

[NCB EXPANSION JOINTS]

Normal Corr expansion joints employ a standardized bellows design ideally suited for general industrial applications. Offered with flanges or butt weld ends from 3" to 48" nominal diameter for design pressures to 300 psig at 650°F. Larger diameters are available (consult factory).

How to order:
Example P/N

DIA	STYLE	ENDS	PRESSURE	CONS	LINER	COVER
8	NCB	FF	300	6	L	C

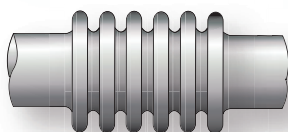
NORMAL CORR DATA

	SINGLE
Size Range	3" to 48" NPS *
Allowable Pressure	Vacuum to 300 psig
Stainless Steel Bellows	
Temperature Limits	-20F to 650F. **
Stainless Steel Bellows	
Axial Traverse	See Data Sheets
Lateral Motion	See Data Sheets

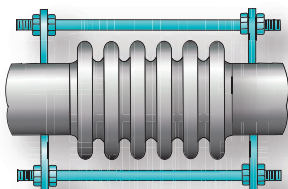
* For sizes larger than 48" consult factory for information.

** With special alloys, temperatures of minus 425°F. to plus 1600°F. can be handled.

STYLE

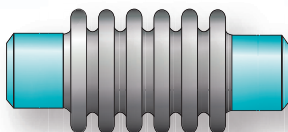


NCB SINGLE

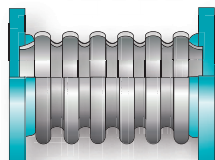


NCB TIED

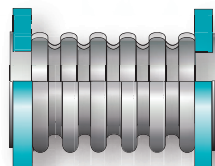
END CONNECTION



WW WELD END



FF FLANGED END



VV VANSTONE END

Please consult factory
for floating flanges

MATERIALS OF CONSTRUCTION

BELLOWS: ASTM A240 T316L (standard)

• Other materials available (see page 12)

PIPE: ASTM A53/A106

50 lb. Series: Sch. 40

150 lb. Series: Sch. 40

300 lb. Series: Sch. 40

FLANGES: A516-70 Plate & A105

50 lb. Series: 150 lb. ANSI B16.5 R.F.S.O.

150 lb. Series: 150 lb. ANSI B16.5 R.F.S.O.

300 lb. Series: 300 lb. ANSI B16.5 R.F.S.O.

COVERS: Carbon Steel

TIE RODS: Carbon Steel

LINERS: 300 Series Stainless Steel

1. Rated cycle life is 2000 cycles per EJMA 10th edition for any one movement tabulated.
2. To combine axial, lateral, and angular movements, refer to page 7.
3. Maximum axial extension movement is 10% of tabulated axial value.
4. To obtain greater movements or cycle life, contact the factory.
5. Catalogue pressure ratings are based upon a maximum bellows temperature of 650°F. Actual operating temperature should always be specified. Consult factory for higher temperature ratings. For special alloys see chart on page 12.
6. Maximum test pressure: 1 1/2 x maximum working pressure.

[NCB EXPANSION JOINTS]

Nominal Diameter (in)	Effective Area (in ²)	Max WP (psig)	No. of Conv.	Non-Concurrent Movement			Spring Rate			Ends WW		Ends FF	
				Axial (in)	Lateral (in)	Angular (deg)	Axial (lb/in)	Lateral (lb/in)	Angular (in-lb/deg)	OAL (in)	Weight (lb)	OAL (in)	Weight (lb)
3	12	50	5	0.45	0.08	10.00	1,338	6,503	45	7.19	4.08	4.56	16.92
			10	0.90	0.33	10.00	669	813	23	9.38	4.50	6.75	17.34
			15	1.35	0.75	10.00	446	241	15	11.56	4.92	8.94	17.76
			20	1.80	1.33	4.50	335	102	11	13.75	5.33	11.13	18.18
3	11.4	150	5	0.33	0.06	9.00	3,450	15,719	109	7.19	4.30	4.56	17.14
			10	0.65	0.25	10.00	1,725	1,965	55	9.38	4.68	6.75	17.53
			15	0.98	0.56	10.00	1,150	582	36	11.56	5.07	8.94	17.91
			20	1.31	1.00	1.00	862	246	27	13.75	5.45	11.13	18.29
3	12	300	5	0.26	0.05	6.50	4,480	21,773	152	7.19	4.54	5.56	27.38
			10	0.52	0.19	9.00	2,240	2,722	76	9.38	5.15	7.75	28.00
			15	0.69	0.39	7.50	1,845	981	61	11.56	5.59	9.94	28.43
			20	0.81	0.61	1.00	1,739	512	57	13.75	5.90	12.13	28.74
3.5	15.5	50	5	0.44	0.07	10.00	1,502	9,274	65	7.19	4.85	4.69	23.05
			10	0.88	0.29	10.00	751	1,159	32	9.38	5.33	6.88	23.53
			15	1.32	0.65	10.00	501	343	22	11.56	5.80	9.06	24.01
			20	1.75	1.15	6.50	376	145	16	13.75	6.28	11.25	24.48
3.5	15	150	5	0.28	0.05	6.50	3,548	21,443	149	7.19	4.97	4.69	23.18
			10	0.57	0.19	10.00	1,774	2,680	75	9.38	5.46	6.88	23.66
			15	0.85	0.42	10.00	1,183	794	50	11.56	5.94	9.06	24.15
			20	1.13	0.75	1.00	887	335	37	13.75	6.43	11.25	24.63
3.5	15	300	5	0.21	0.04	5.00	7,054	42,627	297	7.19	5.26	5.69	35.47
			10	0.43	0.14	7.50	3,527	5,328	148	9.38	5.86	7.88	36.07
			15	0.64	0.32	7.50	2,351	1,579	99	11.56	6.46	10.06	36.67
			20	0.85	0.57	1.00	1,764	666	74	13.75	7.06	12.25	37.27
4	20	50	5	0.539	0.079	10.00	1,144	8,963	62	7.19	5.79	4.81	27.29
			10	1.078	0.314	10.00	572	1,120	31	9.38	6.43	7.00	27.93
			15	1.617	0.708	10.00	381	332	21	11.56	7.07	9.19	28.57
			20	2.156	1.258	0.50	286	140	16	13.75	7.71	11.38	29.22
4	20	150	5	0.331	0.048	7.00	3,921	30,731	214	7.19	6.42	4.81	27.93
			10	0.662	0.193	10.00	1,961	3,841	107	9.38	7.37	7.00	28.88
			15	0.993	0.434	10.00	1,307	1,138	71	11.56	8.33	9.19	29.83
			20	1.324	0.772	3	980	480	53	13.75	9.28	11.38	30.78
4	20	300	5	0.263	0.038	5.50	6,932	54,327	378	7.19	6.80	5.69	36.31
			10	0.525	0.153	8.50	3,466	6,791	189	9.38	7.94	7.88	37.44
			15	0.788	0.345	8.5	2310	2,012	126	11.56	9.07	10.06	38.58
			20	1.050	0.613	0.5	1733	849	95	13.75	10.21	12.25	39.71

Materials:

Bellows --ASTM A240 - T316L. For alternate materials refer to page 12

Flanges: See pages 9,10,11

Pipe: ASTM A53/A106

Materials of construction may be changed to meet specific requirements (consult factory).

Test Pressure is 1.5 times operating pressure.

End Fittings are available in a variety of combinations and materials.

See Page 7 for calculations of concurrent movements.

Standard NCB Expansion Joints to operate at 650 deg F at pressures indicated.

Standard expansion joints are rated for 2000 cycles for non concurrent movements.

To obtain greater movement or cycle life contact the factory.

Larger diameter, higher pressure and temperature expansion joints are available (consult factory).

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Nominal Diameter (in)	Effective Area (in ²)	Max WP (psig)	No. of Conv.	Non-Concurrent Movement			Spring Rate			Ends WW		Ends FF	
				Axial (in)	Lateral (in)	Angular (deg)	Axial (lb/in)	Lateral (lb/in)	Angular (in-lb/deg)	OAL (in)	Weight (lb)	OAL (in)	Weight (lb)
5	29	50	5	0.52	0.06	9.00	1,391	16,021	111	7.19	7.68	5.06	31.6
			10	1.05	0.25	10.00	695	2,003	56	9.38	8.48	7.25	32.4
			15	1.57	0.57	10.00	464	593	37	11.56	9.27	9.44	33.2
			20	2.09	1.01	3.50	348	250	28	13.75	10.06	11.63	34.0
5	29	150	5	0.33	0.04	5.50	4,834	55,686	388	7.2	8.5	5.1	32.4
			10	0.65	0.16	9.50	2,417	6,961	194	9.4	9.6	7.3	33.6
			15	0.98	0.35	10.00	1,611	2,062	129	11.6	10.8	9.4	34.7
			20	1.30	0.63	6.00	1,209	870	97	13.8	12.0	11.6	35.9
5	29	300	5	0.34	0.04	5.50	6,728	76,710	534	7.2	9.8	6.2	59.7
			10	0.68	0.16	9.50	3,364	9,589	267	9.4	11.5	8.4	61.4
			15	1.02	0.37	8.00	2,243	2,841	178	11.6	13.2	10.6	63.1
			20	1.36	0.66	0.00	1,682	1,199	133	13.8	15.0	12.8	64.9
6	41	50	5	0.72	0.10	10.00	1,572	12,637	179	9.1	17.1	7.3	85.6
			10	1.44	0.41	10.00	786	1,580	90	12.3	21.1	10.4	89.6
			15	2.15	0.93	9.50	524	468	60	15.4	25.2	13.5	93.7
			20	2.87	1.65	0.00	393	197	45	18.5	29.2	16.6	97.7
6	41	150	5	0.44	0.06	6.00	5,272	42,383	602	9.1	12.0	6.3	40.5
			10	0.87	0.25	10.00	2,636	5,298	301	12.3	13.3	9.4	41.8
			15	1.31	0.56	10.00	1,757	1,570	201	15.4	14.6	12.5	43.1
			20	1.74	1.00	1.50	1,318	662	150	18.5	15.9	15.6	44.4
6	41	300	5	0.41	0.06	6.00	11,570	93,415	1,327	9.1	13.2	6.3	41.7
			10	0.82	0.24	10.00	5,785	11,677	663	12.3	15.2	9.4	43.7
			15	1.24	0.53	10	3857	3460	442	15.4	17.1	12.5	45.6
			20	1.65	0.95	3.5	2893	1460	332	18.5	19.1	15.6	47.6
8	67	50	5	0.72	0.08	8.00	1,843	24,215	344	9.1	17.6	6.6	63.3
			10	1.43	0.32	10.00	921	3,027	172	12.3	19.4	9.8	65.1
			15	2.15	0.73	10.00	614	897	115	15.4	21.1	12.9	66.9
			20	2.87	1.29	2.00	461	378	86	18.5	22.9	16.0	68.6
8	66.7	150	5	0.62	0.07	7.50	4,747	61,964	880	9.1	20.7	6.6	66.4
			10	1.25	0.28	10.00	2,373	7,745	440	12.3	24.0	9.8	69.7
			15	1.87	0.63	10.00	1,582	2,295	293	15.4	27.2	12.9	73.0
			20	2.49	1.13	10.00	1,187	968	220	18.5	30.5	16.0	76.3
8	66.7	300	5	0.46	0.05	5	9622	125605	1784	9.1	22.2	8.0	124.0
			10	0.91	0.21	8.00	4,811	15,701	892	12.3	26.3	11.1	128.0
			15	1.37	0.46	7.5	3207	4652	595	15.4	30.4	14.3	132.1
			20	1.83	0.83	0.00	2,406	1,963	446	18.5	34.5	17.4	136.2

Materials:

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Flanges: See pages 9,10,11

Pipe: ASTM A53/A106

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				Axial (in)	Lateral (in)	Angular (deg)	Axial (lb/in)	Lateral (lb/in)	Angular (in-lb/deg)	OAL (in)	Weight (lb)	OAL (in)	Weight (lb)
10	108	50	5	1.44	0.18	10.00	1,152	12,466	347	16.4	47.6	8.3	91.1
			10	2.89	0.72	7.50	576	1,558	174	17.3	48.6	9.1	92.1
			14	4.04	1.40	0.50	411	568	124	20.8	52.2	12.6	95.8
10	108	150	5	0.82	0.10	7.00	4,693	50,777	1,414	12.9	46.0	4.8	89.5
			10	1.65	0.41	10.00	2,347	6,347	707	16.4	51.8	8.3	95.4
			14	2.30	0.80	4.00	1,676	2,313	505	19.9	57.7	11.8	101.2
10	108	300	5	0.62	0.08	5	9348	101137	2816	24.25	65.03	16.13	108.55
			10	1.25	0.31	7.50	4,674	12,642	1,408	16.38	54.63	9.63	178.15
			14	1.75	0.61	4.00	3,338	4,607	1,006	20.75	63.72	14.00	187.24
12	151.26	50	4	1.12	0.09	8.50	2,073	48,870	871	15.5	59	7.5375	138
			8	2.25	0.38	10.00	1,037	6,109	435	19	65	11.0375	144
			12	3.37	0.85	7.50	691	1,810	290	22.5	71	14.5375	150
			16	4.49	1.51	1.50	518	764	218	26	78	18.0375	156
12	150.50	150	4	0.75	0.06	5.50	5,382	126,293	2,250	15.5	62	7.5375	141
			8	1.50	0.25	9.50	2,691	15,787	1,125	19	70	11.0375	148
			12	2.25	0.57	5.50	1,794	4,678	750	22.5	78	14.5375	156
			16	3.00	1.01	0.00	1,345	1,973	563	26	86	18.0375	164
12	150.60	300	4	0.57	0.05	4.00	10,704	251,194	4,475	15.5	65	9.25	246
			8	1.13	0.19	7.00	5,352	31,399	2,238	19	75	12.75	255
			12	1.70	0.43	5.50	3,568	9,303	1,492	22.5	85	16.25	265
			16	2.27	0.76	0.00	2,676	3,925	1,119	26	94	19.75	275
14	180	50	4	1.11	0.09	8.00	2,271	63,605	1,133	15.5	65	8	181
			8	2.23	0.34	10.00	1,135	7,951	567	19	72	11.5	187
			12	3.34	0.77	8.50	757	2,356	378	22.5	79	15	194
			16	4.46	1.37	2.50	568	994	283	26	85	18.5	201
14	180	150	4	0.78	0.06	5.50	5,447	152,578	2,718	15.5	69	8	184
			8	1.55	0.24	9.00	2,723	19,072	1,359	19	78	11.5	193
			12	2.33	0.54	5.00	1,816	5,651	906	22.5	86	15	202
			16	3.11	0.96	0.00	1,362	2,384	680	26	95	18.5	211
14	180	300	4	0.59	0.05	4.00	10,832	303,422	5,406	15.5	72	9.5	344
			8	1.17	0.18	6.50	5,416	37,928	2,703	19	83	13	355
			12	1.76	0.41	5.00	3,611	11,238	1,802	22.5	94	16.5	366
			16	2.35	0.72	0.00	2,708	4,741	1,352	26	105	20	377

Materials:

Bellows --ASTM A240 - T316L. For alternate materials refer to page 12

Flanges: See pages 9,10,11

Pipe: ASTM A53/A106

Materials of construction may be changed to meet specific requirements (consult factory).

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				Axial (in)	Lateral (in)	Angular (deg)	Axial (lb/in)	Lateral (lb/in)	Angular (in-lb/deg)	OAL (in)	Weight (lb)	OAL (in)	Weight (lb)
16	230.3	50	4	1.10	0.08	7.00	2,586	92,850	1,654	4	15.5	75	8.5
			8	2.20	0.30	10.00	1,293	11,606	827	8	19.0	82	12
			12	3.31	0.68	9.50	862	3,439	551	12	22.5	90	15.5
			16	4.41	1.20	3.50	646	1,451	414	16	26.0	98	19
16	230.3	150	4	0.77	0.05	4.50	6,210	223,005	3,973	4	15.5	79	8.5
			8	1.54	0.21	8.00	3,105	27,876	1,987	8	19.0	89	12
			12	2.31	0.47	6.00	2,070	8,259	1,324	12	22.5	99	15.5
			16	3.08	0.84	1.00	1,553	3,484	993	16	26.0	109	19
16	230.3	300	4	0.72	0.05	4.50	14,027	503,725	8,975	4	15.5	95	10
			8	1.44	0.20	7.50	7,014	62,966	4,487	8	19.0	115	13.5
			12	2.16	0.44	7.50	4,676	18,656	2,992	12	22.5	135	17
			16	2.88	0.78	2.50	3,507	7,871	2,244	16	26.0	156	20.5
18	286.4	50	4	1.25	0.08	7.00	1,808	80,727	1,438	15.5	81.2	8.875	251
			8	2.50	0.31	10.00	904	10,091	719	19	88.1	12.375	258
			12	3.75	0.69	4.00	603	2,990	479	22.5	95.0	15.875	265
			16	5.00	1.22	0.00	452	1,261	360	26	102.0	19.375	272
18	287.3	150	4	0.76	0.05	4.00	6,971	312,218	5,563	15.5	88.2	8.875	258
			8	1.53	0.19	7.50	3,486	39,027	2,781	19	99.6	12.375	270
			12	2.29	0.42	7.00	2,324	11,564	1,854	22.5	111.0	15.875	281
			16	3.05	0.74	2.00	1,743	4,878	1,391	26	122.4	19.375	292
18	287.3	300	4	0.71	0.04	4.00	15,746	705,221	12,565	15.5	106.3	10.5	596
			8	1.43	0.17	7.00	7,873	88,153	6,282	19	129.1	14	619
			12	2.14	0.39	8.50	5,249	26,119	4,188	22.5	152.0	17.5	642
			16	2.86	0.70	3.00	3,936	11,019	3,141	26	174.8	21	665
20	355	50	2	0.76	0.02	4.00	2,759	610,318	2,718	13.75	87.8	7.5	319
			6	2.29	0.19	10.00	920	22,604	906	17.25	97.0	11	328
			10	3.81	0.52	3.50	552	4,883	544	20.75	106.1	14.5	337
			14	5.33	1.02	0	394	1,779	388	24.25	115.2	18	347
20	355	150	2	0.44	0.01	2.00	11,483	2,539,661	11,312	13.75	93.3	7.5	325
			6	1.33	0.11	6.00	3,828	94,062	3,771	17.25	107.8	11	339
			10	2.22	0.31	7.00	2,297	20,317	2,262	20.75	122.3	14.5	354
			14	3.11	0.60	2.00	1,640	7,404	1,616	24.25	136.7	18	368
20	355	300	2	0.42	0.01	2.00	25,623	5,667,216	25,243	13.75	108.1	9.25	679
			6	1.26	0.10	6.00	8,541	209,897	8,414	17.25	137.0	12.75	708
			10	2.10	0.29	8.00	5,125	45,338	5,049	20.75	165.9	16.25	737
			14	2.94	0.56	3.00	3,660	16,522	3,606	24.25	194.9	19.75	766

Materials:

Bellows --ASTM A240 - T316L. For alternate materials refer to page 12

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[NCB EXPANSION JOINTS]

Nominal Diameter (in)	Effective Area (in ²)	Max WP (psig)	No. of Conv.	Non-Concurrent Movement			Spring Rate			Ends WW		Ends FF	
				Axial (in)	Lateral (in)	Angular (deg)	Axial (lb/in)	Lateral (lb/in)	Angular (in-lb/deg)	OAL (in)	Weight (lb)	OAL (in)	Weight (lb)
22	425	50	4	1.51	0.08	6.50	1,514	100,197	1,785	15.5	105	9.75	333
			8	3.03	0.30	7.00	757	12,525	893	19	115	13.25	343
			12	4.54	0.68	2.00	505	3,711	595	22.5	125	16.75	353
			14	5.30	0.93	0.50	432	2,337	510	24.25	130	18.5	358
22	425	150	4	0.89	0.04	4.00	6,302	417,138	7,432	15.5	114	9.75	342
			8	1.77	0.18	7.00	3,151	52,142	3,716	19	130	13.25	358
			12	2.66	0.40	4.50	2,101	15,450	2,477	22.5	146	16.75	374
			14	3.10	0.54	2.50	1,801	9,729	2,123	24.25	154	18.5	382
22	425	300	4	0.84	0.04	3.50	14,062	930,780	16,584	15.5	138	11.5	914
			8	1.67	0.17	6.50	7,031	116,347	8,292	19	170	15	946
			12	2.51	0.38	5.50	4,687	34,473	5,528	22.5	202	18.5	978
			14	2.93	0.51	3.50	4,018	21,709	4,738	24.25	218	20.25	994
24	501	50	4	1.50	0.07	6.00	1,647	128,616	2,292	15.5	111	10.5	437
			8	3.01	0.28	7.50	824	16,077	1,146	19	122	14	447
			12	4.51	0.63	2.50	549	4,764	764	22.5	133	17.5	458
			14	5.26	0.85	1.00	471	3,000	655	24.25	139	19.25	464
24	501	150	4	0.88	0.04	3.50	6,861	535,667	9,544	15.5	121	10.5	446
			8	1.77	0.16	6.50	3,431	66,958	4,772	19	138	14	464
			12	2.65	0.37	5.00	2,287	19,840	3,181	22.5	156	17.5	481
			14	3.09	0.50	3.00	1,960	12,494	2,727	24.25	164	19.25	490
24	501	300	4	0.83	0.04	3.50	15,309	1,195,194	21,295	15.5	147	11.875	1037
			8	1.67	0.15	6.00	7,655	149,399	10,647	19	182	15.375	1071
			12	2.50	0.35	6.00	5,103	44,266	7,098	22.5	217	18.875	1106
			14	2.92	0.47	4.00	4,374	27,876	6,084	24.25	234	20.625	1123
30	773.4	50	3	1.16	0.04	4.00	3,531	579,236	7,582	15	446	8.88	822
			6	2.31	0.15	7.50	1,765	72,404	3,791	18	459	11.88	835
			9	3.47	0.33	9.00	1,177	21,453	2,527	21	472.94	14.88	849
			12	4.62	0.59	4.50	883	9,051	1,896	24	486.34	17.88	862
30	773.4	150	3	0.66	0.02	2.00	16,736	2,745,801	35,942	15	460.63	8.88	837
			6	1.32	0.08	4.00	8,368	343,225	17,971	18	482.73	11.88	859
			9	1.98	0.19	6.00	5,579	101,696	11,981	21	504.83	14.88	881
			12	2.63	0.34	7.00	4,184	42,903	8,986	24	526.93	17.88	903
30	773.1	225	3	0.78	0.02	2.5	18656	3060837	40066	15	482.71	10.24	1799
			6	1.57	0.10	5	9328	382605	20033	18	518.25	13.24	1834
			9	2.35	0.22	7	6219	113364	13355	21	553.79	16.24	1870
			12	3.14	0.40	6	4664	47826	10017	24	589.34	19.24	1905

Materials:

Bellows --ASTM A240 - T316L. For alternate materials refer to page 12

Flanges: See pages 9,10,11

Pipe: ASTM A53/A106

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[NCB EXPANSION JOINTS]

Nominal Diameter (in)	Effective Area (in ²)	Max WP (psig)	No. of Conv.	Non-Concurrent Movement			Spring Rate			Ends WW		Ends FF	
				Axial (in)	Lateral (in)	Angular (deg)	Axial (lb/in)	Lateral (lb/in)	Angular (in-lb/deg)	OAL (in)	Weight (lb)	OAL (in)	Weight (lb)
32	873.6	50	3	1.31	0.04	4.00	2,312	428,460	5,609	15	472	9.38	1029
			6	2.62	0.16	7.50	1,156	53,557	2,804	18	483	12.38	1041
			9	3.93	0.35	4.50	771	15,869	1,870	21	495	15.38	1052
			12	5.24	0.63	1.50	578	6,695	1,402	24	506	18.38	1064
32	874.8	150	3	1.06	0.03	3.50	8,090	1,501,816	19,659	15	499	9.38	1057
			6	2.13	0.13	6.00	4,045	187,727	9,829	18	528	12.38	1086
			9	3.19	0.29	5.50	2,697	55,623	6,553	21	557	15.38	1114
			12	4.25	0.51	2.50	2,022	23,466	4,915	24	585	18.38	1143
32	874.8	225	3	0.78	0.02	2.50	19,865	3,687,815	48,273	15	515	10.76	2072
			6	1.56	0.09	4.50	9,932	460,977	24,137	18	553	13.76	2110
			9	2.35	0.21	6.50	6,622	136,586	16,091	21	591	16.76	2148
			12	3.13	0.38	6.50	4,966	57,622	12,068	24	629	19.76	2186
34	980.6	50	3	1.28	0.04	4.00	2,533	526,810	6,896	15	501	9.5	1100
			6	2.57	0.15	7.00	1,266	65,851	3,448	18	513	12.5	1112
			9	3.85	0.33	4.50	844	19,511	2,299	21	525	15.5	1125
			12	5.13	0.58	2.00	633	8,231	1,724	24	537	18.5	1137
34	980.6	150	3	1.01	0.03	3.00	9,472	1,970,301	25,791	15	529	9.5	1129
			6	2.01	0.11	5.50	4,736	246,288	12,896	18	558	12.5	1158
			9	3.02	0.26	6.50	3,157	72,974	8,597	21	587	15.5	1187
			12	4.02	0.46	3.50	2,368	30,786	6,448	24	617	18.5	1216
34	983.2	225	3	0.62	0.02	2.00	42,857	8,938,511	117,005	15	563	11	2373
			6	1.25	0.07	3.50	21,429	1,117,314	58,502	18	614	14	2423
			9	1.87	0.16	5.50	14,286	331,056	39,002	21	664	17	2473
			12	2.50	0.28	6.50	10,714	139,664	29,251	24	714	20	2523
36	1097	50	3	1.14	0.03	3.00	4,216	981,441	12,847	15	501	9.5	1100
			6	2.29	0.12	6.00	2,108	122,680	6,424	18	513	12.5	1112
			9	3.43	0.28	8.50	1,405	36,350	4,282	21	525	15.5	1125
			12	4.57	0.49	5.50	1,054	15,335	3,212	24	537	18.5	1137
36	1097	150	3	1.06	0.03	3.00	9,071	2,111,790	27,643	15	529	9.5	1129
			6	2.11	0.11	5.50	4,535	263,974	13,822	18	558	12.5	1158
			9	3.17	0.25	6.00	3,024	78,214	9,214	21	587	15.5	1187
			12	4.22	0.45	3.00	2,268	32,997	6,911	24	617	18.5	1216
36	1097	225	3	0.62	0.02	1.50	45,321	10,551,454	138,118	15	563	11	2909
			6	1.25	0.07	3.50	22,661	1,318,932	69,059	18	614	14	3000
			9	1.87	0.15	5.00	15,107	390,795	46,039	21	664	17	3090
			12	2.49	0.27	6.50	11,330	164,866	34,530	24	714	20	3180

Materials:

Bellows --ASTM A240 - T316L. For alternate materials refer to page 12

Flanges: See pages 9,10,11

Pipe: ASTM A53/A106

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[NCB EXPANSION JOINTS]

Nominal Diameter (in)	Effective Area (in ²)	Max WP (psig)	No. of Conv.	Non-Concurrent Movement			Spring Rate			Ends WW		Ends FF	
				Axial (in)	Lateral (in)	Angular (deg)	Axial (lb/in)	Lateral (lb/in)	Angular (in-lb/deg)	OAL (in)	Weight (lb)	OAL (in)	Weight (lb)
38	1218	50	3	1.14	0.03	3.00	4,442	1,147,719	15,024	15	565	9.88	1468
			6	2.28	0.12	6.00	2,221	143,465	7,512	18	582	12.88	1485
			9	3.43	0.26	8.00	1,481	42,508	5,008	21	599	15.88	1502
			12	4.57	0.46	5.50	1,110	17,933	3,756	24	616	18.88	1519
38	1218	150	3	1.05	0.03	2.50	9,557	2,469,515	32,326	15	593	9.88	1496
			6	2.11	0.11	5.50	4,779	308,689	16,163	18	627	12.88	1530
			9	3.16	0.24	6.00	3,186	91,464	10,775	21	661	15.88	1564
			12	4.22	0.43	3.00	2,389	38,586	8,081	24	695	18.88	1598
38	1218	225	3	0.62	0.02	1.50	47,783	12,346,947	161,621	15	630	11.5	1482
			6	1.25	0.06	3.00	23,891	1,543,368	80,811	18	686	14.5	1538
			9	1.87	0.14	4.50	15,928	457,294	53,874	21	742	17.5	1594
			12	2.49	0.25	6.00	11,946	192,921	40,405	24	798	20.5	1650
40	1345	50	3	1.20	0.03	3.00	4,546	1,024,849	16,979	15.375	595	10.495	1579
			6	2.40	0.13	6.00	2,273	128,106	8,489	18.75	612	13.87	1596
			9	3.60	0.29	8.00	1,515	37,957	5,660	22.125	629	17.245	1614
			12	4.80	0.52	5.00	1,137	16,013	4,245	25.5	647	20.62	1631
40	1345	150	3	0.84	0.02	2.00	23,987	5,407,477	89,586	15.375	643	10.495	1627
			6	1.68	0.09	4.00	11,993	675,935	44,793	18.75	689	13.87	1673
			9	2.52	0.21	6.00	7,996	200,277	29,862	22.125	735	17.245	1720
			12	3.37	0.37	7.50	5,997	84,492	22,396	25.5	781	20.62	1766
40	1345	225	3	0.51	0.01	1.00	100,472	22,649,711	375,238	15.375	686	12.375	1800
			6	1.02	0.06	2.50	50,236	2,831,214	187,619	18.75	757	15.75	1871
			9	1.53	0.12	4.00	33,491	838,878	125,079	22.125	828	19.125	1942
			12	2.04	0.22	5.00	25,118	353,902	93,809	25.5	899	22.5	2013
42	1482	50	3	1.32	0.03	3.00	3,125	771,970	12,789	15.375	618	10.995	1805
			6	2.63	0.14	6.00	1,562	96,496	6,395	18.75	633	14.37	1819
			9	3.95	0.31	5.00	1,042	28,591	4,263	22.125	647	17.745	1833
			12	5.27	0.55	2.00	781	12,062	3,197	25.5	661	21.12	1848
42	1482	150	3	0.90	0.02	2.00	22,135	5,499,780	91,115	15.375	678	10.995	1864
			6	1.81	0.09	4.50	11,067	687,473	45,557	18.75	729	14.37	1915
			9	2.71	0.21	6.00	7,378	203,696	30,372	22.125	780	17.745	1966
			12	3.61	0.37	7.50	5,534	85,934	22,779	25.5	831	21.12	2018
42	1482	225	3	0.55	0.01	1.00	92,334	22,942,087	380,081	15.375	724	12.755	2031
			6	1.10	0.06	2.50	46,167	2,867,761	190,041	18.75	803	16.13	2110
			9	1.65	0.13	4.00	30,778	849,707	126,694	22.125	882	19.505	2189
			12	2.20	0.23	5.00	23,083	358,470	95,020	25.5	961	22.88	2268

Materials:

Bellows --ASTM A240 - T316L. For alternate materials refer to page 12

Flanges: See pages 9,10,11

Pipe: ASTM A53/A106

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[NCB EXPANSION JOINTS]

Nominal Diameter (in)	Effective Area (in ²)	Max WP (psig)	No. of Conv.	Non-Concurrent Movement			Spring Rate			Ends WW		Ends FF	
				Axial (in)	Lateral (in)	Angular (deg)	Axial (lb/in)	Lateral (lb/in)	Angular (in-lb/deg)	OAL (in)	Weight (lb)	OAL (in)	Weight (lb)
44	1622	50	3	1.28	0.03	3.00	4,410	1,199,089	19,865	15.375	655	11.375	2013
			6	2.55	0.13	5.50	2,205	149,886	9,933	18.75	675	14.75	2033
			9	3.83	0.28	7.50	1,470	44,411	6,622	22.125	696	18.125	2054
			12	5.10	0.51	4.50	1,103	18,736	4,966	25.5	716	21.5	2074
44	1622	150	3	0.90	0.02	2.00	23,154	6,295,162	104,292	15.375	710	11.375	2068
			6	1.80	0.09	4.00	11,577	786,895	52,146	18.75	764	14.75	2122
			9	2.71	0.20	6.00	7,718	233,154	34,764	22.125	817	18.125	2175
			12	3.61	0.36	7.00	5,789	98,362	26,073	25.5	871	21.5	2229
44	1622	225	3	0.55	0.01	1.00	96,632	26,271,999	435,248	15.375	759	13.135	2247
			6	1.10	0.05	2.50	48,316	3,284,000	217,624	18.75	842	16.51	2330
			9	1.65	0.12	3.50	32,211	973,037	145,083	22.125	924	19.885	2412
			12	2.20	0.22	5.00	24,158	410,500	108,812	25.5	1007	23.26	2495
46	1767	50	3	1.27	0.03	3.00	4,604	1,364,233	22,601	15.375	685	11.495	2155
			6	2.55	0.12	5.50	2,302	170,529	11,301	18.75	706	14.87	2176
			9	3.82	0.27	7.50	1,535	50,527	7,534	22.125	727	18.245	2197
			12	5.10	0.48	4.50	1,151	21,316	5,650	25.5	748	21.62	2218
46	1767	150	3	0.90	0.02	2.00	24,173	7,163,455	118,677	15.375	742	11.495	2212
			6	1.80	0.09	4.00	12,087	895,432	59,338	18.75	798	14.87	2268
			9	2.70	0.19	5.50	8,058	265,313	39,559	22.125	854	18.245	2324
			12	3.61	0.34	7.00	6,043	111,929	29,669	25.5	911	21.62	2380
46	1767	225	3	0.55	0.01	1.00	100,927	29,908,442	495,493	15.375	793	13.495	2613
			6	1.10	0.05	2.50	50,463	3,738,555	247,746	18.75	880	16.87	2700
			9	1.65	0.12	3.50	33,642	1,107,720	165,164	22.125	966	20.245	2786
			12	2.20	0.21	4.50	25,232	467,319	123,873	25.5	1053	23.62	2873
48	1920	50	3	1.27	0.03	2.50	4,796	1,543,616	25,573	15.375	715	11.875	2406
			6	2.55	0.12	5.00	2,398	192,952	12,787	18.75	737	15.25	2428
			9	3.82	0.26	7.00	1,599	57,171	8,524	22.125	759	18.625	2450
			12	5.09	0.46	4.50	1,199	24,119	6,393	25.5	781	22	2472
48	1920	150	3	0.71	0.02	1.5	51121.8	16453703.78	272588	15.375	798	11.875	2490
			6	1.43	0.06	3	25560.9	2056712.972	136294	18.75	871	15.25	2563
			9	2.14	0.15	4.5	17040.6	609396.4361	90863	22.125	944	18.625	2635
			12	2.85	0.26	5.5	12780.4	257089.1215	68147	25.5	1016	22	2708
48	1920	225	3	0.55	0.01	1	105218.4	33864810.4	561038	15.375	828	13.875	2909
			6	1.10	0.05	2	52609.2	4233101.3	280519	18.75	918	17.25	3000
			9	1.65	0.11	3.5	35072.8	1254252.237	187013	22.125	1008	20.625	3090
			12	2.19	0.20	4.5	26304.6	529137.6625	140260	25.5	1099	24	3180

Materials:

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Flanges: See pages 9,10,11

Pipe: ASTM A53/A106

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