Published Post Strengths FenceDesign.com

The strengths published by manufacturers for the different pipes used for fence posts appears to be based on 1990's building codes when a different method of calculation was used. Modern codes use a different safety factor and different section properties to determine the post strengths. This results in post strengths that are 12% - 17% stronger than the currently published values.

Published strengths per AISC 360-89 Eq. F3-1 $M_{allow} = 0.66\ F_y\ S_x$ This was used up to IBC 2003

IBC 2006 and later codes

Schedule 40, 80 & 120 posts $M_{allow} = F_y\ Z_x / 1.67$

Sheet metal tubes & channels $M_{allow} = F_n\ S_x / 1.67$

Schedule 40 and 80 posts are governed by AISC 360 which is referenced by the IBC

Modern calculations per AISC 360-5, -10, -16 & -22 §F8 $\Omega = 1.67$ Eq. F8-1 $M_{allow} = F_y\ Z_x / \Omega$

30 ksi Schedule 40

							M_{allow} (kip-ft)		
Trade Size	O.D.	t_{nom}	S_x (in^3)	Z_x (in^3)	F_y (ksi)	E (msi)	IBC 2003	Modern IBC	% increase
1-7/8"	1.900	0.145	0.33	0.42	30	29.0	0.54	0.63	16%
2-3/8"	2.375	0.154	0.56	0.71	30	29.0	0.92	1.07	16%
2-7/8"	2.875	0.203	1.06	1.37	30	29.0	1.75	2.05	17%
3-1/2"	3.500	0.216	1.72	2.19	30	29.0	2.84	3.28	16%
4"	4.000	0.226	2.39	3.03	30	29.0	3.94	4.54	15%
6-5/8"	6.625	0.280	8.50	10.60	30	29.0	14.03	15.87	13%
8-5/8"	8.625	0.322	16.81	20.80	30	29.0	27.74	31.14	12%

Group IC, II & IV posts are governed by AISI S100 which is referenced by the IBC

Modern calcs per AISI S100-16 §F2.3 $\Omega = 1.67$ Eq. F2.3-2 $F_n = 1.25\ F_y$ Eq. F2.3-1 $M_{allow} = S_x\ F_n / \Omega$

Group IC

							M_{allow} (kip-ft)		
Trade Size	O.D.	t_{nom}	S_x (in^3)	F_y (ksi)	F_n (ksi)	E (msi)	IBC 2003	Modern IBC	% increase
1-5/8"	1.900	0.111	0.20	50	62.5	29.5	0.55	0.62	13%
1-7/8"	2.375	0.120	0.28	50	62.5	29.5	0.77	0.87	13%
2-3/8"	2.875	0.130	0.49	50	62.5	29.5	1.35	1.53	13%
2-7/8"	3.500	0.160	0.88	50	62.5	29.5	2.42	2.74	13%
3-1/2"	4.000	0.160	1.34	50	62.5	29.5	3.69	4.18	13%
4"	6.625	0.160	1.78	50	62.5	29.5	4.90	5.55	13%