

**MIN. LENGTH (IN FEET) OF PIPE TO BE RESTRAINED**

(SOURCES: EBAA IRON RESTRAINT LENGTH CALCULATION PROGRAM FOR PVC PIPE, RELEASE 3.1,  
AND DIPRA THRUST RESTRAINT FOR DUCTILE IRON PIPE, RELEASE 3.2)

FITTING TYPE		PIPE SIZE							
		4"	6"	8"	10"	12"	16"	20"	24"
90° HORIZ. BEND		14	20	25	30	35	45	54	62
45° HORIZ. BEND		6	8	11	13	15	19	22	26
22.5° HORIZ. BEND		3	4	5	6	7	9	11	12
11.25° HORIZ. BEND		1	2	3	3	4	4	5	6
90° VERT. OFFSET	UPPER BEND	29	41	53	64	74	95	115	134
	LOWER BEND	7	10	13	16	19	25	30	35
45° VERT. OFFSET	UPPER BEND	12	19	24	29	34	39	48	56
	LOWER BEND	3	4	6	7	8	10	12	15
22.5° VERT. OFFSET	UPPER BEND	6	9	12	14	17	19	23	27
	LOWER BEND	1	2	4	4	4	5	6	7
11.25° VERT. OFFSET	UPPER BEND	3	4	6	7	8	9	11	13
	LOWER BEND	1	1	1	2	2	2	3	3
PLUG (DEAD END)		32	45	59	70	83	107	129	151
IN-LINE VALVE		32	45	45	45	45	55	65	80
TEE (BRANCH RESTRAINT)	4"X Ø	23	-	-	-	-	-	-	-
	6"X Ø	21	35	-	-	-	-	-	-
	8"X Ø	18	34	47	-	-	-	-	-
	10"X Ø	16	32	46	58	-	-	-	-
	12"X Ø	13	30	44	57	69	-	-	-
	16"X Ø	7	26	41	55	67	90	-	-
	20"X Ø	1	21	38	52	65	88	109	-
	24"X Ø	1	16	34	49	62	86	108	129
	30"X Ø	1	8	28	44	58	83	106	127
	36"X Ø	1	1	22	39	54	80	103	124
	42"X Ø	1	1	15	33	49	77	100	122
	48"X Ø	1	1	7	27	44	73	97	120
REDUCER (LARGER PIPE RESTRAINT)	6"X Ø	23	-	-	-	-	-	-	-
	8"X Ø	38	25	-	-	-	-	-	-
	10"X Ø	57	43	24	-	-	-	-	-
	12"X Ø	72	60	44	41	-	-	-	-
	16"X Ø	99	90	78	75	45	-	-	-
	20"X Ø	123	116	107	105	81	45	-	-
24"X Ø	146	140	132	131	111	82	45	-	

**NOTES:**

- THE DATA IN THE ABOVE TABLE ARE BASED UPON THE FOLLOWING INSTALLATION CONDITIONS:  
 SOIL TYPE-SAND                      TEST PRESSURE-150 PSI                      DEPTH OF BURY-3'  
 TRENCH TYPE-3                      SAFETY FACTOR- 1.5                      VERTICAL OFFSET-3'  
 MINIMUM PIPE LENGTH ALONG TEE RUN-5'
- THE RESTRAINED PIPE LENGTHS APPLY TO DUCTILE IRON AND PVC PIPE.
- ALL JOINTS BETWEEN UPPER AND LOWER BENDS SHALL BE RESTRAINED.
- RESTRAINED PIPE LENGTHS APPLY TO PIPE ON BOTH SIDES OF VALVES AND FITTINGS.



**STANDARD UTILITY DETAILS**  
 City of Stuart Public Works Department  
 121 S.W. Flagler Avenue, Stuart, Florida 34994  
 (772) 288-5300

**MECHANICAL JOINT  
 REQUIREMENTS NOTES**

DATE: OCTOBER 2016  
 FILE NAME: 2016 COS Std Details.dwg

SHEET NUMBER  
**12**