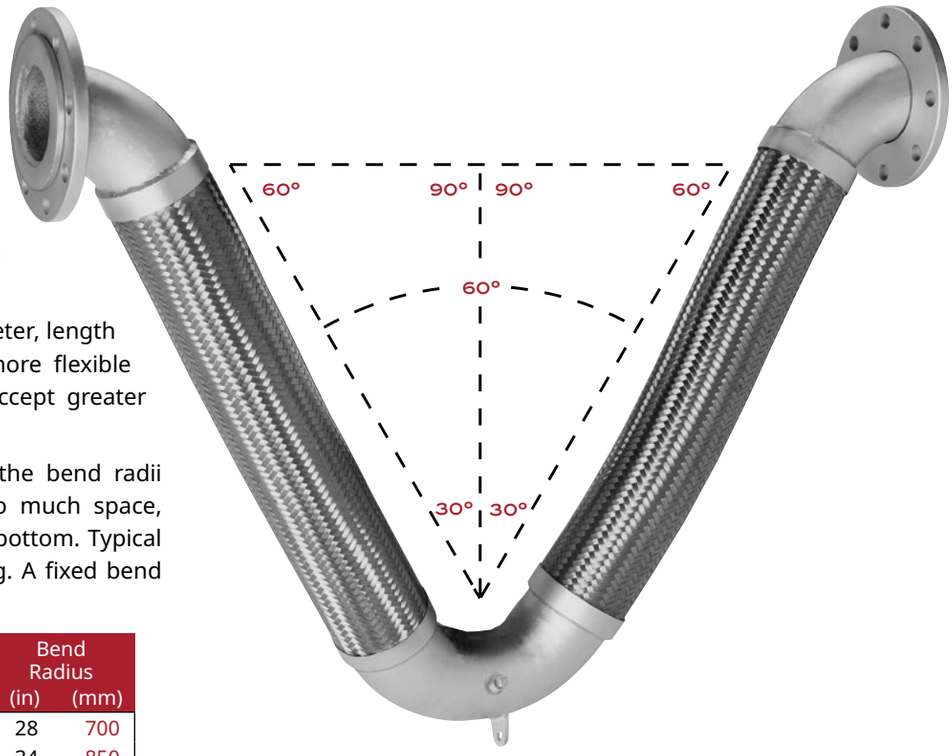
STAINLESS STEEL & BRONZE BRAIDED VEE HOSES

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.

Hose Diameter (in)	Hose Diameter (mm)	Bend Radius (in)	Bend Radius (mm)
1/2	15	6 1/2	165
3/4	20	8 1/4	206
1	25	9 3/4	244
1 1/4	30	11	275
1 1/2	40	12	300
2	50	15	375
2 1/2	65	16	400
3	80	17 1/2	438
4	100	19 3/4	494
5	125	23	575

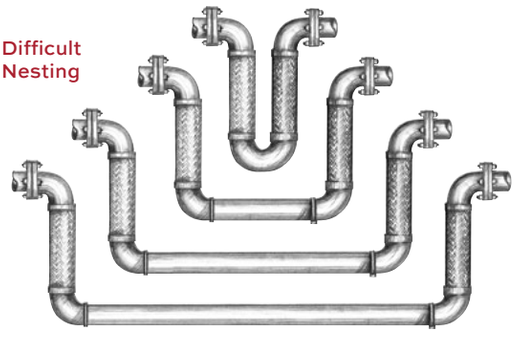
Hose Diameter (in)	Hose Diameter (mm)	Bend Radius (in)	Bend Radius (mm)
6	150	28	700
8	200	34	850
10	250	45	1125
12	300	66	1650
14	350	77	1925
16	400	88	2200
18	450	100	2500
20	500	108	2700
24	600	135	3375
30	750	165	4125

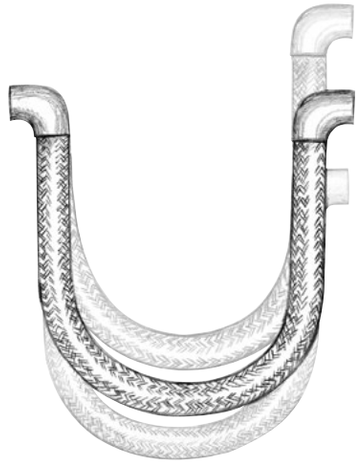
As a 6" diameter hose would have a 56" diameter semicircle at the bottom, plus the vertical legs, you can see the problem.

PARALLEL LEGS

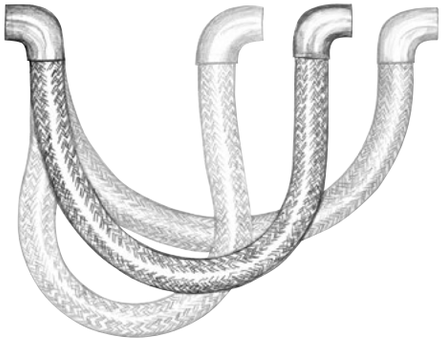
Since the in and out motion is normally the most important, it became common practice to substitute a 180° elbow at the bottom to eliminate the space and cost of the bottom loop. The legs can move up and down awkwardly, and in a walking motion all determined by the live hose length and flexibility.

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.





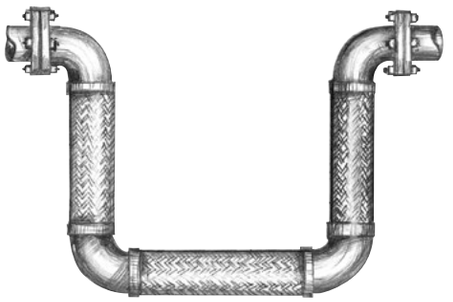
Loop- Up and Down Motion



Loop- In and Out Motion

ADDITIONAL HORIZONTAL HOSE

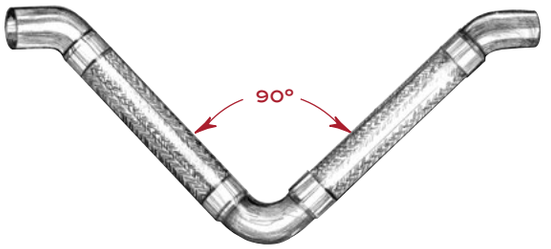
Another market variation is the introduction of a third flexible hose between two 90° elbows in place of the 180° return or the straight pipe. This third element is effective but costly, and does not solve nesting problems either, unless smaller pipes are nested within larger ones or the horizontal flexible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



90° VEE

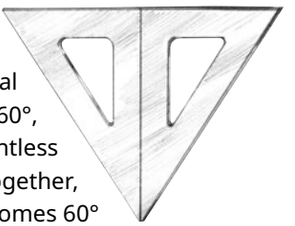
The next approach was the introduction of a 90° Vee. Up and down motion is improved, but opening and closing the Vee suffers.

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.



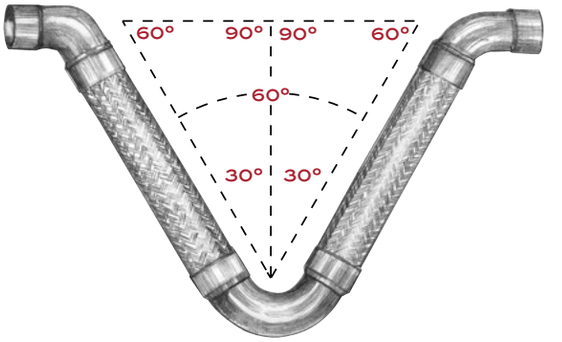
In fairness to others, we should note that all these hose designs can be made to work, if the hoses are made long enough to keep stress within acceptable limits for the stated movements.

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.

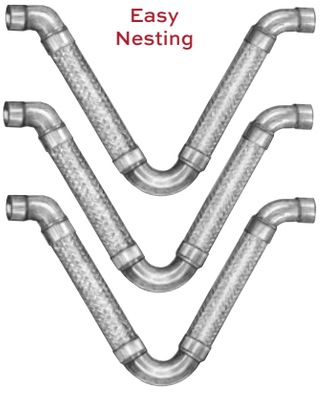


So far our competitors do not do it this way. Perhaps they never thought of it or they related to standard 45°, 90° and 180° fittings only. We studied the advantages and found a way to manufacture 60° and 120° fittings.

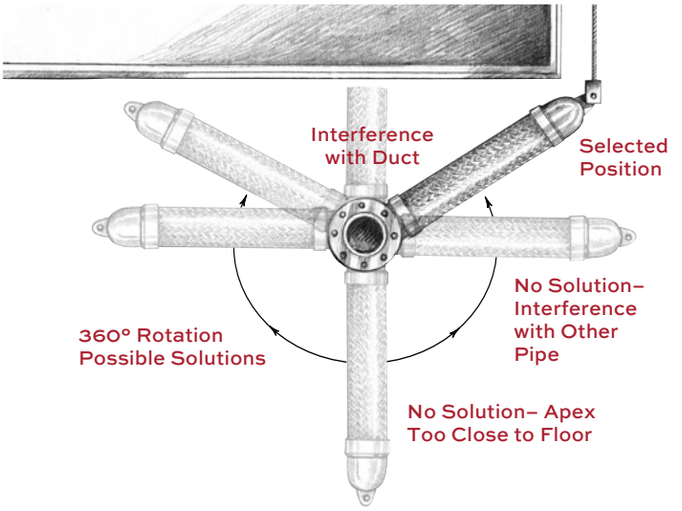
It is very difficult to publish all the nesting capabilities, but in one plane, a typical layout could be as shown below.

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.



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.



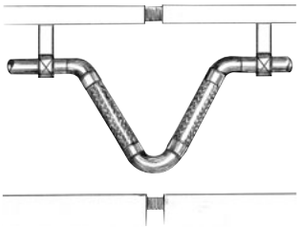
Our standard vee allows for 4" of seismic motion in all directions. The design is very conservative and in expansion locations with no change to the standard product we agree to 6" movements, when the movement is axial compression and extension.

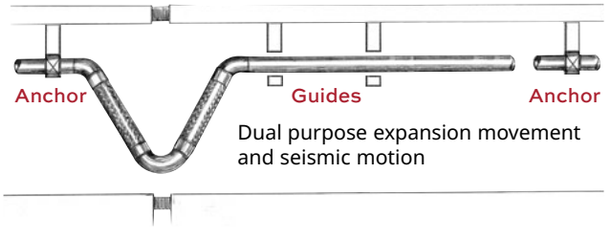
Seismic applications allow for movement of adjacent sections of a structure at building joints or occasionally where piping goes from one building to another. The Vee is anchored close to and on either side of the separation. When it is between adjacent buildings, the location of the anchors depends 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.

Vee between buildings to allow seismic motion only in all planes

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





Dual purpose expansion movement and seismic motion

Let us help you with these layouts in the design stage, or just specify the Vees 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 lb pipe anchors to resist the thrust and overcome the spring rate of a 10" diameter 150 psi stainless steel bellows moving six inches. Finding this structural capacity is very difficult.

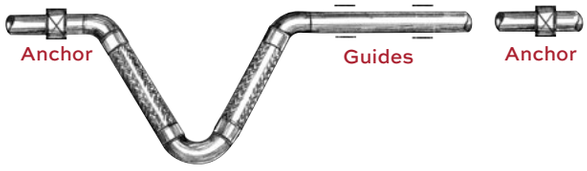
There is no thrust when a Vee is used in place of the bellows because the braid tightens and takes both. The 6" motion is taken by displacing each leg 3" and the force to do this is only is only 3300 lb as shown on page 10•45 of Test Bulletin VT-32. 3300/22000 x 100 = 15% of the bellows anchorage and 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 pages 10•46 - 10•48.

Stainless Vee Hose Size (in)	(mm)	Live Length of Braid & Hose (in)	(mm)	Corrugations per (ft)	(m)	Axial Resistance for 4" (100mm) Displacement at 100 psi (7.0 kg/cm²) (lb)	(kg)
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
11/4	30	67	220	17	425	7	3.2
11/2	35	63	207	19	475	8	3.6
2	50	58	190	20	500	24	10.9
21/2	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.



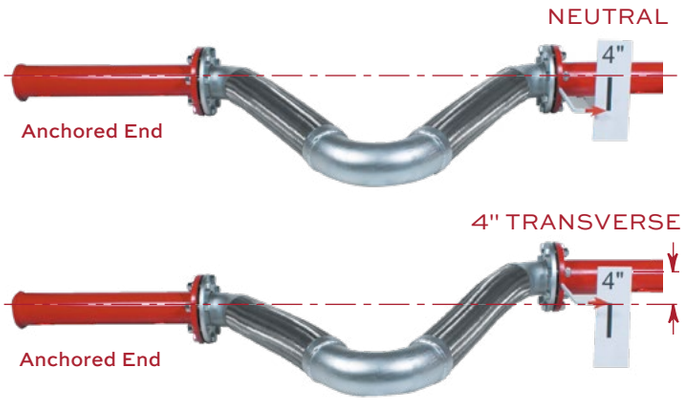
The pages that follow provide data on all of our stock 60° Vees.

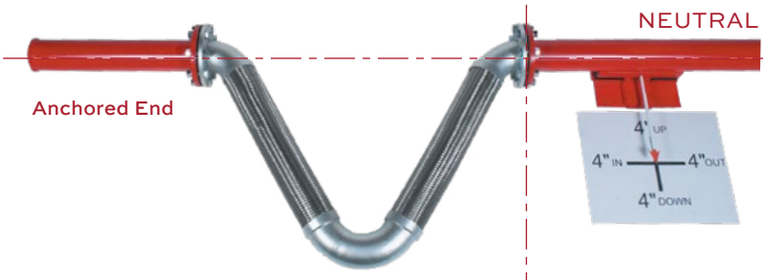
If you would like to specify them, please use the description on page 10•31.

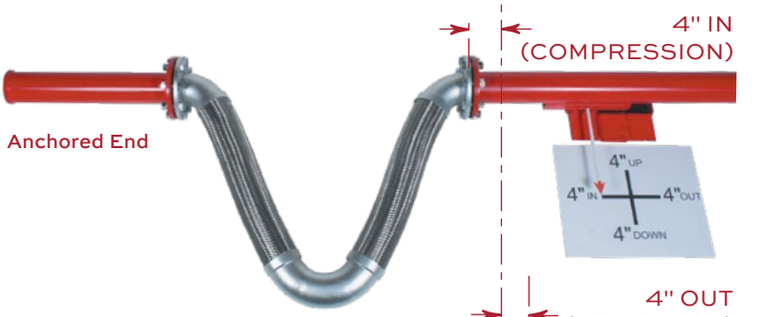
60° VEE MOVEMENTS WHEN INSTALLED VERTICALLY

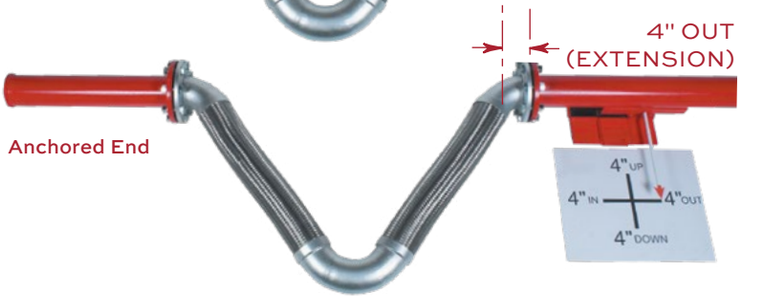
4" PIPE SIZE

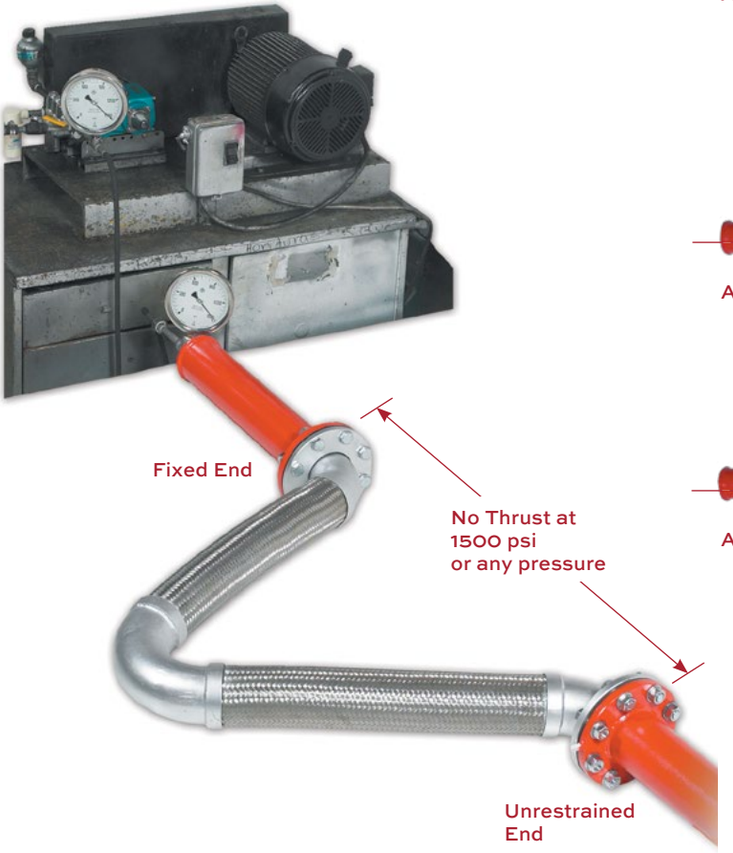
The following photographs show movement in all planes @ 100 psi. The pointer indicates movement.

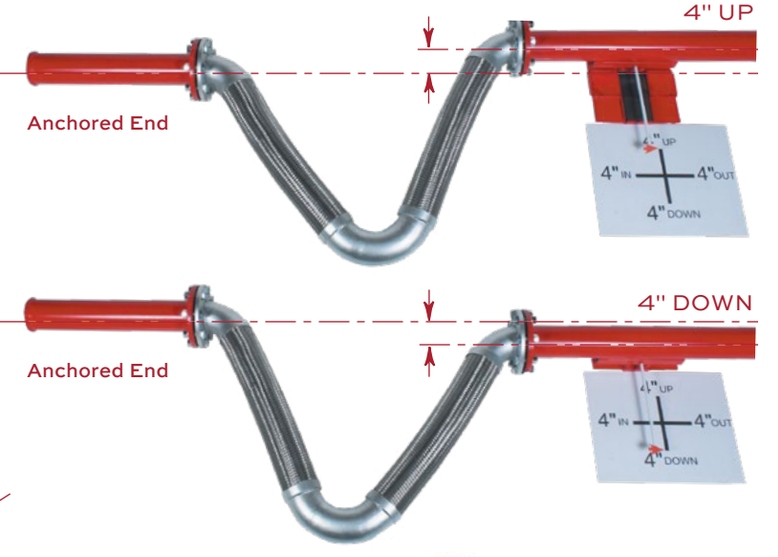












4" DOUBLE BRAIDED VEE PRESSURE TEST

Pressure test discontinued at 1500 psi. No Failure.

VEE SPECIFICATION

Piping and equipment connections shall be protected against seismic damage by the insertion of braided flexible hose Vee assemblies rated for ±4" (102mm) seismic motion in all planes. Should the application include ±6" (152mm) 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° Vees**, **ADA** Resilient Anchors and **ASG** Sliding Guides, all as manufactured by Mason Industries, Inc.

AXIAL FORCE OF DISPLACEMENT FOR 6" MOVEMENT LB / 2.2 = KILOGRAMS

Pressure (psi)	Force (lb) for Stainless Vee Sizes														Force (lb) for Copper Vee Sizes								
	1/2"	3/4"	1"	11/4"	11/2"	2"	21/2"	3"	4"	5"	6"	8"	10"	12"	1/2"	3/4"	1"	11/4"	11/2"	2"	21/2"	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)

QUALITY CONTROL APPROVALS AS NOTED

Mason Hoses are also available with CSA approval for natural gas, UL approval for fire protection (UL) & potable water (NSF), and NFPA approval for medical gas (MG) as follows.

CSA Series– CSAVMN, CSAVWN & CSAVFFL

Special Tested, Inspected and Tagged Gas Hoses

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.

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

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

All dimensions are the same as standard products.
Rated Pressure @ 70°F (21°C) is 175 psi (12kg/cm²).

UL Series– VMN-UL, VFL-UL, VGWN-UL & VCPSB-UL

Special Tested, Inspected and Tagged Hoses for Sprinkler and Fire Protection Systems

Mason Industries is proud to announce that our braided hoses 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.

All dimensions are the same as standard products.
Rated Pressure @ 70°F (21°C) is 175 psi (12kg/cm²)).

c UL US LISTED
FLEXIBLE JOINT FITTINGS
3VX9

NFPA 13

NSF Series– VMNSS-NSF, VFFLSS-NSF & VCPSB-NSF

Special Tested, Inspected and Tagged Hoses for Low Lead Water Quality Annex G of ANSI/NSF-61 and NSF-372

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 Hoses meet all of these listings.

LEAD FREE: The surface contacted by consumable water contains less than one quarter of one percent (0.25%) of lead by weight. 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.

CLASSIFIED c UL US
WATER QUALITY
DRINKING WATER SYSTEM COMPONENT (4RV6) Annex G of ANSI/NSF-61 and NSF-372

WARNING! If disinfecting (chlorinating) is required per the International Plumbing Code, AWWA C651, and AWWA C652, then tablets and granular chlorine (calcium hypochlorite), and chlorine for swimming pool disinfection CANNOT be used on our products. We recommend chlorinating with diluted liquid chlorine (sodium hypochlorite) and immediately flushing thoroughly with potable water, as defined in the above Code. All traces of chlorine must be removed, since residual chlorine will cause corrosion and lead to premature failure of our products. Failure to do so will void our warranty. Mason recommends installing hoses vertically where feasible to promote drainage of chlorine.

All dimensions and pressures the same as standard products.

MG Series– VCPSB-MG

Hoses Cleaned for Medical Gas

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

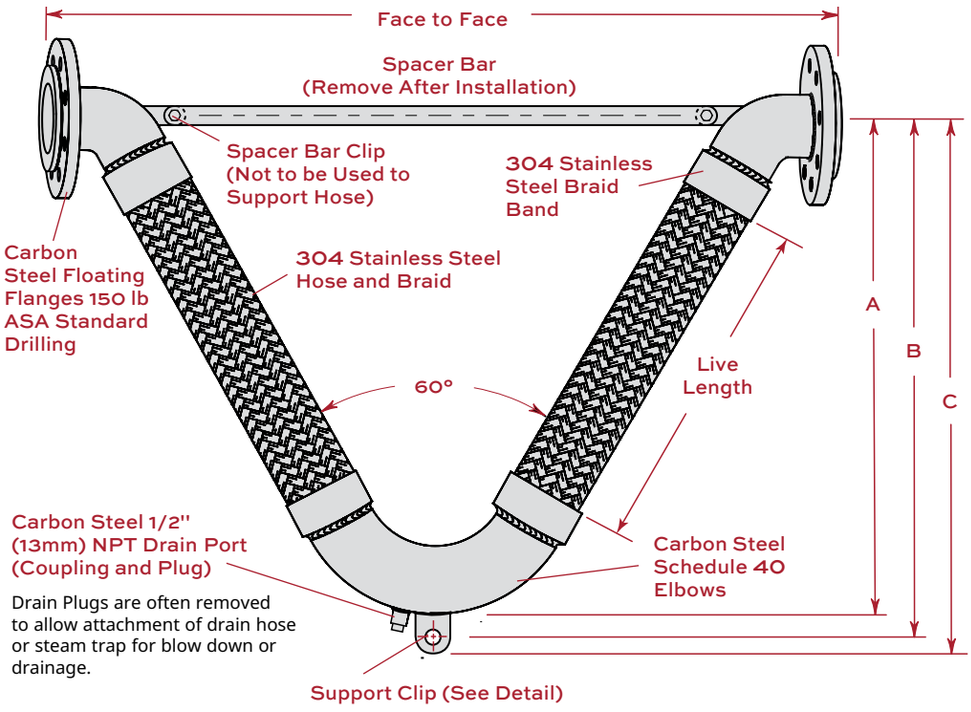
NFPA 99

ALSO AVAILABLE

Industrial Grade Stainless Steel Vees— VMNSS & VFLSS

VFL– 60Vee SS Braided Hose with Carbon Steel Floating Flanges

Available in Stainless Steel, CSA, NSF, and UL (See page 10·32)



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 then 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.

CARBON STEEL PLATE FLANGE THICKNESS

Pipe Size (in)	Pipe Size (mm)	Flange Thickness (in)	Flange Thickness (mm)
2 thru 4	50 thru 100	5/8	16
5 thru 6	125 thru 150	3/4	19
8 thru 12	200 thru 400	1	25

RATED MOVEMENTS

±4" (102mm) All Directional Seismic Movement
±6" (152mm) Guided Thermal Movement Only

Vacuum rating varies with size and application. Consult factory on all vacuum applications.

TYPE VFL DIMENSIONS & PRESSURE RATINGS

Type	Pipe Size & Face to Face† (in)	(mm)	Live Length† (in)	(mm)	Corrugations per (ft)	(m)	A (in)	(mm)	B (in)	(mm)	C (in)	(mm)	Rated Pressure†† @70°F (psi)	@21°C (kg/cm²)
VFL-	2 x 33	50 x 838	20	508	58	190	227/8	603	237/8	613	245/8	629	360	25
	21/2 x 37	65 x 940	22	559	48	157	26	660	27	689	273/4	711	290	20
	3 x 42	80 x 1067	24	610	46	151	287/8	733	301/8	762	311/8	781	280	19
	4 x 49	100 x 1245	26	660	32	105	321/2	826	333/4	857	347/8	886	225	16
	5 x 58	125 x 1473	30	762	29	95	38	965	391/4	1010	401/2	1026	200	14
	6 x 66	150 x 1676	33	838	25	82	425/8	1083	441/8	1118	453/8	1149	200	14
	8 x 80	200 x 2032	36	914	23	75	491/4	1251	503/4	1289	52	1324	180	12
	10 x 96	250 x 2438	42	1067	21	69	581/2	1486	601/4	1524	613/4	1559	170	12
	12 x 112	300 x 2849	48	1219	20	66	673/4	1721	691/2	1762	71	1797	170	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.

SUPPORT CLIP

Pipe Size (in)	Pipe Size (mm)	Support Clip Hole Diameter (in)	Support Clip Hole Diameter (mm)	Support Clip Thickness (in)	Support Clip Thickness (mm)
2	50	1/2	13	1/4	6
21/2	65	5/8	16	1/4	6
3	80	5/8	16	1/4	6
4	100	3/4	19	3/8	9
5	125	3/4	19	3/8	9
6	150	7/8	22	3/8	9
8	200	1	25	1/2	13
10	250	1	25	1/2	13
12	300	11/8	28	1/2	13

RATED PRESSURES @ ELEVATED TEMPERATURES (psi) (kg/cm²)

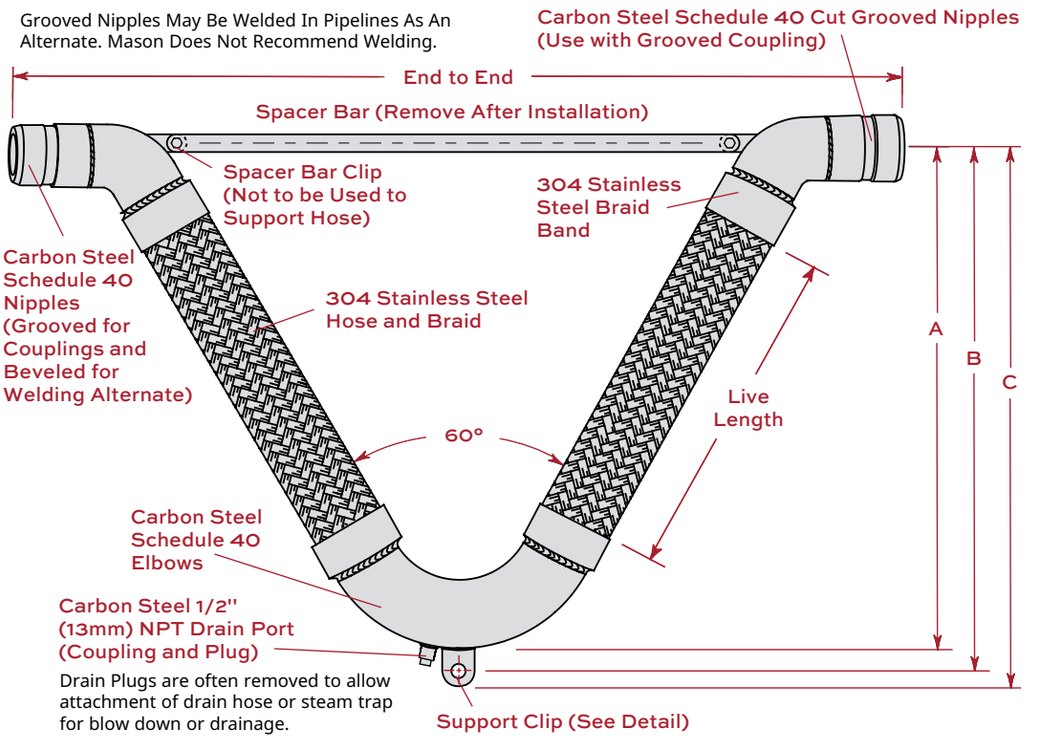
Hose Size (in)	Hose Size (mm)	Factor 0.92 (250°F)	(121°C)	Factor 0.86 (350°F)	(176°C)	Factor 0.81 (450°F)	(232°C)
2	50	330	23	310	21	290	20
21/2	65	270	19	250	17	235	16
3	80	260	18	240	16	230	16
4	100	210	15	200	14	190	13
5	125	190	13	180	12	170	11
6	150	190	13	180	12	170	11
8	200	170	11	160	11	150	10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

SATURATED STEAM RECOMMENDED PRESSURE LIMITS

Size (in)	Size (mm)	Max Gauge (psi)	Max Gauge (kg/cm²)	Temp Ref. (°F)	Temp Ref. (°C)
2	50	150	11	362	183
21/2	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

VGWN– 60Vee SS Braided Hose with Carbon Steel Grooved Weld Nipples

Available in Stainless Steel and UL (See page 10-32)

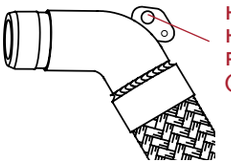


Our steam service ratings are very low in the interest of safety although our 70°F (21°C) pressure ratings are as high or higher then our competitors. All locations where failure could lead to personal injury or suffocation must be avoided. In dangerous locations we suggest housed expansion joints, solid 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.



RATED MOVEMENTS

±4" (102mm) All Directional Seismic Movement
±6" (152mm) Guided Thermal Movement Only

Vacuum rating varies with size and application. Consult factory on all vacuum applications.

TYPE VGWN DIMENSIONS & PRESSURE RATINGS

Type	Pipe Size & End to End (in)	(mm)	Live Length (in)	(mm)	Corru-gations per (ft)	(m)	A (in)	(mm)	B (in)	(mm)	C (in)	(mm)	Rated Pressure†† @70°F (psi)	@21°C (kg/cm²)
VGWN-	2 x 36	50 x 914	20	508	58	190	23 1/4	591	24 1/4	616	25	635	360	25
	2 1/2 x 41	65 x 1041	22	559	48	157	26	660	27	688	27 3/4	700	290	20
	3 x 46	80 x 1168	24	610	46	151	28 7/8	733	30 1/8	766	31 1/8	792	280	19
	4 x 55	100 x 1397	26	660	32	105	32 1/2	826	33 3/4	857	34 3/4	883	225	16
	5 x 64	125 x 1626	30	762	29	95	38	965	39 1/2	1003	40 1/2	1029	200	14
	6 x 72	150 x 1829	33	838	25	82	42 5/8	1083	44 1/8	1121	45 3/8	1153	200	14
	8 x 86	200 x 2184	36	914	23	75	49 1/4	1251	50 3/4	1289	52	1321	180	12
	10 x 105	250 x 2667	42	1067	21	69	58 1/2	1486	60 1/4	1530	61 3/4	1568	170	12
	12 x 120	300 x 4048	48	1219	20	66	67 3/4	1721	69 1/2	1765	71	1803	170	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.

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 PRESSURES @ ELEVATED TEMPERATURES (psi) (kg/cm²)

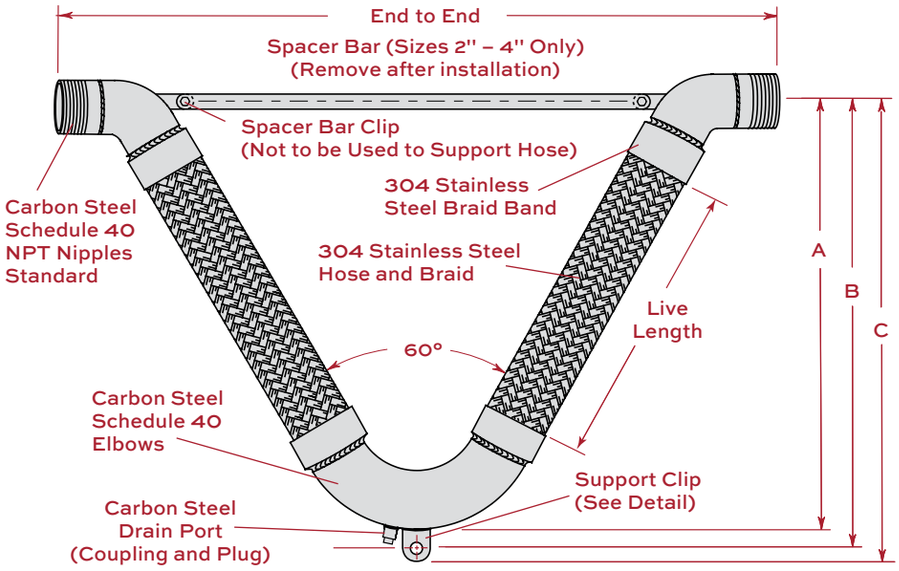
Hose Size (in)	(mm)	Factor 0.92 (250°F)	(121°C)	Factor 0.86 (350°F)	(176°C)	Factor 0.81 (450°F)	(232°C)
2	50	330	23	310	21	290	20
2 1/2	65	270	19	250	17	235	16
3	80	260	18	240	16	230	16
4	100	210	15	200	14	190	13
5	125	190	13	180	12	170	11
6	150	190	13	180	12	170	11
8	200	170	11	160	11	150	10
10	250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

SATURATED STEAM RECOMMENDED PRESSURE LIMITS

Size (in)	(mm)	Max Gauge (psi)	(kg/cm²)	Temp Ref. (°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

VMN– 60Vee SS Braided Hose with Carbon Steel Threaded Nipples

Available in Stainless Steel, CSA, NSF, and UL (See page 10·32)



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

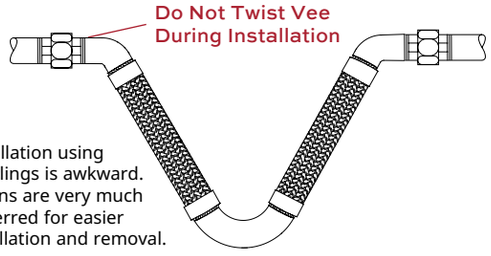
Drain Plugs are often removed to allow attachment of drain hose or steam trap for blow down or drainage.

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 then 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.



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

RATED MOVEMENTS

±4" (102mm) All Directional Seismic Movement
±6" (152mm) Guided Thermal Movement Only

Vacuum rating varies with size and application. Consult factory on all vacuum applications.

TYPE VGWN DIMENSIONS & PRESSURE RATINGS

Type	Pipe Size & End to End (in)	(mm)	Live Length (in)	(mm)	Corru-gations per (ft)	(m)	A (in)	(mm)	B (in)	(mm)	C (in)	(mm)	Rated Pressure†† @70°F (psi)	@21°C (kg/cm²)
VMN-	1/2 x 23 1/2	15 x 597	14	356	92	302	151/8	384	157/8	403	163/8	416	1100	76
	3/4 x 24	20 x 610	15	381	80	262	161/8	410	167/8	429	173/8	441	700	48
	1 x 26	25 x 660	16	406	72	236	177/8	454	185/8	473	191/8	486	580	40
	1 1/4 x 29	32 x 737	17	432	67	220	181/2	470	191/4	489	193/4	502	480	33
	1 1/2 x 32	40 x 813	19	483	63	207	203/4	527	211/2	546	22	559	450	31
	2 x 36	50 x 914	20	508	58	190	231/4	591	241/4	616	25	635	360	25
	2 1/2 x 41	65 x 1041	22	559	48	157	26	660	27	686	273/4	705	290	20
	3 x 46	80 x 1168	24	610	46	151	287/8	733	301/8	765	311/8	791	280	19
	4 x 55	100 x 1397	26	660	32	105	321/2	826	333/4	857	343/4	883	225	16

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

SUPPORT CLIP

Pipe Size (in)	(mm)	Support Clip Hole Diameter (in)	(mm)	Thickness (in)	(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

RATED PRESSURES @ ELEVATED TEMPERATURES (psi) (kg/cm²)

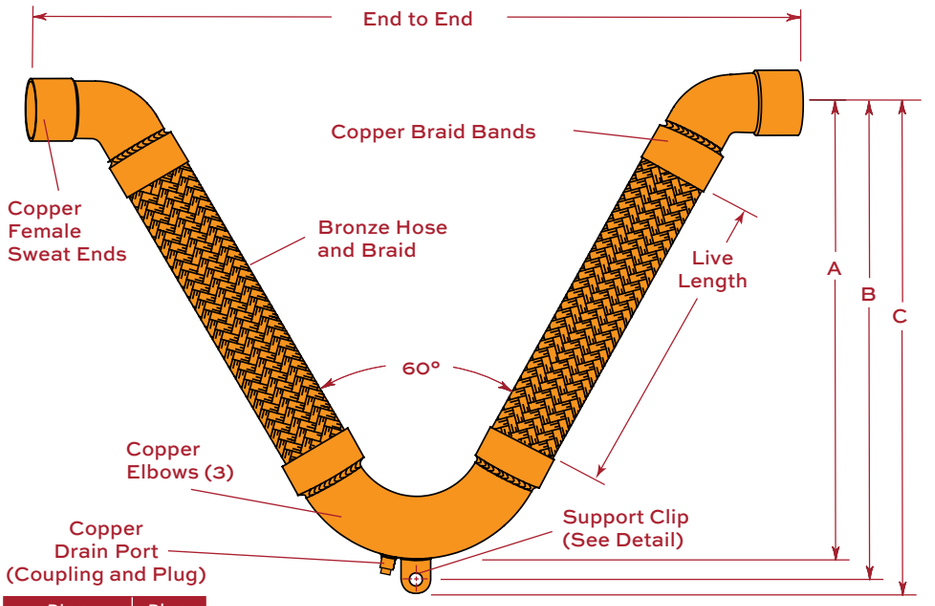
Hose Size (in)	(mm)	Factor 0.92 (250°F)	(121°C)	Factor 0.86 (350°F)	(176°C)	Factor 0.81 (450°F)	(232°C)
1/2	15	1010	69	950	65	890	61
3/4	20	640	44	600	41	570	39
1	25	530	36	500	34	470	32
1 1/4	32	460	32	430	30	400	28
1 1/2	40	400	28	370	26	350	24
2	50	330	23	310	21	290	20
2 1/2	65	270	19	250	17	235	16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

SATURATED STEAM RECOMMENDED PRESSURE LIMITS

Size (in)	(mm)	Max Gauge (psi)	(kg/cm²)	Temp Ref. (°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

VCPSB– Bronze Braided 60Vee Hose with Copper Female Sweat Ends

Available in MG & NSF (See page 10·32)



Pipe Size	Plug Size
1/2" - 1"	None
11/4" - 11/2"	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.

RATED MOVEMENTS

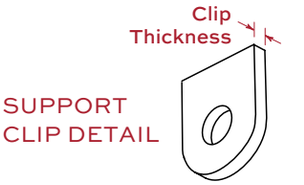
±4" (102mm) All Directional Seismic Movement
±6" (152mm) Guided Thermal Movement Only

Vacuum rating varies with size and application. Consult factory on all vacuum applications.

RATED PRESSURES @ ELEVATED TEMPERATURES (psi) (kg/cm²)

Hose Size	Factor 0.92 (150°F)	(66°C)	Factor 0.83 (300°F)	(149°C)	Factor 0.78 (400°F)	(204°C)
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.



TYPE VGWN DIMENSIONS & PRESSURE RATINGS

Type	Pipe Size & End to End (in)	(mm)	Live Length (in)	(mm)	Corru-gations per (ft)	(m)	A (in)	(mm)	B (in)	(mm)	C (in)	(mm)	Rated Pressure†† @70°F (psi)	@21°C (kg/cm²)
VCPSB-	1/2 x 21 1/2	15 x 546	14	356	73	240	15	381	15 7/8	403	16 3/8	416	500	34
	3/4 x 21 5/8	20 x 549	15	381	67	220	15 3/4	400	16 1/2	419	17	432	470	32
	1 x 24 3/8	25 x 594	16	406	58	190	17	432	17 7/8	454	18 3/8	468	450	31
	1 1/4 x 26 3/4	32 x 679	17	432	55	180	18 3/8	467	19 1/8	486	19 5/8	498	400	28
	1 1/2 x 30 1/8	40 x 765	19	483	53	174	20 5/8	524	21 3/8	543	21 7/8	556	335	23
	2 x 34 3/8	50 x 873	20	508	51	167	22 1/2	572	23 1/2	597	24 1/8	613	235	16
	2 1/2 x 40	65 x 1016	22	559	34	112	25 7/8	657	26 3/4	679	27 3/8	695	230	16
	3 x 45	80 x 1143	24	610	30	98	28 5/8	727	29 7/8	759	30 3/4	781	225	15
	4 x 53 1/8	100 x 1349	26	660	28	92	32 3/8	822	33 5/8	854	34 1/2	876	220	15

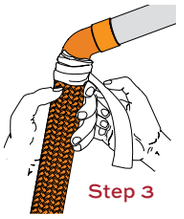
SUPPORT CLIP

Pipe Size (in)	(mm)	Support Clip Hole Diameter (in)	(mm)	Thickness (in)	(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

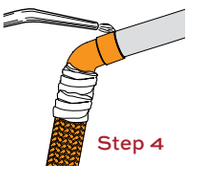
Female end fits over copper tubing, e.g. 1/2 x 21 1/2" (15 x 546mm) fits over 1/2" (15mm) tubing.
End to End Tolerance: minus 1% plus 3%. Minimum Burst is four times the Rated Pressure. Safety factor of 4.
Size 4" (100mm) has double braid.

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.