

## DEFORMATION AND SAFETY INDEXES OF THE 48" PVC TESTED MANHOLE COMPARED TO THE 60" PVC PROPOSED MANHOLE

Since the 60" manhole has a thicker wall the results will obviously be more favorable in many loading reaction calculations, but this is what makes the 60" PVC equivalent or better to the 48" PVC manhole .

*Table 4 Material properties comparison 48" and 60" PVC Manholes*

<b>PVC Material Informati</b>	<b>Units</b>	<b>48" PVC</b>	<b>60" PVC</b>	<b>Difference</b>
PVC Pipe ID	inch	48	60	12
Wall Thickness	inch	1	1.208	0.208
I of Wall	inch <sup>4</sup> /in	0.0833333333	0.146899243	0.063565909
Material Modulus	psi	400000	400000	0
Poisson Ratio		0.38	0.38	0
Tensile Strength	psi	1000	1000	0
Comp. strength	psi	4000	4000	0
axial strain limit		0.035	0.035	0
ring strain limit		0.05	0.05	0

Starting with the material properties shown in Table 4 where not only the wall thickness is improved but this improves the moment of inertia (I) which when applied to equations such as the one shown in Figure 1 in the denominator portion will reduce the calculated strain in obvious improvements. This is also exposed in Table 5 where the axial strain is reduced by up to 33 percent on the upper part of the manhole wall down to 20 percent reduction at the bottom.

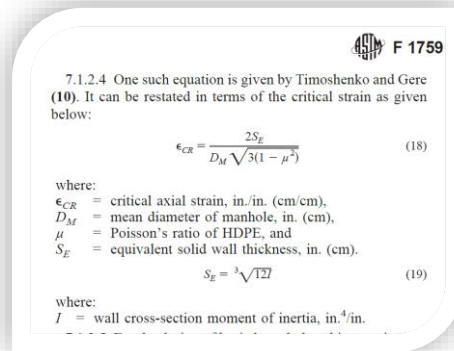


Figure 1 Clip of ASTM F 1759-97 (2004)

Table 5 Comparison of results

Manhole Depth ft	48"	60"	48"	60"	%	48"	60"	
	D.D. Force lbs	D.D. Force lbs	Strain of Axial %	Strain of Axial %		Ring Stress 23	Ring Stress 22	
4	356.37	444.87	0.00027	0.00018	-33%	17	16	-5%
5	997.85	1,245.63	0.00028	0.00019	-33%	14	13	-5%
6	1,924.42	2,402.29	0.00029	0.00020	-32%	11	11	-5%
7	3,136.09	3,914.85	0.00031	0.00021	-31%	10	9	-5%
8	4,632.87	5,783.30	0.00034	0.00023	-30%	9	8	-5%
9	6,414.74	8,007.65	0.00036	0.00026	-29%	8	8	-5%
10	8,481.71	10,587.89	0.00040	0.00029	-28%	7	7	-5%
11	10,833.78	13,524.03	0.00044	0.00032	-27%	7	6	-5%
12	13,470.95	16,816.06	0.00048	0.00035	-26%	6	6	-5%
13	16,393.22	20,463.99	0.00053	0.00039	-25%	6	6	-5%
14	19,600.59	24,467.81	0.00058	0.00044	-25%	6	5	-5%
15	23,093.06	28,827.53	0.00063	0.00048	-24%	5	5	-5%
16	26,870.63	33,543.15	0.00070	0.00053	-23%	5	5	-5%
17	30,933.30	38,614.66	0.00076	0.00059	-23%	5	5	-5%
18	35,281.07	44,042.06	0.00083	0.00065	-22%	5	4	-5%
19	39,913.93	49,825.36	0.00091	0.00071	-22%	4	4	-5%
20	44,831.90	55,964.56	0.00099	0.00077	-22%	4	4	-5%
21	50,034.97	62,459.65	0.00107	0.00084	-21%	4	4	-5%
22	55,523.13	69,310.64	0.00116	0.00092	-21%	4	4	-5%
23	61,296.40	76,517.52	0.00126	0.00100	-21%	4	4	-5%
24	67,354.76	84,080.30	0.00135	0.00108	-20%	4	4	-5%
25	73,698.23	91,998.97	0.00146	0.00116	-20%	0	0	0%

D.D. = Down Drag Force

ASTM F 1759-97 (2004) calculation comparison of Table 5 also demonstrate a constant 5% reduction on the ring stress.



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