Hyspan®

Series 7500

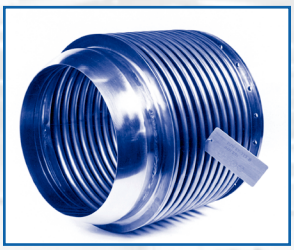
Formed Metal Bellows

Catalog 974C

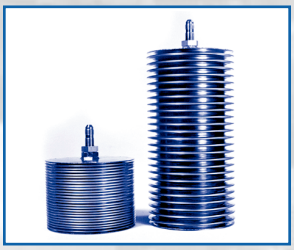
Hyspan

Innovators of the industry

Bellows assemblies for safety valves, control valves, and regulators.



Cryogenic disconnect made from Alloy 625.



Bellows assembly designed to absorb expansion of oil.

Bellows can be used for high-vacuum applications.

When you look for a formed bellows which is reliable, has a long life expectancy, and is competitively priced, look to HYSPAN. Rigid quality control, modern facilities, and the fact that all operations are performed in our own plant means that you receive both quality and performance. HYSPAN Series 7500 Formed Bellows are manufactured in standard sizes ranging from 1-inch to 40-feet inside diameter, and for a broad spectrum of pressure, temperature, flexibility, and movement requirements while conveying both corrosive and non-corrosive fluids. These bellows absorb axial extension and compression, parallel offset, angulation, or combinations of motions. **But there's more. Our engineering assistance is available to you for your special applications or non-standard sizes.**

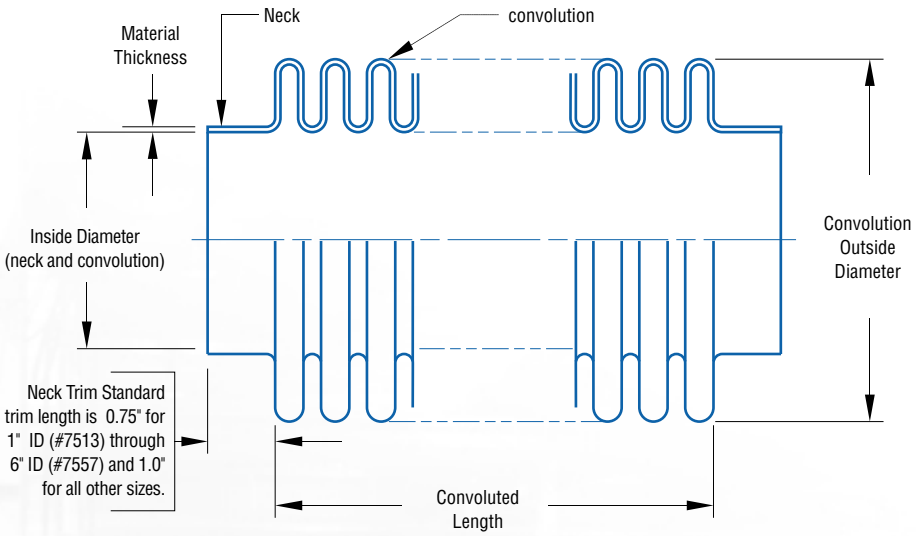
Vacuum Applications

Series 7500 Bellows can be used for high-vacuum applications requiring leakage rates less than 1×10^{-10} STD ATM CC/SEC at base pressure of 1×10^{-6} TORR. Since most of these applications require extremely flexible bellows, Hyspan recommends materials thickness of 0.006" for inside diameters (I.D.) up to 4.5", 0.008"for I.D. up to 8.0", and 0.010" for I.D. up to 14". Any material Thickness can be used which has a maximum pressure (Column 7 on pages 6-17) exceeding 15 PSIG. Type 321 stainless steel is preferred because of its weldability and availability; however, other alloys can be substituted.

Beryllium Copper

The beryllium copper alloys have high thermal and electrical conductivity similar to pure copper. It can be readily joined by resistance and fusion welding, brazing and soldering. The material is nonsparking, nonmagnetic; it has high galling resistance, and maintains its strength and ductility at cryogenic temperatures.

Standard Bellows Nomenclature



Standard Tolerances

Inside Diameter	Stock Number	Neck I.D.	Convolution I.D. & O.D.	Convoluted Length	Trim Length
1”-4”	7513-7544	0.01	0.03	0.06	0.03
4.125”-6”	7545-7557	0.01	0.04	0.06	0.03
6.25”-12”	7558-7577	0.02	0.06	0.09	0.06
12.25”-24”	7578-7586	0.03	0.09	0.12	0.09
26”-48”	7587-7598	0.06	0.12	0.12	0.09
50”-96”	7599-75110	0.12	0.18	0.18	0.12

Tabulated tolerance is plus or minus for nominal

Multiply or Laminated Bellows

Any Standard-size bellows can be fabricated with multiply construction up to four plies of equal thickness. The maximum pressure, spring rate, and stability pressure are increased in direct proportion to the number of plies, but with the same axial deflection as a single ply. Multiply design permits a lower spring rate and a greater cycle life than a single ply configuration for an equivalent pressure. This type of construction is recommended for applications with vibration or rapid cyclic motion because of the inherent damping provided by the relative movement of the plies. Multiply construction in not recommended for vacuum application requiring a mass spectrometer helium leak test because of possible out-gassing from an undetectable leak in an inner ply.

Hyspan Series 7500 Neck Trims

STANDARD TRIM
I.D. NECK
The neck and Convolution I.D. are equal to the nominal I.D

STYLE A
O.D. NECK
The neck O.D. is equal to the convolution O.D.

STYLE B
EXPANDED NECK
The neck I.D. or O.D can be specified within the range of the I.D. to the convolution O.D.

STYLE C
O.D. TRIM
The trim line is at the tangent point of the convolution O.D.

STYLE D
I.D. TRIM
The trim line is at the tangent point of the convolution I.D.

INSIDE BAND

OUTSIDE BAND

Series 7500 bellows with standard, Style A, or Style B neck trims can be specified with inside or outside bands which increase the thickness from welding or added reinforcement. The band thickness is approximately 2.5 times the bellows thickness. The bands are attached by resistance seam welding for sizes 1” through 48” and by edge welding (GTAW) for larger sizes.

Caution: The use of bands is not recommended for vacuum applications requiring a mass spectrometer helium leak test.

Hyspan

Explanation of Tabulated Data

All dimensional data is applicable to tabulated single and multiply configurations with standard and optional materials. The tabulated performance parameters are for type 321 stainless steel at room temperature; however, they apply to all austenitic stainless steels with minor variations. Variations for other materials are given for each column explanation.

Materials & Properties

The performance data tabulated in Columns 7 through 11 (pages 6-17) was calculated for type 321 stainless steel at 70ºF. These values are a function of the Modulus of Elasticity, strength, and fatigue life. If the service conditions are substantially different or an optional material is used, contact the factory for assistance.

Optional materials can be substituted which include but are not limited to alloys 600, 625, 800, 825, Cb-20 and C-276, Nickel 200, Beryllium Copper and weldable Aluminum alloys.

Use of Tabulation

The data included in this catalog was computed by generally accepted analytical methods and empirical data derived from tests. This data should be used as a design guide only. Consult the factory if you have an application requiring close control of these values.

The following paragraph numbers refer to the column numbers of the tabulated data on pages 6 through 17.

1 Stock Number

A four or five digit number identifies the nominal size (inside diameter), and a letter corresponds to the material thickness. In order to fully specify the desired configuration refer to the Ordering Instructions on page 18.

2 Inside Diameter

Nominal Inside diameter of the convolutions and the standard neck trim.

3 Convolution Outside Diameter

Nominal outside diameter of the convolutions and maximum diameter of Style A neck trim.

4 Effective Area

The cross-sectional area of the bellows based on the mean diameter of convolutions. This area multiplied by the pressure equals the pressure thrust force (Lbs.).

5 Material Thickness

The values tabulated are representative designs for each diameter. Other thickness may be available – consult the factory.

6 Maximum Convoluted Length

These values are established by manufacturing limitations. Substantially longer lengths must be obtained by splicing two or more elements. Any shorter length can be specified – refer to the Ordering Instructions on page 18.

7 Maximum Pressure

The highest internal or external pressure recommended with a corresponding *test pressure* of 1.5 times this value. This pressure is exclusive of the squirm or instability pressure (Column 8).

The ***working pressure for internally*** pressurized bellows is determined from the pressure tabulated in Column 7, or the squirm pressure calculated from Column 8 – whichever is lowest. For convenience Column 7 and 8 include a test pressure factor of 1.5, i.e., a bellows can be pressurized to 1.5 times the pressure tabulated in Column 7 without permanent set, and the anticipated squirm pressure is greater than 1.5 times the value calculated from Column 8. The working pressure for internally pressurized bellows which are guided or supported to prevent squirm is determined from Column 7.

The ***working pressure for externally*** pressurized bellows is determined from Column 7 – squirm or instability does not occur. All bellows rated at a pressure (Column 7) exceeding 15 psi are satisfactory for *Full Vacuum* (internal) applications – *Caution* – This pressure applies to the convoluted sections only and the standard neck trims. Long unsupported neck trims may collapse. *Multiply or Laminated Construction* – multiply the values of Columns 7 and 8 times the number of plies.

8 Squirm or Instability Pressure

Internally pressurized bellows are unstable at the critical or squirm pressure. In most instances this condition is characterized by the centerline of individual convolutions deviating from a common centerline – analogous to buckling of a long column under compression. This condition occurs when the convoluted length is long relative to the inside diameter – over 2 or 2.5 times. There is also a less familiar type of squirm which occurs when the plane of the individual convolutions deviates from parallel planes. Either condition represents a maximum pressure and failure will occur if pressure is increased.

The tabulated values (Column 8) are the maximum recommended internal pressure to avoid squirm for one inch of convoluted length. The values are based on a test pressure 1.5 times the tabulated pressure. The pressure for other lengths can be calculated by dividing the tabulated value by the square of the convoluted length.

The Column 8 values do not need to be corrected for other materials which have a modulus of elasticity in the range of 28 – 30 x 10^6 psi. For multiply construction multiply the tabulated value by the number of plies.

9 Axial Spring Rate

The force (Lbs.) per inch of axial extension or compression resulting from the material and configuration spring constant is tabulated for one inch of convoluted length. The spring rate for other convoluted lengths is determined by dividing the tabulated values by the convoluted length. Multiply this value by the number of plies for multiply construction.

10 Lateral Spring Rate

The force (Lbs.) per inch of the lateral offset resulting from the material and configuration spring constant is tabulated for one inch of convoluted length. This movement occurs when the ends remain parallel to each other and perpendicular to the longitudinal centerline, but the centerline displaces laterally. The lateral spring rate for bellows other than one inch convoluted length is calculated by dividing the cube of the convoluted length. For multiply construction multiply by the number of plies. *Caution* – The tabulated values must be multiplied by the 1000 except as noted to obtain the true spring rate.

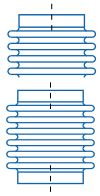
11 Axial Deflection

The allowable axial extension or compression for one inch of convoluted length is tabulated for 2000 cycles of movement from the nominal length to the tabulated value. The movement for other convoluted lengths are obtained by multiplying by the required length. Since these values are determined by the metal fatigue due to the bending stress produced by movement it is unchanged for multiply construction.

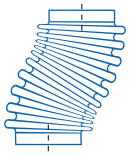
The tabulated values can be corrected for other numbers of cycles (at 70°F.) by applying the following factors:

Cycles to Failure	Multiply by
500	1.40
1,000	1.20
2,000	1.00
4,000	0.85
8,000	0.75
10,000	0.70

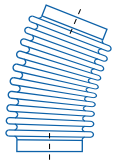
Bellows Movements



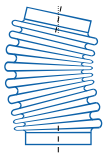
AXIAL
Extension or compression from the manufactured length along the longitudinal centerline with ends parallel.



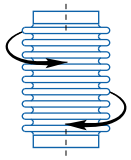
LATERAL
Displacement perpendicular to the longitudinal centerline with the ends parallel.



ANGULAR
Rotation of the longitudinal centerline about the perpendicular axis.



COMBINED
Axial, lateral, and angular movements can be combined within the rated movements.



TORSION OR TWISTING AROUND THE CENTERLINE
(Not recommended.)

Stock number	Inside diameter (inches)	Convolution O.D. (inches)	Effective area (square Inche)	Material thickness (inches)	Maximum convoluted length (inches)	Maximum pressure (PSI)	Stability* pressure (PSI)	Axial* spring rate (lbs/in.)	Lateral* spring rate (lbs/in.)	Axial*deflection +or- for 2,000 cycles (inches)
1	2	3	4	5	6	7	8	9	10	11
7513B	1	1.33	1.09	0.005	6	64	108	138	0.23	0.42
7513D				0.006		90	180	227	0.36	0.36
7513G				0.008		153	397	523	0.83	0.25
7513J				0.010		237	792	1013	1.53	0.19
7514B	1.05	1.43	1.21	0.005	6	64	108	94	0.21	0.43
7514D				0.006		88	180	157	0.35	0.35
7514G				0.008		153	433	364	0.82	0.24
7514J				0.010		237	828	708	1.51	0.19
7515B	1.063	1.44	1.23	0.005	6	64	108	96	0.23	0.42
7515D				0.006		88	180	158	0.37	0.35
7515G				0.008		153	432	358	0.84	0.24
7515J				0.010		237	828	675	1.59	0.19
7516D	1.125	1.5	1.35	0.006	6	88	180	172	0.45	0.35
7516G				0.008		153	432	382	0.99	0.24
7516J				0.010		238	664	743	1.92	0.18
7516K				0.012		348	1548	1223	3.16	0.15
7517D	1.188	1.59	1.51	0.006	6	78	180	175	0.51	0.38
7517G				0.008		133	396	399	1.16	0.26
7517J				0.010		207	792	736	2.13	0.20
7517K				0.012		309	1512	1267	3.67	0.16
7518D	1.25	1.65	1.65	0.006	8	78	180	193	0.61	0.37
7518G				0.008		132	432	414	1.31	0.26
7518J				0.010		208	830	789	2.49	0.20
7518K				0.012		306	1476	1325	4.18	0.16
7519D	1.312	1.71	1.79	0.006	8	76	180	197	0.67	0.37
7519G				0.008		132	432	447	1.53	0.26
7519J				0.010		208	864	835	2.86	0.20
7519K				0.012		307	1548	1439	4.93	0.16
7520D	1.375	1.78	1.95	0.006	8	76	216	198	0.74	0.36
7520G				0.008		132	468	455	1.70	0.26
7520J				0.010		210	1512	845	3.15	0.19
7520K				0.012		307	1620	1446	5.40	0.16
7521D	1.437	1.84	2.13	0.006	8	76	216	181	0.74	0.36
7521G				0.008		133	504	418	1.70	0.26
7521J				0.010		211	972	759	3.10	0.19
7521K				0.012		309	1692	1326	5.41	0.16
7521L				0.014		429	2700	2052	8.37	0.13
7522D	1.5	2	2.33	0.006	8	43	108	156	0.70	0.45
7522G				0.008		73	1512	363	1.62	0.38
7522J				0.010		118	540	678	3.03	0.30
7522K				0.012		172	936	1184	5.29	0.24
7522L				0.014		240	1512	1844	8.23	0.20
7523D	1.625	2.13	2.77	0.006	8	42	108	157	0.83	0.45
7523G				0.008		75	288	327	1.73	0.38
7523J				0.010		118	576	640	3.38	0.30
7523K				0.012		174	1008	1087	5.75	0.24
7523L				0.014		243	1620	1665	8.81	0.20

Stock number	Inside diameter (inches)	Convolution O.D. (inches)	Effective area (square Inche)	Material thickness (inches)	Maximum convoluted length (inches)	Maximum pressure (PSI)	Stability* pressure (PSI)	Axial* spring rate (lbs/in.)	Lateral* spring rate (lbs/in.)	Axial*deflection +or- for 2,000 cycles (inches)
1	2	3	4	5	6	7	8	9	10	11
7524D				0.006		45	128	175	0.95	0.45
7524G				0.008		79	321	378	2.06	0.37
7524J	1.66	2.15	2.85	0.010	8	126	641	711	3.87	0.29
7524K				0.012		184	1090	1183	6.44	0.23
7524L				0.014		256	1792	1893	10.31	0.19
7525D				0.006		28	64	166	1.00	0.45
7525G				0.008		49	192	373	2.24	0.44
7525J	1.75	2.33	3.14	0.010	8	78	384	705	4.23	0.42
7525K				0.012		112	640	1169	7.01	0.34
7525L				0.014		156	1026	1870	11.22	0.29
7526D				0.006		28	64	134	0.93	0.45
7526G				0.008		49	192	296	2.06	0.44
7526J	1.875	2.43	3.64	0.010	8	78	385	552	3.84	0.41
7526K				0.012		114	704	945	6.57	0.33
7526L				0.014		157	1088	1472	10.23	0.28
7527D				0.006		36	128	107	0.78	0.47
7527G				0.008		58	256	237	1.72	0.44
7527J	1.9	2.5	3.8	0.010	8	88	512	460	3.34	0.33
7527K				0.012		126	896	786	5.71	0.27
7527L				0.014		174	1472	1187	8.62	0.23
7528D				0.006		28	100	112	0.89	0.47
7528G				0.008		48	200	258	2.05	0.46
7528J	2	2.65	4.15	0.010	10	72	400	470	3.74	0.38
7528K				0.012		102	800	822	6.53	0.31
7528L				0.014		141	1200	1270	10.08	0.26
7529D				0.006		34	100	92	0.84	0.47
7529G				0.008		37	300	204	1.85	0.45
7529J	2.125	2.78	4.72	0.010	10	85	600	397	3.58	0.35
7529K				0.012		120	1000	693	6.26	0.28
7529L				0.014		162	1600	1039	9.38	0.23
7530D				0.006		34	100	126	1.26	0.47
7530G				0.008		37	300	281	2.80	0.45
7530J	2.25	2.9	5.21	0.010	10	85	600	522	5.19	0.34
7530K				0.012		120	1100	874	8.69	0.27
7530L				0.014		163	1700	1370	13.60	0.22
7531D				0.006		34	200	135	1.48	0.47
7531G				0.008		55	300	302	3.30	0.45
7531J	2.375	3.02	5.71	0.010	10	85	700	569	6.22	0.34
7531K				0.012		120	1100	962	10.51	0.27
7531L				0.014		162	1800	1469	16.04	0.22
7531N				0.018		271	3800	3051	33.31	16
7532D				0.006		58	200	139	1.66	0.47
7532G				0.008		55	400	309	3.70	0.44
7532J	2.5	3.15	6.26	0.010	10	84	700	583	6.98	0.34
7532K				0.012		120	1200	984	11.79	0.27
7532L				0.014		162	1800	1538	18.41	0.22
7532N				0.018		273	3900	3122	37.38	16

Note

*(1) Columns 8, 9, 10 & 11 apply to 1" convoluted length. Refer to the explanation of tables (page 5) for correction to a specific convoluted length.

(2) For the correct value of lateral spring rate (Column 10) multiply the tabulated value by 1000 and apply the correction for convoluted length explained on page 5.

Stock number	Inside diameter (inches)	Convolution O.D. (inches)	Effective area (square Inche)	Material thickness (inches)	Maximum convoluted length (inches)	Maximum pressure (PSI)	Stability* pressure (PSI)	Axial* spring rate (lbs/in.)	Lateral* spring rate (lbs/in.)	Axial*deflection +or- for 2,000 cycles (inches)
1	2	3	4	5	6	7	8	9	10	11
7533D	2.625	3.28	6.84	0.006	10	33	200	149	1.96	0.47
7533G				0.008		55	400	306	4.01	0.44
7533J				0.010		84	700	595	7.79	0.33
7533K				0.012		120	1200	985	12.89	0.27
7533L				0.014		163	1900	1571	20.54	0.22
7533N				0.018		273	3800	3574	46.65	0.16
7534D	2.75	3.4	7.42	0.006	10	33	200	153	2.18	0.47
7534G				0.008		55	400	340	4.83	0.43
7534J				0.010		84	700	637	9.04	0.33
7534K				0.012		120	1300	1050	14.90	0.27
7534L				0.014		163	2000	1674	23.75	0.22
7534N				0.018		274	3900	3740	53.04	0.16
7535D	2.875	3.5	7.97	0.006	10	36	200	178	2.73	0.47
7535G				0.008		60	500	396	6.05	0.40
7535J				0.010		93	900	742	11.32	0.31
7535K				0.012		132	1500	1257	19.17	0.24
7535L				0.014		180	2400	1996	30.43	0.20
7535N				0.018		274	4100	3905	59.98	0.16
7536D	3	3.75	8.94	0.006	10	26	100	130	2.23	0.47
7536G				0.008		42	300	274	4.70	0.46
7536J				0.010		64	600	525	8.98	0.40
7536K				0.012		90	1002	875	14.96	0.32
7536L				0.014		121	1600	1367	23.36	0.26
7536N				0.018		202	3507	2824	48.27	0.19
7537D	3.125	3.88	9.63	0.006	10	25	200	132	2.44	0.47
7537G				0.008		42	301	291	5.35	0.47
7537J				0.010		64	601	527	9.70	0.39
7537K				0.012		90	1100	890	16.39	0.31
7537L				0.014		121	1700	1390	25.59	0.26
7537N				0.018		202	3600	2873	52.88	0.19
7538D	3.25	4.02	10.37	0.006	10	24	100	150	2.98	0.47
7538G				0.008		39	300	355	7.05	0.47
7538J				0.010		60	600	639	12.67	0.41
7538K				0.012		84	1000	1037	20.57	0.33
7538L				0.014		112	1600	1620	32.11	0.27
7538N				0.018		189	3500	3345	66.31	0.20
7539D	3.375	4.17	11.11	0.006	10	24	200	152	3.24	0.48
7539G				0.008		40	400	361	7.67	0.47
7539J				0.010		60	700	648	13.78	0.43
7539K				0.012		84	1100	1081	22.97	0.33
7539L				0.014		112	1800	1682	35.73	0.27
7539N				0.018		184	3700	3396	72.12	0.20
7540D	3.5	4.3	11.94	0.006	10	24	200	143	3.28	0.48
7540G				0.008		40	400	340	7.77	0.47
7540J				0.010		60	700	611	13.95	0.41
7540K				0.012		84	1200	998	22.78	0.33
7540L				0.014		112	1800	1553	35.44	0.27
7540N				0.018		184	3200	3257	74.32	0.22
7540R				0.025		366	9700	9146	209.11	0.13

Stock number	Inside diameter (inches)	Convolution O.D. (inches)	Effective area (square Inche)	Material thickness (inches)	Maximum convoluted length (inches)	Maximum pressure (PSI)	Stability* pressure (PSI)	Axial* spring rate (lbs/in.)	Lateral* spring rate (lbs/in.)	Axial*deflection +or- for 2,000 cycles (inches)
1	2	3	4	5	6	7	8	9	10	11
7541D				0.006		21	144	123	3.04	0.48
7541G				0.008		35	310	280	6.92	0.46
7541J				0.010		51	578	513	12.64	0.45
7541K	3.625	4.48	12.89	0.012	10	72	1020	851	20.97	0.36
7541L				0.014		97	1597	1319	32.50	0.30
7541N				0.018		159	3371	2761	68.02	0.22
7541R				0.025		313	8400	7903	194.83	0.15
7542D				0.006		21	200	129	3.38	0.48
7542G				0.008		34	300	294	7.70	0.47
7542J				0.010		51	600	537	14.07	0.45
7542K	3.75	4.6	13.68	0.012	10	72	1000	916	23.96	0.36
7542L				0.014		97	1600	1415	37.00	0.30
7542N				0.018		159	3500	2946	77.04	0.22
7542R				0.025		313	8700	8170	214.05	0.15
7543D				0.006		21	200	130	3.63	0.48
7543G				0.008		34	300	298	8.28	0.47
7543J				0.010		51	600	544	15.13	0.45
7543K	3.875	4.73	14.53	0.012	10	72	1100	927	25.77	0.36
7543L				0.014		97	1700	1432	39.79	0.30
7543N				0.018		159	3600	2983	82.85	0.22
7543R				0.025		313	9000	8438	234.49	0.15
7544D				0.006		16	100	102	3.12	0.48
7544G				0.008		27	300	233	7.10	0.47
7544J				0.010		39	500	460	13.98	0.47
7544K	4	5	15.9	0.012	10	54	900	740	22.49	0.44
7544L				0.014		72	1300	1146	34.82	0.37
7544N				0.018		117	2700	2347	71.30	0.27
7544R				0.025		225	6700	6338	195.50	0.18
7545D				0.006		16	100	103	3.34	0.48
7545G				0.008		27	300	246	7.92	0.47
7545J				0.010		39	500	448	14.40	0.47
7545K	4.125	5.13	16.81	0.012	10	54	900	750	24.09	0.45
7545L				0.014		72	1400	1161	37.30	0.36
7545N				0.018		117	2800	2378	76.38	0.27
7545R				0.025		225	6900	6532	209.56	0.18
7546D				0.006		16	100	108	3.67	0.48
7546G				0.008		27	300	256	8.69	0.47
7546J				0.010		39	500	482	16.32	0.47
7546K	4.25	5.25	17.71	0.012	10	54	900	802	27.16	0.44
7546L				0.014		72	1400	1210	40.95	0.37
7546N				0.018		117	2900	2477	83.86	0.27
7546R				0.025		225	7100	6724	227.58	0.18
7547D				0.006		16	100	109	3.91	0.48
7547G				0.008		27	300	259	9.27	0.47
7547J				0.010		39	600	487	17.41	0.47
7547K	4.375	5.38	18.67	0.012	10	54	900	788	28.14	0.44
7547L				0.014		72	1400	1234	44.05	0.36
7547N				0.018		117	3000	2506	89.44	0.27
7547R				0.025		225	7300	6918	246.61	0.18

Note

*(1) Columns 8, 9, 10 & 11 apply to 1" convoluted length. Refer to the explanation of tables (page 5) for correction to a specific convoluted length.

(2) For the correct value of lateral spring rate (Column 10) multiply the tabulated value by 1000 and apply the correction for convoluted length explained on page 5.

Stock number	Inside diameter (inches)	Convolution O.D. (inches)	Effective area (square Inche)	Material thickness (inches)	Maximum convoluted length (inches)	Maximum pressure (PSI)	Stability* pressure (PSI)	Axial* spring rate (lbs/in.)	Lateral* spring rate (lbs/in.)	Axial*deflection +or- for 2,000 cycles (inches)
1	2	3	4	5	6	7	8	9	10	11
7548G	4.5	5.5	19.62	0.008	10	26	300	270	10.14	0.47
7548J				0.010		39	600	507	19.04	0.47
7548K				0.012		54	900	820	30.77	0.43
7548L				0.014		72	1300	1284	48.16	0.36
7548N				0.018		78	3100	2600	97.52	0.27
7548R				0.025		226	8200	6697	251.15	0.18
7549G	4.625	5.63	20.6	0.008	10	25	300	273	10.77	0.47
7549J				0.010		39	600	493	19.48	0.47
7549K				0.012		54	1000	828	32.69	0.43
7549L				0.014		72	1500	1297	51.17	0.36
7549N				0.018		115	3100	2627	103.61	0.27
7549R				0.025		226	8500	6766	266.84	0.18
7550G	4.75	5.75	21.6	0.008	10	25	300	283	11.74	0.47
7550J				0.010		39	600	513	21.22	0.47
7550K				0.012		54	1000	861	35.62	0.43
7550L				0.014		72	1500	1348	55.76	0.36
7550N				0.018		115	3200	2730	112.90	0.27
7550R				0.025		174	8700	7121	294.44	0.19
7551G	4.875	5.88	22.7	0.008	10	25	300	286	12.42	0.47
7551J				0.010		39	600	517	22.47	0.47
7551K				0.012		54	1000	869	37.71	0.43
7551L				0.014		72	1600	1360	59.03	0.36
7551N				0.018		115	3300	2755	119.52	0.27
7551R				0.025		226	8900	7186	311.72	0.18
7552G	5	6	23.8	0.008	10	25	300	297	13.49	0.47
7552J				0.010		37	600	537	24.40	0.46
7552K				0.012		54	1000	902	40.95	0.42
7552L				0.014		72	1600	1373	62.34	0.36
7552N				0.018		115	3400	2911	132.10	0.27
7552R				0.025		228	9100	7460	338.54	0.18
7553G	5.25	6.25	25.9	0.008	10	25	300	298	14.82	0.47
7553J				0.010		37	600	563	27.94	0.47
7553K				0.012		52	1100	954	47.35	0.42
7553L				0.014		70	1700	1468	72.85	0.35
7553N				0.018		117	3500	3043	150.94	0.26
7553R				0.025		228	8800	8266	409.94	0.18
7553S				0.030		333	15500	14534	720.80	0.14
7554G	5.5	6.5	28.3	0.008	10	17	400	324	17.52	0.47
7554J				0.010		37	700	587	31.75	0.47
7554K				0.012		52	1100	996	53.80	0.40
7554L				0.014		70	1800	1532	82.77	0.35
7554N				0.018		117	3700	3175	171.50	0.26
7554R				0.025		228	9200	8650	467.09	0.18
7554S				0.030		333	16200	15216	821.65	0.14
7555G	5.563	6.56	28.8	0.008	10	25	369	330	18.22	0.45
7555J				0.010		37	640	599	33.03	0.45
7555K				0.012		52	1100	1015	55.98	0.40
7555L				0.014		70	1800	1562	86.11	0.34
7555N				0.018		117	3700	3237	178.42	0.24
7555R				0.025		228	10800	8401	463.06	0.16
7555S				0.030		333	16400	15388	848.46	0.14

Stock number	Inside diameter (inches)	Convolution O.D. (inches)	Effective area (square Inche)	Material thickness (inches)	Maximum convoluted length (inches)	Maximum pressure (PSI)	Stability* pressure (PSI)	Axial* spring rate (lbs/in.)	Lateral* spring rate (lbs/in.)	Axial*deflection +or- for 2,000 cycles (inches)
1	2	3	4	5	6	7	8	9	10	11
7556G				0.008		19	300	337	19.80	0.47
7556J				0.010		30	500	612	35.89	0.47
7556K				0.012		42	900	1037	60.81	0.46
7556L	5.75	6.85	30.7	0.014	10	55	1400	1596	93.55	0.41
7556N				0.018		91	3000	3366	197.24	0.31
7556R				0.025		178	8000	8693	509.40	0.21
7556S				0.030		261	12800	12008	714.85	0.17
7557G				0.008		22	400	337	21.74	0.48
7557J				0.010		34	700	654	42.12	0.47
7557K				0.012		48	1200	1066	68.66	0.44
7557L	6	7.1	33.7	0.014	10	64	1800	1571	101.13	0.37
7557N				0.018		103	3800	3278	210.96	0.27
7557R				0.025		198	10500	8341	536.78	0.18
7557S				0.030		289	16100	15119	972.95	0.15
7558G				0.008		22	400	350	24.32	0.48
7558J				0.010		34	700	679	47.13	0.47
7558K				0.012		48	1200	1068	74.08	0.44
7558L	6.25	7.35	36.3	0.014	10	64	1900	1631	113.16	0.37
7558N				0.018		103	3900	3371	233.83	0.27
7558R				0.025		198	10700	8768	608.19	0.18
7558S				0.030		289	16800	15757	1092.90	0.15
7559G				0.008		22	400	363	27.10	0.48
7559J				0.010		34	800	668	49.80	0.47
7559K				0.012		48	1300	1107	82.55	0.44
7559L	6.5	7.6	39	0.014	10	63	2000	1691	126.10	0.37
7559N				0.018		103	4000	3495	260.58	0.27
7559R				0.025		199	10900	9090	677.76	0.18
7559S				0.030		291	17500	16395	1222.29	0.15
7560G				0.008		22	400	365	28.24	0.48
7560J				0.010		34	800	670	51.84	0.47
7560K				0.012		48	1300	1112	85.96	0.44
7560L	6.625	7.73	40.4	0.014	10	63	2000	1737	134.22	0.37
7560N				0.018		103	4100	3510	271.24	0.27
7560R				0.025		199	11000	9130	705.54	0.18
7560S				0.030		291	17800	16714	1290.64	0.15
7561G				0.008		22	400	376	30.09	0.48
7561J				0.010		34	800	691	55.29	0.47
7561K				0.012		48	1300	1146	91.65	0.44
7561L	6.75	7.85	41.8	0.014	10	63	2000	1766	141.21	0.37
7561N				0.018		102	4200	3619	289.29	0.27
7561R				0.025		199	10300	9661	772.27	0.18
7561S				0.030		291	18100	17032	1361.48	0.15
7562G				0.008		22	400	389	33.29	0.48
7562J				0.010		34	800	715	61.17	0.47
7562K				0.012		48	1300	1175	100.47	0.44
7562L	7	8.1	44.7	0.014	10	63	2100	1827	156.22	0.36
7562N				0.018		102	4300	3743	320.04	0.27
7562R				0.025		199	11100	9260	791.86	0.18
7562S				0.030		291	16000	17507	1496.97	0.15

Note

*(1) Columns 8, 9, 10 & 11 apply to 1" convoluted length. Refer to the explanation of tables (page 5) for correction to a specific convoluted length.

(2) For the correct value of lateral spring rate (Column 10) multiply the tabulated value by 1000 and apply the correction for convoluted length explained on page 5.

Stock number	Inside diameter (inches)	Convolution O.D. (inches)	Effective area (square Inche)	Material thickness (inches)	Maximum convoluted length (inches)	Maximum pressure (PSI)	Stability* pressure (PSI)	Axial* spring rate (lbs/in.)	Lateral* spring rate (lbs/in.)	Axial*deflection +or- for 2,000 cycles (inches)
1	2	3	4	5	6	7	8	9	10	11
7563G				0.008		16	300	415	40.35	0.48
7563J				0.010		25	600	758	73.75	0.47
7563K				0.012		34	1000	1252	121.79	0.47
7563L	7.5	8.7	50.9	0.014	10	46	1500	1948	189.36	0.45
7563N				0.018		75	3200	3955	384.51	0.33
7563R				0.025		144	9100	9873	959.76	0.23
7563S				0.030		210	14100	18855	1832.84	0.18
7564G				0.008		16	300	310	34.63	0.48
7564J				0.010		24	600	556	62.15	0.47
7564K				0.012		34	1000	940	104.98	0.47
7564L	8	9.25	58.4	0.014	10	46	1600	1441	160.90	0.44
7564N				0.018		75	3400	2973	331.75	0.33
7564R				0.025		145	9500	7774	867.55	0.23
7564S				0.030		211	14200	14847	1656.75	0.18
7565G				0.008		16	300	307	36.28	0.48
7565J				0.010		24	600	573	67.71	0.47
7565K				0.012		34	1100	968	114.37	0.47
7565L	8.25	9.5	61.8	0.014	10	46	1700	1483	175.31	0.44
7565N				0.018		75	3500	3112	367.75	0.33
7565R				0.025		145	9600	8000	945.19	0.23
7565S				0.030		211	14100	14609	1726.06	0.18
7566G				0.008		16	400	315	39.44	0.48
7566J				0.010		24	700	590	73.73	0.47
7566K				0.012		34	1100	995	124.31	0.44
7566L	8.5	9.75	65.4	0.014	10	45	1700	1525	190.54	0.44
7566N				0.018		75	3600	3200	399.71	0.33
7566R				0.025		145	9700	8225	1027.34	0.23
7566S				0.030		211	14100	15020	1876.07	0.18
7567G				0.008		16	400	320	41.14	0.48
7567J				0.010		24	700	598	76.93	0.47
7567K				0.012		34	1100	1009	129.70	0.46
7567L	8.63	9.88	67.2	0.014	10	45	1700	1547	198.80	0.44
7567N				0.018		75	3700	3245	417.03	0.33
7567R				0.025		145	9700	8342	1071.88	0.23
7567S				0.030		211	14100	15234	1957.40	0.18
7568J				0.010		24	700	606	79.96	0.47
7568K				0.012		34	1100	1022	134.81	0.46
7568L	8.75	10	69	0.014	10	45	1800	1567	206.63	0.44
7568N				0.018		75	3700	3287	433.47	0.33
7568R				0.025		145	9700	8556	1128.04	0.22
7568S				0.030		211	14000	15432	2034.53	0.18
7569J				0.010		24	700	622	86.53	0.47
7569K				0.012		34	1200	1049	145.89	0.46
7569L	9	10.25	72.7	0.014	10	45	1800	1609	223.61	0.44
7569N				0.018		75	3800	3375	469.08	0.33
7569R				0.025		145	9800	8784	1220.71	0.22
7569S				0.030		211	14000	16003	2223.84	0.18
7570J				0.010		24	700	655	100.73	0.47
7570K				0.012		34	1200	1073	165.14	0.47
7570L	9.5	10.75	80.5	0.014	10	45	1900	1695	260.73	0.43
7570N				0.018		75	4200	3434	528.20	0.32
7570R				0.025		145	9800	9240	1421.01	0.22
7570S				0.030		226	14600	16834	2588.72	0.17

Stock number	Inside diameter (inches)	Convolution O.D. (inches)	Effective area (square Inche)	Material thickness (inches)	Maximum convoluted length (inches)	Maximum pressure (PSI)	Stability* pressure (PSI)	Axial* spring rate (lbs/in.)	Lateral* spring rate (lbs/in.)	Axial*deflection +or- for 2,000 cycles (inches)
1	2	3	4	5	6	7	8	9	10	11
7571J	10	11.25	89	0.010	12	24	720	677	114.75	0.47
7571K				0.012		33	1296	1126	190.83	0.47
7571L				0.014		45	2016	1779	301.30	0.43
7571N				0.018		75	4176	3667	620.96	0.32
7571R				0.025		145	11520	9817	1662.54	0.22
7571S				0.030		211	16992	17843	3021.50	0.18
7572J	10.25	11.5	93	0.010	12	24	720	693	123.04	0.46
7572K				0.012		33	1296	1183	209.96	0.45
7572L				0.014		45	2016	1821	323.07	0.43
7572N				0.018		75	4320	3753	665.83	0.32
7572R				0.025		145	11664	9609	1704.68	0.22
7572S				0.030		211	16992	18263	3239.84	0.19
7573J	10.5	11.75	97	0.010	12	24	720	709	131.72	0.47
7573K				0.012		33	1296	1210	224.77	0.47
7573L				0.014		45	2016	1863	345.87	0.43
7573N				0.018		75	4464	3839	712.82	0.32
7573R				0.025		145	11664	9830	1824.97	0.22
7573S				0.030		213	16848	18682	3468.45	0.18
7574J	10.75	12	102	0.010	12	24	739	692	134.33	0.47
7574K				0.012		33	1296	1212	235.40	0.47
7574L				0.014		45	2160	1904	369.71	0.43
7574N				0.018		75	4464	3925	761.96	0.32
7574R				0.025		145	11664	10051	1950.79	0.22
7574S				0.030		213	16848	19102	3707.58	0.18
7574T				0.036		313	34800	32670	6340.84	0.15
7575J	11	12.25	106	0.010	12	24	864	741	150.29	0.47
7575K				0.012		33	1440	1239	251.26	0.47
7575L				0.014		45	2160	1946	394.63	0.43
7575N				0.018		75	4608	4012	813.31	0.32
7575R				0.025		145	11808	10272	2082.26	0.22
7575S				0.030		213	16704	19717	3997.02	0.18
7575T				0.036		313	35700	33436	6777.77	0.15
7576J	11.5	12.75	115	0.010	12	24	864	751	165.82	0.47
7576K				0.012		33	1440	1292	285.10	0.47
7576L				0.014		45	2304	2030	447.77	0.42
7576N				0.018		75	5040	4184	922.83	0.32
7576R				0.025		145	11808	10713	2362.66	0.22
7576S				0.030		213	16560	20565	4535.26	0.18
7576T				0.036		313	37300	34966	7710.81	0.15
7577J	12	13.25	125	0.010	12	24	864	782	187.20	0.47
7577K				0.012		33	1440	1346	321.84	0.45
7577L				0.014		45	2304	2114	505.48	0.42
7577N				0.018		75	5328	4357	1041.77	0.32
7577R				0.025		145	11808	11293	2700.23	0.22
7577S				0.030		213	16272	21413	5119.78	0.18
7577T				0.036		315	38900	36496	8725.61	0.14

Note

*(1) Columns 8, 9, 10 & 11 apply to 1" convoluted length. Refer to the explanation of tables (page 5) for correction to a specific convoluted length.

(2) For the correct value of lateral spring rate (Column 10) multiply the tabulated value by 1000 and apply the correction for convoluted length explained on page 5.

Stock number	Inside diameter (inches)	Convolution O.D. (inches)	Effective area (square Inche)	Material thickness (inches)	Maximum convoluted length (inches)	Maximum pressure (PSI)	Stability* pressure (PSI)	Axial* spring rate (lbs/in.)	Lateral* spring rate (lbs/in.)	Axial*deflection +or- for 2,000 cycles (inches)
1	2	3	4	5	6	7	8	9	10	11
7578J				0.010		28	1160	1088	270.12	0.48
7578K				0.012		39	1900	1784	443.27	0.45
7578L				0.014		52	2900	2756	684.35	0.37
7578N	12.25	13.5	130	0.018	12	85	6000	5658	1405.49	0.25
7578R				0.025		166	16100	15138	3760.03	0.19
7578S				0.030		243	28300	26502	6583.06	0.16
7578T				0.036		355	49800	46604	11576.60	0.13
7579J				0.010		18	721	696	183.42	0.48
7579K				0.012		25	1296	1136	299.20	0.48
7579L				0.014		34	2016	1747	460.20	0.47
7579N	12.5	14	138	0.018	12	54	4176	3647	960.62	0.37
7579R				0.025		105	9792	9325	2455.76	0.26
7579S				0.030		153	13838	17723	4667.31	0.21
7579T				0.036		222	30300	28312	7461.48	0.17
7580J				0.010		9	288	336	94.99	0.48
7580K				0.012		13	588	565	159.90	0.48
7580L				0.014		16	865	872	246.41	0.47
7580N	12.75	14.75	148	0.018	12	27	1872	1756	496.33	0.47
7580R				0.025		51	4900	4584	1295.51	0.43
7580S				0.030		73	9072	8755	2474.03	0.35
7580T				0.036		108	13500	12718	3602.92	0.19
7581N				0.018		27	2304	2100	720.65	0.48
7581R				0.025		48	3632	5037	1728.69	0.43
7581S	14	16.25	180	0.030	16	69	9472	9327	3200.63	0.35
7581T				0.036		97	17152	15372	5274.90	0.28
7581W				0.048		172	32000	33161	11379.00	0.20
7582N				0.018		25	2560	2309	1015	0.48
7582R				0.025		48	6400	5655	2487	0.39
7582S	16	18.25	230	0.030	16	67	11520	10556	4643	0.34
7582T				0.036		96	17920	17699	7786	0.27
7582X				0.048		174	31232	42064	18504	0.20
7583N				0.018		25	2816	2527	1386	0.48
7583R				0.025		48	7424	6265	3437	0.41
7583S	18	20.25	287	0.030	16	67	12288	11748	6445	0.34
7583T				0.036		96	18176	19932	10936	0.27
7583W				0.040		120	22016	24352	13360	0.24
7583X				0.048		174	29952	47563	26095	0.19
7584N				0.018		19	2250	2018	1367	0.48
7584R				0.025		36	6075	5179	3508	0.47
7584S				0.030		52	10125	9644	6532	0.40
7584T	20	22.5	354	0.036	15	75	15300	15829	10721	0.32
7584W				0.040		93	18675	19983	13535	0.29
7584X				0.048		133	25425	39029	26436	0.23
7584Z				0.060		235	38025	74622	50544	0.17

Note

*(1) Columns 8, 9, 10 & 11 apply to 1" convoluted length. Refer to the explanation of tables (page 5) for correction to a specific convoluted length.

(2) For the correct value of lateral spring rate (Column 10) multiply the tabulated value by 1000 and apply the correction for convoluted length explained on page 5.

Stock number	Inside diameter (inches)	Convolution O.D. (inches)	Effective area (square Inche)	Material thickness (inches)	Maximum convoluted length (inches)	Maximum pressure (PSI)	Stability* pressure (PSI)	Axial* spring rate (lbs/in.)	Lateral* spring rate (lbs/in.)	Axial*deflection +or- for 2,000 cycles (inches)
1	2	3	4	5	6	7	8	9	10	11
7585N				0.018		19	2475	2176	1765	0.48
7585R				0.025		36	6750	5552	4502	0.47
7585S				0.030		52	10515	10309	8359	0.39
7585T	22	24.5	424	0.036	15	75	15075	17464	14160	0.32
7585W				0.040		93	18225	22033	17865	0.29
7585X				0.048		133	24300	41088	33316	0.23
7585Z				0.060		235	33775	82449	66853	0.17
7586N				0.018		19	2700	2364	2260	0.48
7586R				0.025		36	6975	6104	5838	0.47
7586S				0.030		52	10575	11196	10708	0.39
7586T	24	26.5	500	0.036	15	75	14850	19124	18289	0.32
7586W				0.040		93	17775	24113	23061	0.28
7586X				0.048		133	23296	44898	42938	0.24
7586Z				0.060		237	33975	89981	86053	0.17
7587N				0.018		19	2700	2523	2811	0.48
7587R				0.025		36	7200	6588	7338	0.47
7587S				0.030		51	10575	12204	13593	0.39
7587T	26	28.5	583	0.036	15	75	14400	20639	22989	0.32
7587W				0.040		93	17100	25077	27932	0.28
7587X				0.048		133	22275	48754	54304	0.24
7587Z				0.060		237	31950	97583	108693	0.17
7588N				0.018		18	3025	2708	3476	0.48
7588R				0.025		31	6239	6925	8887	0.47
7588S				0.030		45	8508	13099	16811	0.41
7588T	28	30.5	672	0.036	15	64	11344	21361	27414	0.32
7588W				0.040		102	13045	26917	34544	0.25
7588X				0.048		148	16448	52654	67574	0.20
7588Z				0.060		205	23633	105257	135081	0.18
7589N				0.018		16	3375	2728	4029	0.48
7589R				0.025		31	6750	6982	10310	0.47
7589S				0.030		45	9225	13026	19234	0.40
7589T	30	32.75	773	0.036	15	64	12375	20867	30812	0.33
7589W				0.040		81	14400	26294	38826	0.30
7589X				0.048		117	18675	51435	75949	0.24
7589Z				0.060		195	26100	99796	147358	0.18
7590N				0.018		16	3375	2902	4850	0.48
7590R				0.025		31	6750	7519	12563	0.47
7590S				0.030		45	9000	13994	23382	0.40
7590T	32	34.75	874	0.036	15	64	11925	22197	37088	0.33
7590W				0.040		81	13950	28185	47094	0.29
7590X				0.048		117	17775	53431	89275	0.24
7590Z				0.060		185	24975	106675	178237	0.18
7591N				0.018		16	3375	3034	5696	0.48
7591R				0.025		31	6525	7764	14574	0.47
7591S				0.030		45	8775	14832	27842	0.40
7591T	34	36.75	982	0.036	15	64	11700	23722	44530	0.33
7591W				0.040		81	13500	29874	56077	0.29
7591X				0.048		117	17100	56633	106306	0.24
7591Z				0.060		205	23850	113618	213272	0.18

Stock number	Inside diameter (inches)	Convolution O.D. (inches)	Effective area (square Inche)	Material thickness (inches)	Maximum convoluted length (inches)	Maximum pressure (PSI)	Stability* pressure (PSI)	Axial* spring rate (lbs/in.)	Lateral* spring rate (lbs/in.)	Axial*deflection +or- for 2,000 cycles (inches)
1	2	3	4	5	6	7	8	9	10	11
7592N				0.018		16	3600	3261	6833	0.48
7592R				0.025		32	6525	8203	17188	0.47
7592S				0.030		45	8550	14721	30846	0.40
7592T	36	38.75	1097	0.036	15	64	11250	25064	52518	0.33
7592W				0.040		81	13050	31806	66644	0.29
7592X				0.048		117	16425	60202	126144	0.24
7592Z				0.060		165	22725	120042	251529	0.18
7593N				0.018		16	3600	3436	7990	0.48
7593R				0.025		31	6300	8748	20345	0.48
7593S				0.030		45	8325	15662	36425	0.40
7593T	38	40.75	1217	0.036	15	64	10800	26405	61408	0.33
7593W				0.040		81	12600	33508	77926	0.29
7593X				0.048		117	15750	63423	147498	0.24
7593Z				0.060		207	21825	127081	295538	0.18
7594N				0.018		16	3600	3514	9025	0.48
7594R				0.025		31	6300	9192	23605	0.47
7594S				0.030		45	8100	16458	42262	0.40
7594T	40	42.75	1344	0.036	15	64	10575	27976	71839	0.33
7594W				0.040		81	12150	35210	90414	0.29
7594X				0.048		117	15075	67053	172182	0.24
7594Z				0.060		207	20925	133536	342899	0.17
7595N				0.018		16	3600	3684	10399	0.48
7595R				0.025		31	6075	9637	27197	0.47
7595S				0.030		45	7875	17254	48692	0.40
7595T	42	44.75	1477	0.036	15	64	10125	29329	82769	0.32
7595W				0.040		81	11700	36100	101879	0.29
7595X				0.048		117	14625	70294	198378	0.24
7595Z				0.060		207	20025	140670	396984	0.18
7596R				0.025		31	6075	9470	29248	0.48
7596S				0.030		45	7650	18049	55743	0.40
7596T	44	46.75	1616	0.036	15	64	9900	29778	91967	0.33
7596W				0.040		81	11250	37765	116632	0.29
7596X				0.048		117	14175	73536	227104	0.24
7596Z				0.060		207	19350	147156	454469	0.18
7597R				0.025		31	5850	9887	33288	0.47
7597S				0.030		45	7425	18845	63444	0.39
7597T	46	48.75	1762	0.036	15	64	9675	31348	105537	0.33
7597W				0.040		81	11025	39429	132744	0.29
7597X				0.048		117	13500	77246	260057	0.24
7597Z				0.060		207	18450	154387	519759	0.18
7598R				0.025		25	5625	10305	37685	0.47
7598S				0.030		36	7425	19834	72532	0.46
7598T	48	51	1914	0.036	15	52	9450	32671	119476	0.38
7598W				0.040		64	10800	41094	150276	0.33
7598X				0.048		94	13725	80507	294403	0.27
7598Z				0.060		166	18675	160905	588404	0.20
7599S				0.030		36	6239	16797	66827	0.46
7599T				0.036		52	7941	27716	110265	0.37
7599W	50	53	2083	0.040	14	64	9075	34861	138691	0.33
7599X				0.048		94	11344	68295	271706	0.27
7599Z				0.060		166	15503	136498	543042	0.20

Note

**(1) Columns 8, 9, 10 & 11 apply to 1" convoluted length. Refer to the explanation of tables (page 5) for correction to a specific convoluted length.

(2) For the correct value of lateral spring rate (Column 10) multiply the tabulated value by 1000 and apply the correction for convoluted length explained on page 5.

**(3) For the correct value of lateral spring rate multiply these values by 10,000 and apply the correction for convoluted length explained on page 5.

Stock number	Inside diameter (inches)	Convolution O.D. (inches)	Effective area (square Inche)	Material thickness (inches)	Maximum convoluted length (inches)	Maximum pressure (PSI)	Stability* pressure (PSI)	Axial* spring rate (lbs/in.)	Lateral* spring rate (lbs/in.)	Axial*deflection +or- for 2,000 cycles (inches)
1	2	3	4	5	6	7	8	9	10	11
75100S				0.030		36	6050	16965	72838	0.46
75100T				0.036		52	7752	28792	123617	0.37
75100W	52	55	2248	0.040	14	64	8886	36214	155485	0.33
75100X				0.048		94	10966	70948	304607	0.27
75100Z				0.060		166	14936	141799	608798	0.20
75101S				0.030		36	6050	17599	81316	0.45
75101T				0.036		52	7562	29868	138005	0.37
75101W	54	57	2419	0.040	14	64	8508	37855	174907	0.33
75101X				0.048		94	10587	73600	340061	0.28
75101Z				0.060		166	14369	147100	679659	0.20
75102S				0.030		36	5672	18868	100197	0.45
75102T				0.036		52	7184	32021	170046	0.37
75102W	58	61	2781	0.040	14	64	8130	40583	215516	0.33
75102X				0.048		94	10020	79386	421570	0.27
75102Z				0.060		166	13612	158465	841509	0.20
75103S				0.030		36	5483	19502	110644	0.45
75103T				0.036		52	6995	33097	187776	0.37
75103W	60	63	2971	0.040	14	64	7941	41948	237987	0.33
75103X				0.048		94	9831	82054	465526	0.27
75103Z				0.060		166	13234	155120	880055	0.20
75104S				0.030		36	5105	21615	147728	0.45
75104T				0.036		52	6428	36626	250318	0.37
75104W	66	69	3578	0.040	14	64	7373	46391	317054	0.33
75104X				0.048		94	9075	90059	615502	0.27
75104Z				0.060		166	12100	171076	116920**	0.20
75106S				0.030		46	4916	23536	190728	0.43
75106T				0.036		52	6050	39881	323178	0.37
75106W	72	75	4243	0.040	14	66	6806	50514	409340	0.33
75106X				0.048		94	8319	98661	799493	0.34
75106Z				0.060		168	11155	187181	151681**	0.20
75107S				0.030		18	5105	24817	223593	0.47
75107T				0.036		27	6428	42052	378866	0.46
75107W	76	80	4717	0.040	14	33	7373	53263	479874	0.46
75107X				0.048		48	9264	98523	887636	0.45
75107Z				0.060		82	12856	197368	177817**	0.34
75108S				0.030		18	4916	12335	118420	0.47
75108T				0.036		27	6428	20934	200973	0.46
75108W	78	82	5027	0.040	11	33	7373	26532	254713	0.46
75108X				0.048		48	6050	51900	498242	0.45
75108Z				0.060		82	12478	99589	956058	0.34
75109S				0.030		18	2800	13260	147112	0.47
75109T				0.036		27	3500	22690	251726	0.46
75109W	84	88	5809	0.040	11	33	3900	28522	316428	0.46
75109X				0.048		48	4800	53633	595004	0.44
75109Z				0.060		82	6500	107575	119345**	0.33
75110S				0.030		18	2500	15259	219828	0.47
75110T				0.036		27	3100	25856	372486	0.46
75110W	96	100	7543	0.040	11	33	3500	32749	471794	0.46
75110X				0.048		48	4300	61488	885804	0.44
75110Z				0.060		82	5700	123177	177450**	0.41

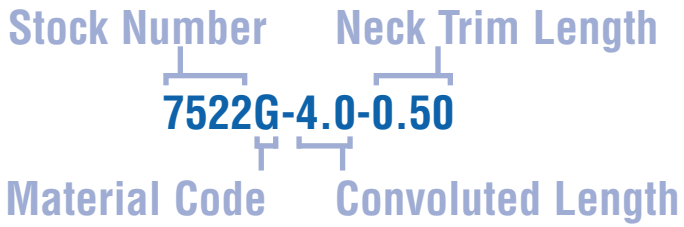
Ordering Instructions

Hyspan Series 7500 Formed Bellows may be ordered directly from this catalog by using the stock number selected from the tabulation and adding the appropriate Dash Numbers.

If the neck trim length is deleted from the part number it is assumed to be the standard—0.75" through 6" I.D., 1.0" over 6" I.D.

Optional materials, neck trim configurations, and bands must be specified separately—refer to pages 3 and 4 for options available.

Example:
Size: 1.50" I.D., 1.95" O.D.
Material: .008" Thick Type 321Stainless Steel
Convoluted Length: 4.0"
Neck Trim: 0.50"



Limited Warranty

This warranty is given by Hyspan Precision Products, Inc. (Hyspan), located at 1685 Brandywine Avenue, Chula Vista, California 91911, (619) 421-1355, for the benefit of the first purchaser of the product to which the warranty applies. This warranty applies only to those parts which are manufactured and delivered by Hyspan.

The warranty is that the parts manufactured and delivered by Hyspan will be free from defects in material or workmanship under normal use and service for the time specified below.

In the event of failure of a part due to such a covered defect, Hyspan will repair or replace, at its option, the defective part at its factory located at 1685 Brandywine Avenue, Chula Vista, California, 91911.

The part must be returned to the factory by and at the expense of the person claiming the benefit of the warranty.

The warranty shall be for a period of twenty-four (24) months after the date of delivery of the product, twelve (12) months after commencement of use of the product, or the specified service life of the product, whichever period is the shortest. All products for which warranty claims are made must be returned as provided above to the factory within thirty (30) days from the date of claimed malfunction in order for this warranty to be effective. The only entity authorized to do any warranty repairs is the manufacturer.

The repairs or replacement by Hyspan will be accomplished within forty-five (45) days from receipt of the defective parts at the factory.

This warranty is expressed in lieu of all other warranties, expressed or implied, including the warranty of merchantability, the implied warranty of fitness for a particular purpose, and of all other obligations or liabilities on the part of Hyspan and it neither assumes nor authorizes any other persons to assume for Hyspan any other liabilities in connection with the sale of the products.

This warranty does not cover parts of products made by others or products or any part thereof which have been repaired or altered, except by Hyspan, or which shall have been subjected to misuse, negligence, or accident.

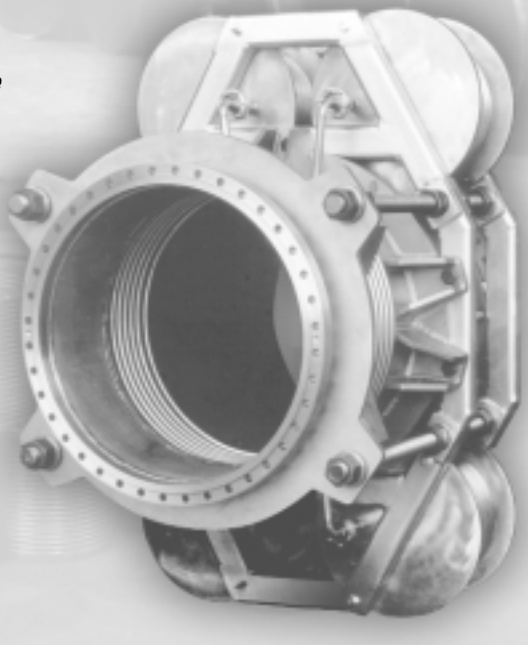
Hyspan shall not be liable for damage or delay suffered by the purchaser regardless of whether such damages are general, special, or consequential in nature, whether caused by defective material or workmanship or otherwise, or whether caused by Hyspan's negligence regardless of the degree.

Three bellows and linkage designed to react pressure thrust while allowing axial, lateral, and angular motion. This design is referred to as a In-Line Pressure Balanced Universal Gimbal, and is patented by Hyspan (U.S. Patent No. 5299840).

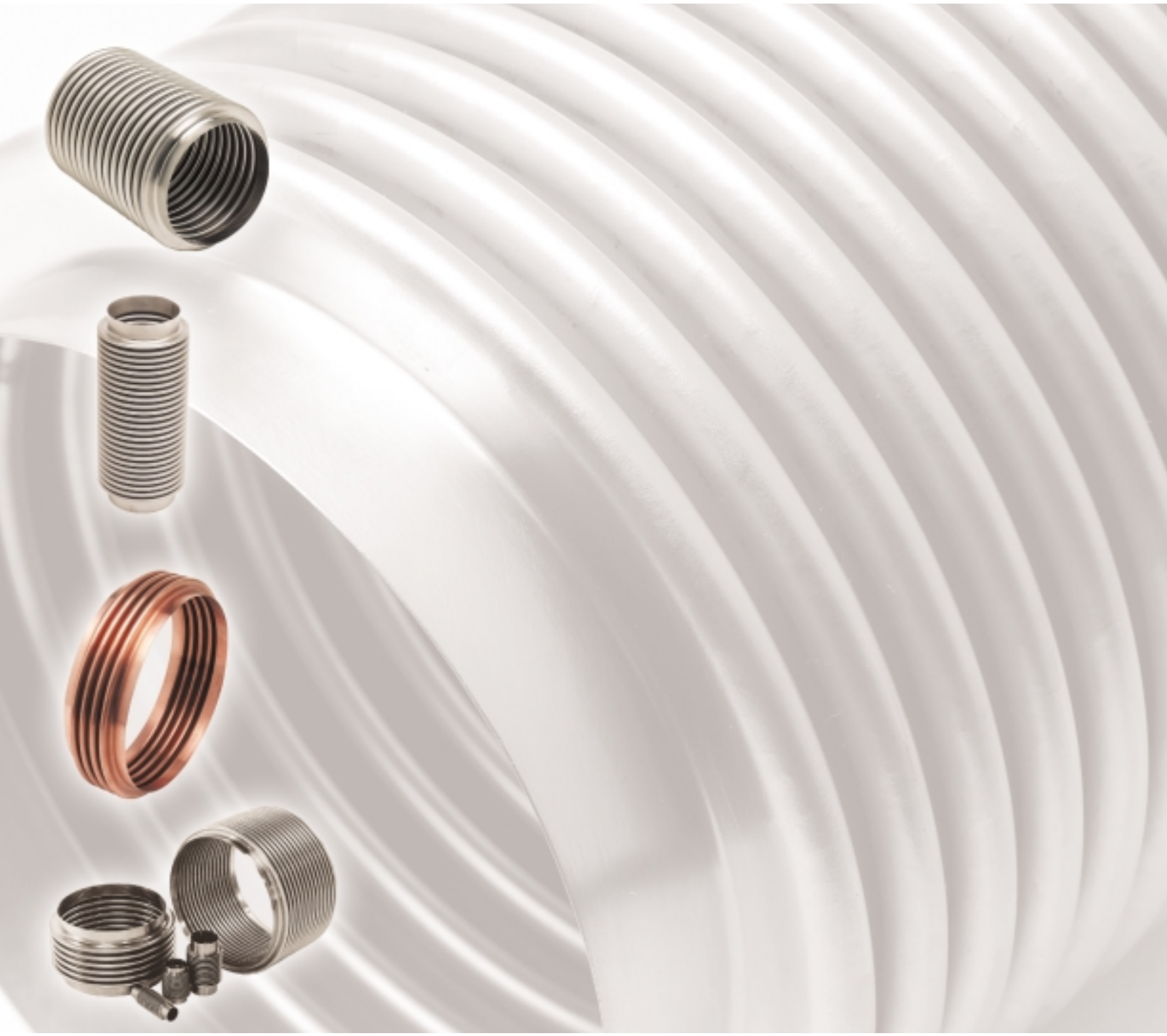
This design is referred to as a gimbaled joint. A single assembly is capable of angular motion, two assemblies in tandem allow lateral and angular displacement, and the addition of a third assembly allows universal movement. The assembly shown was used in a laser research project.

Bellows are commonly used in engine manifolds to absorb the thermal expansion between the rigid branch connections. The manifold shown is for a diesel engine.

The pressure thrust of the large in-line bellows is balanced by the pressure thrust of the four bellows capsules. This configuration is capable of axial extension or compression without pressure thrust. It was designed for a laser research application.



Bellows assembly designed for medical devices. Stainless steel bellows and flanges. The center flange is floating and made of copper.



Hyspan®

Hyspan Precision Products, Inc.
1685 Brandywine Avenue
Chula Vista, CA 91911

Tel: (619) 421-1355
Fax: (619) 421-1702
www.hyspan.com