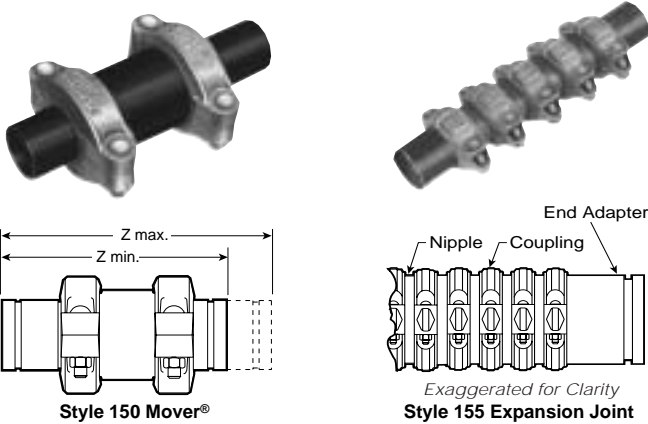


Expansion Joint Installation

KEY:

| | | |
|---|--------------------------|---------------------------------------------------------------------------------|
| | = Style 150 or Style 155 | <i>All illustrations in this publication have been exaggerated for clarity.</i> |
| X | = Anchor | |
| — | = Guide | |

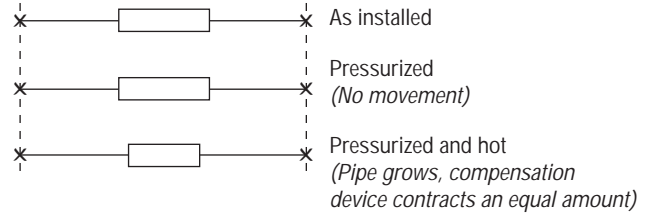
Victaulic® Style 150 Mover® and Style 155 Expansion Joints are designed to accommodate “in-line” pipe expansion and contraction generated by thermal changes in a limited amount of space. When installed in accordance with the guidelines of this sheet, they will provide for an excellent means of accommodating pipeline expansion or contraction.



Victaulic offers 2 distinct products for in-line compensation of thermal movement. Our Style 150 Mover, offered in sizes 2", 3", 4", and 6" (50, 80, 100 and 150 mm), is a slip-type expansion compensation device where a slide telescopes within a sleeve and compensates up to 3" (76 mm) of linear movement (see Victaulic publication 09.04 for additional information). Our Style 155 Expansion Joint, offered in sizes 3/4" through 24" (20 - 600 mm), consists of a series of Victaulic grooved flexible couplings and specially grooved pipe nipples (see Victaulic publication 09.05 for additional information). The linear movement available with standard Style 155 Expansion Joints is 1 7/8"/48 mm (pipe sizes 3/4" through 3 1/2"/20 - 90 mm) or 1 3/4" (pipe sizes 4" through 24"/100 - 600 mm). Custom Style 155 Expansion Joints can be ordered to accommodate specific movement requirements, (more or less movement than the standard unit). When the required movement compensation is more than 50% above the amount provided by a standard Style 155, then multiple, smaller units are recommended over one customized larger unit. The smaller units will ease handling and installation/supporting requirements and minimize overall piping movement.

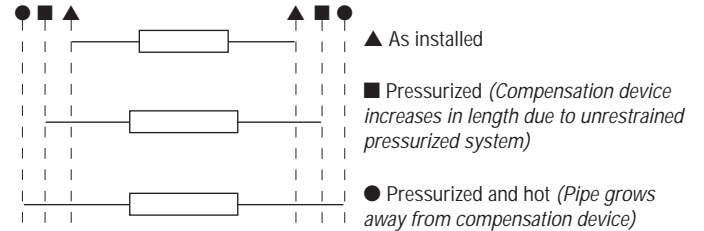
As with all in-line type expansion compensation devices, our Style 150 Movers and Style 155 Expansion Joints must be installed on straight pipe runs between opposing anchors. The anchors serve to direct the thermal movement towards the expansion joint. The anchors also prevent the expansion joints from opening up to their maximum expanded length due to system pressurization.

Anchored – Controlled Movement



In an uncontrolled (no anchors) installation, thermal movement will occur in the path of least resistance, which is unpredictable and may occur at the expansion joint or at the ends of the pipe runs. Both our Style 150 Movers and Style 155 Expansion Joints require an activation force roughly equivalent to the end load generated by 15 psi of internal pressure. Without anchors, pressure generated movement will expand the compensation device to its maximum length and any thermal changes will be directed in the path of least resistance.

No Anchors – Uncontrolled Movement

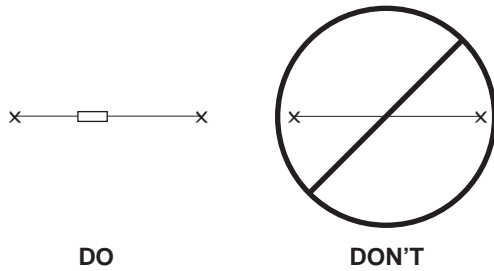


Some systems may require the installation of intermediate anchors. An intermediate anchor is an anchor that is installed between two anchors on a straight run of pipe. Intermediate anchors prevent thermal movement at its location but are not subject to the pressure thrust loads imparted on main anchors, (see Victaulic publication 26.01 for additional information). The purpose for intermediate anchors is to reduce (or eliminate) thermal movement at branch connections or to “break-up” long straight pipe runs into smaller sections, thereby reducing the thermal movement compensation required at each expansion joint.

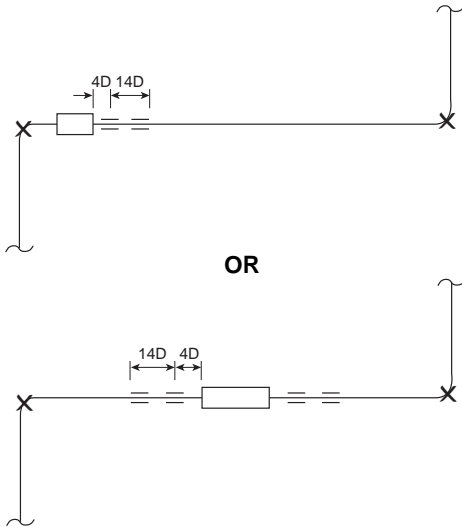


Style 150 Movers or Style 155 Expansion Joints must be installed between any anchors (main or intermediate) on straight pipe runs. **Good piping practice dictates that straight pipe between anchors must have sufficient flexibility to accommodate for thermal expansion or contraction.**

In addition to anchors, the pipe must be guided on both sides of Style 150 Movers and Style 155 Expansion Joints to ensure their satisfactory performance. Angular deflection at a Style 150 Mover will cause damage to the unit as the slide travels within the sleeve. Angular deflection at a Style 155 Expansion Joint will reduce the available axial movement. Therefore, pipe alignment guides should be placed at maximum distances of 4 and 14 pipe diameters from the units, on both sides of the units. When system conditions

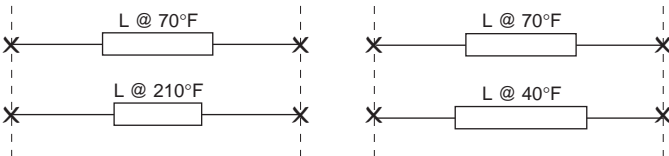


permit, the guides on one side of the expansion compensation device can be eliminated by locating the unit adjacent (within 4 pipe diameters) to an anchor.



At the system designers option, some long straight pipe runs may require additional guides to maintain pipe alignment and prevent "bowing" and pipe joint deflection on areas remote from the expansion compensation device. The use of Victaulic Style 07 Zero-Flex® rigid couplings with proper pipe support spacing (see Victaulic publication 26.01 for additional information) may eliminate the need for the additional guides.

In the installed system, the distance between the anchors remains constant over the full temperature gradient. Style 150 Movers and Style 155 Expansion Joints accommodate pipeline thermal movement by increasing or decreasing their length an amount equal and opposite to the pipeline expansion or contraction.



The installed length of the units is critical to proper operation. Several factors must be considered. To determine the appropriate installation length, the temperature extremes and the installation temperature (at the time the pipe is anchored) must be known. In systems where the installation temperature is also one of the temperature extremes, the following is true. Full extension of the units will allow them to reduce in length as temperature increases and the pipes grow. Similarly, full compression of the units will allow them to increase in length as the temperature decreases and the pipes shrink. For systems where the installation temperature is within the range of extremes, the units' installed length must fall within the maximum and minimum unit length, inversely proportional to where the installation temperature falls within the maximum and minimum system temperatures (see the installation example below.)

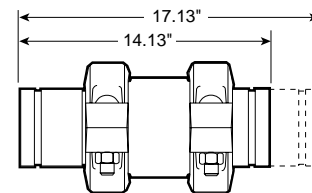
Style 150 Movers are field adjustable to obtain the correct installation length. Style 155 Expansion Joints installation length is factory set based upon customer supplied installation and extreme temperatures. Style 155 Expansion Joints are secured with tie rods which must be removed after the units and anchors have been installed in the system. Both style expansion compensation devices can be assembled in to the piping system using Victaulic grooved couplings (Style 07 Zero-Flex and HP-70 rigid couplings, Styles 75 or 77 flexible couplings), or Styles 90 or 99 plain end couplings depending upon the type of units ordered (grooved or plain end.)

INSTALLATION EXAMPLE

A system is designed to operate within the temperature range of 0°F through 100°F (-18°C through 38°C.) The thermal movement is calculated based on the temperature range and the piping material. An expansion compensation device is selected that will accommodate the calculated movement. If the following installation temperatures are present, then the settings of the expansion compensation device within the range of its minimum and maximum lengths are as follows:

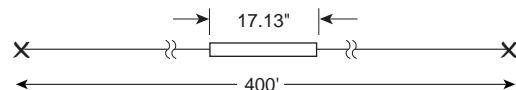
| Installation Temperature | Installation Length |
|--------------------------|------------------------------------------------------------|
| 0°F (-18°C) | Maximum (Fully expanded) |
| 25°F (-4°C) | 75% Extended |
| 50°F (10°C) | 50% (Half-way between fully expanded and fully compressed) |
| 75°F (24°C) | 25% Extended |
| 100°F (38°C) | Minimum (Fully compressed) |

Putting numbers to this example, lets assume that a 4" (100 mm) carbon steel pipeline travels in a straight line with a distance of 400' (122 m) between the anchors. This distance will remain constant as it is not affected by the pipeline temperature. Using the methodology discussed in section 1 of Victaulic publication 26.02, the calculated thermal movement in the 400' (122 m) length will be 3"/76 mm (over a 100°F/38°C temperature change). The 4" (100 mm) Victaulic Style 150 Mover will accommodate up to 3" (76 mm) of pipeline growth. A compressed unit has an end to end length of 14.13" (359 mm) and an extended length of 17.13" (435 mm). See Victaulic publication 09.04 for additional information on the Style 150 Mover.

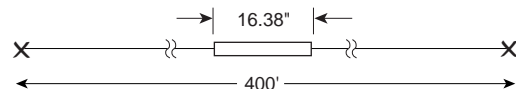


4" Style 150 Mover®

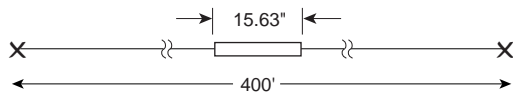
Following the above methodology, if the temperature of the pipeline at the time of installation or anchoring is 0°F (-18°C), then the Mover should be at its fully extended length of 17.13" (435 mm).



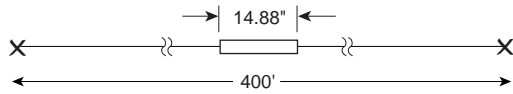
If the temperature of the pipeline at the time of installation or anchoring is 25°F (-4°C), then the length of the Mover should be 16.38"/416 mm, $\{([17.13" - 14.13"] \times 0.75) + 14.13"\}$.



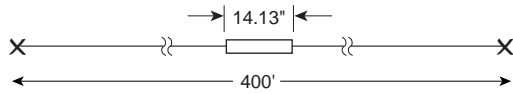
If the temperature of the pipeline at the time of installation or anchoring is 50°F (10°C), then the length of the Mover should be 15.63" (397 mm), $\{([17.13"-14.13"] \times 0.5) + 14.13"\}$.



If the temperature of the pipeline at the time of installation or anchoring is 75°F (24°C), then the length of the Mover should be 14.88" (378 mm), $\{([17.13"-14.13"] \times 0.25) + 14.13"\}$.

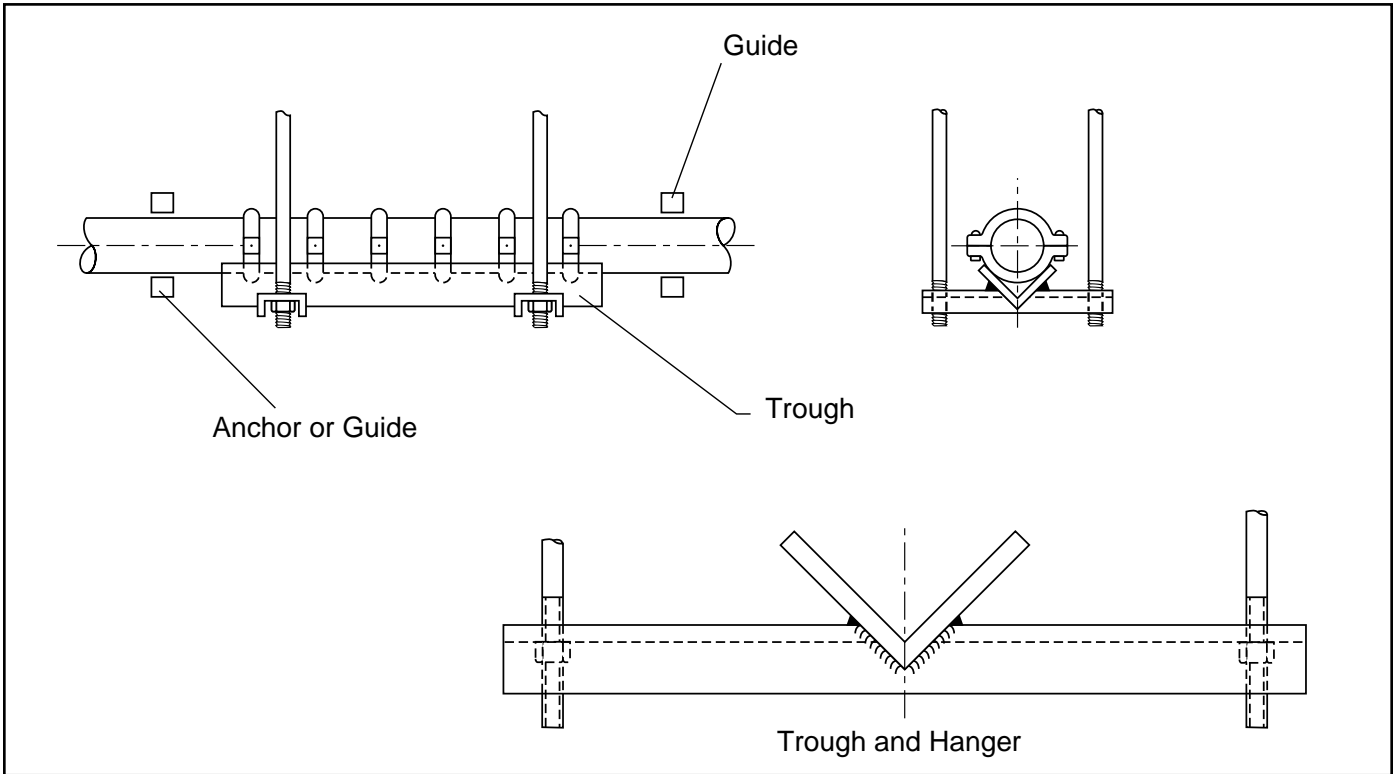


If the temperature of the pipeline at the time of installation or anchoring is 100°F (38°C), then the Mover should be at its fully compressed length of 14.13" (359 mm).

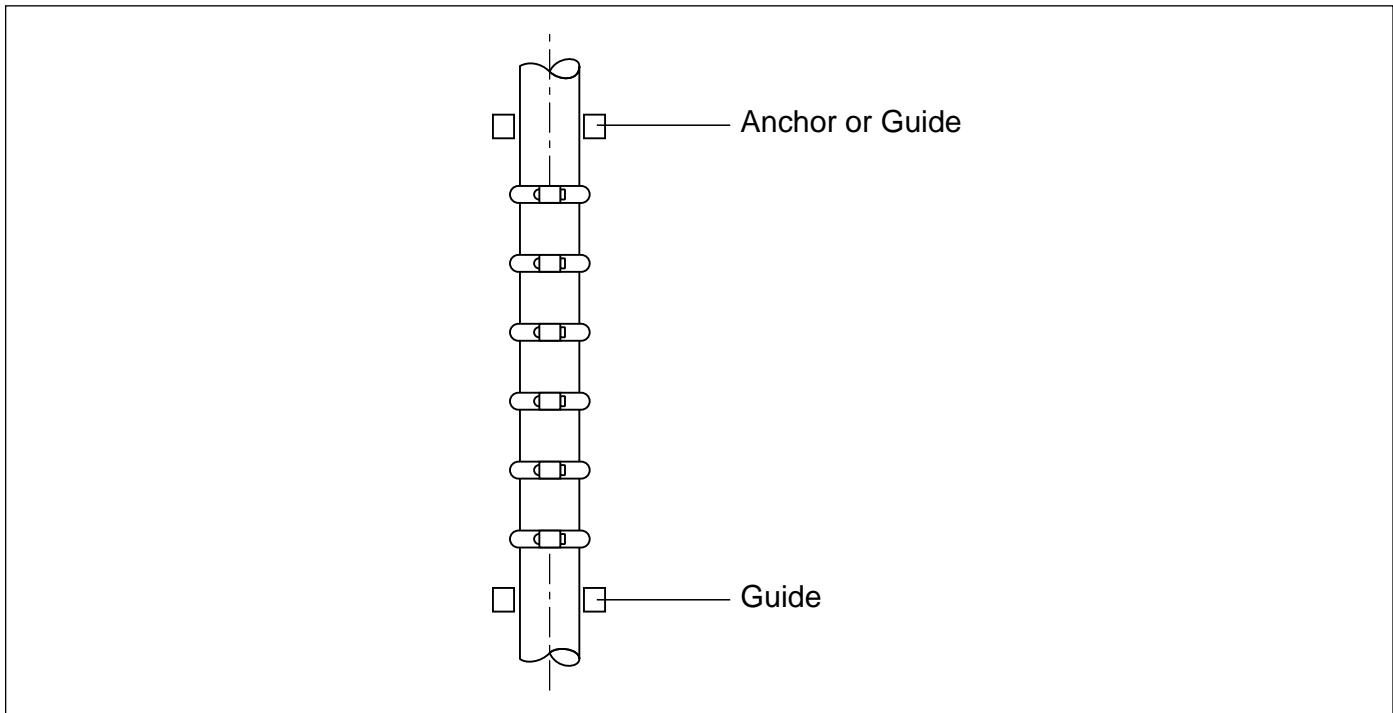


SUGGESTED SUPPORTS FOR VICTAULIC EXPANSION JOINTS

HORIZONTAL



VERTICAL



This product shall be manufactured by Victaulic Company. All products to be installed in accordance with current Victaulic installation/assembly instructions. Victaulic reserves the right to change product specifications, designs and standard equipment without notice and without incurring obligations.