Microflex® inc.

MICROFLEX INDUSTRIAL

HOSE PRODUCTS

FLEXIBLE METAL HOSE

HOSE PRODUCTS

WELCOME TO INNOVATION REDEFINED

Microflex offers a complete line of annular corrugated metal hose in a wide variety of alloys, sizes and extra long unsegmented lengths. Our standard stock sizes range from 1/4" - 16" ID with larger sizes produced on order. Our engineers will gladly assist you in the proper selection and application of standard flexible hose, special applications or prototypes. Microflex is a fully equipped facility specializing in the design and manufacture of flexible metal hose, and hose assemblies.

Microflex corrugated hose is made from strip metal of various alloys. The strip metal is formed into tubes and the edges are inert-arc butt welded. The tube is then corrugated.

Corrugated hose is pressure tight and suited to continuous flexing or vibration. Close pitch is standard. It is also available in open pitch. Open pitch may be used where extreme flexibility is not essential. Specifications for open pitch are available upon request. For pressure applications, one or more wire braid coverings are used. Braiding prevents hose elongation under pressure, dampens vibration and provides some mechanical protection for the inner hose.

The flexibility of corrugated metal hose is due to the spring-like quality of the corrugations. It will return to its original position when bending forces are removed. However, if the hose is bent beyond its maximum recommended bend radius, the hose will take on a permanent set.

Microflex hose is designed to correct problems involving: Vibration, Temperature Variations, Misalignment, Pipe Line Expansion and Contraction and Offset Motion.

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HOW TO ORDER > HOSE PRODUCTS

1 SPECS

When placing an order or requesting a quotation, the following information is required:

1. Quantity
2. Nominal Size (inside diameter)
3. Overall Length
4. Hose Style (i.e. MSS-300, MSS-360, etc)
5. Working Pressure
6. Temperature (Maximum Design & MDMT)
7. Application
8. Media
9. Fittings (Complete description should include type and alloy)
10. Special requirements (i.e. Design Code)

2 TERMS OF SALE

When Microflex products are required to conform to a particular specification or application this should be stated on the order. All orders are subject to Microflex Standard Terms and Conditions of Sale. They can be found at:

http://www.microflexinc.com/industrial/about_tc.html

3 DISCLAIMER

The technical statements and engineering data in this catalog are based on our experience and knowledge and is the best information available at the date of this printing. However, due to new technology and changes in the industry, this information is subject to change without notice, at any time. Since Microflex does not control or supervise any additional fabrication, installation or use of our products, we cannot assume responsibility for subsequent performance.

METAL HOSE > TERMINOLOGY

Annular - The annular hose profile is designed so that each convolution is a complete circle or ring.

Braid - Woven wire sheath placed over hose which prevents elongation of the hose under internal pressure.

Close Pitch - Less spacing between the corrugations, thereby giving longest fatigue life and minimum bend radius.

Constant Motion - Motion that occurs on a regular cyclic basis at a constant travel.

Corrosion Data - For corrosion data/rates for stainless steels consult material manufacturer.

Dynamic Flexing Bend Radius - The minimum centerline radius to which a hose can be repeatedly bent and render satisfactory flexure life.

Intermittent Motion - Motion that occurs on a regular or irregular cyclic basis along a path of full travel.

Fittings - Parts attached to the ends of metal hose so that it can be connected to other components. Examples of fittings: flanges, unions, nipples and stub ends.

Flow Velocity - When the flow velocity exceeds 50 ft/second liquid, 100 ft/second gas in unbraided hose, or 75 ft/second liquid, 150 ft/second gas in braided hose, a flexible metal interlocked liner should be used.

Live Length - The flexible length of the hose assembly measured from the hose side of each braid collar.

Maximum Test Pressure - Maximum Pressure hose assembly should be subject to for testing purposes. Based on 150% of the Maximum Working Pressure.

Maximum Working Pressure - Maximum Pressure hose assembly should be subjected to during operation for commercial applications.

Media - Material conveyed by a hose assembly such as chemicals, gases, liquids.

NPT - American Standard Tapered Pipe Thread

Open Pitch - Fewer corrugations per foot which limits motion and bend radius. Applications - Diesel Engine Exhaust

Operating Conditions - Temperature, Pressure, Media, Motion and Application involved.

PSIG - Gage pressure in pounds per square inch.

Random Motion - Motion that occurs from manual handling of hose.

Rated Burst Pressure - Pressure at which hose can be expected to fail. Burst pressures in this catalog were obtained with the hose installed straight at ambient temperature and subjected to constantly increasing pressure. Braid will normally fail under tensile load.

Safety Factor - Difference between working pressure and rated burst pressure.

Shock or Pulsating Pressure - Shock, pulsating or surge pressure which can cause premature failure of hose. The maximum allowable pressure should not exceed 50% of the Maximum Working Pressure.

Static Bend Radius - Minimum centerline bend radius to which flexible metal hose may be bent for installation.

Vibration - Rapid application of motion.

Working Temperature - Temperature which hose is subjected to during operation.

METAL HOSE > CORRECTION FACTORS FOR ELEVATED TEMPERATURE

As the operating temperature of a hose assembly increases the maximum working pressure decreases. Pressure ratings in the data sections of this catalog are valid at ambient temperature. For operating temperatures in excess of 70° F the maximum working pressure must be decreased according to the Correction Factors chart listed below.

CORRECTION FACTORS CHART

TEMP F˚	STAINLESS STEEL	STEEL	MONEL	BRONZE
70˚	1.00	1.00	1.00	1.00
150˚	0.97	0.99	0.93	0.92
200˚	0.94	0.97	0.90	0.89
250˚	0.92	0.96	0.87	0.86
300˚	0.88	0.93	0.83	0.83
350˚	0.86	0.91	0.82	0.81
400˚	0.83	0.87	0.79	0.78
450˚	0.81	0.86	0.77	0.75
500˚	0.78	0.81	0.73	
600˚	0.74	0.74	0.72	
700˚	0.70	0.66	0.71	
800˚	0.66	0.52	0.70	
900˚	0.62	0.50		
1000˚	0.60			
1100˚	*			
1200˚	*			
1300˚	*			
1400˚	*			
1500˚	*			

Apply to pressure rating for elevated temperatures.

*Consult Microflex Engineering

MAXIMUM SERVICE TEMPERATURE

MAX TEMP F˚	ALLOY
1500˚	Type 321: AISI Stainless Steel
1500˚	Type 316: AISI Stainless Steel
850˚	Type 304: AISI Stainless Steel
850˚	Mild Steel
800˚	Malleable Iron
800˚	Monel
450˚	Bronze
450˚	Brass
400˚	Copper
450˚	Galvanizing

1. Determine maximum operating temperature
2. Locate appropriate correction factor on chart
3. Multiply correction factor by maximum working pressure (MWP) at ambient temperature specified for desired product.

T321 STAINLESS STEEL ANNULAR CORRUGATED HOSE

1 STYLE

MSS-300 Unbraided
MSS-301 Single Braid
MSS-302 Double Braid

2 CONSTRUCTION

A-240 321 Stainless Steel Butt Welded Tube
Annular Close Pitch Corrugations
A-580 304 Stainless Steel Braid (316L / 321 Optional)

			PRESSURE (PSIG) AT AMBIENT TEMPERATURE				MINIMUM CENTER-LINE BEND RADIUS	
NOMINAL HOSE I.D. (INCHES)	HOSE STYLE	HOSE O.D. (INCHES)	MAXIMUM WORKING (MWP)	MAXIMUM TEST (MTP)	RATED BURST (RBP)	APPROXIMATE WEIGHT (LBS/FT)	DYNAMIC FLEXING (INCHES)	STATIC BEND (INCHES)
1/4	MSS-300 MSS-301 MSS-302	0.48 0.56 0.64	160 2750 3300	200 4125 4950	– 11000 13200	0.11 0.20 0.28	5	1
3/8	MSS-300 MSS-301	0.61 0.69	140 1960	210 2940	– 7840	0.16 0.27	5 1/2	1 1/8
1/2	MSS-300 MSS-301	.78 .86	60 1335	90 2003	– 5340	0.19 0.32	6	1 1/2
3/4	MSS-300 MSS-301 MSS-302	1.08 1.16 1.24	60 1135 1335	90 1703 2003	– 4540 5340	0.30 0.51 0.73	8	2 1/8
1	MSS-300 MSS-301 MSS-302	1.38 1.46 1.54	26 795 1120	40 1193 1680	– 3180 4480	0.40 0.66 0.91	9	2 3/4
1 1/4	MSS-300 MSS-301 MSS-302	1.73 1.81 1.89	24 610 800	36 915 1200	– 2440 3200	0.52 0.82 1.12	10	3 1/2
1 1/2	MSS-300 MSS-301 MSS-302	2.02 2.10 2.18	20 530 665	30 795 998	– 2120 2660	0.75 1.16 1.56	11	4 1/2
2	MSS-300 MSS-301	2.63 2.74	10 535	15 803	– 2140	0.95 1.66	13	6
2 1/2	MSS-300 MSS-301 MSS-302	3.15 3.26 3.37	10 395 495	15 593 743	– 1580 1980	1.20 1.98 2.75	15	6 1/2
3	MSS-300 MSS-301 MSS-302	3.70 3.83 3.96	6 385 455	9 578 683	– 1540 1820	1.42 2.56 3.70	18	8 1/2
3 1/2	MSS-300 MSS-301	4.25 4.38	4 365	6 548	– 1460	1.65 2.90	20	10
4	MSS-300 MSS-301 MSS-302	4.75 4.88 5.01	3 270 335	5 405 503	– 1080 1340	1.90 3.27 4.64	22	11
5	MSS-300 MSS-301 MSS-302	5.88 6.01 6.15	6 225 405	9 338 608	– 900 1620	3.22 4.68 6.13	28	14
6	MSS-300 MSS-301 MSS-302	7.00 7.13 7.26	3 170 300	5 255 450	– 680 1200	3.87 5.61 7.35	34	16
8	MSS-300 MSS-301 MSS-302	9.00 9.25 9.50	2.5 235 280	4 353 420	– 940 1120	5.14 8.54 11.95	42	19
10	MSS-300 MSS-301 MSS-302	11.00 11.25 11.50	4 260 280	6 390 420	– 1040 1120	8.20 14.01 19.81	56	24
12	MSS-300 MSS-301 MSS-302	13.12 13.38 13.54	2.5 160 220	4 240 330	– 640 880	9.80 16.30 22.81	58	28
14	MSS-300 MSS-301 MSS-302	14.37 14.62 14.88	2.5 150 190	4 225 285	– 600 760	10.63 17.03 23.43	66	35
16	MSS-300 MSS-301 MSS-302	16.37 16.62 16.88	2 110 170	3 165 255	– 440 680	12.23 18.44 24.65	74	40
18	MSS-300 MSS-301 MSS-302	18.75 19.00 19.25	1 85 150	1.5 128 225	– 340 600	13.83 20.23 26.63	82	45
20	MSS-300 MSS-301 MSS-302	20.75 21.00 21.25	1 65 115	1.5 98 173	– 260 460	15.44 21.84 28.24	90	50
22	MSS-300 MSS-301 MSS-302	22.75 23.00 23.25	1 50 90	1.5 75 135	– 200 360	17.10 23.50 29.90	98	55
24	MSS-300 MSS-301 MSS-302	24.75 25.00 25.25	1 45 80	1.5 68 120	– 180 320	18.64 25.04 31.44	104	60
30	MSS-300 MSS-301 MSS-302	30.75 31.00 31.25	0.75 20 36	1 30 54	– 80 144	24.45 30.85 37.25	128	75

T316L STAINLESS STEEL ANNULAR CORRUGATED HOSE

1 STYLE

MSS-360 Unbraided
MSS-361 Single Braid
MSS-362 Double Braid

2 CONSTRUCTION

A-240 316L Stainless Steel Butt Welded Tube
Annular Close Pitch Corrugations
A-580 304 Stainless Steel Braid (316L / 321 Optional)

			PRESSURE (PSIG) AT AMBIENT TEMPERATURE				MINIMUM CENTER-LINE BEND RADIUS	
NOMINAL HOSE I.D. (INCHES)	HOSE STYLE	HOSE O.D. (INCHES)	MAXIMUM WORKING (MWP)	MAXIMUM TEST (MTP)	RATED BURST (RBP)	APPROXIMATE WEIGHT (LBS/FT)	DYNAMIC FLEXING (INCHES)	STATIC BEND (INCHES)
1/4	MSS-360	0.48	280	420	–	0.13	5	1
	MSS-361	0.56	2750	4125	11000	0.22		
	MSS-362	0.64	3935	5903	15740	0.30		
3/8	MSS-360	0.61	260	390	–	0.20	5 1/2	1 1/8
	MSS-361	0.69	1960	2940	7840	0.31		
	MSS-362	0.77	2740	4110	10960	0.41		
1/2	MSS-360	0.78	100	150	–	0.24	7 1/2	1 1/2
	MSS-361	0.86	1335	2003	5340	0.37		
	MSS-362	0.94	2065	3095	8260	0.50		
3/4	MSS-360	1.08	150	225	–	0.41	8 1/2	2 1/8
	MSS-361	1.16	1135	1703	4540	0.62		
	MSS-362	1.24	1800	2700	7200	0.84		
1	MSS-360	1.38	75	115	–	0.55	10	2 3/4
	MSS-361	1.46	795	1193	3180	0.81		
	MSS-362	1.54	1365	2050	5460	1.06		
1 1/4	MSS-360	1.73	55	80	–	0.70	11 1/2	3 1/2
	MSS-361	1.81	610	915	2440	1.00		
	MSS-362	1.89	1000	1500	4000	1.30		
1 1/2	MSS-360	2.02	60	90	–	1.00	13	4 1/2
	MSS-361	2.10	530	795	2120	1.41		
	MSS-362	2.18	955	1430	3820	1.81		
2	MSS-360	2.63	35	50	–	1.32	15	6
	MSS-361	2.74	535	803	2140	2.03		
	MSS-362	2.85	865	1298	3460	2.73		
2 1/2	MSS-360	3.15	25	40	–	1.64	17	6 1/2
	MSS-361	3.26	395	593	1580	2.42		
	MSS-362	3.37	710	1065	2840	3.19		
3	MSS-360	3.70	18	27	–	1.95	21	8 1/2
	MSS-361	3.83	385	578	1540	3.09		
	MSS-362	3.96	635	953	2540	4.23		
3 1/2	MSS-360	4.25	12	18	–	2.28	23	10
	MSS-361	4.38	365	548	1460	3.53		
	MSS-362	4.51	585	878	2340	4.79		
4	MSS-360	4.75	10	15	–	2.60	27	11
	MSS-361	4.88	270	405	1080	3.97		
	MSS-362	5.01	485	728	1940	5.34		
5	MSS-360	5.88	12	18	–	3.86	32	14
	MSS-361	6.01	225	338	900	5.32		
	MSS-362	6.15	405	608	1620	6.77		
6	MSS-360	7.00	8	12	–	4.63	37	16
	MSS-361	7.13	170	255	680	6.37		
	MSS-362	7.26	300	450	1200	8.11		
8	MSS-360	9.00	6	9	–	6.20	42	19
	MSS-361	9.25	235	353	940	9.60		
	MSS-362	9.50	360	540	1440	13.01		
10	MSS-360	11.00	4	7	–	8.20	56	24
	MSS-361	11.25	260	390	1040	14.01		
	MSS-362	11.50	280	420	1120	19.81		
12	MSS-360	13.12	2.5	4	–	9.80	58	28
	MSS-361	13.37	160	240	640	16.30		
	MSS-362	13.54	220	330	880	22.81		
14	MSS-360	14.37	2.5	4	–	10.63	66	35
	MSS-361	14.62	150	225	600	17.03		
	MSS-362	14.86	190	285	760	23.43		
16	MSS-360	16.37	2	3	–	12.23	74	40
	MSS-361	16.62	110	165	440	18.44		
	MSS-362	16.86	170	255	680	24.65		
18	MSS-360	18.75	1	1.5	–	13.83	82	45
	MSS-361	19.00	85	128	340	20.23		
	MSS-362	19.25	150	225	600	26.63		
20	MSS-360	20.75	1	1.5	–	15.44	90	50
	MSS-361	21.00	65	98	260	21.84		
	MSS-362	21.25	115	173	460	28.24		
22	MSS-360	22.75	1	1.5	–	17.10	98	55
	MSS-361	23.00	50	75	200	23.50		
	MSS-362	23.25	90	135	360	29.90		
24	MSS-360	24.75	1	1.5	–	18.64	104	60
	MSS-361	25.00	45	68	180	25.04		
	MSS-362	25.25	80	120	320	31.44		
30	MSS-360	30.75	0.75	1	–	24.45	128	75
	MSS-361	31.00	20	30	80	30.85		
	MSS-362	31.25	36	54	144	37.25		

HOSE PRODUCTS

T316L STAINLESS STEEL ANNULAR CORRUGATED HIGH PRESSURE HOSE

1 STYLE

MSS-382 Double Braid
MSS-383 Triple Braid
Available only as braided hose

2 CONSTRUCTION

A-240 316L Stainless Steel Butt Welded Tube
Annular Close Pitch Corrugations
A-580 304 Stainless Steel Braid

			PRESSURE (PSIG) AT AMBIENT TEMPERATURE				MINIMUM CENTER-LINE BEND RADIUS	
NOMINAL HOSE I.D. (INCHES)	HOSE STYLE	HOSE O.D. (INCHES)	MAXIMUM WORKING (MWP)	MAXIMUM TEST (MTP)	RATED BURST (RBP)	APPROXIMATE WEIGHT (LBS/FT)	DYNAMIC FLEXING (INCHES)	STATIC BEND (INCHES)
1/4	MSS-382	0.64	5320	7980	21280	0.40	5	1
3/8	MSS-382	0.77	3925	5887	15700	0.52	5 1/2	1 1/8
1/2	MSS-382	0.97	3620	5430	14480	0.76	7 1/2	1 1/2
3/4	MSS-382	1.50	3555	5332	14220	1.60	8 1/2	2 1/8
1	MSS-382	1.80	2810	4215	11240	2.06	10	2 3/4
1 1/4	MSS-382	2.04	2500	3750	10000	2.90	11 1/2	3 3/4
1 1/2	MSS-382	2.34	2220	3330	8880	3.60	13	5
2	MSS-382	2.95	1680	2520	6720	4.60	15	6 3/4
3	MSS-382	4.04	1475	2213	5900	7.33	21	9
4	MSS-382	5.21	1225	1838	4900	13.81	27	11 1/2
5	MSS-383	6.34	1200	1800	4800	16.81	32	14
6	MSS-383	7.87	950	1425	3800	22.21	37	17
8	MSS-383	9.87	875	1313	3500	32.42	46	22
10	MSS-383	11.93	750	1125	3000	45.42	56	26
12	MSS-383	14.44	525	788	2100	50.43	62	32

T321 STAINLESS STEEL ANNULAR CORRUGATED EXHAUST HOSE

1 STYLE

MSS-350 Unbraided
Also Available in T316L (known as style MSS-370)

2 CONSTRUCTION

A-240 321 Stainless Steel Butt Welded Tube
Annular Open Pitch Corrugations

							MINIMUM CENTER-LINE BEND RADIUS	
NOMINAL HOSE I.D. (INCHES)	HOSE STYLE	HOSE O.D. (INCHES)	MAXIMUM WORKING PRESSURE (PSIG) AT AMBIENT TEMPERATURE	MAXIMUM AXIAL EXTENSION OR COMPRESSION (IN/FT)	MAXIMUM LATERAL OFFSET (IN/FT)	APPROXIMATE WEIGHT (LBS/FT)	DYNAMIC FLEXING (INCHES)	STATIC BEND (INCHES)
1 1/2	MSS-350	2.02	50	0.14	1.25	1.15	22	2.7
2	MSS-350	2.72	40	0.14	0.97	1.35	24	3.5
2 1/2	MSS-350	3.15	30	0.22	0.82	1.65	28	4.2
3	MSS-350	3.75	25	0.22	0.75	1.72	36	4.7
3 1/2	MSS-350	4.25	23	0.22	0.65	2.00	40	5.6
4	MSS-350	4.75	20	0.22	0.62	2.28	44	6.2
5	MSS-350	5.88	20	0.22	0.48	3.38	56	7.5
6	MSS-350	7.00	18	0.25	0.44	4.06	68	8.5
8	MSS-350	9.00	15	0.25	0.34	5.40	88	10.5
10	MSS-350	11.00	10	0.25	0.25	7.90	100	13.5
12	MSS-350	13.12	6	0.25	0.22	9.09	116	16.0
14	MSS-350	14.37	5	0.25	0.20	9.92	132	18.5
16	MSS-350	16.37	5	0.25	0.18	11.95	148	21.4
18	MSS-350	18.75	4	0.25	0.17	15.50	164	24.0
20	MSS-350	20.75	4	0.25	0.15	18.06	180	26.1
22	MSS-350	22.75	3	0.25	0.14	19.63	196	28.0
24	MSS-350	24.75	2	0.25	0.12	21.18	208	30.2
30	MSS-350	30.75	2	0.25	0.08	26.86	256	38.0

SERIES MSS-310 PLAIN WEAVE BRAID TYPE 304 SS

The Pressure Ratings are at ambient temperature with 80% weld efficiency rating included.
Braid in Type 316L is also available. Other alloys are available upon request.

NOMINAL SIZE (INCHES)	PART NUMBER	BRAID I.D.	BRAID CONSTRUCTION	BRAID ANGLE	COVERAGE %	WORKING PRESSURE	BURST PRESSURE	WEIGHT LB / FT
1/4	0310-01-0002	0.48	24 x 4 x .016	52	82	2,750	11,000	0.085
3/8	0310-01-0003	0.61	24 x 5 x .016	52	83	1,960	7,840	0.106
1/2	0310-01-0005	0.78	24 x 6 x .016	52	79	1,335	5,340	0.127
3/4	0310-01-0007	1.08	48 x 5 x .016	52	90	1,135	4,540	0.213
1	0310-01-0010	1.38	48 x 6 x .016	52	87	795	3,180	0.255
1 1/4	0310-01-0012	1.73	48 x 7 x .016	52	85	610	2,440	0.298
1 1/2	0310-01-0015	2.02	48 x 9 x .016	48	92	530	2,120	0.406
2	0310-01-0020	2.63	48 x 10 x .02	48	94	535	2,140	0.706
2 1/2	0310-01-0025	3.15	48 x 11 x .02	46	92	395	1,580	0.802
3	0310-01-0030	3.70	64 x 10 x .020	46	91	385	1,540	1.100
3 1/2	0310-01-0035	4.25	96 x 8 x .020	52	87	365	1,460	1.250
4	0310-01-0040	4.75	96 x 8 x .020	52	84	270	1,080	1.370
5	0310-01-0050	5.88	96 x 7 x .025	52	81	225	900	1.456
6	0310-01-0060	7.00	96 x 8 x .025	52	79	170	680	1.740

SERIES MSS-311 BRAIDED BRAID TYPE 304 SS

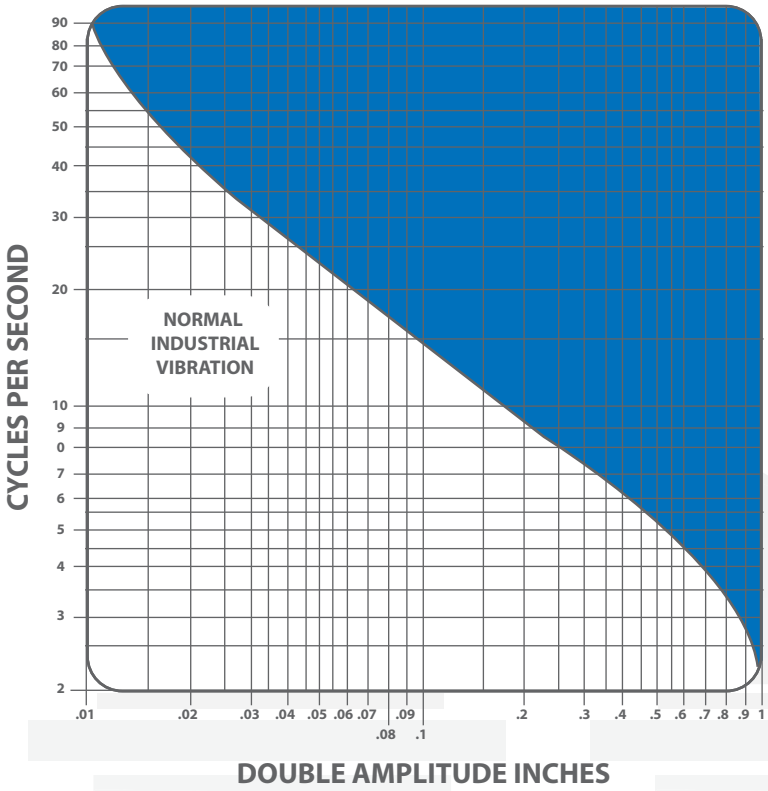
The Pressure Ratings are at ambient temperature with 80% weld efficiency rating included.
Braid in Type 316L is also available. Other alloys are available upon request.

NOMINAL SIZE (INCHES)	PART NUMBER	BRAID I.D.	BRAID CONSTRUCTION	BRAID ANGLE	COVERAGE %	WORKING PRESSURE	BURST PRESSURE	WEIGHT LB / FT
3	0311-01-0030	3.70	96 X 13 X .020	55	99	728	2,912	1.665
4	0311-01-0040	4.75	96 X 13 X .020	55	92	427	1,708	1.665
6	0311-01-0060	7.00	96 X 13 X .025	55	88	302	1,208	2.605
8	0311-01-0080	9.00	96 X 17 X .025	55	87	235	940	3.403
10	0311-01-0100	11.00	96 X 29 X .025	55	92	260	1040	5.805
12	0311-01-0120	13.12	96 X 29 X .025	55	85	160	640	5.995
14	0311-01-0140	14.37	96 X 29 X .025	55	80	150	600	6.195
16	0311-01-0160	16.37	96 X 29 X .025	55	74	110	440	6.409
18	0311-01-0180	18.75	96 X 29 X .025	55	67	85	340	6.638
20	0311-01-0200	20.75	96 X 29 X .025	55	62	65	260	6.884
22	0311-01-0220	22.75	96 X 29 X .025	55	58	50	200	7.148
24	0311-01-0240	24.75	96 X 29 X .025	55	54	45	180	7.434
26	0311-01-0260	26.75	96 X 29 X .025	52	53	40	160	7.744
28	0311-01-0280	28.75	96 X 29 X .025	48	52	33	132	8.081
30	0311-01-0300	30.75	96 X 29 X .025	45	52	20	80	8.448

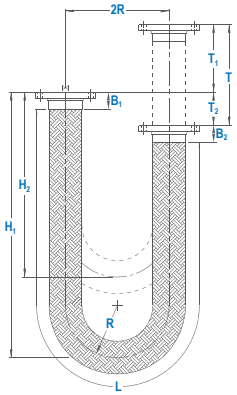
1 DETERMINATION OF MINIMUM HOSE LIVE LENGTH FOR VIBRATION

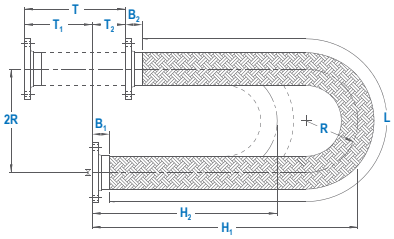
For normal vibrations encountered in industrial applications such as discharge lines on pumps, compressors, and diesel engine exhaust installations, the hose live lengths should be taken from the Minimum Live Length For Vibration Columns on Hose Data Charts.

Normal vibration is shown in the unshaded area of the chart to the right. If the expected vibration appears in the shaded area consult Microflex engineering department.



2 CONSTANT RADIUS TRAVELING LOOP





VERTICAL TRAVEL

Variables:

L (inches) = Minimum Live Length Required For Travel (T)

R (inches) = Radius From Dynamic Minimum Center-Line Bend Radius

T (inches) = Total Travel

T_1, T_2 (inches) = Travel

H_1 (inches) = Maximum Drop Of 180° Loop

H_2 (inches) = Minimum Drop Of 180° Loop

B_{12} (inches) = Fitting Length (See Hose Fitting Tables)

Equations:

$T = T_1 + T_2$

$L = 4R + MAX(T_1, T_2)$

$H_1 = 1.43R + MAX(T/2, T_2) + B_1$

IF $T_2 > T_1$ THEN: $H_2 = 1.43R + T_2 - T/2 + B_1$

OTHERWISE: $H_2 = 1.43R + B_1$

Developed Length = $L + B_1 + B_2$

HORIZONTAL TRAVEL

Loop must be properly supported. See installation guidelines for more information.

3 ANGULAR MOVEMENT

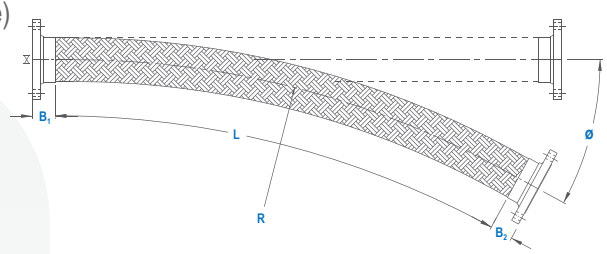
Variables:

L (inches) = Minimum Live Length Required For Bend

R (inches) = Radius From Dynamic Minimum Center-Line Bend Radius

ø (degrees) = Angle Of Bend

B_{12} (inches) = Fitting Length (See Hose Fitting Table)



Equations:

L = .01745Rø

Developed Length = L + B_1 + B_2

4 VARIABLE RADIUS TRAVELING LOOP

HORIZONTAL TRAVEL

Variables:

L (inches) = Minimum Live Length Required For Travel (T)

R (inches) = Radius From Dynamic Minimum Center-Line Bend Radius

T (inches) = Travel

H_1 (inches) = Maximum Drop Of 180° Loop

H_2 (inches) = Minimum Drop Of 180° Loop

B_{12} (inches) = Fitting Length (See Hose Fitting Tables)

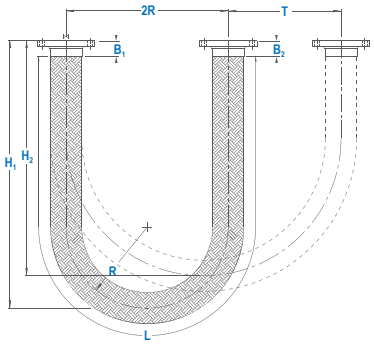
Equations:

L = 4R + 1.57T

H_1 = 1.43R + 0.785T + B_1

H_2 = 1.43R + T/2 + B_1

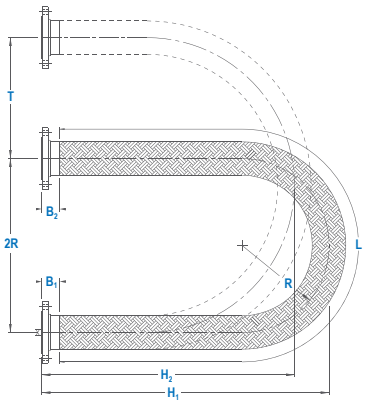
Developed Length = L + B_1 + B_2



VERTICAL TRAVEL

Loop must be properly supported.

See installation guidelines for more information.



5 VERTICAL LOOP WITH TRAVEL IN TWO DIRECTIONS

Variables:

L (inches) = Minimum Live Length Required For Travel (T)

R (inches) = Radius From Dynamic Minimum Center-Line Bend Radius

T (inches) = Total Vertical Travel

T_1 (inches) = Horizontal Travel

T_2 (inches) = Upward Vertical Travel

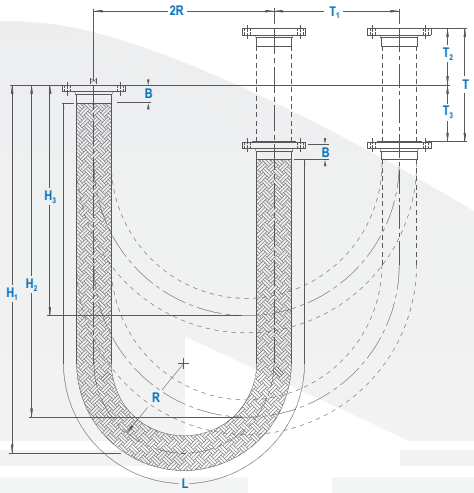
T_3 (inches) = Downward Vertical Travel

H_1 (inches) = Maximum Drop Of 180° Bend Without Horizontal Travel (T_1)

H_2 (inches) = Maximum Drop Of 180° Bend With Horizontal Travel (T_1)

H_3 (inches) = Minimum Drop Of 180° Bend With Horizontal Travel (T_1)

B (inches) = Fitting Length (See Hose Fitting Tables)



Equations:

$T = T_2 + T_3$

$L = \pi R + 1.57T_1 + T/2$

$H_1 = R + 0.785T_1 + T/2 + B$

$H_2 = R + T_1/2 + B$

$H_3 = R - T_1/2 + B$

Developed Length = L+2B

Note: Use the largest value of T_2 or T_3 if either is greater than T/2.

6 DETERMINATION OF MINIMUM HOSE LIVE LENGTH FOR OFFSET MOTION

T = Maximum Distance From Centerline (INCHES)

CENTERLINE RADIUS INCHES "R"	1/4	1/2	3/4	1	1 1/2	2	2 1/2	3	4	5	6	7	8	9	10	12
5	2 3/4	4	5	5 3/4	7	8	9	10	11 3/4	13 1/4	14 3/4	16 1/4	17 1/2	18 3/4	20	22 1/2
5 1/2	3	4 1/4	5	6	7 1/4	8 1/2	9 1/2	10 1/2	12 1/4	14	15 1/2	16 3/4	18 1/4	19 1/2	20 3/4	23 1/4
6	3	4 1/2	5 1/4	6 1/4	7 1/2	8 3/4	10	11	12 3/4	14 1/2	16	17 1/2	19	20 1/4	21 1/2	24
7 1/2	3 1/2	5	6	7	8 1/2	9 3/4	11	12	14	16	17 1/2	19 1/4	20 3/4	22	23 1/2	26 1/4
8	3 1/2	5	6	7	8 3/4	10	11 1/4	12 1/2	14 1/2	16 1/2	18	19 3/4	21 1/4	22 3/4	24 1/4	27
8 1/2	3 3/4	5 1/4	6 1/4	7 1/4	9	10 1/2	11 3/4	12 3/4	15	16 3/4	18 1/2	20 1/4	21 3/4	23 1/4	24 3/4	27 1/2
9	3 3/4	5 1/4	6 1/2	7 1/2	9 1/4	10 3/4	12	13 1/4	15 1/4	17 1/4	19	20 3/4	22 1/2	24	25 1/2	28 1/4
10	4	5 1/2	6 3/4	8	9 3/4	11 1/4	12 1/2	13 3/4	16	18	20	21 3/4	23 1/2	25	26 1/2	29 1/2
11	4 1/4	6	7 1/4	8 1/4	10	11 3/4	13 1/4	14 1/2	16 3/4	19	21	22 3/4	24 1/2	26	27 3/4	30 3/4
11 1/2	4 1/4	6	7 1/4	8 1/2	10 1/2	12	13 1/2	14 3/4	17 1/4	19 1/4	21 1/4	23 1/4	25	26 1/2	28 1/4	31 1/4
13	4 1/2	6 1/2	7 3/4	9	11	12 3/4	14 1/4	15 3/4	18 1/4	20 1/2	22 1/2	24 1/2	26 1/4	28	29 3/4	33
15	4 3/4	6 3/4	8 1/4	9 3/4	11 3/4	13 3/4	15 1/4	16 3/4	19 1/2	22	24	26	28	30	31 3/4	35
17	5 1/4	7 1/4	9	10 1/4	12 1/2	14 1/2	16 1/4	17 3/4	20 3/4	23 1/4	25 1/2	27 3/4	29 3/4	31 3/4	33 1/2	37
18	5 1/2	7 1/2	9 1/4	10 1/2	13	15	16 3/4	18 1/4	21 1/4	24	26 1/4	28 1/2	30 1/2	32 1/2	34 1/2	38
20	5 1/2	8	9 3/4	11	13 1/2	15 3/4	17 1/2	19 1/4	22 1/2	25	27 1/2	30	32	34 1/4	36	40
21	5 3/4	8	9 3/4	11 1/2	14	16	18	19 3/4	23	25 3/4	28 1/4	30 3/4	32 3/4	35	37	40 3/4
22	5 3/4	8 1/4	10	11 3/4	14 1/4	16 1/2	18 1/2	20 1/4	23 1/2	26 1/4	29	31 1/4	33 1/2	35 3/4	37 3/4	41 3/4
23	6	8 1/2	10 1/4	12	14 1/2	16 3/4	18 3/4	20 3/4	24	26 3/4	29 1/2	32	34 1/4	36 1/2	38 1/2	42 1/2
27	6 1/2	9	11	13	15 3/4	18 1/4	20 1/2	22 1/4	26	29	31 3/4	34 1/2	37	39 1/4	41 1/2	45 3/4
28	6 1/2	9 1/4	11 1/4	13	16	18 1/2	20 3/4	22 3/4	26 1/4	29 1/2	32 1/2	35	37 3/4	40	42 1/4	46 1/2
32	7	10	12	14	17	19 3/4	22	24 1/4	28	31 1/2	34 1/2	37 1/2	40	42 3/4	45	49 1/2
34	7 1/4	10 1/4	12 1/2	14 1/2	17 3/4	20 1/2	22 3/4	25	29	32 1/2	35 1/2	38 1/2	41 1/4	44	46 1/2	51
37	7 1/2	10 3/4	13	15	18 1/2	21 1/4	23 3/4	26	30 1/4	33 3/4	37	40	43	45 3/4	48 1/4	53
42	8	11 1/4	14	16	19 1/2	22 3/4	25 1/4	27 3/4	32	36	39 1/2	42 3/4	45 3/4	48 1/2	51 1/4	56 1/2
56	9 1/4	13	16	18 1/2	22 1/2	26	29 1/4	32	37	41 1/4	45 1/2	49	52 1/2	55 3/4	59	64 3/4
58	9 1/2	13 1/4	16 1/4	18 3/4	23	26 1/2	29 3/4	32 1/2	37 3/4	42	46 1/4	50	53 1/2	56 3/4	60	65 3/4
66	10	14 1/4	17 1/4	20	24 1/2	28 1/4	31 3/4	34 3/4	40	45	49 1/4	53 1/4	57	60 1/2	63 3/4	70
74	10 3/4	15	18 1/2	21 1/4	26	30	33 1/2	36 3/4	42 1/2	47 1/2	52	56 1/4	60 1/4	64	67 1/2	74
82	11 1/4	15 3/4	19 1/4	22 1/4	27 1/4	31 1/2	35 1/4	38 3/4	44 3/4	50	54 3/4	59 1/4	63 1/4	67 1/4	71	78
90	11 3/4	16 1/2	20 1/4	23 1/2	28 1/2	33	37	40 1/2	46 3/4	52 1/4	57 1/4	62	66 1/4	70 1/2	74 1/4	81 1/2
98	12 1/4	17 1/4	21	24 1/2	29 3/4	34 1/2	38 1/2	42 1/4	48 3/4	54 1/2	59 3/4	64 3/4	69	73 1/2	77 1/2	85
104	12 1/2	17 3/4	21 3/4	25	30 3/4	35 1/2	39 3/4	43 1/2	50 1/4	56 1/4	61 1/2	66 1/2	71 1/4	75 1/2	79 3/4	87 1/2
128	14	19 3/4	24	27 3/4	34	39 1/4	44	48 1/4	55 3/4	62 1/4	68 1/4	73 3/4	79	83 3/4	88 1/4	96 3/4

LIVE LENGTH "L"

Assembly Live & Overall Length:

After the hose is selected for the application, the live length and overall length of the assembly must be determined to complete the design. The live length is the flexible portion of an assembly. After the live length has been determined, the overall length is calculated by adding the dimensions (B_1, B_2) for the end fittings. **Be sure to add fitting lengths for each end.**

Variables:

L (inches) = Minimum Live Length Required For Travel (T)

R (inches) = Radius From Dynamic Minimum Center-Line Bend Radius

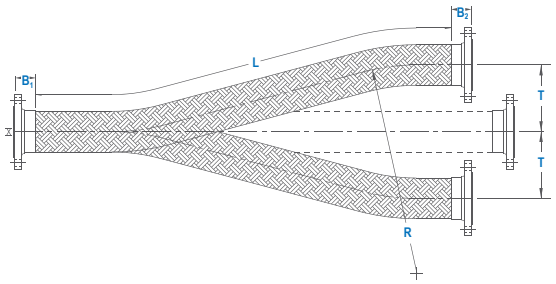
T = Travel

B_{12} (inches) = Fitting Length (See Hose Fitting Tables)

Equations:

$L = \sqrt{T^2 + 6TR}$

Developed Length = $L + B_1 + B_2$



1 INTERMITTENT AND STATIC FLEXING LOOPS

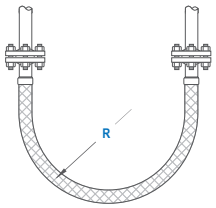


FIGURE 1

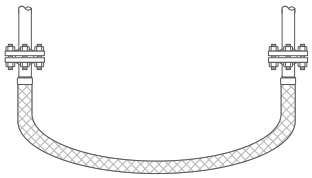


FIGURE 2

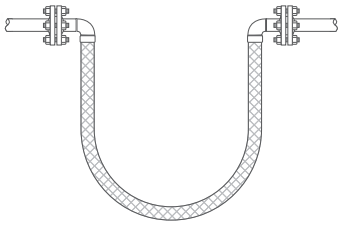


FIGURE 3

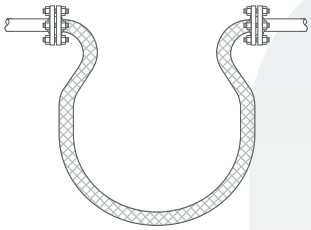


FIGURE 4

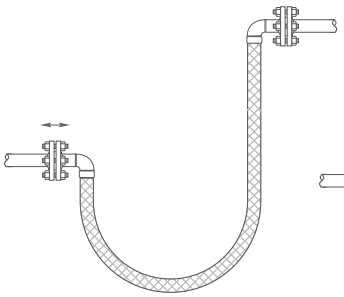


FIGURE 5

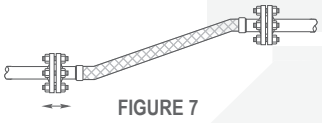


FIGURE 7

FIGURE 6

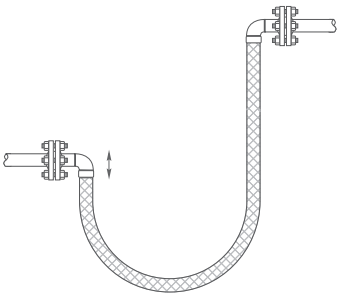


FIGURE 8

FIGURE 9

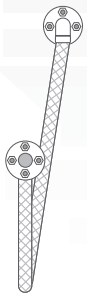


FIGURE 10

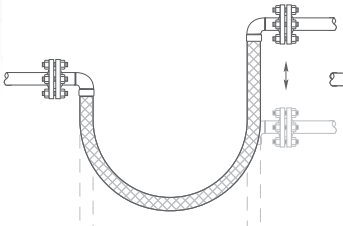


FIGURE 11

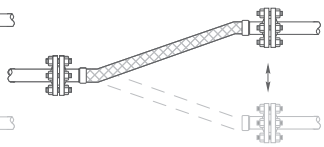


FIGURE 12

CASE ONE

Hose loops must be installed with the proper live length and bend radius (**Figure 1**). The live length can be determined from the formulas on pages 8-11. The live length distance is based on the distance between two pipes and the proper bend radius. Inadequate hose live length is shown **(Figure 2)**.

CASE TWO

Avoid bending the hose at the end connections (**Figure 4**). Install 90° pipe elbows in horizontal pipe runs with hose loops (**Figure 3**). The proper live length and bend radius must be taken into account as in Case one (**Figure 1**).

CASE THREE

The horizontal movement of a hose loop (**Figure 5**) must be directed in the same plane as the loop (**Figure 6**).Movement out-of-the plane or with the loop offset (**Figure 7**) will result in unnecessary torsion on the hose. The torsional stress will result in a hose failure.

CASE FOUR

The vertical movement of a hose loop (**Figure 8**) must be directed in the same plane as the loop (**Figure 9**). Movement out-of-the-plane or with the loop offset (**Figure 10**) will result in unnecessary torsion on the hose. The torsional stress will result in a hose failure.

CASE FIVE

A hose loop with elbows (**Figure 11**) is more suited for vertical movement than a straight hose (**Figure 12**). The vertical movement will cause bending stresses at the hose ends, resulting in a hose failure.

1 INTERMITTENT AND STATIC FLEXING LOOPS (CONTINUED)

CASE SIX

A hose loop (**Figure 13**) should be installed to ensure that the hose at full offset is free from interference and all obstacles (**Figure 14**).

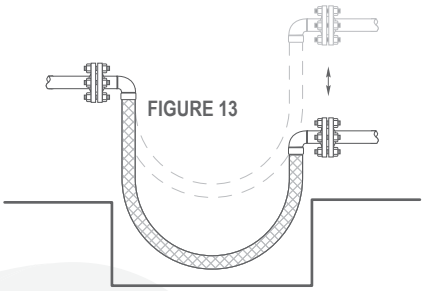


FIGURE 13

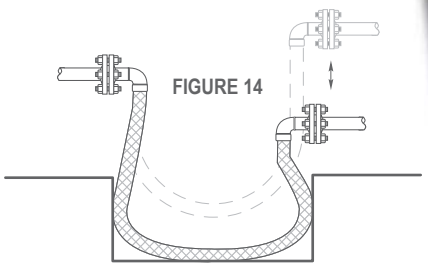


FIGURE 14

CASE SEVEN

A horizontally traveling hose loop (**Figure 15**) should be supported to keep the hose from sagging (**Figure 16**).

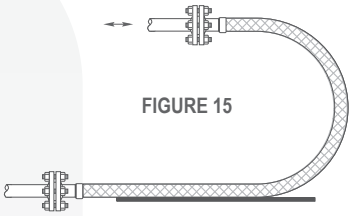


FIGURE 15

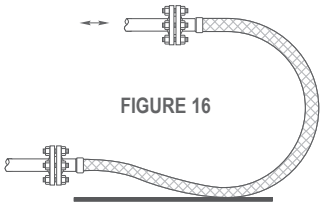


FIGURE 16

2 VIBRATION

CASE EIGHT

For vibration, the hose should be installed so the movement will be in the plane of the bend (**Figure 17**). If the hose bend is installed for vibrations so that the movement is out of the plane of the hose bend (**Figure 18**), a torque will be imposed upon the hose, resulting in a hose failure.

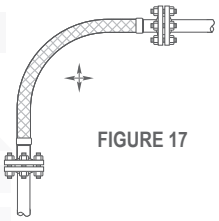


FIGURE 17

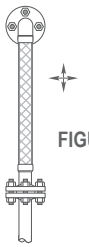


FIGURE 18

CASE NINE

For vibration, the proper hose live length for intermittent flexing should be determined (**Figure 19**). If the hose live length is too long (**Figure 20**) or too short (**Figure 21**), a hose failure could occur. Also, unnecessary flow restriction could result from an awkward bend.

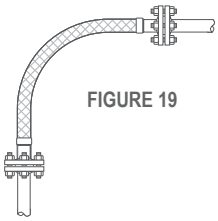


FIGURE 19

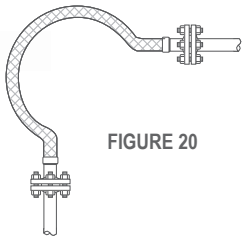


FIGURE 20

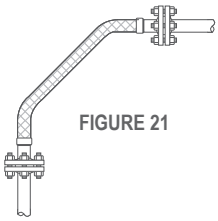


FIGURE 21

CASE TEN

For vibration in one plane, a straight hose should be used and installed perpendicular to the source of the vibration (**Figure 22**). Installing the hose parallel to the source of vibration (**Figure 23**) will cause the hose to be placed in a compression/extension which is not allowed and may cause a hose failure.

FIGURE 22

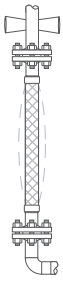


FIGURE 23

2 VIBRATION (CONTINUED)

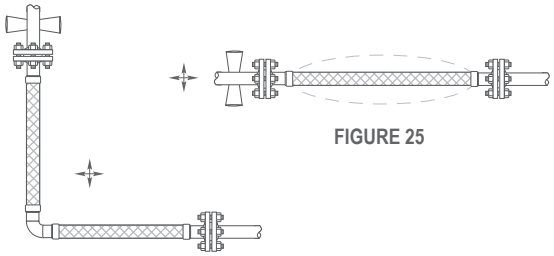


FIGURE 25

FIGURE 24

CASE ELEVEN

For multi-plane vibration a double hose assembly should be installed (**Figure 24**). Installing a single hose for multi-plane vibration (**Figure 25**) will cause the hose to be placed in compression or extension in the axial directions. Compression and/or extension is not allowed and may cause a hose failure.

3 ANGULAR BENDING

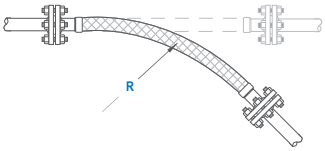


FIGURE 26

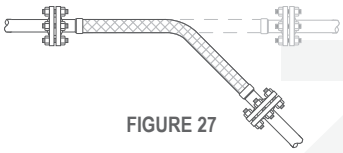


FIGURE 27

CASE TWELVE

The hose must have the proper live length to withstand angular bending (**Figure 26**). Installing a hose that does not have the proper live length for that angular rotation can cause the hose to be permanently bent in the direction of the angular rotation (**Figure 27**) or can cause hose failure if the bend is severe enough.

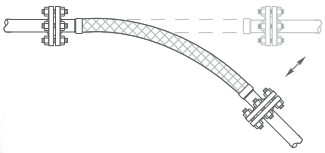


FIGURE 28

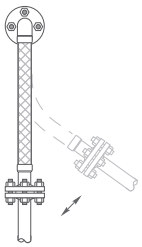


FIGURE 29

CASE THIRTEEN

The direction of the angular rotation must be in the bending plane (**Figure 28**). Angular movement on a hose that is perpendicular to the bending plane (**Figure 29**) will cause torsional stress on the hose or hose failure if the hose bend is severe enough.

4 THERMAL EXPANSION

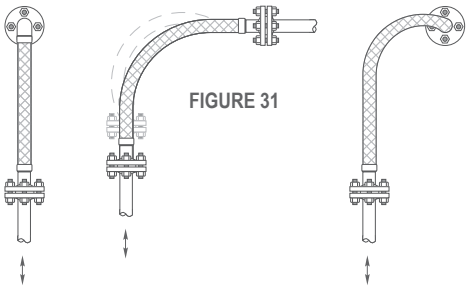


FIGURE 31

FIGURE 30

FIGURE 32

CASE FOURTEEN

Thermal expansion of a pipeline should be absorbed by a 90° hose bend (**Figure 30 & 31**). The movement should be in the directions of the bend plane. A single hose should not be installed in a multi-plane system and then be subjected to thermal expansion (**Figure 32**). This type of installation will cause a torsion on the hose which could result in hose failure.

4 THERMAL EXPANSION (CONTINUED)

CASE FIFTEEN

Lateral movement or intermittent offset is permissible as long as the proper live length of the hose is used (**Figure 33**). The movement should be 90° to the hose. The hose should not be installed in the same direction as the expansion (**Figure 34**). This type of installation will place the hose in compression and/or extension, which is not allowed, and could result in a failure of the hose.

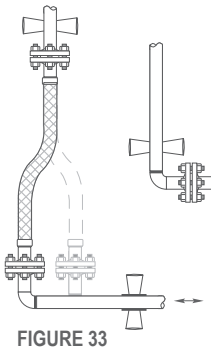


FIGURE 33

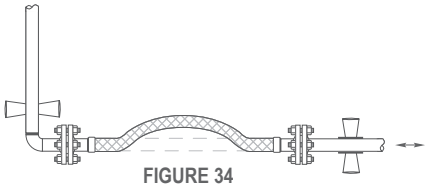


FIGURE 34

CASE SIXTEEN

Considerable magnitudes of lateral movement is better absorbed in a 90° hose bend (**Figure 35**) than an installation of the hose 90° to the expansion (**Figure 36**).

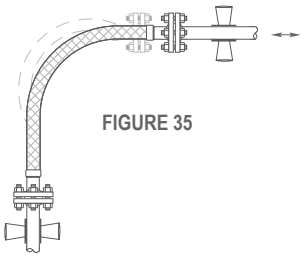


FIGURE 35

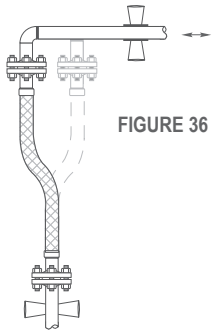


FIGURE 36

5 OTHER

CASE SEVENTEEN

Always use pipe elbows (**Figure 37**) to avoid bending the hose at a sharp angle (**Figure 38**). When the hose will be subject to manual connections to other equipment an Interlock bend restrictor can be placed at each end to restrict over bending the hose at the fittings (**Figure 39**).

FIGURE 37

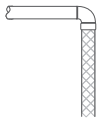
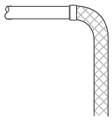


FIGURE 38



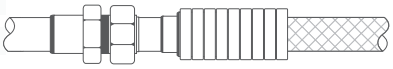


FIGURE 39

CASE EIGHTEEN

Never drag the hose across a surface (**Figure 40**). The braid could be worn or damaged resulting in a hose failure. If there is a possibility that the hose will be dragged across a surface the hose should be protected with an external interlock guard (**Figure 41**).

FIGURE 40

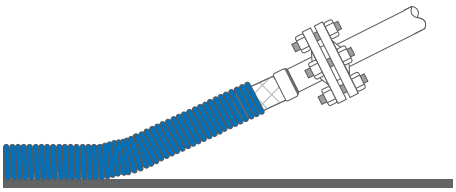


FIGURE 41

CASE NINETEEN

To avoid twisting the hose always use two wrenches when tightening a swivel fitting (**Figure 42**).

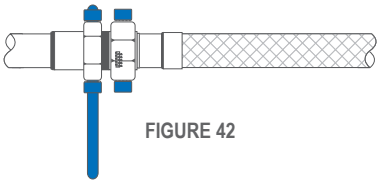
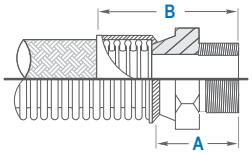


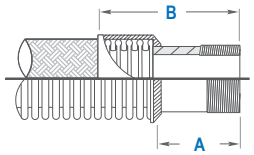
FIGURE 42

1 HEX MALE NPT NIPPLE

HOSE SIZE	DIM. A	DIM. B
1/4	1 1/4	1 5/8
3/8	1 1/4	1 3/4
1/2	1 9/16	2 3/16
3/4	1 1/2	2 1/4
1	1 11/16	2 7/16
1 1/4	2	2 3/4



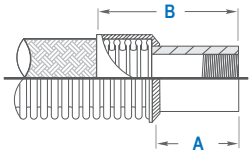
2 PLAIN MALE NPT NIPPLE



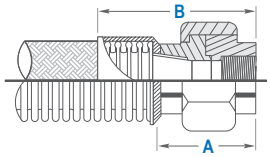
HOSE SIZE	DIM. A	DIM. B
1/4	1 1/2	1 7/8
3/8	1 1/2	2
1/2	2	2 5/8
3/4	2	2 3/4
1	2	2 3/4
1 1/4	2 1/2	3 1/4
1 1/2	2 1/2	3 1/2
2	2 1/2	3 1/2
2 1/2	3	4
3	3	4
3 1/2	4	5 1/4
4	4	5 1/4

3 PLAIN FEMALE NPT NIPPLE

HOSE SIZE	DIM. A	DIM. B
1/4	11/16	1 1/16
3/8	3/4	1 1/4
1/2	13/16	1 7/16
3/4	13/16	1 9/16
1	1	1 3/4
1 1/4	1	1 3/4
1 1/2	1 1/16	2 1/16
2	1 1/4	2 1/4
2 1/2	1 7/16	2 7/16
3	1 5/8	2 5/8
4	1 7/8	3 1/8



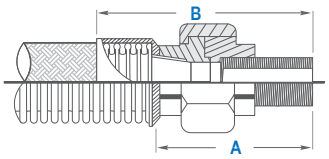
4 FEMALE UNION NPT



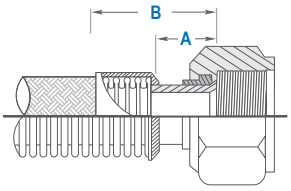
HOSE SIZE	DIM. A	DIM. B
1/4	1 5/8	2
3/8	1 7/8	2 3/8
1/2	2	2 5/8
3/4	2 1/16	2 13/16
1	2 1/16	2 13/16
1 1/4	2 5/8	3 3/8
1 1/2	3 1/16	4 1/16
2	3 1/8	4 1/8
2 1/2	3 5/8	4 5/8

5 MALE UNION NPT

HOSE SIZE	DIM. A	DIM. B
1/4	2 1/4	2 5/8
3/8	2 1/2	3
1/2	2 3/4	3 3/8
3/4	3 1/8	3 7/8
1	3 3/8	4 1/8
1 1/4	3 3/4	4 1/2
1 1/2	4	5
2	4 1/4	5 1/4
2 1/2	5	6
3	5 1/2	6 1/2



6 JIC 37° FEMALE



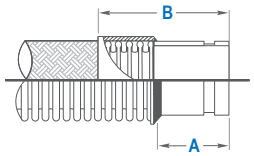
HOSE SIZE	DIM. A	DIM. B
1/4	1 1/2	1 7/8
3/8	1 1/2	2
1/2	1 1/2	2 1/8
3/4	1 1/2	2 1/4
1	2	2 3/4
1 1/4	2 3/8	3 1/8
1 1/2	2 3/8	3 3/8
2	2 1/2	3 1/2

All dimensions are in inches.

7 VICTAULIC™ GROOVE PIPE END

HOSE SIZE	DIM. A	DIM. B
3/4	2	2 3/4
1	2	2 3/4
1 1/4	2	2 3/4
1 1/2	2	3
2	2	3
2 1/2	2	3
3	2	3
3 1/2	2	3 1/4
4	2	3 1/4
5	3	4 1/4
6	3	4 1/4
8	4	5 1/4

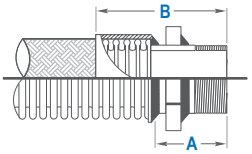
HOSE SIZE	DIM. A	DIM. B
10	4	5 1/4
12	4	5 1/4
14	4	5 1/4
16	4	5 1/4
18	4	5 1/4
20	4	5 1/4
24	4	5 1/4
30	4	5 1/4



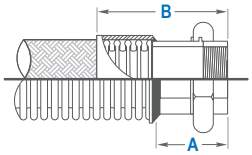
Notes:
The tabulated dimensions listed above reflect standard cap welded construction. Some applications may require neck down construction when utilizing MSS-311 braided braid and would therefore increase B dimensions by approximately 3".

8 MALE NPT NIPPLE WITH HEX NUT

HOSE SIZE	DIM. A	DIM. B
1	2	2 3/4
1 1/4	2 1/2	3 1/4
1 1/2	2 1/2	3 1/2
2	2 1/2	3 1/2
2 1/2	3	4
3	3	4
3 1/2	4	5 1/4
4	4	5 1/4



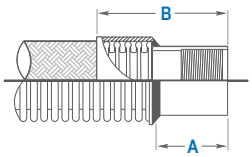
9 FEMALE UNION NPT (3000#)



HOSE SIZE	DIM. A	DIM. B
1/4	1 5/8	2
3/8	1 13/16	2 5/16
1/2	1 15/16	2 9/16
3/4	2 1/4	3
1	2 1/2	3 1/4
1 1/4	2 13/16	3 9/16
1 1/2	3	4
2	3 3/8	4 3/8

10 FEMALE NPT COUPLING (3000#)

HOSE SIZE	DIM. A (HALF)	DIM. B (HALF)	DIM. A (FULL)	DIM. B (FULL)
1/4	**	**	1 3/8	1 3/4
3/8	**	**	1 1/2	2
1/2	15/16	1 9/16	1 7/8	2 1/2
3/4	1	1 3/4	2	2 3/4
1	1 3/16	1 15/16	2 3/8	3 1/8
1 1/4	1 5/16	2 1/16	2 5/8	3 3/8
1 1/2	1 9/16	2 9/16	3 1/8	4 1/8
2	1 11/16	2 11/16	3 3/8	4 3/8
2 1/2	1 13/16	2 13/16	3 5/8	4 5/8
3	2 1/8	3 1/8	4 1/4	5 1/4
4	2 3/8	3 5/8	4 3/4	6



*

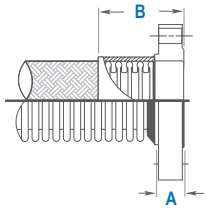
*Half Coupling Shown
**Available In Full Coupling Only

All dimensions are in inches.

11 & 12 FIXED SLIP-ON RAISED FACE FORGED FLANGE

Class: 150 Lbs*

HOSE SIZE	DIM. A	DIM. B
1/2	5/8	1 1/4
3/4	5/8	1 3/8
1	11/16	1 7/16
1 1/4	13/16	1 9/16
1 1/2	7/8	1 7/8
2	1	2
2 1/2	1 1/8	2 1/8
3	1 3/16	2 3/16
3 1/2	1 1/4	2 1/2
4	1 5/16	2 9/16
5	1 7/16	2 11/16
6	1 9/16	2 13/16
8	1 3/4	3
10	1 15/16	3 3/16
12	2 3/16	3 7/16
14	2 1/4	3 1/2
16	2 1/2	3 3/4
18	2 11/16	3 15/16
20	2 7/8	4 1/8
24	3 1/4	4 1/2



Notes:
*ANSI/ASME B16.5
Subtract 1/16 Inch From Dimension A And Dimension B For Flat Face Flanges
The tabulated dimensions listed above reflect standard cap welded construction. Some applications may require neck down construction when utilizing MSS-311 braided braid and would therefore increase B dimensions by approximately 3".

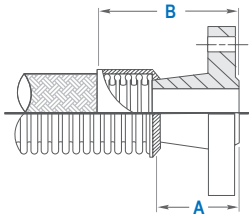
Class: 300 Lbs*

HOSE SIZE	DIM. A	DIM. B
1/2	7/8	1 1/2
3/4	1	1 3/4
1	1 1/16	1 13/16
1 1/4	1 1/16	1 13/16
1 1/2	1 3/16	2 3/16
2	1 5/16	2 5/16
2 1/2	1 1/2	2 1/2
3	1 11/16	2 11/16
3 1/2	1 3/4	3
4	1 7/8	3 1/8
5	2	3 1/4
6	2 1/16	3 5/16
8	2 7/16	3 11/16
10	2 5/8	3 7/8
12	2 7/8	4 1/8
14	3	4 1/4
16	3 1/4	4 1/2
18	3 1/2	4 3/4
20	3 3/4	5
24	4 3/16	5 7/16

13 & 14 WELD NECK RAISED FACE FORGED FLANGE

Class: 150 Lbs*

HOSE SIZE	DIM. A	DIM. B
1/2	1 7/8	2 1/2
3/4	2 1/16	2 13/16
1	2 3/16	2 15/16
1 1/4	2 1/4	3
1 1/2	2 7/16	3 7/16
2	2 1/2	3 1/2
2 1/2	2 3/4	3 3/4
3	2 3/4	3 3/4
3 1/2	2 13/16	4 1/16
4	3	4 1/4
5	3 1/2	4 3/4
6	3 1/2	4 3/4
8	4	5 1/4
10	4	5 1/4
12	4 1/2	5 3/4
14	5	6 1/4
16	5	6 1/4
18	5 1/2	6 3/4
20	5 11/16	6 15/16
24	6	7 1/4



Notes:
*ANSI/ASME B16.5
Subtract 1/16 Inch From Dimension A And Dimension B For Flat Face Flanges
The tabulated dimensions listed above reflect standard cap welded construction. Some applications may require neck down construction when utilizing MSS-311 braided braid and would therefore increase B dimensions by approximately 3".

Class: 300 Lbs*

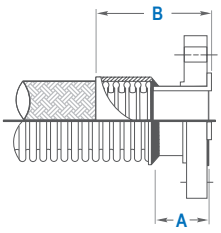
HOSE SIZE	DIM. A	DIM. B
1/2	2 1/16	2 11/16
3/4	2 1/4	3
1	2 7/16	3 3/16
1 1/4	2 9/16	3 5/16
1 1/2	2 11/16	3 11/16
2	2 3/4	3 3/4
2 1/2	3	4
3	3 1/8	4 1/8
3 1/2	3 3/16	4 7/16
4	3 3/8	4 5/8
5	3 7/8	5 1/8
6	3 7/8	5 1/8
8	4 3/8	5 5/8
10	4 5/8	5 7/8
12	5 1/8	6 3/8
14	5 5/8	6 7/8
16	5 3/4	7
18	6 1/4	7 1/2
20	6 3/8	7 5/8
24	6 5/8	7 7/8

All dimensions are in inches.

15 LAP JOINT FLOATING FORGED FLANGE*

HOSE SIZE	DIM. A	DIM. B
1/2	2	2 5/8
3/4	2	2 3/4
1	2	2 3/4
1 1/4	2	2 3/4
1 1/2	2	3
2	2 1/2	3 1/2
2 1/2	2 1/2	3 1/2
3	2 1/2	3 1/2
3 1/2	3	4 1/4
4	3	4 1/4
5	3	4 1/4
6	3 1/2	4 3/4

HOSE SIZE	DIM. A	DIM. B
8	4	5 1/4
10	5	6 1/4
12	6	7 1/4
14	6	7 1/4
16	6	7 1/4
18	6	7 1/4
20	6	7 1/4
24	6	7 1/4



Notes:

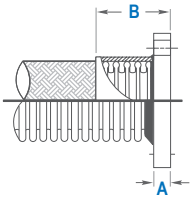
* ANSI/ASME B16.5 Class 150 & 300 lbs. With Type A. Short Stub End

The tabulated dimensions listed above reflect standard cap welded construction. Some applications may require neck down construction when utilizing MSS-311 braided braid and would therefore increase B dimensions by approximately 3".

16 FIXED FLAT FACE PLATE FLANGE*

HOSE SIZE	DIM. A	DIM. B
1/2	5/8	1 1/4
3/4	5/8	1 3/8
1	5/8	1 3/8
1 1/4	5/8	1 3/8
1 1/2	5/8	1 5/8
2	5/8	1 5/8
2 1/2	5/8	1 5/8
3	5/8	1 5/8
3 1/2	5/8	1 7/8
4	5/8	1 7/8

HOSE SIZE	DIM. A	DIM. B
5	3/4	2
6	3/4	2
8	1	2 1/4
10	1	2 1/4
12	1	2 1/4
14	1	2 1/4
16	1	2 1/4
18	1 1/16	2 5/16
20	1 1/8	2 3/8
24	1 1/4	2 1/2



Notes:

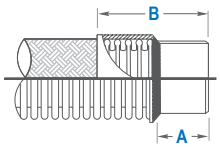
*Class 150 Lbs. O.D. and Drilling per ANSI/ASME B16.5

The tabulated dimensions listed above reflect standard cap welded construction. Some applications may require neck down construction when utilizing MSS-311 braided braid and would therefore increase B dimensions by approximately 3".

17 PIPE WELD END WITH 37 1/2° BEVEL

HOSE SIZE	DIM. A	DIM. B
1/4	1 1/2	1 7/8
3/8	1 1/2	2
1/2	1 1/2	2 1/8
3/4	1 1/2	2 1/4
1	1 1/2	2 1/4
1 1/4	1 1/2	2 1/4
1 1/2	1 1/2	2 1/2
2	1 1/2	2 1/2
2 1/2	2	3
3	2	3
3 1/2	2	3 1/4
4	2	3 1/4

HOSE SIZE	DIM. A	DIM. B
5	3	4 1/4
6	3	4 1/4
8	4	5 1/4
10	4	5 1/4
12	4	5 1/4
14	4	5 1/4
16	4	5 1/4
18	4	5 1/4
20	4	5 1/4
22	4	5 1/4
24	4	5 1/4
30	4	5 1/4



Notes:

The tabulated dimensions listed above reflect standard cap welded construction. Some applications may require neck down construction when utilizing MSS-311 braided braid and would therefore increase B dimensions by approximately 3".

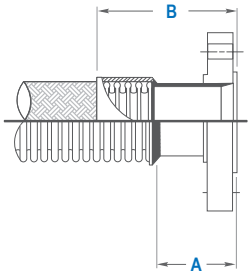
All dimensions are in inches.

18 & 19 SLIP-ON RAISED FACE FORGED FLANGE WITH PIPE SPACER

Class: 150 Lbs*

HOSE SIZE	DIM. A	DIM. B
1/2	2	2 5/8
3/4	2	2 3/4
1	2 1/4	3
1 1/4	2 1/4	3
1 1/2	2 1/2	3 1/2
2	2 1/2	3 1/2
2 1/2	2 3/4	3 3/4
3	2 3/4	3 3/4
3 1/2	2 3/4	4
4	3	4 1/4
5	3	4 1/4
6	3	4 1/4

HOSE SIZE	DIM. A	DIM. B
8	3 1/4	4 1/2
10	3 1/2	4 3/4
12	3 3/4	5
14	3 3/4	5
16	4	5 1/4
18	4 1/4	5 1/2
20	4 1/2	5 3/4
24	4 3/4	6



Class: 300 Lbs*

HOSE SIZE	DIM. A	DIM. B
1/2	2 3/8	3
3/4	2 1/2	3 1/4
1	2 5/8	3 3/8
1 1/4	2 5/8	3 3/8
1 1/2	2 3/4	3 3/4
2	3	4
2 1/2	3	4
3	3 1/4	4 1/4
3 1/2	3 1/8	4 3/8
4	3 3/8	4 5/8
5	3 1/2	4 3/4
6	3 1/2	4 3/4

HOSE SIZE	DIM. A	DIM. B
8	4	5 1/4
10	4	5 1/4
12	4 1/2	5 3/4
14	4 1/2	5 3/4
16	4 3/4	6
18	5	6 1/4
20	5 1/4	6 1/2
24	5 3/4	7

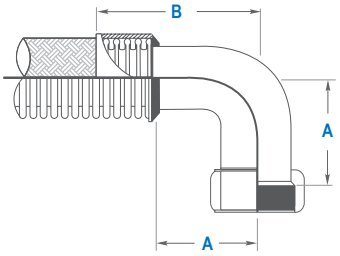
Notes:

*ANSI/ASME B16.5 With Pipe Spacer

The tabulated dimensions listed above reflect standard cap welded construction. Some applications may require neck down construction when utilizing MSS-311 braided braid and would therefore increase B dimensions by approximately 3".

20 90° JIC 37° FEMALE WITH TUBE BODY

HOSE SIZE	DIM. A	DIM. B	BEND RADIUS	THREAD
1/4	1	1 3/8	3/8	7/16-20
3/8	1 1/4	1 3/4	1/2	9/16-18
1/2	1.83	2 1/2	1	3/4-16
3/4	2.35	3 1/8	1 1/2	1 1/16-12
1	3.10	3 7/8	2	1 5/16-12
1 1/4	3.5	4 1/4	2	1 5/8-12
1 1/2	3.75	4 3/4	2	1 7/8-12
2	4.90	5 7/8	2	2 1/2-12

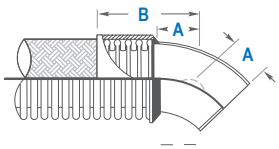


All dimensions are in inches.

21 LONG RADIUS 45° ELBOW

HOSE SIZE	DIM. A	DIM. B
1/2	5/8	1 1/4
3/4	3/4	1 1/2
1	7/8	1 5/8
1 1/4	1	1 3/4
1 1/2	1 1/8	2 1/8
2	1 3/8	2 3/8
2 1/2	1 3/4	2 3/4
3	2	3
3 1/2	2 1/4	3 1/2
4	2 1/2	3 3/4
5	3 1/8	4 3/8
6	3 3/4	5

HOSE SIZE	DIM. A	DIM. B
8	5	6 1/4
10	6 1/4	7 1/2
12	7 1/2	8 3/4
14	8 3/4	10
16	10	11 1/4
18	11 1/4	12 1/2
20	12 1/2	13 3/4
24	15	16 1/4

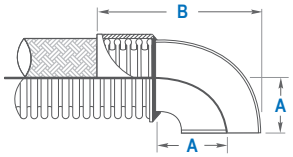


Notes:
The tabulated dimensions listed reflect standard cap welded construction. Some applications may require neck down construction when utilizing MSS-311 braided braid and would therefore increase B dimensions by approximately 3".

22 SHORT RADIUS 90° ELBOW

HOSE SIZE	DIM. A	DIM. B
1	1	1 3/4
1 1/4	1 1/4	2
1 1/2	1 1/2	2 1/2
2	2	3
2 1/2	2 1/2	3 1/2
3	3	4
3 1/2	3 1/2	4 3/4
4	4	5 1/4
5	5	6 1/4
6	6	7 1/4
8	8	9 1/4
10	10	11 1/4

HOSE SIZE	DIM. A	DIM. B
12	12	13 1/4
14	14	15 1/4
16	16	17 1/4
18	18	19 1/4
20	20	21 1/4
24	24	25 1/4

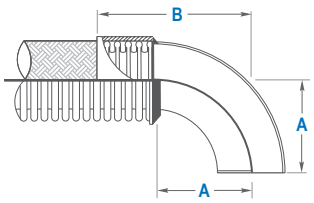


Notes:
The tabulated dimensions listed reflect standard cap welded construction. Some applications may require neck down construction when utilizing MSS-311 braided braid and would therefore increase B dimensions by approximately 3".

23 LONG RADIUS 90° ELBOW

HOSE SIZE	DIM. A	DIM. B
1/2	1 1/2	2 1/8
3/4	1 1/2	2 1/4
1	1 1/2	2 1/4
1 1/4	1 7/8	2 5/8
1 1/2	2 1/4	3 1/4
2	3	4
2 1/2	3 3/4	4 3/4
3	4 1/2	5 1/2
3 1/2	5 1/4	6 1/2
4	6	7 1/4
5	7 1/2	8 3/4
6	9	10 1/4

HOSE SIZE	DIM. A	DIM. B
8	12	13 1/4
10	15	16 1/4
12	18	19 1/4
14	21	22 1/4
16	24	25 1/4
18	27	28 1/4
20	30	31 1/4
24	36	37 1/4

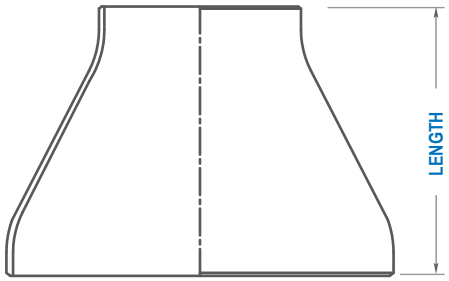


Notes:
The tabulated dimensions listed reflect standard cap welded construction. Some applications may require neck down construction when utilizing MSS-311 braided braid and would therefore increase B dimensions by approximately 3".

All dimensions are in inches.

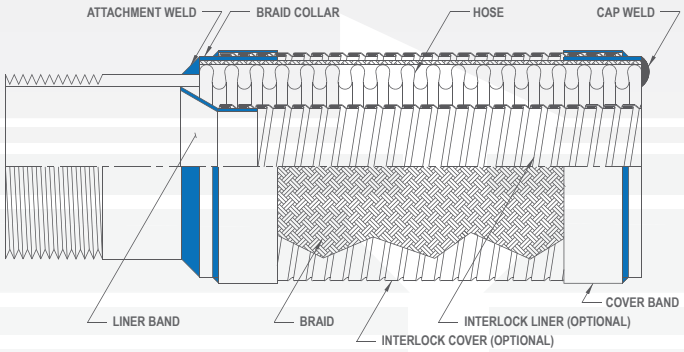
CONCENTRIC REDUCER DIMENSIONS

NOMINAL PIPE SIZE	LENGTH (INCHES)
3/4" x 3/8"	1 1/2"
3/4" x 1/2"	1 1/2"
1" x 3/8"	2"
1" x 1/2"	2"
1" x 3/4"	2"
1 1/4" x 1/2"	2"
1 1/4" x 3/4"	2"
1 1/4" x 1"	2"
1 1/2" x 1/2"	2 1/2"
1 1/2" x 3/4"	2 1/2"
1 1/2" x 1"	2 1/2"
1 1/2" x 1 1/4"	2 1/2"
2" x 3/4"	3"
2" x 1"	3"
2" x 1 1/4"	3"
2" x 1 1/2"	3"
2 1/2" x 1"	3 1/2"
2 1/2" x 1 1/4"	3 1/2"
2 1/2" x 1 1/2"	3 1/2"
2 1/2" x 2"	3 1/2"
3" x 1"	3 1/2"
3" x 1 1/4"	3 1/2"
3" x 1 1/2"	3 1/2"
3" x 2"	3 1/2"
3" x 2 1/2"	3 1/2"
3 1/2" x 1 1/4"	4"
3 1/2" x 1 1/2"	4"
3 1/2" x 2"	4"
3 1/2" x 2 1/2"	4"
3 1/2" x 3"	4"
4" x 1 1/2"	4"
4" x 2"	4"
4" x 2 1/2"	4"
4" x 3"	4"
4" x 3 1/2"	4"
5" x 2"	5"
5" x 2 1/2"	5"
5" x 3"	5"
5" x 3 1/2"	5"
5" x 4"	5"
6" x 2 1/2"	5 1/2"
6" x 3"	5 1/2"
6" x 3 1/2"	5 1/2"
6" x 4"	5 1/2"
6" x 5"	5 1/2"
8" x 3 1/2"	6"
8" x 4"	6"
8" x 5"	6"
8" x 6"	6"
10" x 4"	7"
10" x 5"	7"
10" x 6"	7"
10" x 8"	7"
12" x 5"	8"
12" x 6"	8"
12" x 8"	8"
12" x 10"	8"
14" x 6"	13"
14" x 8"	13"
14" x 10"	13"
14" x 12"	13"
16" x 8"	14"
16" x 10"	14"
16" x 12"	14"
16" x 14"	14"
18" x 10"	15"
18" x 12"	15"
18" x 14"	15"
18" x 16"	15"
20" x 12"	20"
20" x 14"	20"
20" x 16"	20"
20" x 18"	20"
24" x 16"	20"
24" x 18"	20"
24" x 20"	20"

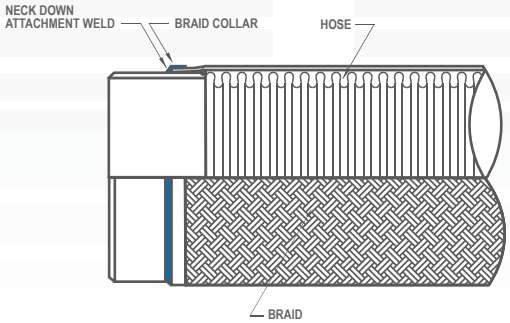


METAL HOSE ASSEMBLY

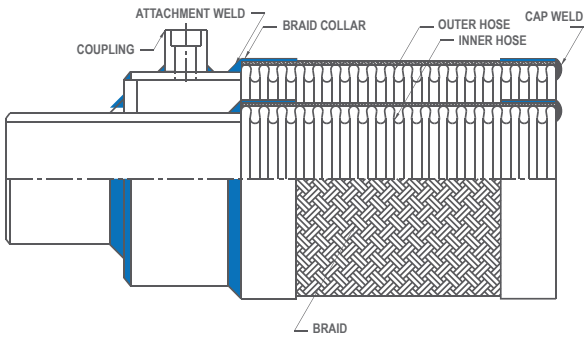
1 WITH STANDARD CAP WELD CONSTRUCTION



2 WITH NECK-DOWN CONSTRUCTION



3 VACUUM/STEAM JACKET



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