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General Information

Feature

- HTC tube fittings are convenient "building block" components. They offer great flexibility in the design and construction of high and ultra-high vacuum system.
- There are two type of bellows of HTC's products, or flexible metal hoses. "Flexible hoses" have concertina walls made by pressurizing a thin-wall tube, they can be bent but not be compressed. The other type is "Flexible bellows connections", this type can bent and compressed. When possible, design the system so that the bellows make only a single bend or curve. Multiple bends concentrate stress at minimum radius points, reducing life expectancy during flexing or vibration. An elbow on one or both ends will usually eliminate multiple bends. It is difficult to make a short bellows fit between parallel flange faces that are not coaxial.

Specifications

- Flanges : 304 S.S. (Other material available upon request)
- Fittings : 304 S.S. (Other material available upon request)
- Flexible hoses : 304 S.S.
- Flexible bellows connections : 316Ti, 321 S.S., 316L S.S, 316 S.S., 304 S.S.
- Htc tube fitting are made from welded pipe or tube.
- Larger or special size available upon request
- Seamless pipe or tube are available upon request.

Applications

- Piping system.

Tube and Pipe O.D. Designator

Tube Tube		Pipe (ANSI B36.19)		Pipe (JIS G3459)		IDF		3A		ISO		DIN (DIN11850)	
Nom.Size	O.D.	Nom.Size	O.D.	Nom.Size	O.D.	Nom.Size	O.D.	Nom.Size	O.D.	Nom.Size	O.D.	Nom.Size	O.D.
1/8	3.18	1/8	10.29	6A	10.5								
3/16	4.76	3/16											
1/4	6.35	1/4	13.72	8A	13.8								
5/16	7.94	5/16											
3/8	9.53	3/8	17.15	10A	17.3						12	DN10	12
1/2	12.7	1/2	21.34	15A	21.7						17.2	15	18
5/8	15.88	5/8											
3/4	19.05	3/4	26.67	20A	27.2						21.3	20	22
7/8	22.23	7/8											
1	25.4	1	33.4	25A	34	1	25.4	1	25.4		25	25	28
1 1/4	31.8	1 1/4	42.16	32A	42.7	1 1/4	31.8				33.7	32	34
1 1/2	38.1	1 1/2	48.26	40A	48.6	1 1/2	38.1	1 1/2	38.1		38	40	40
											40		
2	50.8	2	60.33	50A	60.5	2	50.8	2	50.8		51	50	52
2 1/2	63.5	2 1/2	73.03	65A	76.3	2 1/2	63.5	2 1/2	63.5		63.5	65	70
											70		
3	76.2	3	88.9	80A	89.1	3	76.3	3	76.2		76.1	80	85
3 1/2	88.9	3 1/2	101.6	90A	101.6	3 1/2	89.1				88.9		
4	101.6	4	114.3	100A	114.3	4	101.6	4	101.6		101.6	100	104
											114.3		
5	127	5	141.3	125A	139.8							125	129
											139.7		
6	152.4	6	168.3	150A	165.2							150	154
											168.3		
8	203.2	8	219.1	200A	216.3						219.1		

JIS G3459 : Stainless Steel Pipes (Sch10)

IDF : International Daily Federation

3A : 3-A Sanitary Standards (International Association of Milk, Food and Environment Sanitariums, U.S Public Health Service)

ISO : International Organization for Standardization

DIN : Deutsches Insitut fur Nonmung (Germany DIN 11850)

Pipe Schedules (Metric Units)

NOMINAL WALL THICKNESS IN MILLIMETRES

Nominal Pipe Size In Inches	Outside Diameter In Millimetres	Sched 5	Sched 10	Sched 20	Sched 30	Standard	Sched 40	Sched 60	XS Extra Strong	Sched 80	Sched 100	Sched 120	Sched 140	Sched 160	XXS Double strong
1/8	10.29	0.89	1.24			1.73	1.73		2.41	2.41					
1/4	13.7	1.24	1.65			2.24	2.24		3.02	3.02					
3/8	17.1	1.24	1.65			2.31	2.31		3.20	3.20					
1/2	21.3	1.65	2.11			2.77	2.77		3.73	3.73				4.75	7.46
3/4	26.7	1.65	2.11			2.87	2.87		3.91	3.91				5.53	7.82
1	33.4	1.65	2.77			3.38	3.38		4.55	4.55				6.35	9.09
1 1/4	42.2	1.65	2.77			3.56	3.56		4.85	4.85				6.35	9.70
1 1/2	48.3	1.65	2.77			3.68	3.68		5.08	5.08				7.13	10.16
2	60.3	1.65	2.77			3.91	3.91		5.54	5.54				8.71	11.07
2 1/2	73.0	2.11	3.05			5.16	5.16		7.01	7.01				9.53	14.02
3	88.9	2.11	3.05			5.49	5.49		7.62	7.62				11.10	15.24
3 1/2	101.6	2.11	3.05			5.74	5.74		8.08	8.08					16.15
4	114.3	2.11	3.05			6.02	6.02		8.56	8.56		11.10		13.48	17.12
5	141.3	2.77	3.40			6.55	6.55		9.53	9.53		12.70		15.87	19.05
6	168.3	2.77	3.40			7.11	7.11		10.97	10.97		14.27		18.23	21.95
8	219.1	2.77	3.76	6.35	7.04	8.18	8.18	10.31	12.70	12.70	15.06	18.23	20.62	23.01	22.23
10	273.1	3.40	4.19	6.35	7.79	9.27	9.27	12.70	12.70	15.06	18.23	21.41	25.40	28.57	
12	323.9	4.19	4.57	6.35	8.38	9.53	10.31	14.27	12.70	17.45	21.41	25.40	28.57	33.32	
14	355.6		6.35	7.92	9.53	9.53	11.12	15.06	12.70	19.05	23.80	27.76	31.75	35.71	
16	406.4		6.35	7.92	9.53	9.53	12.70	16.66	12.70	21.41	26.19	30.93	36.52	40.46	
18	457.2		6.35	7.92	11.10	9.53	14.27	19.05	12.70	23.80	29.36	34.92	39.67	45.24	
20	508.0		6.35	9.53	12.70	9.53	15.06	20.62	12.70	26.19	32.51	38.10	44.45	49.99	
22	558.8		6.35			9.53			12.70						
24	609.6		6.35	9.53	14.27	9.53	17.45	24.59	12.70	30.94	38.89	46.02	52.37	59.51	
26	660.4					9.53			12.70						
30	762.0		7.925	12.7		9.53			12.70						
34	863.6					9.53			12.70						
36	914.4					9.53			12.70						

NOMINAL WALL THICKNESS IN INCHES

Nominal Pipe Size In Inches	Outside Diameter In Inches	Sched 5	Sched 10	Sched 20	Sched 30	Standard	Sched 40	Sched 60	XS Extra Strong	Sched 80	Sched 100	Sched 120	Sched 140	Sched 160	XXS Double strong
1/8	0.405	0.035	0.049			0.068	0.068		0.095	0.095					
1/4	0.540	0.049	0.065			0.088	0.088		0.119	0.119					
3/8	0.675	0.049	0.065			0.091	0.091		0.126	0.126					
1/2	0.840	0.065	0.083			0.109	0.109		0.147	0.147				0.187	0.294
3/4	1.050	0.065	0.083			0.113	0.113		0.154	0.154				0.218	0.308
1	1.315	0.065	0.109			0.133	0.133		0.179	0.179				0.250	0.358
1 1/4	1.660	0.065	0.109			0.140	0.140		0.191	0.191				0.250	0.382
1 1/2	1.900	0.065	0.109			0.145	0.145		0.200	0.200				0.281	0.400
2	2.375	0.065	0.109			0.154	0.154		0.218	0.218				0.343	0.436
2 1/2	2.875	0.083	0.120			0.203	0.203		0.276	0.276				0.375	0.552
3	3.5	0.083	0.120			0.216	0.216		0.300	0.300				0.438	0.600
3 1/2	4.0	0.083	0.120			0.226	0.226		0.318	0.318				-	0.636
4	4.5	0.083	0.120			0.237	0.237	0.281	0.337	0.337		0.438		0.531	0.674
5	5.563	0.109	0.134			0.258	0.258		0.375	0.375		0.500		0.625	0.750
6	6.625	0.109	0.134			0.280	0.280		0.432	0.432		0.562		0.718	0.864
8	8.625	0.109	0.148	0.250	0.277	0.322	0.322	0.406	0.500	0.500	0.593	0.718	0.812	0.906	0.875
10	10.75	0.134	0.165	0.250	0.307	0.365	0.365	0.500	0.500	0.593	0.718	0.843	1.000	1.125	
12	12.75	0.165	0.180	0.250	0.330	0.375	0.406	0.562	0.500	0.687	0.843	1.000	1.125	1.312	
14	14.0		0.250	0.312	0.375	0.375	0.438	0.593	0.500	0.750	0.937	1.093	1.250	1.406	
16	16.0		0.250	0.312	0.375	0.375	0.500	0.656	0.500	0.843	1.031	1.218	1.438	1.593	
18	18.0		0.250	0.312	0.438	0.375	0.562	0.750	0.500	0.937	1.156	1.375	1.562	1.781	
20	20.0		0.250	0.375	0.500	0.375	0.593	0.812	0.500	1.031	1.281	1.500	1.750	1.968	
22	22.0		0.250	0.375	0.500	0.375		0.875	0.500	1.125	1.375	1.625	1.875	2.125	
24	24.0		0.250	0.375	0.562	0.375	0.687	0.968	0.500	1.218	1.531	1.812	2.062	2.343	
26	26.0		0.312	0.500		0.375			0.500						
28	28.0		0.312	0.500	0.625	0.375			0.500						
30	30.0		0.312	0.500	0.625	0.375			0.500						
32	32.0		0.312	0.500	0.625	0.375	0.688		0.500						
34	34.0		0.344	0.500	0.625	0.375	0.688		0.500						
36	36.0		0.312	0.500	0.625	0.375	0.750		0.500						

Birmingham Wire Gage (BWG) and Wall Thickness in mm

TUBE		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5
		0.889	1.067	1.245	1.473	1.651	1.829	2.108	2.413	2.769	3.048	3.404	3.759	4.191	4.572	5.156	5.588
O.D.	I.D.																
1/2	MIN.	10.72	10.36	9.957	9.474	9.068	8.687	8.077	7.391	6.604	5.994						
	NOM.	10.92	10.57	10.21	9.754	9.398	9.042	8.484	7.874	7.163	6.604						
5/8	MIN.	13.89	13.54	13.13	12.65	12.24	11.86	11.25	10.59	9.779	9.169	8.382	7.595	6.655	5.817		
	NOM.	14.1	13.74	13.39	12.93	12.57	12.22	11.66	11.05	10.34	9.779	9.068	8.357	7.493	6.731		
3/4	MIN.	17.07	16.71	16.31	15.82	15.42	15.06	14.43	13.77	12.95	12.34	11.56	10.77	9.83	8.992	7.696	6.756
	NOM.	17.27	16.92	16.56	16.1	15.75	15.39	14.83	14.22	13.51	12.95	12.24	11.53	10.67	9.906	8.738	7.874
7/8	MIN.	20.24	19.89	19.48	18.97	18.59	18.21	17.6	16.92	16.15	15.52	14.73	13.94	13.00	12.17	10.87	9.931
	NOM.	20.45	20.09	19.74	19.28	18.92	18.57	18.01	17.40	16.69	16.13	15.42	14.71	13.84	13.08	11.91	11.05
1	MIN.	23.42	23.06	22.66	22.17	21.77	21.39	20.78	20.09	19.33	18.69	17.93	17.15	16.18	15.34	14.05	13.11
	NOM.	23.62	23.27	22.91	22.45	22.1	21.74	21.18	20.57	19.86	19.30	18.59	17.88	17.02	16.26	15.09	14.22
1-1/8	MIN.	26.59	26.24	25.83	25.32	24.94	24.56	23.95	23.27	22.5	21.87	21.11	20.32	19.35	18.52	17.22	16.28
	NOM.	26.8	26.44	26.09	25.63	25.27	24.92	24.36	23.75	23.04	22.48	21.77	21.06	20.19	19.43	18.26	17.40
1-1/4	MIN.	29.77	29.41	29.01	28.5	28.12	27.74	27.13	26.44	25.68	25.04	24.28	23.50	22.53	21.69	20.4	19.46
	NOM.	29.97	29.62	29.26	28.8	28.45	28.09	27.53	26.92	26.21	26.65	24.94	24.23	23.37	22.61	21.44	20.57
1-3/8	MIN.	32.94	32.59	32.18	31.67	31.29	30.91	30.28	29.62	28.85	28.22	27.46	26.64	25.70	24.87	23.57	22.63
	NOM.	33.15	32.79	32.44	31.98	31.62	31.27	30.71	30.1	29.39	28.83	28.12	27.41	26.54	25.78	24.61	23.75
1-1/2	MIN.	36.12	35.76	35.36	34.85	34.47	34.09	33.48	32.79	32	31.39	30.61	29.82	28.88	28.04	26.75	25.81
	NOM.	36.32	36.22	35.61	35.15	34.80	34.44	33.88	33.27	32.56	32.00	31.29	30.58	29.72	28.96	27.79	26.92
1-3/4	MIN.	42.47	42.11	41.71	41.2	40.82	40.44	39.83	39.14	38.35	37.74	36.96	36.17	35.23	34.39	33.1	32.16
	NOM.	118.9	42.32	41.96	41.5	41.15	40.79	40.23	39.62	38.91	38.35	37.64	36.93	36.07	35.31	34.14	33.27
2	MIN.	48.82	48.46	48.06	47.55	47.17	46.79	46.15	45.49	44.7	44.09	43.31	42.52	41.58	40.74	39.45	38.51
	NOM.	49.02	48.67	48.31	47.85	47.5	47.14	46.58	45.97	45.26	44.7	43.99	43.28	42.42	41.66	40.49	39.62
2-1/4	MIN.	55.17	54.81	54.41	53.9	53.52	53.14	52.5	51.84	51.05	50.42	49.66	48.87	47.93	47.09	45.8	44.86
	NOM.	55.37	55.02	54.66	54.2	53.85	53.49	52.93	52.32	51.61	51.05	50.34	49.63	48.77	48.01	46.84	45.97
2-1/2	MIN.	61.52	61.16	60.76	60.25	59.87	59.49	58.85	58.19	57.4	56.79	56.01	55.22	54.28	53.44	52.15	51.21
	NOM.	61.72	61.37	61.01	60.55	60.20	59.84	59.28	58.67	57.96	57.40	56.69	55.98	55.12	54.36	53.19	52.32
2-3/4	MIN.	67.87	67.51	67.11	66.6	66.22	65.84	65.2	64.54	63.75	63.14	62.36	61.57	60.63	59.79	58.5	57.56
	NOM.	68.07	67.72	67.36	66.9	66.55	66.24	65.63	65.02	64.31	63.75	63.04	62.33	61.47	60.71	59.51	58.67
3	MIN.	74.22	73.86	73.46	72.95	72.57	72.19	71.55	70.89	70.10	69.49	68.71	67.92	66.95	66.14	64.85	63.91
	NOM.	74.92	74.07	73.71	73.25	72.90	72.54	71.98	71.37	70.66	70.10	69.39	68.68	67.82	67.06	65.89	65.02
3-1/4	MIN.	80.57	80.21	79.81	79.30	78.92	78.54	78.41	77.24	76.45	75.84	75.06	74.28	73.33	72.49	71.20	70.26
	NOM.	80.77	80.42	80.06	79.60	79.25	78.94	78.33	77.72	77.01	76.45	75.74	75.03	74.17	73.41	72.24	71.37
3-1/2	MIN.	86.92	86.56	86.16	85.65	85.27	84.89	84.25	83.59	82.80	82.19	81.41	80.62	79.68	78.84	77.55	76.61
	NOM.	87.12	86.77	86.41	85.95	85.60	85.24	84.68	84.07	83.36	82.80	82.09	81.38	80.52	79.76	78.59	77.72
3-3/4	MIN.	93.27	92.91	92.51	92.00	91.62	91.24	90.60	89.94	89.15	88.54	87.76	86.97	86.03	85.19	83.90	82.96
	NOM.	93.47	93.12	92.76	92.30	91.95	91.59	91.03	90.42	89.71	89.15	88.44	87.73	86.87	86.11	84.94	84.07
4	MIN.	99.62	99.26	98.86	98.50	97.97	97.59	96.95	96.29	95.50	94.89	94.11	93.32	92.38	91.54	90.25	89.31
	NOM.	99.82	99.47	99.11	98.65	98.30	97.94	97.38	96.77	96.06	96.01	94.79	94.08	93.22	92.46	91.29	90.42
4-1/2	MIN.	112.30	112.00	111.60	111.00	110.70	110.30	109.70	109.00	108.20	107.60	106.80	106.00	105.10	104.20	102.90	102.00
	NOM.	112.50	112.20	111.80	111.40	111.00	110.60	110.1	109.50	108.80	108.20	107.50	106.80	105.90	105.20	104.00	103.10
5	MIN.	125.00	124.70	124.30	123.70	123.40	123.00	122.40	121.70	120.90	120.30	119.50	118.70	117.80	116.90	115.60	114.70
	NOM.	125.20	124.90	124.50	124.10	123.70	123.30	122.80	122.20	121.50	120.90	120.20	119.50	118.60	117.90	116.70	115.80

04 CHAPTER FITTING SERIES

Birmingham Wire Gage (BWG) and Wall Thickness in inches

TUBE		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5
O.D.	I.D.	.035	.042	.049	.058	.065	.072	.083	.095	.109	.120	.134	.148	.165	.180	.203	.220
1/2	MIN.	.422	.408	.392	.373	.357	.342	.318	.291	.260	.236						
	NOM.	.430	.416	.402	.384	.370	.356	.334	.310	.282	.260						
5/8	MIN.	.547	.533	.517	.498	.482	.467	.443	.417	.385	.361	.330	.299	.262	.229		
	NOM.	.555	.541	.527	.509	.495	.481	.459	.435	.407	.385	.357	.329	.295	.265		
3/4	MIN.	.672	.658	.642	.623	.607	.593	.568	.542	.510	.486	.455	.424	.387	.354	.303	.266
	NOM.	.680	.666	.652	.634	.620	.606	.584	.560	.532	.510	.482	.454	.420	.390	.344	.310
7/8	MIN.	.797	.783	.767	.747	.732	.717	.693	.666	.636	.611	.580	.549	.512	.479	.428	.391
	NOM.	.805	.791	.777	.759	.745	.731	.709	.685	.657	.635	.607	.579	.545	.515	.469	.435
1	MIN.	.922	.908	.892	.873	.857	.842	.818	.791	.761	.736	.706	.675	.637	.604	.553	.516
	NOM.	.930	.916	.902	.884	.870	.856	.834	.810	.782	.760	.732	.704	.670	.640	.594	.560
1-1/8	MIN.	1.047	1.033	1.017	.997	.982	.967	.943	.916	.886	.861	.831	.800	.762	.729	.678	.641
	NOM.	1.055	1.041	1.027	1.009	.995	.981	.959	.935	.907	.885	.857	.829	.795	.765	.719	.685
1-1/4	MIN.	1.172	1.158	1.142	1.122	1.107	1.092	1.068	1.041	1.011	.986	.956	.925	.887	.854	.803	.766
	NOM.	1.180	1.166	1.152	1.134	1.120	1.106	1.084	1.060	1.032	1.010	.982	.954	.920	.890	.844	.810
1-3/8	MIN.	1.297	1.283	1.267	1.247	1.232	1.217	1.192	1.166	1.136	1.111	1.081	1.049	1.012	.979	.928	.891
	NOM.	1.305	1.291	1.277	1.259	1.245	1.231	1.209	1.185	1.157	1.135	1.107	1.079	1.045	1.015	.969	.935
1-1/2	MIN.	1.422	1.408	1.392	1.372	1.357	1.342	1.318	1.291	1.260	1.236	1.205	1.174	1.137	1.104	1.053	1.016
	NOM.	1.430	1.426	1.402	1.384	1.370	1.356	1.334	1.310	1.282	1.260	1.232	1.204	1.170	1.140	1.094	1.060
1-3/4	MIN.	1.672	1.658	1.642	1.622	1.607	1.592	1.568	1.541	1.510	1.486	1.455	1.424	1.387	1.354	1.303	1.266
	NOM.	1.680	1.666	1.652	1.634	1.620	1.606	1.584	1.560	1.532	1.510	1.482	1.454	1.420	1.390	1.344	1.310
2	MIN.	1.922	1.908	1.892	1.872	1.857	1.842	1.817	1.791	1.760	1.736	1.705	1.674	1.637	1.604	1.553	1.516
	NOM.	1.930	1.916	1.902	1.884	1.870	1.856	1.834	1.810	1.782	1.760	1.732	1.704	1.670	1.640	1.594	1.560
2-1/4	MIN.	2.172	2.158	2.142	2.122	2.107	2.092	2.067	2.041	2.010	1.985	1.955	1.924	1.887	1.854	1.803	1.766
	NOM.	2.180	2.166	2.152	2.134	2.120	2.106	2.084	2.060	2.032	2.010	1.982	1.954	1.920	1.890	1.844	1.810
2-1/2	MIN.	2.422	2.408	2.392	2.372	2.357	2.342	2.317	2.291	2.260	2.236	2.205	2.174	2.137	2.104	2.053	2.016
	NOM.	2.430	2.416	2.402	2.384	2.370	2.356	2.334	2.310	2.282	2.260	2.232	2.204	2.170	2.140	2.094	2.060
2-3/4	MIN.	2.672	2.658	2.642	2.622	2.607	2.592	2.567	2.541	2.510	2.486	2.455	2.424	2.387	2.354	2.303	2.266
	NOM.	2.680	2.666	2.652	2.634	2.620	2.608	2.584	2.560	2.532	2.510	2.482	2.454	2.420	2.390	2.344	2.310
3	MIN.	2.922	2.908	2.892	2.872	2.857	2.842	2.817	2.791	2.760	2.736	2.705	2.674	2.637	2.604	2.553	2.516
	NOM.	2.930	2.916	2.902	2.884	2.870	2.856	2.834	2.810	2.782	2.760	2.732	2.704	2.670	2.640	2.594	2.560
3-1/4	MIN.	3.172	3.158	3.142	3.122	3.107	3.092	3.087	3.041	3.010	2.986	2.955	2.924	2.887	2.854	2.803	2.766
	NOM.	3.180	3.166	3.152	3.134	3.120	3.108	3.084	3.060	3.032	3.010	2.982	2.954	2.920	2.890	2.844	2.810
3-1/2	MIN.	3.422	3.408	3.392	3.372	3.357	3.342	3.317	3.291	3.260	3.236	3.205	3.174	3.137	3.104	3.053	3.016
	NOM.	3.430	3.416	3.402	3.384	3.370	3.356	3.334	3.310	3.282	3.260	3.232	3.204	3.170	3.140	3.094	3.060
3-3/4	MIN.	3.672	3.658	3.642	3.622	3.607	3.592	3.567	3.541	3.510	3.486	3.455	3.424	3.387	3.354	3.303	3.266
	NOM.	3.680	3.666	3.652	3.634	3.620	3.606	3.584	3.560	3.532	3.510	3.482	3.454	3.420	3.390	3.344	3.310
4	MIN.	3.922	3.908	3.892	3.872	3.857	3.842	3.817	3.791	3.760	3.736	3.705	3.674	3.637	3.604	3.553	3.516
	NOM.	3.930	3.916	3.902	3.884	3.870	3.856	3.834	3.810	3.782	3.780	3.732	3.704	3.670	3.640	3.594	3.560
4-1/2	MIN.	4.422	4.408	4.392	4.372	4.357	4.342	4.317	4.291	4.260	4.236	4.205	4.174	4.137	4.104	4.053	4.016
	NOM.	4.430	4.416	4.402	4.384	4.370	4.356	4.334	4.310	4.282	4.260	4.232	4.204	4.170	4.140	4.094	4.060
5	MIN.	4.922	4.908	4.892	4.872	4.857	4.842	4.817	4.791	4.760	4.736	4.705	4.674	4.637	4.604	4.553	4.516
	NOM.	4.930	4.916	4.902	4.884	4.870	4.856	4.834	4.810	4.782	4.760	4.732	4.704	4.670	4.640	4.594	4.560

ASTM A269 WELDED & BRIGHT ANNEALED STAINLESS STEEL TUBING PRESSURE RATINGS

Nom. Size	Actual O.D.	Nom. Wall	Min. O.D.	Max. O.D.	Max. Ovality	Min. Wall	Weight /Ft	Burst Pressure *** (PSI)	Working Pressure *** (PSI)
1/4									
X .020	0.250	0.020	0.245	0.255	0.005	0.017	0.050	12,000	3,000
X .028	0.250	0.028	0.245	0.255	0.005	0.024	0.066	16,800	4,200
X .035	0.250	0.035	0.245	0.255	0.005	0.030	0.077	21,000	5,250
X .049	0.250	0.049	0.245	0.255	0.005	0.042	0.101	29,400	7,350
5/16									
X .020	0.313	0.020	0.308	0.318	0.005	0.017	0.064	9,585	2,396
X .028	0.313	0.028	0.308	0.318	0.005	0.024	0.085	13,419	3,355
X .035	0.313	0.035	0.308	0.318	0.005	0.030	0.099	16,773	4,193
X .049	0.313	0.049	0.308	0.318	0.005	0.042	0.132	23,482	5,871
3/8									
X .020	0.375	0.020	0.370	0.380	0.005	0.017	0.077	8,000	2,000
X .028	0.375	0.028	0.370	0.380	0.005	0.024	0.103	11,200	2,800
X .035	0.375	0.035	0.370	0.380	0.005	0.030	0.121	14,000	3,500
X .049	0.375	0.049	0.370	0.380	0.005	0.042	0.163	19,600	4,900
X .065	0.375	0.065	0.370	0.380	0.005	0.055	0.213	26,000	6,500
7/16									
X .035	0.437	0.035	0.432	0.442	0.005	0.030	0.150	12,014	3,003
X .065	0.437	0.065	0.432	0.442	0.005	0.055	0.256	22,311	5,578
1/2									
X .020	0.500	0.020	0.495	0.505	0.005	0.018	0.104	6,000	1,500
X .028	0.500	0.028	0.495	0.505	0.005	0.025	0.141	8,400	2,100
X .035	0.500	0.035	0.495	0.505	0.005	0.032	0.173	10,500	2,625
X .049	0.500	0.049	0.495	0.505	0.005	0.044	0.235	14,700	3,675
X .065	0.500	0.065	0.495	0.505	0.005	0.059	0.299	19,500	4,875
X .083	0.500	0.083	0.495	0.505	0.005	0.075	0.362	24,900	6,225
X .095	0.500	0.095	0.495	0.505	0.005	0.086	0.402	28,500	7,125
X .109	0.500	0.109	0.495	0.505	0.005	0.098	0.447	32,700	8,175
5/8									
X .020	0.625	0.020	0.620	0.630	0.008	0.018	0.132	4,800	1,200
X .028	0.625	0.028	0.620	0.630	0.008	0.025	0.178	6,720	1,680
X .035	0.625	0.035	0.620	0.630	0.008	0.032	0.220	8,400	2,100
X .042	0.625	0.042	0.623	0.628	0.003	0.040	0.268	10,080	2,520
X .049	0.625	0.049	0.620	0.630	0.008	0.044	0.300	11,760	2,940
X .065	0.625	0.065	0.620	0.630	0.005	0.059	0.384	15,600	3,900
X .083	0.625	0.083	0.620	0.630	0.005	0.075	0.470	19,920	4,980
X .095	0.625	0.095	0.620	0.630	0.005	0.086	0.524	22,800	5,700
X .109	0.625	0.109	0.620	0.630	0.005	0.098	0.588	26,160	6,540

ASTM A269 WELDED & BRIGHT ANNEALED STAINLESS STEEL TUBING PRESSURE RATINGS

Nom. Size	Actual O.D.	Nom. Wall	Min. O.D.	Max. O.D.	Max. Ovality	Min. Wall	Weight /Ft	Burst Pressure *** (PSI)	Working Pressure *** (PSI)
3/4									
X .020	0.750	0.020	0.745	0.755	0.008	0.018	0.159	4,000	1,000
X .025	0.750	0.025	0.745	0.755	0.008	0.023	0.207	5,000	1,250
X .028	0.750	0.028	0.745	0.755	0.008	0.025	0.215	5,600	1,400
X .035	0.750	0.035	0.745	0.755	0.008	0.032	0.266	7,000	1,750
X .049	0.750	0.049	0.745	0.755	0.008	0.044	0.365	9,800	2,450
X .065	0.750	0.065	0.745	0.755	0.005	0.059	0.47	13,000	3,250
X .083	0.750	0.083	0.745	0.755	0.005	0.075	0.577	16,600	4,150
X .095	0.750	0.095	0.745	0.755	0.005	0.086	0.646	19,000	4,750
X .109	0.750	0.109	0.745	0.755	0.005	0.098	0.729	21,800	5,450
7/8									
X .020	0.875	0.020	0.870	0.880	0.008	0.018	0.186	3,429	857
X .025	0.875	0.025	0.870	0.880	0.008	0.023	0.242	4,286	1,071
X .028	0.875	0.028	0.870	0.880	0.008	0.025	0.252	4,800	1,200
X .035	0.875	0.035	0.870	0.880	0.008	0.032	0.313	6,000	1,500
X .049	0.875	0.049	0.870	0.880	0.008	0.044	0.430	8,400	2,100
X .065	0.875	0.065	0.870	0.880	0.005	0.059	0.555	11,143	2,786
X .083	0.875	0.083	0.870	0.880	0.005	0.075	0.685	14,229	3,557
X .095	0.875	0.095	0.870	0.880	0.005	0.086	0.768	16,286	4,071
X .109	0.875	0.109	0.870	0.880	0.005	0.098	0.870	18,686	4,671
1									
X .020	1.000	0.020	0.995	1.005	0.008	0.018	0.213	3,000	750
X .028	1.000	0.028	0.995	1.005	0.008	0.025	0.289	4,200	1,050
X .035	1.000	0.035	0.995	1.005	0.008	0.032	0.359	5,250	1,313
X .049	1.000	0.049	0.995	1.005	0.008	0.044	0.496	7,350	1,838
X .065	1.000	0.065	0.995	1.005	0.005	0.059	0.640	9,750	2,438
X .083	1.000	0.083	0.995	1.005	0.005	0.075	0.792	12,450	3,113
X .095	1.000	0.095	0.995	1.005	0.005	0.086	0.891	14,250	3,563
X .109	1.000	0.109	0.995	1.005	0.005	0.098	1.011	16,350	4,088
6mm									
X 1mm	0.236	0.039	0.231	0.241	0.005	0.033	0.084	25,023	6,256
8mm X									
1mm	0.315	0.039	0.310	0.320	0.005	0.033	0.118	18,574	4,643
10mm X									
1mm	0.394	0.039	0.389	0.399	0.005	0.033	0.151	14,859	3,715
12mm X									
1mm	0.472	0.039	0.467	0.477	0.005	0.033	0.185	12,383	3,096
20mm X									
1mm	0.787	0.039	0.782	0.792	0.005	0.035	0.319	7,433	1,858

Pressure Formula

$$\text{Internal Burst} = 2 St/D$$

- Where P = Internal pressure psi
- S = Tensile stress psi
- t = Minimum wall thickness in inches
- D = Nominal outside diameter in inches
- Working pressure = 1/4 internal burst pressure

Tensile Requirements (304, 304L, 316, 316L)

- A minimum of (2) tests per work order / heat number
- Minimum yield strength = 30,000 psi
- Minimum ultimate strength = 75,000 psi
- Minimum elongation = 35%

Hardness Requirements (304, 304L, 316, 316L)

- A minimum of (2) tests per work order / heat number
- Maximum hardness* = 74 30T or 90 RB

Not applicable to sizes < 0.250 I.D. unless specified

B.W.G. To Decimal Conversion Chart

B.W. GA.	DECIMAL EQUIV.	B.W. GA.	DECIMAL EQUIV.	B.W. GA.	DECIMAL EQUIV.	B.W. GA.	DECIMAL EQUIV.
1	0.300	10	0.134	19	0.042	28	0.014
2	0.284	11	0.120	20	0.035	29	0.013
3	0.259	12	0.109	21	0.032	30	0.012
4	0.238	13	0.095	22	0.028	31	0.010
5	0.220	14	0.083	23	0.025	32	0.009
6	0.203	15	0.072	24	0.022	33	0.008
7	0.180	16	0.065	25	0.020	34	0.007
8	0.165	17	0.058	26	0.018	35	0.005
9	0.148	18	0.049	27	0.016	36	0.004

ASTM A312 / ASME SA312 WELDED STAINLESS STEEL PIPE PRESSURE RATINGS

Nom. Size	Actual O.D.	Nom. Wall	Min. O.D.	Max. O.D.	Max. Ovality	Min. Wall	Weight /Ft	Burst Pressure *** (PSI)	Working Pressure *** (PSI)
1/8"									
Sch 5	0.405	0.035	0.395	0.413	0.006	0.031	0.136	12963	3241
Sch 10	0.405	0.049	0.395	0.413	0.006	0.043	0.184	18148	4537
Sch 40	0.405	0.068	0.395	0.413	0.006	0.060	0.239	25185	6296
1/4"									
Sch 5	0.540	0.049	0.530	0.548	0.006	0.043	0.253	13611	3403
Sch 10	0.540	0.065	0.530	0.548	0.006	0.057	0.333	18056	4514
Sch 40	0.540	0.088	0.530	0.548	0.006	0.077	0.408	24444	6111
3/8"									
Sch 10	0.675	0.065	0.665	0.683	0.006	0.057	0.427	14444	3611
Sch 40	0.675	0.091	0.665	0.683	0.006	0.080	0.543	20222	5056
1/2"									
Sch 5	0.840	0.065	0.830	0.848	0.010	0.057	0.543	11607	2902
Sch 10	0.840	0.083	0.830	0.848	0.010	0.073	0.643	14821	3705
Sch 40	0.840	0.109	0.830	0.848	0.010	0.095	0.808	19464	4866
Sch 80	0.840	0.147	0.830	0.848	0.010	0.129	1.059	26250	6563
3/4"									
Sch 5	1.050	0.065	1.040	1.058	0.010	0.057	0.690	9286	2321
Sch 10	1.050	0.083	1.040	1.058	0.010	0.073	0.820	11857	2964
Sch 40	1.050	0.113	1.040	1.058	0.010	0.099	1.079	16143	4036
Sch 80	1.050	0.154	1.040	1.058	0.010	0.135	1.426	22000	5500
1"									
Sch 5	1.315	0.065	1.305	1.323	0.010	0.057	0.875	7414	1854
Sch 10	1.315	0.109	1.305	1.323	0.010	0.095	1.327	12433	3108
Sch 40	1.315	0.133	1.305	1.323	0.010	0.116	1.590	15171	3793
Sch 80	1.315	0.179	1.305	1.323	0.010	0.157	2.085	20418	5105

Theoretical burst and working pressure in psi to 100 degrees F

Pressure Formula

$$\text{Internal Burst} = 2 St/D$$

- Where P = Internal pressure psi
- S = Tensile stress psi
- t = Minimum wall thickness in inches
- D = Nominal outside diameter in inches
- Working pressure = 1/4 internal burst pressure

Tensile Requirements (304, 304L, 316, 316L)

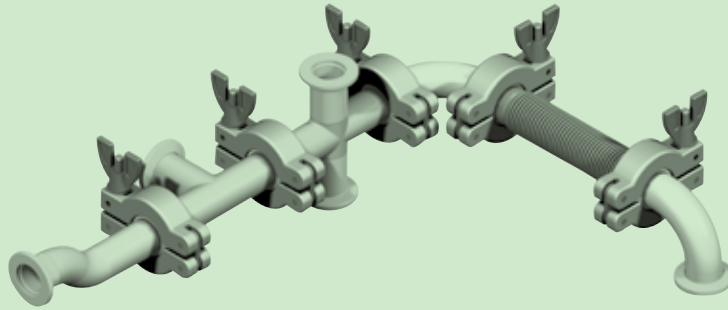
- A minimum of (2) tests per work order / heat number
- Minimum yield strength = 30,000 psi
- Minimum ultimate strength = 75,000 psi
- Minimum elongation = 35%

Hardness Requirements (304, 304L, 316, 316L)

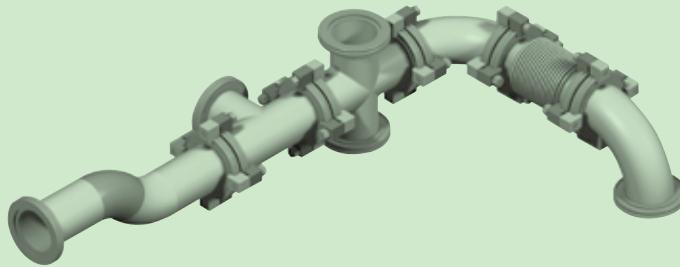
- A minimum of (2) tests per work order / heat number
- Maximum hardness* = 74 30T or 90 RB

Not applicable to sizes < 0.250 I.D. unless specified

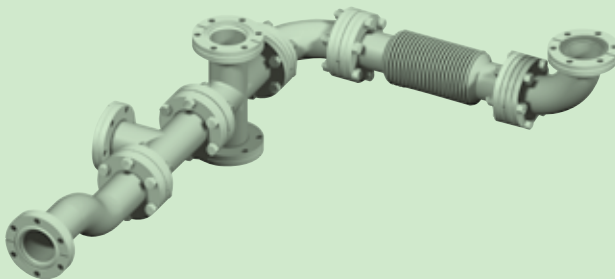
Connections of KF-series Fittings



Connections of ISO-series Fittings



Connections of CF-series Fittings



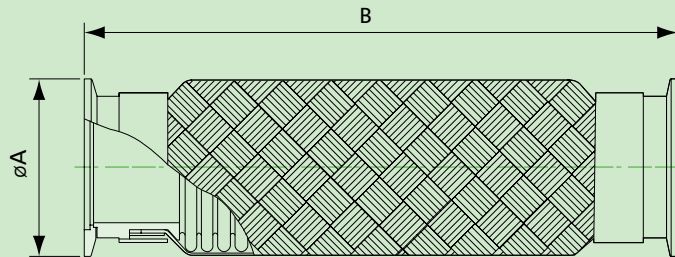
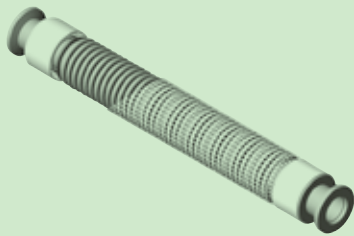
Corrosion Resistance Guide

Media Conveyed or Atmosphere	Temperature	AISI type 304	AISI type 316	Media Conveyed or Atmosphere	Temperature	AISI type 304	AISI type 316
Acetone		◎	◎	Carbonated Water		◎	◎
Acetylene		◎	◎	Sodium Carbonate		◎	◎
Sulfur.Dioxide (Moist)		△	○	Nitrogen		◎	◎
Sulfur.Dioxide (Dry)		◎	◎	Trichlor Ethylene (Dry)		◎	◎
Ethyl Alcohol		◎	◎	Trichlor Ethylene (Moist)		△	△
Methyl Alcohol		◎	◎	Naphtha		◎	◎
Ammonia	R.T.	◎	◎	Benzene		◎	◎
Ammonia	Hot	△	△	Hydrogen Sulfide (Dry)	H65°C	◎	◎
Sulfar (Dry)		◎	◎	Hydrogen Sulfide (Moise)		○	○
Sulfar (Wet)	R.T.	*○	*◎	Ammonium Sulfate (1%)	R.T.	◎	◎
Sulfar (Molten)		△	△	Ammonium Sulfate (5% Aeration)	R.T.	◎	◎
Sulfar (Moist)	R.T.	△	△	Ammonium Sulfate (10%)	Boil	*○	*◎
Ethylene Glvcol		◎	◎	Calcium Sulfate	R.T.	◎	◎
Ethers		◎	◎	Copper Sulfate Solution		◎	◎
Alminum Chloride		△	△	Sodium Sulfate (5%)	R.T.	○	◎
Iron Chloride		△	△	Sodium Sulfate (Conc)	R.T.	◎	◎
Magnesium Chloride		△	△	Barium Sulfate	R.T.	◎	◎
Chlorine (Dry)		△	○	Phospholic Acid (≤5%)	R.T.	◎	◎
Chlorine (Moist)		△	△	Phospholic Acid (5–25%)		△	○
Hydrogen Peroxide	R.T.	*◎	◎	Phospholic Acid (25–50%)		△	△
Hydrogen Peroxide	Boil	*○	◎	Chloric Acid (<5%)		△	○
Sea Water		△	△	Chloric Acid (≥5%)		△	△
Gasoline		◎	◎	Nitric Acid (<50%)		◎	◎
Glycerin		◎	◎	Nitric Acid (65%)	R.T.	◎	◎
Crude Oil		◎	◎	Nitric Acid (≥50%)	Boil	○	○
Ethyl Acetate		◎	◎	Nitric Acid (Conc)	R.T.	○	○
Oxygen		◎	◎	Nitric Acid (Conc)	Boil	△	△
Carbon Tetrachloride (Dry)		◎	◎	Sulfuric Acid (95–100%)		◎	◎
Carbon Tetrachloride with water		△	△	Sulfuric Acid (75–95%)		○	○
Steam		◎	◎	Sulfuric Acid (<75%)		△	△
Oxalic Acid (<10%)	R.T.	◎	◎	Sulfuric Acid (anhydrous)	R.T.	◎	◎
Oxalic Acid (10%)	Boil	△	△	Sulfuric Acid (anhydrous)	Boil	△	△
Oxalic Acid (>10%)		△	△	Fluoric Acid		△	△
Mercury		◎	◎	Acetic Acid	R.T.	◎	◎
Potassium Hydroxide (<10%)		◎	◎	Acetic Acid	Boil	△	△
Potassium Hydroxide (10%–70%)	R.T.	◎	◎	Sodium Hydroxide (<10%)		◎	◎
Potassium Hydroxide (50%)	Boil	○	○	Sodium Hydroxide (10–50%)	<100°C	◎	◎
Barium Hydroxide (≤10%)		◎	◎	Sodium Hydroxide (10–50%)	Boil	○	○
Barium Hydroxide (100%–70%)	R.T.	◎	◎	Sodium Hydroxide (50–70%)	<100°C	◎	◎
Bromium		△	△	Sodium Hydroxide (50–70%)	100°C-150°C	○	○
Tar		◎	◎	Sodium Hydroxide (70–anhydrous)	<260°C	○	○
Carbon Dioxide		◎	◎	Sodium Hydroxide (Molten)	<480°C	△	△

◎ : Suitable (normal conditions) ○ : Limited Service △ : Unsuitable

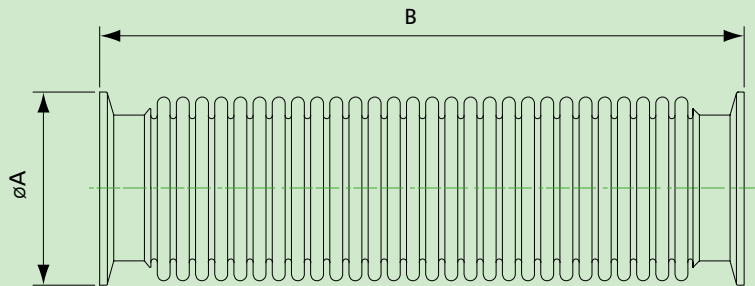
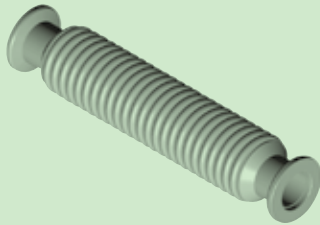
* : Susceptible to pitting corrosion where contacting with air.

Note : R.T. : Room Temperature

KF Braided Flexible Hoses

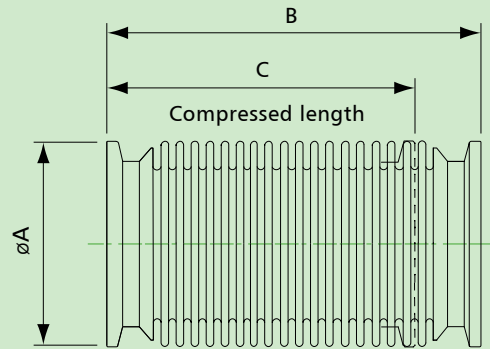
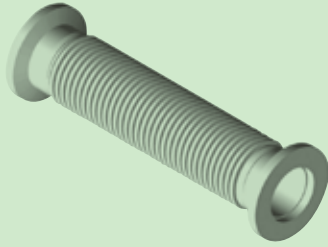
Model No.	Material	A	B	Parts No.
KF16BFX250	304 S.S.	30	250	40210550250AA
KF16BFX500	304 S.S.	30	500	40210550500AA
KF16BFX750	304 S.S.	30	750	40210550750AA
KF16BFX1000	304 S.S.	30	1000	40210551000AA
KF25BFX250	304 S.S.	40	250	40210560250AA
KF25BFX500	304 S.S.	40	500	40210560500AA
KF25BFX750	304 S.S.	40	750	40210560750AA
KF25BFX1000	304 S.S.	40	1000	40210561000AA
KF40BFX250	304 S.S.	55	250	40210570250AA
KF40BFX500	304 S.S.	55	500	40210570500AA
KF40BFX750	304 S.S.	55	750	40210570750AA
KF40BFX1000	304 S.S.	55	1000	40210571000AA
KF50BFX250	304 S.S.	75	250	40210580250AA
KF50BFX500	304 S.S.	75	500	40210580500AA
KF50BFX750	304 S.S.	75	750	40210580750AA
KF50BFX1000	304 S.S.	75	1000	40210581000AA

KF Flexible Hoses



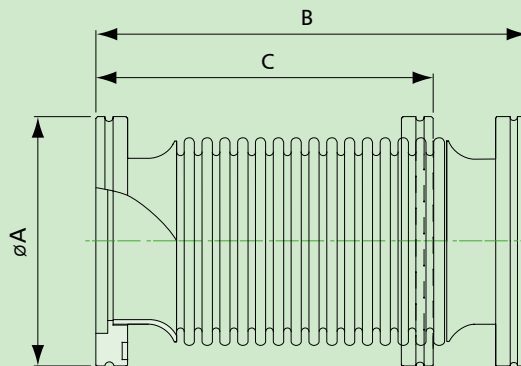
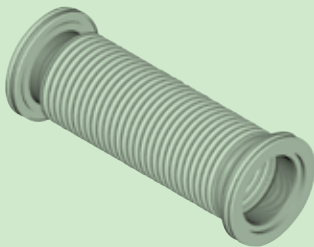
Model No.	Material	A	B	Parts No.
KF16FX250	304 S.S.	30	250	40010550250AA
KF16FX500	304 S.S.	30	500	40010550500AA
KF16FX750	304 S.S.	30	750	40010550750AA
KF16FX1000	304 S.S.	30	1000	40010551000AA
KF25FX250	304 S.S.	40	250	40010560250AA
KF25FX500	304 S.S.	40	500	40010560500AA
KF25FX750	304 S.S.	40	750	40010560750AA
KF25FX1000	304 S.S.	40	1000	40010561000AA
KF40FX250	304 S.S.	55	250	40010570250AA
KF40FX500	304 S.S.	55	500	40010570500AA
KF40FX750	304 S.S.	55	750	40010570750AA
KF40FX1000	304 S.S.	55	1000	40010571000AA
KF50FX250	304 S.S.	75	250	40010580250AA
KF50FX500	304 S.S.	75	500	40010580500AA
KF50FX750	304 S.S.	75	750	40010580750AA
KF50FX1000	304 S.S.	75	1000	40010581000AA

KF Compressible Bellows Connections



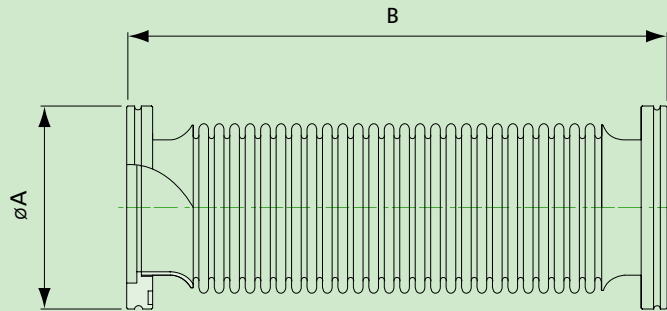
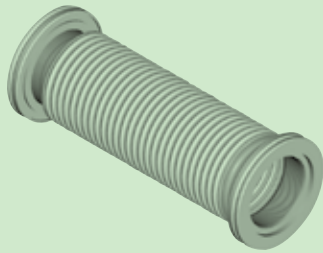
Model No.	Material	A	B	C	Parts No.
Excluding Bellows					
KF10FXC100	304 S.S.	30	100	80	40310410100AA
KF16FXC100	304 S.S.	30	100	80	40310430100AA
KF25FXC100	304 S.S.	40	100	80	40310440100AA
KF40FXC100	304 S.S.	55	100	80	40310450100AA
KF50FXC100	304 S.S.	75	100	80	40310460100AA

ISO Compressible Bellows Connections

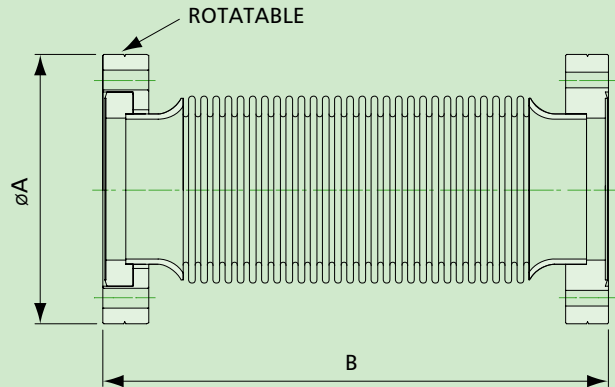
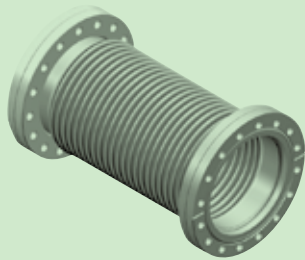


Model No.	Material	A	B	C	Parts No.
Excluding Bellows					
ISO63FXC140	304 S.S.	95	140	125	40310470140BB
ISO80FXC187	304 S.S.	110	187	160	40310480187BB
ISO100FXC187	304 S.S.	130	187	160	40310490187BB

ISO Flexible Hoses

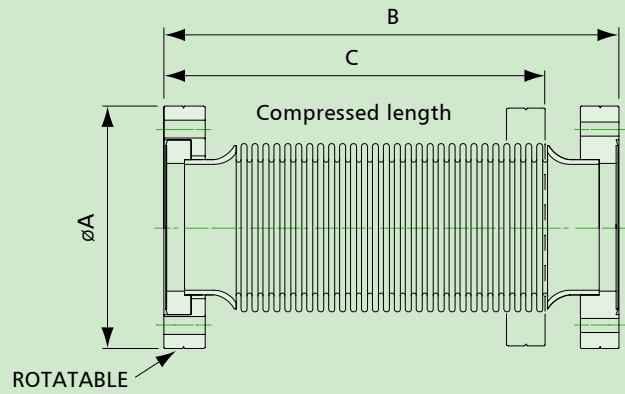
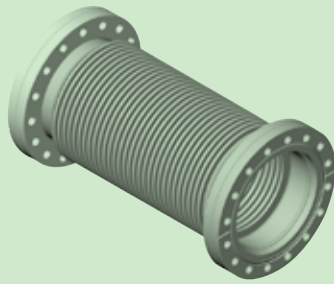


Model No.	Material	A	B	Parts No.
ISO63FX250	304 S.S.	95	250	40310670250BB
ISO63FX500	304 S.S.	95	500	40310670500BB
ISO63FX750	304 S.S.	95	750	40310670750BB
ISO63FX1000	304 S.S.	95	1000	40310671000BB
ISO80FX250	304 S.S.	110	250	40310680250BB
ISO80FX500	304 S.S.	110	500	40310680500BB
ISO80FX750	304 S.S.	110	750	40310680750BB
ISO80FX1000	304 S.S.	110	1000	40310681000BB
ISO100FX250	304 S.S.	130	250	40310690250BB
ISO100FX500	304 S.S.	130	500	40310690500BB
ISO100FX750	304 S.S.	130	750	40310690750BB
ISO100FX1000	304 S.S.	130	1000	40310691000BB

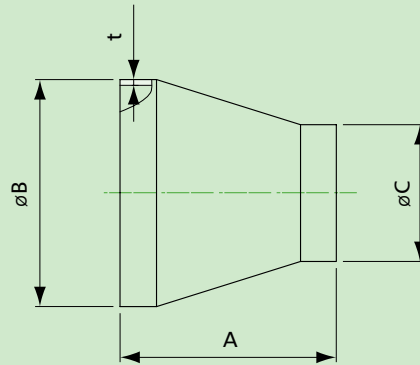
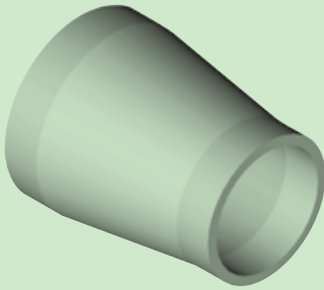
CF Flexible Hoses-1 Flange Rotatable

Model No.	Material	A	B	Parts No.
CF16FX250R	304 S.S.	33.8	250	40010550250FH
CF16FX500R	304 S.S.	33.8	500	40010550500FH
CF16FX750R	304 S.S.	33.8	750	40010550750FH
CF16FX1000R	304 S.S.	33.8	1000	40010551000FH
CF35FX250R	304 S.S.	69.5	250	40010570250FH
CF35FX500R	304 S.S.	69.5	500	40010570500FH
CF35FX750R	304 S.S.	69.5	750	40010570750FH
CF35FX1000R	304 S.S.	69.5	1000	40010571000FH
CF63FX250R	304 S.S.	113.6	250	40310670250FH
CF63FX500R	304 S.S.	113.6	500	40310670500FH
CF63FX750R	304 S.S.	113.6	750	40310670750FH
CF63FX1000R	304 S.S.	113.6	1000	40310671000FH
CF100FX250R	304 S.S.	151.6	250	40310690250FH
CF100FX500R	304 S.S.	151.6	500	40310690500FH
CF100FX750R	304 S.S.	151.6	750	40310690750FH
CF100FX1000R	304 S.S.	151.6	1000	40310691000FH

CF Compressible Bellows Connections-1 Flange Rotatable

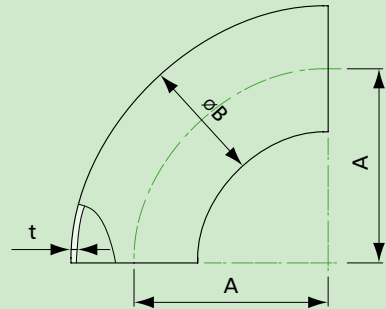
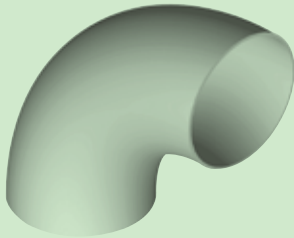


Model No.	Material	A	B	C	Parts No.
Excluding Bellows					
CF16FXC150R	304 S.S.	33.8	150	130	40310430150FH
CF35FXC180R	304 S.S.	69.5	180	160	40310450180FH
CF63FXC210R	304 S.S.	113.6	210	190	40310470210FH
CF100FXC270R	304 S.S.	151.6	270	250	40310490270FH

Conical Reducers

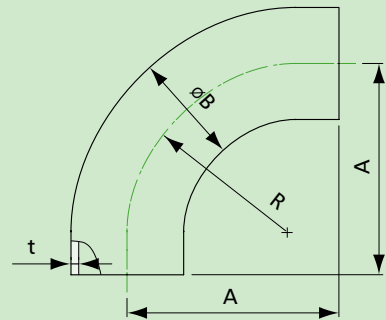
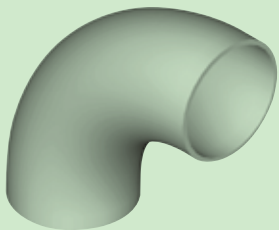
Model No.	Material	A	B	C	t	Parts No.
25-16CR	304 S.S.	35	25.4	19.05	1.5	16230030024
40-16CR	304 S.S.	60.3	38.1	19.05	1.65	16230050024
40-25CR	304 S.S.	60.3	38.1	25.4	1.65	16230050034
50-25CR	304 S.S.	60.3	50.8	25.4	1.65	16230060034
50-40CR	304 S.S.	60.3	50.8	38.1	1.65	16230060054
63-40CR	304 S.S.	60.3	63.5	38.1	1.65	16230070054
63-50CR	304 S.S.	60.3	63.5	50.8	1.65	16230070064
80-50CR	304 S.S.	92	76.2	50.8	1.65	16230080064
80-63CR	304 S.S.	92	76.2	63.5	1.65	16230080074
100-50CR	304 S.S.	92	101.6	50.8	2.5	16230090064
100-63CR	304 S.S.	92	101.6	63.5	2.5	16230090074
100-80CR	304 S.S.	92	101.6	76.2	2.5	16230090084
150-80CR	304 S.S.	152.4	152.4	76.2	3	16230110084
150-100CR	304 S.S.	152.4	152.4	101.6	3	16230110094

90° Elbows

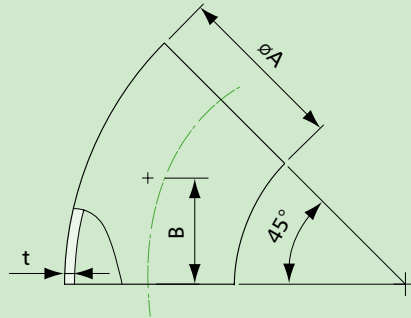


Model No.	Material	A	B	t	Parts No.
16EL90A	304 S.S.	28.6	19.05	1.65	16030020024
25EL90A	304 S.S.	38.1	25.4	1.65	16030030034
40EL90A	304 S.S.	57.2	38.1	1.65	16030050054
50EL90A	304 S.S.	76.2	50.8	1.65	16030060064
63EL90A	304 S.S.	95.2	63.5	1.65	16030070074
80EL90A	304 S.S.	114.3	76.2	1.65	16030080084
100EL90A	304 S.S.	152.4	101.6	2	16030090094
150EL90A	304 S.S.	228.6	152.4	2.7	16030110114

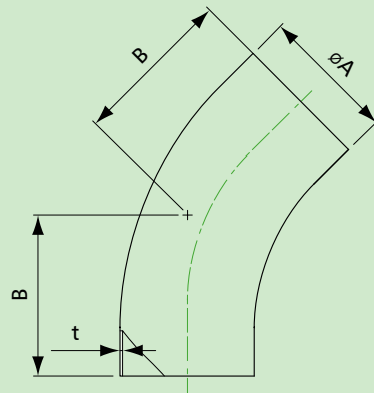
90° Elbows with Tangents



Model No.	Material	A	B	R	t	Parts No.
16ELT90A	304 S.S.	34.5	19.05	28.6	1.65	16240020024
25ELT90A	304 S.S.	52.4	25.4	38.1	1.65	16240030034
40ELT90A	304 S.S.	74.6	38.1	57.2	1.65	16240050054
50ELT90A	304 S.S.	103.2	50.8	76.2	1.65	16240060064
63ELT90A	304 S.S.	131.8	63.5	95.3	1.65	16240070074
80ELT90A	304 S.S.	160.3	76.2	114.3	1.65	16240080084
100ELT90A	304 S.S.	211.1	101.6	152.4	2	16240090094

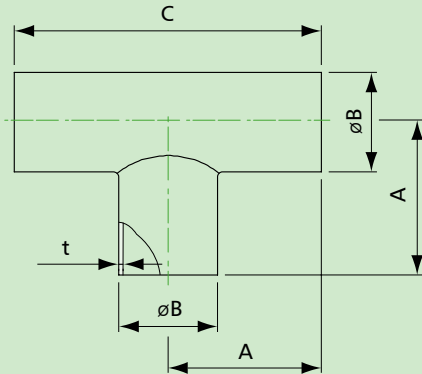
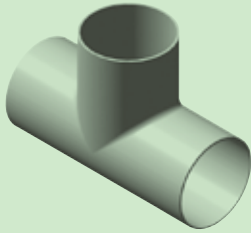
45° Elbows

Model No.	Material	A	B	t	Parts No.
16EL45A	304 S.S.	19.05	10.8	1.65	16070020024
25EL45A	304 S.S.	25.4	15.9	1.65	16070030034
40EL45A	304 S.S.	38.1	23.8	1.65	16070050054
50EL45A	304 S.S.	50.8	31.8	1.65	16070060064
63EL45A	304 S.S.	63.5	39.7	1.65	16070070074
80EL45A	304 S.S.	76.2	47.6	1.65	16070080084
100EL45A	304 S.S.	101.6	63.5	2	16070090094

45° Elbows with Tangents

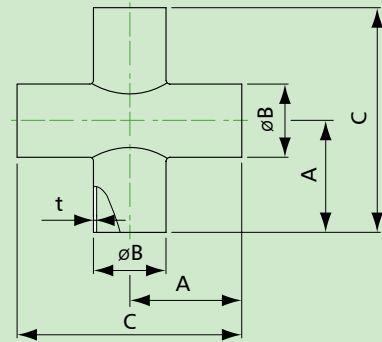
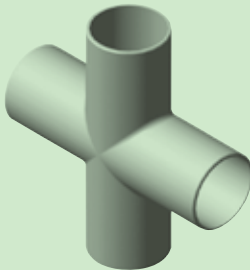
Model No.	Material	A	B	t	Parts No.
16ELT45A	304 S.S.	19.05	19.3	1.65	16250020024
25ELT45A	304 S.S.	25.4	30.2	1.65	16250030034
40ELT45A	304 S.S.	38.1	41.3	1.65	16250050054
50ELT45A	304 S.S.	50.8	58.7	1.65	16250060064
63ELT45A	304 S.S.	63.5	76.2	1.65	16250070074
80ELT45A	304 S.S.	76.2	93.7	1.65	16250080084
100ELT45A	304 S.S.	101.6	122.2	2	16250090094

Tees



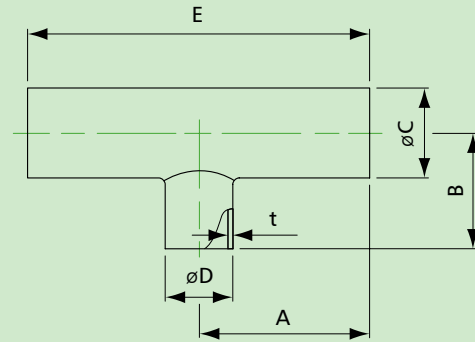
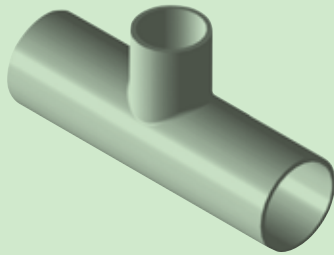
Model No.	Material	A	B	C	t	Parts No.
16TA	304 S.S.	34.5	19.05	69	1.65	16150020024
25TA	304 S.S.	47.6	25.4	95.2	1.65	16150030034
40TA	304 S.S.	57.2	38.1	114.3	1.65	16150050054
50TA	304 S.S.	76.2	50.8	152.4	1.65	16150060064
63TA	304 S.S.	76.2	63.5	152.4	1.65	16150070074
80TA	304 S.S.	82.5	76.2	165.1	1.65	16150080084
100TA	304 S.S.	98.4	101.6	196.8	2	16150090094
150TA	304 S.S.	127	152.4	254	2.7	16150110114

4-Way Crosses



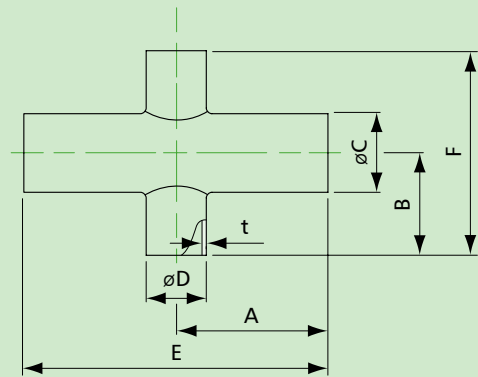
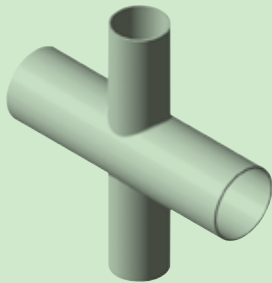
Model No.	Material	A	B	C	t	Parts No.
16XA	304 S.S.	34.5	19.05	69	1.65	16190020024
25XA	304 S.S.	47.6	25.4	95.2	1.65	16190030034
40XA	304 S.S.	57.2	38.1	114.3	1.65	16190050054
50XA	304 S.S.	76.2	50.8	152.4	1.65	16190060064
63XA	304 S.S.	76.2	63.5	152.4	1.65	16190070074
80XA	304 S.S.	82.5	76.2	165.1	1.65	16190080084
100XA	304 S.S.	98.4	101.6	196.8	2	16190090094
150XA	304 S.S.	127	152.4	254	2.7	16190110114

Unequal Tees

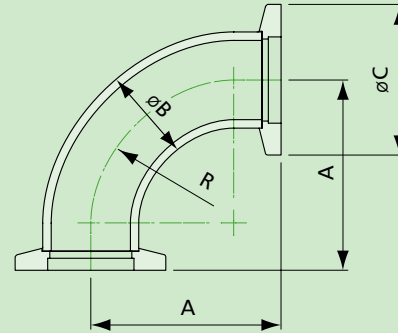


Model No.	Material	A	B	C	D	E	t	Parts No.
25UT16A	304 S.S.	48.2	33.7	25.4	19.05	96.4	1.65	16170030024
40UT16A	304 S.S.	57.2	48.2	38.1	19.05	114.3	1.65	16170050024
40UT25A	304 S.S.	57.2	54	38.1	25.4	114.3	1.65	16170050034
50UT16A	304 S.S.	76.2	54.4	50.8	19.05	152.4	1.65	16170060024
50UT25A	304 S.S.	76.2	60.3	50.8	25.4	152.4	1.65	16170060034
50UT40A	304 S.S.	76.2	63.5	50.8	38.1	152.4	1.65	16170060054
80UT63A	304 S.S.	82.5	82.5	76.2	63.5	165	1.65	16170080074
100UT50A	304 S.S.	98.4	101.6	101.6	50.8	196.8	2	16170090064
100UT63A	304 S.S.	98.4	95.3	101.6	63.5	196.8	2	16170090074
100UT80A	304 S.S.	98.4	95.3	101.6	76.2	196.8	2	16170090084
150UT80A	304 S.S.	127	120.7	152.4	76.2	254	2.77	16170110084
150UT100A	304 S.S.	127	123.8	152.4	101.6	254	2.77	16170110094

Unequal 4-Ways Crosses



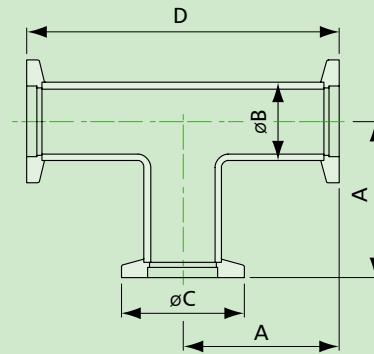
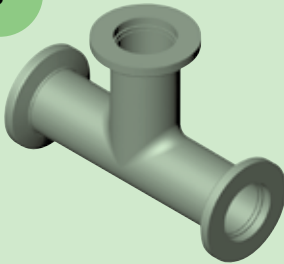
Model No.	Material	A	B	C	D	E	F	t	Parts No.
25UX16A	304 S.S.	48.2	33.7	25.4	19.05	96.4	67.4	1.65	16210030024
40UX16A	304 S.S.	57.2	48.2	38.1	19.05	114.3	96.4	1.65	16210050024
40UX25A	304 S.S.	57.2	54	38.1	25.4	114.3	108	1.65	16210050034
50UX16A	304 S.S.	76.2	54.4	50.8	19.05	152.4	108.8	1.65	16210060024
50UX25A	304 S.S.	76.2	60.3	50.8	25.4	152.4	120.6	1.65	16210060034
50UX40A	304 S.S.	76.2	63.5	50.8	38.1	152.4	127	1.65	16210060054
80UX63A	304 S.S.	82.5	82.5	76.2	63.5	165	165	1.65	16210080074
100UX50A	304 S.S.	98.4	101.6	101.6	50.8	196.8	203.2	2	16210090064
100UX63A	304 S.S.	98.4	95.3	101.6	63.5	196.8	190.6	2	16210090074
100UX80A	304 S.S.	98.4	95.3	101.6	76.2	196.8	190.6	2	16210090084
150UX80A	304 S.S.	127	120.7	152.4	76.2	254	241.4	2.77	16210110084
150UX100A	304 S.S.	127	123.8	152.4	101.6	254	247.6	2.77	16210110094

KF 90° Elbows

Model No.	Available Area	Material	A	B	C	R	Parts No.
KF16EL90A	USA	304 S.S.	38.3	19.05	30	28.6	16031021024
KF25EL90A	USA	304 S.S.	56.2	25.4	40	38.1	16031031034
KF40EL90A	USA	304 S.S.	78.4	38.1	55	57.2	16031051054
KF50EL90A	USA	304 S.S.	107	50.8	75	76.2	16031061064

Model No.	Available Area	Material	A	B	C	R	Parts No.
KF16EL90E	Europe	304 S.S.	40	19.05	30	28.6	16041021024
KF25EL90E	Europe	304 S.S.	50.8	25.4	40	38.1	16041031034
KF40EL90E	Europe	304 S.S.	65	38.1	55	57.2	16041051054
KF50EL90E	Europe	304 S.S.	80	50.8	75	76.2	16041061064

Special Size Available Upon Request

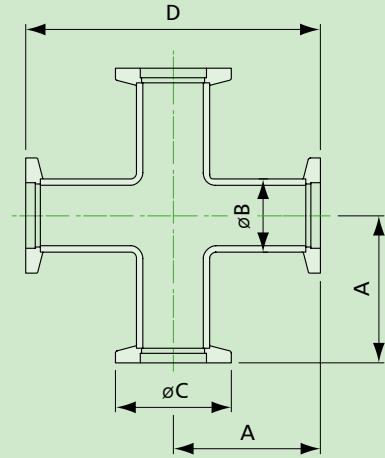
KF Tees

Model No.	Available Area	Material	A	B	C	D	Parts No.
KF16TA	USA	304 S.S.	38.3	19.05	30	76.6	16151021024
KF25TA	USA	304 S.S.	51.4	25.4	40	102.8	16151031034
KF40TA	USA	304 S.S.	61	38.1	55	122	16151051054
KF50TA	USA	304 S.S.	80	50.8	75	160	16151061064

Model No.	Available Area	Material	A	B	C	D	Parts No.
KF16TE	Europe	304 S.S.	40	19.05	30	80	16161021024
KF25TE	Europe	304 S.S.	50	25.4	40	100	16161031034
KF40TE	Europe	304 S.S.	65	38.1	55	130	16161051054
KF50TE	Europe	304 S.S.	70	50.8	75	140	16161061064

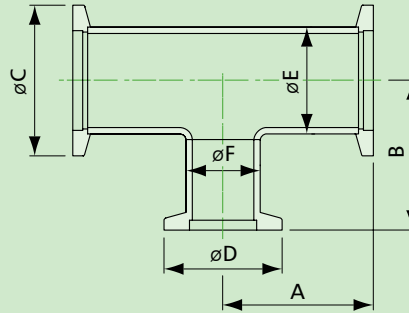
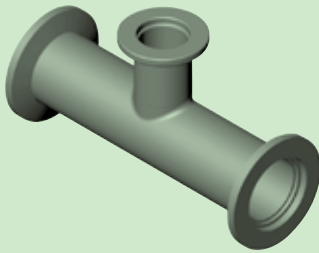
Special Size Available Upon Request

KF 4-Way Crosses



Model No.	Available Area	Material	A	B	C	D	Parts No.
KF16XA	USA	304 S.S.	38.3	19.05	30	76.6	16191021024
KF25XA	USA	304 S.S.	51.4	25.4	40	102.8	16191031034
KF40XA	USA	304 S.S.	61	38.1	55	122	16191051054
KF50XA	USA	304 S.S.	80	50.8	75	160	16191061064
Model No.	Available Area	Material	A	B	C	D	Parts No.
KF16XE	Europe	304 S.S.	40	19.05	30	80	16201021024
KF25XE	Europe	304 S.S.	50	25.4	40	100	16201031034
KF40XE	Europe	304 S.S.	65	38.1	55	130	16201051054
KF50XE	Europe	304 S.S.	70	50.8	75	140	16201061064

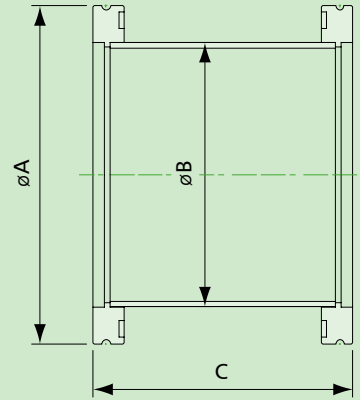
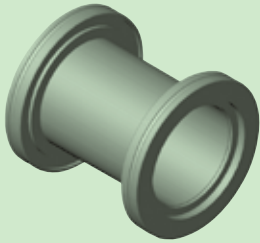
Special Size Available Upon Request

KF Unequal Tees

Model No.	Available Area	Material	A	B	C	D	E	F	Parts No.
KF25UT16A	USA	304 S.S.	52	37.5	40	30	25.4	19.05	16171031024
KF40UT16A	USA	304 S.S.	61	52	55	30	38.1	19.05	16171051024
KF40UT25A	USA	304 S.S.	61	57.8	55	40	38.1	25.4	16171051034
KF50UT16A	USA	304 S.S.	80	58.2	75	30	50.8	19.05	16171061024
KF50UT25A	USA	304 S.S.	80	64.1	75	40	50.8	25.4	16171061034
KF50UT40A	USA	304 S.S.	80	67.3	75	55	50.8	38.1	16171061054
Model No.	Available Area	Material	A	B	C	D	E	F	Parts No.
KF25UT16E	Europe	304 S.S.	50	40	40	30	25.4	19.05	16181031024
KF40UT16E	Europe	304 S.S.	65	40	55	30	38.1	19.05	16181051024
KF40UT25E	Europe	304 S.S.	65	50	55	40	38.1	25.4	16181051034
KF50UT16E	Europe	304 S.S.	70	50	75	30	50.8	19.05	16181061024
KF50UT25E	Europe	304 S.S.	70	65	75	40	50.8	25.4	16181061034
KF50UT40E	Europe	304 S.S.	70	65	75	55	50.8	38.1	16181061054

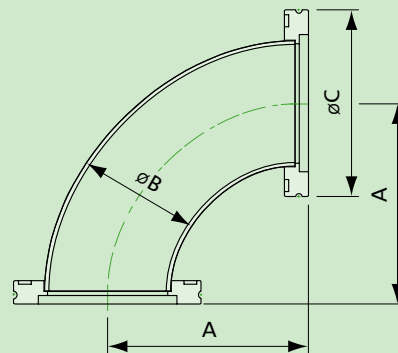
Special Size Available Upon Request

ISO Full Nipples

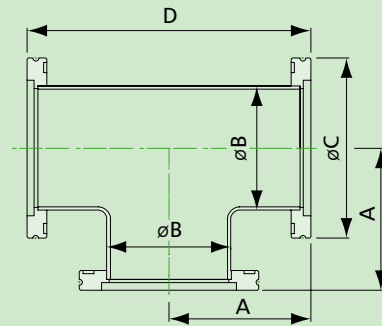
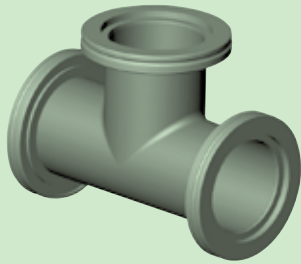


Model No.	Material	A	B	C	Parts No.
ISO63N	304 S.S.	95	63.5	100	16012072074
ISO80N	304 S.S.	110	76.2	100	16012082084
ISO100N	304 S.S.	130	101.6	100	16012092094
ISO160N	304 S.S.	180	152.4	100	16012122124
ISO200N	304 S.S.	240	203.2	100	16012132134
ISO250N	304 S.S.	290	254	100	16012142144
ISO320N	304 S.S.	370	304.8	200	16012162164
ISO400N	304 S.S.	450	406.4	200	16012182184
ISO500N	304 S.S.	550	508	200	16012202204

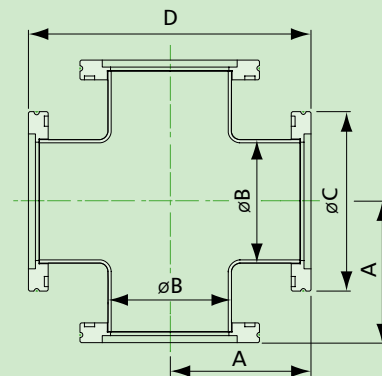
ISO 90° Elbows



Model No.	Material	A	B	C	Parts No.
ISO63EL90A	304 S.S.	138.4	63.5	95	16032072074
ISO80EL90A	304 S.S.	166.9	76.2	110	16032082084
ISO100EL90A	304 S.S.	217.7	101.6	130	16032092094
ISO160EL90A	304 S.S.	235.2	152.4	180	16032122124

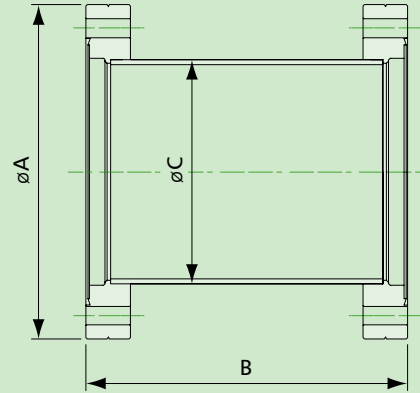
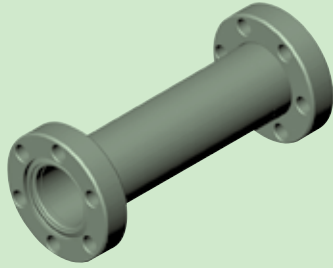
ISO Tees

Model No.	Material	A	B	C	D	Parts No.
ISO63TA	304 S.S.	82.8	63.5	95	165.6	16152072074
ISO80TA	304 S.S.	89.15	76.2	110	178.3	16152082084
ISO100TA	304 S.S.	105	101.6	130	210	16152092094
ISO160TA	304 S.S.	133.6	152.4	180	267.2	16152122124

ISO 4-Way Crosses

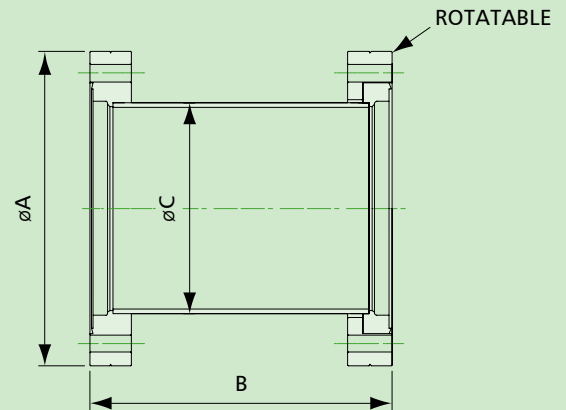
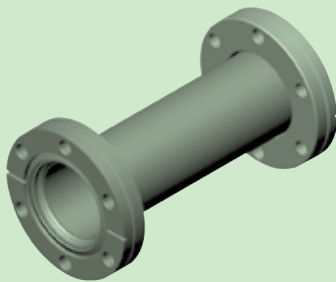
Model No.	Material	A	B	C	D	Parts No.
ISO63XA	304 S.S.	82.8	63.5	95	165.6	16192072074
ISO80XA	304 S.S.	89.15	76.2	110	178.3	16192082084
ISO100XA	304 S.S.	105	101.6	130	210	16192092094
ISO160XA	304 S.S.	133.6	152.4	180	267.2	16192122124

CF Nipples-Fixed

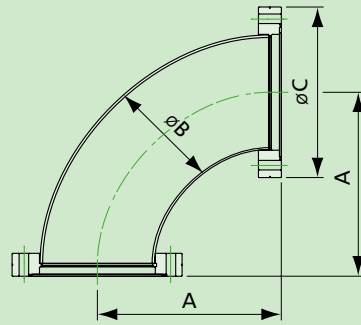
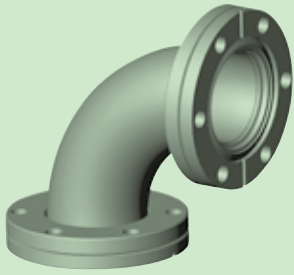


Model No.	Material	A	B	C	Parts No.
CF16N	304 S.S.	33.8	76	19.05	16018028024
CF35N	304 S.S.	69.5	126	38.1	16018048044
CF63N	304 S.S.	113.6	210	63.5	16018078074
CF100N	304 S.S.	151.6	270	101.6	16018098094
CF150N	304 S.S.	202.5	334	152.4	16018118114
CF200N	304 S.S.	253.2	334	203.2	16018138134

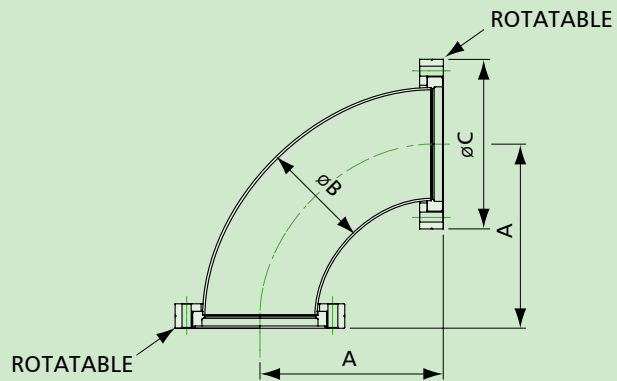
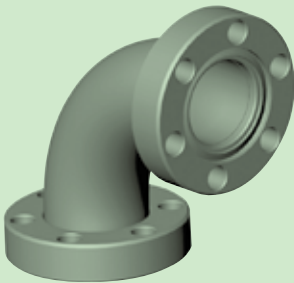
CF Nipples-1 Flange Rotatable



Model No.	Material	A	B	C	Parts No.
CF16NR	304 S.S.	33.8	76	19.05	16016028024
CF35NR	304 S.S.	69.5	126	38.1	16016048044
CF63NR	304 S.S.	113.6	210	63.5	16016078074
CF100NR	304 S.S.	151.6	270	101.6	16016098094
CF150NR	304 S.S.	202.5	334	152.4	16016118114
CF200NR	304 S.S.	253.2	334	203.2	16016138134

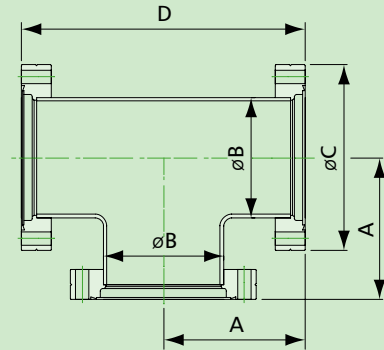
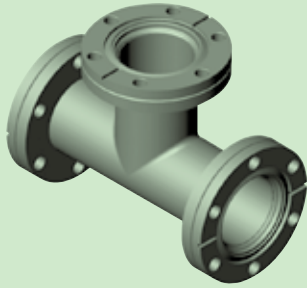
CF90° Elbows-Fixed

Model No.	Material	A	B	C	Parts No.
CF16EL90	304 S.S.	37.5	19.05	33.8	16038028024
CF35EL90	304 S.S.	79.9	38.1	69.5	16038048044
CF63EL90	304 S.S.	141.3	63.5	113.6	16038078074
CF100EL90	304 S.S.	222.2	101.6	151.6	16038098094
CF150EL90	304 S.S.	241.3	152.4	202.5	16038118114

CF90° Elbows-Rotatable

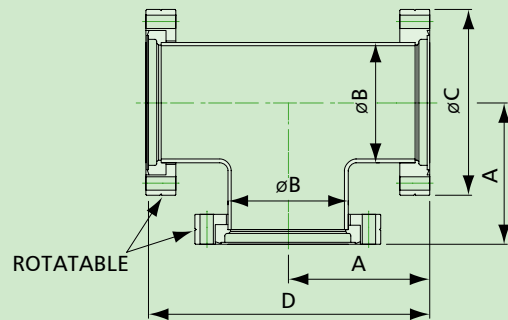
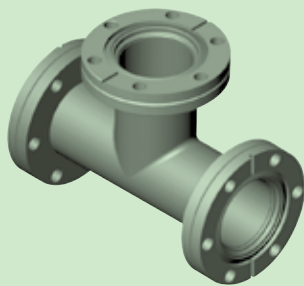
Model No.	Material	A	B	C	Parts No.
CR16EL90	304 S.S.	47.2	19.05	33.8	16036026024
CR35EL90	304 S.S.	79.9	38.1	69.5	16036046044
CR63EL90	304 S.S.	141.3	63.5	113.6	16036076074
CR100EL90	304 S.S.	222.2	101.6	151.6	16036096094
CR150EL90	304 S.S.	241.3	152.4	202.5	16036116114

CF Tees-Fixed

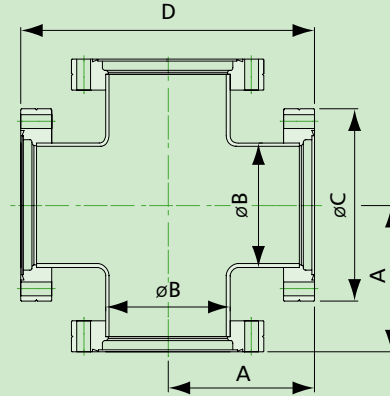
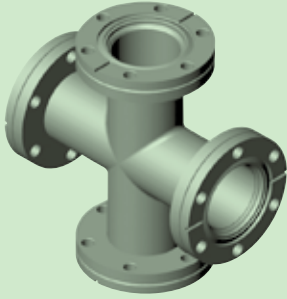


Model No.	Material	A	B	C	D	Parts No.
CF16T	304 S.S.	37.5	19.05	33.8	75	16158028024
CF35T	304 S.S.	62.5	38.1	69.5	125	16158048044
CF63T	304 S.S.	85.7	63.5	113.6	171.4	16158078074
CF100T	304 S.S.	109.5	101.6	151.6	219	16158098094
CF150T	304 S.S.	139.7	152.4	202.5	279.4	16158118114

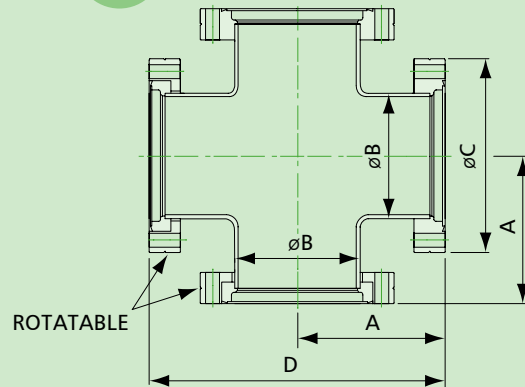
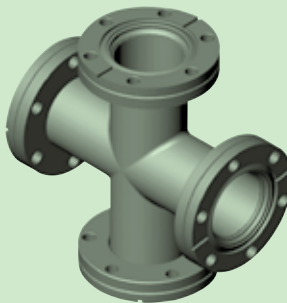
CF Tees-2 Flanges Rotatable



Model No.	Material	A	B	C	D	Parts No.
CR16T	304 S.S.	47.2	19.05	33.8	94.4	16156028024
CR35T	304 S.S.	62.5	38.1	69.5	125	16156048044
CR63T	304 S.S.	85.7	63.5	113.6	171.4	16156078074
CR100T	304 S.S.	109.5	101.6	151.6	219	16156098094
CR150T	304 S.S.	139.7	152.4	202.5	279.4	16156118114

CF 4 Way Crosses-Fixed

Model No.	Material	A	B	C	D	Parts No.
CF16X	304 S.S.	37.5	19.05	33.8	75	16198028024
CF35X	304 S.S.	62.5	38.1	69.5	125	16198048044
CF63X	304 S.S.	85.7	63.5	113.6	171.4	16198078074
CF100X	304 S.S.	109.5	101.6	151.6	219	16198098094
CF150X	304 S.S.	139.7	152.4	202.5	279.4	16198118114

CF 4 Way Crosses-2 Flanges Rotatable

Model No.	Material	A	B	C	D	Parts No.
CR16X	304 S.S.	47.2	19.05	33.8	94.4	16196028024
CR35X	304 S.S.	62.5	38.1	69.5	125	16196048044
CR63X	304 S.S.	85.7	63.5	113.6	171.4	16196078074
CR100X	304 S.S.	109.5	101.6	151.6	219	16196098094
CR150X	304 S.S.	139.7	152.4	202.5	279.4	16196118114