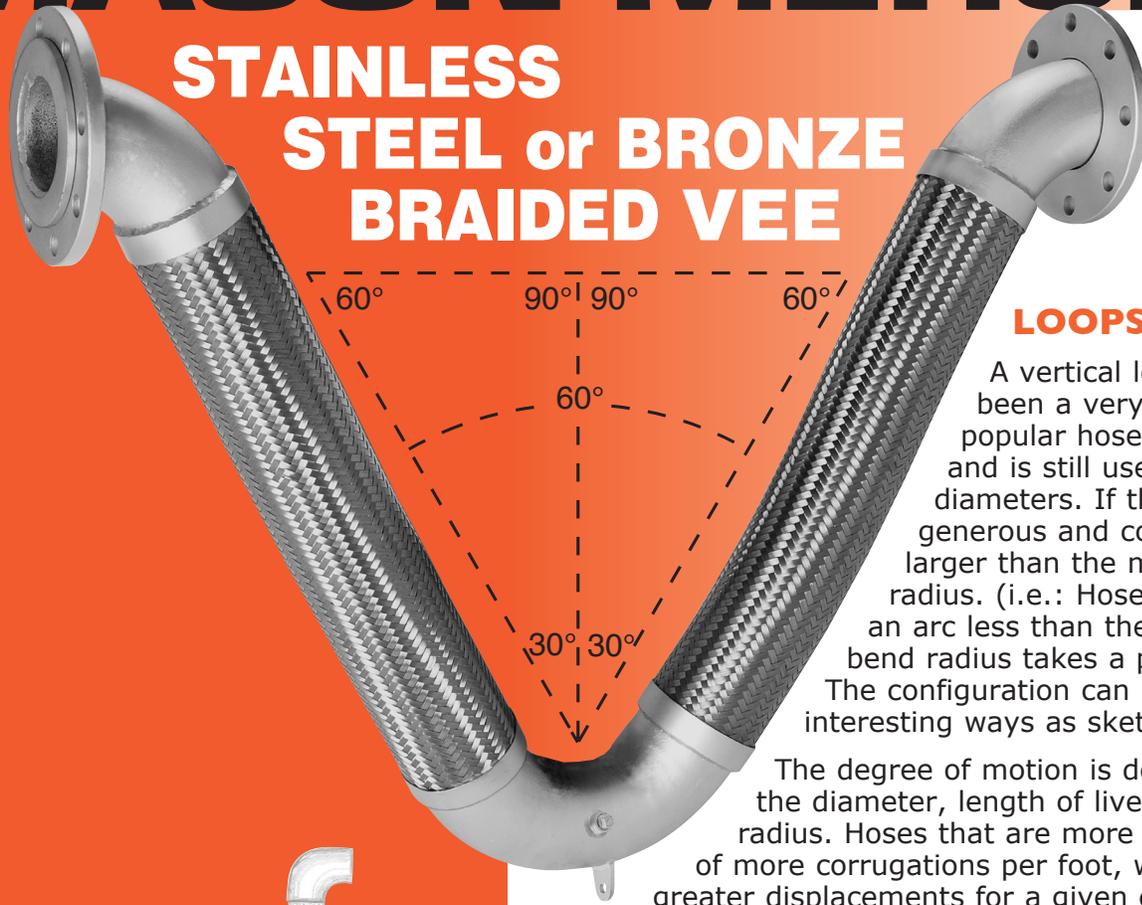


# MASON-MERCER

## STAINLESS STEEL or BRONZE BRAIDED VEE



### LOOPS

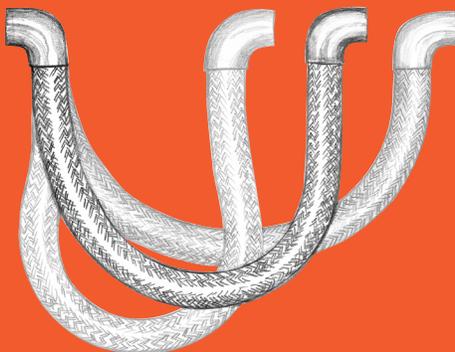
A vertical loop has always been a very useful and popular hose configuration and is still used in small diameters. If the radius is generous and considerably larger than the minimum bend radius. (i.e.: Hose forced into an arc less than the minimum bend radius takes a permanent set.) The configuration can move in many interesting ways as sketched.

The degree of motion is dependent on the diameter, length of live hose and the radius. Hoses that are more flexible because of more corrugations per foot, will accept greater displacements for a given configuration.

It is not practical in the larger diameters as the bend radii become large and the configuration takes too much space, because of what is lost to the semicircle at the bottom. Typical bend radii are as follows for intermittent flexing. A fixed bend could be tighter.



LOOP- UP AND DOWN MOTION



LOOP- IN AND OUT MOTION

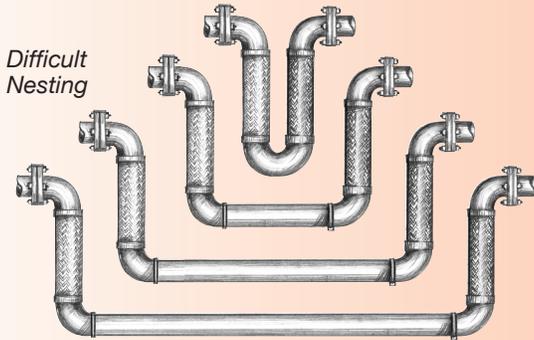
Hose Diameter (in) (mm)	Bend Radius (in) (mm)	Hose Diameter (in) (mm)	Bend Radius (in) (mm)
1/2 15	6 1/2 165	6 150	28 700
3/4 20	8 1/4 206	8 200	34 850
1 25	9 3/4 244	10 250	45 1125
1 1/4 30	11 275	12 300	66 1650
1 1/2 40	12 300	14 350	77 1925
2 50	15 375	16 400	88 2200
2 1/2 65	16 400	18 450	100 2500
3 80	17 1/2 438	20 500	108 2700
4 100	19 3/4 494	24 600	135 3375
5 125	23 575	30 750	165 4125

As a 6" diameter hose would have a 56" diameter semicircle at the bottom, plus the vertical legs, you can see the problem.

### PARALLEL LEGS

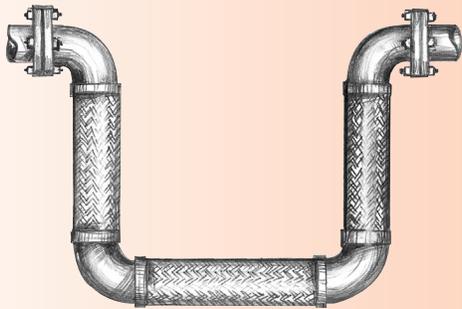
Since the in and out motion is normally the most important, it became common practice to substitute a 180° elbow at the bottom to eliminate the space and cost of the bottom loop. The legs can move up and down awkwardly, and in a walking motion all determined by the live hose length and flexibility.

Parallel pipe line loops cannot nest in the same plane without changing the 180° return to two 90° with a straight length of pipe between. Rather than working from stock, every nesting location becomes special order.



### ADDITIONAL HORIZONTAL HOSE

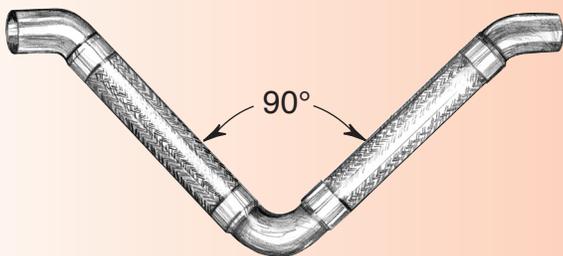
Another market variation is the introduction of a third flexible hose between two 90° elbows in place of the 180° return or the straight pipe. This third element is effective but costly, and does not solve nesting problems either, unless smaller pipes are nested within larger ones or the horizontal flexible hose is lengthened. Once again, special order.



### 90° VEE

The next approach was the introduction of a 90° Vee. Up and down motion is improved, but opening and closing the Vee suffers.

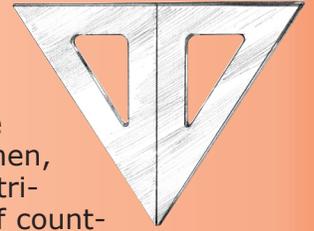
We liked the general concept primarily because of the nesting, but did not want to suffer so great a loss of motion in compression or extension.



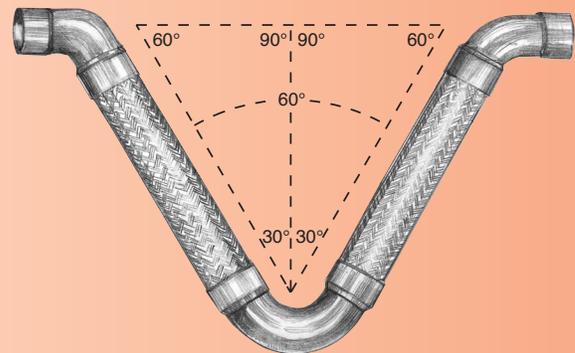
In fairness to others, we should note that all these hose designs can be made to work, if the hoses are made long enough to keep stress within acceptable limits for the stated movements.

### MASON'S 60° VEE

Almost anyone with an engineering or mathematical background, and especially those of us who were manual mechanical draftsmen, think of the 30°, 60°, 90° triangle as the cornerstone of countless designs. When you put two of them together, as illustrated, the upside-down apex becomes 60° and this makes for an equilateral triangle. What a great configuration! All engineers with developed instincts know when a design looks right, it is often the solution, even without the mathematics. These simple sketches became the basis of our design.



The elements move more easily both toward and away from each other, up and down, and transversely. All movements are dependent on the length of the legs. They are great for nesting, and the space between the fittings takes less space than the 45° configuration with the same length of live hose.

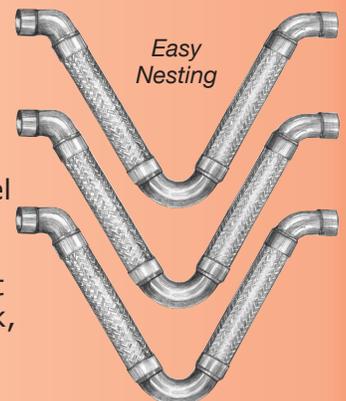


So far our competitors do not do it this way. Perhaps they never thought of it or they related to standard 45°, 90° and 180° fittings only. We studied the advantages and found a way to manufacture 60° and 120° fittings.

It is very difficult to publish all the nesting capabilities, but in one plane, a typical layout could be as shown below.

This illustration is just to suggest the idea and put your imagination to work. Send us your problems and let us work them out with you.

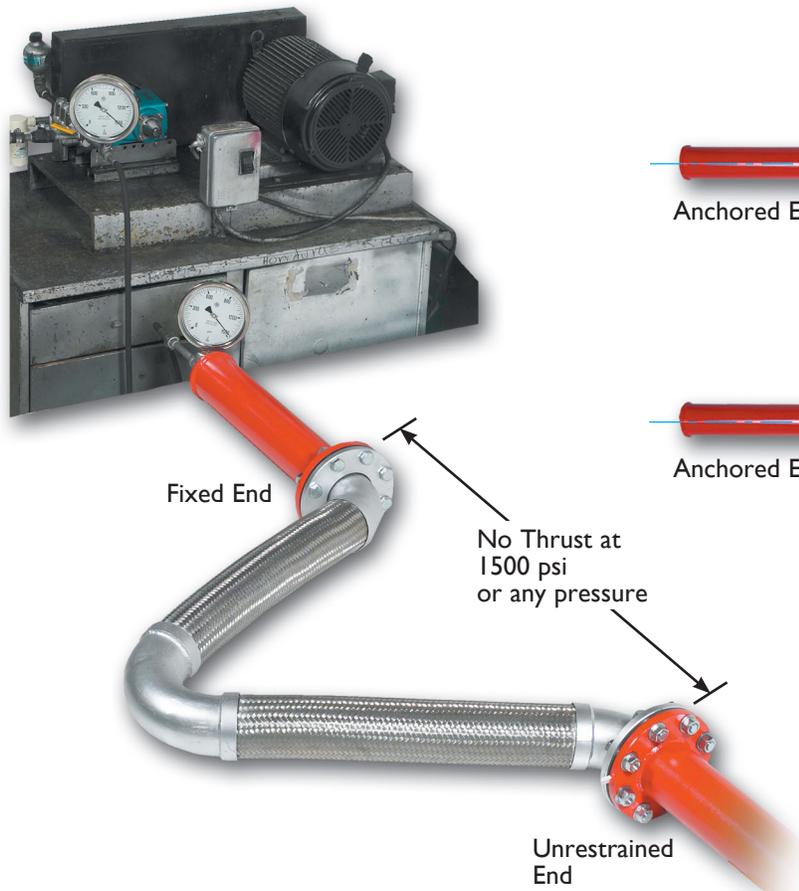
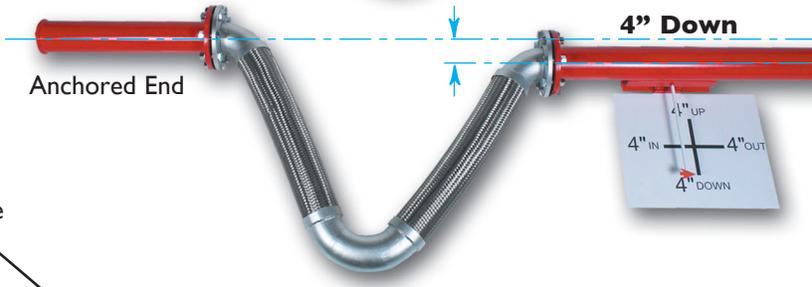
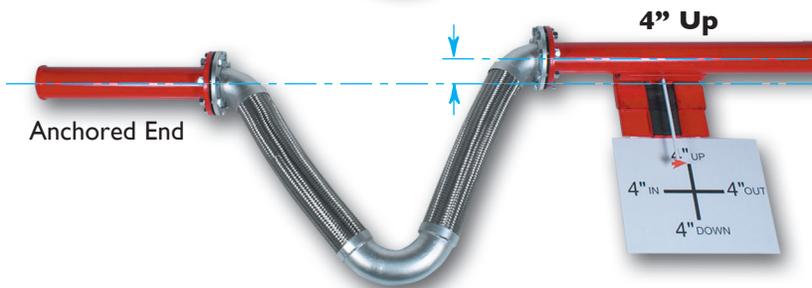
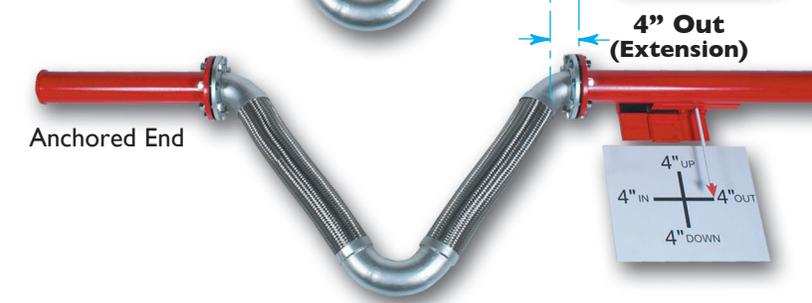
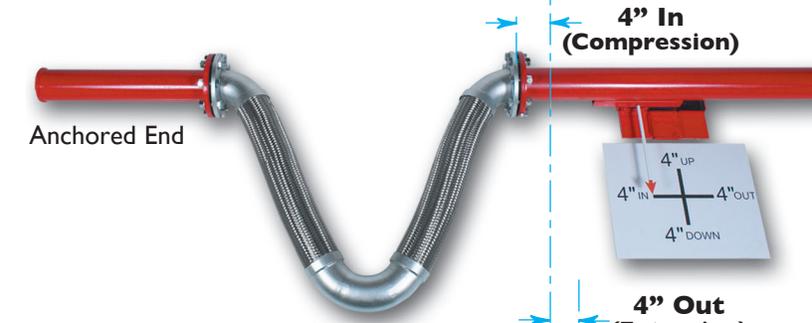
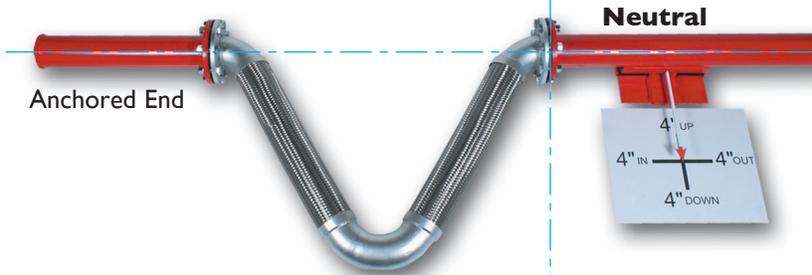
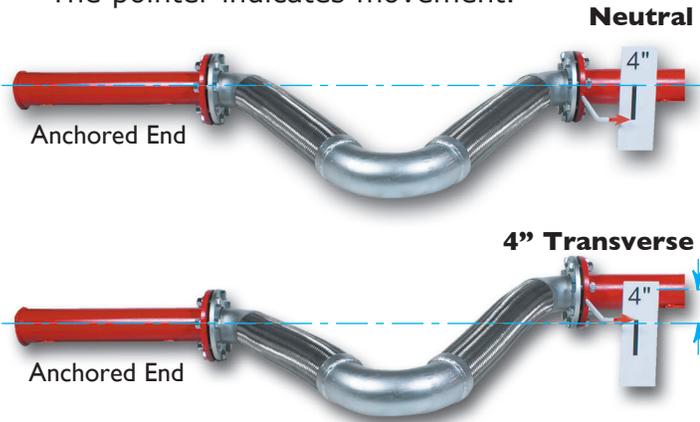
While all our configurations can be nested, it is very difficult for the firms with parallel legs, as mentioned earlier. Customization of parallel leg designs takes time and increases cost. In most cases, our product comes right out of stock, and fits the application.



# 60° VEE MOVEMENTS WHEN INSTALLED VERTICALLY

4" Pipe Size

The following photographs show movement in all planes @ 100 psi. The pointer indicates movement.

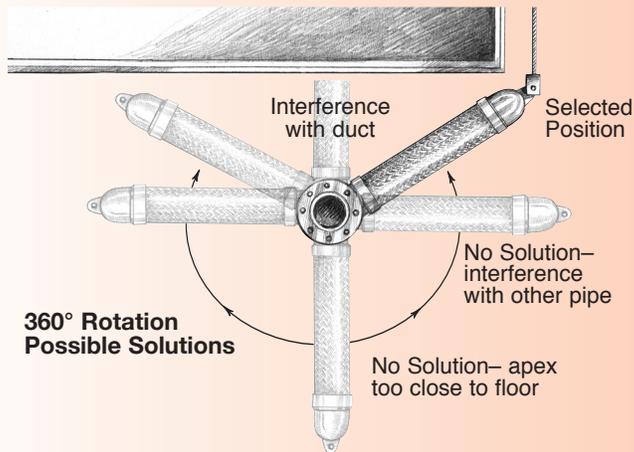


## 4" DOUBLE BRAIDED VEE PRESSURE TEST

Pressure test discontinued at 1500 psi. No Failure.



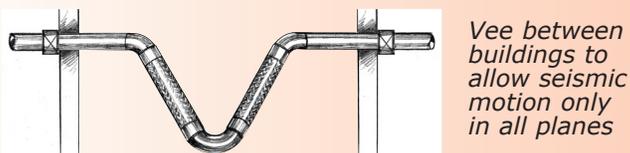
Our flanged vees have floating flanges at each end. When space is tight, the design allows for rotation to any angle to avoid obstacles like adjacent piping or ductwork. This is very important, particularly in the larger diameters where the legs become quite long.



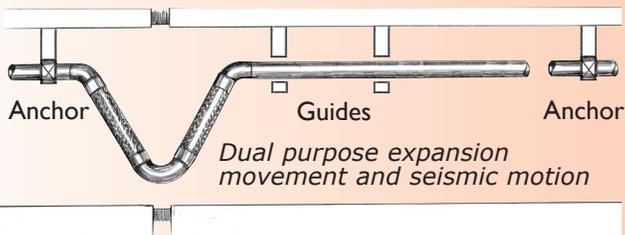
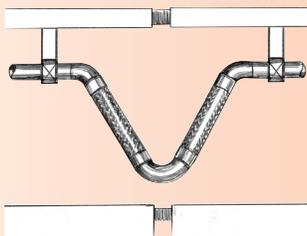
Our standard vee allows for 4" of seismic motion in all directions. The design is very conservative and in expansion locations with no change to the standard product we agree to 6" movements, when the movement is axial compression and extension.

Seismic applications allow for movement of adjacent sections of a structure at building joints or occasionally where piping goes from one building to another. The Vee is anchored close to and on either side of the separation. When it is between adjacent buildings, the location of the anchors depends on the space between the buildings and the rigidity of the pipe. The Vee may be in the space between buildings with a pipe anchor in each building or anchored in one building and guided in the other with an anchor further down.

Sometimes if the Vee is used to allow for expansion and contraction as well, one side is anchored and the other guided, provided there is more than one guide and there is an anchor at the end of the movement run.



Common configuration across building expansion joints for seismic motion only in all planes



Let us help you with these layouts in the design stage, or just specify the Vee's and their function and we will submit layouts, as part of our certifications.

Simple internally pressurized or externally pressurized housed bellows were the only seamless solutions to thermal expansion in straight pipe runs for a very long time. While the force needed to move these configurations is not high, the pressure thrust is approximately equal to the projected area of the expansion joint to the center of the corrugations multiplied by the pressure. If it is a housed expansion joint, the internal area of the external housing is the reference.

It would take two 22,000 lbs. pipe anchors to resist the thrust and overcome the spring rate of a 10" diameter 150psi stainless steel bellows moving six inches. Finding this structural capacity is very difficult.

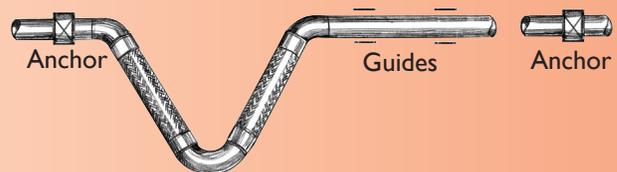
There is no thrust when a Vee is used in place of the bellows because the braid tightens and takes both. The six inch motion is taken by displacing each leg three inches and the force to do this is only 3300 lbs. as shown on page 7 of Test Bulletin VT-32.  $3300/22000 \times 100 = 15\%$  of the bellows anchorage and much easier to work with structurally.

**The following resistances are typical. For a comprehensive view of the complete Vee hose test data, consult Test Bulletin VT-32.**

Stainless Vee Hose Size in (mm)	Corrugations per foot (meter)	Live Length of Braid & Hose inches (mm)	Axial Resistance for 4"(100mm) Displacement at 100psi (7.0 kg/cm <sup>2</sup> ) pounds (kgs)	
1/2 15	92 302	14 350	4	1.8
3/4 20	80 262	15 375	3	1.5
1 25	72 236	16 400	4	1.8
1 1/4 30	67 220	17 425	7	3.2
1 1/2 35	63 207	19 475	8	3.6
2 50	58 190	20 500	24	10.9
2 1/2 65	48 157	22 550	79	35.8
3 75	46 151	24 600	85	38.6
4 100	32 105	26 650	105	47.6
5 125	29 95	30 750	140	63.5
6 150	25 82	33 825	430	195
8 200	23 75	36 900	1300	590
10 250	21 69	42 1050	2200	998
12 300	20 66	48 1200	2250	1021

Even adding 50% to these numbers allows for relatively small anchors.

We do recommend guides as a better way to assure long life. Other companies are less conservative, but guides are not expensive, and the money is well spent.



The pages that follow provide data on all of our stock 60° Vee's.

If you would like to specify them, please use the description on the following page.

Just as we used the name SAFEFLEX for our rubber expansion joints after we eliminated failure, we are now using FLEXMORE for the stainless steel and bronze products because with our longer live lengths and greater corrugations, our hoses literally flex more than any of our competitors.

**VEE SPECIFICATION:**

Piping and equipment connections shall be protected against seismic damage by the insertion of braided flexible hose Vee assemblies rated for ±4" (100mm) seismic motion in all planes. Should the application include ±6" (150mm) thermal movement or thermal movement alone, install the Vee so the thermal movement is axial.

All submittals shall include a recognized test report, covering the full range of the specified movements at the operating pressures. Forces required to move the Vees shall not exceed the values below. Vees shall have a

minimum burst pressure of four times their rated pressure. Vees in steel lines shall have stainless hose and braid with threaded ends, weld ends or floating flanges. In stainless lines, all fittings in contact with the media must be stainless as well. Copper lines, bronze hose and braid with copper or bronze fittings. Guiding and anchoring shall be as designed by the manufacturer, stamped by a PE and included with the submittals. Submittals shall include Movement-Force Test Reports. 60 Degree Vees, ADA Resilient Anchors and ASG Sliding Guides, all as manufactured by Mason Industries, Inc.

**AXIAL FORCE OF DISPLACEMENT for 6" MOVEMENT Lbs / 2.2 = Kilograms**

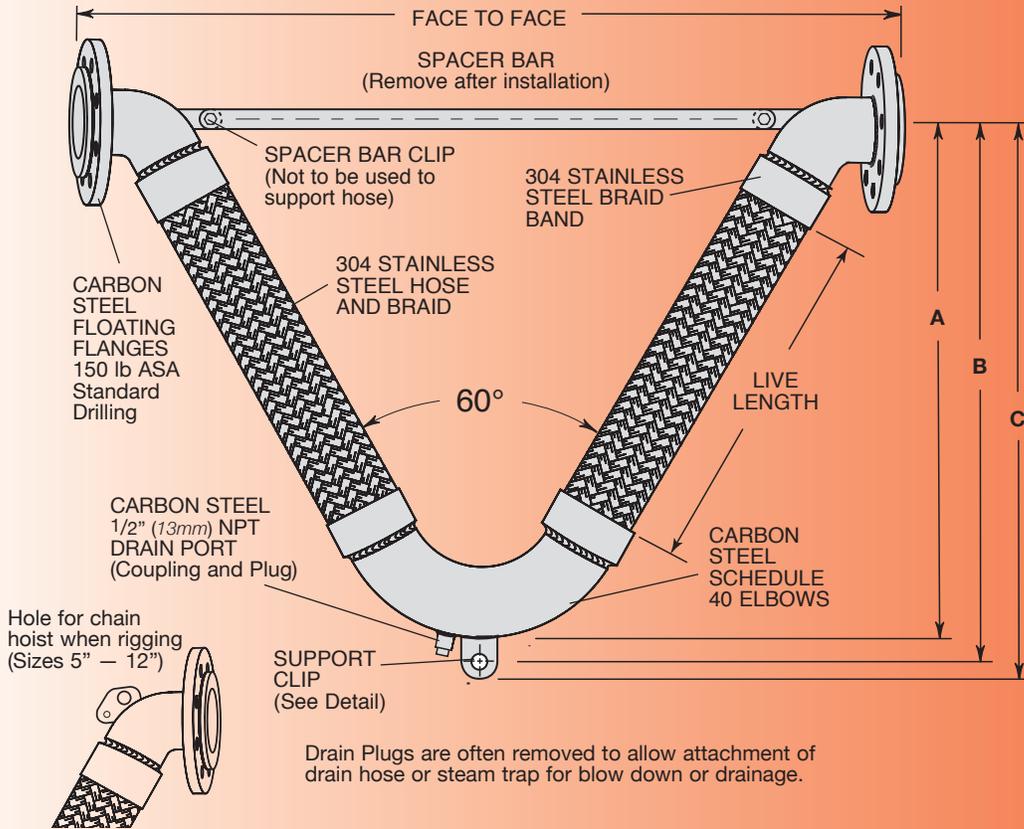
Pressure (psi)	FORCE (lbs) FOR STAINLESS VEE SIZES												FORCE (lbs) FOR COPPER VEE SIZES										
	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
50	4	4	5	8	9	22	60	75	90	230	350	1200	1900	1900	4	6	7	13	13	25	80	90	140
100	5	4	6	12	13	28	90	120	140	240	520	1650	2700	2800	5	7	8	18	24	40	120	150	230
150	5	5	7	17	18	38	125	160	200	370	660	2200	3300	3400	5	8	9	20	25	45	150	200	300
170	5	5	7	18	19	40	130	170	215	380	680	2350	3700	3750	5	8	10	24	31	60	160	215	320
175	5	6	8	19	19	41	135	175	225	385	690	2400	-	-	5	9	12	25	38	63	170	230	350
180	5	6	8	20	20	42	140	180	235	390	720	2500	-	-	-	-	-	-	-	-	-	-	-
200	5	6	9	21	22	44	160	200	290	400	850	-	-	-	-	-	-	-	-	-	-	-	-
230	5	7	10	23	24	50	180	230	290	-	-	-	-	-	-	-	-	-	-	-	-	-	-
250	5	7	10	26	27	54	190	280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: Forces for lesser movements are proportionately lower, e.g., 3" movement is 1/2 of 6" movement force.



**VERTICAL VFL INSTALLATION (Apex Near Ceiling)**

**VFL** 60Vee SS BRAIDED HOSE  
with CARBON STEEL  
FLOATING FLANGES



**CARBON STEEL PLATE FLANGES**

Pipe Size (in)	Flange Thickness (in)	Pipe Size (mm)	Flange Thickness (mm)
2 thru 4	5/8	50 thru 100	16
5 thru 6	3/4	125 thru 150	19
8 thru 12	1	200 thru 300	25



**SUPPORT CLIP DETAIL**

**SUPPORT CLIP**

Pipe Size (in)	SUPPORT CLIP Hole Diameter (in)	Thickness (in)	Pipe Size (mm)	SUPPORT CLIP Hole Diameter (mm)	Thickness (mm)
2	1/2	1/4	50	13	6
2 1/2	5/8	1/4	63	16	6
3	5/8	1/4	75	16	6
4	3/4	3/8	100	19	9
5	3/4	3/8	125	19	9
6	7/8	3/8	150	22	9
8	1	1/2	200	25	13
10	1	1/2	250	25	13
12	1 1/8	1/2	300	28	13

**RATED PRESSURES @ ELEVATED TEMPERATURES** (psi) (kg/cm<sup>2</sup>)

Pipe Size (in) (mm)	250°F 121°C Factor 0.92	350°F 176°C Factor 0.86	450°F 232°C Factor 0.81
2 50	330 23	310 21	290 20
2 1/2 65	270 19	250 17	235 16
3 80	260 18	240 16	230 16
4 100	210 15	200 14	190 13
5 125	190 13	180 12	170 11
6 150	190 13	180 12	170 11
8 200	170 11	160 11	150 10
10 250	160 11	150 10	140 9
12 300	160 11	150 10	140 9

**SATURATED STEAM RECOMMENDED PRESSURE LIMITS**

Pipe Size (in) (mm)	Max Gauge (psi) (kg/cm <sup>2</sup> )	Temp Reference (F) (°C)
2 50	150 11	362 183
2 1/2 65	125 9	355 179
3 80	125 9	355 179
4 100	125 9	355 179
5 125	100 7	337 169
6 150	100 7	337 169
8 200	75 5	320 160
10 250	60 4	307 153
12 300	60 4	307 153

Full Vacuum Rating– 30" (762mm) Hg

Our steam service ratings are very low in the interest of safety although our 70°F (21°C) pressure ratings are as high or higher than our competitors. All locations where failure could lead to personal injury or suffocation must be avoided. In dangerous locations we suggest housed expansion joints, solid loops, ball joints, packed devices etc. rather than thin walled flexible products regardless of manufacturer.

Consult factory with full location description as well as service conditions for higher pressure or temperature applications.

304 SS can be used up to 850°F (454°C) in applications such as engine exhaust.

When using VFL products in copper or brass water or steam systems, dielectric flanges must be used on each end to prevent leakage from galvanic action.

**RATED MOVEMENTS**

±4"(100mm) All Directional Seismic Movement  
±6"(150mm) Guided Thermal Movement Only

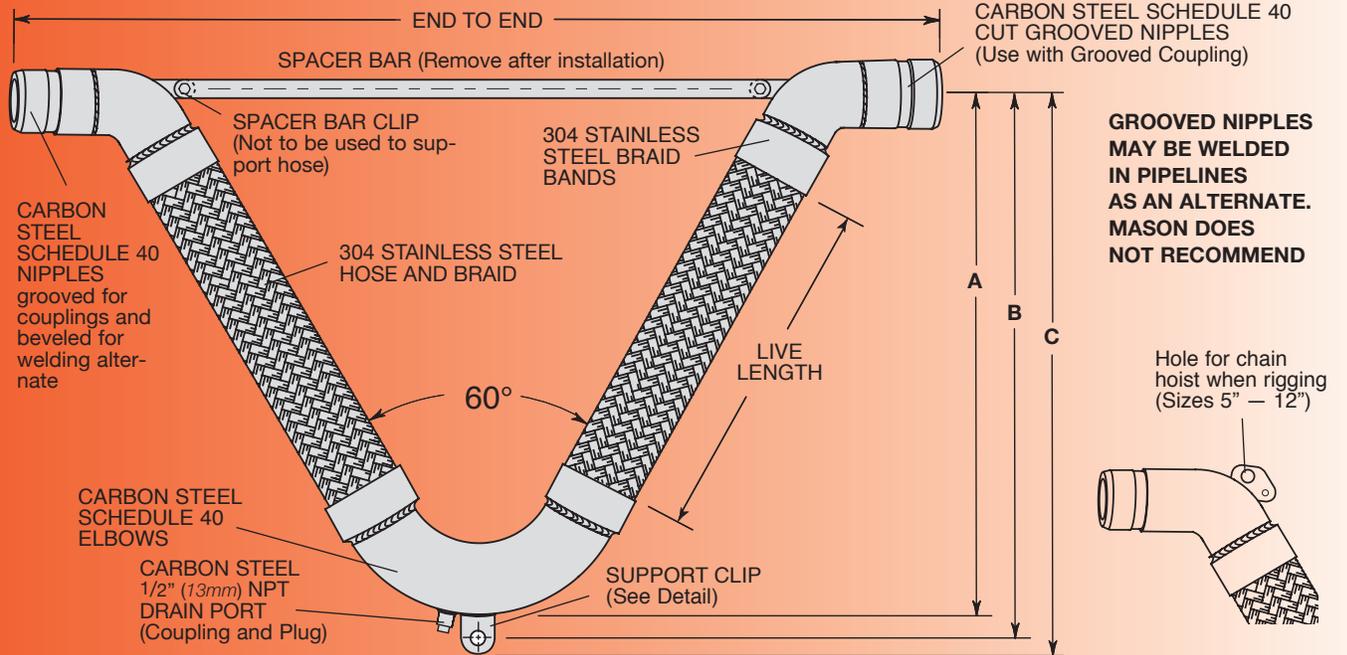
**VFL DIMENSIONS AND PRESSURE RATINGS (American Units)**

Type	Pipe Size & Face to Face <sup>†</sup> (in)	Live Length <sup>†</sup> (in)	Corrugations per foot	A (in)	B (in)	C (in)	Rated Pressure @70°F <sup>††</sup> (psi)
VFL	2 X 33	20	58	227/8	237/8	245/8	360
VFL	2 1/2 X 37	22	48	26	27	273/4	290
VFL	3 X 42	24	46	287/8	301/8	311/8	280
VFL	4 X 49	26	32	321/2	333/4	347/8	225
VFL	5 X 58	30	29	38	391/4	401/2	200
VFL	6 X 66	33	25	425/8	441/8	453/8	200
VFL	8 X 80	36	23	491/4	503/4	52	180
VFL	10 X 96	42	21	581/2	601/4	613/4	170
VFL	12 X 112	48	20	673/4	691/2	71	170

**VFL DIMENSIONS AND PRESSURE RATINGS (Metric Units)**

Type	Pipe Size & Face to Face <sup>†</sup> (mm)	Live Length <sup>†</sup> (mm)	Corrugations per meter	A (mm)	B (mm)	C (mm)	Rated Pressure @21°C <sup>††</sup> (kg/cm <sup>2</sup> )
VFL	50 X 838	508	190	603	613	629	25
VFL	65 X 940	559	157	660	689	711	20
VFL	80 X 1067	610	151	733	762	781	19
VFL	100 X 1245	660	105	826	857	886	16
VFL	125 X 1473	762	95	965	1010	1026	14
VFL	150 X 1676	838	82	1083	1118	1149	14
VFL	200 X 2032	914	75	1251	1289	1324	12
VFL	250 X 2438	1067	69	1486	1524	1559	12
VFL	300 X 2849	1219	66	1721	1762	1797	12

Face to Face Tolerance: minus 1% plus 3%. Minimum Burst is four times the Rated Pressure. Safety factor of 4. Size 12" (300mm) has double braid.



**GROOVED NIPPLES MAY BE WELDED IN PIPELINES AS AN ALTERNATE. MASON DOES NOT RECOMMEND**

Hole for chain hoist when rigging (Sizes 5" - 12")

CLIP THICKNESS



Drain Plugs are often removed to allow attachment of drain hose or steam trap for blow down or drainage.

**RATED PRESSURES @ ELEVATED TEMPERATURES (psi) (kg/cm<sup>2</sup>)**

Pipe Size (in) (mm)	250°F 121°C Factor 0.92	350°F 176°C Factor 0.86	450°F 232°C Factor 0.81
2 50	330 23	310 21	290 20
2 1/2 65	270 19	250 17	235 16
3 80	260 18	240 16	230 16
4 100	210 15	200 14	190 13
5 125	190 13	180 12	170 11
6 150	190 13	180 12	170 11
8 200	170 11	160 11	150 10
10 250	160 11	150 10	140 9
12 300	160 11	150 10	140 9

**SATURATED STEAM RECOMMENDED PRESSURE LIMITS**

Pipe Size (in) (mm)	Max Gauge (psi) (kg/cm <sup>2</sup> )	Temp Reference (F) (°C)
2 50	150 11	362 183
2 1/2 65	125 9	355 179
3 80	125 9	355 179
4 100	125 9	355 179
5 125	100 7	337 169
6 150	100 7	337 169
8 200	75 5	320 160
10 250	60 4	307 153
12 300	60 4	307 153

Full Vacuum Rating- 30" (762mm) Hg

Our steam service ratings are very low in the interest of safety although our 70°F (21°C) pressure ratings are as high or higher than our competitors. All locations where failure could lead to personal injury or suffocation must be avoided. In dangerous locations we suggest housed expansion joints, solid loops, ball joints, packed devices etc. rather than thin walled flexible products regardless of manufacturer.

Consult factory with full location description as well as service conditions for higher pressure or temperature applications.

304 SS can be used up to 850°F (454°C) in applications such as engine exhaust.

When using VGWN products in copper or brass water or steam systems, dielectric unions must be used on each end to prevent leakage from galvanic action.

**SUPPORT CLIP**

Pipe Size (in) (mm)	SUPPORT CLIP Hole Diameter (in) (mm)	Thickness (in) (mm)
2 50	5/8 16	1/8 3
2 1/2 65	5/8 16	1/8 3
3 80	3/4 19	1/8 3
4 100	3/4 19	1/8 3
5 125	3/4 19	1/4 6
6 150	7/8 22	3/8 9
8 200	7/8 22	1/2 13
10 250	1 25	1/2 13
12 300	1 25	1/2 13

**RATED MOVEMENTS**

±4" (100mm) All Directional Seismic Movement
±6" (150mm) Guided Thermal Movement Only

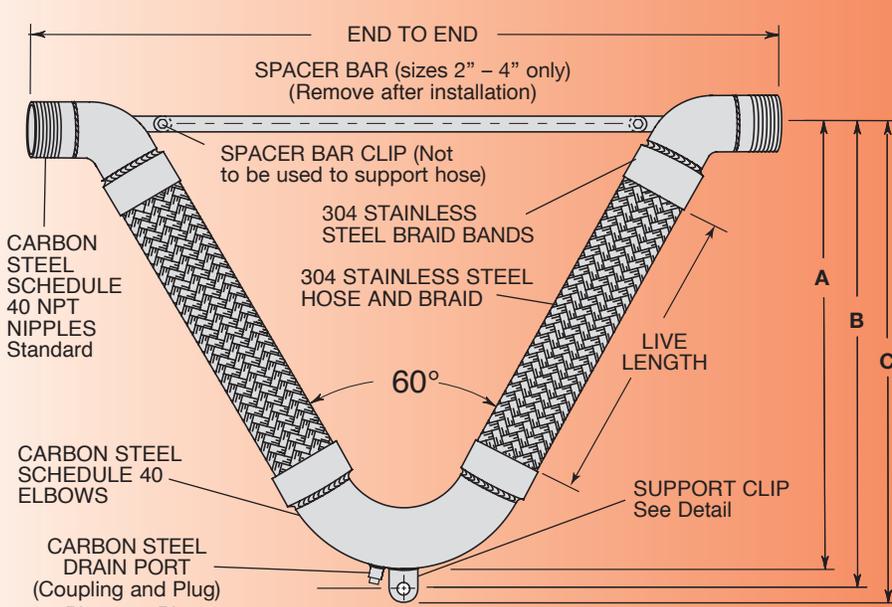
**VGWN DIMENSIONS AND PRESSURE RATINGS (American Units)**

Type	Pipe Size & End to End (in)	Live Length (in)	Corrugations per foot	A (in)	B (in)	C (in)	Rated Pressure @70°F (psi)
VGWN	2 X 36	20	58	23 1/4	24 1/4	25	360
VGWN	2 1/2 X 41	22	48	26	27	27 3/4	290
VGWN	3 X 46	24	46	28 7/8	30 1/8	31 1/8	280
VGWN	4 X 55	26	32	32 1/2	33 3/4	34 3/4	225
VGWN	5 X 64	30	29	38	39 1/2	40 1/2	200
VGWN	6 X 72	33	25	42 5/8	44 1/8	45 3/8	200
VGWN	8 X 86	36	23	49 1/4	50 3/4	52	180
VGWN	10 X 105	42	21	58 1/2	60 1/4	61 3/4	170
VGWN	12 X 120	48	20	67 3/4	69 1/2	71	170

**VGWN DIMENSIONS AND PRESSURE RATINGS (Metric Units)**

Type	Pipe Size & End to End (mm)	Live Length (mm)	Corrugations per meter	A (mm)	B (mm)	C (mm)	Rated Pressure @21°C (kg/cm <sup>2</sup> )
VGWN	50 X 914	508	190	591	616	635	25
VGWN	65 X 1041	559	157	660	688	700	20
VGWN	80 X 1168	610	151	733	766	792	19
VGWN	100 X 1397	660	105	826	857	883	16
VGWN	125 X 1626	762	95	965	1003	1029	14
VGWN	150 X 1829	838	82	1083	1121	1153	14
VGWN	200 X 2184	914	75	1251	1289	1321	12
VGWN	250 X 2667	1067	69	1486	1530	1568	12
VGWN	300 X 3048	1219	66	1721	1765	1803	12

End to End Tolerance: minus 1% plus 3%. Minimum Burst is four times the Rated Pressure. Safety factor of 4. Size 12" (300mm) has double braid.



CLIP THICKNESS

SUPPORT CLIP DETAIL

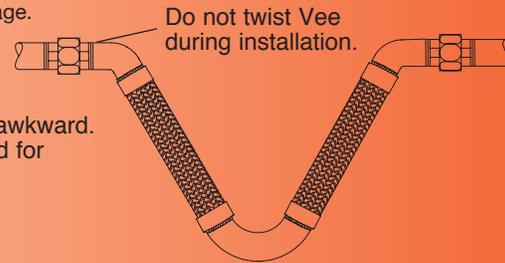


**SUPPORT CLIP**

Pipe Size (in)	Pipe Size (mm)	SUPPORT CLIP Hole Diameter (in)	SUPPORT CLIP Hole Diameter (mm)	Thickness (in)	Thickness (mm)
1/2	15	1/2	13	1/8	3
3/4	20	1/2	13	1/8	3
1	25	1/2	13	1/8	3
1 1/4	32	1/2	13	1/8	3
1 1/2	40	1/2	13	1/8	3
2	50	5/8	16	1/8	3
2 1/2	65	5/8	16	1/8	3
3	80	3/4	19	1/8	3
4	100	3/4	19	1/8	3

Pipe Size	Plug Size
1/2" - 1"	None
1 1/4" - 1 1/2"	1/4"
2" - 4"	1/2"

Drain Plugs are often removed to allow attachment of drain hose or steam trap for blow down or drainage.



Installation using Couplings is awkward. Unions are very much preferred for easier installation and removal.

**RATED PRESSURES @ ELEVATED TEMPERATURES (psi) (kg/cm<sup>2</sup>)**

Pipe Size (in) (mm)	250°F 121°C Factor 0.92	350°F 176°C Factor 0.86	450°F 232°C Factor 0.81
1/2 15	1010 69	950 59	890 61
3/4 20	640 44	600 41	570 39
1 25	530 36	500 34	470 32
1 1/4 32	460 32	430 30	400 28
1 1/2 40	400 28	370 26	350 24
2 50	330 23	310 21	290 20
2 1/2 65	270 19	250 17	235 16
3 80	260 18	240 16	230 16
4 100	210 15	200 14	190 13

**SATURATED STEAM RECOMMENDED PRESSURE**

Pipe Size (in) (mm)	Max Gauge (psi) (kg/cm <sup>2</sup> )	Temp Reference (°F) (°C)
1/2 15	200 14	387 197
3/4 20	200 14	387 197
1 25	150 11	362 183
1 1/4 32	150 11	362 183
1 1/2 40	150 11	362 183
2 50	150 11	362 183
2 1/2 65	125 9	355 179
3 80	125 9	355 179
4 100	125 9	355 179

Full Vacuum Rating- 30" (762mm) Hg

Our steam service ratings are very low in the interest of safety although our 70°F (21°C) pressure ratings are as high or higher than our competitors. All locations where failure could lead to personal injury or suffocation must be avoided. In dangerous locations we suggest housed expansion joints, solid loops, ball joints, packed devices etc. rather than thin walled flexible products regardless of manufacturer.

Consult factory with full location description as well as service conditions for higher pressure or temperature applications.

304 SS can be used up to 850°F (454°C) in applications such as engine exhaust.

When using VMN products in copper or brass water or steam systems, dielectric unions must be used on each end to prevent leakage from galvanic action.

**RATED MOVEMENTS**

±4"(100mm) All Directional Seismic Movement  
±6"(150mm) Guided Thermal Movement Only

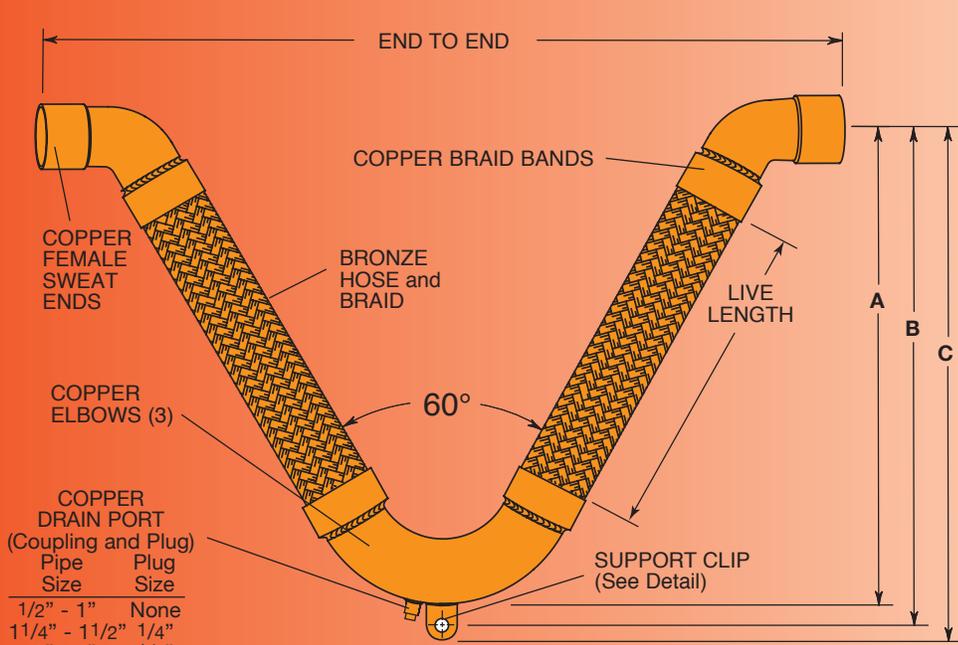
**VMN DIMENSIONS AND PRESSURE RATINGS (American Units)**

Type	Pipe Size & End to End (in)	Live Length (in)	Corrugations per foot	A (in)	B (in)	C (in)	Rated Pressure @70°F (psi)
VMN	1/2 X 23 1/2	14	92	15 1/8	15 7/8	16 3/8	1100
VMN	3/4 X 24	15	80	16 1/8	16 7/8	17 3/8	700
VMN	1 X 26	16	72	17 7/8	18 5/8	19 1/8	580
VMN	1 1/4 X 29	17	67	18 1/2	19 1/4	19 3/4	500
VMN	1 1/2 X 32	19	63	20 3/4	21 1/2	22	430
VMN	2 X 36	20	58	23 1/4	24 1/4	25	360
VMN	2 1/2 X 41	22	48	26	27	27 3/4	290
VMN	3 X 46	24	46	28 7/8	30 1/8	31 1/8	280
VMN	4 X 55	26	32	32 1/2	33 3/4	34 3/4	225

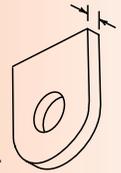
**VMN DIMENSIONS AND PRESSURE RATINGS (Metric Units)**

Type	Pipe Size & End to End (mm)	Live Length (mm)	Corrugations per meter	A (mm)	B (mm)	C (mm)	Rated Pressure @21°C (kg/cm <sup>2</sup> )
VMN	15 X 597	356	302	384	403	416	76
VMN	20 X 610	381	262	410	429	441	48
VMN	25 X 660	406	236	454	473	486	40
VMN	32 X 737	432	220	470	489	502	34
VMN	40 X 813	483	207	527	546	559	30
VMN	50 X 914	508	190	591	616	635	25
VMN	65 X 1041	559	157	660	686	705	20
VMN	80 X 1168	610	151	733	765	791	19
VMN	100 X 1397	660	105	826	857	883	16

End to End Tolerance: minus 1% plus 3%. Minimum Burst is four times the Rated Pressure. Safety factor of 4.



CLIP THICKNESS



SUPPORT CLIP DETAIL

**SUPPORT CLIP**

Pipe Size (in) (mm)	SUPPORT CLIP Hole Diameter (in) (mm)	Thickness (in) (mm)
1/2 15	1/2 16	1/8 3
3/4 20	1/2 16	1/8 3
1 25	1/2 16	1/8 3
1 1/4 32	1/2 16	1/8 3
1 1/2 40	1/2 16	1/8 3
2 50	5/8 16	1/8 3
2 1/2 65	5/8 16	1/8 3
3 80	3/4 19	1/8 3
4 100	3/4 19	1/8 3

COPPER DRAIN PORT (Coupling and Plug)

Pipe Size	Plug Size
1/2" - 1"	None
1 1/4" - 1 1/2"	1/4"
2" - 4"	1/2"

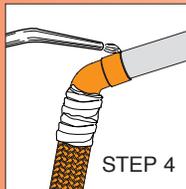
Drain Plugs are often removed to allow attachment of drain hose or steam trap for blow down or drainage.

**INSTALLATION INSTRUCTIONS for VCPSB**

1. Thoroughly clean male and female ends using steel wool and steel brushes.
2. Apply flux.
3. Wrap base of copper fitting on connector and 2" (50mm) of the braid with a wet cloth to prevent overheating during soldering.
4. Direct the torch away from the base of the copper fitting and braided section. Avoid contact of the flame with the base of the copper fitting and braid. Heat end of copper fitting for proper flow of silver solder. Silver solder flows at approximately 430°F (221°C).
5. Use caution with brazing rod or other higher temperature techniques. Overheating will cause leaks.
6. Remove wet cloth and remove all soldering flux immediately after installation. Flux chlorides will cause premature failure of hose assembly.



STEP 3



STEP 4

**RATED PRESSURES @ ELEVATED TEMPERATURES (psi) (kg/cm<sup>2</sup>)**

Hose Size	150°F	300°F	400°F
	66°C	149°C	204°C
	Factor 0.92	Factor 0.83	Factor 0.78
All Sizes	160 11	145 10	135 9

When using VCPSB products in stainless steel water systems, dielectric unions must be used on each end to prevent leakage from galvanic action.

Full Vacuum Rating- 30" (762mm) Hg

**RATED MOVEMENTS**

±4"(100mm) All Directional Seismic Movement  
±6"(150mm) Guided Thermal Movement Only

**VCPSB DIMENSIONS AND PRESSURE RATINGS (American Units)**

Type	Tubing Size & End to End (in)	Live Length (in)	Corrugations per foot	A (in)	B (in)	C (in)	Rated Pressure @70°F (psi)
VCPSB	1/2 x 21 1/2	14	73	15	157/8	163/8	500
VCPSB	3/4 x 21 5/8	15	67	15 3/4	161/2	17	470
VCPSB	1 x 24 3/8	16	58	17	177/8	183/8	450
VCPSB	1 1/4 x 26 3/4	17	55	18 3/8	191/8	195/8	400
VCPSB	1 1/2 x 30 1/8	19	53	20 5/8	213/8	217/8	335
VCPSB	2 x 34 3/8	20	51	22 1/2	231/2	241/8	235
VCPSB	2 1/2 x 40	22	34	25 7/8	263/4	273/8	230
VCPSB	3 x 45	24	30	28 5/8	297/8	303/4	225
VCPSB	4 x 53 1/8	26	28	32 3/8	335/8	341/2	220

**VCPSB DIMENSIONS AND PRESSURE RATINGS (Metric Units)**

Type	Tubing Size & End to End (mm)	Live Length (mm)	Corrugations per meter	A (mm)	B (mm)	C (mm)	Rated Pressure @21°C (kg/cm <sup>2</sup> )
VCPSB	15 x 546	356	240	381	403	416	34
VCPSB	20 x 549	381	220	400	419	432	32
VCPSB	25 x 594	406	190	432	454	468	31
VCPSB	32 x 679	432	180	467	486	498	28
VCPSB	40 x 765	483	174	524	543	556	23
VCPSB	50 x 873	508	167	572	597	613	16
VCPSB	65 x 1016	559	112	657	679	695	16
VCPSB	80 x 1143	610	98	727	759	781	15
VCPSB	100 x 1349	660	92	822	854	876	15

Female end fits over copper tubing, e.g. 1/2 x 21 1/2" (15 x 546mm) fits over 1/2" (15mm) tubing.

End to End Tolerance: minus 1% plus 3%. Minimum Burst is four times the Rated Pressure. Safety factor of 4.

Size 4" (100mm) has double braid.

## ALSO AVAILABLE

Mason Vee Hoses are also available with CSA approval for natural gas, and UL approval for fire protection and potable water as follows.

### CSA Series Braided Vee Hose

Everyone is concerned when installing flexible hose in flammable gas or liquid lines because of the risk of both asphyxiation and fire. Approved by the CSA, the successor to the American Gas Association, and complying with UL 536 provides that assurance. Tests include vibration 300 hours at 15 Hz, 90° bends at rated pressure @ 10 cpm for 20,000 cycles, elongation and tension, 450°F (232°C) for 100 hours as well as flame resistance. All of our standard hoses 1/2" through 4" diameter passed and can be used in straight, looped or Vee configurations. However, in addition to the general UL approval, all specific hoses must be rechecked with an approved thread gauge, if threaded, and retested to 50% above rated pressure using water or rated pressure using air. It must be clearly identified as a Mason product and tagged with maximum pressure rating and minimum bend radius.

Vee flexes have 4" all directional movement capability and are listed to handle up to 36" movement. Nobody else in our industry can offer that. They are a great solution for Natural Gas piping.

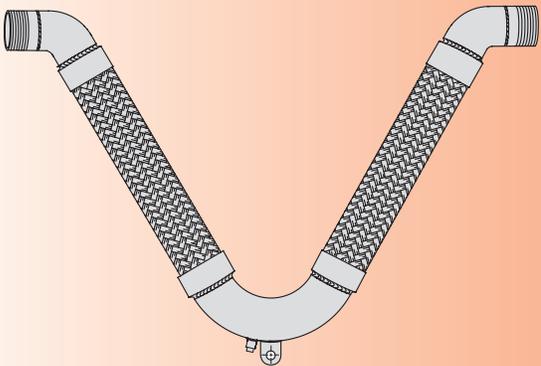
We have the right product for all your flexible piping requirements. We look forward to hearing from you.



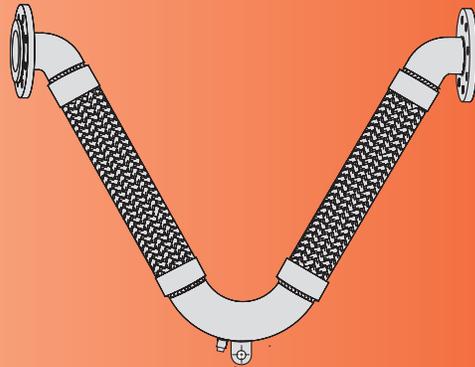
These assemblies have been "CSA" approved for use in gas pipelines. "CSA" is the current certification agency for gas industry products, assuming the authority formerly associated with the American Gas Association (AGA).

The Certification Report is #230720-1764990. This Certification meets all requirements of ANSI/UL #536-1997 Standards for Flexible Metal Hose.

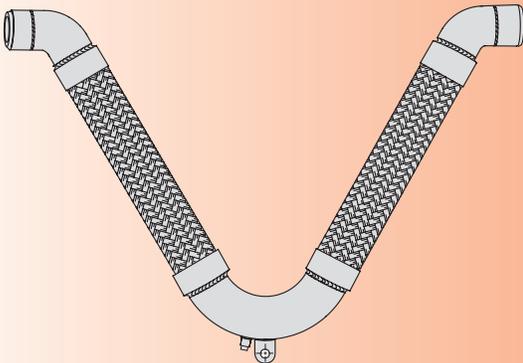
### CSAVMN 60Vee SS BRAIDED HOSE with CARBON STEEL THREADED NIPPLES



### CSAVFL 60Vee SS BRAIDED HOSE with CARBON STEEL FLOATING FLANGES



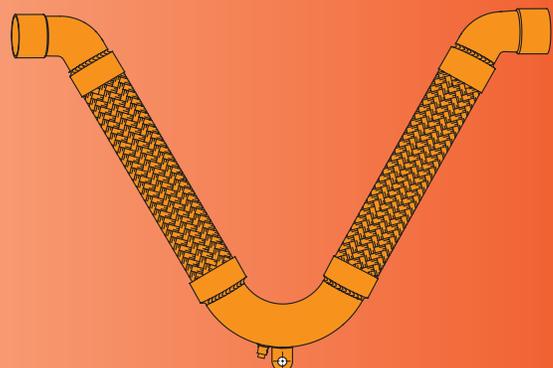
### CSAVWN 60Vee SS BRAIDED HOSE with CARBON STEEL THREADED WELD NIPPLES



### MG Series Braided Vee Hose

VCPSB-MG hoses are cleaned and bagged for medical gas applications. Manufactured in accordance with NFPA99 Requirements.

### VCPSB-MG BRONZE BRAIDED 60Vee HOSE with COPPER FEMALE SWEAT ENDS for MEDICAL GAS



All dimensions are the same as standard products. Rated Pressure @ 70°F (21°C) is 175 (12kg/cm<sup>2</sup>) psi.

## UL Series Braided Vee Hose

Mason Industries is proud to announce that our Vee flexes (VMN, VFL, VGWN & VCPSB) have passed the stringent UL (Underwriters Laboratories) testing and are now certified for use for Wet & Dry Fire Protection Systems. To receive this prestigious certification our material was subjected to many tests including stress, flexing, low temperature and high pressure testing. We have also completed extensive in house testing on all our materials to determine safe working pressures as well as spring rates and allowable movements.

UL approved products are acceptable on all fire protection systems designed to the stringent NFPA 13 (National Fire Protection Agency) code requirements. We have included every possible attachment in the certification, including grooved, threaded, welded, and ASA 150 and 300 lb flanges, so you are covered regardless of how you decide to install your system.

Vee flexes have 4" all directional movement capability and are listed to handle up to 36" movement. Nobody else in our industry can offer that. They are a great solution for fire protection piping crossing building expansion joints, or in areas where building settlement is anticipated. Of course they are great for absorbing thermal movement as well.

We are confident we can help you with all your flexible piping requirements. Please let us hear from you.

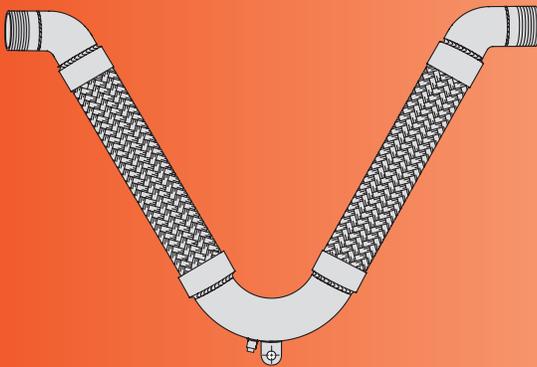


FLEXIBLE JOINT FITTINGS  
3VX9

NFPA 13

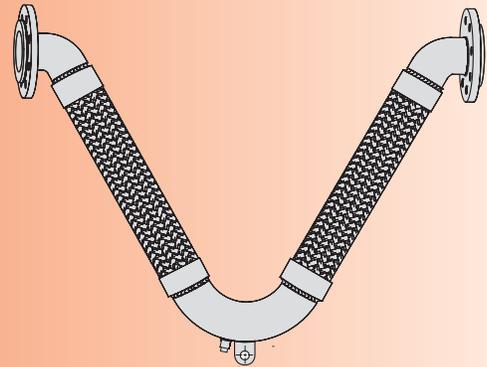
### VMN-UL

60Vee SS BRAIDED HOSE with CARBON STEEL THREADED NIPPLES for SPRINKLER and FIRE PROTECTION SYSTEMS



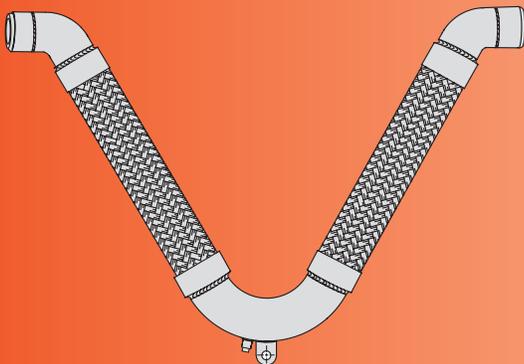
### VFL-UL

60Vee SS BRAIDED HOSE with CARBON STEEL FLOATING FLANGES for SPRINKLER and FIRE PROTECTION SYSTEMS



### VGWN-UL

60Vee SS BRAIDED HOSE with CARBON STEEL WELD NIPPLES for SPRINKLER and FIRE PROTECTION SYSTEMS



## NSF Series Braided Vee Hose Potable Water Certified

Mason was the first company in the industry to be approved by UL (Underwriters Laboratory) as manufacturers of braided hoses with the new NSF/ANSI-372 low lead requirements for drinking water. We originally were listed to NSF/ANSI 61 which included the summation provision in Annex G. Then California added a new law, AB1953, which later became HB116875, which changed again the definition of low lead. Mason Vee Hoses (VFLSS-NSF, VMNSS-NSF & VCPSB-NSF) meet all of these listings.

Vee flexes have 4" all directional movement capability and are listed to handle up to 36" movement. Nobody else in our industry can offer that. They are a great solution for Potable Water piping.

Give us a call to find out how we can help.

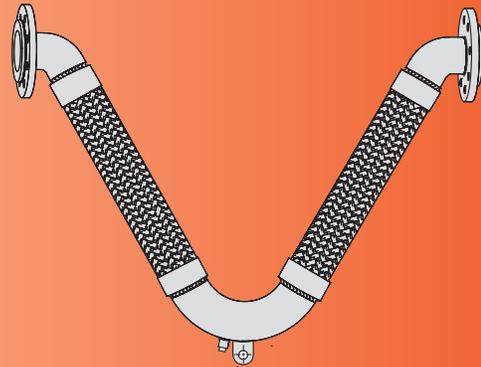
These flexible joint fitting assemblies are UL Listed under File MH48651 and are intended for installation in accordance with the Mason installation instructions and the applicable requirements in Annex G of ANSI/NSF-61 and NSF-372.



**WATER QUALITY**  
DRINKING WATER  
SYSTEM COMPONENT  
(4RV6) Annex G of  
ANSI/NSF-61 and NSF-372

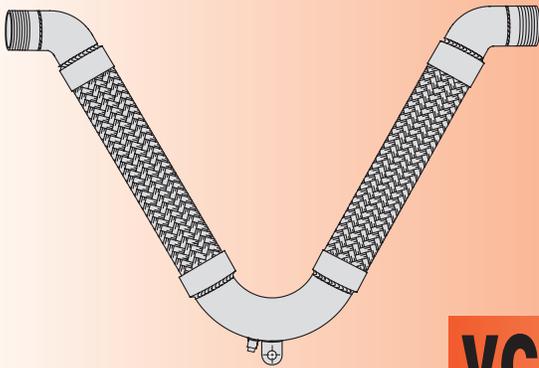
## VFLSS-NSF

60Vee STAINLESS STEEL  
BRAIDED HOSE with SS  
FLOATING FLANGES



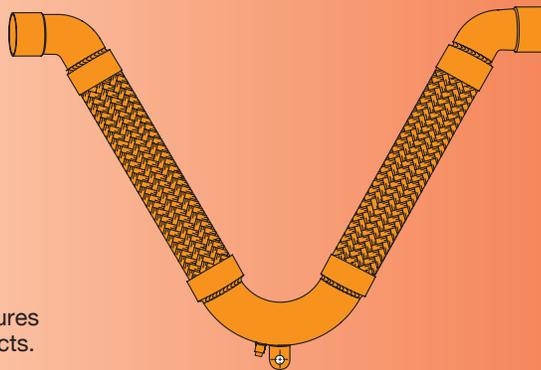
## VMNSS-NSF

60Vee STAINLESS STEEL  
BRAIDED HOSE with SS  
THREADED NIPPLES



## VCPSB-NSF

BRONZE BRAIDED 60Vee  
HOSE with COPPER  
FEMALE SWEAT ENDS



All dimensions and Rated Pressures  
are the same as standard products.

ALSO AVAILABLE

## VMNSS & VFLSS- Industrial Grade Stainless Steel



# MASON – MERCER

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