

# Thrust Restraint in PVC Piping Systems

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## MUNICIPAL PIPING SYSTEMS

When using any gasketed pressure piping system, proper thrust restraint at valves and fittings is extremely important to the long term performance of the installation.

Thrust restraint can be accomplished by using properly sized thrust blocks<sup>1</sup> at valves and changes of direction, or by restraining the gasketed joints in the system using mechanical thrust restraints.

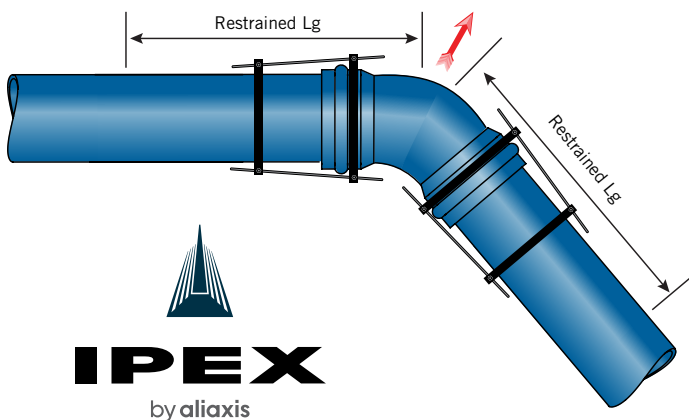
Only the joints falling within the "restrained length" adjacent to the fitting or valve must be restrained. Where possible, it is recommended to use full lengths of pipe adjacent to valves and fittings to avoid unnecessary expense. The tables below show examples of restrained lengths for various commonly used fittings. They have been calculated using the following parameters:

1. A safety factor of 1.5 and a test pressure of 1050 kPa.
2. A 2 metre depth of bury with a clay type soil of low to medium plasticity.
3. PVC watermain pipe with standard granular "A" embedment material in soils with bearing capacity greater than 100 kPa (Type 5 trench).

Reducers Smaller Diameter (fitting only)	Larger Diameter Side (to be restrained in m)				
	100 mm	150 mm	200 mm	250 mm	300 mm
100mm	n/a	5.2	9.4	12.8	16.5
150mm	n/a	n/a	5.5	9.8	13.7
200mm	n/a	n/a	n/a	5.5	10.1
250mm	n/a	n/a	n/a	n/a	5.5
300mm	n/a	n/a	n/a	n/a	n/a

Description	Pipe Diameter (mm)				
	100	150	200	250	300
<b>Dead Ends, Caps, Plugs, Valves (m)</b>					
Before Caps and Either side of Valves - L	7	10.1	13.1	15.8	18.9
<b>Vertical Bends (m)</b>					
Length High Side - LHS (2.0m cover)	4	5.5	7.3	8.8	10.7
Length Low Side - LLS (2.1m cover)	0.9	1.5	1.8	2.1	2.4
<b>Tees, Horizontal Bends</b>					
Size on Size Tees, 90° Bends	2.4	3.4	4.6	5.5	6.4
<b>Horizontal Bends</b>					
11.25° Bends	0.3	0.6	0.6	0.6	0.9
22.5° Bends	0.6	0.9	0.9	1.2	1.5
45° Bends	1.2	1.5	1.8	2.4	2.7

For more information on restraining joints, see our pressure pipe installation guide.



<sup>1</sup>Refer to the Uni-Bell PVC Pipe Association - Handbook of PVC Pipe – 5th Edition (2012) for information on proper thrust block design.