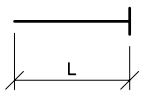
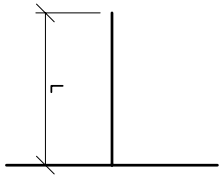
ROD DIAMETER, GRADE & LENGTH OF RESTRAINED PIPE

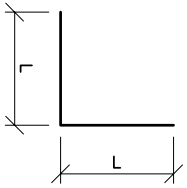
PIPE SIZE	4"			6"			8"			12"			16"			20"			24"		
FITTING	D	L	G	D	L	G	D	L	G	D	L	G	D	L	G	D	L	G	D	L	G
90° BEND, TEE, PLUG	$\frac{3}{4}$"	30'	M.S.	$\frac{3}{4}$"	45'	M.S.	$\frac{3}{4}$"	60'	M.S.	$\frac{3}{4}$"	86'	M.S.	1"	108'	H.S.	$1\frac{1}{4}$"	132'	H.S.	–	155'	–
VALVE	–	–	–	–	–	–	–	–	–	–	–	–	1"	108'	H.S.	$1\frac{1}{4}$"	132'	H.S.	–	155'	–
45° BEND	$\frac{3}{4}$"	9'	M.S.	$\frac{3}{4}$"	13'	M.S.	$\frac{3}{4}$"	18'	M.S.	$\frac{3}{4}$"	25'	M.S.	1"	32'	M.S.	$\frac{3}{4}$"	39'	H.S.	–	45'	–
$22\frac{1}{2}$° BEND	$\frac{3}{4}$"	1'	M.S.	$\frac{3}{4}$"	4'	M.S.	$\frac{3}{4}$"	5'	M.S.	$\frac{3}{4}$"	7'	M.S.	$\frac{3}{4}$"	8'	M.S.	$\frac{3}{4}$"	10'	M.S.	–	12'	–
$11\frac{1}{4}$° BEND	–	–	–	–	–	–	$\frac{3}{4}$"	1'	M.S.	$\frac{3}{4}$"	2'	M.S.	$\frac{3}{4}$"	2'	M.S.	$\frac{3}{4}$"	3'	M.S.	–	3'	–



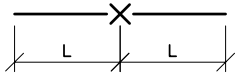
PLUG



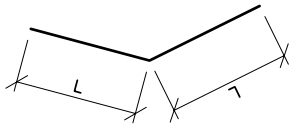
TEE



90° BEND



VALVE



BENDS

NOTES:

1. LENGTH OF RESTRAINED PIPE MEASURED EACH WAY FROM VALVES AND BENDS.
2. CLAMPS, RODS & MEGALUGS NOT ALLOWED FOR 24" & LARGER PIPES.
3. D=DIAMETER, L=LENGTH, G=GRADE, M.S.=MILD STEEL, H.S.=HIGH STRENGTH.
4. MINIMUM 4.5' GROUND COVER REQUIRED.
5. BASED ON 150 PSI INTERNAL PRESSURE, FOR L AND PRESSURES LISTED ON SHEET 21 OF 79 FOR D AND G.
6. M.S. = MILD STEEL ROD ASTM A36.
7. H.S. = HIGH STRENGTH ROD ASTM A193 GRADE B7.
8. NUTS SHALL BE ASTM A307 GRADE A OR B HEXAGON HEAVY SERIES. HIGH STRENGTH NUTS SHALL CONFORM TO MS–22.
9. SEE TIE ROD DETAIL DRAWING. ALSO, TIE ROD COUPLING DETAILS, CLAMP DETAILS AND SET CLAMP DETAILS.
10. LENGTH REFERS TO THE AMOUNT OF PIPE WHICH MUST BE RESTRAINED TOGETHER AND IS NOT NECESSARILY THE LENGTH OF THE RODS.
11. LENGTH OF RESTRAINED PIPE CHART IS ALSO FOR THE LENGTH OF JOINT RESTRAINT FOR MEGALUGS.
12. CROSSES MUST BE RESTRAINED IN ALL APPLICABLE DIRECTIONS.
13. 12" AND SMALLER IN LINE VALVES AND TEES SHALL HAVE A MECHANICAL JOINT RESTRAINT DEVICE ON EACH SIDE OF THE FITTING OR VALVE. MECHANICAL JOINT RESTRAINT DEVICE SHALL BE PER MS–2 OF THE ENGINEERING STANDARDS.
14. A SECOND VALVE WILL BE REQUIRED TO BE CLOSED WHEN EXCAVATING NEXT TO A EXISTING VALVE.

DENVER WATER
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Phone(303)628–6000 • Telecopier No.(303)628–6851

LENGTH OF RESTRAINED PIPE

Scale: NONE | Date: MARCH 1997
Drawn: C.B.B. | Tr: | Ck:
Approved: | Dr. 127 | No. 35

REVISED 5–2002