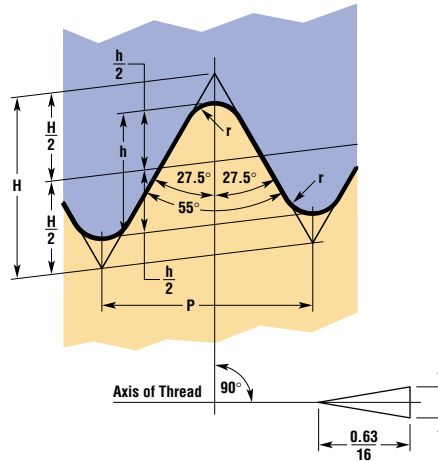


Technical Reference – Thread Specifications

R and PT Series (External and Internal Taper)

$P = 25.4/n$
 $H = 0.960237 P$
 $h = 0.640327 P$
 $r = 0.137278 P$



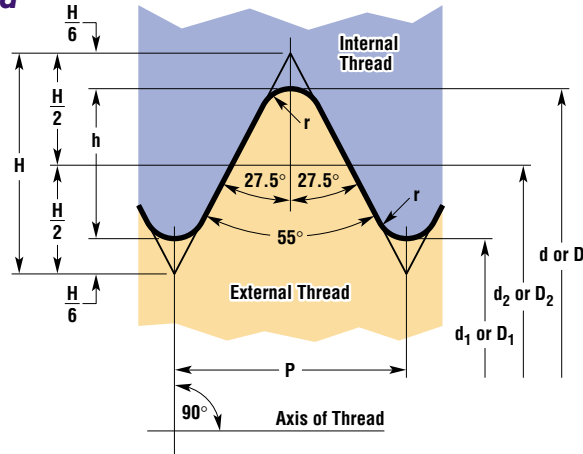
All dimensions in mm.

# Threads		Tolerance													
Thread	Per Inch	Pitch													
Size	n	P	h	r	d or D	d ₂ or D ₂	d ₁ or D ₁	a	$\pm b$	$\pm c$	D, D ₂ , D ₁	l	l'	l''	t
R1/16	28	0.9071	0.681	0.12	7.723	7.142	6.361	3.97	0.91	1.13	0.071	2.5	6.2	7.4	4.4
R 1/8	28	0.9071	0.681	0.12	9.728	9.147	8.566	3.97	0.91	1.13	0.071	2.5	6.2	7.4	4.4
R 1/4	19	1.3368	0.856	0.18	13.157	12.301	11.245	6.01	1.34	1.67	0.104	3.7	9.4	11.0	6.7
R 3/8	19	1.3368	0.856	0.18	16.662	15.806	14.950	6.35	1.34	1.67	0.104	3.7	9.7	11.4	7.0
R 1/2	14	1.8143	1.162	0.25	20.955	19.793	18.631	8.16	1.61	2.27	0.142	5.0	12.7	15.0	9.1
R 3/4	14	1.8143	1.162	0.25	26.441	25.279	24.117	9.53	1.81	2.27	0.142	5.0	14.1	16.3	10.2
R 1	11	2.3091	1.479	0.32	33.249	31.770	30.291	10.39	2.31	2.89	0.181	6.5	16.2	19.1	11.6
R1-1/4	11	2.3091	1.479	0.32	41.910	40.431	38.952	12.70	2.31	2.89	1.181	6.4	16.5	21.4	13.4
R1-1/2	11	2.3091	1.479	0.32	47.803	46.324	44.845	12.70	2.31	2.89	0.181	6.4	16.5	21.4	13.4
R 2	11	2.3091	1.479	0.32	59.614	58.135	56.656	15.88	2.31	2.89	0.181	7.5	22.8	25.7	16.9
R2-1/4	11	2.3091	1.479	0.32	75.184	73.705	72.226	17.46	3.46	3.46	0.216	9.2	26.7	30.1	18.6
R 3	11	2.3091	1.479	0.32	87.884	86.405	84.926	20.64	3.46	3.46	0.216	9.2	29.8	33.3	21.1
R 4	11	2.3091	1.479	0.32	113.030	111.551	110.072	25.40	3.46	3.46	0.216	10.4	35.8	39.3	25.9
R 5	11	2.3091	1.479	0.32	138.430	136.951	135.472	28.58	3.46	3.46	0.216	11.5	40.1	43.5	29.3
R 6	11	2.3091	1.479	0.32	163.830	162.351	160.872	28.58	3.46	3.46	0.216	11.5	40.1	43.5	29.3
PT1/8	28	0.9071	0.501	0.12	9.728	9.147	8.566	5.97	0.91	1.13	0.071	2.5	6.2	7.4	4.4
PT1/4	19	1.3368	0.856	0.18	13.157	12.301	11.445	6.01	1.34	1.67	0.104	3.7	9.4	11.0	6.7
PT3/4	19	1.3368	0.856	0.18	16.662	15.806	14.950	6.35	1.34	1.67	0.104	3.7	9.7	11.4	7.0
PT1/2	14	1.8143	1.162	0.25	20.955	19.793	18.631	8.10	1.81	2.27	0.142	5.0	12.7	15.0	9.1
PT3/4	14	1.8143	1.162	0.25	26.441	25.279	24.117	9.53	1.81	2.27	0.142	5.0	14.1	16.3	10.2
PT 1	11	2.3091	1.479	0.32	33.249	31.770	30.291	10.39	2.31	2.89	0.181	6.4	16.2	19.1	11.3
PT1-1/4	11	2.3091	1.479	0.32	41.910	40.431	30.952	12.70	2.31	2.89	0.181	6.4	10.5	21.4	13.4
PT1-1/2	11	2.3091	1.479	0.32	47.803	46.324	44.845	12.70	2.31	2.89	0.181	6.4	10.5	21.4	13.4
PT 2	11	2.3091	1.479	0.32	59.814	58.135	56.656	15.00	2.31	2.09	0.181	7.5	22.8	25.7	16.9
PT2-1/2	11	2.3091	1.479	0.32	75.186	73.705	72.226	17.46	3.46	3.40	0.216	9.2	26.7	30.1	18.5
PT 3	11	2.3091	1.479	0.32	87.884	96.405	84.926	20.61	3.46	3.46	0.216	9.2	29.0	33.3	21.1
PT3-1/2	11	2.3091	1.479	0.32	100.330	98.051	97.372	22.23	3.46	3.46	0.216	9.2	31.4	34.9	22.4
PT 4	11	2.3091	1.479	0.32	113.030	111.551	110.072	25.40	3.46	3.46	0.216	10.4	35.0	39.3	25.9
PT 5	11	2.3091	1.479	0.32	138.490	136.951	135.472	28.58	3.46	3.46	0.216	11.5	40.1	43.5	29.3
PT 6	11	2.3091	1.479	0.32	163.830	162.351	160.872	28.58	3.46	3.46	0.216	11.5	40.1	43.5	29.3
PT 7	11	2.3091	1.479	0.32	109.230	107.751	106.272	34.91	5.00	5.08	0.318	14.0	40.9	54.0	35.1
PT 8	11	2.3091	1.479	0.32	214.630	213.151	211.672	38.10	5.00	5.08	0.318	14.0	52.1	57.2	37.6
PT 9	11	2.3091	1.479	0.32	240.030	230.551	237.072	38.10	6.08	5.08	0.318	14.0	52.1	57.2	37.6
PT10	11	2.3091	1.479	0.32	265.430	261.951	262.472	41.28	5.08	5.08	0.318	14.0	55.3	60.4	40.2
PT12	11	2.3091	1.479	0.32	316.210	314.751	313.272	41.28	6.36	6.36	0.397	17.5	68.3	65.1	41.9

Technical Reference – Thread Specifications

■ G Series (Parallel Pipe) Thread

$$\begin{aligned}
 P &= 25.4/n \\
 H &= 0.960491 P \\
 h &= 0.640327 P \\
 r &= 0.137329 P \\
 d_2 &= d - h \\
 d_1 &= d - 2h \\
 D_2 &= d_2 \\
 D_1 &= d
 \end{aligned}$$



All dimensions in mm.

Nominal Thread Size	Thread Per Inch n	Pitch P	h	r	d or D	d ₂ or D ₂	d ₁ or D ₁
G 1/16	28	0.9071	0.581	0.12	7.723	7.142	6.561
G 1/8	28	0.9071	0.581	0.12	9.728	9.147	8.386
G 1/4	19	1.3368	0.656	0.18	13.157	12.301	11.445
G 3/8	19	1.3368	0.856	0.18	15.862	15.806	14.950
G 1/2	14	1.8143	1.162	0.25	20.955	19.793	18.531
G 5/8	14	1.8143	1.162	0.25	22.911	21.749	20.587
G 3/4	14	1.8143	1.162	0.25	26.441	25.279	24.117
G 7/8	14	1.8143	1.162	0.25	30.201	29.039	27.877
G 1	11	2.3091	1.479	0.32	33.249	31.770	30.291
G 1-1/8	11	2.3091	1.479	0.32	37.897	36.418	34.939
G 1-1/4	11	2.3091	1.479	0.32	41.910	40.431	36.962
G 1-1/2	11	2.3091	1.479	0.32	47.803	46.324	44.845
G 1-3/4	11	2.3091	1.479	0.32	53.746	52.267	50.788
G 2	11	2.3091	1.479	0.32	59.614	58.135	56.556
G 2-1/4	11	2.3091	1.479	0.32	65.710	64.231	62.252
G 2-1/2	11	2.3091	1.479	0.32	75.184	73.705	72.226
G 2-3/4	11	2.3091	1.479	0.32	81.534	80.055	78.576
G 3	11	2.3091	1.479	0.32	87.884	86.405	84.926
G 3-1/2	11	2.3091	1.479	0.32	100.330	98.851	97.372
G 4	11	2.3091	1.479	0.32	113.030	111.551	110.072
G 4-1/2	11	2.3091	1.479	0.32	125.730	124.251	122.772
G 5	11	2.3091	1.479	0.32	138.430	135.951	135.472
G 5-1/2	11	2.3091	1.479	0.32	151.30	149.651	148.172
G 6	11	2.3091	1.479	0.32	163.830	162.351	160.872

■ PF Series (Parallel Pipe) Thread

$$P = 25.4/n$$

$$H = 0.960491 P$$

$$h = 0.640327 P$$

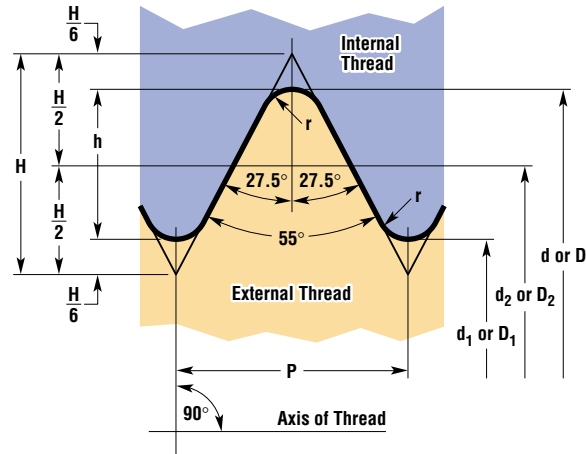
$$r = 0.137329 P$$

$$d_2 = d - h$$

$$d_1 = d - 2h$$

$$D_2 = d_2$$

$$D_1 = d$$



All dimensions in mm.

Nominal Thread Size	Thread Per Inch n	Pitch P	h	r	d or D	d ₂ or D ₂	d ₁ or D ₁
PF 1/8	28	0.9071	0.581	0.12	9.728	9.147	8.366
PF 1/4	19	1.3368	0.856	0.18	13.157	12.301	11.445
PF 1/3	19	1.3368	0.856	0.18	16.662	15.806	14.950
PF 1/2	14	1.8143	1.162	0.25	20.955	19.793	18.631
PF 5/8	14	1.8143	1.162	0.25	22.911	21.749	20.587
PF 3/4	14	1.8143	1.162	0.25	26.441	25.279	24.117
PF 7/8	14	1.8143	1.162	0.25	30.201	29.039	27.877
PF 1	11	2.3091	1.479	0.32	33.349	31.770	30.291
PF 1-1/8	11	2.3091	1.479	0.32	37.897	36.418	34.939
PF 1-1/4	11	2.3091	1.479	0.32	41.910	40.431	38.952
PF 1-1/2	11	2.3091	1.479	0.32	47.803	46.324	44.345
PF 1-3/4	11	2.3091	1.479	0.32	53.746	53.267	50.788
PF 2	11	2.3091	1.479	0.32	59.614	58.135	56.656
PF 2-1/4	11	2.3091	1.479	0.32	65.710	64.231	62.752
PF 2-1/2	11	2.3091	1.479	0.32	75.184	73.705	72.226
PF 2-3/4	11	2.3091	1.479	0.32	81.534	80.058	72.576
PF 3	11	2.3091	1.479	0.32	87.884	86.405	84.926
PF 3-1/2	11	2.3091	1.479	0.32	100.330	98.851	97.372
PF 4	11	2.3091	1.479	0.32	113.030	111.551	110.072
PF 4-1/2	11	2.3091	1.479	0.32	125.730	124.251	122.772
PF 5	11	2.3091	1.479	0.32	138.430	136.951	135.472
PF 5-1/2	11	2.3091	1.479	0.32	151.130	149.651	148.172
PF 6	11	2.3091	1.479	0.32	163.830	162.351	160.872
PF 7	11	2.3091	1.479	0.32	109.230	187.751	186.272
PF 8	11	2.3091	1.479	0.32	214.630	213.151	211.672
PF 9	11	2.3091	1.479	0.32	240.030	238.551	237.072
PF 10	11	2.3091	1.479	0.32	265.430	263.951	262.472
PF 12	11	2.3091	1.479	0.32	316.230	314.751	313.272



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Thread Specs-3

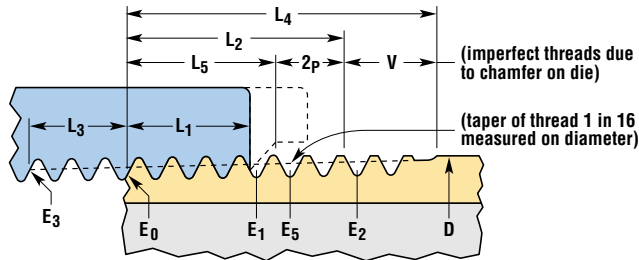
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engineering

Technical Reference – Thread Specifications

NPT (Taper)



For all dimensions see corresponding reference letters in table. Angle between sides of thread is 60 degrees. Taper of thread, on diameter, is 3/4 inch per foot. Angle of taper with centerline is 1 47'. The basic maximum thread height, h , of the truncated thread is 0.8 x pitch of thread. The crest and root are truncated a minimum of 0.033 x pitch for all pitches.

Nom. Pipe Size	Outside Dia.		Pitch of Thread, ρ	Pitch Dia. at Begin. of Ext. Thread, E_3	Handtight Engagement		Effective Thread, Ext.		Wrench Length for Internal Thread		Varnish Overall Thread, Length (3-47) Ext. Thread, V		Nominal Perfect Ext. Threads ³		Basic Height of Thread, h	Basic Minor Dia. at End of Pipe, ⁵ K_0
	Dia. D	Threads per Inch, n			Length, ² L_1 In.	Dia., ³ E_1	Length, ⁴ L_2 In.	Dia. E_2	Length, ⁷ L_3	Dia., E_3	Length, L_4	Length, L_5	Dia. E_5			
														Ext. Thread, E_0		
1/16	0.3125	27	0.03704	0.27118	0.160	0.28118	0.2611	0.28750	0.1111	0.26424	0.1285	0.3896	0.1870	0.28287	0.02963	0.2416
1/8	0.405	27	0.03704	0.36351	0.1615	0.37360	0.2639	0.38000	0.1111	0.35656	0.1285	0.3924	0.1898	0.37537	0.02963	0.3339
1/4	0.540	18	0.05556	0.47739	0.2278	0.49163	0.4018	0.50250	0.1667	0.46697	0.1928	0.5946	0.2907	0.49556	0.04444	0.4329
3/8	0.675	18	0.05556	0.61201	0.240	0.62701	0.4078	0.63750	0.1667	0.60160	0.1928	0.6006	0.2967	0.63056	0.04444	0.5676
1/2	0.840	14	0.07143	0.75843	0.320	0.77843	0.5337	0.79179	0.2143	0.74504	0.2478	0.7815	0.3909	0.78286	0.05714	0.7013
3/4	1.050	14	0.07143	0.96768	0.339	0.98887	0.5457	1.00179	0.2143	0.95429	0.2478	0.7935	0.4029	0.99286	0.05714	0.9105
1	1.315	11-1/2	0.08696	1.21363	0.400	1.23863	0.6828	1.25630	0.2609	1.19733	0.3017	0.9845	0.5089	1.24543	0.06957	1.1441
1-1/4	1.660	11-1/2	0.08696	1.55713	0.420	1.58338	0.7068	1.60130	0.2609	1.54083	0.3017	1.0085	0.5329	1.59043	0.06957	1.4876
1-1/2	1.900	11-1/2	0.08696	1.79609	0.420	1.82234	0.7235	1.84130	0.2609	1.77978	0.3017	1.0252	0.5496	1.83043	0.06957	1.7265
2	2.375	11-1/2	0.08696	2.26902	0.436	2.29627	0.7565	2.31630	0.2609	2.25272	0.3017	1.0582	0.5826	2.30543	0.06957	2.1995
2-1/2	2.875	8	0.12500	2.71953	0.682	2.76216	1.1375	2.79062	0.2500 ⁸	2.70391	0.4337	1.5712	0.8875	2.77500	0.100000	2.6195
3	3.500	8	0.12500	3.34062	0.766	3.38850	1.2000	3.41562	0.2500 ⁸	3.32500	0.4337	1.6337	0.9500	3.40000	0.100000	3.2406
3-1/2	4.000	8	0.12500	3.83750	0.821	3.88881	1.2500	3.91562	0.2500	3.82188	0.4337	1.6837	1.0000	3.90000	0.100000	3.7375
4	4.500	8	0.12500	4.33438	0.844	4.38712	1.3000	4.41562	0.2500	4.31875	0.4337	1.7337	1.0500	4.40000	0.100000	4.2344
5	5.563	8	0.12500	5.39073	0.937	5.44929	1.4063	5.47862	0.2500	5.37511	0.4337	1.8400	1.1563	5.46300	0.100000	5.2907
6	6.625	8	0.12500	6.44609	0.958	6.50597	1.5125	6.54062	0.2500	6.43047	0.4337	1.9462	1.2625	6.52500	0.100000	6.3461
8	8.625	8	0.12500	8.43359	1.063	8.50003	1.7125	8.54062	0.2500	8.41797	0.4337	2.1462	1.4625	8.52500	0.100000	8.3336
10	10.750	8	0.12500	10.54531	1.210	10.62094	1.9250	10.66562	0.2500	10.52969	0.4337	2.3587	1.6750	10.65000	0.100000	10.4453
12	12.750	8	0.12500	12.53281	1.360	12.61781	2.1250	12.66562	0.2500	12.51719	0.4337	2.5587	1.8750	12.65000	0.100000	12.4328
140D	14.000	8	0.12500	13.77500	1.562	13.87262	2.2500	13.91562	0.2500	13.75938	0.4337	2.6837	2.0000	13.90000	0.100000	13.6750
160D	16.000	8	0.12500	15.76250	1.812	15.87575	2.4500	15.91562	0.2500	15.74688	0.4337	2.8837	2.2000	15.90000	0.100000	15.6625
180D	18.000	8	0.12500	17.75000	2.000	17.87500	2.6500	17.91562	0.2500	17.73438	0.4337	3.0837	2.4000	17.90000	0.100000	17.6500
200D	20.000	8	0.12500	19.73750	2.125	19.87031	2.8500	19.91562	0.2500	19.72188	0.4337	3.2837	2.6000	19.90000	0.100000	19.6375
240D	24.000	8	0.12500	23.71250	2.375	23.86094	3.2500	23.91562	0.2500	23.69688	0.4337	3.6837	3.0000	23.90000	0.100000	23.6125

All dimensions in inches.

■ NPT (Straight)

All dimensions in inches.

Nominal Pipe Size	Threads per Inch	Allowance	External Thread				Internal Thread			
			Major Diameter		Pitch Diameter		Minor Diameter		Pitch Diameter	
			Max. ²	Min.	Max.	Min.	Min. ²	Max.	Min. ¹	Max.
Free-fitting Mechanical Joints for Fixtures — NPSM										
1/8	27	0.0011	0.397	0.390	0.3725	0.3689	0.358	0.364	0.3736	0.3783
1/4	18	0.0013	0.526	0.517	0.4903	0.4859	0.468	0.481	0.4916	0.4974
3/8	18	0.0014	0.662	0.653	0.6256	0.6211	0.603	0.612	0.6270	0.6329
1/2	14	0.0015	0.823	0.813	0.7769	0.7718	0.747	0.759	0.7784	0.7851
3/4	14	0.0016	1.034	1.024	0.9873	0.9820	0.958	0.970	0.9889	0.9958
1	11-1/2	0.0017	1.293	1.281	1.2369	1.2311	1.201	1.211	1.2386	1.2462
1-1/4	11-1/2	0.0018	1.638	1.626	1.5816	1.5756	1.546	1.555	1.5834	1.5912
1-1/2	11-1/2	0.0018	1.877	1.865	1.8205	1.8144	1.785	1.794	1.8223	1.8302
2	11-1/2	0.0019	2.351	2.339	2.2944	2.2882	2.259	2.268	2.2963	2.3044
2-1/2	8	0.0022	2.841	2.826	2.7600	2.7526	2.708	2.727	2.7622	2.7720
3	8	0.0023	3.467	3.452	3.3862	3.3786	3.334	3.353	3.3885	3.3984
3-1/2	8	0.0023	3.968	3.953	3.8865	3.8788	3.835	3.848	3.8888	3.8988
4	8	0.0023	4.466	4.451	4.3848	4.3771	4.333	4.346	4.3871	4.3971
5	8	0.0024	5.528	5.513	5.4469	5.4390	5.395	5.408	5.4493	5.4598
6	8	0.0024	6.585	6.570	6.5036	6.4955	6.452	6.464	6.5060	6.5165
Loose-fitting Mechanical Joints for Locknut Connection — NPSL										
1/3	27		0.409		0.3840	0.3805	0.362		0.3863	0.3898
1/4	18		0.541		0.5038	0.4986	0.470		0.5073	0.5125
3/8	18		0.678		0.6409	0.6357	0.607		0.6444	0.6496
1/2	14		0.844		0.7963	0.7896	0.753		0.8008	0.8075
3/4	14		1.054		1.0067	1.0000	0.964		1.0112	1.0179
1	11-1/2		1.318		1.2604	1.2523	1.208		1.2658	1.2739
1-1/4	11-1/2		1.663		1.6051	1.5970	1.553		1.6106	1.6187
1-1/2	11-1/2		1.902		1.8441	1.8360	1.792		1.8495	1.8576
2	11-1/2		2.376		2.3180	2.3099	2.265		2.3234	2.3315
2-1/2	8		2.877		2.7934	2.7817	2.718		2.8012	2.8129
3	8		3.503		3.4198	3.4081	3.344		3.4276	3.4393
3-1/2	8		4.003		3.9201	3.9084	3.845		3.9279	3.9396
4	8		4.502		4.4184	4.4067	4.343		4.4262	4.4379
5	8		5.564		5.4805	5.4688	5.405		5.4884	5.5001
6	8		6.620		6.5372	6.5255	6.462		6.5450	6.5567
8	8		8.615		8.5313	8.5196	8.456		8.5391	8.5508
10	8		10.735		10.6522	10.6405	10.577		10.6600	10.6717
12	8		12.732		12.6491	12.6374	12.574		12.6569	12.6686



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Thread Specs-5

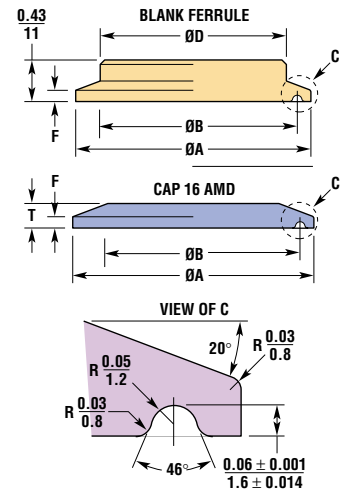
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Technical Reference – Sanitary Ferrule/Cable Gland

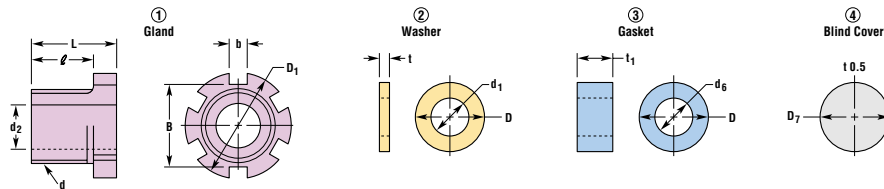
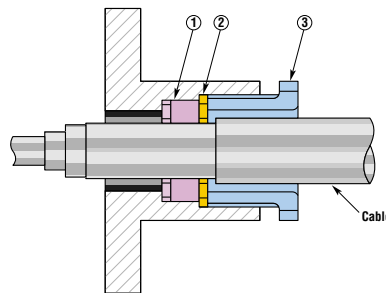
■ Sanitary Ferrule

All dimensions in mm.

Size	A	Tolerance	B	Tolerance	F	Tolerance	D	Tolerance	T	Tolerance
15A	34	0 - 0.16	27.5	0 - 0.13	2.85	±0.1	21.7	-	-	-
1S	34	0 - 0.19	43.5	0 - 0.16	2.85	±0.1	38.1	-	6.4	-
1-1/2S	50.5	0 - 0.19	43.5	0 - 0.16	2.85	±0.1	38.1	-	6.4	-
2S	64	0 - 0.19	56.5	0 - 0.19	2.85	±0.1	50.8	-	6.4	-
2-1/2S	77.5	0 - 0.19	70.5	0 - 0.19	2.85	±0.1	63.5	-	6.4	-
3S	91	0 - 0.22	83.5	0 - 0.22	2.85	±0.1	76.3	-	6.4	-
3-1/2S	106	0 - 0.22	97	0 - 0.22	2.85	±0.1	89.1	-	6.4	-
4S	119	0 - 0.22	110	0 - 0.22	2.85	±0.1	101.6	-	7.9	-
4-1/2S	130	0 - 0.25	122	0 - 0.25	2.85	±0.1	114.3	-	-	-
5-1/2S	155	0 - 0.25	146	0 - 0.25	5.6	±0.12	139.8	-	-	-
6-1/2S	183	0 - 0.29	174	0 - 0.25	5.6	±0.12	165.2	-	-	-
200A	233.5	0 - 0.29	225	0 - 0.29	5.6	±0.12	216.3	-	-	-



■ Cable Gland



All dimensions in mm.

Nominal Width	Parallel Threads Designation: d	Mark	Washer & Gasket						Gland				Blind Cover	
			d ₁	d ₆	D	t	t ₁	d ₂	D ₁	L	B	b	D ₁	
10	PF3/8	a	8	7	14	1.6	8	10	22	19	14	17	4	14
		b	9	8										
15	PF1/2	a	10	9	18	1.6	9	15	28	21	16	22	4	18
		b	11	10										
		c	12	11										
20	PF3/4	a	13	12	23	1.6	12	20	34	22	17	28	6	23
		b	15	13										
		c	17	15										
25	PF1	a	18	16	29	2	14	25	42	25	19	34	6	29
		b	20	18										
		c	22	20										