

OSNA[®]-10

OFFSHORE

KME Special Products GmbH & Co. KG
SPECIAL DIVISION
[EN]

Copper-Nickel Alloy
for Seawater Piping Systems
(CuNi 90/10)



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KME - The Company

KME offers innovative product solutions tailored to the respective individual requirements of our customers from the most various industrial sectors. KME is divided into two corporate divisions – the COPPER DIVISION (rolled products) and the SPECIAL DIVISION (special products) – and has a worldwide sales network. The structure of KME into its two divisions provides important prerequisites for concentrating on the different markets for the respective product groups. This enables customised solutions to be developed and exemplary engineering and services to be provided.

Marine Applications

KME Special Products GmbH & Co. KG business unit Marine Applications is specialized in the production of copper-nickel alloys for piping systems in shipbuilding, offshore installations and other marine applications. Since decades, these alloys are successfully used in:

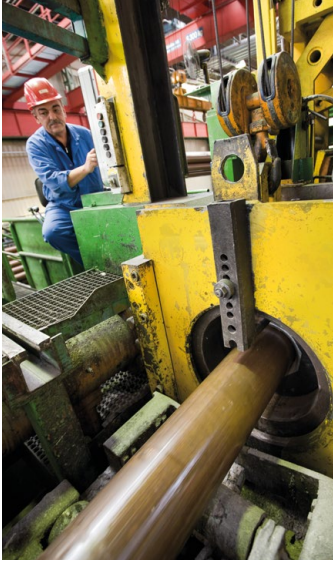
- Merchant and military shipbuilding
- Offshore oil and gas installations
- Coastal petroleum and petrochemical processing plants
- Seawater desalination plants
- Coastal electricity generation plants

Copper-nickel alloys are widely applied in:

- Seawater cooling systems
- Fire water systems
- Sanitary systems
- Deck steam pipes
- Deluge systems
- Hydraulic and pneumatic systems
- Seawater feed lines to desalination and processing units
- Splash zone sheathing



The Material



KME OSNA®-10-Alloy

The chemical composition of the KME's OSNA®-10-alloy is modified to ensure the compliance with all international specifications. Controlled content of alloying elements and minimised concentration of impurities ensure reliable service and fabrication properties of the alloy.

Main Advantages of OSNA®-10-Alloy

Despite the rough conditions in marine service and the highly corrosive nature of seawater, the product range provides a well balanced combination of technical and economical benefits:

- Straight forward alloying system with good weldability
- Excellent ductility and toughness
- Good erosion/corrosion performance
- Resistant to uniform and localised corrosion
- No effect of ambient seawater temperatures
- No effect of seawater chlorination
- Resistant to biofouling
- Resistant to stress-corrosion cracking
- Low maintenance costs

Comparison of Standard Specifications for OSNA®-10 (CuNi 90/10)

	KME Alloy OSNA®-10 (CuNi 90/10)	EN 1652/ 12420/12449 ¹⁾ CW352H	DIN 86019 WL 2.1972	EEMUA 2016, 234/1-2 UNS C 7060 x	MIL-T-16420K ASTM B 466 ^{2)/467} C 70620
Ni %	10.0 – 11.0	9.0 – 11.0	9.0 – 11.0	10.0 – 11.0	9.0 – 11.0
Fe %	1.5 – 1.8	1.0 – 2.0	1.5 – 1.8	1.5 – 2.0*	1.0 – 1.8
Mn %	0.6 – 1.0	0.5 – 1.0	0.5 – 1.0	0.5 – 1.0	max. 1.0
C %	max. 0.02	max. 0.05	max. 0.05	max. 0.05	max. 0.05
Pb %	max. 0.01	max. 0.02	max. 0.01	max. 0.01	max. 0.02
S %	max. 0.005	max. 0.05	max. 0.005	max. 0.02	max. 0.02
P %	max. 0.02	max. 0.02	max. 0.02	max. 0.02	max. 0.02
Zn %	max. 0.05	max. 0.50	max. 0.05	max. 0.20	max. 0.50
Sn %	max. 0.03	max. 0.03	–	–	–
other imp.	max. 0.20	max. 0.20	max. 0.20	max. 0.30	–
Cu %	rem.	rem.	rem.	rem.	min. 86.5

¹⁾ formerly BS 2871 Part 2 (now withdrawn)

²⁾ equal to C 70600 for subsequent welding

* The iron content has been specified to improve corrosion resistance

Offshore Product Range

The OSNA®-10 offshore product range is based on:

- EEMUA 234/1-2, 2016: Tubes¹ Seamless and Welded
- EEMUA 234/3-6, 2016: Flanges Composite and Solid
- EEMUA 234/7-13, 2016: Fittings

The unique dimensional range from ½ inch to 36 inch ensures the supply of the entire piping systems from one source. Although the pipe dimensions of 38 and 40 inch are not included in the EEMUA 234-2016 they are available here as they are commonly specified in offshore projects.

Furthermore, we are also offering sheets and plates in different sizes.

¹ The reference „pipe“ rather than „tube“ is used in this document.



Seamless Pipes

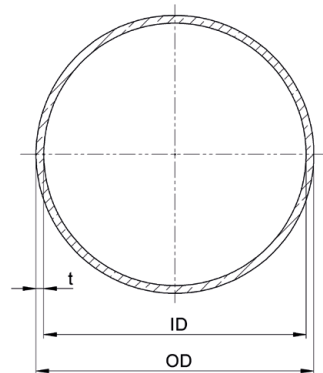
Seamless pipes are in accordance with EEMUA 234/chapter 1. They are manufactured from hot extruded shells followed by cold work and annealing.

Welded Pipes

Longitudinally welded pipes are in accordance with EEMUA 234/chapter 2. They are manufactured from hot rolled or cold rolled and annealed sheet or plates in accordance with BS 2870, BS 2875, ASTM B171 or ASTM B402. Mechanical testing is carried out in accordance with the standards above. The pipes are supplied in “as welded” condition.

Dimensions

Dimensions are based on EEMUA 234, Tables 3/4 and Tables 8/9. However, the pipe diameters range from ½ in./16 mm to 36 in./914 mm. Although the pipe dimensions of 38 in./965 mm and 40 in./1016 mm are not included in the EEMUA 234-2016 they are available on request as they are commonly specified. The corresponding wall thicknesses of the pipes comply with the pressure containment requirements of B31.3 as well as the requirements of the International Association of Classification Societies. Pipes with other wall thicknesses are available on request.



Tolerances

See notes 1-4 for seamless and notes 2-4 for welded pipes.

Weld Preparation

For wall thickness less than 3 mm, the pipes are supplied with plain weld ends. Larger thicknesses are supplied with the weld bevel of $37\frac{1}{2}^{\circ} \pm 2\frac{1}{2}^{\circ}$.



Dimensions (mm)**Seamless Pipe**

Size		Specified Wall Thickness (mm) t		Theoretical Weight/Metre (kg)	
Nominal (in)	Specified (mm)	16 bar	20 bar	16 bar	20 bar
½	16	2.0	2.0	0.78	0.78
¾	25	2.0	2.0	1.29	1.29
1	30	2.5	2.5	1.93	1.93
1¼	38	2.5	2.5	2.49	2.49
1½	44.5	2.5	2.5	2.94	2.94
2	57	2.5	2.5	3.82	3.82
2½	76.1	2.5	2.5	5.15	5.15
3	88.9	2.5	2.5	6.05	6.05
4	108	3.0	3.0	8.82	8.82
6	159	3.0	3.5	13.10	15.24
8	219.1	4.0	4.5	24.10	27.04
10	267	4.5	5.5	33.10	40.27
12	323.9	5.5	7.0	49.05	62.10
14	368	6.5	8.0	65.80	80.64
16	419	7.0	9.0	80.75	103.32

Seam-Welded Pipe

Size		Specified Wall Thickness (mm) t		Theoretical Weight/Metre (kg)	
Nominal (in)	Specified (mm)	16 bar	20 bar	16 bar	20 bar
16	419		9.0		103.32
18	457.2	8.0	9.5	100.62	119.10
20	508	8.5	11.0	118.90	153.10
24	610	10.5	13.0	176.30	217.30
28	711	12.0	15.0	234.90	292.21
32	813	13.5	17.0	302.20	378.76
36	914	15.5	19.0	390.00	475.97

Note 1

The pipe sizes up to including 4 in./108 mm are based on BS 2871 (now withdrawn): Part 2: Table 3 for outside diameters and their tolerances to allow for the use of capillary and compression fittings and brazed (and welded) slip-on flanges. The wall thickness of the 16 bar range have been increased to match the 20 bar range for mechanical strength.

Note 2

The pipe size 6 in./159 mm up to 16 in./419 mm are also based on BS 2871 (now withdrawn): Part 2: Table 3 for specified diameters but the tolerance have been applied to the inside diameters for facilitate alignment of matching weld preparations.

Note 3

The ovality of the finished pipe doesn't exceed 2% of the difference of the maximum and minimum diameter measured on the same cross section.

Note 4

Up to including 4 in./108 mm, the wall thickness doesn't vary by more than 10 % specified therein. For diameters from 6 in./159 mm and larger, the wall thickness is not less than 12.5 % of the specified value. The pipes with other dimensions than mentioned herein are available on request. Please contact us for more information.

Stock Dimensions

All seamless pipes are available from stock.

Type and Construction

Elbows are in accordance with EEMUA 234/7. Seamless elbows are typically available up to 18 inch/457 mm. Larger dimensions are manufactured from longitudinally welded half shells. 45° and 90° elbows are available in all sizes.

Dimensions

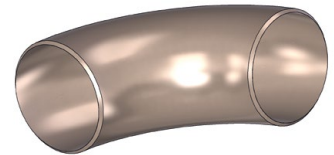
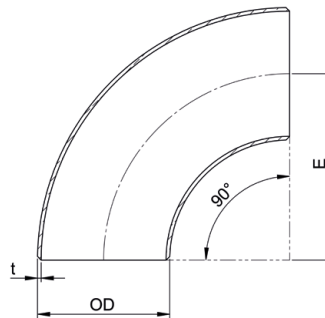
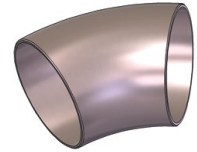
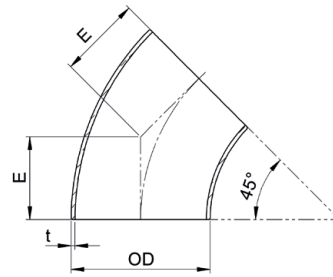
Dimensions are based on EEMUA 234/7, Figure 4, Tables 35-36 and 38-39. Standard elbows are supplied with long radius, i.e. 1.5 x O.D. Elbows with other dimensions are available on request.

Tolerances

See Appendix C

Weld Preparation

For wall thickness less than 3 mm, the elbows are supplied with plain weld ends. Larger thicknesses are supplied with the weld bevel of $37 \frac{1}{2}^\circ \pm 2 \frac{1}{2}^\circ$.



Dimensions (mm)

Nominal Size in	Specified Size (OD) mm	Specified Pipe Wall Thickness t		E		Theoretical Weight (kg)			
		16 bar	20 bar	45°	90°	45° 16 bar	45° 20 bar	90° 16 bar	90° 20 bar
1	30	Use 20 bar	2.5	22	38	Use 20 bar	0.06	Use 20 bar	0.12
1¼	38		2.5	25	43		0.09		0.13
1½	44.5		2.5	29	57		0.15		0.30
2	57		2.5	35	76		0.25		0.52
2½	76.1		2.5	44	95		0.45		0.90
3	88.9		2.5	51	114		0.65		1.25
4	108	3.0	3.0	64	152	2.30	1.00	4.70	2.10
6	159		3.5	95	229		2.70		5.50
8	219.1		4.5	127	305		6.00		12
10	267		5.5	159	381		12		24
12	323.9		7.0	190	457		23		45
14	368		8.0	222	533		34		67
16	419	7.0	9.0	254	610	38	50	77	99
18	457.2		9.5	286	686		64		109
20	508		11.0	318	762		92		142
24	610		13.0	381	914		156		252
28	711		15.0	438	1067		245		394
32	813		17.0	502	1219		362		579
36	914	15.5	19.0	565	1372	420	513	841	1026

Type and Construction

Tee pieces are in accordance with EEMUA 234/7. Seamless tee pieces are typically available up to 8 in./219.1 mm; bigger dimensions are welded.

Dimensions

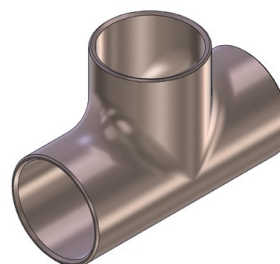
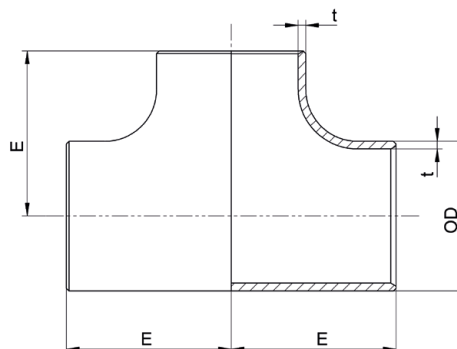
Dimensions are based on EEMUA 234/7, Figures 4-5, Tables 35-36 and 40. Tee pieces with other dimensions are available on request.

Tolerances

See Appendix C

Weld Preparation

For wall thickness less than 3 mm, the tees are supplied with plain weld ends. Larger thicknesses are supplied with the weld bevel of $37 \frac{1}{2}^{\circ} \pm 2 \frac{1}{2}^{\circ}$.



Dimensions (mm)

Nominal Size in	Specified Size (OD) mm	Specified Pipe Wall Thickness t mm		E	Theoretical Weight (kg)	
		16 bar	20 bar		16 bar	20 bar
1	30	Use 20 bar	2.5	38	Use 20 bar	0.30
1¼	38		2.5	48		0.50
1½	44.5		2.5	57		0.75
2	57		2.5	64		1.00
2½	76.1		2.5	76		1.60
3	88.9		2.5	86		2.00
4	108		3.0	105		3.25
6	159		3.0	143		6.00
8	219.1		4.0	178		11.25
10	267		4.5	216		22.50
12	323.9		5.5	254		39.50
14	368		6.5	279		62.00
16	419		7.0	305		88.00
18	457.2		8.0	343		128.00
20	508		8.5	381		165.00
24	610		10.5	432		266.00
28	711		12.0	521		388.00
32	813		13.5	597		508.00
36	914		15.4	673		650.00

Reducing Tees (16 bar systems)

Type and Construction

Pieces are in accordance with EEMUA 234/7. Seamless tee pieces are typically available up to 8 inch/219.1 mm; bigger dimensions are welded.

Dimensions

Dimensions are based on EEMUA 234/7, Figures 4-5, Tables 35-36 and 41-43. Tee pieces with other dimensions are available on request.

Tolerances

See Appendix C

Weld Preparation

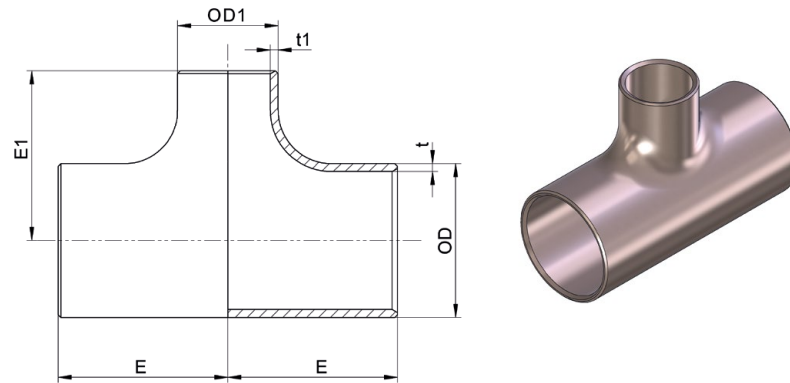
For wall thickness less than 3 mm, the tees are supplied with plain weld ends. Larger thicknesses are supplied with the weld bevel of $37\frac{1}{2}^{\circ} \pm 2\frac{1}{2}^{\circ}$.

Dimensions for 16 bar systems

Specified Size			Pipe Wall Thickness			Centre-to-End (mm)		Theoretical Weight
OD mm	OD mm	OD ₁ mm	t mm	t mm	t ₁ mm	E nom	E ₁ nom	kg
for sizes from 30 mm up to 108 mm use 20 bar								
		108			3.0		130	4.19
159	159	88.9	3.0	3.0	2.5	143	124	4.01
		76.1			2.5		121	3.96
		159			3.0		168	9.33
219.1	219.1	108	4.0	4.0	3.0	178	156	8.97
		88.9			2.5		152	8.82
		219.1			4.0		203	15.94
267	267	159	4.5	4.5	3.0	216	194	15.06
		108			3.0		184	14.71
		267			4.5		241	27.48
323.9	323.9	219.1	5.5	5.5	4.0	254	229	26.49
		159			3.0		219	25.62
		323.9			5.5		270	40.87
368	368	267	6.5	6.5	4.5	279	257	39.07
		219.1			4.0		248	38.20
		368			6.5		305	55.46
419	419	323.9	7.0	7.0	5.5	305	295	53.38
		267			4.5		283	51.62
		419			7.0		330	77.10
457.2	457.2	368	8.0	8.0	6.5	343	330	75.59
		323.9			5.5		321	73.45

Reducing Tees (16 bar systems)

Butt Welding Fittings



Dimensions for 16 bar systems

Specified Size			Pipe Wall Thickness			Centre-to-End (mm)		Theoretical Weight
OD mm	OD mm	OD ₁ mm	t mm	t mm	t ₁ mm	E nom	E ₁ nom	kg
for sizes from 30 mm up to 108 mm use 20 bar								
508	508	457.2	8.5	8.5	8.0	381	368	101.91
		419			7.0		356	98.68
		368			6.5		356	97.16
610	610	508	10.5	10.5	8.5	432	432	167.14
		457.2			8.0		419	163.52
		419			7.0		406	160.21
711	711	610	12.0	12.0	10.5	521	508	271.22
		508			8.5		483	259.52
		457.2			8.0		470	255.88
813	813	711	13.5	13.5	12.0	597	572	399.14
		610			10.5		559	387.17
		508			8.5		533	375.34
914	914	813	15.5	15.5	13.5	673	648	581.77
		711			12.0		622	562.82
		610			10.5		610	551.05

Type and Construction

Pieces are in accordance with EEMUA 234/7. Seamless tee pieces are typically available up to 8 inch/219.1 mm; bigger dimensions are welded.

Dimensions

Dimensions are based on EEMUA 234/7, Figures 4-5, Tables 35-36 and 41-43.. Tee pieces with other dimensions are available on request.

Tolerances

See Appendix C

Weld Preparation

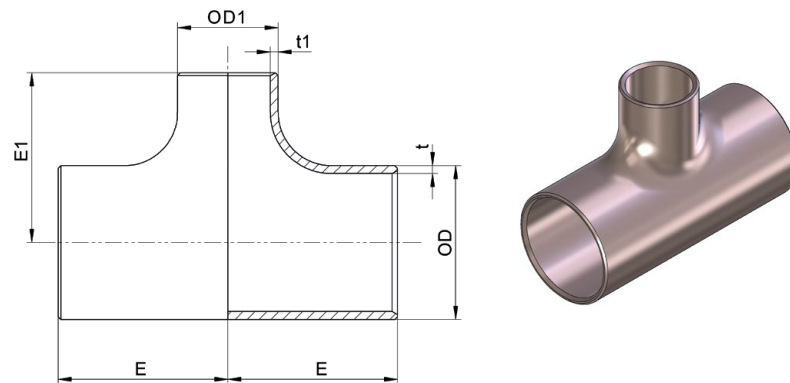
For wall thickness less than 3 mm, the tees are supplied with plain weld ends. Larger thicknesses are supplied with the weld bevel of $37 \frac{1}{2}^{\circ} \pm 2 \frac{1}{2}^{\circ}$.

Dimensions for 20 bar systems

Specified Size			Pipe Wall Thickness			Centre-to-End (mm)		Theoretical Weight
OD mm	OD mm	OD ₁ mm	t mm	t mm	t ₁ mm	E nom	E ₁ nom	kg
30	30	25	2.5	2.5	2.0	38	38	0.18
38	38	30	2.5	2.5	2.5	48	48	0.29
		25	2.5	2.5	2.0			0.28
		38	2.5	2.5	2.5			0.42
44.5	44.5	30	2.5	2.5	2.5	57	57	0.40
		25	2.5	2.5	2.0			0.38
		44.5					60	0.58
57	57	38	2.5	2.5	2.5	64	57	0.56
		30					51	0.53
		57					70	0.90
76.1	76.1	44.5	2.5	2.5	2.5	76	67	0.87
		38					64	0.85
		76.1					83	1.24
88.9	88.9	57	2.5	2.5	2.5	86	76	1.16
		44.5					73	1.12
		88.9					98	2.12
108	108	76.1	3.0	3.0	2.5	105	95	2.06
		57					89	1.98
		108			3.0		130	4.80
159	159	88.9	3.5	3.5	2.5	143	124	4.62
		76.1			2.5		121	4.57
		159			3.5		168	10.50
219.1	219.1	108	4.5	4.5	3.0	178	156	10.02
		88.9			2.5		152	9.87
		219.1			4.5		203	19.25
267	267	159	5.5	5.5	3.5	216	194	18.29
		108			3.0		184	17.82

Reducing Tees (20 bar systems)

Butt Welding Fittings



Dimensions for 20 bar systems

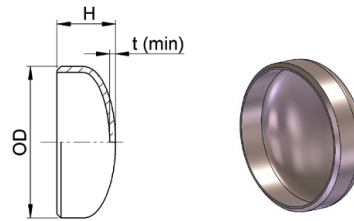
Specified Size			Pipe Wall Thickness			Centre-to-End (mm)		Theoretical Weight kg
OD mm	OD mm	OD ₁ mm	t mm	t mm	t ₁ mm	E nom	E ₁ nom	
323.9	323.9	267	7.0	7.0	5.5	254	241	34.69
		219.1			4.5		229	33.32
		159			3.5		219	32.38
368	368	323.9	8.0	8.0	7.0	279	270	50.27
		267			5.5		257	47.87
		219.1			4.5		248	46.66
419	419	368	9.0	9.0	8.0	305	305	70.63
		323.9			7.0		295	68.24
		267			5.5		283	65.89
457.2	457.2	419	9.5	9.5	9.0	343	330	92.04
		368			8.0		330	89.74
		323.9			7.0		321	87.31
508	508	457.2	11.0	11.0	9.5	381	368	130.03
		419			9.0		356	127.00
		368			8.0		356	124.69
610	610	508	13.0	13.0	11.0	432	432	206.90
		457.2			9.5		419	201.04
		419			9.0		406	197.91
711	711	610	15.0	15.0	13.0	521	508	337.26
		508			11.0		483	323.65
		457.2			9.5		470	317.78
813	813	711	17.0	17.0	15.0	597	572	500.07
		610			13.0		559	484.85
		508			11.0		533	471.09
914	914	813	19.0	19.0	17.0	673	648	712.24
		711			15.0		622	688.14
		610			13.0		610	673.17

Type and Construction

End caps are in accordance with EEMUA 234/7, and seamless.

Dimensions

Dimensions are based on EEMUA 234/7, Figure 4, Tables 35-36 and 44. The additional wall compensatory thicknesses over and above the minimum pipe wall thicknesses are included. End caps with other dimensions are available on request.



Tolerances

See Appendix C

Weld Preparation

For wall thickness less than 3 mm, the end caps are supplied with plain weld ends. Larger thicknesses are supplied with the weld bevel of $37 \frac{1}{2}^\circ \pm 2 \frac{1}{2}^\circ$.

Specified Size OD	16 bar		20 bar		Theoretical Weight	
	t min mm	H mm	t min mm	H mm	16 bar kg	20 bar kg
44.5	Use 20 bar		2.25	19.6	Use 20 bar	0.08
57			2.25	22.0		0.11
76.1			2.25	25.7		0.18
88.9			2.25	28.2		0.24
108			2.70	31.7		0.40
159	2.63	41	3.12	44	0.8	0.97
219.1	3.54	55	4.29	60	2.0	2.40
267	4.29	69	5.23	69	3.4	4.10
323.9	5.24	80	6.34	85	5.9	7.70
368	5.90	93	7.21	103	9.1	11.90
419	6.73	102	8.21	112	12.4	16.90
457.2	7.33	119	8.97	119	17.6	20.90
508	8.15	129	9.96	139	22.7	30.80
610	9.81	148	11.96	163	39.2	51.60
711	11.50	176	13.97	191	61.8	81.40
813	13.17	200	15.97	210	90.5	117.40
914	14.81	221	17.96	231	132.2	166.20



Type and Construction

Eccentric and concentric reducers are in accordance with EEMUA 234/7. The concentric reducers are typically supplied up to incl. 12 in./323.9 mm in seamless condition; bigger dimensions are seamwelded. The eccentric reducers are supplied up to incl. 8 inch/219.1 mm in seamless condition; bigger dimensions are seamwelded.

Tolerances

See Appendix C

Weld Preparation

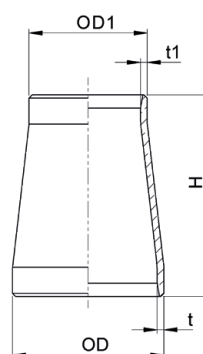
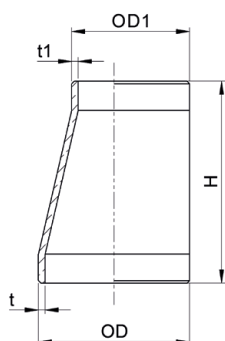
For wall thickness less than 3 mm, the reducers are supplied with plain weld ends. Larger thicknesses are supplied with the weld bevel of $37 \frac{1}{2}^{\circ} \pm 2 \frac{1}{2}^{\circ}$.

Dimensions

Dimensions are based on EEMUA 234/7, Figures 4, Tables 35-36 and 45-47. Reducers with other dimensions are available on request.

Specified Size OD x OD ₁ mm	Length H mm	Specified Wall Thickness t x t ₁		Theoretical Weight	
		16 bar mm	20 bar mm	16 bar kg	20 bar kg
30 x 25	51	2.5 x 2.0	2.5 x 2.0	0.07	0.07
38 x 25	51	2.5 x 2.0	2.5 x 2.0	0.09	0.09
38 x 30	51	2.5 x 2.5	2.5 x 2.5	0.11	0.11
44.5 x 25	64	2.5 x 2.0	2.5 x 2.0	0.18	0.18
44.5 x 30	64	2.5 x 2.5	2.5 x 2.5	0.20	0.20
44.5 x 38	64	2.5 x 2.5	2.5 x 2.5	0.22	0.22
57 x 30	76	2.5 x 2.5	2.5 x 2.5	0.29	0.29
57 x 38	76	2.5 x 2.5	2.5 x 2.5	0.29	0.29
57 x 44.5	76	2.5 x 2.5	2.5 x 2.5	0.29	0.29
76.1 x 57	89	2.5 x 2.5	2.5 x 2.5	0.40	0.40
88.9 x 57	89	2.5 x 2.5	2.5 x 2.5	0.44	0.44
88.9 x 76.1	89	2.5 x 2.5	2.5 x 2.5	0.50	0.50
108 x 57	102	3.0 x 2.5	3.0 x 2.5	0.67	0.67
108 x 76.1	102	3.0 x 2.5	3.0 x 2.5	0.75	0.75
108 x 88.9	102	3.0 x 2.5	3.0 x 2.5	0.80	0.80
159 x 57	140	3.0 x 2.5	3.5 x 2.5	1.32	1.54
159 x 76.1	140	3.0 x 2.5	3.5 x 2.5	1.44	1.68
159 x 88.9	140	3.0 x 2.5	3.5 x 2.5	1.52	1.77
159 x 108	140	3.0 x 3.0	3.5 x 3.0	1.64	1.91
219.1 x 76.1	152	4.0 x 2.5	4.5 x 2.5	2.49	2.79
219.1 x 88.9	152	4.0 x 2.5	4.5 x 2.5	2.60	2.92
219.1 x 108	152	4.0 x 3.0	4.5 x 3.0	2.77	3.11
219.1 x 159	152	4.0 x 3.0	4.5 x 3.5	3.21	3.60
267 x 108	178	4.5 x 3.0	5.5 x 3.0	4.84	5.89
267 x 159	178	4.5 x 3.0	5.5 x 3.5	5.52	6.71
267 x 219.1	178	4.5 x 4.0	5.5 x 4.5	6.31	7.68
323.9 x 159	203	5.5 x 3.0	7.0 x 3.5	7.63	9.65
323.9 x 219.1	203	5.5 x 4.0	7.0 x 4.5	8.60	10.89
323.9 x 267	203	5.5 x 4.5	7.0 x 5.5	9.38	11.87

Reducers



Specified Size OD x OD ₁ mm	Length H mm	Specified Wall Thickness t x t ₁		Theoretical Weight	
		16 bar mm	20 bar mm	16 bar kg	20 bar kg
368 x 219.1	330	6.5 x 4.0	8.0 x 4.5	17.24	21.50
368 x 267	330	6.5 x 4.5	8.0 x 5.5	18.68	23.00
368 x 323.9	330	6.5 x 5.5	8.0 x 7.0	20.39	25.00
419 x 267	356	7.0 x 4.5	9.0 x 5.5	23.44	30.00
419 x 323.9	356	7.0 x 5.5	9.0 x 7.0	25.43	32.50
419 x 368	356	7.0 x 6.5	9.0 x 8.0	26.97	34.50
457.2 x 323.9	381	8.0 x 5.5	9.5 x 7.0	30.70	37.03
457.2 x 368	381	8.0 x 6.5	9.5 x 8.0	34.06	41.50
457.2 x 419	381	8.0 x 7.0	9.5 x 9.0	37.90	46.50
508 x 368	508	8.5 x 6.5	11.0 x 8.0	50.80	64.10
508 x 419	508	8.5 x 7.0	11.0 x 9.0	55.40	71.10
508 x 457.2	508	8.5 x 8.0	11.0 x 9.5	61.20	75.70
610 x 419	508	10.5 x 7.0	13.0 x 9.0	70.00	87.50
610 x 457.2	508	10.5 x 8.0	13.0 x 9.5	76.30	92.50
610 x 508	508	10.5 x 8.5	13.0 x 11.0	81.80	102.80
711 x 457.2	610	12.0 x 8.0	15 x 9.5	109.30	133.60
711 x 508	610	12.0 x 8.5	15 x 11.0	116.30	146.70
711 x 610	610	12.0 x 10.5	15 x 13.0	137.30	170.10
813 x 508	610	13.5 x 8.5	17 x 11	136.40	172.60
813 x 610	610	13.5 x 10.5	17 x 13	158.40	197.30
813 x 711	610	13.5 x 12.0	17 x 15	179.50	224.20
914 x 610	610	15.5 x 10.5	19 x 13	185.00	226.70
914 x 711	610	15.5 x 12	19 x 15	207.10	255.00
914 x 813	610	15.5 x 13.5	19 x 17	231.30	285.80

Type and Construction

Saddle pieces are in accordance with EEMUA 234/13. Saddle pieces up to including 12 inch/ 323.9 mm are supplied in seamless. Larger dimensions are manufactured from seamless or welded pipes as well as plates.

Dimensions

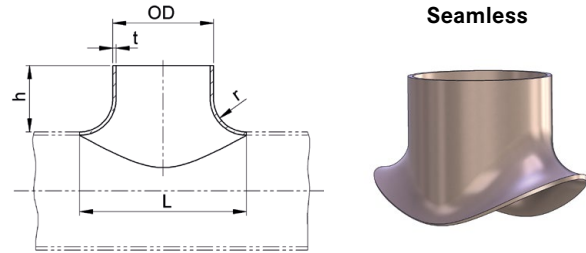
Dimensions are based on EEMUA 234/13, Figures 7-9 and Tables 60-65. Saddle pieces with other dimensions are available on request.

Tolerances

The tolerances are based on EEMUA 234/13, Tables 62-63.

Weld Preparation

Welding ends of butt weld ends for wall thickness less than 3 mm, the saddle pieces are supplied with plain weld ends. Larger thicknesses are supplied with the weld bevel of $37\frac{1}{2}^{\circ} \pm 2\frac{1}{2}^{\circ}$.



Seamless saddle pieces

Header Specified OD mm	Branch Size Range mm	t 16 bar mm	t 20 bar mm	Dimension L mm	Tolerance on L mm	Dimension h mm	Tolerance on h mm	r mm
	323.9	5.5	7.0	560	± 6	185	± 2.5	100
All header	267	4.5	5.5	447	± 5	155	± 2.5	90
sizes equal to	219.1	4.0	4.5	379	± 5	125	± 1.6	80
or larger than	159	3.0	3.5	279	± 4	95	± 1.6	60
branch up to	108	3.0	3.0	188	± 4	75	± 1.6	40
and including	88.9	2.5	2.5	149	± 3	55	± 1.6	30
914 x 15.5 (16 bar)	76.1	2.5	2.5	126	± 3	50	± 1.6	25
610 x 13 (20 bar)	57	2.5	2.5	97	± 3	40	± 1.6	20
	44.5	2.5	2.5	74	± 3	35	± 1.6	15
	38	2.5	2.5	64	± 3	35	± 1.6	13

Note

Other sizes and reducing saddles are available on request.

Saddle Pieces (16 bar rating)

Type and Construction

Saddle pieces are in accordance with EEMUA 234/13. Saddle pieces up to including 12 inch/ 323.9 mm are supplied in seamless. Larger dimensions are manufactured from seamless or welded pipes as well as plates.

Dimensions

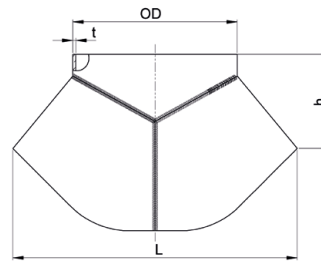
Dimensions are based on EEMUA 234/13, Figures 7-9 and Tables 60-65. Saddle pieces with other dimensions are available on request.

Tolerances

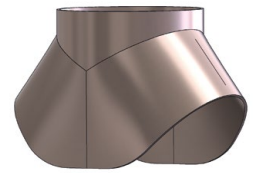
The tolerances are based on EEMUA 234/13, Tables 62-63.

Weld Preparation

Welding ends of butt weld ends for wall thickness less than 3 mm, the saddle pieces are supplied with plain weld ends. Larger thicknesses are supplied with the weld bevel of $37\frac{1}{2}^{\circ} \pm 2\frac{1}{2}^{\circ}$.



Seamwelded



Seamwelded saddle pieces (16 bar rating)

Header Specified OD mm	Branch Size Range mm	Dimension	Tolerance on	Dimension	Tolerance on
		L mm	L mm	h mm	h mm
All header sizes equal to or larger than branch in the range 323.9 x 5.5 up to and including 914 x 15.5	914 x 15.5	1550	± 7	460	± 3.5
	813 x 13.5	1400	± 7	410	± 3.5
	711 x 12	1225	± 7	360	± 3.5
	610 x 10.5	1020	± 7	300	± 3.0
	508 x 8.5	880	± 6	275	± 3.0
	457.2 x 8.0	800	± 6	250	± 3.0
	419 x 7.0	680	± 6	225	± 3.0
	368 x 6.5	613	± 6	200	± 3.0
	323.9 x 5.5	560	± 6	185	± 2.5
	267 x 4.5	447	± 5	155	± 2.5
	219.1 x 4.0	379	± 5	125	± 1.6

Saddle Pieces (20 bar rating)

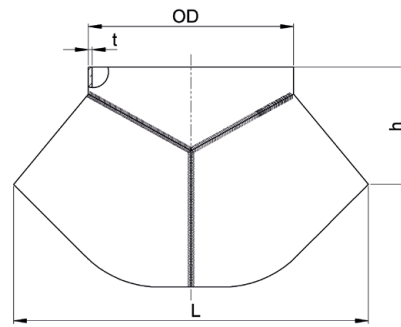
Butt Welding Fittings

Type and Construction

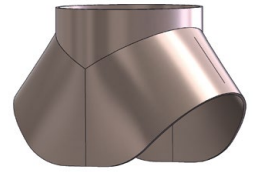
Saddle pieces are in accordance with EEMUA 234/13. Saddle pieces up to including 12 inch/ 323.9 mm are supplied in seamless. Larger dimensions are manufactured from seamless or welded pipes as well as plates.

Dimensions

Dimensions are based on EEMUA 234/13, Figures 7-9 and Tables 60-65. Saddle pieces with other dimensions are available on request.



Seamwelded



Tolerances

The tolerances are based on EEMUA 234/13, Tables 62-63.

Weld Preparation

Welding ends of butt weld ends for wall thickness less than 3 mm, the saddle pieces are supplied with plain weld ends. Larger thicknesses are supplied with the weld bevel of $37 \frac{1}{2}^{\circ} \pm 2 \frac{1}{2}^{\circ}$.

Seamwelded saddle pieces - 20 bar rating

Header Specified OD mm	Branch Size Range mm	Dimension L mm	Tolerance on L mm	Dimension h mm	Tolerance on h mm
All header sizes equal to or larger than branch in the range 323.9 x 7.0 up to and including 610 x 13	610 x 13	1020	± 7	300	± 3.0
	508 x 11	880	± 7	275	± 3.0
	457.2 x 9.5	800	± 6	250	± 3.0
	419 x 9.0	680	± 6	225	± 3.0
	368 x 8.0	613	± 6	200	± 3.0
	323.9 x 7.0	560	± 6	185	± 2.5
	267 x 5.5	447	± 5	155	± 2.5
	219.1 x 4.5	379	± 5	125	± 1.6

Welding Outlets

Self Reinforced Branch Connector - Butt Welding Type

Type and Construction

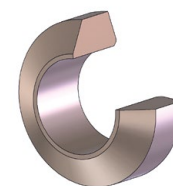
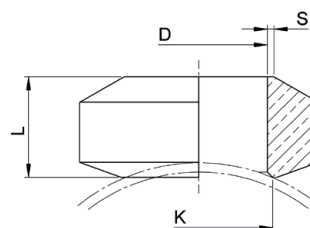
Welding outlets are in accordance with EEMUA 234/12. The components are manufactured by hot forging and machining from extruded bars (solid or hollow).

Dimensions

The dimensions and tolerances are suitable for welding to seamless and seam-welded pipes to EEMUA 234/1-2. The branch size covered is from ½ in./16 mm to 16 in./419 mm. Other branch sizes are available on request. The welding outlets covered are suitable for application to header sizes from ½ in./16 mm to 38 in./965 mm. The sizes of the header pipes for a given branch size are consolidated in accordance with MSS SP-97, Section 3.3 and Figure 1, whereas the gap distance between the header pipe radius and the fitting inlet radius doesn't exceed 1/16 in./1.6 mm.

The design of the self reinforced connection is in accordance with B31.3 Section 304.3 suitable for both 16 and 20 bar pressure ratings. The additional design feature is the smooth entry into the connection to reduce the turbulences.

The overall dimensions are based on EEMUA 234/12, Table 57.



section view

Branch Specified OD mm	Header Size Range mm	L Nom mm	D mm	K Nom mm	S min/max mm
16	16 - 965	18	11.57 - 12.45	12.8 - 17.0	1.8 - 2.0
25	25 - 965	23	20.58 - 21.45	26.0 - 26.0	1.8 - 2.0
30	30 - 965	26	24.48 - 25.56	31.0 - 31.0	2.25 - 2.5
38	38 - 965	29	32.49 - 33.57	34.8 - 40.0	2.25 - 2.5
44.5	44.5 - 965	32	38.99 - 40.07	41.3 - 45.0	2.25 - 2.5
57	57 - 965	36	51.62 - 52.70	53.8 - 58.0	2.25 - 2.5
76.1	76.1 - 965	43	70.65 - 71.80	72.9 - 75.0	2.25 - 2.5
88.9	88.9 - 965	44 - 53	83.50 - 84.65	85.7 - 88.0	2.25 - 2.5
108	108 - 965	53	101.40 - 102.85	104.8 - 108.0	0.8 - 2.4
159	159 - 965	60	151.50 - 153.00	155.8 - 170.0	0.8 - 2.4
219.1	219.1 - 965	70	209.40 - 210.90	215.9 - 219.0	0.8 - 2.4
267	267 - 965	78	255.20 - 256.70	263.8 - 267.0	0.8 - 2.4
323.9	323.9 - 965	86	309.00 - 310.50	320.7 - 324.0	0.8 - 2.4
368	368 - 965	89	350.00 - 352.00	364.8 - 368.0	0.8 - 2.4
419	419 - 965	94	399.00 - 401.00	415.0 - 419.0	0.8 - 2.4

Composite Weld Neck Flanges

Weld Neck Stub Ends and Backing Flanges

Type and Construction

The weld neck stub ends are in accordance with EEMUA 234/3 for 16 and 20 bar systems. The range of sizes covered is ½ inch/16 mm to 36 inch/914 mm. Other sizes are available on request. The stub ends are subdivided in two types short (Type S) based on DIN 86037 and long (Type L) based on MSS SP-43 suit the appropriate pipe dimension. The Type L stub ends are included to facilitate the attachments of this type of flange to butt weld welding fittings in accordance with EEMUA 234/7.

Dimensions

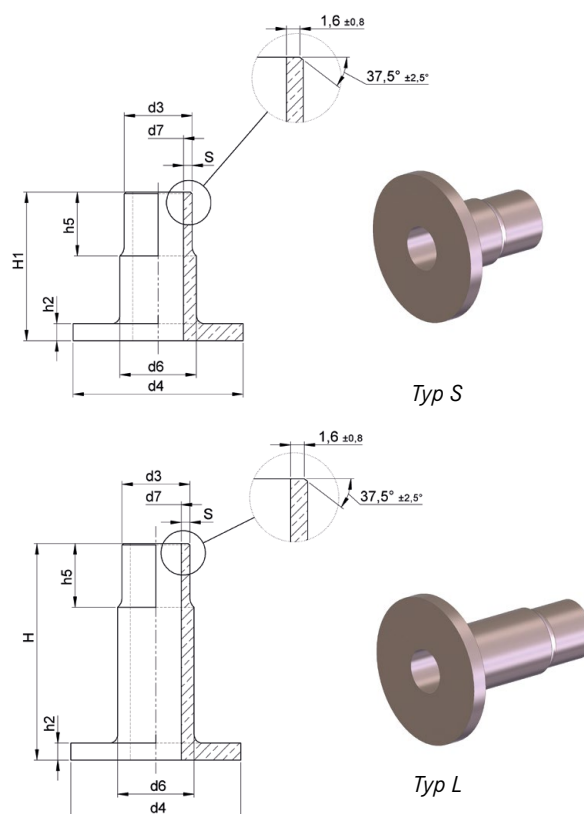
Dimensions are based on EEMUA 234/3, Tables 12-13.

Tolerances

The tolerances are based on EEMUA 234/3, Table 15.

Weld Preparation

The stub ends with $S1 < 3\text{mm}$ are supplied with plain weld ends. Larger dimension are supplied with the weld bevel of $37.5^\circ \pm 2.5^\circ$.



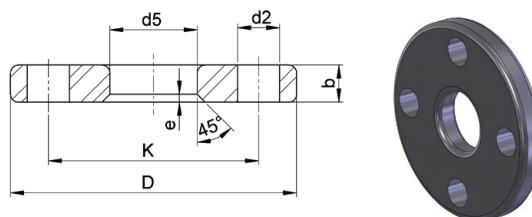
Nom. Size in	Spec. Size mm	16 bar					20 bar					16 bar		20 bar	
		d ₃ mm	d ₄ mm	d ₆ mm	d ₇ mm	d ₇ mm	Type S H ₁ mm	Type L H mm	h ₂ mm	h ₅ mm	S min. mm	S min. mm			
½	16	16	40	18	Use 20 bar	12.00	35	51	4	15	Use 20 bar	2.0			
¾	25	25	50	27		21.00	40	51	5	15		2.0			
1	30	30	60	32		25.00	40	51	5	15		2.5			
1¼	38	38	70	40		33.03	40	51	5	15		2.5			
1½	44.5	44.5	80	46.5		39.53	45	51	6	15		2.5			
2	57	57	99	59		52.16	45	64	6	15		2.5			
2½	76.1	76.1	120	78		71.23	45	64	6	15		2.5			
3	88.9	88.9	130	91		84.08	50	64	7	15		2.5			
4	108	108	158	110		102.13	50	76	7	15		3.0			
6	159	159	212	161.5		152.38	50	89	9	15		3.0	3.5		
8	219.1	219.1	270	222	211.10	210.10	50	102	9	15	4.0	4.5			
10	267	267	320	270	257.97	255.93	50	127	9	15	4.5	5.5			
12	323.9	323.9	370	327	312.83	309.74	50	152	11	16	5.5	7.0			
14	368	368	430	371	354.22	351.00	50	152	11	16	6.5	8.0			
16	419	419	482	422	404.17	399.84	50	152	12	16	7.0	9.0			
18	457.2	457.2	530	460	441.50	438.50	50	152	12	16	8.0	9.5			
20	508	508	585	511	490.50	486.50	50	152	12	20	8.5	11.0			
24	610	610	685	613	589.50	584.50	60	152	14	20	10.5	13.0			
28	711	711	800	719	687.50	681.50	60	190	19	24	12.0	15.0			
32	813	813	905	821	786.50	779.50	60	190	20.5	24	13.5	17.0			
36	914	914	1000	922	883.50	876.50	60	190	22	32	15.5	19.0			

Composite Weld Neck Flanges

Weld Neck Stub Ends and Backing Flanges

Type and Construction

The weld neck backing flanges are in accordance with EEMUA 234/3 and are suitable for both 16 and 20 bar pressure rating. The range of sizes covered is ½ inch/16 mm to 36 inch/914 mm Class 150. Other sizes are available on request. Drilling and outside diameter dimensions of flange sizes ½ inch/16 mm-24 inch/610 mm are in accordance with ANSI B16.5 and BS EN 1759-1:2004, whereas the larger sizes, 28 inch/711 mm -36 inch/914 mm are in accordance with MSS SP-44.



The backing flanges are manufactured from forged carbon steel in accordance with ASTM A105N. The chemical composition and mechanical properties of the components are in accordance with EEMUA 234/3, Table 18. The recommended bolting is in accordance with ASTM A193-B7. Unless otherwise specified the flanges are protected by hot dipped galvanising.

Dimensions

Dimensions are based on EEMUA 234/3, Table 14.

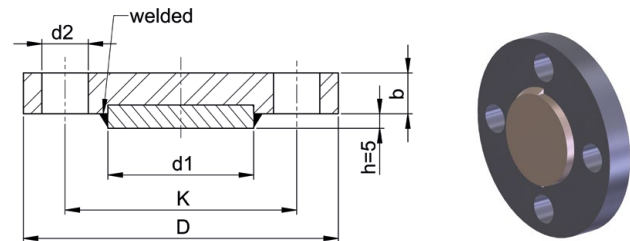
Tolerances

The tolerances are based on EEMUA 234/3, Table 16.

Nom. Size in	Spec. Size mm	D mm	b min. mm	d ₂		d ₅ mm	K mm	No. of Bolts	e mm	Theoretical Total Weight incl. Stub End – kg					
				in	mm					S	16 bar	L	S	20 bar	L
½	16	89	14	5/8	15.9	19	60.3	4	2	As for 20 bar			0.64	0.66	
¾	25	98	14	5/8	15.9	28	69.8	4	3				0.8	0.9	
1	30	108	14	5/8	15.9	33	79.4	4	3				1.0	1.0	
1¼	38	117	14	5/8	15.9	41	88.9	4	3				1.2	1.3	
1½	44.5	127	14	5/8	15.9	48	98.4	4	3				1.5	1.6	
2	57	152	18	¾	19.0	62	120.6	4	3				2.5	2.6	
2½	76.1	178	18	¾	19.0	81	139.7	4	3				3.3	3.4	
3	88.9	190	19	¾	19.0	94	152.4	4	3				3.8	3.9	
4	108	229	24	¾	19.0	113	190.5	8	3				6.6	6.9	
6	159	279	27	7/8	22.2	164	241.3	8	4			9.7	10.4	9.9	10.7
8	219.1	343	31	7/8	22.2	225	298.4	8	5		15.0	16.7	15.1	17.0	
10	267	406	38	1	25.4	273	362.0	12	5		23.1	26.6	23.5	27.5	
12	323.9	483	41	1	25.4	330	431.8	12	7		34.6	41.0	35.2	43.1	
14	368	533	45	1 1/8	28.6	374	476.2	12	7		44.7	53.4	45.5	55.8	
16	419	597	51	1 1/8	28.6	426	539.8	16	7		60.0	70.5	60.6	72.5	
18	457.2	635	52	1 1/4	31.8	465	577.8	16	7		66.0	78.0	68.0	84.3	
20	508	698	58	1 1/4	31.8	517	635.0	20	7		84.4	98.7	86.0	103.5	
24	610	813	71	1 3/8	34.9	618	749.3	20	9		131.4	149.8	134.0	156.5	
28	711	927	81	1 3/8	34.9	727	864.0	28	9		180.3	202.9	183.6	212.1	
32	813	1060	95	1 5/8	41.1	829	978.0	28	9		269.0	296.8	275.5	311.2	
36	914	1168	105	1 5/8	41.1	931	1086.0	32	9		335.8	369.8	341.0	385.8	

Type and Construction

The composite blind flanges are in accordance with manufacturer's specification. The range of sizes covered is ½ in./16 mm to 36 inch/914 mm Class 150. Drilling and outside diameter dimensions of flange sizes ½ in./16 mm-24 inch/610 mm are in accordance with ANSI Class 150, whereas the larger sizes, 28 inch/711 mm -36 inch/914 mm are in accordance with MSS SP-44. The blind flanges are suitable for use both 16 and 20 bar systems. The composite blind flanges are manufactured from forged carbon steel in accordance with ASTM A105N with a welded C70620 copper nickel disk. In contrast to raised face blind flanges in accordance to ANSI B16.5, the supplied composite flanges are considered as flat face, since the diameter of the copper nickel disk d1 is equivalent to the flange diameter d4 weld neck stub end in accordance with EEMUA 234/3. By these means, uniform contact over the weld neck stub end faces is ensured. The recommended bolting is in accordance with ASTM A193-B7 and ASTM A194-2H and should be suitably protected from corrosion. Unless otherwise specified the flanges are protected by hot dipped galvanising.



Tolerances

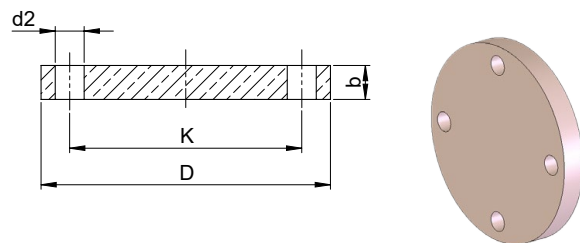
Tolerances are equivalent to the dimensions for weld neck backing flanges based on EEMUA 234/3, Table 16.

Nom. Size	Spec. Size	Flange		Diameter of Bolt Holes		Flange Thickness b	Diameter of Disk d ₁	No. of Bolt Holes	Theoretical Total Weight (kg)
		Diameter D	K	d ₂					
in	mm	mm	mm	in	mm	min mm	mm		
½	16	89	60.3	5/8	15.9	14	40	4	0.82
¾	25	98	69.8	5/8	15.9	14	50	4	1.04
1	30	108	79.4	5/8	15.9	14	50	4	1.31
1¼	38	117	88.9	5/8	15.9	14	70	4	1.58
1½	44.5	127	98.4	5/8	15.9	14	80	4	1.90
2	57	152	120.6	¾	19.0	18	99	4	3.01
2½	76.1	178	139.7	¾	19.0	18	120	4	4.68
3	88.9	190	152.4	¾	19.0	19	130	4	5.70
4	108	229	190.5	¾	19.0	24	158	8	8.67
6	159	279	241.3	7/8	22.2	27	212	8	15.46
8	219.1	343	298.4	7/8	22.2	31	270	8	24.90
10	267	406	362.0	1	25.4	38	320	12	41.23
12	323.9	483	431.8	1	25.4	41	370	12	70.55
14	368	533	476.2	1 1/8	28.6	45	430	12	93.16
16	419	597	539.8	1 1/8	28.6	51	482	16	123.99
18	457.2	635	577.8	1 1/4	31.8	52	530	16	147.55
20	508	698	635.0	1 1/4	31.8	58	585	20	191.00
24	610	813	749.3	1 3/8	34.9	71	685	20	285.74
28	711	927	864.0	1 3/8	34.9	81	800	28	434.66
32	813	1060	978.0	1 5/8	41.1	95	905	28	665.63
36	914	1168	1086.0	1 5/8	41.1	105	1000	32	886.43

Solid Blind Flanges

Type and Construction

The basic metric dimensions for drilling and flange outside diameters are those given in ANSI B16.5-2017, BS EN 1759-1:2004 and MSS SP-44-2006 for Class 150 rating with inch size bolting. The range of sizes covered is ½ inch to 24 inch. One side of the flange is produced with a serrated finish.



The blind flanges are suitable for use in 16 and 20 bar systems. All items are made of Osna10 to cover material grade UNS C 70620 and C 7060X as well. Flanges in Raised face, Class 300 and ANSI B16.47 are available upon request.

Tolerances

Tolerances are in accordance with ANSI B 16.5-2017.

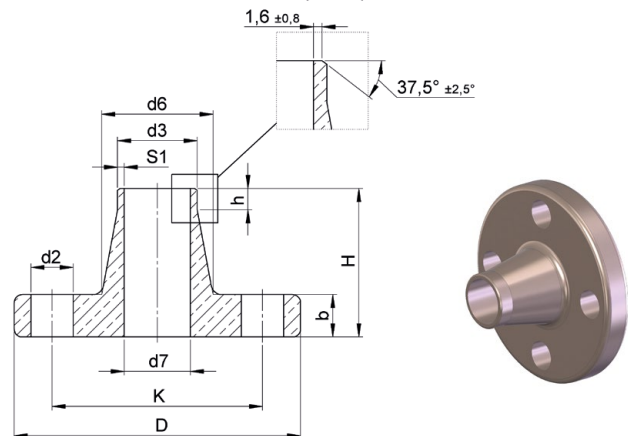
Nom. Size in	Spec. Size mm	Flange Diameter D mm	K mm	Diameter of Bolt Holes d ₂		Flange Thickness b min mm	No. of Bolt Holes	Theoretical Total Weight (kg)
½	16/213	90	60.3	5/8	15.9	9.6	4	0.54
¾	25/26.7	100	69.8	5/8	15.9	11.2	4	0.72
1	30/33.4	110	79.4	5/8	15.9	12.7	4	1.08
1¼	38/42.2	115	88.9	5/8	15.9	14.3	4	1.41
1½	44.5/48.3	125	98.4	5/8	15.9	15.9	4	1.86
2	57/60.3	150	120.7	¾	19.0	17.5	4	3.04
2½	76.1/73	180	139.7	¾	19.0	20.7	4	4.67
3	88.9	190	152.4	¾	19.0	22.3	4	5.64
4	108/114.3	230	190.5	¾	19.0	22.3	8	8.52
6	159/168.3	280	241.3	7/8	22.2	23.9	8	13.01
8	219.1	345	298.5	7/8	22.2	27	8	22.91
10	267/273	405	362.0	1	25.4	28.6	12	33.8
12	323.9	485	431.8	1	25.4	30.2	12	50.26
14	368/355.6	535	476.3	1 1/8	28.6	33.4	12	68.33
16	419/406.4	595	539.8	1 1/8	28.6	35	16	88.68
18	457	635	577.9	1 1/4	31.8	38.1	16	109
20	508	700	635.0	1 1/4	31.8	41.3	20	141.9
24	610	815	749.3	1 3/8	34.9	46.1	20	216.5

Solid Weld Neck Flanges

Flanges

Type and Construction

The solid weld neck flanges are in accordance with EEMUA 234/5 for 16 and 20 bar systems. The range of sizes covered is ½ inch/16 mm to 36 inch/914 mm Class 150. Other sizes are available on request. Drilling and outside diameter dimensions of flange sizes ½ inch/16 mm-24 inch/610 mm are in accordance with ANSI B16.5 and BS EN 1759-1:2004, whereas the larger sizes, 28 inch/711 mm -36 inch/914 mm are in accordance with MSS SP-44. The recommended bolting is in accordance with ASTM B150 alloy UNS C63000.



Dimensions

Dimensions are based on EEMUA 234/5, Table 27-28.

Tolerances

The tolerances are based on EEMUA 234/5, Table 29.

Nom. Size in	Spec. Size mm	Outside Diameter of Flange D mm	Thickn. of Flange b mm	Diameter of Hub d ₆ mm	Hub Dia at weld Chamfer d ₃ mm	Length Through Hub H mm	16 bar Bore of Flange d ₇ mm	20 bar Bore of Flange d ₇ mm
		D mm	b mm	d ₆ mm	d ₃ mm	H mm	d ₇ mm	d ₇ mm
½	16	89	14	23	16	48	Use 20 bar	12.00
¾	25	98	16	32	25	52		21.00
1	30	108	16	42	30	56		25.00
1¼	38	117	17	51	38	57		33.03
1½	44.5	127	20	61	44.5	62		39.53
2	57	152	25	73	57	64		52.16
2½	76.1	178	27	91	76.1	70		71.23
3	88.9	190	27	105	88.9	70		84.08
4	108	229	27	135	108	76		102.13
6	159	279	27	192	159	89	153.75	152.38
8	219.1	343	31	246	219.1	98	211.10	210.10
10	267	406	31	305	267	98	257.97	255.93
12	323.9	483	35	365	323.9	98	312.83	309.74
14	368	533	41	400	368	99	354.22	351.00
16	419	597	43	457	419	106	404.17	399.84
18	457.2	635	45	505	457.2	113	441.50	438.50
20	508	698	45	559	508	118	490.50	486.50
24	610	813	49	664	610	137	589.50	584.50
28	711	927	72	748	711	145	687.50	681.40
32	813	1060	72	876	813	160	786.50	779.50
36	914	1168	72	984	914	175	883.50	876.50

It should be noted that although these flanges are flat faced, inside bolt circle gaskets shall be used and special care should be taken to avoid overtightening the bolting.



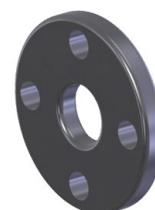
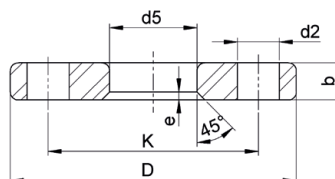
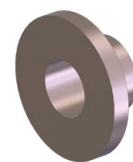
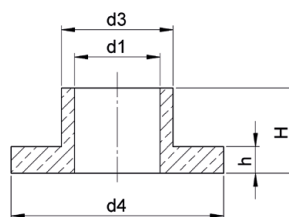
	16 bar Thickn. of Hub at Welding End S_1 min mm	20 bar Thickn. of Hub at Welding End S_1 min mm	16 bar Theoretical Weight kg	20 bar Theoretical Weight kg	Parallel Length of Hub h mm	Diameter of Bolt Circle K mm	Drilling No. of Bolts	Diameter of Bolt Holes d_2 mm
Use 20 bar		2.0	Use 20 bar	0.7	8	60.3	4	15.9
		2.0		1.0	7	69.8	4	15.9
		2.5		1.3	8	79.4	4	15.9
		2.5		1.6	8	88.9	4	15.9
		2.5		2.2	7	98.4	4	15.9
		2.5		3.6	9	120.6	4	19.0
		2.5		5.3	8	139.7	4	19.0
		2.5		5.8	8	152.4	4	19.0
	3.0	3.0		8.7	8	190.5	8	19.0
	3.0	3.5	12.3	12.6	8	241.3	8	22.2
	4.0	4.5	19.1	19.4	8	298.4	8	22.2
	4.5	5.5	26.2	26.9	8	362.0	12	25.4
	5.5	7.0	39.7	41.0	8	431.8	12	25.4
	6.5	8.0	50.9	52.5	8	476.2	12	28.6
	7.0	9.0	65.8	68.4	8	539.8	16	28.6
	8.0	9.5	76.6	78.7	8	577.8	16	31.8
	8.5	11.0	92.3	95.5	8	635.0	20	31.8
	10.5	13.0	133.1	138.7	8	749.3	20	34.9
	12.0	15.0	206.4	214.7	8	864.0	28	34.9
	13.5	17.0	285.8	297.5	8	978.0	28	41.1
	15.5	19.0	349.6	364.7	8	1086.0	32	41.1

Composite Slip-On Flanges

Slip-On Stub Ends and Slip-On Backing Flanges

Type and Construction

The slip-on stub ends are in accordance with EEMUA 234/4 and are suitable for 16 and 20 pressure rating. The range of sizes covered is ½ inch/16 mm to 4 inch/108 mm Class 150. The slip-on backing flanges are in accordance with EEMUA 234/4. Drilling and outside diameter dimensions are in accordance with ANSI B16.5 and BS EN 1759-1:2004. The backing flanges are suitable for use in both 16 and 20 bar systems. The backing flanges are manufactured from forged carbon steel in accordance with ASTM A105N. The chemical composition and mechanical properties of the components are in accordance with EEMUA 234/4, Table 25. The recommended bolting is in accordance with ASTM A193-B7. Unless otherwise specified the flanges are protected by hot dipped galvanising.



Dimensions

Dimensions are based on EEMUA 234/4, Tables 20-21.

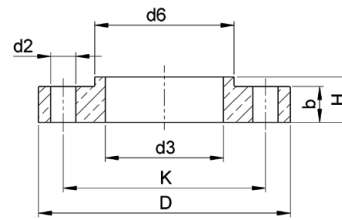
Tolerances

The tolerances are based on EEMUA 234/4, Tables 22-23.

Nom. Size in	Spec. Size mm	Inner Stub End Dimension					Outer Steel Flange – Dimension						No. of Bolt Holes	Theoretical Total Weight (kg)
		d ₁ mm	d ₃ mm	d ₄ mm	H mm	h mm	D mm	b mm	K mm	d ₅ mm	d ₂ in/mm	e mm		
½	16	16.07	21	40	16	5	89	14	60.3	23	5/8 / 15.9	3	4	0.61
¾	25	25.08	31	53	16	5	98	14	69.8	33	5/8 / 15.9	3	4	0.75
1	30	30.08	36	60	18	5	108	14	79.4	38	5/8 / 15.9	3	4	0.92
1¼	38	38.10	45	70	18	5	117	14	88.9	47	5/8 / 15.9	3	4	1.10
1½	44.5	44.60	51	80	19	5	127	14	98.4	53	5/8 / 15.9	3	4	1.30
2	57	57.23	67	99	19	6	152	18	120.6	69	¾ / 19	3	4	2.20
2½	76.1	76.33	87	120	19	6	178	18	139.7	89	¾ / 19	3	4	3.00
3	88.9	89.18	100	130	21	7	190	19	152.4	103	¾ / 19	3	4	3.50
4	108	108.38	120	158	23	7	229	24	190.5	123	¾ / 19	3	4	6.00

Type and Construction

The solid slip-on flanges are in accordance with EEMUA 234/6 and are suitable for both 16 and 20 bar systems. The range of sizes covered is ½ inch/16 mm to 4 inch/108 mm Class 150. Drilling and outside diameter dimensions are in accordance with ANSI B16.5 and BS EN 1759-1:2004. The recommended bolting is in accordance with ASTM B150 alloy UNS C63000.



Dimensions

Dimensions are based on EEMUA 234/6, Table 32.

Tolerances

The tolerances are based on EEMUA 234/6, Table 33.

Nom. Size	Spec. Size	Flange Diameter D	Flange Thickness b	H	d ₃	d ₆	No. of Bolt Holes	Diameter of Bolt Holes d ₂	K	Theoretical Weight
in	mm	mm	mm	mm	mm	mm		mm	mm	kg
½	16	89	14	20	16.07	23	4	15.9	60.3	0.66
¾	25	98	16	24	25.08	32	4	15.9	69.8	0.91
1	30	108	16	24	30.08	47	4	15.9	79.4	1.16
1¼	38	117	17	26	38.10	51	4	15.9	88.9	1.4
1½	44.5	127	20	26	44.60	61	4	15.9	98.4	1.9
2	57	152	25	28	57.23	73	4	19.0	120.6	3.3
2½	76.1	178	27	32	76.33	91	4	19.0	139.7	4.7
3	88.9	190	27	34	89.18	105	4	19.0	152.4	5.2
4	108	229	27	40	108.38	135	8	19.0	190.5	7.7

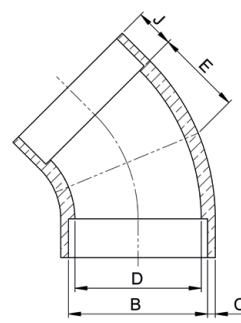
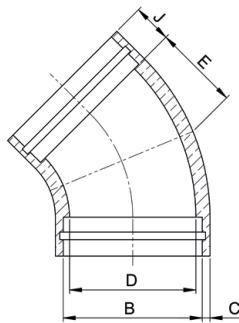
Capillary Brazing Elbow 45° Socket Welding Elbow 45°

Capillary Brazing, Socket Weld
Fittings and Miscellaneous

CB

SW

Elbows 45°
16 mm – 57 mm



Dimensions Table 45°

nominal	specified	J		B		C		D	E	weight
		min	max	min	max	min	max	min	max	
in	mm	mm	mm	mm	mm	mm	mm	mm	mm	~kg
1/2	16	10	16.121	16.070	3.2	12.0	12.0	0.080		
3/4	25	13	25.131	25.080	3.2	21.0	15.5	0.139		
1	30	13	30.131	30.080	3.2	25.0	18.6	0.201		
1 1/4	38	13	38.146	38.095	3.2	33.0	23.6	0.289		
1 1/2	44.5	13	44.646	44.595	3.2	39.5	27.6	0.402		
2	57	16	57.276	57.225	3.2	52.0	35.3	0.552		

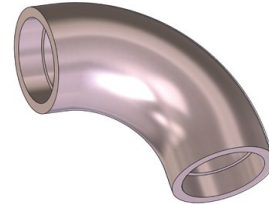
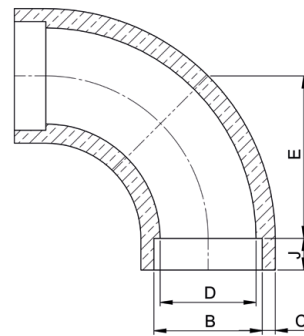
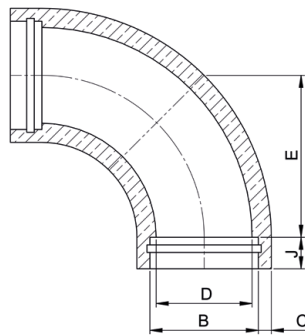
Capillary Brazing Elbow 90° Socket Welding Elbow 90°

Capillary Brazing, Socket Weld
Fittings and Miscellaneous

CB

SW

Elbows 90°
16 mm – 57 mm



Dimensions Table 90°

nominal	specified	J			B		C		D	E		weight
		min	min	max	min	max	min	min		socket wall	centre-to socket	
in	mm	mm	mm	mm	mm	mm	mm	mm	mm	(+/- 1m)	~kg	
½	16	10	16.070	16.121	3.2		12.0	30.0	0.091			
¾	25	13	25.080	25.131	3.2		21.0	37.5	0.170			
1	30	13	30.080	30.131	3.2		25.0	45.0	0.248			
1¼	38	13	38.095	38.146	3.2		33.0	57.0	0.406			
1½	44.5	13	44.595	44.646	3.2		39.5	66.8	0.547			
2	57	16	57.225	57.276	3.2		52.0	85.5	0.831			

Capillary Brazing Equal Tees

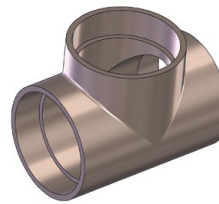
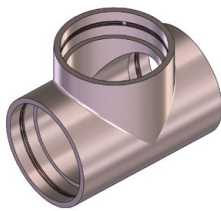
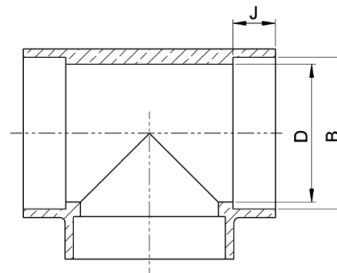
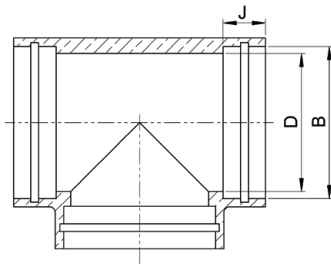
Socket Welding Equal Tees

Capillary Brazing, Socket Weld
Fittings and Miscellaneous

CB

SW

Equal Tees
16 mm – 57 mm



Dimensions Table Equal Tees

nominal		D	B		J	weight
in	mm	min mm	max/min mm		min mm	
1/2	16	12	16.121	16.070	10	0.107
3/4	25	21	25.131	25.080	13	0.193
1	30	25	30.131	30.080	13	0.261
1 1/4	38	33	38.146	38.095	13	0.428
1 1/2	44.5	39.5	44.646	44.595	13	0.567
2	57	52	57.276	57.225	16	0.804

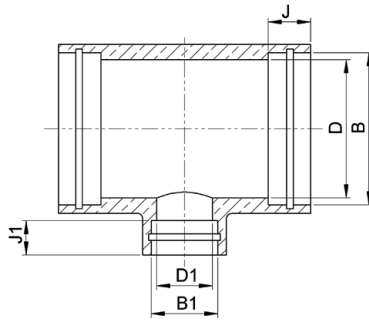
Capillary Brazing Reducing Tees

Socket Welding Reducing Tees

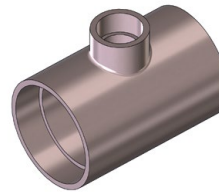
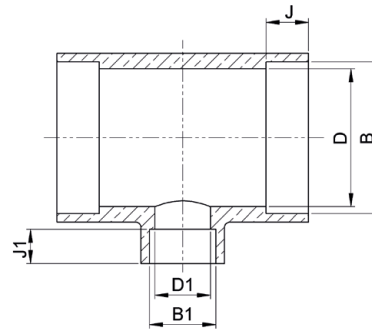
Capillary Brazing, Socket Weld
Fittings and Miscellaneous

CB

Reducing Tees
16 mm – 57 mm



SW



Dimensions Table Reducing Tees

nominal in	specified mm	D		B		J	D ₁ min mm	B ₁		J ₁	weight ~kg
		min mm	max/min mm	max/min mm	min mm	min mm		max/min mm	max/min mm	min mm	
¾ x ½	25 x 16	21	25.131	25.080	13	12	12	16.121	16.070	10	0.196
1 x ½	30 x 16	25	30.131	30.080	13	12	12	16.121	16.070	10	0.270
1 x ¾	30 x 25	25	30.131	30.080	13	21	21	25.131	25.080	13	0.269
1¼ x ½	38 x 16	33	38.146	38.095	13	12	12	16.121	16.070	10	0.481
1¼ x ¾	38 x 25	33	38.146	38.095	13	21	21	25.131	25.080	13	0.454
1¼ x 1	38 x 30	33	38.146	38.095	13	25	25	30.131	30.080	13	0.451
1½ x ½	44.5 x 16	39.5	44.646	44.595	13	12	12	16.121	16.070	10	0.651
1½ x ¾	44.5 x 25	39.5	44.646	44.595	13	21	21	25.131	25.080	13	0.629
1½ x 1	44.5 x 30	39.5	44.646	44.595	13	25	25	30.131	30.080	13	0.623
1½ x 1¼	44.5 x 38	39.5	44.646	44.595	13	33	33	38.146	38.095	13	0.600
2 x ½	57 x 16	52	57.276	57.225	16	12	12	16.121	16.070	10	0.972
2 x ¾	57 x 25	52	57.276	57.225	16	21	21	25.131	25.080	13	0.966
2 x 1	57 x 30	52	57.276	57.225	16	25	25	30.131	30.080	13	0.961
2 x 1¼	57 x 38	52	57.276	57.225	16	33	33	38.146	38.095	13	0.939
2 x 1½	57 x 44.5	52	57.276	57.225	16	39.5	39.5	44.646	44.595	13	0.911

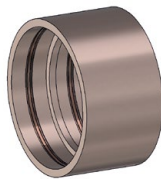
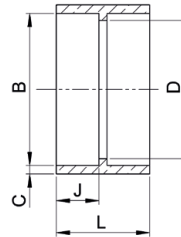
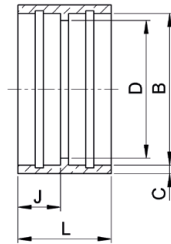
Capillary Brazing Equal Couplings Socket Welding Equal Couplings

Capillary Brazing, Socket Weld
Fittings and Miscellaneous

CB

SW

Equal
Couplings
16mm - 57 mm



Dimensions Table Equal Couplings

nominal	specified	D		B		C	J	L	weight
		min	max/min	min	max/min				
in	mm	mm	mm	mm	mm	mm	mm	mm	~kg
1/2	16	12	16.121 16.070	3.2	10	22	0.039		
3/4	25	21	25.131 25.080	3.2	13	28	0.073		
1	30	25	30.131 30.080	3.2	13	28	0.087		
1 1/4	38	33	38.146 38.095	3.2	13	28	0.108		
1 1/2	44.5	39.5	44.646 44.595	3.2	13	29	0.132		
2	57	52	57.276 57.225	3.2	16	35	0.201		

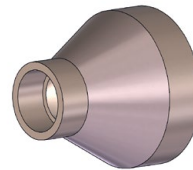
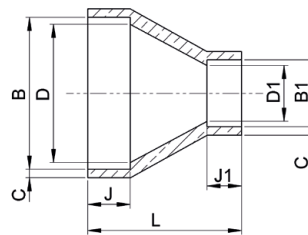
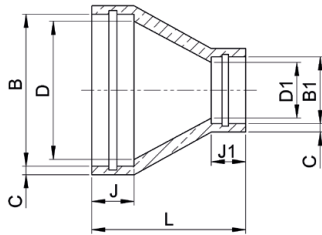
Capillary Brazing Reducing Couplings Socket Welding Reducing Couplings

Capillary Brazing, Socket Weld
Fittings and Miscellaneous

CB

SW

Reducing
Couplings
16 mm – 57 mm



Dimensions Table Reducing Couplings

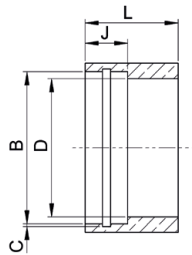
nominal		specified	D		B		J	C	D ₁	B ₁		J ₁	L	weight
in	mm		min mm	max/min mm			min mm	min mm	min mm	max/min mm		min mm	min mm	~kg
¾ x ½	25 x 16		21	25.131 25.080			13	3.2	12	16.121 16.070		10	36	0.092
1 x ½	30 x 16		25	30.131 30.080			13	3.2	12	16.121 16.070		10	37	0.108
1 x ¾	30 x 25		25	30.131 30.080			13	3.2	21	25.131 25.080		13	33	0.102
1¼ x ½	38 x 16		33	38.146 38.095			13	3.2	12	16.121 16.070		10	43	0.152
1¼ x ¾	38 x 25		33	38.146 38.095			13	3.2	21	25.131 25.080		13	37	0.136
1¼ x 1	38 x 30		33	38.146 38.095			13	3.2	25	30.131 30.080		13	33	0.126
1½ x ½	44.5 x 16		39.5	44.646 44.595			13	3.2	12	16.121 16.070		10	49	0.199
1½ x ¾	44.5 x 25		39.5	44.646 44.595			13	3.2	21	25.131 25.080		13	43	0.182
1½ x 1	44.5 x 30		39.5	44.646 44.595			13	3.2	25	30.131 30.080		13	39	0.174
1½ x 1¼	44.5 x 38		39.5	44.646 44.595			13	3.2	33	38.146 38.095		13	32	0.144
2 x ½	57 x 16		52	57.276 57.225			16	3.2	12	16.121 16.070		10	63	0.322
2 x ¾	57 x 25		52	57.276 57.225			16	3.2	21	25.131 25.080		13	58	0.310
2 x 1	57 x 30		52	57.276 57.225			16	3.2	25	30.131 30.080		13	53	0.298
2 x 1¼	57 x 38		52	57.276 57.225			16	3.2	33	38.146 38.095		13	46	0.268
2 x 1½	57 x 44.5		52	57.276 57.225			16	3.2	39.5	44.646 44.595		13	40	0.234

Capillary Brazing (Half)-Couplings Socket Welding (Half)-Couplings

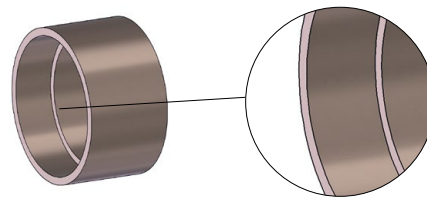
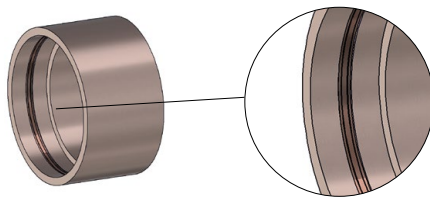
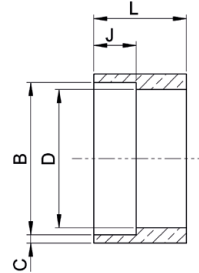
Capillary Brazing, Socket Weld
Fittings and Miscellaneous

CB

(Half)-Couplings
16 mm – 57 mm

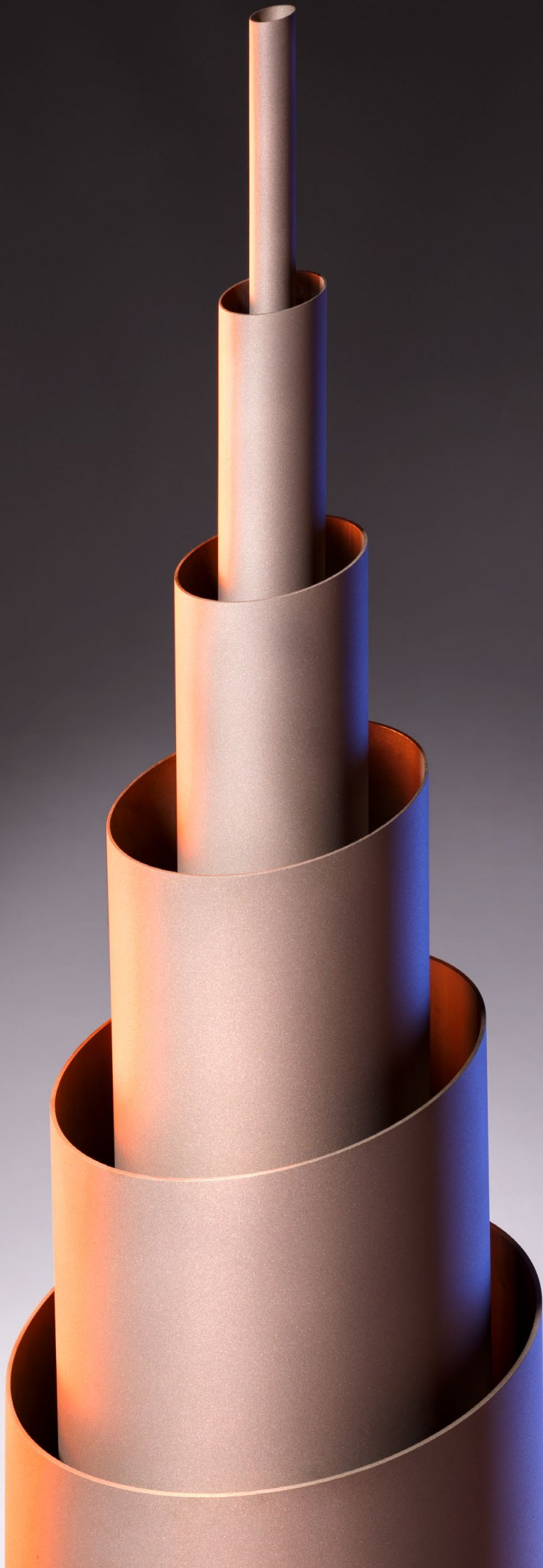


SW



Dimensions Table Brazing (Half)-Couplings / Socket Welding (Half)-Couplings

nominal specified		D		B		C		J		L		Halfcoupling	Coupling
in	mm	min	max/min	min	max/min	min	max/min	min	max/min	min	max/min	weight	weight
		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	~kg	~kg
½	16	12	16.121 16.070	3.2		10		22		0.047		0.039	
¾	25	21	25.131 25.080	3.2		13		28		0.090		0.073	
1	30	25	30.131 30.080	3.2		13		28		0.112		0.087	
1¼	38	33	38.146 38.095	3.2		13		28		0.141		0.108	
1½	44.5	39.5	44.646 44.595	3.2		13		29		0.171		0.132	
2	57	52	57.276 57.225	3.2		16		35		0.266		0.201	



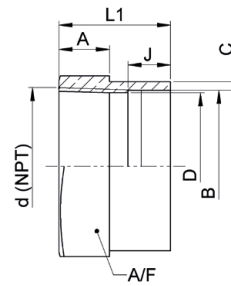
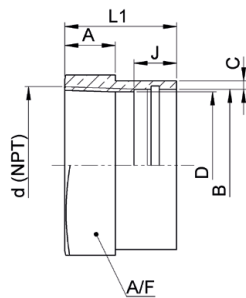
Straight Female Connector

Capillary Brazing, Socket Weld
Fittings and Miscellaneous

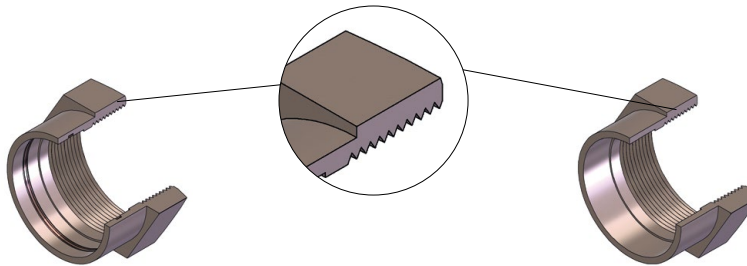
CB

SW

Connector 30
16 mm – 57 mm



section view



Dimensions Table Female

nominal	specified	d	B		C	L ₁	J	A	A/F	weight
in	mm	Thread NPT	max/min mm		min mm	mm	min mm	min mm	mm	~kg
½	16	½	16.121	16.070	3.2	32	10	13.5	27	0.070
¾	25	¾	25.131	25.080	3.2	33	13	14	32	0.110
1	30	1	30.131	30.080	3.2	37	13	17.5	41	0.180
1¼	38	1¼	38.146	38.095	3.2	38	13	18	50	0.240
1½	44.5	1½	44.646	44.595	3.2	38	13	18.5	55	0.280
2	57	2	57.276	57.225	3.2	42	16	19	70	0.470

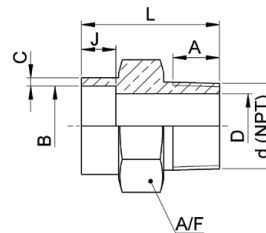
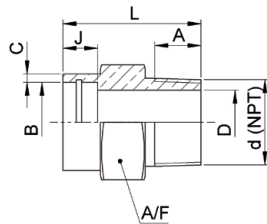
Straight Male Connector

Capillary Brazing, Socket Weld
Fittings and Miscellaneous

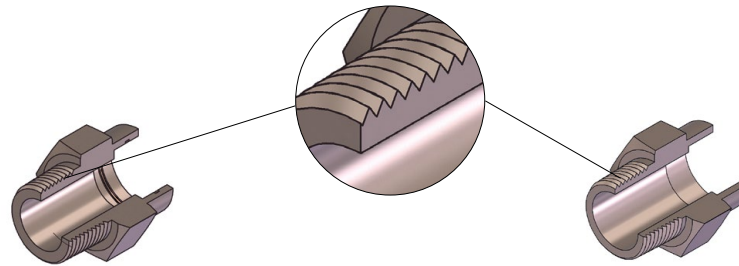
CB

SW

Connector 30
16 mm – 57 mm



section view



Dimensions Table Male

nominal	specified	A	B	C	D	L	J	A	A/F	weight
in	mm	Thread NPT	max/min mm	min mm	mm	mm	mm	mm	mm	~kg
½	16	½	16.121 16.070	3.2	13.8	40	10	13.5	27	0.090
¾	25	¾	25.131 25.080	3.2	18.9	46	13	14	32	0.150
1	30	1	30.131 30.080	3.2	24.3	52	13	17.5	41	0.250
1¼	38	1¼	38.146 38.095	3.2	32.5	54	13	18	50	0.350
1½	44.5	1½	44.646 44.595	3.2	38.1	57	13	18.5	55	0.440
2	57	2	57.276 57.225	3.2	49.2	63	16	19	70	0.720

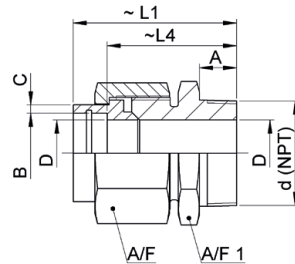
Male Unions

Capillary Brazing, Socket Weld
Fittings and Miscellaneous

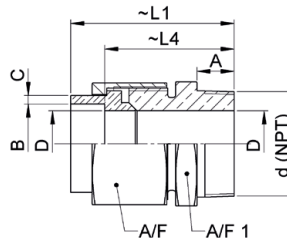
Socket Welding Unions, Capillary Brazing Unions, Male Unions, Socket Welding x Male Thread,
Capillary Brazing x Male Thread

Male Unions
16 mm – 57 mm
male thread
3/4" – 2"

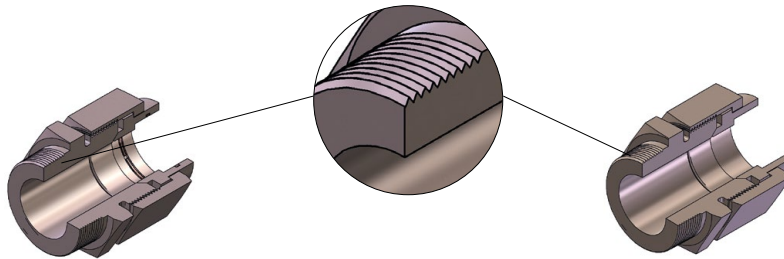
CB



SW



section view

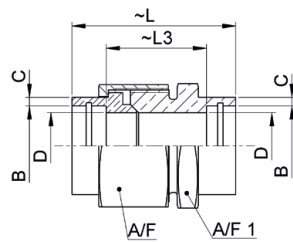


Dimensions Table Male Unions

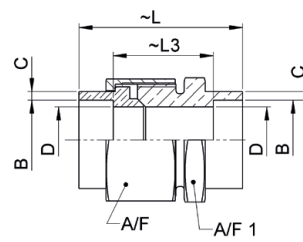
nominal specified		d	C	B		D	~L ₁	~L ₄	A	A/F	A/F ₁	weight
in	mm	Thread NPT	min mm	max/min mm		min mm	mm	mm	min mm	mm	mm	~kg
1/2	16	3/4	3.2	16.121	16.070	12.0	66	56	14	36	32	0.39
3/4	25	1	3.2	25.131	25.080	21.0	81	68	17.5	46	41	0.69
1	30	1 1/4	3.2	30.131	30.080	25.0	83.5	70.5	18	50	46	0.87
1 1/4	38	1 1/2	3.2	38.146	38.095	33.0	86.5	73.5	18.5	60	55	1.17
1 1/2	44.5	1 1/2	3.2	44.646	44.595	39.5	91.5	78.5	18.5	70	60	1.46
2	57	2	3.2	57.276	57.225	52.0	100.5	84.5	19	85	75	2.18

Unions
16 mm – 57 mm

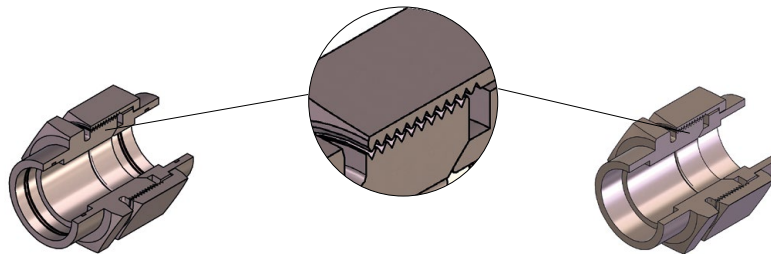
CB



SW



section view



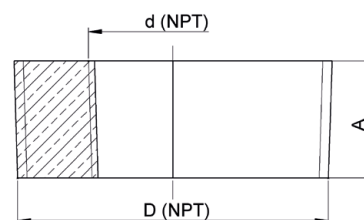
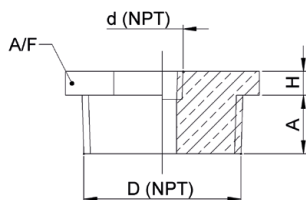
Dimensions Table Unions

nominal specified		C	B		D	~L	~L ₃	A/F	A/F ₁	weight
in	mm	min mm	max/min mm		min mm	mm	mm	mm	mm	~kg
½	16	3.2	16.121	16.070	12.0	58	38	36	32	0.34
¾	25	3.2	25.131	25.080	21.0	71	45	46	41	0.62
1	30	3.2	30.131	30.080	25.0	72.5	46.5	50	46	0.71
1¼	38	3.2	38.146	38.095	33.0	75.5	49.5	60	55	1.02
1½	44.5	3.2	44.646	44.595	39.5	80.5	54.5	70	60	1.39
2	57	3.2	57.276	57.225	52.0	91.5	59.5	85	75	2.12

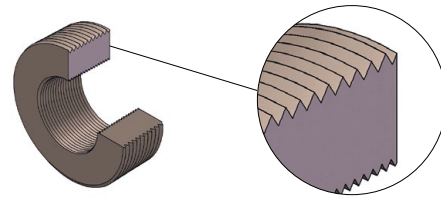
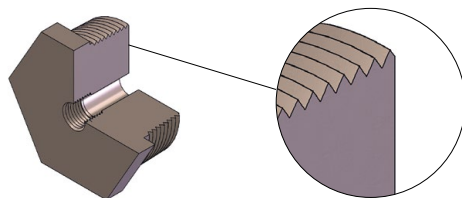
Hexagon Head and Flush Bushings

Capillary Brazing, Socket Weld
Fittings and Miscellaneous

Hex. Head and
Flush Bushings



section view



Dimensions Table

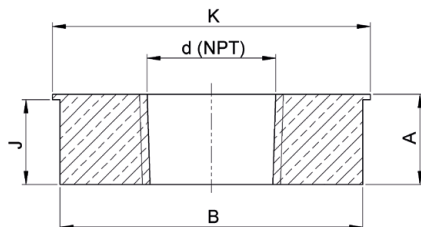
nominal size in	Thread D NPT	Thread d NPT	A min mm	H mm	A/F mm	Hex. Head weight ~kg	Flush weight ~kg
1/2	1/2	1/4	14.5	5	22	0.048	0.033
3/4	3/4	1/4	16.0	6	27	0.094	0.065
3/4	3/4	3/8	16.0	6	27	0.082	0.056
1	1	1/4	19.0	6	35	0.181	0.129
1	1	3/8	19.0	6	35	0.167	0.118
1	1	1/2	19.0	6	35	0.150	0.105
1 1/4	1 1/4	1/4	20.5	7	44.5	0.333	0.233
1 1/4	1 1/4	3/8	20.5	7	44.5	0.318	0.221
1 1/4	1 1/4	1/2	20.5	7	44.5	0.299	0.207
1 1/4	1 1/4	3/4	20.5	7	44.5	0.260	0.177
1 1/2	1 1/2	1/4	20.5	8	51	0.463	0.311
1 1/2	1 1/2	3/8	20.5	8	51	0.447	0.299
1 1/2	1 1/2	1/2	20.5	8	51	0.428	0.285
1 1/2	1 1/2	3/4	20.5	8	51	0.387	0.255
1 1/2	1 1/2	1	20.5	8	51	0.331	0.214
2	2	1/4	22.0	9	63.5	0.799	0.530
2	2	3/8	22.0	9	63.5	0.782	0.518
2	2	1/2	22.0	9	63.5	0.761	0.503
2	2	3/4	22.0	9	63.5	0.716	0.471
2	2	1	22.0	9	63.5	0.655	0.427
2	2	1 1/4	22.0	9	63.5	0.534	0.341
2	2	1 1/2	22.0	9	63.5	0.432	0.268

Sprinkler Bushing

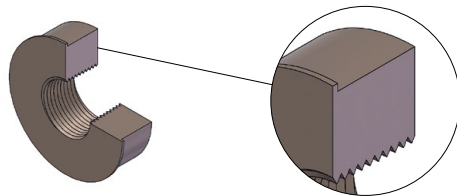
Capillary Brazing, Socket Weld
Fittings and Miscellaneous

Sprinkler Bushing

25 mm – 57 mm x
1" – 1½" NPT



section view



Dimensions Table

nominal specified		B		A	J	K	d	weight
in	mm	max/min mm		min mm	min mm	mm	Thread NPT	~kg
¾	25	25.031	24.980	14	13	28	½	0.031
1	30	30.055	29.975	14	13	33	½	0.058
1¼	38	38.070	37.990	14	13	41	½	0.112
1½	44.5	44.570	44.490	14	13	47.5	½	0.165
2	57	57.200	57.120	17	16	60	½	0.350
1	30	30.055	29.975	14	13	33	¾	0.037
1¼	38	38.070	37.990	14	13	41	¾	0.091
1½	44.5	44.570	44.490	14	13	47.5	¾	0.143
2	57	57.200	57.120	17	16	60	¾	0.324
1¼	38	38.070	37.990	14	13	41	1	0.061
1½	44.5	44.570	44.490	14	13	47.5	1	0.114
2	57	57.200	57.120	17	16	60	1	0.288
1½	44.5	44.570	44.490	14	13	47.5	1¼	0.057
2	57	57.200	57.120	17	16	60	1¼	0.219
2	57	57.200	57.120	17	16	60	1½	0.161

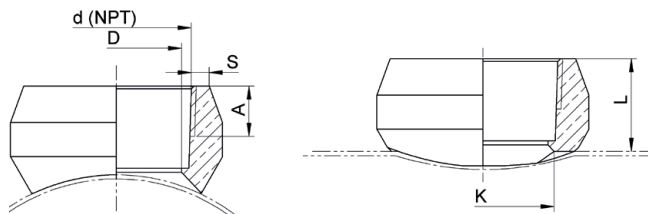
Threaded Outlets

Self Reinforced Branch Connector

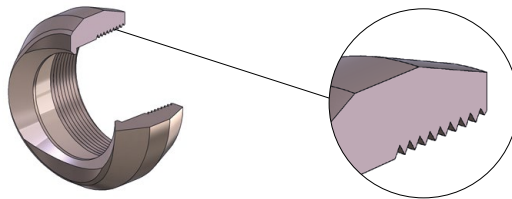
Threaded Type

Capillary Brazing, Socket Weld
Fittings and Miscellaneous

Threaded Outlets
16 mm – 965 mm x
1/2" – 2" NPT



section view



Threaded Outlets

Dimensions Table 16/1/2" - 965/38" x 16/1/2" - 57/2" - 16/20 bar

Nominal Branch Size	Header Size	L Nom	D Nom	K Nom	A min	S
d NPT in	mm	mm	mm	mm	mm	mm
1/2	16 - 965	24	13.84	14.0 - 21.0	13.5	4.78
3/4	25 - 965	24	18.88	21.0 - 26.0	14.0	5.56
1	30 - 965	28	24.30	26.8 - 33.0	17.5	6.35
1 1/4	38 - 965	30	32.50	34.8 - 42.0	18.0	6.35
1 1/2	44.5 - 965	33 - 34	38.14	53.8 - 59.5	18.5	7.14
2	57 - 965	34 - 38	49.22	53.8 - 59.5	19.0	8.74

Socket Outlets

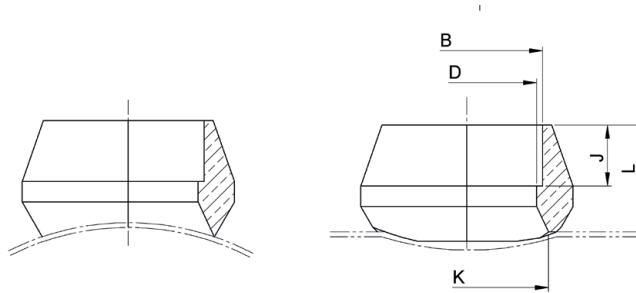
Self Reinforced Branch Connector

Socket Welding Type

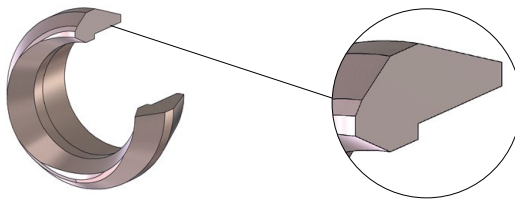
Capillary Brazing, Socket Weld
Fittings and Miscellaneous

Socket Outlets

16 mm - 57 mm x
16 mm - 965 mm



section view



Socket Outlets

Dimensions Table 16/1/2" - 965/38" x 16/1/2" - 57/2" - 16/20 bar

Branch		Header Size		L		D		K		J		B		S	
Specified OD				Nom		max/min		Nom		Nom		min/max		min/max	
mm	mm			mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
16	16 - 965			18	11.565	12.445		12.8	17	10		16.070	16.121	1.8	2
25	25 - 965			23	20.575	21.445		26	26	13		25.080	25.131	1.8	2
30	30 - 965			26	24.475	25.555		31	31	13		30.080	30.131	2.25	2.5
38	38 - 965			29	32.490	33.570		34.8	40	13		32.490	33.570	2.25	2.5
44.5	44.5 - 965			32	38.990	40.070		41.3	45	13		38.990	40.070	2.25	2.5
57	57 - 965			36	51.620	52.700		53.8	58	16		57.225	57.276	2.25	2.5

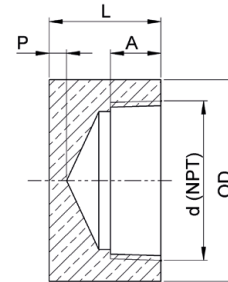
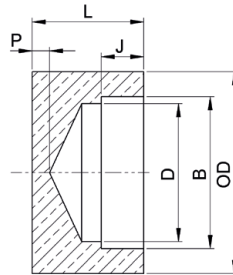
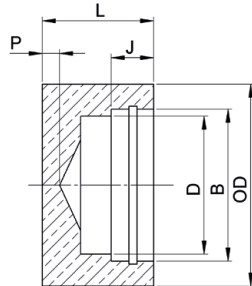
Capillary Brazing End Caps Socket Welding End Caps / NPT End Caps

Capillary Brazing, Socket Weld
Fittings and Miscellaneous

CB

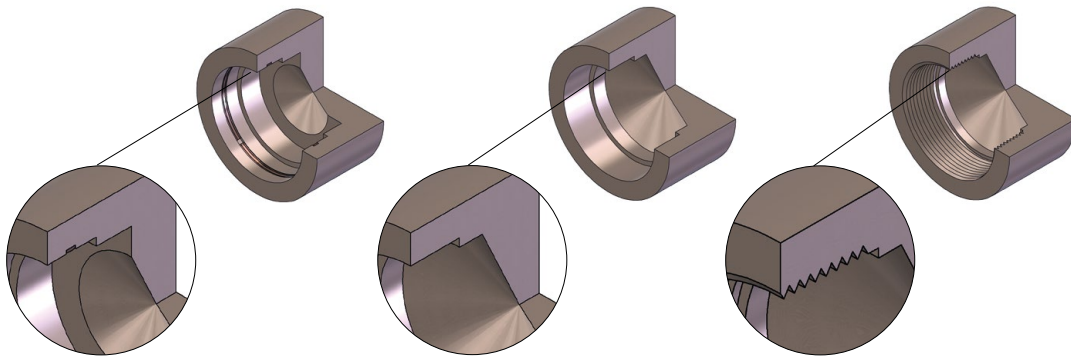
SW

End Caps
16 mm – 57 mm



NPT End Caps
16 mm – 57 mm

section view



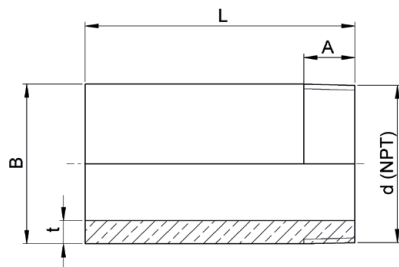
Dimensions Table

nominal	specified	OD	B	D	L	P	J	A	d	weight
in	mm	min mm	max/min mm	min mm	min mm	min mm	min mm	min mm	NPT	~kg
½	16	29	16.121 16.070	12	32	6.5	10	13.5	½	0.149
¾	25	35	25.131 25.080	21	37	6.5	13	14.0	¾	0.216
1	30	44	30.131 30.080	25	38	6.5	13	17.5	1	0.363
1¼	38	57	38.146 38.095	33	41	6.5	13	18.0	1¼	0.665
1½	44.5	64	44.646 44.595	39.5	41	6.5	13	18.5	1½	0.814
2	57	76	57.276 57.225	52	42	6.5	16	19.0	2	1.098

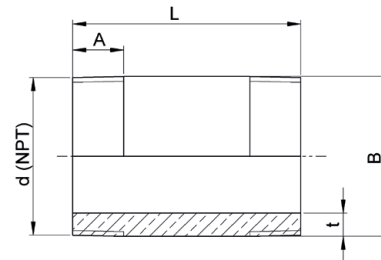
Male Nipple one / Male Nipple both

Capillary Brazing, Socket Weld
Fittings and Miscellaneous

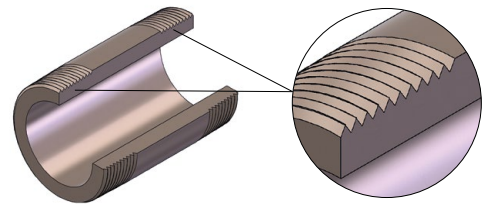
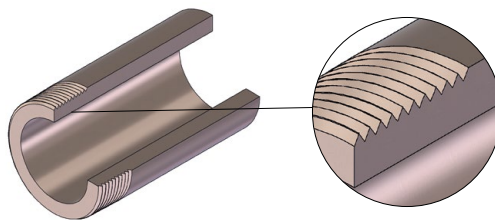
Male Nipple one
1/2" - 2" x
21,3 mm - 60,3 mm



Male Nipple both
21,3 mm - 60,3 mm



section view



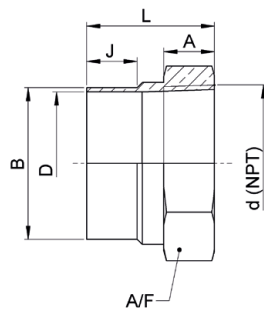
Dimensions Table Male Nipple one

nominal	B	d	L	A	t	weight
in	specified mm	Thread NPT	min mm	min mm	mm	~kg
1/2	21.3	1/2	76.2	13.6	4.78	0.167
3/4	26.7	3/4	76.2	13.9	5.56	0.248
1	33.4	1	76.2	17.3	6.35	0.362
1 1/4	42.2	1 1/4	76.2	18.0	6.35	0.479
1 1/2	48.3	1 1/2	76.2	18.4	7.14	0.619
2	60.3	2	76.2	19.2	8.74	0.950
1/2	21.3	1/2	101.6	13.6	4.78	0.223
3/4	26.7	3/4	101.6	13.9	5.56	0.332
1	33.4	1	101.6	17.3	6.35	0.484
1 1/4	42.2	1 1/4	101.6	18.0	6.35	0.641
1 1/2	48.3	1 1/2	101.6	18.4	7.14	0.828
2	60.3	2	101.6	19.2	8.74	1.270

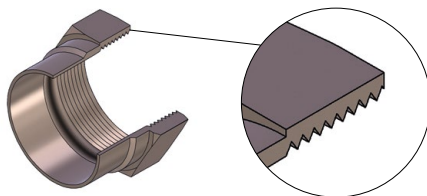
Female Adapter / Male Adapter

Capillary Brazing, Socket Weld
Fittings and Miscellaneous

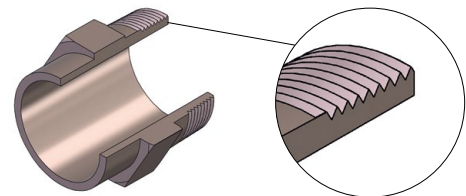
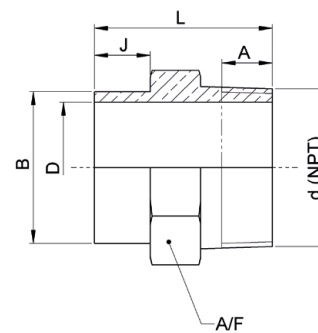
**Female
End Adapter**
16 mm – 57 mm



section view



**Male
End Adapter**
16 mm – 57 mm



Dimensions Table Female Adaptor

nominal		specified	d	B		D	L	J	A	A/F	weight
in	mm		Thread NPT	max/min	mm	min mm	min mm	min mm	min mm	mm	~kg
½	16		½	16.045 15.965		12	36	13	13.5	27	0.070
¾	25		¾	25.055 24.975		21	39	16	14	32	0.110
1	30		1	30.055 29.975		25	43	16	17.5	41	0.190
1¼	38		1¼	38.070 37.990		33	44	16	18	50	0.240
1½	44.5		1½	44.570 44.490		39.5	44	16	18.5	55	0.290
2	57		2	57.200 57.120		52	48	19	19	70	0.470

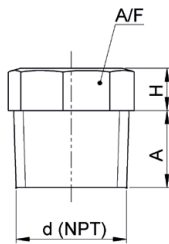
Dimensions Table Male Adaptor

nominal		specified	d	B		D	L	J	A	A/F	weight
in	mm		Thread NPT	max/min	mm	min mm	min mm	min mm	min mm	mm	~kg
½	16		½	16.045 15.965		12.0	44	15	13.5	27	0.100
¾	25		¾	25.055 24.975		18.9	50	18	14	32	0.140
1	30		1	30.055 29.975		24.3	56	18	17.5	41	0.240
1¼	38		1¼	38.070 37.990		32.5	58	18	18	50	0.340
1½	44.5		1½	44.570 44.490		38.1	61	18	18.5	55	0.440
2	57		2	57.200 57.120		49.2	67	21	19	70	0.740

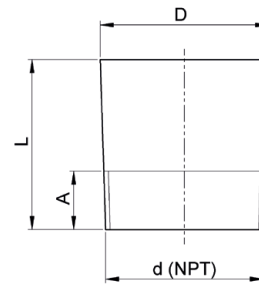
Hexagon Plug / Round Plug

Capillary Brazing, Socket Weld
Fittings and Miscellaneous

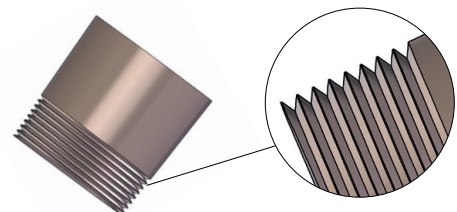
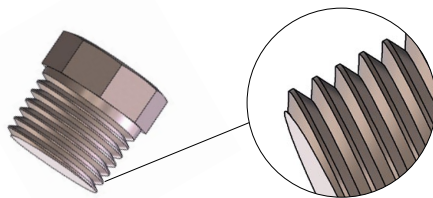
Hex. Plug
21,3 mm – 60,3 mm
1/2" – 2"



Round Plug
1/2" – 2"



section view



Dimensions Table

nominal size = Length		Width of flats	Hex height	Lenght	Dia of Head	Hex.	Round
Thread d	A	A/F	H	L	D	Head weight	Head weight
NPT	min	min	min	min	min	~kg	~kg
in	mm	mm	mm	mm	mm		
1/2	14.5	22	8	44	21	0.074	0.135
3/4	16.0	27	10	44	27	0.133	0.219
1	19.0	35	10	51	33	0.242	0.386
1 1/4	20.5	44.5	14	51	43	0.461	0.641
1 1/2	20.5	51	16	51	48	0.645	0.616
2	22.0	63.5	17	64	60	1.073	1.603

Appendix A

Surface finish of the copper-nickel stub end and flangejoint faces

Method of machining	Ra* µm		Rz* µm	
	min.	max.	min.	max.
turning	3.2	12.5	12.5	50

Note

The term "turning" includes any method of machining producing concentric or spiral grooves.

Mechanical Properties

	Tensile Strength N/mm ²		0.2 % Proof Stress N/mm ²	Elongation % min on L = 5.65 √S ₀	Hardness HV5 max
	min.	max.			
Seamless Pipes	300	380	105	30	
Seam-welded pipes	280	-	105	30	120*
Weld neck and slip-on stub ends, solid weld neck and slip-on flanges	280	-	105	30	120*
Fittings	280	-	105	30	120*

* Determined on finished tube outside of heat affected zone

Appendix B

Temperature Range	SI Units	Imperial Units	20°C	68°F	100°C	212°F	200°C	392°F	300°C	572°F	400°C	752°F
Thermal Expansion Coefficient	10-16/°K	10-16/°K			16.4	9.1	16.8	9.3	17.1	9.5	17.5	9.7
Young´s Modulus	kN/mm ²	ksi	124	18.000	118	17.110	112	16.240	106	15.370	100	14.500
Modulus of Rigidity	kN/mm ²	ksi	50	6.800								
Poisson´s Ratio	-	-	0.35		0.36		0.36		0.36			
Density	g/cm ³	pound/inch ³	8.91	0.321								
Thermal Conductivity	W/m°K	Btu/pound °F	51.7	29.9	60.2	34.8	70	40,5	78.9	45.6	86.7	50.1
Specific Heat Capacity	kJ/kg°K	BTU/pound °F	0.377	0.09								
Electrical Conductivity	MegaSiemens/cm	%IACS	0.053	9								
Electrical Resistivity	microhm-cm	circular mil ohm/foot	19.12	115.0								

Appendix C

Adjust the description of dimensions to the images

Size	90 deg & 45 deg elbows & tees (see tables 1.4, 1.6 & 1.7)	reducer (see table 1.9)	end caps (see table 1.8)
Specified OD	centre-to-end dimension D, E, C&M	overall length H	overall length h1 + h2
up to and including 267	± 2	± 2	+0.015 D ₀ -0
323.9 up to and including 711	± 3	± 3	
813 up to and including 914	± 5	± 5	

Design Scope

Working pressures and temperatures of components included in this specification:

1. 16 bar/232 psi: -29°C/-20°F to +75°C/+167°F
2. 20 bar/290 psi: -29°C/-20°F to +38°C/+100°F

Pipes Seamless and Welded:

- Pipes are based on BS MA 60 (now withdrawn), DIN 86007, and ANSI B31.3
- The wall thicknesses comply with ANSI B31.3 and DIN 86007 as well as International Association of Classification Societies with additional allowances for robustness to withstand mechanical damage, especially in the smaller sizes.
- The fit-for-purpose corrosion allowance of 0.5 mm sufficient for entire service life of the piping installation has been included. This corrosion allowance is in accordance with all major classification societies specified for alloys containing ≥10 wt. % Ni and ≥1.5 wt. % Fe. Mechanical properties of pipes are given in Appendix A.

Flanges Composite and Solid:

- Included series of composite (lap type) and solid flanges in metric dimensions based on ANSI B16.5, MSS SP-44 and BS EN 1759-1:2004
- The basic metric dimensions for drilling and flange outside diameters are those given in ANSI B16.5 and MSS SP 44 Class 150 rating with inch size bolting.
- The copper-nickel stub end and flange joint faces are machine finished and comply with the corresponding Sections of EEMUA 234/3-6 and are summarized in the Appendix A.
- Mechanical properties of flanges are given in Appendix A.

Fittings:

- The specification comprises a series for pipe fittings including butt weld, socket welding, capillary brazing, threaded, self-reinforced fittings as well as saddle pieces.
- The "assembly dimensions" of the butt welding fittings are based on ANSI B16.9 apart from the caps that are based on DIN 28011 (with suitable amendments).
- Mechanical properties of fittings are given in Appendix A.

Physical Properties of CuNi 90/10

The physical properties of the alloy are given by Appendix B. The basic allowable stresses in tension are in accordance with B31.3 Table A-1.

Welding

The welding consumables used for the manufacturing of welded components are in accordance with AWS-A5.7 Class ER CuNi. The welding procedure specification and welder qualification are in accordance with the requirements of EEMUA Publication 234 Edition 1 (section IX).

Testing of Welds

The weld seams are examined by the liquid dye penetrant testing in accordance with EEMUA Publication 234 Edition 1 (section VIII, division 1, appendix 8). The radiographic examination is performed for the complete length of each weld to meet the requirements of EEMUA Publication 234 Edition 1 (section VIII, UW51).

Gaskets

The gaskets normally used with flanges are those made from aramid fibre with nitrile binder. The gasket hardness shall not be less than 75 Shore. The gaskets shall not be graphited. In order to ensure adequate seating when solid weldneck and solid slip-on flanges are used, irrespective of gasket materials, the gaskets shall be located within the bolt circle. Note: Gaskets should not be used when mating with elastomer rubber faced flanges.

PDMS Data

The components mentioned in this catalogue are available in the PDMS-format. Please contact us for more information.





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The aim of our commitment is to increase the satisfaction of all stakeholders.

We are constantly engaged in:

- creating products of outstanding quality
- preventing errors and defects
- minimising the costs associated with errors and inefficiencies
- preventing the waste of resources
- establishing safe production conditions to protect both our employees and the environment

We aim for excellence by means of transparent management systems designed to satisfy the requirements of our clients together with the demands of the market and technology.

The quality management systems implemented throughout the KME Group are fully compliant with the provisions of ISO 9001 as well as, in the case of our automotive industry clients, ISO TS 16 949, and our staff is strongly committed to their implementation at all levels.



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KME Special Products GmbH & Co. KG *Marine Applications*

P.O. Box 33 20 49023 Osnabrück Klosterstrasse 29 49074 Osnabrück GERMANY

T +49 541 321-3201 info-maritime@kme.com www.kme.com/marine

