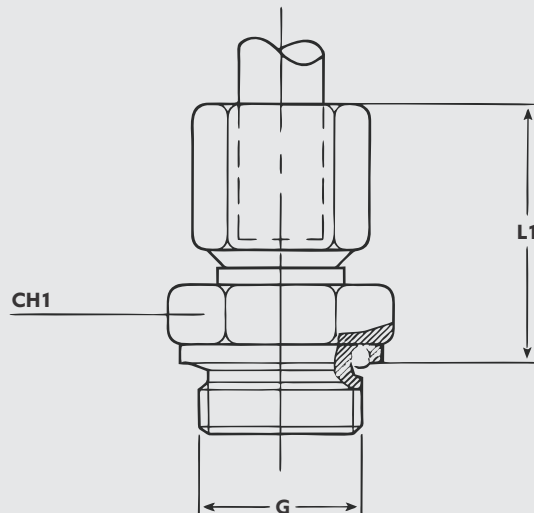


## Straight Male Stud Couplings Complete with Elastomer Seal Type GE - RED



### BSP Parallel Threads (Jump Sizes)

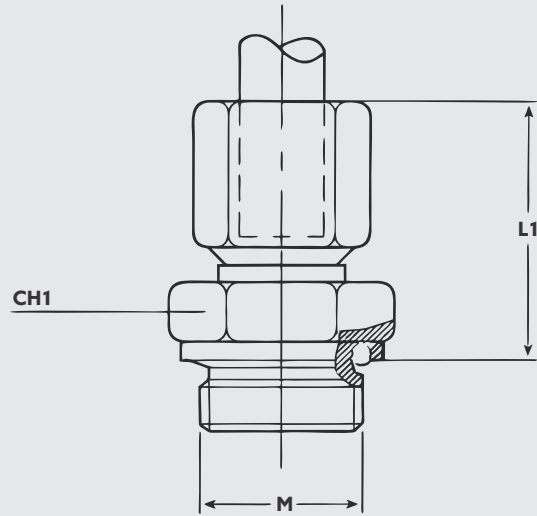
Series	Bar	Part No	Tube	Stud Thread (BSP)	CH1	L1
L	315	GE6LR-ED 1/4	6	1/4	19	24.5
		GE8LR-ED 1/8	8	1/8	17	24.5
		GE8LR-ED 3/8	8	3/8	22	26.5
		GE8LR-ED 1/2	8	1/2	27	27
		GE10LR-ED 1/8	10	1/8	17	25.5
		GE10LR-ED 3/8	10	3/8	22	27.5
		GE10LR-ED 1/2	10	1/2	27	28
		GE 12LR-ED 1/4	12	1/4	19	26.5
		GE12LR-ED 1/2	12	1/2	27	27.5
		GE15LR-ED 3/8	15	3/8	24	28.5
GE18LR-ED 3/4	18	3/4	32	31		
S	630	GE12SR-ED 1/2	12	1/2	27	33.5
	400	GE16SR-ED 3/8	16	3/8	27	36.5
		GE20SR-ED 1/2	20	1/2	32	42
		GE25SR-ED 3/4	25	3/4	41	47
	630	GE30SR-ED 1"	30	1	50	50
		GE8SR-ED 3/8	8	3/8	22	30.5
		GE10SR-ED 1/4	10	1/4	19	30.5
		GE10SR-ED 1/2	10	1/2	27	33.5
		GE12SR-ED 1/4	12	1/4	22	32.5
		400	GE16SR-ED 3/4	16	3/4	32
GE20SR-ED 1"	20		1	41	44	
315	GE38SR-ED 1 1/4	38	1 1/4	55	57	
L	315	GE15LR-ED 3/4	15	3/4	32	30
	160	GE22LR-ED 1/2	22	1/2	32	33
		GE22LR-ED 1"	22	1	41	34
		GE28LR-ED 3/4	28	3/4	41	34
		GE35LR-ED 1"	35	1	50	39
	315	GE6LR-ED 3/8	6	3/8	22	26
	160	GE42LR-ED 1 1/4	42	1 1/4	55	42



# STUD COUPLINGS

## Straight Male Stud Couplings Complete with Elastomer Seal

### Type GE - MED

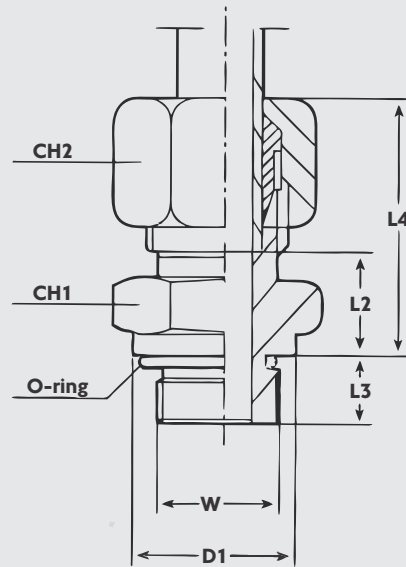


### Metric Threads (Standard & Jump Sizes)

Series	Bar	Part No	Tube	Stud Thread (BSP)	CH1	L4	
LL	100	GE4LLM-ED	4	8x1	12	20	
		GE6LLM-ED	6	10x1	14	20	
		GE8LLM-ED	8	10x1	14	21	
L	315	GE6LM-ED	6	10x1	14	23	
		GE8LM-ED	8	12x1.5	17	25	
		GE10LM-ED	10	14x1.5	19	26	
		GE10LM-ED	12	16x1.5	22	27	
		GE15LM-ED	15	18x1.5	24	29	
		GE18LM-ED	18	22x1.5	27	31	
	160	GE22LM-ED	22	26x1.5	32	33	
		GE28LM-ED	28	33x2	41	34	
		GE35LM-ED	35	42x2	50	39	
		GE42LM-ED	42	48x2	55	42	
S	630	GE6SM-ED	6	12x1.5	17	28	
		GE8SM-ED	8	14x1.5	19	30	
		GE10SM-ED	10	16x1.5	22	31	
		GE12SM-ED	12	18x1.5	24	33	
	400	GE16SM-ED	16	22x1.5	27	37	
		GE20SM-ED	20	27x2	32	42	
		GE25SM-ED	25	33x2	41	47	
		GE30SM-ED	30	42x2	50	50	
		GE38SM-ED	38	48x2	55	57	
		315	GE6LLM-ED8X1	6	8x1	12	20
L	315	GE8LM-ED10X1	8	10x1	24	26.5	
		GE8LM-ED18X1.5	8	18x1.5	22	27.5	
		GE10LM-ED16X1.5	10	16x1.5	27	27.5	
		GE10LM-ED18X1.5	10	18x1.5	19	29	
		GE10LM-ED22X1.5	10	22x1.5	24	27	
		GE12LM-ED14X1.5	12	14x1.5	27	27	
		GE12LM-ED18X1.5	12	18x1.5	24	28.5	
		GE12LM-ED22X1.5	12	22x1.5	27	28	
		GE15LM-ED16X1.5	15	16x1.5	27	30	
		GE15LM-ED22X1.5	15	22x1.5	32	30.5	
		GE18LM-ED18X1.5	18	18x1.5	27	33	
		160	GE22LM-ED22X1.5	22	22x1.5	27	33.5
	S	630	GE12SM-ED22X1.5	12	22x1.5	32	36.5
		400	GE16SM-ED18X1.5	16	18x1.5	41	42
			GE20SM-ED22X1.5	20	22x1.5	46	47
GE25SM-ED27X2			25	27x2	17	50	
GE30SM-ED33X2			30	33x2		24.5	



## Straight Male Stud Couplings Complete with elastomer seal (SAE O-Ring) - Type GE - UNF



### UNF Threads (Standard & Jump Sizes)

Series	Bar	Part No	Tube	Stud Thread	CH1	L4	
L	315	GE6L 7/16-20 UNF	6	7/16-20 UNF	14	23	
		GE6L 9/16-18 UNF	6	9/16-18 UNF	14	23	
		GE8L 7/16-20 UNF	8	7/16-20 UNF	17	25	
		GE8L 9/16-18 UNF	8	9/16-18 UNF	17	25	
		GE8L 1/2-20 UNF	8	1/2-20 UNF	17	25	
		GE10L 7/16-20 UNF	10	7/16-20 UNF	19	26	
		GE10L 9/16-18 UNF	10	9/16-18 UNF	19	26	
		GE12L 9/16-18 UNF	12	9/16-18 UNF	22	27	
		GE12L 3/4-16 UNF	12	3/4-16 UNF	22	27	
		GE12L 7/8-16 UNF	15	7/8-16 UNF	22	27	
		GE15L 3/4-16 UNF	15	3/4-16 UNF	24	29	
		GE18L 3/4-16 UNF	18	3/4-16 UNF	27	31	
	GE18L 7/8-16 UNF	18	7/8-16 UNF	27	31		
	160	GE22L 7/8-16 UNF	22	7/8-16 UNF	32	33	
		GE22L 1 1/16-12 UNF	22	11 /16-12 UNF	32	33	
		GE22L 1 5/16-12 UNF	22	15/16-12 UNF	32	33	
		GE28L 1 1/16-12 UNF	28	11 /16-12 UNF	41	34	
		GE28L 1 5/16-12 UNF	28	15/16-12 UNF	41	34	
GE35L 1 5/16-12 UNF		35	15/16-12 UNF	50	39		
GE35L 1 5/8-12 UNF		35	15/8-12 UNF	50	39		
GE42L 1 5/8-12 UNF		42	15/8-12 UNF	55	42		
GE42L 1 7/8-12 UNF	42	17/8-12 UNF	55	42			
S	630	GE6S 7/16-20 UNF	6	7/16-20 UNF	17	28	
		GE8S 7/16-20 UNF	8	7/16-20 UNF	19	30	
		GE8S 1/2-20 UNF	8	1/2-20 UNF	19	30	
		GE10S 9/16-18 UNF	10	9/16-18 UNF	22	31	
		GE12S 9/16-18 UNF	12	9/16-18 UNF	24	33	
		GE12S 3/4-16 UNF	12	3/4-16 UNF	24	33	
	400	GE16S 3/4-16 UNF	16	3/4-16 UNF	27	37	
		GE16S 7/8-16 UNF	16	7/8-16 UNF	27	37	
		GE20S 3/4-16 UNF	20	3/4-16 UNF	32	42	
		GE20S 7/8-16 UNF	20	7/8-16 UNF	32	42	
		GE20S 1 1/16-12 UNF	20	11 /16-12 UNF	32	42	
		GE25S 1 1/16-12 UNF	25	11 /16-12 UNF	41	47	
		GE25S 1 5/16-12 UNF	25	15/16-12 UNF	41	47	
		GE30S 1 5/16-12 UNF	30	15/16-12 UNF	50	50	
		GE30S 1 5/8-12 UNF	30	15/8-12 UNF	50	50	
		315	GE38S 1 5/8-12 UNF	38	15/8-12 UNF	55	57
			GE38S 1 7/8-12 UNF	38	17/8-12 UNF	55	57

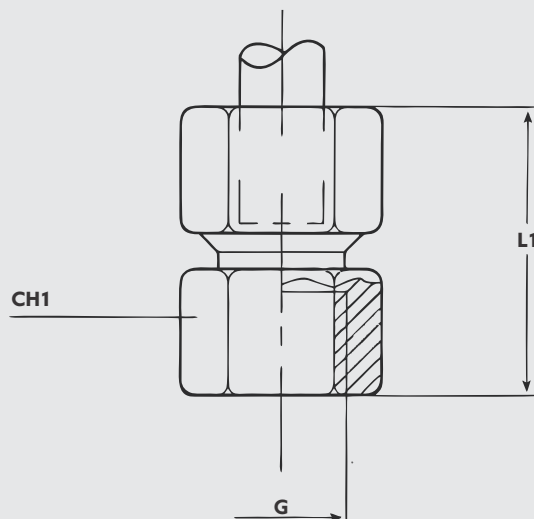
# STUD COUPLINGS

## Straight Female Stud Couplings - Type GAI - R



### BSPP Threads

Series	Bar	Part No	Tube	Stud Thread	CH1	L1
L	315	GAI6LR	6	1/8	14	33.5
		GAI8LR	8	1/4	19	39
		GAI10LR	10	1/4	19	40
		GAI12LR	12	3/8	24	40.5
		GAI15LR	15	1/2	27	46
		GAI18LR	18	1/2	27	47
	160	GAI22LR	22	3/4	36	52
		GAI28LR	28	1	41	54
		GAI35LR	35	1 1/4	55	63
		GAI42LR	42	1 1/2	60	66
S	630	GAI6SR	6	1/4	19	41
		GAI8SR	8	1/4	19	41
		GAI10SR	10	3/8	24	42.5
		GAI12SR	12	3/8	24	42.5
	400	GAI16SR	16	1/2	30	50
		GAI20SR	20	3/4	36	56
		GAI25SR	25	1	41	61
		GAI30SR	30	1 1/4	55	69
	315	GAI38SR	38	1 1/2	60	75

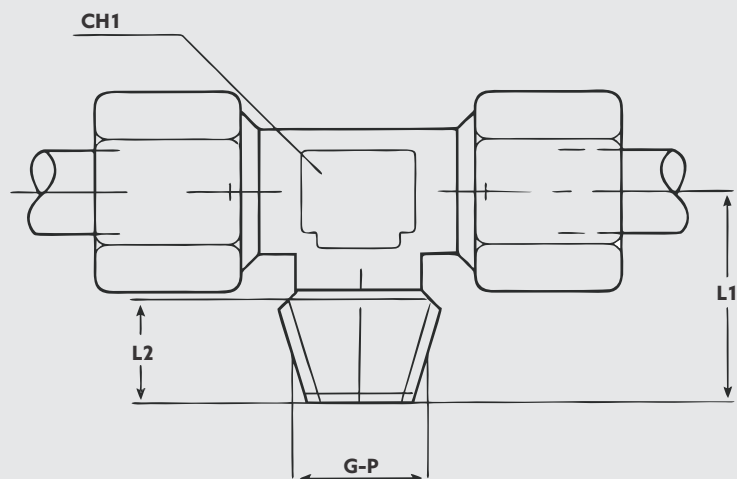


## Male Stud Branch Tees - Type - TE - R



### BSPT Threads

Series	Bar	Part No	Tube	Stud Thread
LL	100	TE4LLR	4	1/8
		TE6LLR	6	1/8
		TE8LLR	8	1/8
L	315	TE6LR	6	1/8
		TE8LR	8	1/4
		TE10LR	10	1/4
		TE12LR	12	3/8
		TE15LR	15	1/2
		TE18LR	18	1/2
	160	TE22LR	22	3/4
		TE28LR	28	1
		TE35LR	35	1 1/4
		TE42LR	42	1 1/2
S	630	TE6SR	6	1/4
		TE8SR	8	1/4
		TE10SR	10	3/8
	400	TE12SR	12	3/8
		TE16SR	16	1/2
		TE20SR	20	3/4
		TE25SR	25	1
		TE30SR	30	1 1/4
		TE38SR	38	1 1/2
315	TE38SR	38	1 1/2	



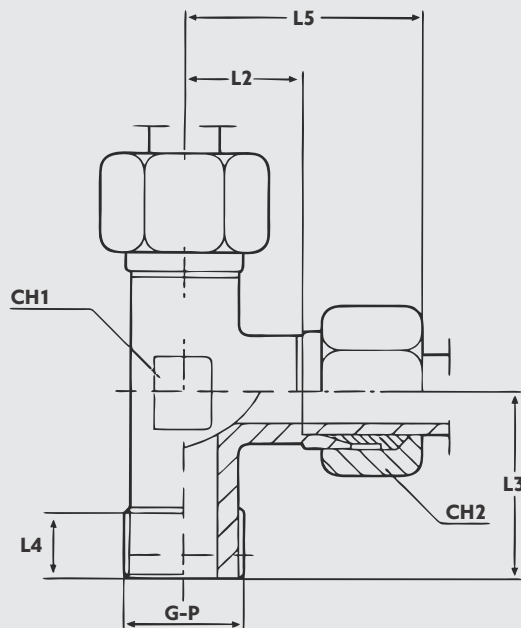
# STUD COUPLINGS

## Male Stud Barrel Tees - Type LE-R



### BSPT Threads

Series	Bar	Part No	Tube	Stud Thread (BSP)	CH1	L3	L4
LL	100	LE4LLR	4	1/8	9	17	8
		LE6LLR	6	1/8	9	17	8
		LE8LLR	8	1/8	12	20	8
L	315	LE6LR	6	1/8	12	20	8
		LE8LR	8	1/4	12	26	12
		LE10LR	10	1/4	14	27	12
		LE12LR	12	3/8	17	28	12
		LE15LR	15	1/2	19	34	14
		LE18LR	18	1/2	24	36	14
		160	LE22LR	22	3/4	27	42
	LE28LR		28	1	36	48	18
	LE35LR		35	1 1/4	41	54	20
	S	630	LE42LR	42	1 1/2	50	61
LE6SR			6	1/4	12	26	12
LE8SR			8	1/4	14	27	12
LE10SR			10	3/8	17	28	12
400		LE12SR	12	3/8	17	28	12
		LE16SR	16	1/2	24	32	14
		LE20SR	20	3/4	27	42	16
		LE25SR	25	1	36	48	18
		LE30SR	30	1 1/4	41	54	20
		LE38SR	38	1 1/2	50	61	22

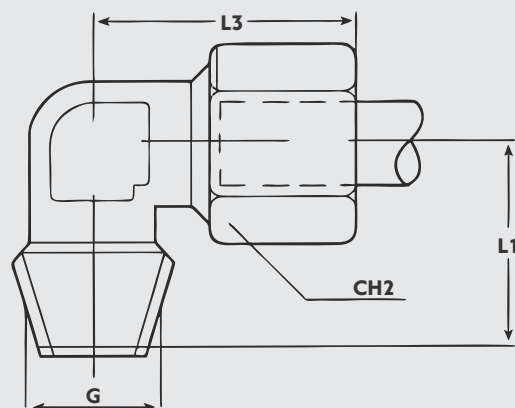


## Male Stud Elbow Fittings - Type WE-R



## BSPT Threads

Series	Bar	Part No	Tube	G	L1	L3	CH2
LL	100	WE4LLR	4	1/8	17	21	10
		WE6LLR	6	1/8	17	21	12
		WE8LLR	8	1/8	20	23	14
		WE6LR	6	1/8	20	27	14
L	315	WE8LR	8	1/4	26	29	17
		WE10LR	10	1/4	27	30	19
		WE12LR	12	3/8	28	32	22
	160	WE18LR	18	1/2	36	40	32
		WE22LR	22	3/4	42	44	36
		WE28LR	28	1	48	47	41
S	630	WE35LR	35	1 1/4	54	56	50
		WE42LR	42	1 1/2	61	63	60
		WE6SR	6	1/4	26	31	17
		WE8SR	8	1/4	27	32	19
	400	WE10SR	10	3/8	28	34	22
		WE12SR	12	3/8	28	38	24
		WE16SR	16	1/2	32	43	30
		WE20SR	20	3/4	42	48	36
		WE25SR	25	1	48	54	46
		WE30SR	30	1 1/4	54	62	50
315	WE38SR	38	1 1/2	61	72	60	
L	315	WE6LR1/4	6	1/4	26	29	14
		WE8LR1/8	8	1/8	22	29	17
		WE8LR3/8	8	3/8	28	31	17
		WE8LR1/2	8	1/2	34	34	17
		WE10LR1/8	10	1/8	22	30	19
		WE10LR3/8	10	3/8	28	32	19
		WE10LR1/2	10	1/2	34	35	19
		WE12LR1/4	12	1/4	28	32	22
		WE12LR1/2	12	1/2	34	34	22
		WE15LR3/8	15	3/8	30	36	27
		WE18LR3/4	18	3/4	42	43	32
		S	630	WE12LS1/2	12	1/2	32
WE14LS3/4	14			3/8	30	40	27
400	WE16LS3/8		16	3/8	37	43	30
	WE20LS1/2		20	1/2	36	48	36
	WE25LS3/4		25	3/4	42	54	46
	WE30LS1		30	1	48	62	50



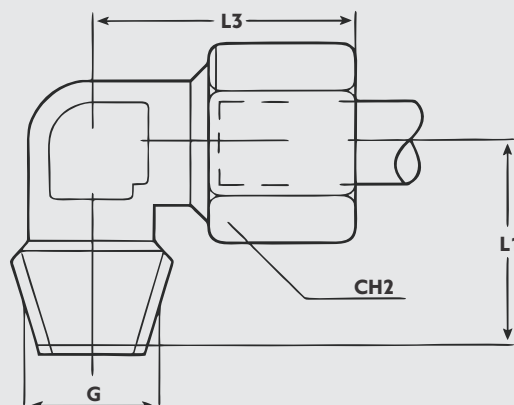
# STUD COUPLINGS

## Male Stud Elbow Fittings - Type WE-NPT



### NPT Threads

Series	Bar	Part No	Tube	Stud (NPT)	L1	L3	CH2
L	315	WE6LNPT	6	1/8	20	27	14
		WE8LNPT	8	1/4	26	29	17
		WE10LNPT	10	1/4	27	30	19
		WE12LNPT	12	3/8	28	32	22
		WE15LNPT	15	1/2	34	36	27
		WE18LNPT	18	1/2	36	40	32
	160	WE22LNPT	22	3/4	42	44	36
		WE28LNPT	28	1	48	47	41
		WE35LNPT	35	1 1/4	54	56	50
		WE42LNPT	42	1 1/2	61	63	60
S	630	WE6SNPT	6	1/4	26	31	17
		WE8SNPT	8	1/4	27	32	19
		WE10SNPT	10	3/8	28	34	22
		WE12SNPT	12	3/8	28	38	24
		WE14SNPT	14	1/2	34	40	27
		WE16SNPT	16	1/2	36	43	30
	400	WE20SNPT	20	3/4	42	48	36
		WE25SNPT	25	1	48	54	46
		WE30SNPT	30	1 1/4	54	62	50
		WE38SNPT	38	1 1/2	61	72	60
L	315	WE6LNPT1/4"	6	1/4	26	29	14
		WE8LNPT1/8"	8	1/8	24	29	17
		WE8LNPT3/8"	8	3/8	28	31	17
		WE8LNPT1/2"	8	1/2	34	34	17
		WE10LNPT1/8"	10	1/8	24	30	19
		WE10LNPT3/8"	10	3/8	28	32	19
		WE10LNPT1/2"	10	1/2	34	35	19
		WE12LNPT1/4"	12	1/4	28	32	22
		WE12LNPT1/2"	12	1/2	34	35	22
		WE15LNPT3/8"	15	3/8	33	36	27
S	630	WE18LNPT3/4"	18	3/4	42	43	32
		WE12SNPT1/2"	12	1/2	34	37	24
		WE14SNPT3/8"	14	3/8	33	40	27
	400	WE16SNPT3/8"	16	3/8	37	43	30
		WE20SNPT1/2"	20	1/2	42	48	36
		WE25SNPT3/4"	25	3/4	46	54	46
		WE30SNPT1"	30	1	55	62	50

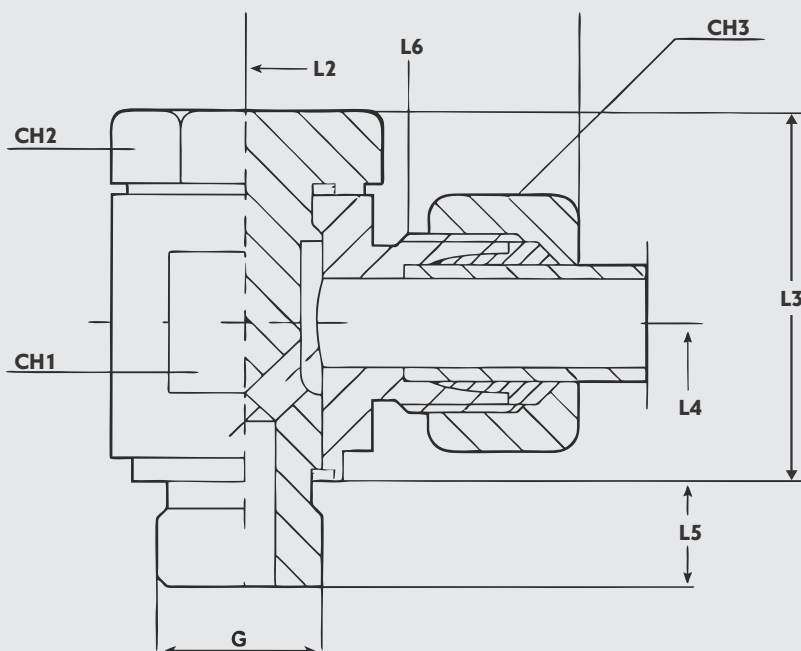


## Banjo Fittings Complete with Elastomer Seal - Type - WHO



### BSP Parallel Threads

Series	Bar	Part No	Tube Ø	Thread (BSP)	L2	L3	L5	CH1	CH2	
L	315	WH06LR1/8	6	1/8	12	18.5	8	17	17	
		WH08LR1/4	8	1/4	14.5	25	12	22	19	
		WH010LR1/4	10	1/4	15.5	25	12	22	19	
		WH012LR3/8	12	3/8	18	30	12	27	24	
		WH015LR1/2	15	1/2	22	37.5	14	32	30	
		WH018LR1/2	18	1/2	21.5	37.5	14	32	30	
	160	WH022LR3/4	22	3/4	26.5	44	16	41	36	
		WH028LR1	28	1	31	55.5	18	50	46	
		WH035LR1 1/4	35	1 1/4	35	65.5	20	60	55	
		WH042LR1 1/2	42	1 1/2	39.5	75.5	22	70	60	
S	630	WH06SR1/4	6	1/4	16.5	25	12	22	19	
		WH08SR1/4	8	1/4	16.5	25	12	22	19	
		WH010SR3/8	10	3/8	18.5	30	12	27	24	
		WH012SR3/8	12	3/8	18.5	30	12	27	24	
	400	WH016SR1/2	16	1/2	22.5	37.5	14	32	30	
		WH020SR3/4	20	3/4	25.5	44	16	41	36	
		WH025SR1	25	1	31.5	55.5	18	50	46	
		WH030SR1 1/4	30	1 1/4	36	65.5	20	60	55	
		315	WH038SR1 1/2	38	1 1/2	40.5	75.5	22	70	60



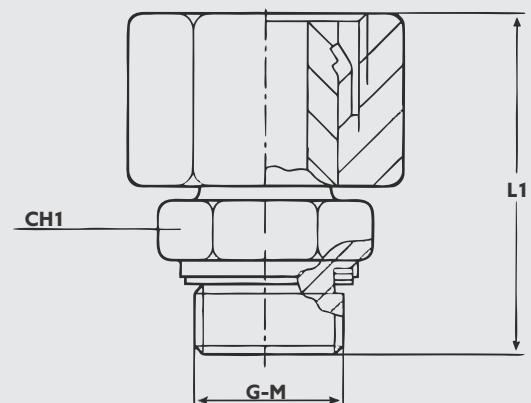
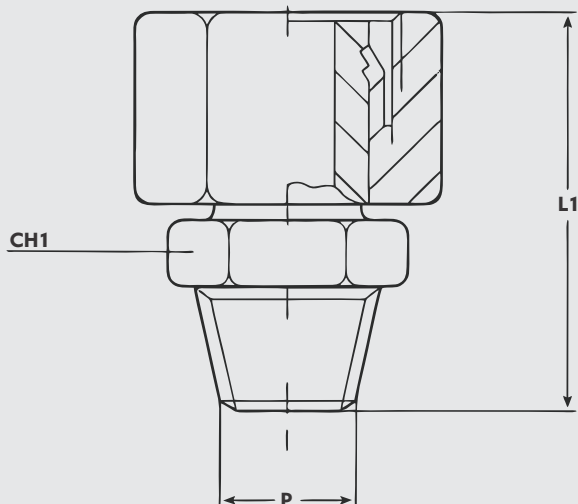
# ADJUSTABLE COUPLINGS

## Adjustable Stud Standpipe Couplings - Type EVGE



### NPT Threads

Series	Bar	Part No	Tube	Thread (NPT)	L1	CH1
L	315	EVGE6LNPT	6	1/8	33	12
		EVGE8LNPT	8	1/4	42.5	14
		EVGE10LNPT	10	1/4	40.5	14
		EVGE12LNPT	11	3/8	46.5	19
		EVGE15LNPT	15	1/2	48.5	22
		EVGE18LNPT	18	1/2	48	22
	160	EVGE22LNPT	22	3/4	49.5	27
		EVGE28LNPT	28	1	57	36
		EVGE35LNPT	35	1 1/4	65	46
		EVGE42LNPT	42	1 1/2	69.5	50
S	630	EVGE6SNPT	6	1/4	40	14
		EVGE8SNPT	8	1/4	42.5	14
		EVGE10SNPT	10	3/8	44.5	19
		EVGE12SNPT	12	3/8	46.5	19
		EVGE14SNPT	14	1/2	53	22
	400	EVGE16SNPT	16	1/2	53.5	22
		EVGE20SNPT	20	3/4	60	27
		EVGE25SNPT	25	1	70	36
		EVGE30SNPT	30	1 1/4	73.5	46
	315	EVGE38SNPT	38	1 1/2	83	50





Series	Bar	Part No	Tube	G-M (BSP)/Metric	L1	CH1
L	315	EVGE6-LRED	6	1/8	24.5	14
		EVGE8-LRED	8	1/4	29.5	19
		EVGE10-LRED	10	1/4	27.5	19
		EVGE12-LRED	12	3/8	34	22
		EVGE15-LRED	15	1/2	32	27
		EVGE18-LRED	18	1/2	31.5	27
	160	EVGE22-LRED	22	3/4	32.5	32
		EVGE28-LRED	28	1	35	41
		EVGE35-LRED	35	1 1/4	42.5	50
		EVGE42-LRED	42	1 1/2	46.5	55
S	630	EVGE6-SRED	6	1/4	27	19
		EVGE8-SRED	8	1/4	29.5	19
		EVGE10-SRED	10	3/8	32	22
		EVGE12-SRED	12	3/8	34	22
	400	EVGE16-SRED	16	1/2	37	27
		EVGE20-SRED	20	3/4	43	32
		EVGE25-SRED	25	1	48	41
		EVGE30-SRED	30	1 1/4	51	50
	315	EVGE38-SRED	38	1 1/2	60	55
	L	315	EVGE6-LMED	6	10x1	24.5
EVGE8-LMED			8	12x1.5	26.5	17
EVGE10-LMED			10	14x1.5	27.5	19
EVGE12-LMED			12	16x1.5	30.5	22
EVGE15-LMED			15	18x1.5	31.5	24
EVGE18-LMED			18	22x1.5	31.5	27
160		EVGE22-LMED	22	26x1.5	32.5	32
		EVGE28-LMED	28	33x2	35	41
		EVGE35-LMED	35	42x2	42.5	50
		EVGE42-LMED	42	48x2	46.5	55
S	630	EVGE6-SMED	6	12x1.5	27	17
		EVGE8-SMED	8	14x1.5	29.5	19
		EVGE10-SMED	10	16x1.5	32	22
		EVGE12-SMED	12	18x1.5	34	24
	400	EVGE16-SMED	16	22x1.5	37	27
		EVGE20-SMED	20	27x2	43	32
		EVGE25-SMED	25	33x2	48	41
		EVGE30-SMED	30	42x2	51	50
	315	EVGE38-SMED	38	48x2	60	55

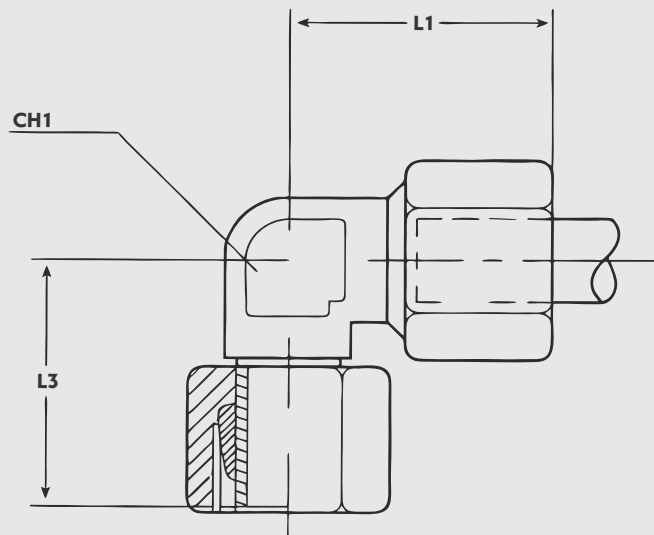


# ADJUSTABLE COUPLINGS

## Adjustable Equal Elbows - Type EVW



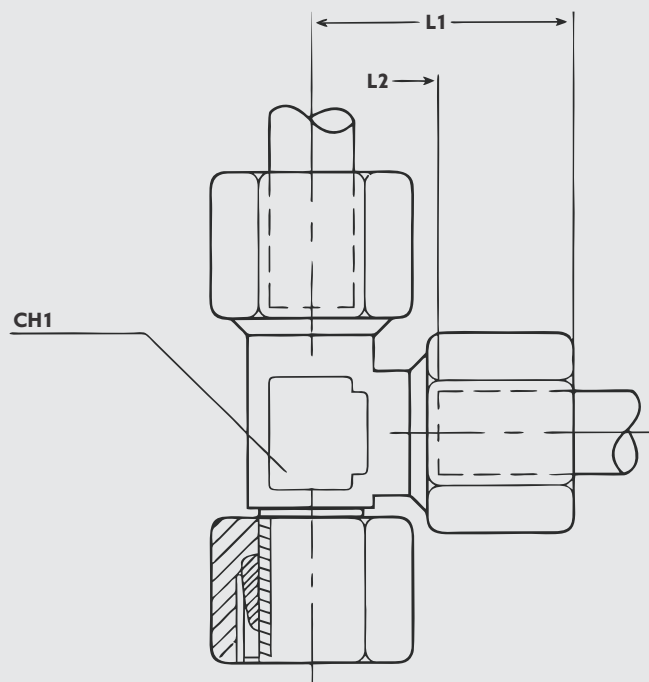
Series	Bar	Part No	Tube	L1	L3	CH1
L	35	EVW6L	6	27	26	12
		EVW8L	8	29	27	12
		EVW10L	10	30	28.5	14
		EVW12L	12	32	29	17
		EVW15L	15	36	32	19
	60	EVW18L	18	40	35	24
		EVW22L	22	44	38	27
		EVW28L	28	47	41.5	36
		EVW35L	35	56	51	41
		EVW42L	42	63	56	50
S	630	EVW6S	6	31	27	12
		EVW8S	8	32	27	14
		EVW10S	10	34	29.5	17
		EVW12S	12	38	30.5	17
	400	EVW16S	16	43	36	24
		EVW20S	20	48	44	27
		EVW25S	25	54	49.5	36
		EVW30S	30	62	55	41
	35	EVW38S	38	72	63	50



## Adjustable Male Stud Barrel Tee - Type EVL



Series	Bar	Part No	Tube	L1	L2	CH1
L	315	EVL6L	6	27	12	12
		EVL8L	8	29	14	12
		EVL10L	10	30	15	14
		EVL12L	12	32	17	17
		EVL15L	15	36	21	19
		EVL18L	18	40	23.5	24
	160	EVL22L	22	44	27.5	27
		EVL28L	28	47	30.5	36
		EVL35L	35	56	34.5	41
		EVL42L	42	63	40	50
S	630	EVL6S	6	31	16	12
		EVL8S	8	32	17	14
		EVL10S	10	34	17.5	17
		EVL12S	12	38	21.5	17
	400	EVL16S	16	43	24.5	24
		EVL20S	20	48	26.5	27
		EVL25S	25	54	30	36
		EVL30S	30	62	35.5	41
	315	EVL38S	38	72	41	50

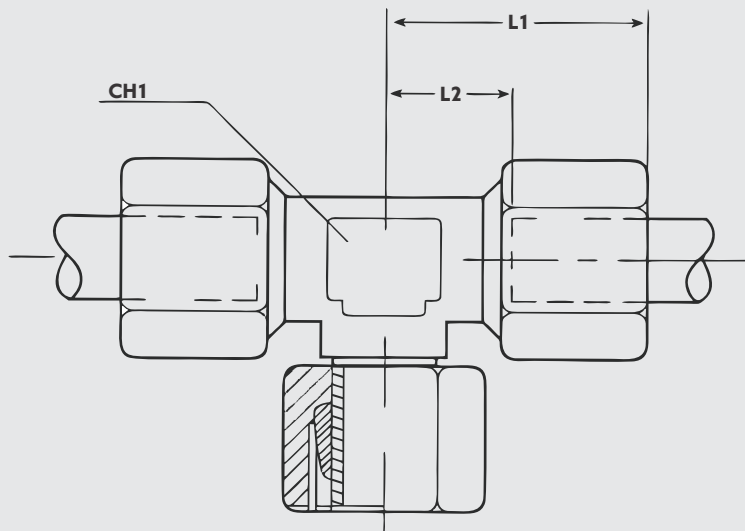


# ADJUSTABLE COUPLINGS

## Adjustable Equal Branch Tee - Type EVT



Series	Bar	Part No	Tube	L1	L2	CH1
L	315	EVT6L	6	27	12	12
		EVT8L	8	29	14	12
		EVT10L	10	30	15	14
		EVT12L	12	32	17	17
		EVT15L	15	36	21	19
		EVT18L	18	40	23.5	24
	160	EVT22L	22	44	27.5	27
		EVT28L	28	47	30.5	36
		EVT35L	35	56	34.5	41
		EVT42L	42	63	40	50
630	EVT6S	6	31	16	12	
	EVT8S	8	32	17	14	
	EVT10S	10	34	17.5	17	
	EVT12S	12	38	21.5	17	
400	EVT16S	16	43	24.5	24	
	EVT20S	20	48	26.5	27	
	EVT25S	25	54	30	36	
	EVT30S	30	62	35.5	41	
	315	EVT38S	38	72	41	50



## Male to Female Reducing Thread Adaptors - Type RI-ED

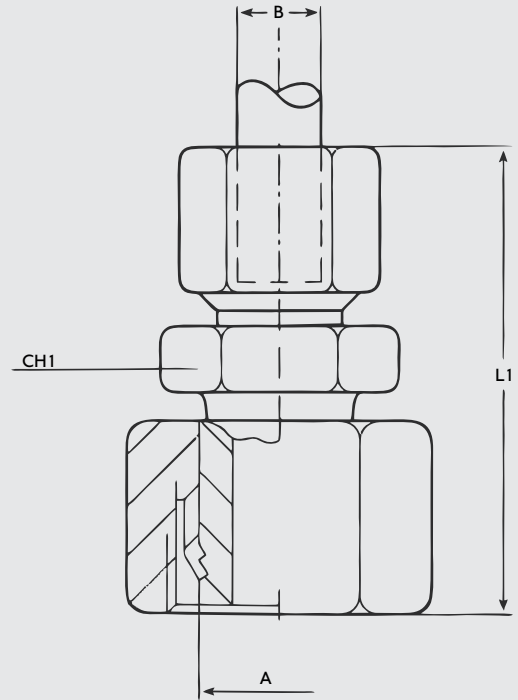


### BSP Parallel Threads

Series	Bar	Part No	(1) Male	(2) Female
L/S	630	RI3/8X1/8-ED	3/8	1/8
		RI1/2X1/8-ED	1/2	1/8
		RI1/2X1/4-ED	1/2	1/4
	400	RI3/4X1/4-ED	3/4	1/4
		RI3/4X3/8ED	3/4	3/8
		RI1X1/4ED	1	1/4
		RI1X3/8ED	1	3/8
		RI1X1/2ED	1	1/2
		RI11/4X1/2-ED	1 1/4	1/2
		RI11/4X3/4ED	1 1/4	3/4
	315	RI11/2X1/2-ED	1 1/2	1/2
		RI11/2X3/4-ED	1 1/2	3/4
RI11/2X1-ED		1 1/2	1	
L/S	630	RI1/8X1/4-ED	1/8	1/4
		RI1/8X3/8-ED	1/8	3/8
		RI1/4X1/8-ED	1/4	1/8
		RI1/4X3/8-ED	1/4	3/8
		RI1/4X1/2-ED	1/4	1/2
		RI3/8X1/4-ED	3/8	1/4
	400	RI3/8X1/2-ED	3/8	1/2
		RI3/8X3/4-ED	3/8	3/4
	630	RI1/2X1/8-ED	1/2	3/8
	400	RI1/2X3/4-ED	1/2	3/4
		RI1/2X1-ED	1/2	1
		RI1/2X11/4-ED	1/2	11/4
		RI3/4X1/2-ED	3/4	1/2
		RI3/4X1-ED	3/4	1
		RI3/4X11/4-ED	3/4	11/4
	315	RI3/4X11/2-ED	3/4	11/2
	400	RI1X3/4-ED	1	3/4
	315	RI1X11/4-ED	1	11/4
		RI1X11/2-ED	1	11/2
	400	RI11/4X1-ED	1	1
	315	RI11/4X11/2-ED	1 1/4	11/2
RI11/2X11/4-ED		1 1/2	11/4	

# ADJUSTABLE COUPLINGS

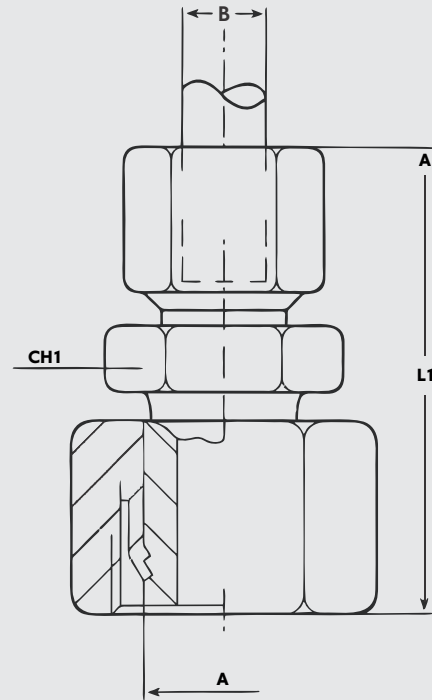
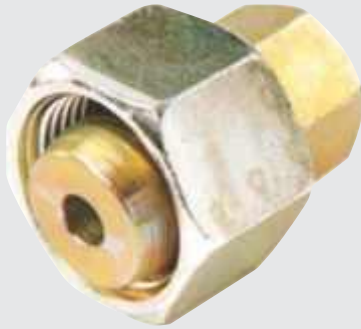
## Adjustable Reducing Standpipe - Type - KOR



### L Series

Series	Bar	Part No	A	B	L1	CH1
L	315	KOR8/6L	8	6	40	12
		KOR10/6L	10	6	40.5	12
		KOR12/6L	12	6	41.5	14
		KOR15/6L	15	6	41.5	17
		KOR18/6L	18	6	44	19
	160	KOR22/6L	22	6	45	24
		KOR28/6L	28	6	46.5	30
		KOR35/6L	35	6	53	36
		KOR42/6L	42	6	54	46
	315	KOR10/8L	10	8	42	14
		KOR12/8L	12	8	42	14
		KOR15/8L	15	8	42	17
		KOR18/8L	18	8	44.5	19
	160	KOR22/8L	22	8	45.5	24
		KOR28/8L	28	8	47	30
		KOR35/8L	35	8	53.5	36
		KOR42/8L	42	8	54.5	46
	315	KOR12/10L	12	10	43	17
		KOR15/10L	15	10	43	17
		KOR18/10L	18	10	45.5	19
	160	KOR22/10L	22	10	46.5	24
		KOR28/10L	28	10	48	30
		KOR35/10L	35	10	54.5	36
		KOR42/10L	42	10	55.5	46
	315	KOR15/12L	15	12	43.5	19
		KOR18/12L	18	12	45	19
	160	KOR22/12L	22	12	46	24
		KOR28/12L	28	12	47.5	30
		KOR35/12L	35	12	54	36
		KOR42/12L	42	12	55	46
	160	KOR18/15L	18	15	46.5	24
		KOR22/15L	22	15	47.5	24
		KOR28/15L	28	15	49	30
KOR35/15L		35	15	55.5	36	
KOR42/15L		42	18	56.5	46	
KOR22/18L		22	18	49	27	
KOR28/18L		28	18	50	30	
KOR35/18L		35	18	56.5	36	
KOR42/18L		42	18	57.5	46	
KOR28/22L		28	22	52	32	
KOR35/22L		35	22	58.5	36	
KOR42/22L		42	22	59.5	46	
KOR35/28L		35	28	58.5	41	
KOR42/28L		42	28	59.5	46	
KOR42/35L		42	35	63.5	46	

## Adjustable Reducing Standpipe - Type - KOR



### S Series

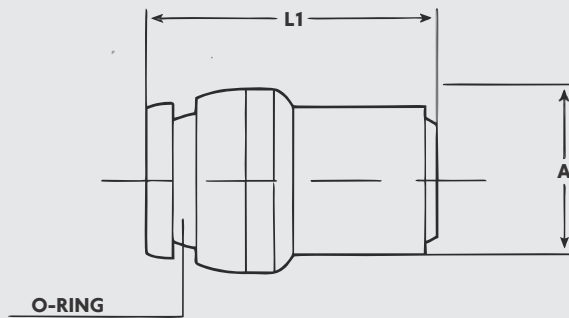
Series	Bar	Part No	A	B	L1	CH1
S	630	KOR8/6S	8	6	44	14
		KOR10/6S	10	6	46.5	14
		KOR12/6S	12	6	46	14
	400	KOR16/6S	16	6	51	17
		KOR20/6S	20	6	56.5	22
		KOR25/6S	25	6	59	27
		KOR30/6S	30	6	63.5	32
	315	KOR38/6S	38	6	69.5	41
		KOR10/8S	10	8	48.5	17
	630	KOR12/8S	12	8	48	17
		KOR16/8S	16	8	51	17
	400	KOR20/8S	20	8	56.5	22
		KOR25/8S	25	8	59	27
		KOR30/8S	30	8	63.5	32
		KOR38/8S	38	8	69.5	41
	315	KOR12/10S	12	10	48.5	19
		KOR16/10S	16	10	51.5	19
	400	KOR20/10S	20	10	57	22
		KOR25/10S	25	10	59.5	27
		KOR30/10S	30	10	64	32
	250	KOR38/10S	38	10	70	41
		400	KOR16/12S	16	12	53.5
	KOR20/12S		20	12	57	22
	KOR25/12S		25	12	59.5	27
	KOR30/12S		30	12	64	32
	315	KOR38/12S	38	12	70	41
		KOR20/16S	20	16	60.5	27
	400	KOR25/16S	25	16	63	27
		KOR30/16S	30	16	67.5	32
	315	KOR38/16S	38	16	73.5	41
400		KOR25/20S	25	20	68	32
	KOR30/20S	30	20	70.5	32	
	KOR38/20S	38	20	76.5	41	
	KOR30/25S	30	25	75.5	41	
	KOR38/25S	38	25	79.5	41	
315	KOR38/30S	38	30	82.5	46	

# ADJUSTABLE COUPLINGS

## Blanking Plugs - Type - BUZ



Series	Bar	Part No	Tube	A	L1
L	315	BUZ6L/S	6	6	17
		BUZ8L/S	8	8	17
		BUZ10L/S	10	10	20
		BUZ12L/S	12	12	21
		BUZ15L	15	15	21
		BUZ18L	18	18	23
	160	BUZ22L	22	22	23
		BUZ28L	28	28	25
		BUZ 35L	35	35	29
		BUZ42L	42	42	30
S	400	BUZ16S	16	16	24
		BUZ20S	20	20	28
		BUZ25S	25	25	31
		BUZ30S	30	30	34
	315	BUZ38S	38	38	38

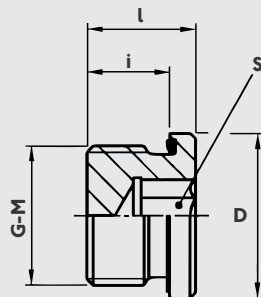




## Blanking Plugs (Internal Hex) - Type - VSTI-ED



Psi	G-M	Part No	D	l	i	S
400 (5801)	G 1/8 A	VSTI1/8-ED	14	12	8	5
	G 1/4 A	VSTI1/4-ED	19	17	12	6
	G 3/8 A	VSTI3/8-ED	22	17	12	8
	G 1/2 A	VSTI1/2-ED	27	19	14	10
	G 3/4 A	VSTI3/4-ED	32	21	16	12
	G 1 A	VSTI-WD	40	22.5	16	17
250 (3626)	G 1 1/4 A	VSTI1/4-WD	50	22.5	16	22
	G 1 1/2 A	VSTI1/2-ED	55	22.5	16	24
400 (5801)	G 1 1/4 A	VSTI1/4-WD/PN400	50	28	20	22
	G 1 1/2 A	VSTI1/2-WD/PN400	55	30	22	24
400 (5801)	M 10 x 1	VSTI10X1-ED	14	12	8	5
	M 12 x 1,5	VSTI12X1,5-ED	17	17	12	6
	M 14 x 1,5	VSTI14X1,5-ED	19	17	12	6
	M 16 x 1,5	VSTI16X1,5-ED	22	17	12	8
	M 18 x 1,5	VSTI18X1,5-ED	24	17	12	8
	M 20 x 1,5	VSTI20X1,5-WD	26	19	14	10
	M 22 x 1,5	VSTI22X1,5-WD	27	19	14	10
	M 26 x 1,5	VSTI26X1,5-WD	32	21	16	12
	M 27 x 2	VSTI27X2-WD	32	21	16	12
	M 33 x 2	VSTI33X2-WD	40	22.5	16	17
250 (3626)	M 42 x 2	VSTI42X2-WD	50	22.5	16	22
	M 48 x 2	VSTI48X2-WD	55	22.5	16	24
400 (5801)	M 42 x 2	VSTI42X2-WD/PN400	50	28	20	22
	M 48 x 2	VSTI48X2-WD/PN400	55	30	22	24

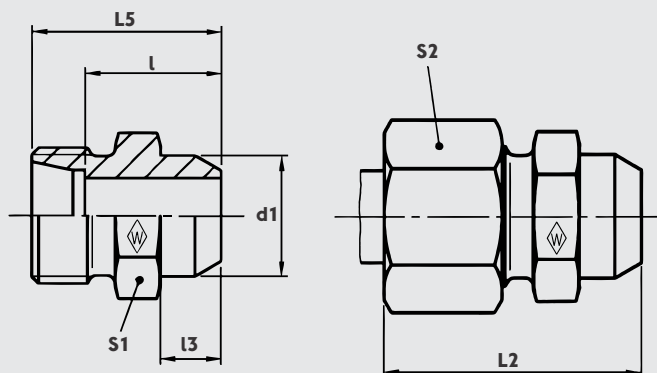


# WELD-ON COUPLINGS

## Welding Bosses - Type AS



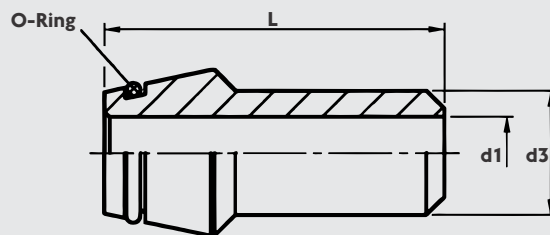
Tube	Bar	Part No	pcs	L <sub>2</sub>	L <sub>5</sub>	l	l <sub>3</sub>	d <sub>1</sub>	S <sub>1</sub>	S <sub>2</sub>
500 (7252) L	6	AS 6L	1.1	29	21	14	7	10	12	14
	8	AS 8L	1.5	31	23	16	8	12	14	17
	10	AS10L	2.2	33	25	18	8	14	17	19
400 (5801) L	12	AS 1L	2.5	33	25	18	8	16	19	22
	15	AS15L	4.3	37	29	22	10	19	22	27
	18	AS18L	6.6	40	31	23.5	10	22	27	32
250 (3626) L	22	AS22L	9.8	45	36	28.5	12	27	32	36
	28	AS 2L	15.9	47	38	30.5	12	32	41	41
	35	AS35L	23.0	54	43	32.5	14	40	46	50
	42	AS42L	32.7	58	46	35	16	46	55	60
800 (11603) S	6	AS 6S	2.1	34	26	19	7	11	14	17
	8	AS 8S	3.1	36	28	21	8	13	17	09
	10	AS10S	4.1	39	30	22.5	8	15	19	22
630 (9137) S	12	AS12S	5.6	41	32	24.5	10	17	22	24
	14	AS14S	7.0	45	35	27	10	19	24	27
	16	AS16S	8.3	45	35	26.5	10	21	27	30
400 (5801) S	20	AS20S	12.9	51	40	29.5	12	26	32	36
	25	AS25S	21.9	56	44	32	12	31	41	46
	30	AS30S	29.5	62	49	35.5	14	36	46	50
	38	AS38S	44.7	69	54	38	16	44	55	60



## Weld Nipple with O-ring - Type - SKO



Tube	Bar	Part No	pcs	d <sub>1</sub>	L	O-Ring
8	400	SKO8X2	1.1	4	31	6 X 1.5
10	315	SKO10X2	1.5	6	32.5	7.5 X 1.5
12	400	SKO12X2.5	2.2	7	32.5	9 X 1.5
16	400	SKO16X3	3.9	10	38.5	12 X 2
20	250	SKO20X3	6.0	14	44.5	16.3 X 2.4
	400	SKO20X4	7.4	12		
25	250	SKO25X3	8.7	19	49.5	20.3 X 2.4
	315	SKO25X4	10.7	17		
30	250	SKO30X4	14.0	22	52	25.3 X 2.4
	315	SKO30X5	16.5	20		
	400	SKO30X6	18.6	18		
38	160	SKO38X4	20.4	30	56.5	33.3 X 2.4
	250	SKO38X5	23.5	28		
	315	SKO38X6	27.2	26		
	400	SKO38X7	30.1	24		



# WELD-ON COUPLINGS

## Weld Bulkheads - Type ESV



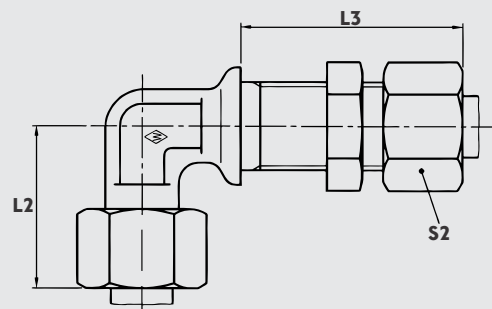
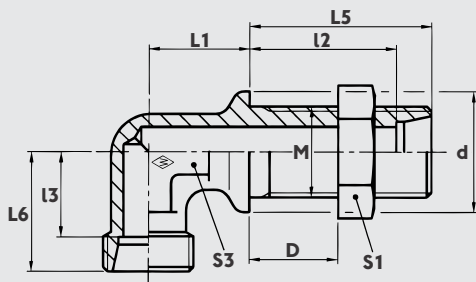
Series	Bar	Part No	Tube
L	315	ESV6L	6
		ESV8L	8
		ESV10L	10
		ESV12L	12
		ESV15L	15
		ESV18L	18
	160	ESV22L	22
		ESV28L	28
		ESV35L	35
		ESV42L	42
S	630	ESV6S	6
		ESV8S	8
		ESV10S	10
		ESV12S	12
	400	ESV16S	16
		ESV20S	20
		ESV25S	25
		ESV30S	30
	315	ESV38S	38



## Elbow Bulkhead Couplings with Locknut - Type - WSV

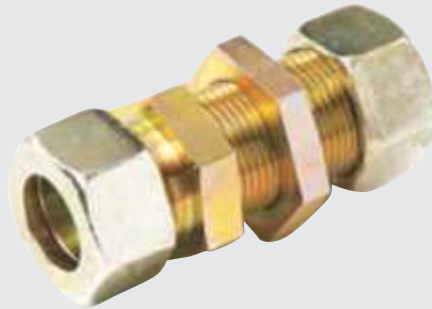


Bar	Tube	M	D		Part No	pcs	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>5</sub>	L <sub>6</sub>	§	§	§	§	
			Min	Max												
500 (7252) L	6	12 X 1.5	4	16	WSV6L	5.0	14	27	42	34	19	27	12	17	14	12
	8	14 X 1.5	4	16	WSV8L	6.5	17	29	42	34	21	27	14	19	17	12
	10	16 X 1.5	4	16	WSV10L	8.0	18	30	43	35	22	28	15	22	19	14
400 (5801) L	12	18 X 1.5	4	16	WSV12L	10.0	20	32	44	36	24	29	17	24	22	17
	15	22 X 1.5	4	16	WSV15L	17.0	23	36	46	38	28	31	21	30	27	19
	18	26 X 1.5	4	16	WSV18L	24.0	24	40	49	40	31	32.5	23.5	36	32	24
250 (3626) L	22	30 X 2	5	16	WSV22L	64.2	30	44	51	42	35	34.5	27.5	41	36	27
	28	36 X 2	5	16	WSV28L	44.5	34	47	52	43	38	35.5	30.5	46	41	36
	35	45 X 2	5	16	WSV35L	68.8	39	56	58	47	45	36.5	34.5	55	50	41
	42	52 X 2	5	16	WSV42L	196.7	43	63	59	47	51	36	40	65	60	50
800 (11603) S	6	14 X 1.5	4	16	WSV6S	7.5	17	31	44	36	23	29	16	19	17	12
	8	16 X 1.5	4	16	WSV8S	10.0	18	32	44	36	24	29	17	22	19	14
	10	18 X 1.5	4	16	WSV10S	12.2	20	34	46	37	25	29.5	17.5	24	22	17
630 (9137) S	12	20 X 1.5	4	16	WSV12S	16.0	21	38	47	38	29	30.5	21.5	27	24	17
	14	22 X 1.5	4	16	WSV14S	20.0	23	40	50	40	30	32	22	30	27	19
	16	24 X 1.5	4	16	WSV16S	23.0	24	43	50	40	33	31.5	24.5	32	30	24
400 (5801) S	20	30 X 2	5	16	WSV20S	38.5	30	48	55	44	37	33.5	26.5	41	36	27
	25	36 X 2	5	16	WSV25S	62.0	34	54	59	47	42	35	30	46	46	36
	30	42 X 2	5	16	WSV30S	88.5	39	62	64	51	49	37.5	35.5	50	50	41
	38	52 X 2	5	16	WSV38S	129.9	43	72	68	53	57	37	41	65	60	50

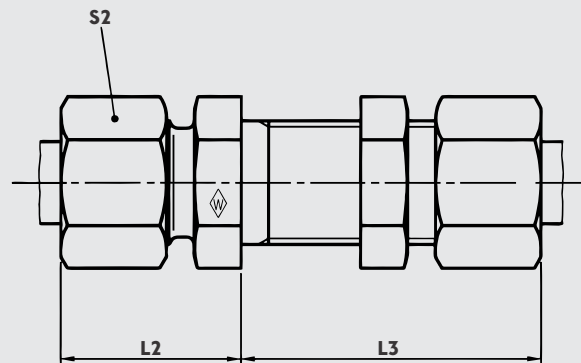
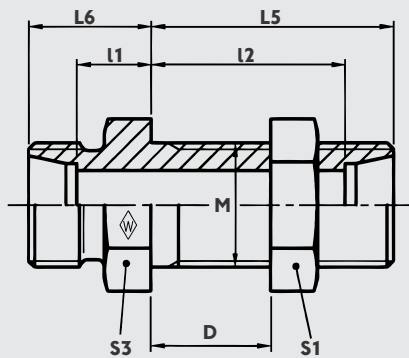


# BULKHEAD COUPLINGS

## Straight Bulkhead Couplings with Locknut - Type - SV

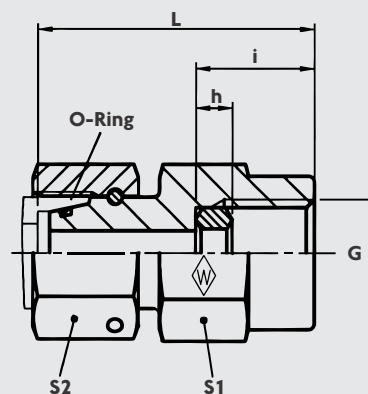


Bar	Tube	M	D <sub>Min</sub>	D <sub>Max</sub>	Part No	pcs	L <sub>2</sub>	L <sub>3</sub>	L <sub>5</sub>	L <sub>6</sub>	l	l	§	§	§
500 (7252) L	6	12 X 1.5	4	16	SV6L	4.0	22	42	34	14	7	27	17	14	17
	8	14 X 1.5	4	16	SV8L	5.0	23	42	34	15	8	27	19	17	19
	10	16 X 1.5	4	16	SV10L	6.5	25	43	35	17	10	28	22	19	22
400 (5801) L	12	18 X 1.5	4	16	SV12L	7.5	25	44	36	17	10	29	24	22	24
	15	22 X 1.5	4	16	SV15L	13.0	27	45	38	19	12	31	30	27	27
	18	26 X 1.5	4	16	SV18L	19.5	30	49	40	21	13.5	32.5	36	32	32
250 (3626) L	22	30 X 2	5	16	SV22L	25.5	33	51	42	44	16.5	34.5	41	36	36
	28	36 X 2	5	16	SV28L	34.0	35	52	43	26	18.5	35.5	46	41	41
	35	45 X 2	5	16	SV35L	49.4	40	58	47	29	18.5	36.5	55	50	50
	42	52 X 2	5	16	SV42L	71.6	42	59	47	30	19	36	65	60	60
800 S	6	14 X 1.5	4	16	SV6S	6.2	27	44	36	19	12	29	19	17	19
	8	16 X 1.5	4	16	SV8S	9.0	18	44	36	20	13	29	22	19	22
	10	18 X 1.5	4	16	SV10S	11.3	31	46	37	22	14.5	29.5	24	22	24
630 (9137) S	12	20 X 1.5	4	16	SV12S	14.0	31	47	38	22	14.5	30.5	27	24	27
	14	22 X 1.5	4	16	SV14S	18.0	35	50	40	25	17	32	30	27	30
	16	24 X 1.5	4	16	SV16S	17.5	35	50	40	25	16.5	31.5	32	30	32
400 (5801) S	20	30 X 2	5	16	SV20S	33.2	39	55	44	28	17.5	33.5	41	36	41
	25	36 X 2	5	16	SV25S	49.5	44	59	47	32	20	35	46	46	46
	30	42 X 2	5	16	SV30S	66.4	48	64	51	35	21.5	37.5	50	50	50
	38	52 X 2	5	16	SV38S	105.9	53	68	53	38	22	37	65	60	65



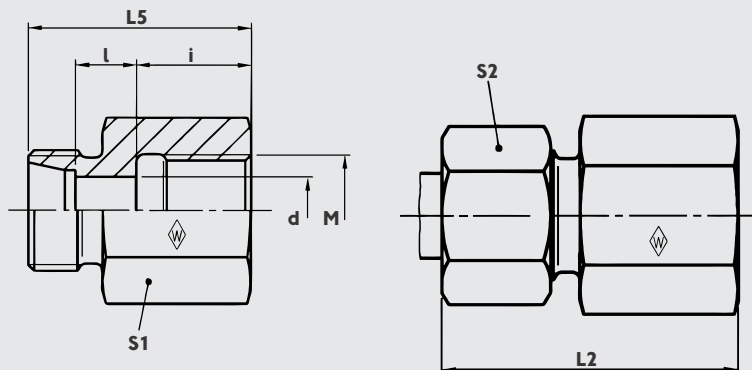
# PRESSURE GAUGE CONNECTIONS

## Pressure Gauge Connectors - Type MAV - EV



Bar	Tube	G	Part No	pcs	L	i	h	S <sub>1</sub>	S <sub>2</sub>	O-Ring
500 (7252) L	6	1/4	MAV-EV6LR	5.7	38	14.5	4.5	19	14	4.5 X 1.5
	8	1/4	MAV-EV8LR	7.0	38	14.5	4.5	19	17	6 X 1.5
	10	1/4	MAV-EV10LR	7.2	39.5	14.5	4.5	19	19	8.5 X 1.5
400(5801) L	12	1/4	MAV-EV12LR	8.0	40.5	14.5	4.5	19	22	10 X 1.5
630 (9137) S	6	1/2	MAV-EV6SR	11.5	45	20	5	27	17	4.5 X 1.5
	8	1/2	MAV-EV8SR	11.4	45	20	5	27	19	6 X 1.5
	10	1/2	MAV-EV10SR	13.4	47	20	5	27	22	8.5 X 1.5
	12	1/2	MAV-EV12SR	12.9	47.5	20	5	27	24	10 X 1.5

## Pressure Gauge Adaptors - Type MAV



Bar	Tube	G	Part No	pcs	i	h	L <sub>2</sub>	L <sub>3</sub>	S <sub>1</sub>	S <sub>2</sub>	O-Ring
250 (3626) L	6	10 X 1	MAV6LR	1.9	34	26.5	7	12.5	4	14	14
	8	12 X 1.5	MAV8LR	3.1	39	31	7	17	6	17	17
	10	14 X 1.5	MAV10LR	3.8	40	32	8	17	8	19	19
	12	16 X 1.5	MAV12LR	5.2	41	33	9	17	10	22	22
	15	18 X 1.5	MAV15LR	6.7	43	35	11	17	12	24	27
160 (2321) L	18	22 X 1.5	MAV18LR	10.9	46	37	10.5	19	15	30	32
	22	26 X 1.5	MAV22LR	12.1	51	42	13.5	21	19	32	36
630 (9137) S	6	12 X 1.5	MAV 6SR	3.6	41	33	9	17	4	17	17
	8	14 X 1.5	MAV8SR	4.2	41	33	9	17	5	19	19
	10	16 X 1.5	MAV10SR	5.7	43	34	9.5	17	7	22	22
	12	18 X 1.5	MAV12SR	6.9	44	35	10.5	17	8	24	24
	14	20 X 1.5	MAV14SR	9.3	49	39	12	19	10	27	27
400 (5801) S	16	22 X 1.5	MAV16SR	11.4	49	39	11.5	19	12	30	30
	20	27 X 2	MAV20SR	15.2	56	45	12.5	22	16	36	36

# PRESSURE GAUGE CONNECTIONS

## Test Points - Type - MA3ED



## BSP Parallel Threads

Working Pressure Bar	Part No	Stud Thread (BSP)
400	MA3R1/8	1/8
400	MA3R1/4	1/4
400	MA3R3/8	3/8
400	MA3R1/2	1/2

## Tee Piece Test Points - Type MV3 - L/S



Series	Bar	Part No	Tube
L	250	MV3-L6	6
		MV3-L8	8
		MV3-L10	10
		MV3-L12	12
		MV3-L15	15
	160	MV3-L18	18
		MV3-L22	22
		MV3-L28	28
	100	MV3-L35	35
		MV3-L42	42
400		MV3-S6	6
		MV3-S8	8
	MV3-S10	10	
	MV3-S12	12	
	MV3-S16	15	
	MV3-S20	18	
	MV3-S25	22	
	MV3-S30	28	
250	MV3-S38	35	



## Test Point with Swivel Nut - Type MA3 - L/S



Series	Bar	Part No	Tube
L	250	MA3-L6	6
		MA3-L8	8
		MA3-L10	10
		MA3-L12	12
		MA3-L15	15
	160	MA3-L18	18
		MA3-L22	28
		MA3-L28	28
	100	MA3-L35	35
		MA3-L42	42
MA3-L42		42	
S	400	MA3-S6	6
		MA3-S8	8
		MA3-S10	10
		MA3-S12	12
		MA3-S16	15
		MA3-S20	18
		MA3-S25	22
		MA3-S30	28
	250	MA3-S38	35

# MINIMESS HOSE AND TEST POINTS

## Minimess Hose - Type - SMS

Working Pressure Bar	Part No
400	SMS20



## Minimess Hose Fittings - Type - SMS20A

- Hoses assembled in store

Working Pressure Bar	Part No	GM
400	SMS20A	16X2

# SAE FLANGES



Family	Type
SAE 4 Bolt Flanges (SAE J58)	SAE O-Ring Flanges BSP Threaded
	SAE O-Ring Flanges Socket Weld
	SAE O-Ring Flange Dimensions
	SAE Counter Flanges BSP Threaded
	SAE Counter Flanges Socket Weld
	SAE Counter Flange Dimensions
	SAE Blanking Flanges
	SAE Blanking Flange Dimensions
Pump Connectors	Cast Iron Gear Pump Elbows (Group 3)
	Cast Iron Gear Pump Elbows (Group P, BK) "Bosch Mount"
	Straight Steel Gear Pump Flanges (Group 3)

## SAE O-ring Flanges - BSP Threaded



- Forged in carbon steel and conforming to SAE J58 standard.
- Supplied complete with four metric or UNC bolts, four washers & one o-ring.
- Note: Although all 6000 series flanges have a designated working pressure of 6000 psi (414 Bar), working pressures of 3000 series flanges vary between sizes. To avoid dangerous failures, always check the recommended working pressure of 3000 series flanges against system pressure prior to installation.

**3000 Series BSP Threaded Flanges (Code 61)**

Size	Part No	Max Working Pressure (Bar)	Bolts
3/4"	AFS100GM	345	Metric
3/4"	AFS100GU	345	UNC
1"	AFS102GM	345	Metric
1"	AFS102GU	345	UNC
1 1/4"	AFS104GM	276	Metric
1 1/4"	AFS104GU	276	UNC
1 1/2"	AFS106GM	207	Metric
1 1/2"	AFS106GU	207	UNC
2"	AFS108GM	207	Metric
2"	AFS108GU	207	UNC
2 1/2"	AFS110GM	172	Metric
2 1/2"	AFS110GU	172	UNC
3"	AFS112GM	138	Metric
3"	AFS112GU	138	UNC
3 1/2"	AFS114GM	34	Metric
3 1/2"	AFS114GU	34	UNC
4"	AFS116GM	34	Metric
4"	AFS116GU	34	UNC

**6000 Series BSP Threaded Flanges (Code 62)**

Size	Part No	Max Working Pressure (Bar)	Bolts
3/4"	AFS402GM	414	Metric
3/4"	AFS402GU	414	UNC
1"	AFS403GM	414	Metric
1"	AFS403GU	414	UNC
1 1/4"	AFS404GM	414	Metric
1 1/4"	AFS404GU	414	UNC
1 1/2"	AFS405GM	414	Metric
1 1/2"	AFS405GU	414	UNC
2"	AFS406GM	414	Metric
2"	AFS406GU	414	UNC
2 1/2"	AFS507GM	414	Metric
2 1/2"	AFS507GU	414	UNC
3"	AFS508GM	414	Metric

# SAE FLANGES

## SAE O-ring Flanges - Socket Weld



- Forged in carbon steel and conforming to SAE J58 standard.
- Supplied complete with four metric or UNC bolts, four washers & one o-ring.
- Note: Although all 6000 series flanges have a designated working pressure of 6000 psi (414 Bar), working pressures of 3000 series flanges vary between sizes. To avoid dangerous failures, always check the recommended working pressure of 3000 series flanges against system pressure prior to installation.

**3000 Series Socket Weld Flanges (Code 61)**

Size	Part No	Max Working Pressure (Bar)	Bolts
3/4"	AFS100SM	345	Metric
3/4"	AFS100SU	345	UNC
1"	AFS102SM	345	Metric
1"	AFS102SU	345	UNC
1 1/4"	AFS104SM	276	Metric
1 1/4"	AFS104SU	276	UNC
1 1/2"	AFS106SM	207	Metric
1 1/2"	AFS106SU	207	UNC
2"	AFS108SM	207	Metric
2"	AFS108SU	207	UNC
2 1/2"	AFS110SM	172	Metric
2 1/2"	AFS110SU	172	UNC
3"	AFS112SM	138	Metric
3"	AFS112SU	138	UNC
3 1/2"	AFS114SM	34	Metric
3 1/2"	AFS114SU	34	UNC
4"	AFS116SM	34	Metric
4"	AFS116SU	34	UNC

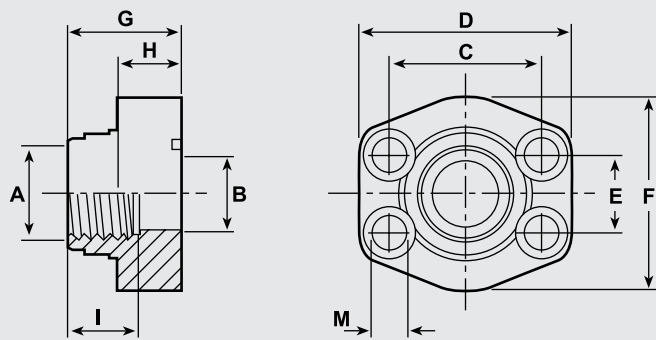
**6000 Series Socket Weld Flanges (Code 62)**

Size	Part No	Max Working Pressure (Bar)	Bolts
3/4"	AFS402SM	414	Metric
3/4"	AFS402SU	414	UNC
1"	AFS403SM	414	Metric
1"	AFS403SU	414	UNC
1 1/4"	AFS404SM	414	Metric
1 1/4"	AFS404SU	414	UNC
1 1/2"	AFS405SM	414	Metric
1 1/2"	AFS405SU	414	UNC
2"	AFS406SM	414	Metric
2"	AFS406SU	414	UNC
2 1/2"	AFS507SM	414	Metric
2 1/2"	AFS507SU	414	UNC
3"	AFS508SM	414	Metric

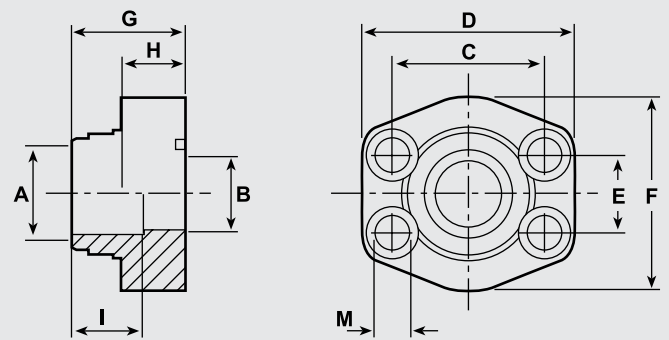
## SAE O-ring Flange Dimensions BSP Threaded and Socket Weld Flanges



	Size	A Threaded	A Socket Weld	B	C	D	E	F	G	H	I	L	Metric Cap Screws	UNC Cap Screws	Weight (Kg)
	<b>3000 Series</b>	3/4"	3/4" BSPF	27.2	19	47.63	65	22.23	50	36	18	19	11	M10x35	3/8x1"1/2
1"		1" BSPF	34	25	52.37	70	26.19	55	38	18	22	11	M10x35	3/8x1"1/2	0.45
1 1/4"		1"1/4 BSPF	42.8	32	58.72	79	30.18	68	40	21	22	11.5	M10x40	7/16x1"3/4	0.66
1 1/2"		1"1/2 BSPF	48.6	38	69.85	93	35.71	78	45	25	24	13.5	M12x45	1/2x1"3/4	1.05
2"		2" BSPF	61	51	77.77	102	42.88	90	45	25	30	13.5	M12x45	1/2x1"3/4	1.17
2 1/2"		2"1/2 BSPF	76.6	63	88.9	114	50.8	105	50	25	30	13.5	M12x45	1/2x1"3/4	1.59
3"		3" BSPF	90.5	73	106.38	134	61.93	124	50	27	34	17.5	M16x50	5/8x2"	2.28
3 1/2"		3"1/2 BSPF	103	89	120.65	152	69.85	136	48	27	34	17.5	M16x50	5/8x2"	2.42
4"		4" BSPF	115.5	99	30.18	162	77.77	146	48	27	34	17.5	M16x50	5/8x2"	2.78
<b>6000 Series</b>	3/4"	3/4" BSPF	27.2	19	50.8	71	23.8	55	35	21	19	11	M10x40	3/8x1"1/2	0.51
	1"	1" BSPF	34	25	57.15	81	27.76	65	42	25	22	13	M12x45	7/16x"3/4	0.81
	1 1/4"	1"1/4 BSPF	42.8	32	66.68	95	31.75	78	45	27	23	15 *	M14x45	1/2x"3/4	1.13
	1 1/2"	1"1/2 BSPF	48.6	38	79.38	112	36.5	94	50	30	26	17	M16x50	5/8x2"	1.81
	2"	2" BSPF	61	51	96.82	134	44.45	114	65	37	30	21	M20x70	3/4x2"1/2	3.31
	2 1/2"	2"1/2 BSPF	76.6	63	123.8	180	58.7	152	80	45	32	26	M24x80	-	6.75
	3"	3" BSPF	90.5	73	152.4	208	71.4	178	90	55	40	33	M30x00	-	-



BSP Threaded



Socket Weld

## SAE Counter Flanges - BSP Threaded



- Forged in carbon steel and conforming to SAE J58 standard.
- Supplied with metric or UNC threaded fixing holes.
- Note: Although all 6000 series flanges have a designated working pressure of 6000 psi (414 Bar), working pressures of 3000 series flanges vary between sizes. To avoid dangerous failures, always check the recommended working pressure of 3000 series flanges against system pressure prior to installation.

### 3000 Series BSP Threaded Counter Flanges (Code 61)

Size	Part No	Max Working Pressure (Bar)	Fixing Bolt Holes
3/4"	GFS100G	345	Metric
3/4"	GFS100GU	345	UNC
1"	GFS102G	345	Metric
1"	GFS102GU	345	UNC
1 1/4"	GFS104G	276	Metric
1 1/4"	GFS104GU	276	UNC
1 1/2"	GFS106G	207	Metric
1 1/2"	GFS106GU	207	UNC
2"	GFS108G	207	Metric
2"	GFS108GU	207	UNC
2 1/2"	GFS110G	172	Metric
2 1/2"	GFS110GU	172	UNC
3"	GFS112G	138	Metric
3"	GFS112GU	138	UNC
3 1/2"	GFS114G	34	Metric
3 1/2"	GFS114GU	34	UNC
4"	GFS116G	34	Metric
4"	GFS116GU	34	UNC

### 6000 Series BSP Threaded Counter Flanges (Code 62)

Size	Part No	Max Working Pressure (Bar)	Fixing Bolt Holes
3/4"	GFS402G	414	Metric
3/4"	GFS402GU	414	UNC
1"	GFS403G	414	Metric
1"	GFS403GU	414	UNC
1 1/4"	GFS404G	414	Metric
1 1/4"	GFS404GU	414	UNC
1 1/2"	GFS405G	414	Metric
1 1/2"	GFS405GU	414	UNC
2"	GFS406G	414	Metric
2"	GFS406GU	414	UNC
2 1/2"	GFS507G	414	Metric
2 1/2"	GFS507GU	414	UNC
3"	GFS508G	414	Metric

## SAE Counter Flanges - Socket Weld



- Forged in carbon steel and conforming to SAE J58 standard.
- Supplied with metric or UNC threaded fixing holes.
- Note: Although all 6000 series flanges have a designated working pressure of 6000 psi (414 Bar), working pressures of 3000 series flanges vary between sizes. To avoid potential failures, always check the recommended working pressure of 3000 series flanges against system pressure prior to installation.

**3000 Series Socket Weld Counter Flanges (Code 61)**

Size	Part No	Max Working Pressure (Bar)	Fixing Bolt Holes
3/4"	GFS100S	345	Metric
3/4"	GFS100SU	345	UNC
1"	GFS102S	345	Metric
1"	GFS102SU	345	UNC
1 1/4"	GFS104S	276	Metric
1 1/4"	GFS104SU	276	UNC
1 1/2"	GFS106S	207	Metric
1 1/2"	GFS106SU	207	UNC
2"	GFS108S	207	Metric
2"	GFS108SU	207	UNC
2 1/2"	GFS110S	172	Metric
2 1/2"	GFS110SU	172	UNC
3"	GFS112S	138	Metric
3"	GFS112SU	138	UNC
3 1/2"	GFS114S	34	Metric
3 1/2"	GFS114SU	34	UNC
4"	GFS116S	34	Metric
4"	GFS116SU	34	UNC

**6000 Series Socket Weld Counter Flanges (Code 62)**

Size	Part No	Max Working Pressure (Bar)	Fixing Bolt Holes
3/4"	GFS402S	44	Metric
3/4"	GFS402SU	44	UNC
1"	GFS403S	44	Metric
1"	GFS403SU	44	UNC
1 1/4"	GFS404S	44	Metric
1 1/4"	GFS404SU	44	UNC
1 1/2"	GFS405S	44	Metric
1 1/2"	GFS405SU	44	UNC
2"	GFS406S	44	Metric
2"	GFS406SU	44	UNC
2 1/2"	GFS507S	44	Metric
2 1/2"	GFS507SU	44	UNC
3"	GFS508S	44	Metric

# SAE FLANGES

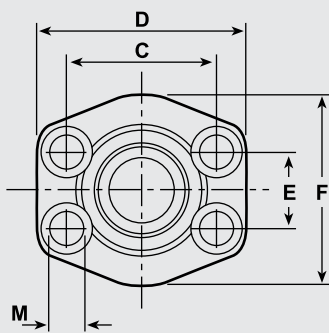
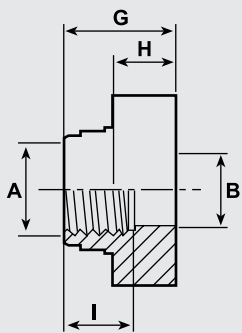
## SAE Counter Flange Dimensions

### BSP Threaded and Socket Weld Counter Flanges (without O-ring)

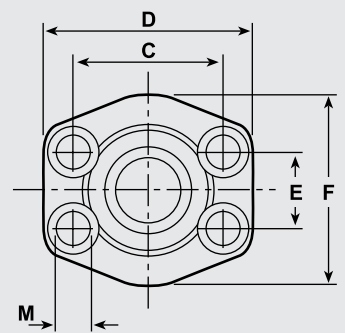
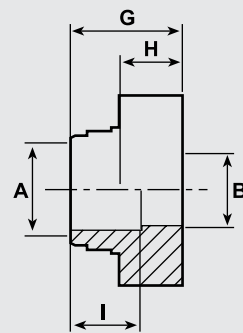


3000 Series	Size	A Threaded	A Socket Weld	B	C	D	E	F	G	H	I	M Metric	M UNC	Weight (Kg)
	3/4"	3/4" BSPF	27.2	19	47.63	65	22.23	50	36	18	19	M10	3/8	0.41
	1"	1" BSPF	34	25	52.37	70	26.19	55	38	18	22	M10	3/8	0.49
	1 1/4"	1 1/4" BSPF	42.8	32	58.72	79	30.18	68	40	21	22	M10	7/16	0.71
	1 1/2"	1 1/2" BSPF	48.6	38	69.85	93	35.71	78	45	25	24	M12	1/2	1.12
	2"	2" BSPF	61	51	77.77	102	42.88	90	45	25	30	M12	1/2	1.24
	2 1/2"	2 1/2" BSPF	76.6	63	88.9	114	50.8	105	50	25	30	M12	1/2	1.66
	3"	3" BSPF	90.5	73	106.38	134	61.93	124	50	27	34	M16	5/8	2.37
	3 1/2"	3 1/2" BSPF	103	89	120.65	152	69.85	136	48	27	34	M16	5/8	2.51
4"	4" BSPF	115.5	99	130.18	162	77.77	146	48	27	34	M16	5/8	2.87	

6000 Series	Size	A Threaded	A Socket Weld	B	C	D	E	F	G	H	I	M Metric	M UNC	Weight (Kg)
	3/4"	3/4" BSPF	27.2	19	50.8	71	23.8	55	35	21	19	M10	3/8	0.55
	1"	1" BSPF	34	25	57.15	81	27.76	65	42	25	22	M12	7/16	0.87
	1 1/4"	1 1/4" BSPF	42.8	32	66.68	95	31.75	78	45	27	23	M14	1/2	1.21
	1 1/2"	1 1/2" BSPF	48.6	38	79.38	112	36.5	94	50	30	26	M16	5/8	1.9
	2"	2" BSPF	61	51	96.82	134	44.45	114	65	37	30	M20	3/4x2	3.43
	2 1/2"	2 1/2" BSPF	76.6	63	123.8	180	58.7	152	80	45	32	M24		6.98
3"	3" BSPF	90.5	73	152.4	208	71.4	178	90	55	40	M30			



BSP Threaded



Socket Weld



## SAE Blanking Flanges With O-ring



- Forged in carbon steel and conforming to SAE J58 standard.
- Supplied complete with one o-ring.
- Supplied without bolts.
- Note: Although all 6000 series flanges have a designated working pressure of 6000 psi (414 Bar), working pressures of 3000 series flanges vary between sizes. To avoid dangerous failures, always check the recommended working pressure of 3000 series flanges against system pressure prior to installation.

**3000 Series Blanking Flanges (Code 61)**

Size	Part No	Max Working Pressure (Bar)	Bolts
3/4"	AFC100	345	Bolts Sold Separately
1"	AFC102	345	Bolts Sold Separately
1 1/4"	AFC104	276	Bolts Sold Separately
1 1/2"	AFC106	207	Bolts Sold Separately
2"	AFC108	207	Bolts Sold Separately
2 1/2"	AFC110	172	Bolts Sold Separately
3"	AFC112	138	Bolts Sold Separately
3 1/2"	AFC114	34	Bolts Sold Separately
4"	AFC116	34	Bolts Sold Separately

**6000 Series Blanking Flanges (Code 62)**

Size	Part No	Max Working Pressure (Bar)	Bolts
3/4"	AFC402	414	Bolts Sold Separately
1"	AFC403	414	Bolts Sold Separately
1 1/4"	AFC404	414	Bolts Sold Separately
1 1/2"	AFC405	414	Bolts Sold Separately
2"	AFC406	414	Bolts Sold Separately
2 1/2"	AFC507	414	Bolts Sold Separately
3"	AFC508	414	Bolts Sold Separately



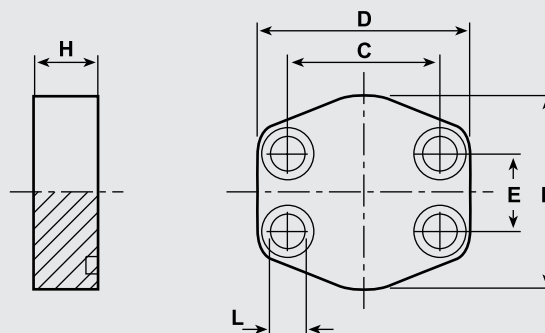
# SAE FLANGES

## SAE Blanking Flange Dimensions With O-ring



Series	Size	C	D	E	F	H	L	Metric Cap Screws	UNC Cap Screws	Weight (Kg)
	3000 Series	3/4"	47.63	65	22.23	50	18	11	M10X35	3/8X1"1/2
1"		52.37	70	26.19	55	18	11	M10X35	3/8X1"1/2	0.45
1 1/4"		58.72	79	30.18	68	21	11.5	M10X40	7/16X1"3/4	0.66
1 1/2"		69.85	93	35.71	78	25	13.5	M12X45	1/2X"3/4	1.05
2"		77.77	102	42.88	90	25	13.5	M12X45	1/2X"3/4	1.17
2 1/2"		88.9	114	50.8	105	25	13.5	M12X45	1/2X"3/4	1.59
3"		106.38	134	61.93	124	27	17.5	M16X50	5/8X2"	2.28
3 1/2"		120.65	152	69.85	136	27	17.5	M16X50	5/8X2"	2.42
4"		130.18	162	77.77	146	27	17.5	M16X50	5/8X2"	2.78
6000 Series	3/4"	50.8	71	23.8	55	21	11	M10X40	3/8X1"1/2	0.51
	1"	57.15	81	27.76	65	25	13	M12X45	7/16X1"3/4	0.81
	1 1/4"	66.68	95	31.75	78	27	15 *	M14X45	1/2X1"3/4	1.13
	1 1/2"	79.38	112	36.5	94	30	17	M16X50	5/8X2"	1.81
	2"	96.82	134	44.45	114	37	21	M20X70	3/4X2"1/2	3.31
	2 1/2"	123.8	180	58.7	152	45	26	M24X80		6.75
	3"	152.4	208	71.4	178	55	33	M30X100		

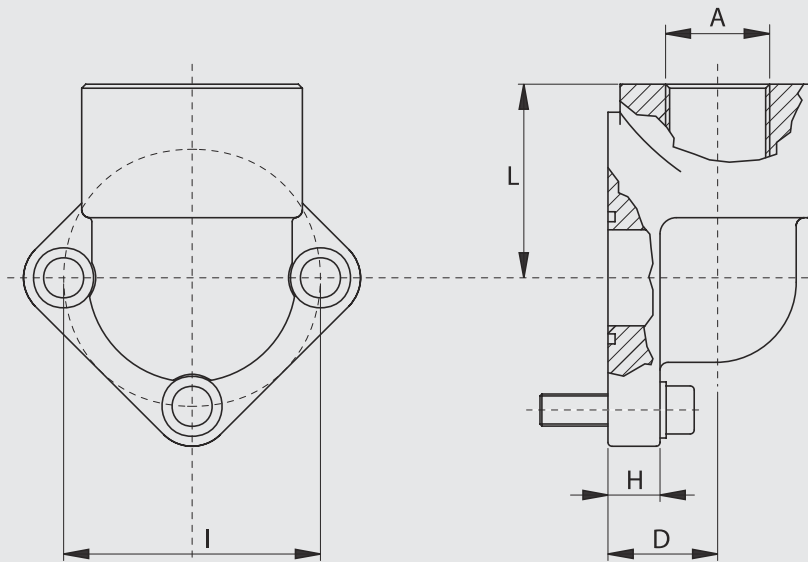
Bolts sold separately



Type RPA Cast Iron Gear Pump Elbows



Part No	Pump Group	Dimensions					Screws	O-Rings
		A (BSP)	I	D	H	L		
RPA1-038-M	1	3/8"	30	17	10	27	M6X20	121
RPA1-012-M	1&2	1/2"	30	17	10	27	M6X20	121
RPA2-038-M	2	3/8"	40	21	11	36	M8X25	132
RPA2-012-M	2	1/2"	40	21	11	36	M8X25	132
RPA2-034-M	2	3/4"	40	21	11	36	M8X25	132
RPA3-034-M	3	3/4"	51	27	15	46	M10X30	4118
RPA3-100-M	3	1"	51	27	15	46	M10X30	4118
RPA3-034B-M	3	3/4"	56	27	15	46	M10X30	4118
RPA3-100B-M	3	1"	56	27	15	46	M10X30	4118
RPA35-114M10	3	1 1/4"	62	36	16	56	M10X30	4150

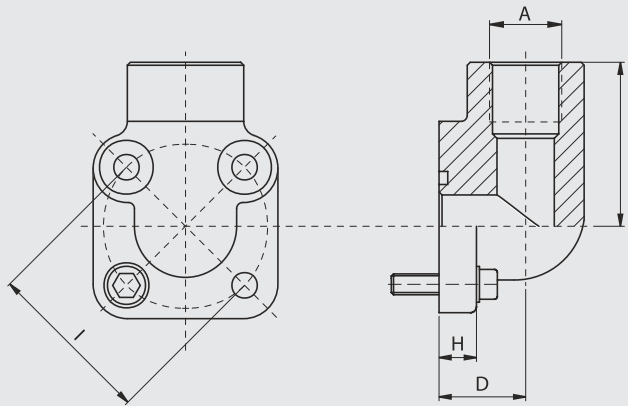


# GEAR PUMP PORT FLANGES

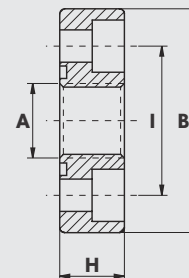
## Type RIA Cast Iron Gear Pump Elbows



Part No	Pump Group	Dimensions					Screws		O-Rings
		I	A (BSP)	D	H	L	N 2	N 2	
RIA 30-038-M	1P	30	3/8"	19	11	40	M6X20	M6X35	121
RIA 30-012-M	1P	30	1/2"	19	11	40	M6X20	M6X35	121
RIA 35-038-M	2BK	35	3/8"	18	11.5	40	M6X20	M6X35	3075
RIA 35-012-M	2BK	35	1/2"	18	11.5	40	M6X20	M6X35	3075
RIA 40-038-M	2BK	40	3/8"	24	13	42.5	M6X25	M6X45	132
RIA 40-012-M	2BK	40	1/2"	24	13	42.5	M6X25	M6X45	132
RIA 40-034-M	2BK	40	3/4"	24	13	42.5	M6X25	M6X45	132



## Type F Cast Iron Gear Pump Flanges



Part No	Pump Group	Dimensions				Screws	O-Rings
		I	B	A (BSP)	H		
F1-038-M	1	30	45	3/8"	13	M6X16	2075
F2-012-M	2	40	58	1/2"	15	M8X20	2100
F3-034-M	3	51	76	3/4"	18	M10X25	3125
F3-034B-M	3	56	76	3/4"	18	M10X25	3125
F35-100-M10	3	62	88	1"	20	M10X30	144

## Stucchi Quick-Release Couplers



Category	Features	Type
Ball Type Couplers	More commonly used in the agricultural industry, their rugged design makes ball type couplers ideal where frequent, easy and quick connections are necessary in both mobile and industrial applications. Also available in a 70 Bar model.	IR Series Ball-type Couplers
		IV-HP Ultrahigh-Pressure Ball Type Couplers
Pin Type Couplers	Similar in many ways to the Ball-type couplers, Pin-type couplers pose a poppet type sealing arrangement which offers superior sealing to that of the Ball-type alternative when uncoupled.	IR-V Series Pin Type Couplers
		BIR Series Pin-type Couplers
		IRBX Series Stainless Steel Pin-type Couplers
Flat Face Couplers	The most advanced couplers in the range, the Flat Faced design eliminates recesses where dirt can become trapped and later enter the system when coupled. The face can easily be wiped clean before coupling, making these couplers the ideal choice for proactively maintained systems operating in the harshest of environments. Also available in a 70 Bar model.	FIRG Series Flat-face Couplers
		FM Series Stainless Steel High-Pressure Flat-Face Couplers
		A-HP Series Ultra high-Pressure Flat-Face Couplers
Dust Caps and Protection Plugs	These are practical accessories, which prevent dust, water- or mud from entering the quick couplings when uncoupled, dramatically lengthening their life-span.	Plastic or Aluminium Dust Caps



# QUICK-RELEASE COUPLERS

## IR Series Ball-type Couplers



- IR Series hydraulic quick couplings equipped with ball seals are perfect for agricultural equipment and other mobile applications. Their rugged design makes this series ideal where frequent, easy and quick connections are necessary in both mobile and industrial applications.

Part No	Stock Code	Rated Flow (lpm)	$\Delta p$ at Rated Flow (Bar)	Port Type	Nominal $\varnothing$ mm	Max Operating Pressure Coupled (Bar)	Male/Female
800000000	IR14BSPF	12	2.7	1/4" BSP	6.3	300	F
800000001	IR14BSPM	12	2.7	1/4" BSP	6.3	300	M
800000002	IR38BSPF	23	2.7	3/8" BSP	10	300	F
800000003	IR38BSPM	23	1.7	3/8" BSP	10	300	M
800000004	IR12BSPF	45	1.4	1/2" BSP	12	250	F
800000005	IR12BSPM	45	1.4	1/2" BSP	12	250	M
820000020	IR34BSPF	74	1.5	3/4" BSP	20	250	F
820000021	IR34BSPM	74	1.5	3/4" BSP	20	250	M
800000008	IR100BSPF	100	2.6	1" BSP	25	200	F
800000009	IR100BSPM	100	2.6	1" BSP	25	200	M

## IV-HP Ultra High-Pressure Ball-type Couplers



- The IV-HP series is designed specifically for use with hydraulic tools and jacks. The unique connection which prevents being joined to couplers of a lower pressure rating makes the IV-HP series safe and reliable. These couplers are compatible with both the Larzep and Enerpac ranges of High-Pressure Hydraulic Tools.

Part No	Stock Code	Rated Flow	Port Type	Nominal $\varnothing$ mm	Max Operating Pressure Coupled (Bar)	Male/Female
800201008	IVHP14NPT F	12	1/4"NPT	5	720	F
800201009	IVHP14NPT M	12	1/4"NPT	5	720	M
800201004	IVHP38NPT F	23	3/8"NPT	7	720	F
800201005	IVHP38NPT M	23	3/8"NPT	7	720	M

Compatible with Larzep and Enerpac Hydraulic Tools

## IR-V Series Pin-type Couplers



- Interchangeable with the IR Series ball-type couplers, the poppet sealing valve allows better sealing than the ball-type variety when uncoupled.

Part No	Stock Code	Rated Flow (l/m)	$\Delta p$ at Rated Flow (Bar)	Port Type	Nominal $\varnothing$ mm	Max Operating Pressure Coupled (Bar)	Male/Female
800100000	IRV14BSP F	12	1.1	1/4" BSP	6.3	300	F
800100001	IRV14BSP M	12	1.1	1/4" BSP	6.3	300	M
800100002	IRV38BSP F	23	0.8	3/8" BSP	10	300	F
800100003	IRV38BSP M	23	0.8	3/8" BSP	10	300	M
800500004	IRV12BSP M	45	0.85	1/2" BSP	12.5	250	F
800500005	IRV12BSP M	45	0.85	1/2" BSP	12.5	250	M
820000022	IRV34BSP F	74	0.85	3/4" BSP	16	250	F
820000023	IRV34BSP M	74	0.85	3/4" BSP	16	250	M
800100006	IRV00BSP F	100	1	1" BSP	20	200	F
800100007	IRV00BSP M	100	1	1" BSP	20	200	M

## BIR Series Pin-type Couplers



- An extremely versatile range, the BIR Series quick couplings with poppet-type seals are widely used in both industrial and mobile applications.

Part no	Stock Code	Rated Flow (l/m)	$\Delta p$ at Rated Flow (Bar)	Port Type	Nominal $\varnothing$ mm	Max Operating Pressure Coupled (Bar)	Male/Female
800500010	BIR114BSPF	189	0.65	1 1/4" BSP	31.5	30	F
800500011	BIR114BSPM	189	0.65	1 1/4" BSP	31.5	30	M
800500012	BIR112BSPF	288	0.7	1 1/2" BSP	40	80	F
800500013	BIR112BSPM	288	0.7	1 1/2" BSP	40	80	M
800500014	BIR2BSPF	379	0.5	2" BSP	50	30	F
800500015	BIR2BSPM	379	0.5	2" BSP	50	30	M

# QUICK-RELEASE COUPLERS

## IRBX Series Stainless Steel Pin-type Couplers



- Known as an industrial range, the IRBX series is compact, practical, robust and safe. Stainless Steel Construction (AISI 36) allows these quick couplers to withstand the effects of highly-corrosive environments.

Part no	Stock Code	Rated Flow (l/m)	$\Delta p$ at Rated Flow (Bar)	Port Type	Nominal $\varnothing$ mm	Max Operating Pressure Coupled (Bar)	Male/Female
804600100	IRBX18BSPF	3	0.7	1/8" BSP	5	250	F
804600101	IRBX18BSPM	3	0.7	1/8" BSP	5	250	M
804600102	IRBX14BSPF	12	1.8	1/4" BSP	6.3	250	F
804600103	IRBX14BSPM	12	1.8	1/4" BSP	6.3	250	M
804600104	IRBX38BSPF	23	0.7	3/8" BSP	10	200	F
804600105	IRBX38BSPM	23	0.7	3/8" BSP	10	200	M
804600106	IRBX12BSPF	45	1	1/2" BSP	12.5	200	F
804600107	IRBX12BSPM	45	1	1/2" BSP	12.5	200	M
804600108	IRBX34BSPF	74	0.65	3/4" BSP	20	160	F
804600109	IRBX34BSPM	74	0.65	3/4" BSP	20	160	M
804600110	IRBX100BSPF	100	0.5	1" BSP	25	125	F
804600111	IRBX100BSPM	100	0.5	1" BSP	25	125	M





## FIRG Series Flat-face Couplers



- Heading the flat-face couplings family, the "FIRG" series has received wide approval from influential manufacturers all over the world since it appeared on the market. Flat-faced design eliminates recesses where dirt can become trapped and later enter the system when coupled. The face can easily be wiped clean before coupling, making these couplers the ideal choice for proactively maintained systems operating in the harshest of environments.

Part No	Stock Code	Rated Flow (l/m)	$\Delta p$ at Rated Flow (Bar)	Port Type	Nominal $\varnothing$ mm	Max Operating Pressure Coupled (Bar)	Male/Female
800800000	FIRG14BSPF	12	0.9	1/4" BSP	6.3	300	F
800800001	FIRG14BSPM	12	0.9	1/4" BSP	6.3	300	M
800800002	FIRG12BSPF	23	0.9	1/2" BSP	10	300	F
800800003	FIRG12BSPM	23	0.9	1/2" BSP	10	300	M
800800004	FIRG38BSPF	23	0.9	3/8" BSP	10	300	F
800800005	FIRG38BSPM	23	0.9	3/8" BSP	10	300	M
800800008	FIRG34BSPF	45	0.9	3/4" BSP	16	250	F
800800009	FIRG34BSPM	45	0.9	3/4" BSP	16	250	M
800800012	FIRG100BSPF	100	0.65	1" BSP	19	250	F
800800013	FIRG100BSPM	100	0.65	1" BSP	19	250	M
800800014	FIRG114BSPF	189	0.85	1 1/4" BSP	25	250	F
800800015	FIRG114BSPM	189	0.85	1 1/4" BSP	25	250	M
800800016	FIRG112BSPF	288	0.4	1 1/2" BSP	31.5	200	F
800800017	FIRG112BSPM	288	0.4	1 1/2" BSP	31.5	200	M
800800018	FIRG2BSPF	379	0.3	2" BSP	40	200	F
800800019	FIRG2BSPM	379	0.3	2" BSP	40	200	M



# QUICK-RELEASE COUPLERS

## FM Series Stainless Steel High-Pressure Flat-face Couplers



- The FM series is the solution for offshore hydraulic applications. Their leakproof design which prevents oil spillage during coupling and uncoupling as well as their extraordinary resistance to corrosion are important features. Flat-faced design eliminates recesses where dirt can become trapped and later enter the system when coupled. The face can easily be wiped clean before coupling, making these couplers the ideal choice for proactively maintained systems operating in the harshest of environments.

Part No	Stock Code	Rated Flow (l/m)	$\Delta p$ at Rated Flow (Bar)	Port Type	Nominal $\varnothing$ mm	Max Operating Pressure Coupled (Bar)	Male/Female
802300102	FM9F	23	0.9	3/8" BSP	10	350	F
802300103	FM9M	23	0.9	3/8" BSP	10	350	M
802300106	FM13F	45	0.8	1/2" BSP	12.5	350	F
802300107	FM13M	45	0.8	1/2" BSP	12.5	350	M

## A-HP Series Ultra High-Pressure Flat-Face Couplers



- This series is dedicated to use in ultra high-pressure hydraulic applications. The A-HP series cannot be interchanged with a series that operates at lower pressures, making them extremely safe. Flat-faced design eliminates recesses where dirt can become trapped and later enter the system when coupled. The face can easily be wiped clean before coupling, making these couplers the ideal choice for proactively maintained systems operating in the harshest of environments.

Part No	Stock Code	Rated Flow (l/m)	$\Delta p$ at Rated Flow (Bar)	Port Type	Nominal $\varnothing$ mm	Max Operating Pressure Coupled (Bar)	Male/Female
801601008	A5HP38NPTF	12	1.5	3/8" NPT	6.3	70	F
801601009	A5HP38NPTM	12	1.5	3/8" NPT	6.3	70	M

## Dust Caps and Protection Plugs

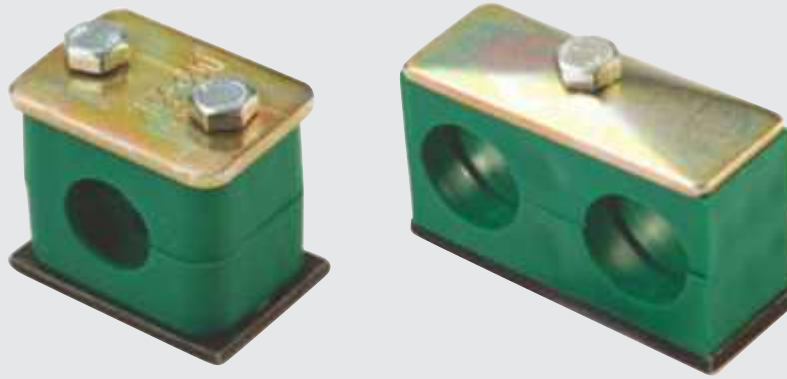


- These are practical accessories, which prevent dust, water or mud from entering the quick couplings, dramatically lengthening their lifespan.

Part No	Stock Code	To Fit Series	Port Type	Material	Male/Female
815000000	TF14	IR, IR_V or BIR	1/4"	Plastic	F
815000001	TM14	IR, IR_V or BIR	1/4"	Plastic	M
815000002	TF38	IR, IR_V or BIR	3/8"	Plastic	F
815000003	TM38	IR, IR_V or BIR	3/8"	Plastic	M
815000004	TF12	IR, IR_V or BIR	1/2"	Plastic	F
815000005	TM12	IR, IR_V or BIR	1/2"	Plastic	M
815000006	TF34	IR, IR_V or BIR	3/4"	Plastic	F
815000007	TM34	IR, IR_V or BIR	3/4"	Plastic	M
815000008	TF1	IR, IR_V or BIR	1"	Plastic	F
815000009	TM1	IR, IR_V or BIR	1"	Plastic	M
815605002	CAPIVHP38 F	IV or HP	3/8"	Aluminium	F
815605003	CAPIVHP38 M	IV or HP	3/8"	Aluminium	M
815605004	CAPIVHP14 F	IV or HP	1/4"	Aluminium	F
815605005	CAPIVHP14 M	IV or HP	1/4"	Aluminium	M
815100000	INFFIRG14	FIRG	1/4"	Plastic	F
815100001	INMFIRG14	FIRG	1/4"	Plastic	M
815100002	INFFIRG38	FIRG	3/8"	Plastic	F
815100003	INMFIRG38	FIRG	3/8"	Plastic	M
815100004	INFFIRG12	FIRG	1/2"	Plastic	F
815100005	INMFIRG12	FIRG	1/2"	Plastic	M
815100006	INFFIRG34	FIRG	3/4"	Plastic	F
815100009	INMFIRG34	FIRG	3/4"	Plastic	M
815100010	INFFIRG1	FIRG	1"	Plastic	F
815100013	INMFIRG1	FIRG	1"	Plastic	M

# TUBE CLAMPS

## Light-Duty Single Tube Clamps



- Manufactured in Polypropylene & secured with carbon steel cover, bolts and weld plates.

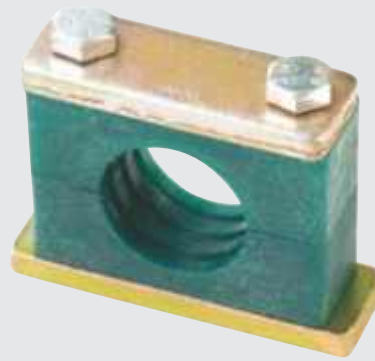
Durability	Part No	Tube Size (mm)	Description
Light-duty Single	A106+APS	6	Single Tube Clamp
	A108+APS	8	Single Tube Clamp
	A110+APS	10	Single Tube Clamp
	A112+APS	12	Single Tube Clamp
	A214+APS	14	Single Tube Clamp
	A216+APS	16	Single Tube Clamp
	A218+APS	18	Single Tube Clamp
	A320+APS	20	Single Tube Clamp
	A322+APS	22	Single Tube Clamp
	A325+APS	25	Single Tube Clamp
	A428+APS	28	Single Tube Clamp
	A430+APS	30	Single Tube Clamp
	A535+APS	35	Single Tube Clamp
	A538+APS	38	Single Tube Clamp
	A542+APS	40	Single Tube Clamp

## Light-duty Double Tube Clamps

- Manufactured in Polypropylene & secured with carbon steel cover, bolts and weld plates.

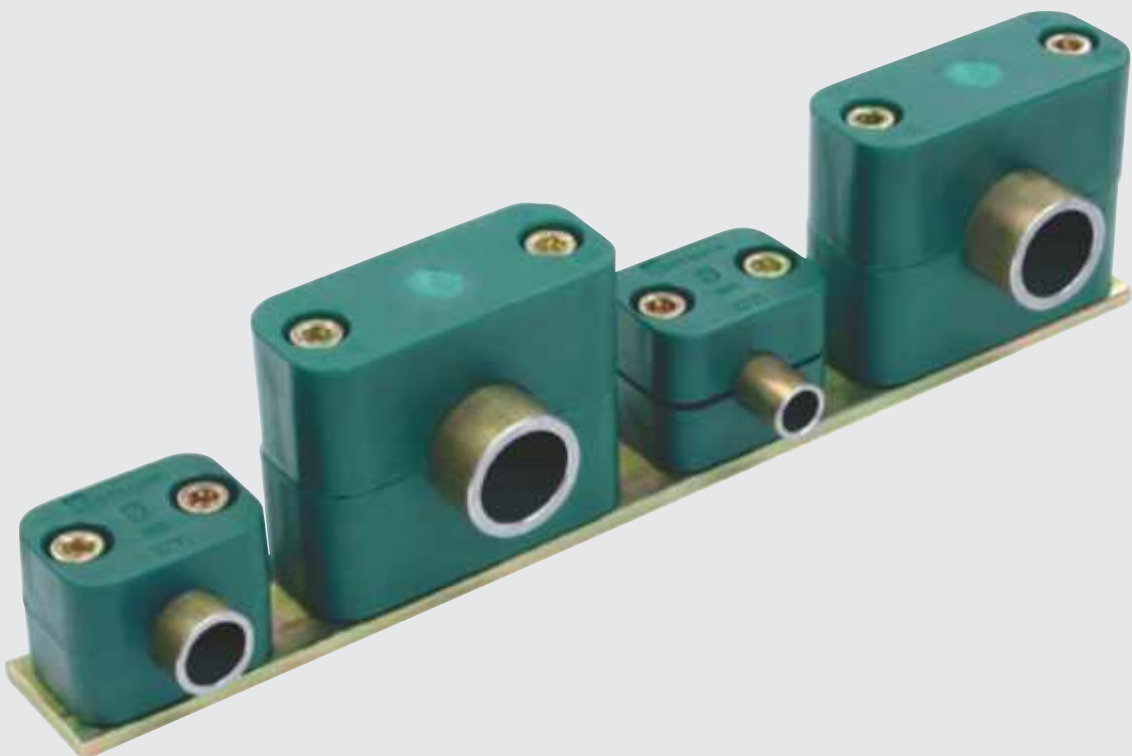
Durability	Part No	Tube Size (mm)	Description
Light-duty Double	AD1 06-06	6	Double Tube Clamp
	AD1 08-08	8	Double Tube Clamp
	AD1 10-10	10	Double Tube Clamp
	AD1 12-12	12	Double Tube Clamp
	AD2 14-14	14	Double Tube Clamp
	AD2 16-16	16	Double Tube Clamp
	AD2 18-18	18	Double Tube Clamp
	AD3 20-20	20	Double Tube Clamp
	AD3 22-22	22	Double Tube Clamp
	AD3 25-25	25	Double Tube Clamp
	AD4 28-28	28	Double Tube Clamp
	AD4 30-30	30	Double Tube Clamp
	AD5 35-35	35	Double Tube Clamp
	AD5 38-38	38	Double Tube Clamp
	AD5 42-42	42	Double Tube Clamp

## Heavy-duty Single Tube Clamps



- Manufactured in Polypropylene & supplied with carbon steel cover, bolts and weld plates.

Durability	Part No	Tube Size (mm)	Description
Heavy-duty	AMP.P1 0-06	6	Single Tube Clamp
	AMP.P1 0-08	8	Single Tube Clamp
	AMP.P1 0-10	10	Single Tube Clamp
	AMP.P1 0-12	12	Single Tube Clamp
	AMP.P1 0-14	14	Single Tube Clamp
	AMP.P1 0-16	16	Single Tube Clamp
	AMP.P1 0-18	18	Single Tube Clamp
	AMP.P2 0-20	20	Single Tube Clamp
	AMP.P2 0-22	22	Single Tube Clamp
	AMP.P2 0-25	25	Single Tube Clamp
	AMP.P2 0-28	28	Single Tube Clamp
	AMP.P2 0-30	30	Single Tube Clamp
	AMP.P3 0-35	35	Single Tube Clamp
	AMP.P3 0-38	38	Single Tube Clamp
	AMP.P3 0-42	40	Single Tube Clamp



# FLUID COMPATIBILITY CHART

Fluid Type	Seal Compound													
	PVC	Nitrile	Vinyl Nitrile	Neoprene	Telon	Nylon/Nylon II	EPDM	Hypalon	Hydrel	Polyurethane	CPE	Brass	Steel	36 Stainless
Acetaldehyde	X	X	X	X	G	G	G	F	X	X	-	X	X	G
Acetic Acid (Concentrated)	X	X	X	X	G	X	G	X	X	X	G	X	X	G
Acetic Acid (Diluted)	F	X	X	F	G	F	G	F	G	X	G	X	X	G
Acetic Anhydride	X	G	G	X	G	X	G	F	X	X	G	X	F	F
Acetone	X	X	X	X	G	G	G	F	F	X	G	G	G	G
Acrylonitrile	G	X	X	X	G	G	X	X	-	X	G	-	G	G
Air	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Alcohols (Methanol & Ethanol)	X	G	G	G	G	G	G	G	G	X	G	G	F	G
Aluminum Chloride	G	G	G	G	G	X	G	G	G	G	X	X	F	F
Aluminum Fluoride	G	G	G	F	G	X	G	G	-	G	X	X	X	X
Aluminum Hydroxide	G	G	G	G	G	G	G	G	-	G	G	X	F	G
Aluminum Sulfate	G	G	G	G	G	G	G	G	G	G	X	X	G	G
Alums	G	G	G	G	G	F	G	G	X	G	G	X	X	F
Ammonia, Anhydrous	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ammonia Solution (0%)	G	G	G	F	G	G	G	G	X	X	X	X	G	G
Ammonium Chloride	G	G	G	G	G	X	G	G	G	G	G	X	G	F
Ammonium Hydroxide	X	F	F	F	G	G	G	G	X	X	G	X	F	G
Ammonium Nitrate	G	G	G	G	G	G	G	G	G	X	G	-	-	G
Ammonium Phosphate	F	G	G	G	G	G	G	G	G	F	G	X	X	G
Ammonium Sulfate	G	G	G	G	G	G	G	G	G	G	X	X	F	F
Amyl Acetate	X	X	X	X	G	G	F	X	X	X	X	G	F	G
Amyl Alcohol	X	G	G	F	G	G	G	G	G	X	G	G	F	F
Aniline	X	X	X	X	G	X	X	X	X	X	X	X	G	G
Aniline Dyes	X	F	F	F	G	X	G	F	X	X	X	X	X	F
Animal Oils and Fats	G	G	G	X	G	G	F	F	G	X	F	G	G	G
Anti-Freeze (Glycol Base)	G	G	G	G	G	F	G	G	G	X	G	G	G	G
Aqua Regia	X	X	X	X	G	X	X	X	X	X	X	-	X	X
Asphalt	X	G	G	X	G	G	X	X	-	X	F	G	G	G
Barium Chloride	G	G	G	G	G	X	G	G	G	G	X	F	G	G
Barium Hydroxide	G	G	G	G	G	G	G	G	X	G	X	G	G	G
Barium Sulphide	G	G	G	G	G	X	G	G	X	G	G	X	X	G
Beet Sugar Liquors	G	G	G	G	G	G	X	G	G	X	G	X	G	G
Benzaldehyde	X	X	X	X	G	G	F	X	X	X	X	F	F	G
Benzene, Benzol	X	X	X	X	G	G	X	X	X	X	F	G	G	G
Benzoic Acid	X	X	X	G	G	X	X	X	X	X	F	F	X	F
Black Sulfate Liquor	X	F	F	G	G	F	G	F	G	X	F	X	G	G
Borax	G	F	F	G	G	G	G	G	G	G	G	G	G	G
Boric Acid	G	G	G	G	G	G	G	G	G	X	X	X	G	G

Fluid Type	Seal Compound													
	PVC	Nitrile	Vinyl Nitrile	Neoprene	Telon	Nylon/Nylon II	EPDM	Hypalon	Hydrel	Polyurethane	CPE	Brass	Steel	36 Stainless
Hydrocyanic Acid	G	F	F	X	G	X	F	G	X	X	X	X	X	G
Hydrofluoric Acid (Under)	F	X	X	X	G	X	F	G	X	X	X	X	X	G
Hydrofluoric Acid (Over)	X	X	X	X	G	X	X	G	X	X	X	X	X	G
Hydrofluosilicic Acid	G	F	F	X	G	X	G	G	G	X	G	X	X	X
Hydrogen	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hydrogen Peroxide	-	X	X	X	G	X	F	X	X	-	G	X	X	G
Hydrogen Sulfide	-	X	X	X	X	X	X	F	G	-	X	F	F	F
Hydrolube	-	G	G	F	G	G	-	-	G	X	-	G	G	G
Isopropyl Alcohol	G	G	G	G	G	G	G	G	G	X	G	G	G	G
Isopropylamine	X	X	X	F	G	X	F	X	-	-	-	G	G	G
Iso-Octane	X	G	G	F	G	G	X	F	G	X	G	G	G	G
Jet Fuel (Transfer Only)	X	G	G	F	G	G	X	X	-	G	-	G	G	G
Kerosene	X	G	G	F	G	G	X	F	F	G	G	G	G	G
Lacquer	X	X	X	X	G	G	X	X	X	X	F	G	G	G
Lacquer Solvents	G	X	X	X	G	G	X	X	F	X	F	G	G	G
Lactic Acid	G	X	X	G	G	X	F	G	X	X	X	F	F	G
Lime Sulfur	G	X	X	G	G	F	G	F	-	-	-	X	X	G
Lindol	-	X	X	X	G	G	G	X	-	X	-	F	F	G
Linseed Oil	G	G	G	X	G	G	X	F	F	F	G	F	F	G
Lubricating Oils	G	G	G	F	G	G	X	F	G	F	G	G	G	G
Lye	G	F	F	G	G	X	G	G	-	-	G	F	X	G
Magnesium Chloride	G	G	G	G	G	X	G	G	F	G	G	F	F	G
Magnesium Hydroxide	G	F	F	G	G	X	G	F	F	X	G	G	G	G
Magnesium Sulfate	G	G	G	G	G	G	G	G	G	X	G	F	G	G
Mercuric Chloride	F	F	F	G	G	X	G	G	-	G	X	X	X	X
Mercury	F	G	G	G	G	G	G	G	G	G	G	X	G	G
Methanol	X	G	G	G	G	G	G	G	G	F	G	F	G	G
Methyl Acrylate	X	X	X	X	G	X	F	X	X	X	F	G	G	G
Methyl Chloride	X	X	X	X	G	F	X	X	X	X	F	G	G	G
Methylene Chloride	X	X	X	X	G	G*	X	X	X	X	X	G	G	G
Methyl t-Butyl Ether (MTBE)	X	F	F	X	G	G	X	X	-	-	-	-	G	G
Methyl Ethyl Ketone	X	X	X	X	G	G	F	X	G	X	X	G	G	G
Methyl Isobutyl Ketone	X	X	X	X	G	G	F	X	X	X	X	G	G	G
Methyl Isopropyl Ketone	X	X	X	X	G	G	F	X	X	X	X	G	G	G
Methyl Methacrylate	X	X	X	X	G	F	X	X	X	X	X	-	G	G
Mineral Oil	F	G	G	F	G	G	X	F	G	G	G	G	G	G
Mineral Spirits	X	G	G	F	G	G	X	X	G	G	G	G	G	G
Naphtha	X	F	F	F	G	G	X	X	G	F	G	F	G	G

# FLUID COMPATIBILITY CHART

Fluid Type	Seal Compound													
	PVC	Nitrile	Vinyl Nitrile	Neoprene	Telom	Nylon/Nylon II	EPDM	Hypalon	Hytral	Polyurethane	CPE	Brass	Steel	36 Stainless
Brine	G	G	G	G	G	G	G	G	G	X	G	-	X	F
Butyl Alcohol, Butanol	X	G	G	G	G	G	G	G	G	X	G	G	G	G
Calcium Bisulfite	G	G	G	G	G	F	G	G	X	G	X	X	X	X
Calcium Chloride	G	G	G	G	G	X	G	G	G	G	X	F	F	F
Calcium Hydroxide	G	F	F	G	G	F	G	F	G	X	G	F	G	G
Calcium Hypochlorite	G	F	F	F	G	F	G	F	F	X	G	F	X	F
Cane Sugar Liquors	G	G	G	G	G	G	G	G	G	X	G	F	G	G
Carbon Dioxide (Dry)	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Carbon Dioxide (Wet)	-	G	G	G	G	G	G	G	-	G	-	F	G	G
Carbon Disulfide (Bisulfide)	X	X	X	X	G	X	X	X	X	G	X	G	G	G
Carbon Monoxide (Hot)	X	F	F	F	G	X	F	G	G	F	G	X	F	G
Carbon Tetrachloride	X	X	X	X	G	G	X	X	F	X	X	G	G	G
Carbonic Acid	X	G	G	G	G	X	G	G	X	F	X	X	X	F
Castor Oil	G	G	G	F	G	G	F	G	F	F	G	G	G	G
Cellosolve Acetate	X	X	X	X	G	F	F	F	X	X	X	X	X	G
Chlorinated Solvents	X	X	X	X	G	F	X	X	X	X	X	G	G	F
Chloroacetic Acid	X	X	X	X	G	X	F	X	X	X	X	X	X	F
Chlorobenzene	X	X	X	X	G	G	X	X	X	X	X	F	F	G
Chloroform	X	X	X	X	G	G	X	X	X	X	X	G	G	G
Chlorosulfonic Acid	X	X	X	X	G	X	X	X	X	X	X	F	X	X
Chromic Acid (Under 25%)	F	X	X	X	G	X	G	G	X	X	X	X	X	G
Chromic Acid (Over 25%)	X	X	X	X	G	X	G	G	X	X	X	X	X	F
Citric Acid	G	F	F	G	G	X	G	G	G	X	X	X	X	G
Coke Oven Gas	X	X	X	X	F	X	X	X	-	X	X	F	G	G
Copper Chloride	G	G	G	F	G	G	G	G	G	X	X	X	X	G

Fluid Type	Seal Compound													
	PVC	Nitrile	Vinyl Nitrile	Neoprene	Telom	Nylon/Nylon II	EPDM	Hypalon	Hytral	Polyurethane	CPE	Brass	Steel	36 Stainless
Nickel Acetate	G	X	X	G	G	G	G	G	-	X	-	-	-	-
Nickel Chloride	G	G	G	F	G	G	G	G	X	X	G	X	X	F
Nitric Acid (Under 35%)	G	X	X	X	G	X	F	F	X	X	X	X	X	G
Nitric Acid (35% to 60%)	F	X	X	X	G	X	X	X	X	X	X	X	X	G
Nitric Acid (Over 60%)	X	X	X	X	G	X	X	X	X	X	X	X	X	G
Nitrobenzene	X	X	X	X	G	G	X	X	X	X	X	F	G	G
Nitrogen Gas	G	G	G	G	G	G	G	-	G	G	G	-	-	-
Nitrous Oxide	X	X	X	X	G	X	X	X	X	X	X	G	G	G
Oleic Acid	F	F	F	X	G	G	F	F	G	F	G	F	F	G
Oleum (Fuming Sulfuric)	X	X	X	X	G	X	X	X	X	X	X	X	F	G
Oxalic Acid	G	X	X	X	G	X	G	X	X	-	G	F	X	G
Paint (Solvent Base)	X	F	F	X	G	G	X	X	-	-	-	G	G	G
Palmitic Acid	F	F	F	F	G	G	F	X	G	X	G	X	F	F
Pentane	X	G	G	F	G	G	X	F	G	G	G	G	G	G
Perchloroethylene	X	X	X	X	G	G	X	X	X	X	X	F	G	G
Petroleum Ether	X	G	F	X	G	G	X	X	G	G	G	G	G	G
Petroleum Oils	G	G	G	F	G	G	X	F	G	G	G	G	G	G
Phenol	X	X	X	X	G	X	X	X	X	X	G	F	X	F
Phosphoric Acid (to 85%)	G	X	X	F	G	X	G	G	X	X	X	X	X	F
Picric Acid (Molten)	X	X	X	X	G	X	X	F	X	X	X	X	X	F
Picric Acid (Solution)	X	F	F	X	G	X	F	G	X	F	X	X	X	F
Potassium Chloride	G	G	G	G	G	G	G	G	G	G	G	F	X	G
Potassium Cyanide	G	G	G	G	G	G	G	G	G	G	G	X	G	G
Potassium Dichromate	G	X	X	X	G	F	G	X	G	G	G	X	G	G
Potassium Hydroxide	G	F	F	F	G	G	G	G	F	X	G	F	X	G

### Key:

G = Good Compatibility

F = Fair Compatibility

X = Incompatible

- = No Data Available

# FLUID COMPATIBILITY CHART

Fluid Type	Seal Compound													
	PVC	Nitrile	Vinyl Nitrile	Neoprene	Telom	Nylon/Nylon II	EPDM	Hypalon	Hyrel	Polyurethane	CPE	Brass	Steel	36 Stainless
Copper Sulfate	G	G	G	G	G	G	G	G	G	G	X	X	G	
Corn Syrup (non-food)	G	G	G	F	G	G	G	F	G	G	-	-	G	G
Cottonseed Oil	F	G	G	X	G	G	F	F	G	G	G	G	G	G
Creosote	X	F	F	X	G	X	X	F	X	F	F	-	G	G
Cresol	X	X	X	X	G	X	X	X	X	X	G	-	G	G
Dextrose (food grade)	X	X	X	X	G	X	X	X	X	X	X	G	G	G
Diaminoethane	X	X	X	X	G	X	F	X	-	X	-	G	G	G
Dibromoethane	X	X	X	X	G	G	X	X	-	X	-	-	-	-
Dichlorobenzene	X	X	X	X	G	G	X	X	X	X	-	-	G	G
Diesel Fuel	X	G	G	X	G	G	X	F	F	F	G	G	G	G
Diethanolamine	-	F	F	X	G	X	G	X	X	X	G	X	G	G
Diethylenetriamine	-	F	F	X	G	X	G	X	X	X	G	-	-	-
Dowtherm A	X	X	X	X	G	X	X	X	X	X	X	X	F	G
Enamel (Solvent Base)	X	F	F	X	G	G	X	X	X	X	X	G	-	G
Ethanolamine	X	F	F	X	G	X	G	X	-	X	G	X	G	G
Ethers (Ethyl Ether)	X	X	X	X	G	F	X	X	X	F	G	G	G	G
Ethyl Alcohol (To 50°)	F	G	G	G	G	G	G	G	G	G	F	G	G	G
Ethyl Acetate	X	X	X	X	G	G	G	X	F	X	F	G	G	G
Ethyl Acrylate	X	X	X	X	G	G	F	X	X	X	F	-	G	G
Ethylamine	X	X	X	X	G	X	F	X	-	X	-	G	-	G
Ethyl Cellulose	-	F	F	F	G	G	F	F	G	F	G	F	G	F
Ethyl Chloride	X	X	X	X	G	G	X	X	X	F	X	F	F	G
Ethylene Dichloride	X	X	X	X	G	G	X	X	X	X	X	G	X	X
Ethylene Glycol	G	G	G	G	G	F	G	G	G	F	G	F	G	G
Ethylene Oxide	X	X	X	X	G	G	X	X	G	X	X	X	F	F
Ethyl Methacrylate	X	X	X	X	G	G	F	X	X	X	F	-	G	G
Fatty Acids	G	F	F	X	G	G	F	X	G	X	F	F	F	G
Ferric Chloride	G	G	G	G	G	G	G	G	G	F	G	X	X	X
Ferric Sulfate	G	G	G	G	G	G	G	G	G	G	X	X	F	G
Fertilizer Solution (Water)	G	F	F	F	G	F	G	G	-	-	-	-	-	G
Formaldehyde	X	F	F	F	G	G	G	X	F	X	G	F	X	G
Formic Acid	X	F	F	F	G	X	G	X	X	X	G	F	X	G

Fluid Type	Seal Compound													
	PVC	Nitrile	Vinyl Nitrile	Neoprene	Telom	Nylon/Nylon II	EPDM	Hypalon	Hyrel	Polyurethane	CPE	Brass	Steel	36 Stainless
Potassium Sulfate	G	G	G	G	G	G	G	G	G	G	G	F	F	G
Propylene Glycol	F	G	F	G	G	G	G	G	G	-	G	G	G	G
Pyridine	X	X	X	X	G	X	F	X	X	X	X	F	G	G
Sea Water	G	G	G	G	G	G	G	G	G	X	G	F	G	G
Skydrol (Transfer Only)	X	X	X	X	G	G	G	X	X	X	G	G	F	G
Soap Solution	G	G	G	F	G	G	G	G	G	G	G	G	G	G
Sodium Bisulfate	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Sodium Carbonate	G	G	G	G	G	G	G	G	G	G	G	F	F	F
Sodium Chloride	G	G	G	G	G	G	G	G	G	G	G	X	G	G
Sodium Cyanide	G	G	G	G	G	G	G	G	G	G	G	X	F	G
Sodium Hydroxide	G	F	F	G	G	X	G	G	G	X	X	X	F	G
Sodium Hypochlorite	G	X	X	X	G	X	G	G	G	X	F	F	X	G
Sodium Nitrate	G	G	G	F	G	G	G	G	G	F	G	F	G	G
Sodium Perborate	G	G	G	X	G	G	G	X	G	X	X	F	F	G
Sodium Peroxide	X	F	F	F	G	X	G	F	G	X	X	X	F	G
Sodium Phosphates	G	G	G	F	G	G	G	G	F	G	X	F	F	F
Sodium Silicate	G	G	G	G	G	G	G	G	G	G	G	F	F	G
Sodium Sulfate	G	G	G	G	G	G	G	G	G	G	G	F	F	G
Sodium Sulide	G	G	G	G	G	G	G	G	G	G	G	X	X	G
Sodium Thiosulfate	G	G	G	G	G	G	G	G	G	-	G	G	X	X
Soybean Oil	F	G	G	F	G	G	F	G	G	G	G	G	G	G
Stannic Chloride	G	G	G	X	G	X	G	G	G	G	X	X	X	X
Steam 450°	X	X	X	X	G	X	G	X	X	X	X	F	F	G
Stearic Acid	F	F	F	F	G	G	F	F	G	G	G	X	X	G
Stoddard Solvent	X	G	G	F	G	G	X	X	G	G	G	G	G	G
Sulfur	F	X	X	X	X	X	X	F	-	-	G	X	X	G
Sulfur Chloride	X	X	X	X	G	F	X	F	X	X	G	X	X	X
Sulfur Dioxide	X	X	X	X	G	X	G	X	X	-	X	X	-	G
Sulfuric Acid (Under)	G	X	X	X	G	X	G	G	X	X	X	X	X	X
Sulfuric Acid (5%)	G	X	X	X	G	X	F	G	X	X	X	X	X	X
Sulfuric Acid (7%)	X	X	X	X	G	X	F	F	X	X	X	X	X	X
Sulfuric Acid (96%)	X	X	X	X	G	X	X	X	X	X	X	X	X	X



# PRESSURE CONVERSION CHART

Psi	Kg/cm <sup>2</sup>	Bar	Kpa	Mpa
1	0.07	0.06896557	6.895	0.006896552
5	0.35	0.344827586	34.475	0.034482759
10	0.70	0.68965572	68.95	0.06896557
20	1.41	1.37930345	37.9	0.3793034
30	2	2.06896557	206.85	0.206896552
50	3.52	3.448275862	344.75	0.344827586
75	5.27	5.7243793	57.25	0.5724379
00	7.03	6.89655724	689.5	0.68965572
25	8.79	8.620689655	86.875	0.862068966
50	0.55	0.34482759	034.25	.034482759
75	2.30	2.06896552	206.625	.206896552
200	4.06	3.7930345	379	.37930345
250	7.58	7.243793	723.75	.7243793
300	2.09	20.6896557	2068.5	2.06896557
350	24.6	24.379303	243.25	2.4379303
400	28.2	27.5862069	2758	2.75862069
450	3.64	3.03448276	302.75	3.03448276
500	35.5	34.48275862	3447.5	3.448275862
550	38.67	37.9303448	3792.25	3.79303448
600	42.9	4.3793034	437	4.3793034
650	45.70	44.8275862	448.75	4.48275862
700	49.22	48.27586207	4826.5	4.827586207
750	52.73	5.7243793	57.25	5.7243793
800	56.25	55.724379	556	5.5724379
850	59.76	58.62068966	5860.75	5.862068966
900	63.28	62.06896552	6205.5	6.206896552
950	66.79	65.572438	6550.25	6.5572438
000	70.3	68.9655724	6895	6.89655724
000	77.34	75.86206897	7584.5	7.586206897
200	84.37	82.75862069	8274	8.275862069
300	9.40	89.655724	8963.5	8.9655724
400	98.43	96.557244	9653	9.6557244
500	05.46	03.4482759	0342.5	0.34482759
600	2.49	0.3448276	032	.03448276
700	9.52	7.243793	72.5	.7243793
800	26.56	24.3793	24	2.43793
900	33.59	3.0344828	300.5	3.0344828
2000	40.62	37.930345	3790	3.7930345
200	47.65	44.8275862	4479.5	4.48275862
2200	54.68	5.724379	569	5.724379
2300	6.7	58.6206897	5858.5	5.86206897
2400	68.74	65.57244	6548	6.557244
2500	75.77	72.43793	7237.5	7.243793

Psi	Kg/cm <sup>2</sup>	Bar	Kpa	Mpa
2600	82.80	79.303448	7927	7.9303448
2700	89.83	86.2068966	866.5	8.62068966
2800	96.86	93.034483	9306	9.3034483
2900	203.90	200	9995.5	20
3000	20.93	206.896557	20685	20.6896557
300	27.96	23.793034	2374.5	2.3793034
3200	224.99	220.6896552	22064	22.06896552
3300	232.02	227.5862069	22753.5	22.75862069
3400	239.05	234.4827586	23443	23.44827586
3500	246.08	24.379303	2432.5	24.379303
3600	253	248.275862	24822	24.8275862
3700	260.4	255.72438	255.5	25.572438
3800	267.7	262.0689655	2620	26.20689655
3900	274.20	268.965572	26890.5	26.8965572
4000	28.23	275.862069	27580	27.5862069
400	288.27	282.7586207	28269.5	28.27586207
4200	295.30	289.655724	28959	28.9655724
4300	302.33	296.55724	29648.5	29.655724
4400	309.36	303.4482759	30338	30.34482759
4500	36.39	30.3448276	3027.5	3.03448276
4600	323.42	37.243793	377	3.7243793
4700	330.45	324.3793	32406.5	32.43793
4800	337.48	33.0344828	33096	33.0344828
4900	344.5	337.930345	33785.5	33.7930345
5000	35.54	344.8275862	34475	34.48275862
500	358.57	35.724379	3564.5	35.724379
5200	365.6	358.6206897	35854	35.86206897
5300	372.64	365.57244	36543.5	36.557244
5400	379.67	372.43793	37233	37.243793
5500	386.70	379.303448	37922.5	37.9303448
5600	393.73	386.2068966	3862	38.62068966
5700	400.76	393.034483	3930.5	39.3034483
5800	407.79	400	3999	40
5900	44.82	406.896557	40680.5	40.6896557
6000	42.85	43.793034	4370	4.3793034
6500	457.0	448.275862	4487.5	44.8275862
7000	492.6	482.7586207	48265	48.27586207
7500	527.3	57.243793	572.5	5.7243793
8000	562.47	55.724379	5560	55.724379
8500	597.62	586.2068966	58607.5	58.62068966
9000	632.78	620.6896552	62055	62.06896552
9500	667.93	655.72438	65502.5	65.572438
0000	703.09	689.655724	68950	68.9655724

kPa = 0.0 bar	Psi = 6.895 kPa
Mpa = 0 bar	kPa = 0.45 PSI
Kg/cm <sup>2</sup> = atm	Kg/cm <sup>2</sup> = 4.223 PSI

# FLUID COMPATIBILITY CHART

Fluid Type	Seal Compound													
	PVC	Nitrile	Vinyl Nitrile	Neoprene	Telom	Nylon/Nylon II	EPDM	Hypalon	Hytrel	Polyurethane	CPE	Brass	Steel	36 Stainless
Fuel Oil	F	G	G	F	G	G	X	X	G	F	G	F	G	G
Furfural	X	X	X	X	G	G	F	F	G	X	F	F	G	G
Gasoline (Rei ned)	X	F	F	X	G	G	X	X	G	F	G	G	G	G
Gasoline (Unleaded)	X	G	G	X	G	G	X	F	X	X	G	G	G	G
Gasoline (0% Ethanol)	X	G	G	X	G	G	X	X	X	X	X	G	G	G
Gasoline (0% Methanol)	X	F	F	X	G	G	X	X	X	X	X	G	G	G
Glycerine, Glycerol	G	G	G	G	G	G	G	G	G	X	G	G	G	G
Greases	G	G	G	F	G	G	X	F	G	G	G	G	G	G
Green Sulfate Liquor	G	F	F	F	G	X	G	G	X	G	X	X	X	G
Heptane	X	G	G	F	G	G	X	F	G	F	G	G	G	G
Hexane	X	G	G	F	G	G	X	F	G	F	G	G	G	G
Houghto Safe 273 to 640	F	G	G	G	G	G	-	-	X	G	G	G	G	G
Houghto Safe 5046, 5047F	G	G	G	G	G	G	X	X	G	X	G	G	G	G
Houghto Safe 000 Series	X	X	X	X	G	G	G	X	-	X	-	G	G	G
Straight Petroleum Base	G	G	G	F	G	G	X	F	G	G	G	G	G	G
Water Petroleum Emulsion	-	G	G	F	G	G	X	F	G	X	G	G	G	G
Water Glycol	-	G	G	G	G	G	G	-	X	X	G	G	G	G
Straight Phosphate Ester	X	X	X	X	G	G	G	X	-	X	G	G	G	G
Phos. Ester/Petroleum	X	X	X	X	G	G	X	X	-	X	-	G	G	G
Polyol Ester	-	G	G	X	G	G	X	-	X	G	G	G	G	G
Hydrobromic Acid	G	X	X	X	G	X	G	G	X	X	G	X	X	X
Hydrochloric Acid	G	X	X	X	G	X	G	G	X	X	G	X	X	X

Fluid Type	Seal Compound													
	PVC	Nitrile	Vinyl Nitrile	Neoprene	Telom	Nylon/Nylon II	EPDM	Hypalon	Hytrel	Polyurethane	CPE	Brass	Steel	36 Stainless
Tannic Acid	G	F	F	F	G	X	G	G	G	G	G	F	X	G
Tar	X	F	F	F	G	X	X	X	G	F	G	F	F	G
Tartaric Acid	G	G	G	F	G	X	G	G	G	G	G	F	X	F
Tetrachloroethane	X	X	X	X	G	G	X	X	X	X	X	-	-	G
Tetrahydrofuran	X	X	X	X	G	G	X	X	-	X	X	-	-	G
Toluene	X	X	X	X	G	G	X	X	X	X	X	G	G	G
Transmission Oil (Petrol)	G	G	G	F	G	G	X	F	G	G	G	G	G	G
Trichloroethane	X	X	X	X	G	G	X	X	X	X	X	G	G	G
Trichloroethylene	X	X	X	X	G	G*	X	X	X	X	X	G	G	G
Tung Oil	-	G	G	F	G	G	X	F	G	X	X	F	G	G
Turpentine	X	F	F	X	G	G	X	X	F	X	F	F	G	G
Urea (Water Solution)	G	X	X	G	G	G	G	G	G	G	G	-	G	G
Varnish	X	X	X	X	G	G	X	X	-	X	F	G	G	G
Vegetable Oil	F	G	G	X	G	G	X	G	-	G	-	G	G	G
Vinyl Acetate	X	X	X	X	G	G	F	X	X	X	-	F	G	G
Water	G	G	G	G	G	G	G	G	G	G	G	F	F	G
Water-Glycol mixture	-	G	G	G	G	G	G	G	X	X	G	F	G	G
Water-Petroleum	-	G	G	F	G	G	X	F	G	X	G	G	F	G
Xylene	X	X	X	X	G	G	X	X	F	X	X	G	G	G
Zinc Chloride	G	G	G	G	G	X	G	G	X	G	X	X	X	X
Zinc Sulfate	G	G	G	G	G	G	G	G	-	G	X	X	X	G

Key:
G = Good Compatibility
F = Fair Compatibility
X = Incompatible
- = No Data Available

# UNITS OF CONVERSION

Imperial/S.I. Conversion Factors

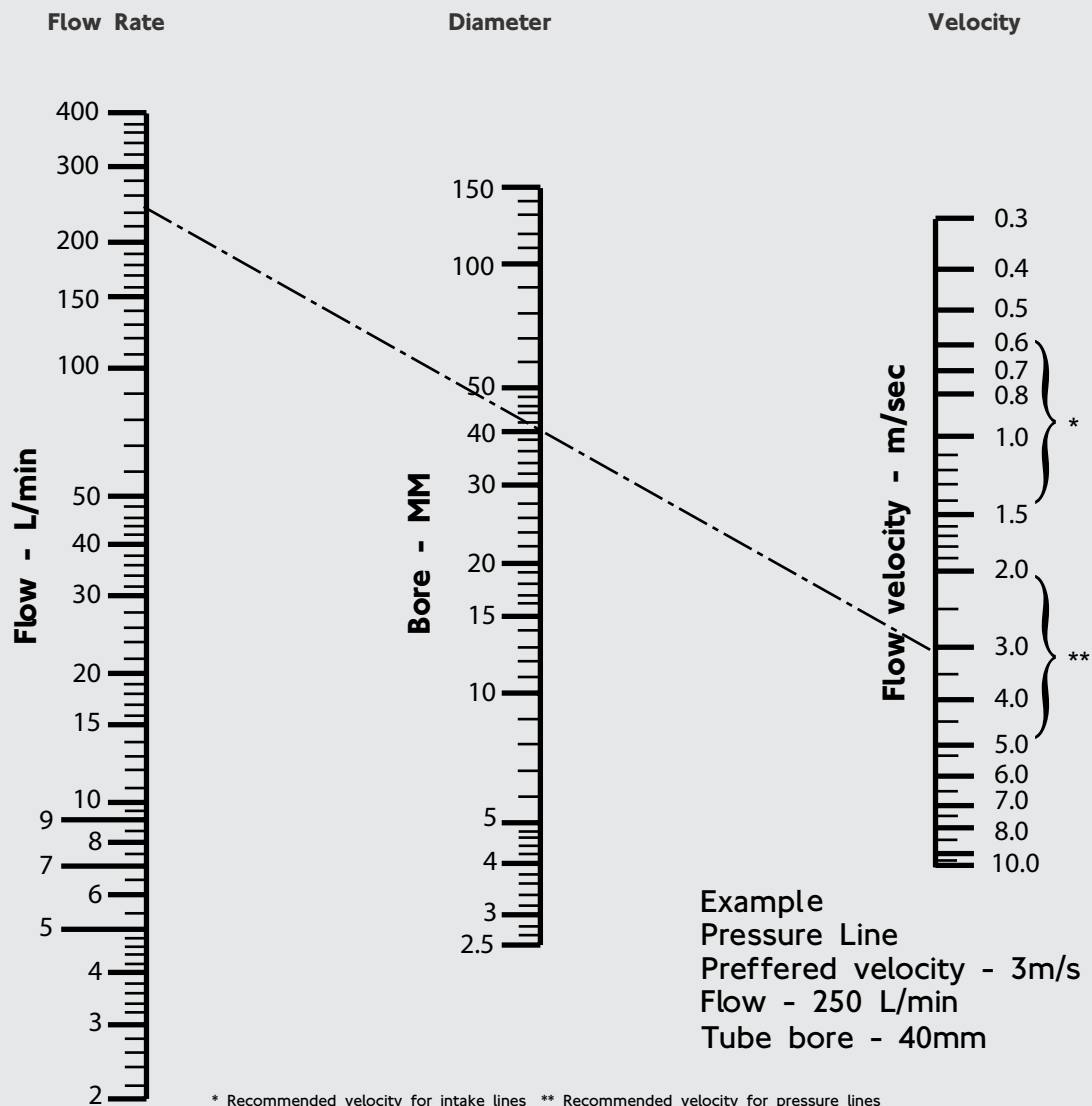
Imperial Unit	Symbol	S.I. Unit	Symbol	Factor
Atmospheres	Atm	bar	bar	1.01325
BTU/hour	Btu/h	kilowatts	kW	0.293071X10 <sup>3</sup>
Cubic Feet	ft <sup>3</sup>	cubic meters	m <sup>3</sup>	0.0283168
Cubic Feet	ft <sup>3</sup>	liters	l	28.3186
Cubic Inches	in <sup>3</sup>	cubic centimeters	cm <sup>3</sup>	16.3871
Cubic Inches	in <sup>3</sup>	liters	l	0.0163866
Degrees	±	radians	rad	0.0174533
Fahrenheit	±F	celsius	±C	C=5(±F-32)÷9
Feet	ft	meters	m	0.3048
Feet of water	ft H <sub>2</sub> O	bar	bar	0.0298907
Fluid Ounces UK	UK l oz	cubic centimeters	cm <sup>3</sup>	28413
Fluid Ounces USA	US l oz	cubic centimeters	cm <sup>3</sup>	29,5735
Foot pounds f.	ft lbf	joules	J	1,35582
Foot pounds/minute	ft lbf/min	watts	W	81,3492
Gallons UK	UK gal	liters	l	4,54596
Gallons USA	US gal	liters	l	3,78531
Horsepower	hp	kilowatts	kW	0.7457
Inches of mercury	in Hg	millibar	mbar	33,8639
Inches of water	in H <sub>2</sub> O	millibar	mbar	2,49089
Inches	in	centimeters	cm	2,54
Inches	in	millimeters	mm	25,4
Pints UK	UK pt	liters	l	0,568245
Pints USA	Usliqpt	liters	l	0,473163
Pounds	lb	kilogrammes	kg	0,4536
Pounds/cubic foot	lb/ft <sup>3</sup>	kilogrammes/cubic meter	kg/m <sup>3</sup>	16,0185
Pounds/cubic inch	lb/in <sup>3</sup>	kilogrammes/cubic centimeter	kg/cm <sup>3</sup>	0,0276799
Pounds force	lbf	newtons	N	4,44822
Pounds. feet	lbf ft	newton meters	Nm	1,35582
Pounds. Inch	lbf in	newton meters	Nm	0,11 2985
Revolution/minute	rpm	radians/sec	rad/s	0,104720
Square feet	ft <sup>2</sup>	square meters	m <sup>2</sup>	0,092903
Square inches	in <sup>2</sup>	square meters	m <sup>2</sup>	6,4516X10-4
Square inches	in <sup>2</sup>	square centimeters	cm <sup>2</sup>	6,4516

# BASIC HYDRAULIC FORMULA

Hydraulic Pumps	
<b>Output Flow</b>	Litres per Minute = $\frac{\text{cm}^3/\text{rev} \times \text{rpm}}{1000}$
<b>Input Power</b>	Kilowatts = $\frac{\text{l/min} \times \text{Bar}}{600}$
Hydraulic Motors	
<b>Shaft Torque</b>	Newton Meters = $\frac{\text{Bar} \times \text{cm}^3/\text{rev}}{62.8}$
<b>Shaft Speed</b>	Revs per Minute = $\frac{1000 \times \text{l/min}}{\text{cm}^3/\text{rev}}$
<b>Output Power</b>	Kilowatts = $\frac{\text{Nm} \times \text{rpm}}{9549}$
Hydraulic Cylinders	
<b>Area</b>	Area = $\frac{\pi \times d^2}{4}$
<b>Pressure</b>	Pressure (Pa) = $\frac{\text{Force (N)}}{\text{Area (mm}^2\text{)}}$

$\pi = 3.14$

# NOMOGRAPHIC CHART



# SETTING TARGET CLEANLINESS LEVEL

- Using the "Recommended Cleanliness Code Chart" below to determine the cleanest fluid (lowest code) required by any component in the system. All components that draw fluid from a common reservoir should be considered part of the same system even if their operations are independent or sequential (i.e. a central power unit running several different machines). The pressure rating for the system is the maximum system pressure achieved by the machine during a complete cycle of operation.
- For any system where the fluid is not 100% petroleum oil, set the target one range code cleaner for each particle size.  
Example: If the cleanest code required was 17/15/13 and water glycol is the system fluid, the target becomes 6/4/2.
- If any two or more of the following conditions are experienced by the machine or system, set the target cleanliness one level lower for each particle size:
  - Frequent cold starts at less than  $-8^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ )
  - Intermittent operation with fluid temperatures over  $70^{\circ}\text{C}$  ( $160^{\circ}\text{F}$ )
  - High-vibration or high-shock operation
  - Critical dependence on the system as part of a process operation

Looking at the example above, if this system was expected to cold start and a failure could stop all production, the target cleanliness would become 5/3/1.

Using this three-step procedure the system target cleanliness code for the system is now set.

Recommended Cleanliness Code Chart			
<b>Pumps</b>		<b>Cleanliness Level</b>	
<b>Pressure</b>	<b>&lt;40 Bar</b>	<b>≤ 210 Bar</b>	<b>&gt; 20 Bar</b>
Fixed Gear	20/8/5	9/7/5	8/6/3
Fixed Vane	20/8/5	9/7/4	8/6/3
Fixed Piston	9/7/5	8/6/4	7/5/3
Variable Vane	9/7/5	8/6/4	7/5/3
Variable Piston	8/6/4	7/5/3	6/4/2
<b>Valves</b>		<b>Cleanliness Level</b>	
<b>Pressure</b>		<b>≤ 210 Bar</b>	<b>&gt; 20 Bar</b>
Directional (solenoid)		20/8/5	9/7/4
Pressure (modulating)		9/7/4	9/7/4
Flow Controls (standard)		9/7/4	9/7/4
Check Valves		20/8/5	20/8/5
Cartridge Valves		20/8/5	9/7/4
Screw-in Valves		8/6/3	7/5/2
Prell Valves		20/8/5	9/7/4
Load-sensing Directional Valves		8/6/4	7/5/3
Hydraulic Remote Controls		8/6/3	7/5/2
Proportional Directional (throttle)		8/6/3	7/5/2*
Proportional Pressure Controls		8/6/3	7/5/2*
Proportional Cartridge Valves		8/6/3	7/5/2*
Proportional Screw-in Valves		8/6/3	7/5/2
Servo Valves		6/4/*	5/3/0*
<b>Actuators</b>		<b>Cleanliness Level</b>	
<b>Pressure</b>	<b>&lt; 40 Bar</b>	<b>≤ 210 Bar</b>	<b>&gt; 20 Bar</b>
Cylinders	20/8/5	20/8/5	20/8/5
Vane Motors	20/8/5	9/7/4	8/6/3
Axial Piston Motors	9/7/4	8/6/3	7/5/2
Gear Motors	2/9/7	20/8/5	9/7/4
Radial Piston Motors	20/8/4	9/7/5	8/6/3
Swashplate Design Motors	8/6/4	7/5/3	6/4/2
<b>Hydrostatic Transmissions</b>		<b>Cleanliness Level</b>	
<b>Pressure</b>	<b>&lt; 40 Bar</b>	<b>≤ 210 Bar</b>	<b>&gt; 20 Bar</b>
Hydrostatic Transmissions (in-loop fluid)	7/5/3	6/4/2*	6/4/*
<b>Bearings</b>		<b>Cleanliness Level</b>	
Ball Bearing Systems	5/3/*		
Roller Bearing Systems	6/4/2*		
Journal Bearings (high-speed)	7/5/3 >400 rpm		
Journal Bearings (low-speed)	8/6/4 <400 rpm		
General Industrial Gearboxes	7/5/3		

\*Requires precise sampling practices to verify cleanliness levels.

# HYDRAULIC OIL

Which hydraulic oil to use requires careful consideration. In general, the best hydraulic oil is the thinnest most effective as this minimizes pressure drops throughout the system as well as pipe size / strength requirements. Where the hydraulic system requires the use of mineral oil, it is necessary to allow for the change of viscosity that occurs with change of oil temperature (e.g. arctic / tropical).

## Hydraulic Fluid Viscosity

Low temperature viscosity needs to be low enough to enable the system to be started without creating high initial system pressures. At the other extreme, the hydraulic fluid's viscosity at the highest working temperature at which it will operate, will need to be high enough to provide effective lubrication of the critical moving parts within pumps and motors. Within modern commercial applications, there are a wide range of hydraulic systems which will have varying requirements in respect of hydraulic fluid performance and viscometric characteristics.

The hydraulic oil can be 'monograde oil' with improved rust oxidation and antiwear properties or 'multigrade' which includes the additional feature of improved viscosity index. These hydraulic fluids will either meet or approximate to the requirements of ISO 6743/4 Code HM or HV hydraulic fluids.

An additional requirement for high V.I. (Viscosity Index) hydraulic fluids, which use polymer additives to achieve enhanced V.I., is that the fluid should be shear stable, i.e. the fluid does not lose its lubricating properties due to shear of V.I additives.

## Water

Hydraulic systems are generally very intolerant to water contamination. The action to be taken if testing shows appreciable water contamination will depend on whether the water appears to be emulsified, and whether the particular system has the means within it to remove water from the circulating oil (e.g. a filter coalescing unit).

## Particulate Contaminants

Solid particulate contaminants are arguably the most common cause of failure in hydraulic components. One should never assume that new oil from a drum is free of particulate contaminants. When adding new oil to a hydraulic system, the oil should always be passed through a high-efficiency filter before it is introduced into the tank. Each hydraulic system should be equipped with a filtration system consisting of a suction line, return line, pressure line and/or kidney loop filtration depending on the cleanliness requirements of the system. The function of the filtration system being to prevent buildup of solid contaminants, be it due to particle ingress or generation. A high-efficiency vent breather with at least 3 micron filtration should always be installed onto the reservoir to prevent airborne contaminants from entering the system as it breathes.

## Oil Sampling and Analysis

For the more critical hydraulic equipment, a structured program for sampling and analysis will be appropriate. No rules can be laid down for the required frequency of testing, however the table on the following page can be used as a guide.



# FLUID SAMPLING FREQUENCY CHART

## Recommended System Sampling Frequency Chart

Routine Sampling - Systems with target cleanliness 7/5/2 or lower			
System Pressure	40 bar	40 - 20 bar	20 bar
8 hours of operation per day	4 months	3 months	3 months
Over 8 hours of operation per day	3 months	2 months	2 months
Routine Sampling - Systems with target cleanliness 8/6/3 or higher			
System Pressure	40 bar	40 - 20 bar	20 bar
8 hours of operation per day	6 months	4 months	4 months
Over 8 hours of operation per day	4 months	3 months	2 months
Ad Hoc (Non-routine) Sampling			
<b>Initial commissioning or major rebuild</b> Large system (2000 liters or more) and systems with servo or proportional valves <ul style="list-style-type: none"> <li>• Sample fluid before start-up</li> <li>• Sample fluid at intervals during first day running</li> <li>• Sample fluid after one week</li> <li>• Sample after one month operation</li> </ul>			
<b>Other systems</b> <ul style="list-style-type: none"> <li>• Sample after one month operation</li> </ul>			
<b>Systems in distress (i.e. increased heat, erratic operation, unusual sound, etc)</b> <ul style="list-style-type: none"> <li>• Immediate</li> </ul>			
<b>Systems that have undergone a maintenance event (Filter service, hose change, seal service, etc)</b> <ul style="list-style-type: none"> <li>• Immediate</li> </ul>			

In many cases, recommendations may be available from equipment and oil manufacturers. Items of equipment that have suffered previous operating problems probably warrant more attention than others, at least until it becomes clear that problems have been rectified. In the absence of any other information on the equipment, the safe approach will be to initially use relatively short monitoring intervals to get an initial profile of the trends in the system and then adjust the interval inline with experience.

It is important to appreciate that filling the wrong oil into a system and water leakage at coolers is not a progressive event and these types of problems will be missed if the sampling and monitoring interval is too long. The table below shows the three key indicators that are used to judge the condition of hydraulic oil. Monitoring the level of these three indicators and ensuring that they remain within default limits provides framework whereby the risk of catastrophic failure can be minimised.

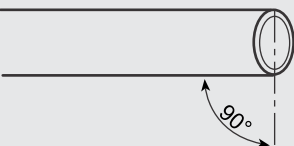
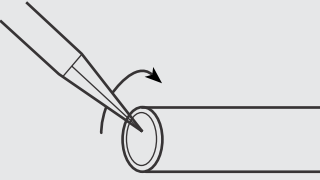
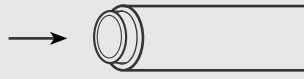
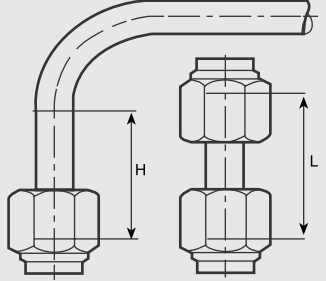
## Hydraulic Oil Key Test Parameters (Mineral Oil)

Key Test Parameters	Oil Condition	Default Limit	Comment
Particulates		Refer to Manufacturers Data or Recommended Fluid Cleanliness Targets	Hydraulic systems can be extremely sensitive to wear from particulate contamination and great care should be taken to ensure all filters are in good condition and no dirt enters via top-up oil or tank vents.
Viscosity (cSt at 40°C)	Exceeds limit	< +/- 0% norm	Viscosity increase is more common than decrease. It should be noted and checked at more frequent intervals. Check that the correct grade of oil is used for top-up.
Water (%)	Satisfactory Borderline Exceeds limit	0.05% - 0.5% 0.5% - 0.2% > 0.20%	BEWARE - Upper limit should be checked against manufacturers' data. Some oils cannot tolerate water. Data not applicable to water or phosphate ester-based hydraulic fluids.

# STEEL TUBE FITTING ASSEMBLY INSTRUCTIONS

## Assembly of compression fitting with safety cutting ring

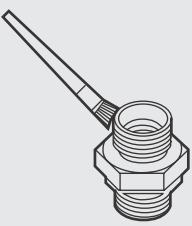
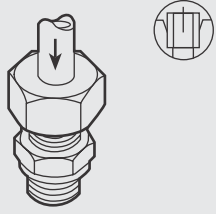
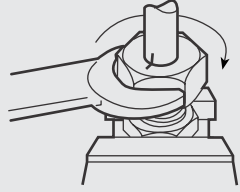
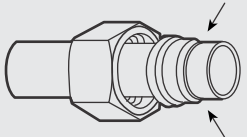
### Tube preparation

			
<b>Saw off</b>	<b>Deburring</b>	<b>Reinforcing sleeves</b>	<b>Length</b>
<p>Saw off the tube at the right angles. An angle deviation of 0,5° is allowed. Do not use a tube cutter to cut the tube.</p>	<p>Deburr the tube inside and outside. Do not sharpen the tube. Maximum allowed facing 0,3x45°. Clean the tube.</p>	<p>Please use reinforcing sleeves for soft and thin tubes. Introduce the reinforcing sleeve as shown and press in evenly.</p>	<p>Respect the minimum length for straight tube ends related to elbows and straight connections according to the table below.</p>

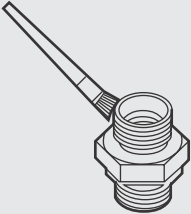
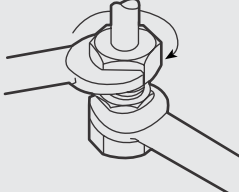
### Minimum lengths for straight tube ends

OD	LL				L										S									
	4	5	6	8	6	8	0	2	5	8	22	28	35	42	6	8	0	2	4	6	20	25	30	38
Hmin	24	25	25	26	3	3	33	33	36	38	42	42	48	48	35	35	37	37	43	43	50	54	58	65
Lmin	30	32	32	33	39	39	42	42	45	48	53	53	60	60	44	44	47	47	54	54	63	68	73	82

### Direct assembly

			
<b>Oil</b>	<b>Combination</b>	<b>Final assembly</b>	<b>Visual inspection</b>
<p>Slightly oil the thread of the body and cone of the pressure ring.</p>	<p>Nut and cutting ring must be put over the tube and introduce the tube into the body. Tube must lay square to the body.</p>	<p>Tighten nut by hand as far as possible. Mark position and finish the assembly with one and a half turns.</p>	<p>Loosen the nut. Check that the cutting ring completely covers the outer end of the tube.</p>

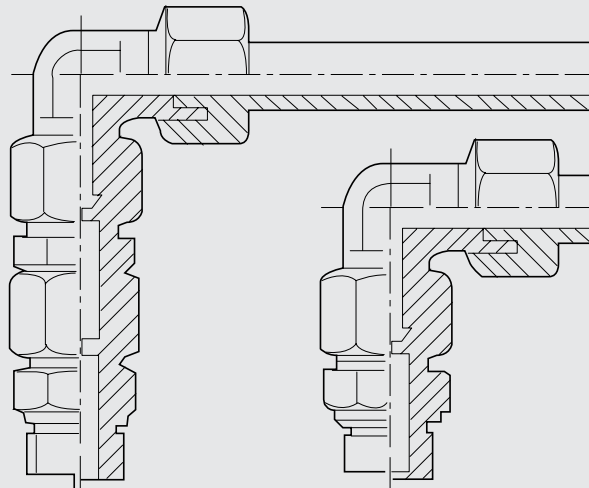
### Repeated assembly

	
<b>Oil</b>	<b>Final assembly</b>
<p>Slightly oil the thread of the body and cone of the pressure ring.</p>	<p>Tighten nut by hand as far as possible, hold the body against it.</p>



# STEEL TUBE FITTING ASSEMBLY INSTRUCTIONS

Material combination			
The blago compression fitting must be selected according to the related tube material. Please respect the assembly instructions in the table on the right hand side.	Tube material	Compression fitting	Notes
	Steel	Steel	-
	Stainless steel	Stainless steel	Pre-assembly necessary
	Copper	Brass	-
	Plastic	Steel	Reinforcing sleeve necessary
Notes			
Lubrication material	Control of the VOMO	Safety note	Short connections
Yellow chromated Blago compression fittings with lubrication surface do not need to be oiled before assembly. The thread of the nut and the cone of the body must be oiled before assembly when blank or phosphated compression fittings and pre assembly body.	Please check cones of pre-assembly bodies regularly regarding diameters and damage to ensure a correct assembly.	Hydraulic compression fittings have to withstand very high pressures. We therefore recommend that the assembly is only carried out by trained staff. A correctly assembled compression fitting does not show any leakage up to tube failure.	Short connections should be avoided due to sustainability. Please use distance pieces in order to increase the length of the connections.





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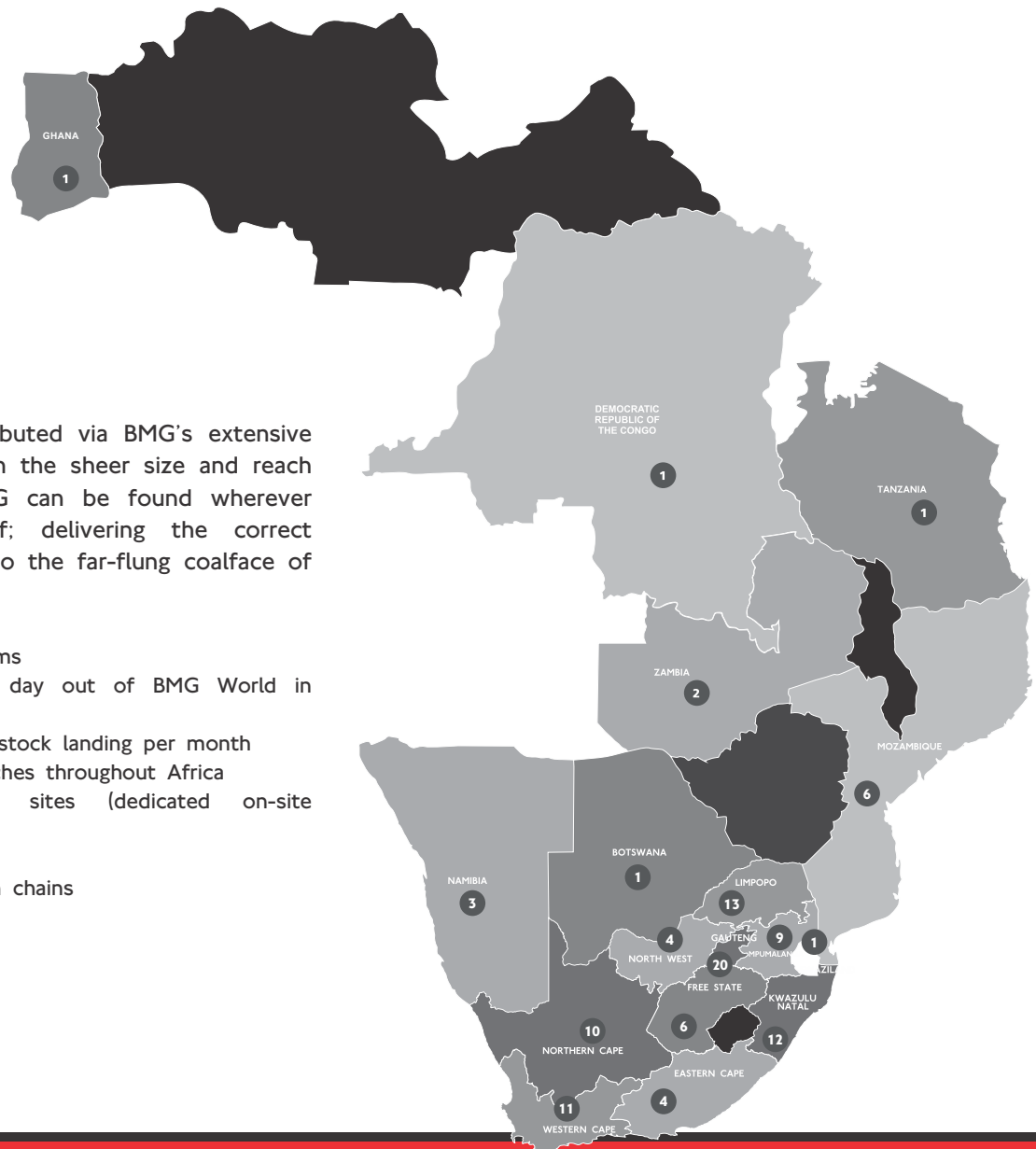
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