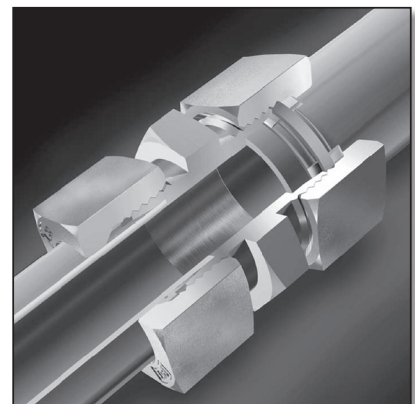
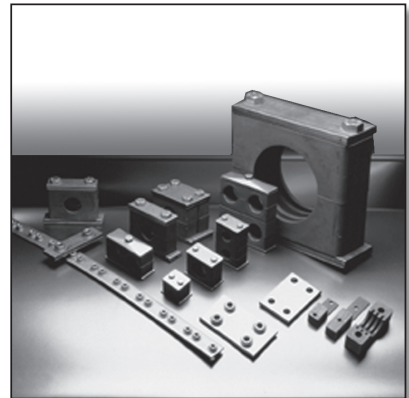



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 **WARNING:** This product may contain chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm. For more information please visit: [www.p65warnings.ca.gov](http://www.p65warnings.ca.gov)

## INTRODUCTION

Tube and pipe merchants within U.S.A offer a range of products suited to hydraulic, pneumatic and instrumentation applications. The data included here is intended as a guide only to the products more commonly used, and should not be construed as representative of products offered for sale by PIRTEK. Specifications and technical data are typical.

## Standard Tube and Pipe

Tabulated burst pressures for imperial tube and pipe size of various sizes are derived from use of Barlow's Formula. Results are converted to bars for convenience.

$$\text{BP (psi)} = \frac{\text{Wall Thickness (mm/ins)} \times 2 \times \text{Tensile Strength (psi)}}{\text{Outside Dia. (ins)}}$$

Material	Adopted tensile strength	Tabulated
Butt welded wrought steel pipe * (Sched. 40, 80, 160)	39,885 psi (2812 kg/cm <sup>2</sup> )	Yes
Lap welded wrought steel pipe	50,038 psi (3515 kg/cm <sup>2</sup> )	No. Add 20% to above.
Hydraulic Cold Drawn Steel Tube (CDS)	50,038 psi (3515 kg/cm <sup>2</sup> )	Yes
Stainless Steel 302, 303, 304,309, 310, 316, 321, 416	73,969 psi (273 kg/cm <sup>2</sup> )	Yes
Stainless Steel 410, 430	60,045 psi (4222 kg/cm <sup>2</sup> )	No
Stainless Steel 202, 440C	100,076 (7037 kg/cm <sup>2</sup> )	No
Copper	31,908 psi (2 250 kg/cm <sup>2</sup> )	No
* Wrought iron pipe	Thicker than wrought steel. Adopt the same burst pressure as butt welded wrought steel.	

## Flow Rate / Velocity

Flow rates given in the tables are based on the following guides:

Suction lines:	0.6 - 1.2 m/sec
Return lines:	3 - 4.5 m/sec
Medium Pressure (35 - 140 bar) lines:	4.5 - 6 m/sec
High Pressure lines (≥ 200 bar):	≤ 9 m/sec

## Safety Factor

It's recommended that hydraulic systems subjected to shock loads incorporate a 6:1 factor of safety. Use of a lower factor can be contemplated after due consideration of the system operating parameters.

Quoted working pressures for metric tubing are as per relevant DIN standards.

## Copper Tube

Consult page E 8



## Metric Tube

Metric steel tubing is designated by the combination of outside diameter and wall thickness. PIRTEK recommends the use of precision cold drawn seamless tube manufactured to conform to the requirements of DIN 2391 Part 1. Material grade should be St 37.4, Type NBK, as described in DIN 1630. Maximum exterior hardness 75 HRB.

Tabulated pressure ratings are in accordance with :

DIN 2413-I (static loads using a tensile stress yield point of 34,083 psi)  
DIN 2413-III (dynamic loads using a yield point of 32,778 psi).

For thick walled tube (ie the ratio of OD to ID exceeds 1.35), the tabulated pressure is as per DIN2413-III, but with the 34,083 psi yield point. The applicable safety factor in all cases is 1.5.

Allowance factors are:

4 mm tube C = 0.8

6-8 mm tube C = 0.85

8mm tube and larger C = 0.9

No additional provision for corrosion is incorporated.

1.4571 stainless steel tubing is designated by the combination of outside diameter and wall thickness. It should be cold drawn precision seamless tube manufactured in accordance with the provisions of DIN 17458-X6CrNiMoTi17122-m or ASTM A269. Maximum exterior hardness 85 HRB. Tolerances as per DIN/EN/ISO 1127.

Tabulated pressure ratings are in accordance with DIN 2413-I (static loads using a tensile stress yield point of 35,534 psi). Pressure ratings for dynamic loads use a yield point of 27,557 psi. Note that no yield stress is published for DIN 17458, so this is a recommended guide only. Calculations are as per DIN 2423-III for dynamic loads.

For thick walled tube (ratio of OD to ID exceeds 1.35), the tabulated pressure is as per DIN2413-III, but with a 35,534 psi yield point. The applicable safety factor in all cases is 1.5.

Allowance factors are:

C = 0.9

No additional provision for corrosion is incorporated.

## Working Temperature

Carbon steel:

Use safely with no reduction in the range of -76° to +248° F. Maximum allowable working temperature 482° F.

Stainless steel:

Use stated working pressures within the range -76° to +68° F.

Maximum allowable working temperature 752° F.

Reduce pressures as indicated for the range 68° to 752° F.

122° F	4.5%
212° F	11%
392° F	20%
572° F	29%
752° F	33%

## Tube Length

Standard tube 20 ft

Metric tube 19.6 ft

## Bending Tube

Use the guide:

Bend Radius ≥ 3 x Tube OD

Bending can cause wall thinning, with a consequent reduction in safe working pressure.

**ANSI / ASME B36.10M SCHEDULE 40 (API STANDARD WEIGHT) PIPE**

Nominal Size	WP psi	BP psi	Oil flow capacity (gpm) @ flow velocity (fps)				Dimensions inches			Flow Area (sq. inches)	WT/FT (pounds)
	Safety Factor 6:1		gpm@2fps	gpm@10fps	gpm@15fps	gpm@25fps	OD	ID	Wall Thickness		
1/8"	2233	13430	0.4	1.8	2.7	4.4	0.405	0.269	0.068	0.057	0.244
1/4"	2175	13038	0.6	3.2	4.9	8.1	0.540	0.364	0.088	0.104	0.424
3/8"	1798	10790	1.2	6.0	8.9	14.9	0.675	0.493	0.091	0.191	0.567
1/2"	1725	10384	1.9	9.5	14.2	23.7	0.840	0.622	0.109	0.304	0.850
3/4"	1435	8615	3.3	16.6	24.9	41.6	1.050	0.824	0.113	0.533	1.13
1"	1348	8093	5.4	26.9	40.4	67.4	1.315	1.049	0.133	0.864	1.677
1.1/4"	1116	6744	9.3	46.6	69.9	93.2	1.660	1.380	0.140	1.496	2.27
1.1/2"	1015	6106	12.7	63.5	95.2	15.7	1.90	1.610	0.145	2.036	2.715
2"	870	5192	20.9	104.6	156.9	261.5	2.375	2.067	0.154	3.649	3.649
2.1/2"	850	5100	29.8	149.2	223.9	373.1	2.875	2.469	0.203	5.787	5.787
3"	826	4931	46.1	230.4	345.7	576.1	3.50	3.068	0.216	7.568	7.568

**ANSI / ASME B36.10M SCHEDULE 80 (API EXTRA STRONG WEIGHT) PIPE**

Nominal Size	WP psi	BP psi	Oil flow capacity (gpm) @ flow velocity (fps)				Dimensions inches			Flow Area (sq. inches)	WT/FT (pounds)
	Safety Factor 6:1		gpm@2fps	gpm@10fps	gpm@15fps	gpm@25fps	OD	ID	Wall Thickness		
1/8"	3190	19130	0.2	1.1	1.7	2.8	0.405	0.215	0.095	0.036	0.314
1/4"	2997	17984	0.4	2.2	3.3	5.6	0.540	0.302	0.119	0.072	0.534
3/8"	2538	15228	0.9	4.4	6.6	11.0	0.675	0.423	0.126	0.141	0.738
1/2"	2378	14271	1.5	7.3	10.9	18.2	0.840	0.546	0.147	0.234	1.087
3/4"	1987	11965	2.7	13.5	20.2	33.7	1.050	0.742	0.154	0.432	1.472
1"	1841	11109	4.5	22.4	33.6	56.1	1.315	0.957	0.179	0.719	2.169
1.1/4"	1566	9383	8.0	40.0	60.0	100.0	1.660	1.278	0.191	1.283	2.993
1.1/2"	1435	8586	11.0	55.1	82.6	137.7	1.900	1.500	0.200	1.767	3.627
2"	1247	7483	18.4	92.0	138.1	230.1	2.375	1.939	0.218	2.953	5.017
2.1/2"	1200	7200	26.4	132.1	198.2	330.3	2.875	2.323	0.276	4.238	7.653
3"	1160	6990	41.2	205.9	308.8	514.7	3.50	2.900	0.300	6.605	10.242

**ANSI / ASME B36.10M SCHEDULE 160 (API DOUBLE EXTRA HEAVY WEIGHT) PIPE**

Nominal Size	WP psi	BP psi	Oil flow capacity (gpm) @ flow velocity (fps)				Dimensions inches			Flow Area (sq. inches)	WT/FT (pounds)
	Safety Factor 6:1		gpm@2fps	gpm@10fps	gpm@15fps	gpm@25fps	OD	ID	Wall Thickness		
1/2"	3045	18260	1.1	5.3	8.0	13.3	0.840	0.466	0.187	0.171	1.303
3/4"	2835	17012	1.8	9.2	13.8	23.1	1.050	0.614	0.218	0.296	1.935
1"	2584	15504	3.3	16.3	24.4	40.7	1.315	0.815	0.250	0.522	2.841
1.1/4"	2045	12284	6.6	32.9	49.4	82.4	1.660	1.160	0.250	1.057	3.761
1.1/2"	2010	12067	8.8	43.8	65.7	109.6	1.900	1.338	0.281	1.406	4.854
2"	1968	11820	13.9	69.7	104.5	174.2	2.375	1.687	0.344	2.235	7.454
2.1/2"	1769	10645	22.1	110.6	165.8	276.4	2.875	2.125	0.375	3.547	10.002
3"	1699	10210	33.7	251.1	627.7	941.5	88.9	66.65	11.125	34.871	21.3

## PRECISION SEAMLESS HYDRAULIC TUBE (Standard)

Size	GAUGE Thickness	CDS LOW CARBON Note SF 3:1*		316 L STAINLESS STEEL Note SF 3:1*		Oil flow capacity (lit/min) @ flow velocity (m/sec)				Dimensions Inches			Weight lb/ft
		WP psi	BP psi	WP psi	BP psi	1.2 Suction	4.5 Return	6 Med. Press.	9 High Press.	OD	ID	Wall Thick.	
1/8"	20G	10500	31502	-	-	0.1	0.4	0.6	0.8	0.125	0.055	0.035	0.03
3/16"	20G	7005	21001	-	-	0.5	1.9	2.5	3.8	0.187	0.117	0.035	0.05
1/4"	20G	5250	15751	7150	1478	1.2	4.4	5.9	8.9	0.250	0.179	0.035	0.08
	18G	7193	21596	9790	2026	0.9	3.2	4.3	6.5	0.250	0.153	0.049	0.10
	16G	9616	28848	-	-	0.5	2.0	2.7	4.0	0.250	0.121	0.065	0.13
5/16"	20G	4206	12603	5714	17143	2.1	8.0	10.7	16.1	0.312	0.242	0.035	0.10
	18G	5758	17273	7832	23496	1.7	6.4	8.5	12.8	0.312	0.216	0.049	0.13
	16G	7687	23075	-	-	1.2	4.6	6.2	9.3	0.312	0.184	0.065	0.17
3/8"	20G	3495	10500	4757	14286	3.4	12.7	17.0	25.4	0.375	0.305	0.035	0.13
	18G	4800	14402	6526	19580	2.8	10.6	14.2	21.3	0.375	0.279	0.049	0.17
	16G	6410	19232	8716	26164	2.2	8.3	11.1	16.6	0.375	0.246	0.065	0.22
1/2"	20G	2625	7875	3567	10718	6.7	25.3	33.7	50.6	0.50	0.429	0.035	0.17
	18G	3596	10790	4916	14692	6.0	22.3	29.8	44.6	0.50	0.403	0.049	0.23
	16G	4815	14431	6541	19638	5.0	18.9	25.2	37.8	0.50	0.371	0.065	0.30
	14G	-	-	8151	24453	4.2	15.8	21.1	31.7	0.50	0.340	0.083	0.35
5/8"	18G	2886	8644	3916	11748	10.2	38.3	51.0	76.6	0.625	0.529	0.049	0.30
	16G	3843	11545	5235	15693	9.0	33.7	45.0	67.5	0.625	0.496	0.065	0.38
	14G	4786	14373	6512	19551	7.9	29.6	39.5	59.2	0.625	0.465	0.083	0.46
3/4"	18G	2393	7193	3263	9790	15.6	58.5	78.0	117.0	0.750	0.653	0.049	0.36
	16G	3205	9616	4365	13082	14.1	52.9	70.5	105.7	0.750	0.621	0.065	0.32
	14G	3988	11980	5438	16302	12.7	47.7	63.5	95.3	0.750	0.590	0.083	0.57
7/8"	18G	-	-	2799	8397	22.1	83.1	110.7	166.1	0.875	0.779	0.049	0.42
	16G	2741	8238	3741	11211	20.3	76.3	101.7	152.5	0.875	0.746	0.065	0.56
	14G	3422	10268	4655	13967	18.7	70.0	93.3	139.9	0.875	0.715	0.083	0.68
	12G	-	-	6352	19057	15.8	59.1	78.8	118.1	0.875	0.657	0.109	0.89
1"	18G	1798	5395	2451	7353	29.8	111.8	149.1	223.6	1"	0.903	0.049	0.49
	16G	2407	7208	3277	9819	27.7	103.9	138.6	207.9	1"	0.871	0.065	0.96
	14G	2987	8977	4075	12226	25.8	96.6	128.8	193.1	1"	0.840	0.083	0.79
	12G	4090	7034	5554	16679	22.3	83.6	111.5	167.3	1"	0.781	0.109	1.04
	10G	4800	14387	-	-	20.2	75.8	101.0	151.5	1"	0.744	0.134	1.19
1.1/4"	14G	2393	7193	3263	9775	43.4	162.6	216.8	325.2	1.25	1.090	0.083	1.00
	12G	3263	9804	4452	13343	38.8	145.7	194.2	291.4	1.25	1.031	0.109	1.33
	10G	3829	11501	5221	15664	36.1	135.2	180.3	270.4	1.25	0.994	0.134	1.53
1.1/2"	14G	-	-	2712	8151	65.5	245.7	327.6	491.4	1.50	1.340	0.083	3.99
	12G	2726	8165	3712	11124	60.0	224.8	299.8	449.6	1.50	1.281	0.109	1.62
	10G	3190	9586	4351	13053	56.5	211.8	282.3	423.5	1.50	1.244	0.134	1.87
2"	12G	2045	6135	-	-	115.8	434.4	579.2	868.8	2"	1.781	0.109	2.20
	10G	2393	7193	-	-	111.0	416.2	554.9	832.3	2"	1.744	0.134	2.56
	7G	3292	9891	-	-	99.1	371.6	495.5	743.2	2"	1.648	0.180	3.43

**\* Safety Factor**

It's recommended that hydraulic systems subjected to shock loads incorporate a 6:1 factor of safety. Use of a lower factor can be contemplated after due consideration of the system operating parameters.



**PRECISION SEAMLESS HYDRAULIC STEEL TUBE (Metric)**

Ø Tube	Tolerance	Working Pressure (psi)		Working Pressure (psi)		Oil flow capacity (lit/min) @ flow velocity (m/sec)				Dimensions (mm)			Weight	† pref. size	
		St. 37.4 Carbon steel	Dynamic	1.4571 Stainless steel	Dynamic	1.2 Suction	4.5 Return	6 Med. Press.	9 High Press.	OD	ID	Wall Thick.			lb/ft
mm	mm	Static DIN2413-I	DIN2413-III	Static DIN2413-I	(Guide)										
<b>4</b>	± 0.1	5932	6773	6178	5192	0.4	1.3	1.8	2.7	4	2.5	0.75	0.040	†	
		7570	7280	7890	6120	0.2	0.8	1.1	1.7	4	2	1	0.049		
<b>6</b>	± 0.1	5641	5424	5888	4551	0.9	3.4	4.5	6.8	6	4	1	0.082	†	
		7962	7657	8296	6439	0.5	1.9	2.5	3.8	6	3	1.5	0.111		
		10036	9645	10457	8107	0.2	0.8	1.1	1.7	6	2	2	0.132		
<b>8</b>	± 0.1	4829	4191	5032	3524	2.0	7.6	10.2	15.3	8	6	1	0.116	†	
		6251	6396	6512	5380	1.4	5.3	7.1	10.6	8	5	1.5	0.161	†	
		7962	7657	8296	6439	0.9	3.4	4.5	6.8	8	4	2	0.198		
		9543	9166	9949	8136	0.5	1.9	2.5	3.8	8	3	2.5	0.227		
<b>10</b>	± 0.1	4090	3611	4264	3031	3.6	13.6	18.1	27.1	10	8	1	0.149	†	
		5409	5192	5641	4365	2.8	10.4	13.9	20.8	10	7	1.5	0.210	†	
		6932	6671	7222	5612	2.0	7.6	10.2	15.3	10	6	2	0.265		
		8354	8020	8716	6744	1.4	5.3	7.1	10.6	10	5	2.5	0.310		
<b>12</b>	± 0.08	9659	9296	10065	7817	0.9	3.4	4.5	6.8	10	4	3	0.348		
		3407	3045	3553	2552	5.7	21.2	28.3	42.4	12	10	1 <sup>a</sup>	0.182	†	
		5119	4423	5337	3712	4.6	17.2	22.9	34.4	12	9	1.5	0.261	†	
		5932	5699	6178	4786	3.6	13.6	18.1	27.1	12	8	2	0.331	†	
		7179	6903	7483	5801	2.8	10.4	13.9	20.8	12	7	2.5	0.393		
<b>14</b>	± 0.08	8354	8020	8716	6744	2.0	7.6	10.2	15.3	12	6	3	0.447		
		9441	9093	9848	7643	1.4	5.3	7.1	10.6	12	5	3.5	0.493		
		4380	3843	4568	3234	6.8	25.7	34.2	51.3	14	11	1.5	0.310		
		5845	4974	6091	4177	5.7	21.2	28.3	42.4	14	10	2	0.397	†	
		6294	6048	6555	5090	4.6	17.2	22.9	34.4	14	9	2.5	0.476		
<b>15</b>	± 0.08	7353	7063	7672	5932	3.6	13.6	18.1	27.1	14	8	3	0.546		
		8354	8020	8716	6744	2.8	10.4	13.9	20.8	14	7	3.5	0.608		
		2726	2480	2842	2074	9.6	35.8	47.8	71.7	15	13	1	0.231		
		4090	3611	4264	3031	8.1	30.5	40.7	61.1	15	12	1.5	0.335	†	
<b>16</b>	± 0.08	5453	323	5685	3945	6.8	25.7	34.2	51.3	15	11	2	0.430		
		6932	460	7222	5612	4.6	17.2	22.9	34.4	15	9	3	0.596		
		3829	4684	3988	2842	9.6	35.8	47.8	71.7	16	13	1.5	0.360	†	
<b>18</b>	± 0.08	5119	4423	5337	3712	8.1	30.5	40.7	61.1	16	12	2	0.464	†	
		5598	5395	5830	4525	6.8	25.7	34.2	51.3	16	11	2.5	0.559	†	
		6555	6309	6831	5293	5.7	21.2	28.3	42.4	16	10	3	0.646		
		2277	2074	1885	-	14.5	54.3	72.4	108.6	18	16	1 <sup>a</sup>	0.281		
<b>20</b>	± 0.08	3408	3045	3553	2567	12.7	47.7	63.6	95.4	18	15	1.5 <sup>a</sup>	0.409	†	
		4539	3974	4728	3335	11.1	41.6	55.4	83.1	18	14	2	0.530	†	
		5685	4858	5932	4090	9.6	35.8	47.8	71.7	18	13	2.5	0.642		
		5932	5699	6178	4786	8.1	30.5	40.7	61.1	18	12	3	0.745		
		3074	2770	-	-	16.3	61.3	81.7	122.6	20	17	1.5	0.459		
<b>22</b>	± 0.08	4090	3611	4264	3031	14.5	54.3	72.4	108.6	20	16	2	0.596	†	
		5119	4423	5337	3712	12.7	47.7	63.6	95.4	20	15	2.5	0.725	†	
		5409	5192	5641	4365	11.1	41.6	55.4	83.1	20	14	3	0.845		
		6178	5946	6439	4989	9.6	35.8	47.8	71.7	20	13	3.5	0.956		
		6932	6671	7222	5612	8.1	30.5	40.7	61.1	20	12	4	1.060		
		2784	2523	2900	2117	20.4	76.6	102.1	153.1	22	19	1.5 <sup>a</sup>	0.509		
<b>25</b>	± 0.08	3712	3306	3872	2784	18.3	68.7	91.6	137.4	22	18	2 <sup>a</sup>	0.662	†	
		4641	4061	4844	3408	16.3	61.3	81.7	122.6	22	17	2.5	0.807		
		5583	4771	5816	4003	14.5	54.3	72.4	108.6	22	16	3	0.944	†	
		5583	4771	-	-	11.1	41.6	55.4	83.1	22	14	4	1.193		
		1377	-	-	-	22.6	84.8	113.1	169.7	22	20	1 <sup>a</sup>	0.348		
<b>28</b>	± 0.08	3277	2929	3422	2465	24.9	93.5	124.7	187.0	25	21	2 <sup>a</sup>	0.761	†	
		4090	3611	4264	3031	22.6	84.8	113.1	169.7	25	20	2.5	0.931	†	
		4902	4264	5105	3582	20.4	76.6	102.1	153.1	25	19	3	0.496	†	
		5714	5496	5961	4612	16.3	61.3	81.7	122.6	25	17	4	1.392	†	
		6338	6091	6613	5119	14.5	54.3	72.4	108.6	25	16	4.5	1.528		
		2190	2016	2291	1696	35.3	132.5	176.7	265.1	28	25	1.5 <sup>a</sup>	0.658		
<b>30</b>	± 0.08	2915	2639	3045	2219	32.6	122.1	162.9	244.3	28	24	2 <sup>a</sup>	0.861	†	
		3654	3248	3814	2726	29.9	112.2	149.6	224.4	28	23	2.5	1.056		
		4380	3843	4568	3234	27.4	102.6	136.9	205.3	28	22	3	1.243		
		2436	2480	2538	2088	38.2	143.4	191.1	286.7	30	26	2	0.927		
<b>35</b>	± 0.15	3408	3045	3553	2567	35.3	132.5	176.7	265.1	30	25	2.5	1.139		
		4090	3611	4264	3031	32.6	122.1	162.9	244.3	30	24	3	1.342	†	
		5453	4684	5685	3930	27.4	102.6	136.9	205.3	30	22	4	1.723	†	
		2335	2132	2436	1783	54.3	203.8	271.7	407.6	35	31	2 <sup>a</sup>	1.093	†	
		2915	2639	3045	2219	50.9	190.9	254.5	381.7	35	30	2.5	1.346		
<b>38</b>	± 0.15	3509	3132	3654	2639	47.6	178.3	237.8	356.7	35	29	3	1.591	†	
		4061	-	-	-	44.3	166.3	221.7	332.5	35	28	3.5	1.826		
		4670	4075	4873	3422	41.2	154.6	206.1	309.2	35	27	4	2.054		
		3234	2900	3364	2436	57.9	217.2	289.5	434.3	38	32	3	1.740		
<b>42</b>	± 0.2	4307	3785	4496	3176	50.9	190.9	254.5	381.7	38	30	4	2.253	†	
		5380	6178	5612	3887	44.3	166.3	221.7	332.5	38	28	5	2.734	†	
		1943	1798	2030	1508	81.7	306.2	408.3	612.4	42	38	2	1.325		
		2915	2639	3045	2219	73.3	274.8	366.4	549.7	42	36	3	1.938	†	
		3901	3451	4061	2900	65.4	245.1	326.9	490.3	42	34	4	2.519	†	

<sup>a</sup> Use support tube



## COPPER TUBE TO AS1432

Product Code			Standard Size	DN Size	Gauge	O.D.	Wall thickness	Min wall thickness	I.D.	Oil Flow Capacity (Litre/min) @ Flow Velocity (m/sec)				Weight lb/ft	W.P. psi	B.P. psi
Hard drawn 19.6 ft	Annealed coil 59 ft	Annealed coil 98 ft								ins	ins	ins	ins			
-	-	Z17222-02	1/8"	DN 3	22 swg	0.125	0.028	0.024	0.069	0.09	0.17	0.44	0.65	0.033	2771	13856
-	-	Z17222-03	3/16"	DN 5	22 swg	0.187	0.028	0.024	0.131	0.32	0.63	1.58	2.37	0.053	1714	8571
Z17120-03	Z17220-03	-	3/16"	DN 5	20 swg	0.187	0.91	0.030	0.115	0.24	0.49	1.22	1.84	0.067	2293	11468
Z17122-04	-	Z17222-04	1/4"	DN 6	22 swg	0.250	0.028	0.024	0.194	0.69	1.37	3.44	5.15	0.073	1241	6205
Z17120-04	Z17220-04	-	1/4"	DN 6	20 swg	0.250	0.91	0.030	0.178	0.58	1.16	2.90	4.35	0.042	1641	8205
-	-	•	1/4"	DN 6	20 swg	0.250	0.91	0.030	0.178	0.58	1.16	2.90	4.35	0.042	1641	8205
•	-	-	5/16"	DN 8	22 swg	0.312	0.028	0.024	0.256	1.20	2.40	6.01	9.01	0.042	972	4860
-	-	Z17222-05	5/16"	DN 8	22 swg	0.312	0.028	0.024	0.256	1.20	2.40	6.01	9.01	0.042	972	4860
Z17120-05	Z17220-05	-	5/16"	DN 8	20 swg	0.312	0.035	0.030	0.240	1.06	2.12	5.29	7.94	0.120	1277	6386
-	-	•	5/16"	DN 8	20 swg	0.312	0.035	0.030	0.240	1.06	2.12	5.29	7.94	0.120	1277	6386
•	-	-	3/8"	DN 10	22 swg	0.375	0.028	0.024	0.319	1.86	3.72	9.30	13.95	0.120	799	3995
-	-	Z17222-06	3/8"	DN 10	22 swg	0.375	0.028	0.024	0.319	1.86	3.72	9.30	13.95	0.120	799	3995
-	Z17220-06	-	3/8"	DN 10	20 swg	0.375	0.035	0.030	0.303	1.68	3.36	8.40	12.61	0.147	1045	5227
Z17120-06	-	-	3/8"	DN 10	20 swg	0.375	0.035	0.030	0.303	1.68	3.36	8.40	12.61	0.147	1045	5227
•	-	-	1/2"	DN 15	22 swg	0.50	0.028	0.024	0.444	3.60	7.20	17.99	26.98	0.161	589	2948
•†	Z17220-08	-	1/2"	DN 15	20 swg	0.50	0.035	0.030	0.428	3.35	6.69	16.73	25.10	0.201	767	3838
Z17120-08‡	-	-	1/2"	DN 15	20 swg	0.50	0.035	0.030	0.428	3.35	6.69	16.73	25.10	0.201	767	3838
Bendable	-	-	1/2"	DN 15	19 swg	0.50	0.040	0.035	0.419	3.21	6.43	16.06	24.10	0.221	885	4427
-	Z17220-10	-	5/8"	DN 18	20 swg	0.625	0.035	0.030	0.553	5.59	11.18	27.95	41.92	0.255	606	3030
-	•	-	5/8"	DN 18	19 swg	0.625	0.040	0.035	0.554	5.42	10.83	27.08	40.62	0.288	697	3488
•	-	-	5/8"	DN 18	18 swg	0.625	0.049	0.040	0.529	5.11	10.21	25.54	38.30	0.335	833	4167
-	Z17220-12	-	3/4"	DN 20	20 swg	0.750	0.035	0.030	0.678	8.39	16.79	41.97	62.95	0.309	500	2504
-	•	-	3/4"	DN 20	19 swg	0.750	0.040	0.035	0.669	8.18	16.36	40.90	61.36	0.349	575	2880
-	•	-	3/4"	DN 20	17 swg	0.750	1.42	0.049	0.638	7.43	14.86	37.15	55.72	0.470	806	4033
Bendable	-	-	3/4"	DN 20	17 swg	0.750	1.42	0.049	0.638	7.43	14.86	37.15	55.72	0.470	806	4033
•	-	-	1"	DN 25	20 swg	1"	0.035	0.030	0.928	15.72	31.44	78.60	117.91	0.423	371	1859
-	Z17220-16	-	1"	DN 25	20 swg	1"	0.035	0.030	0.928	15.72	31.44	78.60	117.91	0.423	371	1859
•	-	-	1"	DN 25	18 swg	1"	0.049	0.040	0.903	14.91	29.81	74.53	111.79	0.252	507	2538
-	•	-	1"	DN 25	16 swg	1"	0.065	0.055	0.871	13.86	27.72	69.30	103.95	0.732	688	3442
•	-	-	1"	DN 25	16 swg	1"	0.065	0.055	0.871	13.86	27.72	69.30	103.95	0.732	688	3442
•	-	-	1.1/4"	DN 32	20 swg	1.25	0.035	0.030	1.178	25.33	50.66	126.64	189.96	0.530	395	1447
•	-	-	1.1/4"	DN 32	18 swg	1.25	0.049	0.040	1.153	24.29	48.58	121.45	182.17	0.705	402	2013
•	-	-	1.1/4"	DN 32	16 swg	1.25	0.065	0.055	1.121	22.95	45.90	114.75	172.12	0.927	544	2722
•	-	-	1.1/2"	DN 40	20 swg	1.50	0.035	0.030	1.428	37.22	74.43	186.08	279.12	0.950	245	1226
•	-	-	1.1/2"	DN 40	18 swg	1.50	0.049	0.040	1.403	35.95	71.91	179.77	269.66	0.846	450	1668
•	-	-	1.1/2"	DN 40	16 swg	1.50	0.065	0.055	1.371	34.32	68.64	171.60	257.40	1.122	450	2251
•	-	-	2"	DN 50	20 swg	2"	0.035	0.030	1.928	67.83	135.66	339.16	508.73	0.860	183	915
•	-	-	2"	DN 50	18 swg	2"	0.049	0.040	1.903	66.12	132.25	330.62	495.94	1.142	248	1242
•	-	-	2"	DN 50	16 swg	2"	0.065	0.055	1.871	63.90	127.80	319.51	479.26	1.511	334	1672
•	-	-	2.1/2"	DN 65	20 swg	2.50	0.035	0.030	2.428	107.57	215.14	537.84	806.76	1.075	146	729
•	-	-	2.1/2"	DN 65	18 swg	2.50	0.049	0.040	2.403	105.42	210.83	527.08	790.62	1.431	197	990
•	-	-	2.1/2"	DN 65	16 swg	2.50	0.065	0.055	2.371	102.60	205.21	513.02	769.53	1.901	266	1330
•	-	-	3"	DN 80	18 swg	3"	0.049	0.040	2.903	153.83	307.66	769.14	1153.71	1.726	164	822
•	-	-	3"	DN 80	16 swg	3"	0.065	0.055	2.871	150.43	300.85	752.13	1128.20	1.039	221	1104
•	-	-	3"	DN 80	14 swg	3"	0.80	0.069	2.840	147.14	294.29	735.72	1103.59	2.842	276	1381
•	-	-	3.1/2"	DN 90	16 swg	3.50	0.065	0.055	3.371	207.37	414.74	1036.85	1555.27	2.687	188	944
•	-	-	4"	DN 100	18 swg	4"	0.049	0.043	3.903	278.01	556.03	1390.07	2085.10	2.311	128	644
•	-	-	4"	DN 100	16 swg	4"	0.065	0.590	3.871	273.43	546.87	1367.17	2050.76	3.077	174	872
•	-	-	5"	DN 125	16 swg	5"	0.065	0.590	4.871	432.92	865.85	2164.62	3246.94	3.856	139	696
•	-	-	5"	DN 125	14 swg	5"	0.80	0.590	4.840	427.35	854.69	2136.73	3205.09	4.790	173	869
•	-	-	6"	DN 150	16 swg	6"	0.065	0.590	5.871	628.90	1257.80	3144.49	4716.74	4.636	115	579
•	-	-	6"	DN 150	14 swg	6"	0.80	0.590	5.840	622.17	1244.34	3110.85	4666.27	5.758	144	722
•	-	-	6"	DN 150	12 swg	152.40	2.64	2.38	147.12	611.98	1223.96	3059.89	4589.84	11.10	1301	6504
•	-	-	8"	DN 200	12 swg	203.20	2.64	2.24	197.92	1107.57	2215.14	5537.86	8306.79	14.87	914	4570

† Annealed 6 m coil    ‡ Bendable    • Available to order

### Safe working pressures calculation

$$WP \text{ (psi)} = 2000 \times \text{Min. Wall Thickness (ins)} \times \text{Tensile Strength (psi)} / \text{O.D. (ins)}$$

The design tensile strength is taken as 5946 psi up to 122° F.

### Temperature Allowance

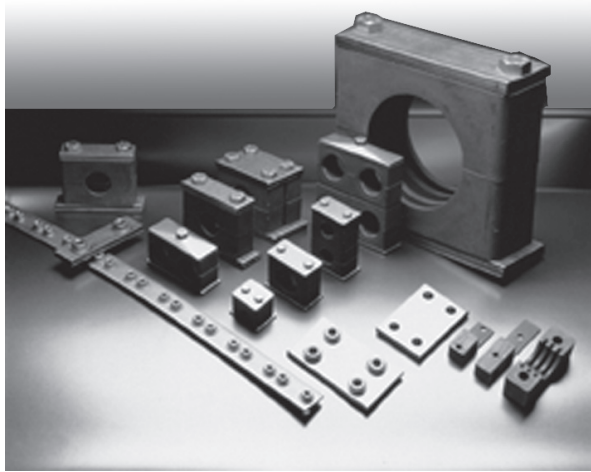
Adjust tabulated working pressures as shown at right

Temp. Range	% of WP
0 - 122° F	100
122° - 167° F	83
167° - 257° F	80
257° - 302° F	74
302° - 347° F	68
347° - 392° F	51

This page is part of a complete catalog containing technical and safety data. All data must be reviewed when selecting a product. PIRTEK reserves the right to change technical specifications without notice.



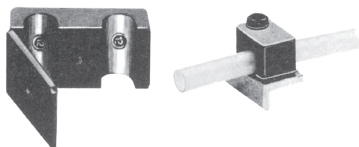
# TUBE CLAMPS



PIRTEK offers a comprehensive and diversified range designed to meet the practical mounting needs of single or multiple tubes and pipes.

Materials used in the manufacture of the supports should be chosen according to the application, from a range that includes polypropylene for temperatures up to 194°F and aluminium for operating temperatures up to 752°F.

Top and base mounting plates are available in galvanized and CR6-free plated mild steel to maximize corrosion resistance. Steel components can be supplied as AISI 316L stainless steel on request.



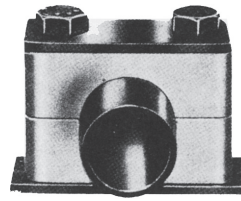
## LIGHTWEIGHT SERIES

In polypropylene (PP) for the sizes shown.

Recommended for the fixing of tubes in pneumatic plants. The clamp can be supplied in either single or double styles, and is available for differing tube diameters within the same clamp.

Low fittings costs, together with the wide range of clamping combinations, make these lightweight supports an essential element of all industrial installations.

Standard • PP from 3/8" to 1/2"  
Metric • PP from 4 to 25.4 mm  
Gas • PP from 1/8" to 1/2"



## "CC" OR STANDARD SERIES:

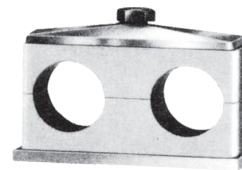
In polypropylene (PP) or aluminium (AL) in a range of sizes and mounting systems:

- weldable plate • elongated plate • double plate • multiple plate
- mounting rail • stacked with upper plate.

This series is recommended for oil-hydraulic installations up to 2900 PSI

Clamp shells with vibration dampening rubber inserts are available on request

Metric • PP from 6 to 102 mm • AL from 6 to 102 mm  
Gas • PP from 1/8" to 3.1/2" • AL from 1/8" to 1.1/2"  
Standard • PP from 1/4" to 4" • AL from 1/4" to 2"



## "CF" OR STANDARD TWIN SERIES:

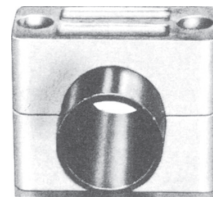
In polypropylene for pipe pairs.

It is recommended that only equally sized pipes be mounted in twin clamps. However, on request, clamps for 2 pipes of different diameter can be supplied. Again, various mounting systems are possible.

- weldable plate • elongated plate • double plate • multiple plate
- mounting rail • stacked with upper plate.

The twin series is recommended for oil-hydraulic installations up to 2900 psi.

Standard • PP from 1/4" to 1-1/2"  
Metric • PP from 6 to 42.4 mm  
Gas • PP from 1/8" to 1-1/4"



## "CP" and "CH" HEAVYWEIGHT SERIES:

In polypropylene (CP) or aluminium (CH) in a range of sizes.

Recommended for complex systems, for high pressures and considerable oil velocities. Upper plates are supplied in this series. High hexagon head bolts VACP are used in stacked mounting configurations. Clamp shells with vibration dampening rubber inserts are available on request.

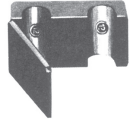
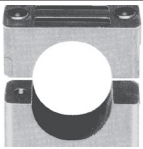








A rail mounting option applies only in Size Groups 1-4 ( jaw diameters from 12.7 mm to 63 mm)

Double width welded base plates available up to Size Group 5 (88 mm tube)

Standard • CP from 1/4" to 8" • CH from 1/4" to 8"  
Metric • CP from 6 to 324 mm • CH from 6 to 324 mm  
Gas • CP from 1/8" to 12" • CH from 1/8" to 12"

# TECHNICAL

## Material Specifications of Components

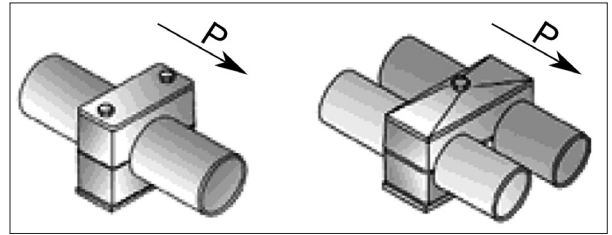
Component	Appearance	Product Code	Material	Composition	Applicable Standard	Corrosion Prevention
Clamps Light		CCA, CCB	Polypropylene	-	-	-
Clamp Jaws		CC2 - CC7 (Std.) CF1 - CF5 (Twin) CP1 - CP9 (Hvy.)	Polypropylene	Vibration dampening polypropylene shells with NBR70 rubber inserts are available in the CCx and CPx Series		
Clamp Jaws		CH2 - CH3 (Alum)	Aluminium	-	-	-
Bottom Weld Plate Standard		CC2-01 to CC7-01	Steel	Fe P11	UNI EN 10111	CF6 Free
Bottom Weld Plate Heavy		CP2-01 to CP9-01 CP2-DP to CP9-DP	Steel	Fe 430 B	UNI EN 10025	CF6 Free
Cover Plate Standard		CC2-02 to CC7-02	Steel	Fe P11	UNI EN 10111	CF6 Free
Cover Plate Heavy		CP1-02 to CP9-02 CP1-DC to CP9-DC	Steel	Fe 430 B	UNI EN 10025	CF6 Free
Mounting Rail Standard		CC - BB	Steel	Fe 360	UNI EN 10025	Galvanised Sendizimir
Mounting Rail Heavy		CP - BB	Steel	Fe P11	UNI EN 10111	CF6 Free
Mounting Nuts Standard		CC - DF CC - DF	Pressure die-cast alloy Zinc	Gp-ZN AL4 Cu1	UNI 3718	-
Mounting Nuts Heavy		CP - DF10 CP - DF12	Steel AVP	-	UNI EN 10277-3	CF6 Free
O-Rings		CC - AG CP - AG	Rubber	NBR 70	UNI ISO 3601-1	-
Locking Plates Standard		CC - PB CF - PB	Steel	Fe P11	UNI EN 10111	CF6 Free
Locking Plates Heavy		CP1 - PB to CP5 - PB	Steel	Fe 430 B	UNI EN 10025	CF6 Free
Hex. Screws		CC2-03 to CC7-03 CF1-03 to CF5-03	Steel	-	UNI 24014	-
Stacking Screws Standard		CC2-VA to CC7-VA CF1-VA to CF5-VA	Steel AVP	-	UNI EN 10277-3	CF6 Free
Stacking Screws Heavy		CP1-VA to CP5-VA	Steel AVP	-	UNI EN 10277-3	CF6 Free
Flat Washers Standard		CC - RP	Steel	-	UNI 6592	-
Bushings Standard		CC - B	Steel AVP	-	UNI EN 10277-3	CF6 Free



# TECHNICAL

## Clamp Shear Force Capability

The tabulated data applies for steel pipe St. 35.4.  
In each case, hex screws and cover plates have been used to maximize the load capability.

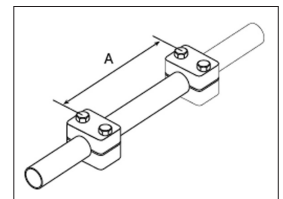


Sliding starts when the shear force 'P' is reached.

Clamp Series	Type	Jaw Material	Bolt	Tightening Torque	Max. Shear Force P in the direction of the pipe
				(Nm)	(kN)
CC2	Standard Single	Polypropylene	M6	8	1.2
CC3	Standard Single		M6	8	1.5
CC4	Standard Single		M6	8	1.7
CC5	Standard Single		M6	8	1.8
CC6	Standard Single		M6	8	2
CC7	Standard Single		M6	8	2.2
CF1	Standard Twin		Polypropylene	M6	6
CF2	Standard Twin	M8		13	2.5
CF3	Standard Twin	M8		13	2.1
CF4	Standard Twin	M8		13	2.9
CF5	Standard Twin	M8		9	2.2
CP1	Heavy Single	Polypropylene	M10	13	1.8
CP2	Heavy Single		M10	13	3
CP3	Heavy Single		M10	15	3.5
CP4	Heavy Single		M12	30	8.5
CP5	Heavy Single		M16	46	11.5
CP6	Heavy Single		M20	80	15
CP7	Heavy Single		M20	100	30
CP8	Heavy Single		M30	190	41
CP9	Heavy Single		M30	210	125
CH2	Heavy Single	Aluminium	M10	32	16
CH3	Heavy Single		M10	37	16.5

## Recommended Clamp Spacings

Tabulated data represents standard values for static loads.  
Clamps should always be applied at each side of a bend.



Clamp Series / Pipe OD (mm)	Clamp pitch A (m)
CC2 6 - 13.25	1
CC3 14 - 18	1.2
CC4 20 - 25.4	1.5
CC5 28 - 32	1.5
CC6 32 - 45	2.2
CC7 45 - 54	2.7

Clamp Series / Pipe OD (mm)	Clamp pitch A (m)
CP1 6 - 20	1.0
CP2 20 - 30	1.5
CP3 / CP4 30 - 50	2.2
CP4 / CP5 53 - 73	3
CP5 80 - 90	3.5
CP6 100 - 121	4.5
CP7 133 - 168	5
CP8 / CP9 168 - 219	6

<p>Cutting Rings</p>  <p>B3 D 31 B4</p>	<p>Tightening Nut</p>  <p>M D 30</p>	<p>Male Tapered Stud</p>  <p>GE-NPT D 31 -BSPT D 32</p>	<p>Male Tapered Stud</p>  <p>GE-Metric D 34</p>	<p>Male Parallel Stud Metal Seal</p>  <p>GE-BSPP D 33</p>	<p>Male Parallel Stud Elastomer Seal</p>  <p>GE-BSPP D 33</p>
<p>Male Parallel Stud O-Ring Seal</p>  <p>GE-UNO D 36</p>	<p>Male Parallel Stud Female Nut</p>  <p>EVGE-BSPP D 43 -Metric D 43</p>	<p>Straight Tube Coupling</p>  <p>G equal D 36 GV reducing D 37</p>	<p>Straight Equal Female Coupling</p>  <p>EDKO D 38</p>	<p>Female Stud Coupling</p>  <p>GAI-BSPP D 50</p>	<p>Male-Female Adapter</p>  <p>KOR D 45-46</p>
<p>Weld Nipple Male</p>  <p>AS D 40</p>	<p>Weld Nipple Female (Nut excluded)</p>  <p>SKA D 41</p>	<p>Reducing Bush BSPP Elast. Seal</p>  <p>RI D 42</p>	<p>Socket Head Plugs Elastomer Seal</p>  <p>VSTI Metric D 47 VSTIR BSPP D 47</p>	<p>Blanking Plug Metric</p>  <p>ROV D 49</p>	<p>Blanking Cap Metric (Nut excluded)</p>  <p>BUZ D 48</p>
<p>Bulkhead Coupling Straight</p>  <p>SV D 39</p>	<p>Bulkhead Coupling Elbow</p>  <p>WSV D 58</p>	<p>Male Stud Elbow</p>  <p>WE-NPT D 55 -BSPT D 56</p>	<p>Adjustable Female Elbow</p>  <p>EVW D 61</p>	<p>Banjo Coupling</p>  <p>DSVW BSPP D 59 Metric D 60</p>	<p>Male Elbow Coupling</p>  <p>W D 57</p>
<p>Male Stud Barrel Tee</p>  <p>LE-BSPT D 63</p>	<p>Male Stud Branch Tee</p>  <p>TE-BSPT D 62</p>	<p>Adjustable Barrel Tee</p>  <p>EVL D 65</p>	<p>Adjustable Branch Tee</p>  <p>EVT D 64</p>	<p>Equal Tee Coupling</p>  <p>T D 66</p>	<p>Equal Cross Coupling</p>  <p>K D 67</p>
<p>Gauge Coupling Male</p>  <p>MAV D 51</p>	<p>Gauge Coupling Female</p>  <p>MAVE D 51</p>	<p>Non Return Valve</p>  <p>NRV D 52</p>	<p>Lock Nut</p>  <p>GM D 54</p>	<p>Elastomeric Seal</p>  <p>EZ D 53 Viton</p>	<p>Adjustable Elbow 45°</p>  <p>EVF D 64</p>

**Standards**

PIRTEK metric compression fittings are manufactured by Cast S.p.A. to ISO 8434-1 / DIN 2353 Standards.

Two cutting rings are available for use with the fittings, both of which incorporate double cutting edges, but only one of which incorporates additional elastomeric seals to enhance sealing performance in adverse conditions (DB4 ring at right).

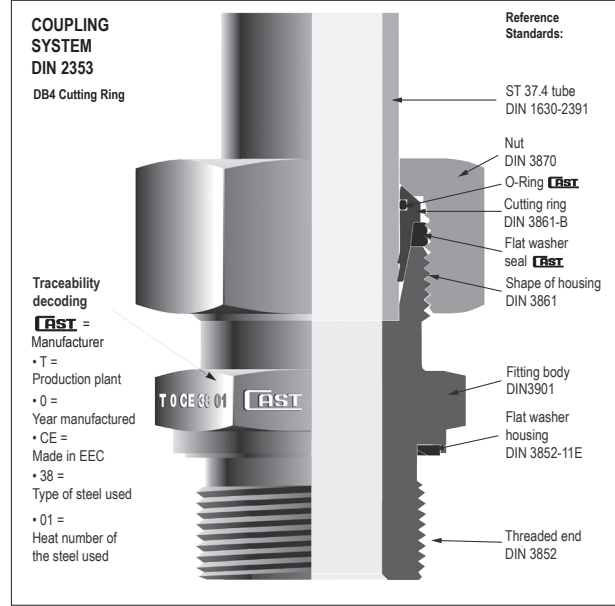
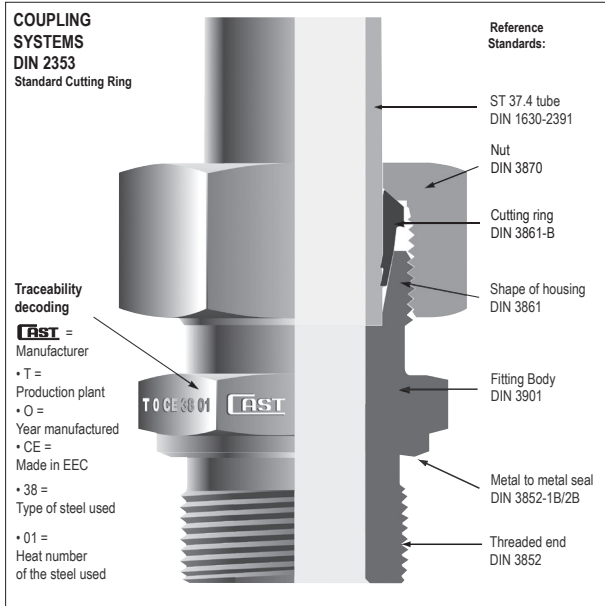


**Approvals**

All components are manufactured in a Quality Assured environment, and carry the following approvals:

DVGW Certificate No. NG-4502AU0117

Det Norske Veritas (DNV) Certificate No. P-10963



**Materials**

Carbon steel fittings are manufactured from steels with the following compositions:

Component	Material specification				Reference
Ring /sleeve	CF9SMnPb36	CF9SMnPb28	CF9SMnPb36	CF9SMnPb28	UNI 4838
	11SMnPb37	11SMnPb30	11SMnPb37	11SMnPb30	EN10087
Nut	CF9SMnPb36	CF9SMnPb28	CF9SMnPb36	CF9SMnPb28	UNI 4838
	11SMnPb37	11SMnPb30	11SMnPb37	11SMnPb30	EN10087
Straight body	CF9SMnPb36	CF9SMnPb28	CF9SMnPb36	CF9SMnPb28	UNI 4838
	11SMnPb37	11SMnPb30	11SMnPb37	11SMnPb30	EN10087
Forged body	CF9SMnPb36	CF9SMnPb28	CF9SMnPb36	CF9SMnPb28	UNI 4838
	11SMnPb37	11SMnPb30	11SMnPb37	11SMnPb30	EN10087

**Working Temperatures**

Carbon steel -4° F to +248° F as per ISO 8434

**O Rings**

All O Rings are supplied as NBR (Nitrile) with the properties:

Temp. range -31° F to +212° F

Hardness 80-90 Shore

Viton seals are recommended for higher temperatures. Please contact PIRTEK for assistance. Viton properties:

Temp. range -13° F to +392° F

Hardness 80-90 Shore

**Storage**

All fittings incorporating O Rings should be stored in accordance with the provisions of DIN 7716 to avoid problems induced by deterioration of the O Ring

**Surface Treatment**

Steel fittings are zinc plated to UNI ISO 2081 and 4520

Plating thickness 8 - 12 microns

400 hours resistance to saline fog as per UNI ISO 9227

**Anti seize compound**

An anti-seize compound with nickel base is recommended for use when tightening compression fittings.

**Support Sleeves**

Fittings being assembled on thin-walled tubes require the use of support sleeves. Consult the metric tube table on page E 7 for affected sizes

**Safety Factors**

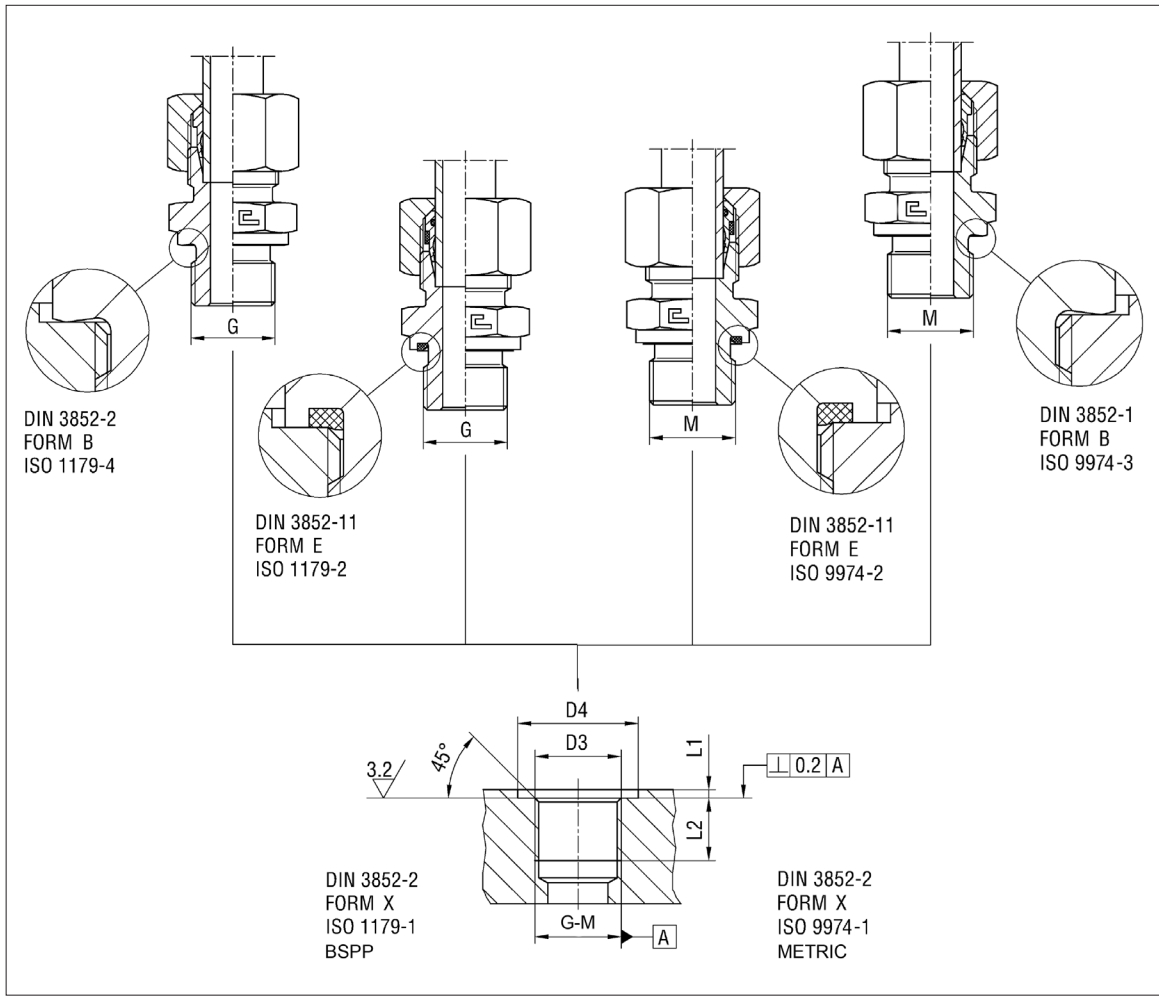
The nominal working pressures tabulated for the fittings indicate the maximum working pressures including pressure peaks. Higher working pressures should only be contemplated after consultation with PIRTEK for specific applications.

The safety factor is 4:1 in the case of static load at a temperature as per DIN 3861 (24° cone). The 4:1 safety factor applies also to parallel threaded port connections with elastomeric seal. Tapered stud fittings or parallel threaded studs with metal to metal sealing faces have only a 2.5:1 safety factor

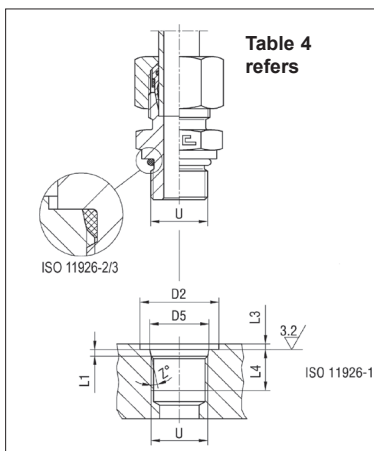
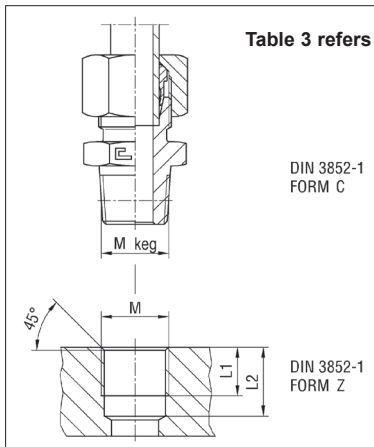
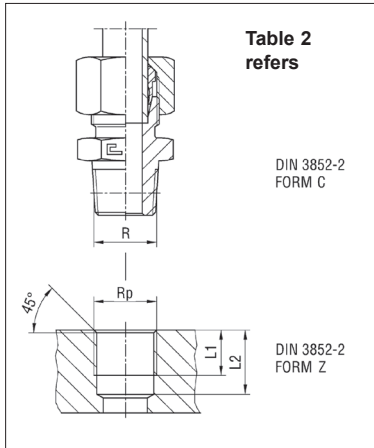
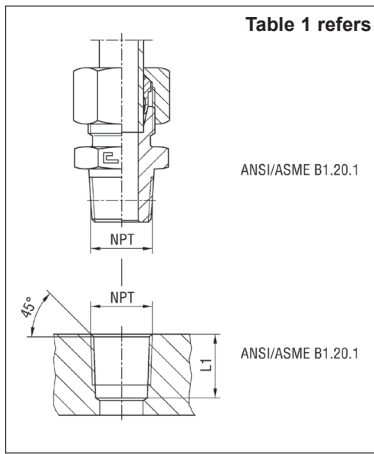
**Tightening Torques**

Refer to the tables following





Series	Ø Tube	BSPP Thread								Metric Parallel Thread							
		Dimensions						Tightening Torque ft lbs		Dimensions						Tightening Torque ft lbs	
		Thread	D3	D4 min form B/E	L1 max	L2 min	L rif	form B	form E	Thread	D3	D4 min form B/E	L1 max	L2 min	L rif	form B	form E
L	6	G 1/8	9.8	15	1	8	7.5	15	15	M10x1	10	15	1	8	7.6	15	15
	8	G 1/4	13.2	20	1.5	12	10.2	33	33	M12x1.5	12	18	1.5	12	9.7	22	22
	10	G 1/4	13.2	20	1.5	12	10.2	33	33	M14x1.5	14	20	1.5	12	9.7	33	33
	12	G 3/8	16.7	23	2	12	10.4	52	52	M16x1.5	16	23	1.5	12	10.2	44	41
	15	G 1/2	21	28	2.5	14	13.1	96	63	M18x1.5	18	25	2	12	10.9	59	52
	18	G 1/2	21	28	2.5	14	13.1	96	63	M22x1.5	22	28	2	14	12	96	89
	22	G 3/4	26.5	33	2.5	16	13.5	125	125	M26x1.5	26	33	5	16	-	133	125
	28	G 1	33.3	41	2.5	18	14.7	243	243	M33x2	33	41	2.5	18	13.8	243	243
	35	G 1.1/4	42	51	2.5	20	14.7	317	317	M42x2	42	51	2.5	20	13.8	347	317
	42	G 1.1/2	47.9	56	2.5	22	14.7	443	376	M48x2	48	56	2.5	22	15.3	443	376
S	6	G 1/4	13.2	20	1.5	12	10.2	41	41	M12x1.5	12	18	1.5	12	9.7	30	30
	8	G 1/4	13.2	20	1.5	12	10.2	41	41	M14x1.5	14	20	1.5	12	9.7	41	41
	10	G 3/8	16.7	23	2	12	10.4	59	59	M16x1.5	16	23	1.5	12	10.2	59	52
	12	G 3/8	16.7	23	2	12	10.4	63	59	M18x1.5	18	25	2	12	10.9	77	63
	14	G 1/2	21	28	2.5	14	13.1	111	81	M20x1.5	20	27	2	14	12	111	89
	16	G 1/2	21	28	2.5	14	13.1	111	81	M22x1.5	22	28	2.5	14	12	125	96
	20	G 3/4	26.5	33	2.5	16	13.5	207	125	M27x2	27	33	2.5	16	13.8	148	125
	25	G 1	33.3	41	2.5	18	14.7	243	243	M33x2	33	41	2.5	18	13.8	288	244
	30	G 1.1/4	42	51	2.5	20	14.7	376	317	M42x2	42	51	2.5	20	13.8	376	317
	38	G 1.1/2	47.9	56	2.5	22	14.7	502	376	M48x2	48	56	2.5	22	15.3	502	376



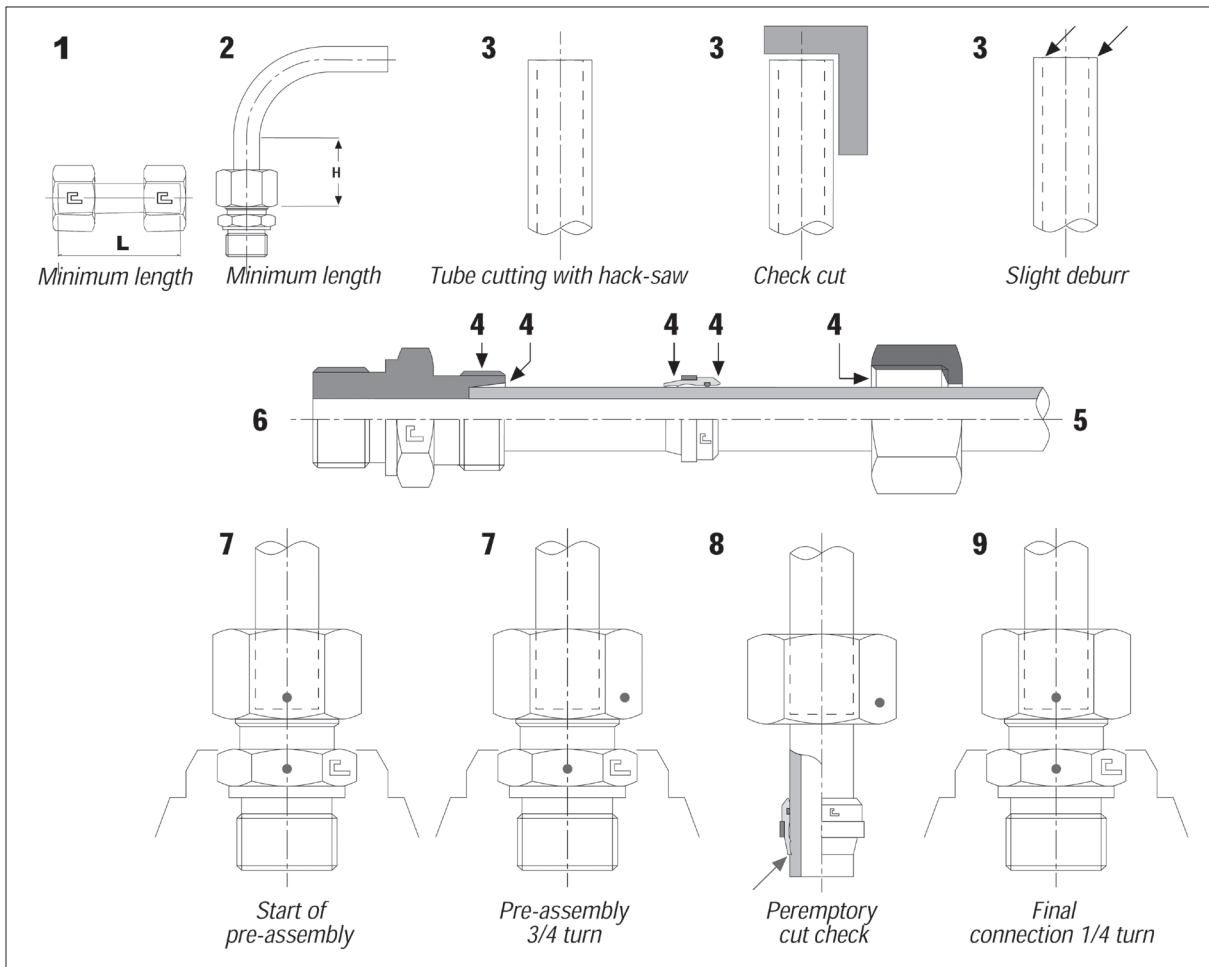
Series	Tube	Table 1 NPT Thread		Table 2 BSPT Thread		
		Dimensions mm		Dimensions mm		
		NPT	L1	R	L1	L2
L	6	1/8-18 NPT	11.6	R 1/8	5.5	9.5
	8	1/4-18 NPT	16.4	R 1/4	8.5	13.5
	10	1/4-18 NPT	16.4	R 1/4	8.5	13.5
	12	3/8-18 NPT	17.4	R 3/8	8.5	13.5
	15	1/2-14 NPT	22.6	R 1/2	10.5	16.5
	18	1/2-14 NPT	22.6	R 1/2	10.5	16.5
	22	3/4-14 NPT	23.1	R 3/4	13	19
	28	1-11.5 NPT	27.8	R 1	-	-
	35	1.1/4-11.5 NPT	28.3	R 1.1/4	-	-
	42	1.1/2-11.5 NPT	28.3	R 1.1/2	-	-
S	6	1/4-18 NPT	16.4	R 1/4	8.5	13.5
	8	1/4-18 NPT	16.4	R 1/4	8.5	13.5
	10	3/8-18 NPT	17.4	R 3/8	8.5	13.5
	12	3/8-18 NPT	17.4	R 3/8	8.5	13.5
	14	1/2-14 NPT	22.6	R 1/2	10.5	16.5
	16	1/2-14 NPT	22.6	R 1/2	10.5	16.5
	20	3/4-14 NPT	23.1	R 3/4	13	19
	25	1-11.5 NPT	27.8	R 1	-	-
	30	1.1/4-11.5 NPT	28.3	R 1.1/4	-	-
	38	1.1/2-11.5 NPT	28.3	R 1.1/2	-	-

Series	Tube	Table 3 Metric Taper		
		Dimensions mm		
		Metric Taper †	L1	L2
L	6	M10x1 keg	5.5	10
	8	M12x1.5 keg	8.5	13.5
	10	M14x1.5 keg	8.5	13.5
	12	M16x1.5 keg	8.5	13.5
	15	M18x1.5 keg	8.5	13.5
	18	M22x1.5 keg	10.5	15.5
S	6	M12x1.5 keg	8.5	13.5
	8	M14x1.5 keg	8.5	13.5
	10	M16x1.5 keg	8.5	13.5
	12	M18x1.5 keg	8.5	13.5
	14	M20x1.5 keg	10.5	15.5
	16	M22x1.5 keg	10.5	15.5

† 'keg' denotes the German 'kegelig' meaning 'tapered'

Series	Tube	Table 4 UNF/UN-2A Thread								
		U	Dimensions							Torque ft lbs
			D2 min	D5	L1	L3 max	L4 min	L rif	Z	
L	6	7/16-20 UNF-2A	21	12.45	2.4	1.6	11.5	9.9	12	15
	8	1/2-20 UNF-2A	23	14.05	2.4	1.6	11.5	9.9	12	18
	10	1/2-20 UNF-2A	23	14.05	2.4	1.6	11.5	9.9	12	18
	12	9/16-18 UNF-2A	25	15.7	2.5	1.6	12.7	11.1	12	22
	15	3/4-16 UNF-2A	30	20.65	2.5	2.4	14.3	12.5	15	33
	18	3/4-16 UNF-2A	30	20.65	2.5	2.4	14.3	12.5	15	33
	18	7/8-14 UNF-2A	34	24	2.5	2.4	16.7	14.5	15	41
	22	1.1/16-12 UNF-2A	41	29.2	3.3	2.4	19	16.8	15	63
	28	1.5/16-12 UNF-2A	49	35.55	3.3	3.2	19	16.8	15	96
	35	1.5/8-12 UNF-2A	58	43.55	3.3	3.2	19	16.8	15	126
S	42	1.7/8-12 UNF-2A	65	49.9	3.3	3.2	19	16.8	15	133
	6	1/2-20 UNF-2A	23	14.05	2.4	1.6	11.5	9.9	12	18
	8	1/2-20 UNF-2A	23	14.05	2.4	1.6	11.5	9.9	12	18
	10	9/16-18 UNF-2A	25	15.7	2.5	1.6	12.7	11.1	12	26
	12	9/16-18 UNF-2A	25	15.7	2.5	1.6	12.7	11.1	12	26
	14	3/4-16 UNF-2A	30	20.65	2.5	2.4	14.3	12.5	15	44
	16	3/4-16 UNF-2A	30	20.65	2.5	2.4	14.3	12.5	15	44
	16	7/8-14 UNF-2A	34	24	2.5	2.4	16.7	14.5	15	63
	20	1.1/16-12 UNF-2A	41	29.2	3.3	2.4	19	16.8	15	111
	25	1.5/16-12 UNF-2A	49	35.55	3.3	3.2	19	16.8	15	170
30	1.5/8-12 UNF-2A	58	43.55	3.3	3.2	19	16.8	15	184	
38	1.7/8-12 UNF-2A	65	49.9	3.3	3.2	19	16.8	15	236	

# ASSEMBLY INSTRUCTIONS

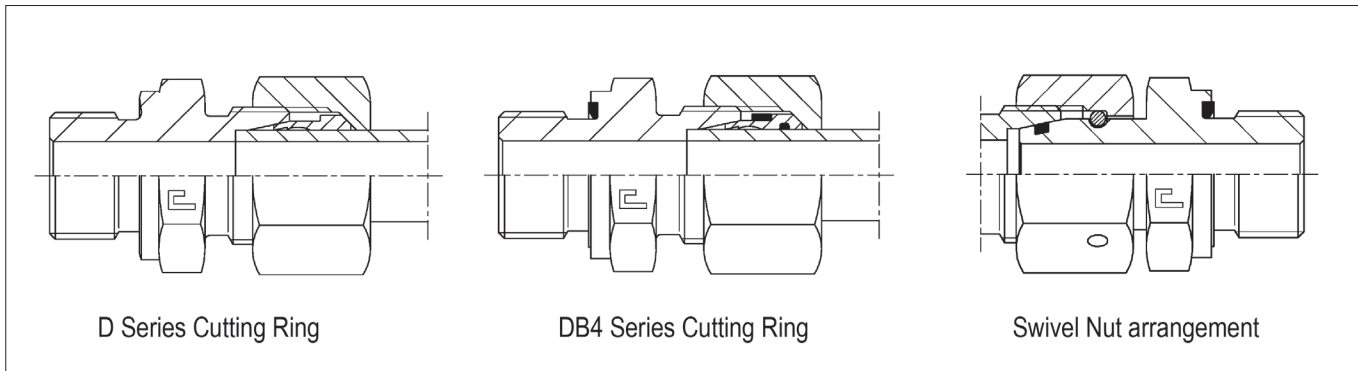


Ø Tube	LL				L								S											
	4	5	6	8	6	8	10	12	15	18	22	28	35	42	6	8	10	12	14	16	20	25	30	38
H min	24	25	25	26	31	31	33	33	36	38	42	42	48	48	35	35	37	37	43	43	50	54	58	65
L min	30	32	32	33	39	39	42	42	45	48	53	53	60	60	44	44	47	47	54	54	63	68	73	82

- Consult the table above for minimum length requirements.
- Cut the tube square with a hacksaw (*not a rolling wheel cutter*).
- Check that the cut is square.
- Deburr the ends internally and externally.
- Slide the cutting ring and nut on the tube as depicted above.
- Oil all components.
- For wall thicknesses thicker than 2.5mm use a setting tool. Use a new adapter in wall thicknesses less than 2.5mm. Must use setting tool when using stainless steel components
- Insert the oiled tube end into the assembly piece.
- Hold the tube end firmly against the internal ledge.
- Hand tighten the nut and ring onto the assembly piece.
- Use a spanner to engage the cutting ring onto the tube (about 1/2 turn). This takes up the clearances and prevents tube rotation.
- Place reference marks on the opposing nut and assembly piece - see Start point #7 illustrated.
- Use the reference marks to tighten a further 3/4 turn.
- Disassemble and check that the cutting ring is buried to at least 80% of its leading edge - Check point #8 illustrated.
- Repeat pre assembly if 80% embedment is not achieved.
- Install the pre-assembled tube into its final location and tighten a further 1/4 turn - Final installation point #9.
- The procedure is the same for all sizes of tube.

Cast S.p.A. have developed indicative tightening torques for the pre-assembly of cutting ring fittings based on practical tests in the laboratory, and they are detailed overleaf. If the tables are to be used for shop pre-assembly, the results should be checked as in Step 14 above before final installation and tightening.

# Tightening Torques



D Series Cutting Ring

DB4 Series Cutting Ring

Swivel Nut arrangement

Series	Ø	Metric Thread	Cutting Ring Pre-assembly <sup>a</sup>		Swivel Nut Fittings
			Tightening Torque ft lbs		Torque ft lbs
			Carbon Steel	Stainless Steel †	Carbon Steel
L	6	M12x1.5	15	22	15
	8	M14x1.5	18	41	26
	10	M16x1.5	22	63	30
	12	M18x1.5	30	89	33
	15	M22x1.5	44	96	41
	18	M26x1.5	66	162	81
	22	M30x2	125	236	96
	28	M36x2	155	369	148
	35	M45x2	266	715	148
	42	M52x2	361	819	177
S	6	M14x1.5	18	33	30
	8	M16x1.5	22	41	33
	10	M18x1.5	30	66	37
	12	M20x1.5	37	77	44
	14	M22x1.5	52	111	59
	16	M24x1.5	59	133	74
	20	M30x2	103	251	118
	25	M36x2	170	391	177
	30	M45x2	221	450	192
	38	M52x2	317	627	258

† Only available to special order

<sup>a</sup> Refers to pre-assembly tightening only. Please consult the assembly instructions on the previous page for clarification

# Nomenclature

The metric compression part numbering adopted by PIRTEK is a derivation of a commonly adopted International system. Its basis is to be found within the German language, and is elaborated below to allow the interested reader to perhaps better understand the logic behind the Product Codes. Codes are aligned where possible with those used by PIRTEK in Europe

Product Code	German derivation	English equivalent
<b>AS</b>	Anschweissen	Weld on
<b>BUZ</b>	Not derived from German	Sometimes called VKA (German for Verschlusskegel-Adapter or stopper cone)
<b>B3</b>	Doppel	Double (also called DS for Doppel-Schneid or double cutting ring)
<b>B4</b>	No direct derivation	Used by Cast® to differentiate the elastomeric seal form of cutting ring
<b>DSVW</b>	Drehschenk-Verschraubung-Winkel	Turn swivel screw together angle (Banjo coupling)
<b>ED</b>	Elastomerisch-Dichtung	Elastomeric seal (soft seal)
<b>EZ</b>	E=elastomerisch (Z suggests Z series bonded seals)	Elastomeric bonded seals for banjo type metric fittings DSVW
<b>WD</b>	Weich-Dichtung	Soft Seal
<b>EDKO</b>	Elastomerisch-Dichtung-Konus	Straight female joiner with elastomeric seals (konus = cone)
<b>EDKOR</b>	Elastomerisch-Dichtung-Konus-Reduzierung	Straight female reducing joiner with elastomeric seals (konus = cone)
<b>EVGE</b>	Einstellbar-Gerade-Einschraubung	Adjustable straight thread (Male stud coupling)
<b>EVGER</b>	Einstellbar-Gerade-Einschraubung-Reduzierung	Adjustable straight reducing thread (Male stud reducing coupling)
<b>EVL</b>	Einstellbar-Verschraubung 'L' pattern	Adjustable screw Tee with L configuration (adjustable barrel tee)
<b>EVT</b>	Einstellbar-Verschraubung 'T' pattern	Adjustable screw Tee with T configuration (adjustable branch tee)
<b>EVW</b>	Einstellbar-Verschraubung-Winkel	Adjustable screw elbow (adjustable elbow)
<b>G</b>	Gerade	Straight (Male Joiner)
<b>GAI</b>	Gerade-Adapter-Innengewinde	Straight adapter with internal thread (female stud coupling)
<b>GE</b>	Gerade-Einschrauben	Straight screw in (male stud coupling)
<b>GE-BSPP ED</b>	ED suffix (elastomerisch Dichtung)	BSPP thread uses an elastomeric soft seal
<b>GE-BSPP Form B</b>	Form B suffix	BSPP thread uses a Form B type seal (see page E25)
<b>GM</b>	Gegen-Mutter	Against Nut (lock nut)
<b>GSV</b>	Gerade-Schott-Verschraubung	Straight bulkhead screw (straight bulkhead coupling)
<b>GV</b>	Gerade-Verschraubung	Straight threaded connection (reserved for reducing G series within PIRTEK)
<b>KOR</b>	Konus-Reduzieranschlusse	Straight conical reducing connector (male female)
<b>LE-BSPT</b>	L configuration Einschraub-Verschraubung	L configuraion screw in BSPT threaded Tee (male stud barrel tee)
<b>M</b>	Mutter	Nut
<b>MAV</b>	Manometer-Anschlussverschraubung	Gauge connection screw thread (gauge coupling male thread)
<b>MAVE</b>	Manometer-Anschlussverschraubung-Einstellbar	Gauge connection adjustable screw thread (gauge coupling female thread)
<b>NRV</b>	Ruckschlag-Ventile	Non return valve
<b>RI</b>	Reduzierung-Innengewinde	Reducing Bush
<b>ROV</b>	Rohr-Verschluss	Tube blanking plug
<b>SKA</b>	Schweisskegel-Adapter	Weld taper adapter (weld nipple)
<b>T</b>	Tee	Equal Tee Coupling
<b>TE-BSPT</b>	T configuration Einschraub-Verschraubung	T configuraion screw in BSPT threaded Tee (male stud branch tee)
<b>VSTI</b>	Verschlussschrauben	Socket Head Port Plug (metric thread)
<b>VSTIR</b>	R suffix	Rohr (BSPP pipe thread)
<b>W</b>	Winkel	Elbow
<b>WE-BSPT</b>	Winkel-Einschrauben	Screw in elbow with BSPT thread
<b>WSV</b>	Winkel-Schott-Verschraubung	Elbow bulkhead threaded connection
<b>'k' or 'keg' Suffix</b>	kegelig	tapered
<b>'R' Suffix</b>	Rohr	BSPT pipe thread (the meaning changes in some contexts to reducing)
<b>'ED' Suffix</b>	Elastomerisch-Dichtung	Elastomeric seal (soft seal)
<b>'N' or 'NPT' Suffix</b>	NPT	NPT thread
<b>'G' Suffix</b>	Gas	BSPP thread

- Metric tube sizes are expressed in millimetres using 2 digits in association with the tube weight eg 12L or 14S
- Metric threads are expressed in the form M27x2 indicating thread diameter and pitch in millimetres
- Standard thread sizes are expressed as fractions of an inch (eg R1/4 or 1/2NPT) to avoid the use of Dash Sizes that may otherwise resemble metric tube sizes
- Tube weights are denoted as LL, L and S  
LL = super light    L = light (from the German 'leicht')    S = heavy (from the German 'schwer')