



Expansion Loop Length In Inches (60°F to 120°F) T = 60°△F															
Nominal Pipe Size	Avg. O.D.	Length Of Run In Feet													
		5	10	15	20	25	30	35	40	45	50	70	90	120	160
		Thermal Expansion △L (in.)													
3/4"	1.050	7	10	13	15	16	18	19	21	22	23	27	31	36	41
1"	1.315	8	12	14	16	18	20	22	23	25	26	31	35	40	46
1-1/4"	1.660	9	13	16	18	21	23	24	26	28	29	35	39	45	52
1-1/2"	1.900	10	14	17	20	22	24	26	28	30	31	37	42	48	56
2"	2.375	11	16	19	22	25	27	29	31	33	35	41	47	54	62
2-1/2"	2.875	12	17	21	24	27	30	32	34	36	38	45	51	59	69
3"	3.500	13	19	23	27	30	33	35	38	40	42	50	57	66	76

Note: Table is based on Stress (S) and Modulus of Elasticity (E) at 120°F

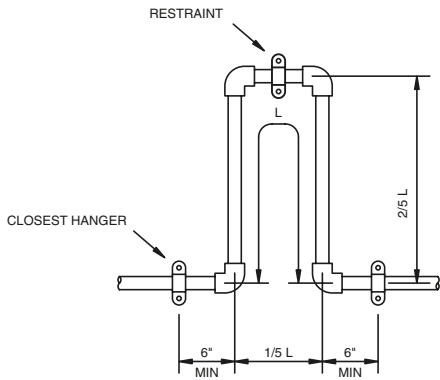
△T = 60°F
E = 3.55 x 10⁵
S = 1275

Thermal Expansion In Inches															
Temp Change △T °F	Length Of Run In Feet														
	5	10	15	20	25	30	35	40	45	50	70	90	120	160	
		Thermal Expansion △L (in.)													
20	.04	.08	.12	.16	.20	.24	.29	.33	.37	.41	.57	.73	.98	1.31	
30	.06	.12	.18	.24	.31	.37	.43	.49	.55	.61	.86	1.10	1.47	1.96	
40	.08	.16	.24	.33	.41	.49	.57	.65	.73	.82	1.14	1.47	1.96	2.61	
50	.10	.20	.31	.41	.51	.61	.71	.82	.92	1.02	1.43	1.84	2.45	3.26	
60	.12	.24	.37	.49	.61	.73	.86	.98	1.10	1.22	1.71	2.20	2.94	3.92	
70	.14	.29	.43	.57	.71	.86	1.00	1.14	1.29	1.43	2.00	2.57	3.43	4.57	
80	.16	.33	.49	.65	.82	.98	1.14	1.31	1.47	1.63	2.28	2.94	3.92	5.22	
90	.18	.37	.55	.73	.92	1.10	1.29	1.47	1.65	1.84	2.57	3.30	4.41	5.88	
100	.20	.41	.61	.82	1.02	1.22	1.43	1.63	1.84	2.04	2.86	3.67	4.90	6.53	

△L = 12eL (T) △
e = 3.4 x 10 in./in.⁵ °F (coefficient of linear expansion)
L = Length of run in feet

△T = Temperature change in °F

EXPANSION LOOP



HANGERS SHOULD ONLY BE PLACED IN THE LOOP AS INDICATED ABOVE. PIPING SUPPORTS SHOULD RESTRICT LATERAL MOVEMENT AND SHOULD DIRECT AXIAL MOVEMENT INTO THE EXPANSION LOOP.

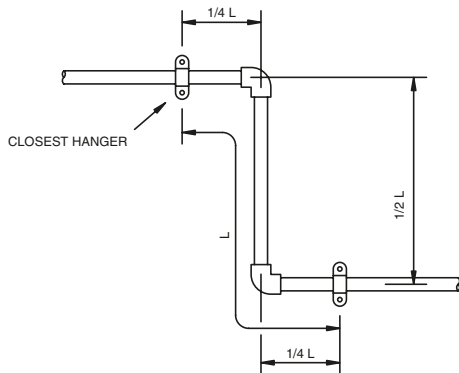
EXPANSION LOOP FORMULA

$$L = \sqrt{\frac{3 E D (\Delta L)}{2 S}}$$

Where:

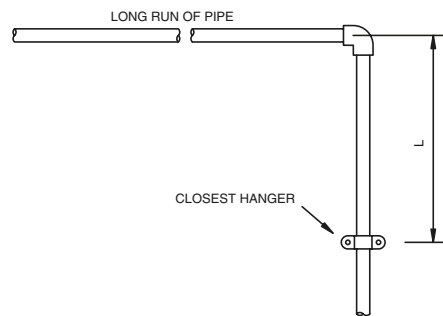
- L = Loop length (in.)
- E = Modulus of elasticity at maximum temperature (psi)
- S = Working stress at maximum temperature (psi)
- D = Outside diameter of the pipe (in.)
- ΔL = Change in length due to change in temperature (in.)

PIPE OFFSET

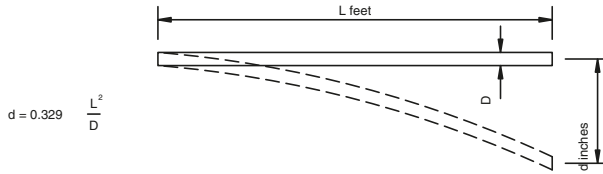


HANGERS SHOULD ONLY BE PLACED IN THE OFFSET AS INDICATED ABOVE. PIPING SUPPORTS SHOULD RESTRICT LATERAL MOVEMENT AND SHOULD DIRECT AXIAL MOVEMENT INTO THE EXPANSION LOOP.

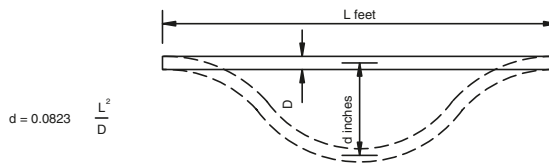
CHANGE IN DIRECTION



HANGERS SHOULD ONLY BE PLACED IN THE CHANGE OF DIRECTION AS INDICATED ABOVE. PIPING SUPPORTS SHOULD RESTRICT LATERAL MOVEMENT AND SHOULD DIRECT AXIAL MOVEMENT INTO THE EXPANSION LOOP.



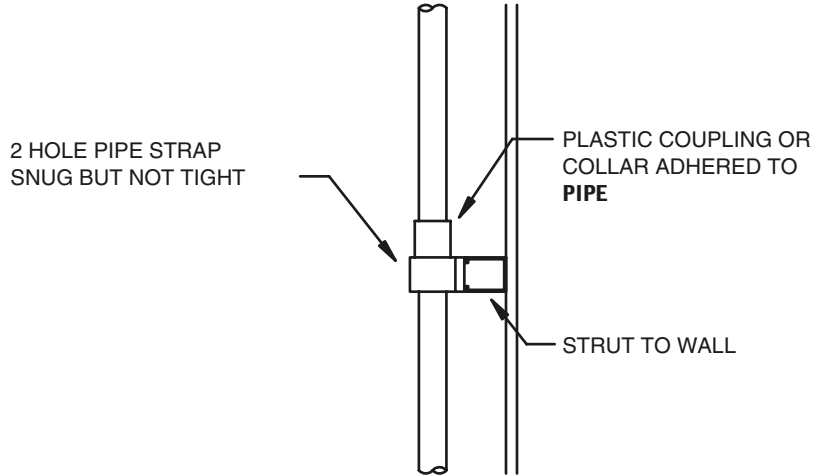
Permissible Bending Deflections SDR 13.5 (73°F) (One End Restrained)														
Pipe Size inches	Length Of Run In Feet													
	2'	5'	7'	10'	12'	15'	17'	20'	25'	30'	35'	40'	45'	50'
3/4"	1.3"	7.8"	15.4"	31.3"	45.1"	70.5"	90.6"	125.4"	195.9"	282.1"	383.9"	-	-	-
1"	1.0"	6.3"	12.3"	25.0"	36.0"	56.3"	72.3"	100.1"	156.4"	225.2"	306.6"	400.4"	-	-
1-1/4"	0.8"	5.0"	9.7"	19.8"	28.5"	44.6"	57.3"	79.3"	123.9"	178.4"	242.8"	317.2"	401.4"	-
1-1/2"	0.7"	4.3"	8.5"	17.3"	24.9"	39.0"	50.1"	69.3"	108.2"	155.9"	212.2"	277.1"	350.7"	433.0"
2"	0.6"	3.5"	6.8"	13.9"	20.0"	31.2"	40.0"	55.4"	86.6"	124.7"	169.7"	221.7"	280.6"	346.4"
2-1/2"	0.5"	2.9"	5.6"	11.4"	16.5"	25.8"	33.1"	45.8"	71.5"	103.0"	140.2"	183.1"	231.8"	286.2"
3"	0.4"	2.4"	4.6"	9.4"	13.5"	21.2"	27.2"	37.6"	58.8"	84.6"	115.2"	150.4"	190.4"	235.1"



Permissible Bending Deflections SDR 13.5 (73°F) (Both Ends Restrained)														
Pipe Size inches	Length Of Run In Feet													
	2'	5'	7'	10'	12'	15'	17'	20'	25'	30'	35'	40'	45'	50'
3/4"	0.3"	2.0"	3.8"	7.8"	11.3"	17.6"	22.6"	31.3"	49.0"	70.5"	96.0"	125.4"	158.7"	195.9"
1"	0.3"	1.6"	3.1"	6.3"	9.0"	14.1"	18.1"	25.0"	39.1"	56.3"	76.6"	100.1"	126.7"	156.4"
1-1/4"	0.2"	1.2"	2.4"	5.0"	7.1"	11.2"	14.3"	19.8"	31.0"	44.6"	60.7"	79.3"	100.4"	123.9"
1-1/2"	0.2"	1.1"	2.1"	4.3"	6.2"	9.7"	12.5"	17.3"	27.1"	39.0"	53.0"	69.3"	87.7"	108.2"
2"	0.1"	0.9"	1.7"	3.5"	5.0"	7.8"	10.0"	13.9"	21.6"	31.2"	42.4"	55.4"	70.1"	86.6"
2-1/2"	0.1"	0.7"	1.4"	2.9"	4.1"	6.4"	8.3"	11.4"	17.9"	25.8"	35.1"	45.8"	57.9"	71.5"
3"	0.1"	0.6"	1.2"	2.4"	3.4"	5.3"	6.8"	9.4"	14.7"	21.2"	28.8"	37.6"	47.6"	58.8"

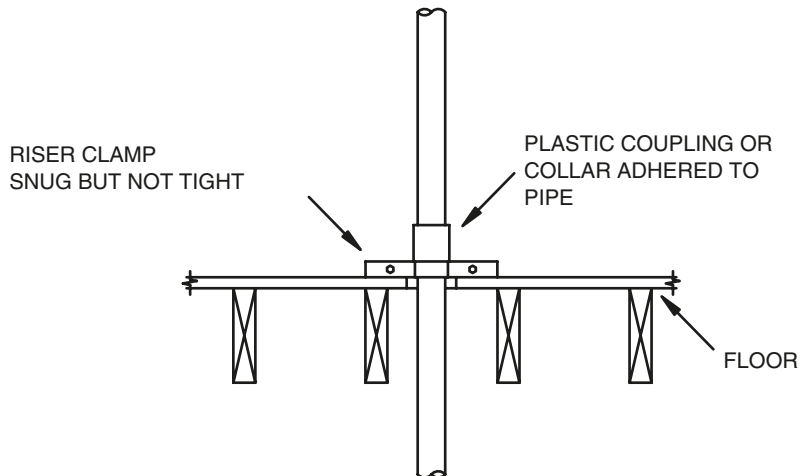
Modulus Of Elasticity & Stress vs. Temperature for BlazeMaster Piping Systems								
	Temperature °F							
	73°	80°	90°	100°	110°	120°	140°	150°
Modulus of Elasticity "E" X 10 psi ⁵	4.23	4.14	3.99	3.85	3.70	3.55	3.23	3.08
Working Stress "S" psi	2,000	1,875	1,715	1,560	1,415	1,275	1,000	875

VERTICAL SUPPORT OF BLAZEMASTER PIPE
AT MID FLOOR LOCATION



VERTICAL PIPING SHALL BE SUPPORTED AT EACH FLOOR LEVEL
OR AT 10 FOOT INTERVALS, WHICHEVER IS LESS.

VERTICAL SUPPORT OF BLAZEMASTER PIPE
AT FLOOR PENETRATION



VERTICAL PIPING SHALL BE SUPPORTED AT EACH FLOOR LEVEL
OR AT 10 FOOT INTERVALS, WHICHEVER IS LESS.