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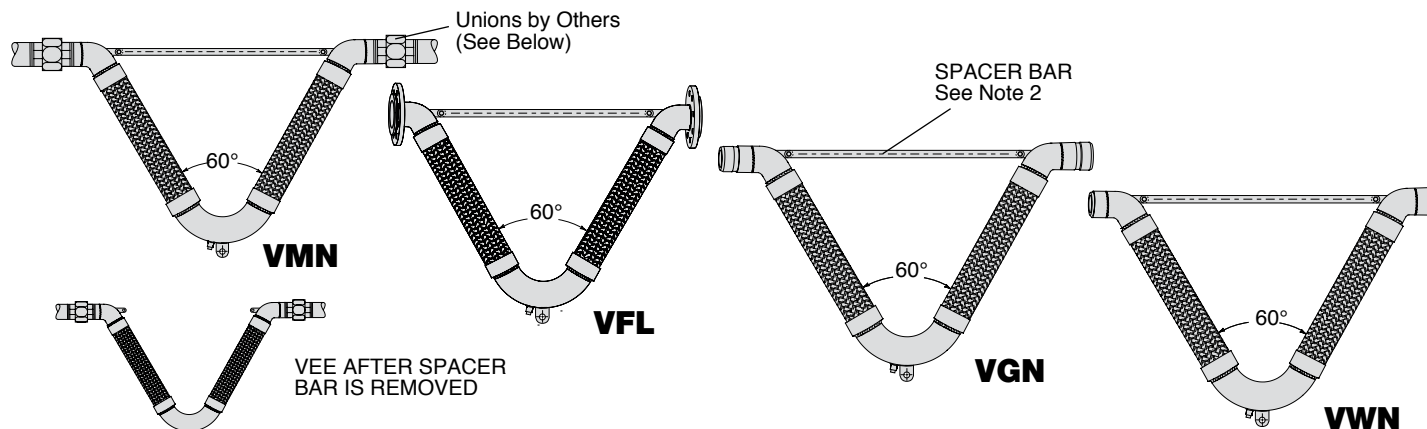
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INSTALLATION AND MAINTENANCE INSTRUCTIONS FOR STAINLESS VEE ASSEMBLIES (VMN, VFL, VGN, VWN)

FORM A-33170

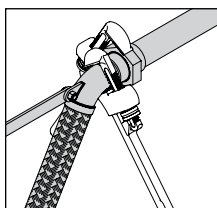


INSTALLATION PROCEDURES

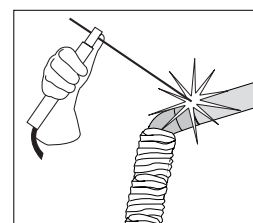
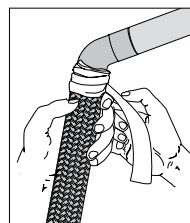
1. Braided Vees are easily damaged. Please use care during transportation, storage, and installation. The braided hose sections must not be allowed to bend excessively, compress, sag, or scuff.
2. Remove the Vee from the shipping box or crate. The two 60° elbows are bolted together for shipping purposes in sizes 2" and larger. Remove the bolt from the clips and spread the two legs apart to install the loose spacer bar by bolting it to the same clips. The spacer bar is to keep the Vee in its neutral end-to-end dimension prior to and during installation. After installation, the spacer bar must be removed.

Remove the short, bolted shipping bar and attach the loose spacer bar to sizes 6" and larger. The spacer bar is to keep the Vee in its neutral end-to-end dimension prior to and during installation. After installation, the spacer bar must be removed.

3. Be sure all pipelines are supported so the Vee does not carry the pipe load.
4. If the Vee must be installed with an initial misalignment, compression, or extension, then the maximum allowable movements are reduced by the amount of the initial variation in that direction.
5. Check system pressures and temperatures to make sure that they do not exceed Vee ratings. Operation beyond design limits will result in premature failure.
6. To install a thread end Vee (VMN), use unions at each end. Install female union parts to piping and Vee first. Do not place wrenches on the braided portion or the collar of the Vee. Use care not to twist the Vee while tightening the union. Use two wrenches at each end; one to prevent the hose from twisting and the other to tighten the coupling.



7. When installing a Weld End Vee (VWN) or when welding near the Vee, cover the entire braided portion with weld blankets or wet wraps to protect against splatter. Direct welding rod away from the base of the fitting and braided section.

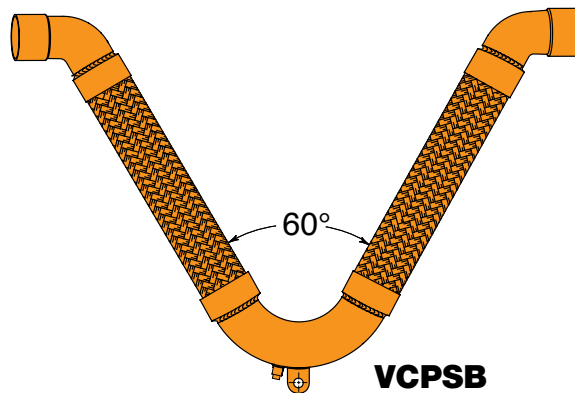


NOTE 1: When installed in any position other than with the Vee hanging down (vertical), the weight of the filled Vee must be supported at the suspension clip or bolt on the elbow. Use chain, cable, rod, or other suitable means. The elbow moves half the distance of the total motion. Suspension must allow 3" motion. Do not allow the chain, cable, or other support to come in contact with the braided hose sections of the Vee. Any repeated rubbing will cause abrasion and failure.

NOTE 2: In accordance with some application requirements, the elbow port may be piped for continual removal of condensate or gas. Follow all fluid draining or gas purging codes to avoid personal injury and property damage.

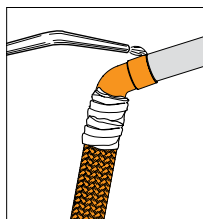
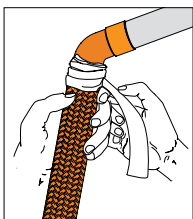
MAINTENANCE

1. After seismic activity, the Vee should be inspected for damage from movements greater than design. If there is any question, the Vee should be replaced rather than risk failure.
2. Inspect Vees periodically for signs of wear or damage such as frayed, dented, or broken braid wires, damage to the end fittings, minor leakage in the body, or at welds. Replace any suspect units rather than risk failure.



INSTALLATION PROCEDURES

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2. Be sure all pipelines are supported so the Vee does not carry the pipe load.
3. If the Vee must be installed with an initial misalignment, compression, or extension, then the maximum allowable movements are reduced by the amount of the initial variation in that direction.
4. Check system pressures and temperatures to make sure that they do not exceed Vee ratings. Operation beyond design limits will result in premature failure.
5. Thoroughly clean male and female ends using steel wool and steel brushes.
6. Apply flux if soldering or brazing. For medical gas, use nitrogen purge since flux is not permitted.
7. Wrap base of copper fitting on connector and 2" of the braid with a wet cloth to prevent overheating during soldering or brazing.
8. 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.



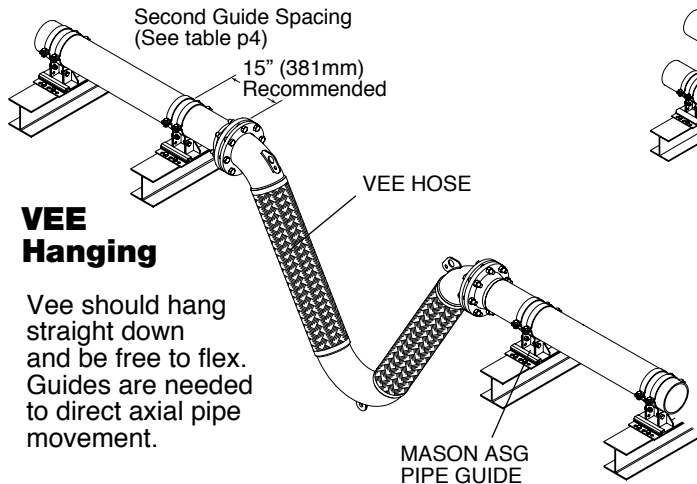
9. Be careful when using brazing rod or other higher temperature techniques. Overheating will cause leaks.
10. Remove wet rag and remove all flux (if applicable) immediately after installation. Flux chlorides will cause premature failure of joint.

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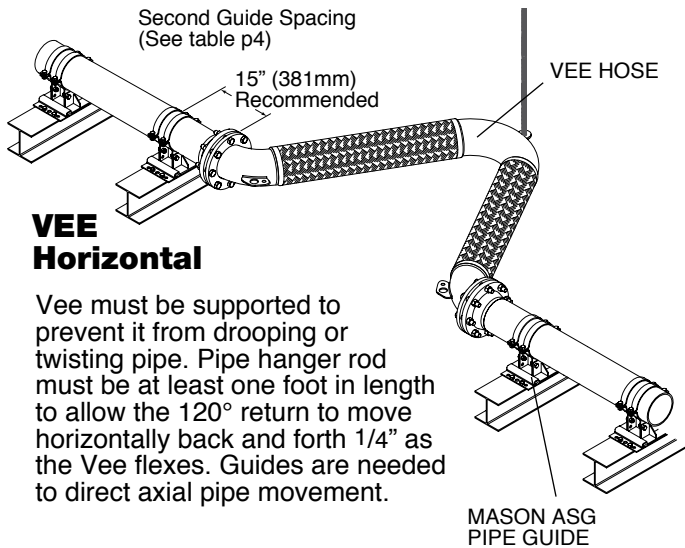
MAINTENANCE

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2. Inspect Vees periodically for signs of wear or damage such as frayed, dented, or broken braid wires, damage to the end fittings, minor leakage in the body, or at welds. Replace any suspect units rather than risk failure.



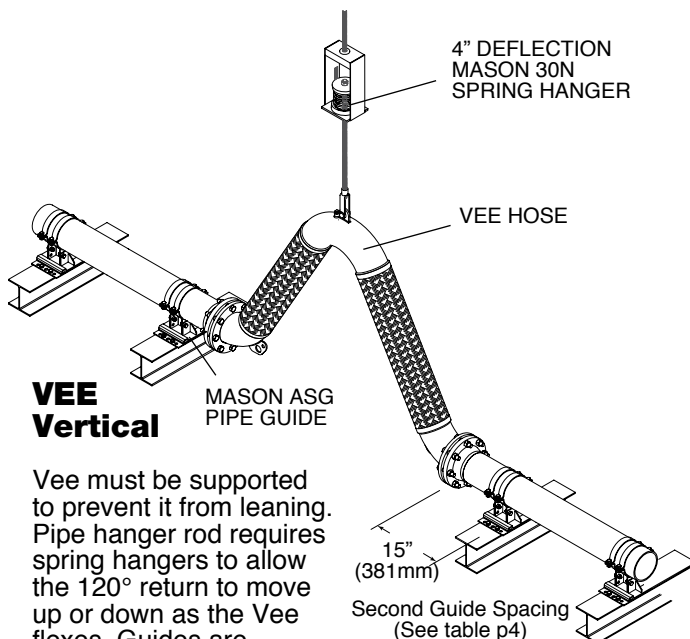
VEE Hanging

Vee should hang straight down and be free to flex. Guides are needed to direct axial pipe movement.



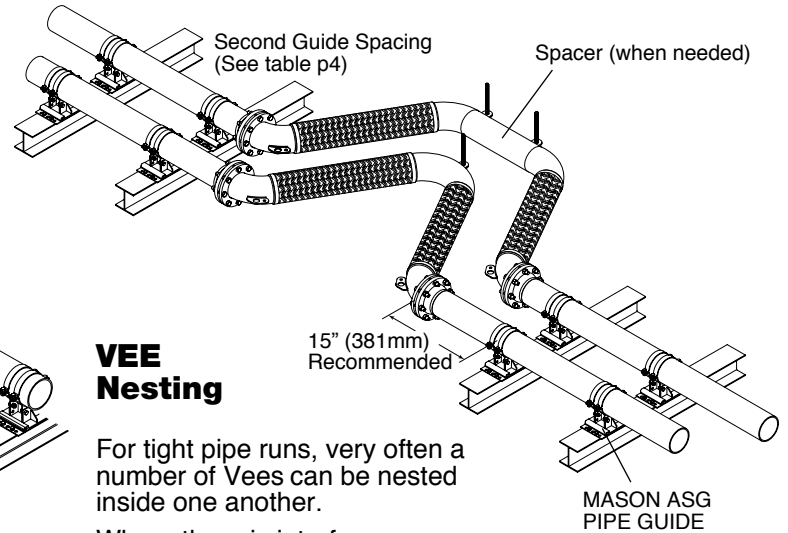
VEE Horizontal

Vee must be supported to prevent it from drooping or twisting pipe. Pipe hanger rod must be at least one foot in length to allow the 120° return to move horizontally back and forth 1/4" as the Vee flexes. Guides are needed to direct axial pipe movement.



VEE Vertical

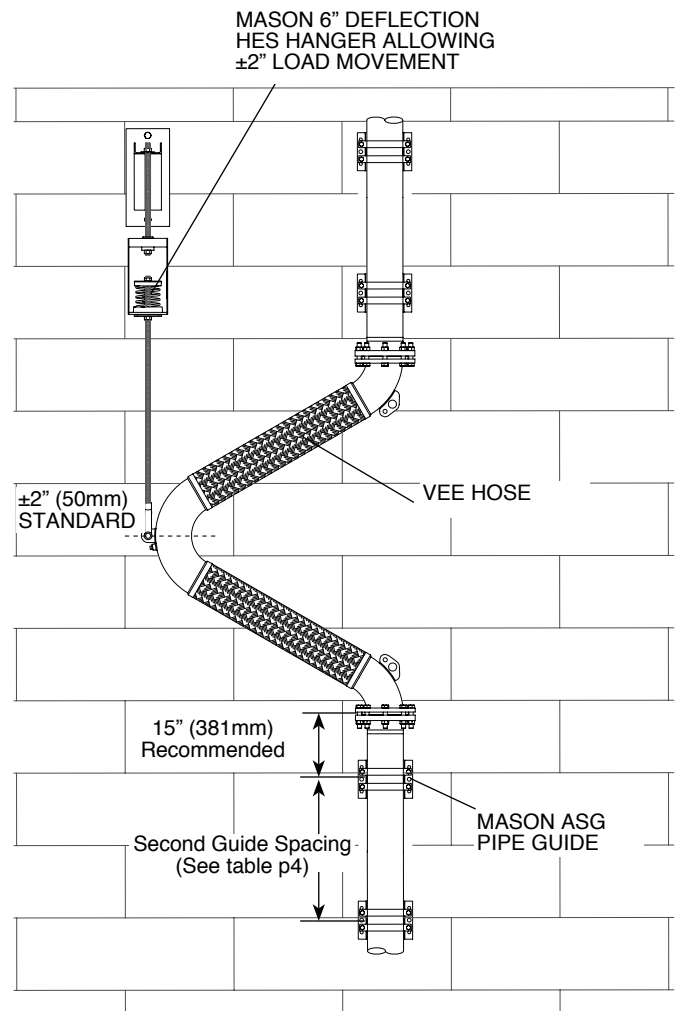
Vee must be supported to prevent it from leaning. Pipe hanger rod requires spring hangers to allow the 120° return to move up or down as the Vee flexes. Guides are needed to direct axial pipe movement.



VEE Nesting

For tight pipe runs, very often a number of Vees can be nested inside one another.

Where there is interference, the Vee may be widened with a spacer at the apex.

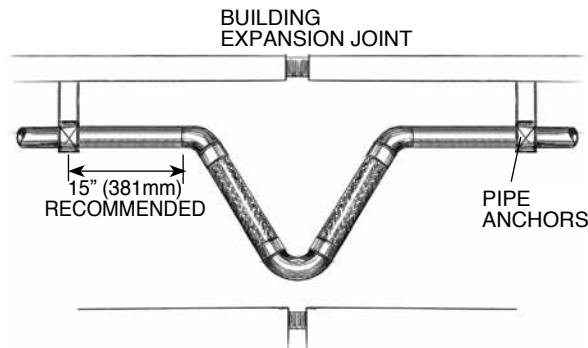


VEE Riser

Vee must be supported with a spring hanger to allow the 120° return to move horizontally back and forth as the Vee flexes. Guides are needed to direct axial pipe movement.

VEE ANCHORAGE DETAILS

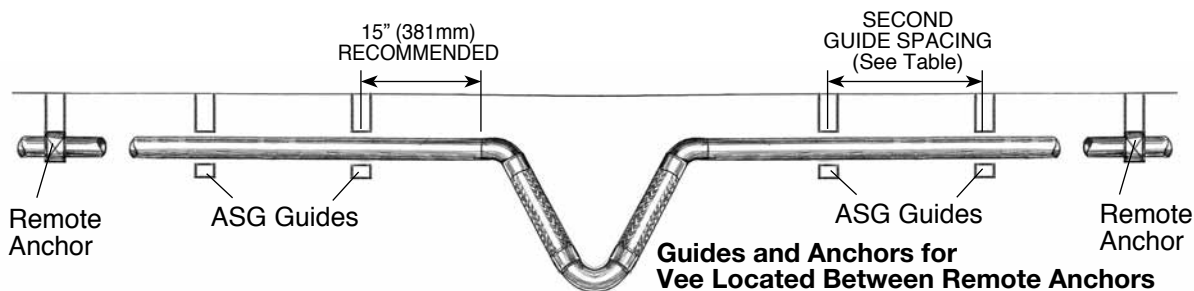
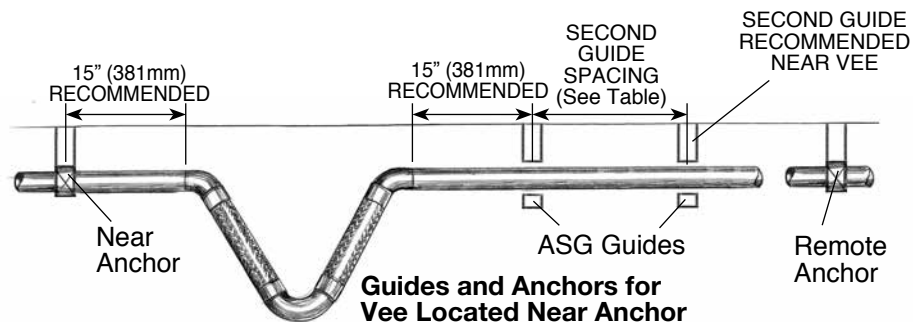
Anchoring Vees at a Building Expansion Joint



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

Anchoring and Guiding Vees for Thermal Applications

Dual purpose expansion movement and seismic motion



VEE POSITIONING DETAIL

SECOND GUIDE SPACING

Pipe Size in (mm)	Guide Spacing feet (meters)
1/2 15	5 1.5
3/4 20	5 1.5
1 25	5 1.5
1 1/4 30	5 1.5
1 1/2 35	5 1.5
2 50	6 1.8
2 1/2 65	6 1.8
3 75	6 1.8
4 100	6 1.8
5 125	8 2.4
6 150	8 2.4
8 200	8 2.4
10 250	8 2.4
12 300	10 3.0
14 350	12 3.6
16 400	14 4.2

