

10-78 TRANSPORT AND STORAGE OF FLUIDS

TABLE 10-22 Properties of Steel Pipe

Nominal pipe size, in	Outside diameter, in	Schedule no.	Wall thickness, in	Inside diameter, in	Cross-sectional area		Circumference, ft, or surface, ft ² /ft of length		Capacity at 1-ft/s velocity		Weight of plain-end pipe, lb/ft
					Metal, in ²	Flow, ft ²	Outside	Inside	U.S. gal/min	lb/h water	
1/8	0.405	10S	0.049	0.307	0.055	0.00051	0.106	0.0804	0.231	115.5	0.19
		40ST, 40S	.068	.269	.072	.00040	.106	.0705	.179	89.5	.24
		80XS, 80S	.095	.215	.093	.00025	.106	.0563	.113	56.5	.31
1/4	0.540	10S	.065	.410	.097	.00092	.141	.107	.412	206.5	.33
		40ST, 40S	.088	.364	.125	.00072	.141	.095	.323	161.5	.42
		80XS, 80S	.119	.302	.157	.00050	.141	.079	.224	112.0	.54
3/8	0.675	10S	.065	.545	.125	.00162	.177	.143	.727	363.5	.42
		40ST, 40S	.091	.493	.167	.00133	.177	.129	.596	298.0	.57
		80XS, 80S	.126	.423	.217	.00098	.177	.111	.440	220.0	.74
1/2	0.840	5S	.065	.710	.158	.00275	.220	.186	1.234	617.0	.54
		10S	.083	.674	.197	.00248	.220	.176	1.112	556.0	.67
		40ST, 40S	.109	.622	.250	.00211	.220	.163	0.945	472.0	.85
		80XS, 80S	.147	.546	.320	.00163	.220	.143	0.730	365.0	1.09
		160	.188	.464	.385	.00117	.220	.122	0.527	263.5	1.31
		XX	.294	.252	.504	.00035	.220	.066	0.155	77.5	1.71
3/4	1.050	5S	.065	.920	.201	.00461	.275	.241	2.072	1036.0	0.69
		10S	.083	.884	.252	.00426	.275	.231	1.903	951.5	0.86
		40ST, 40S	.113	.824	.333	.00371	.275	.216	1.665	832.5	1.13
		80XS, 80S	.154	.742	.433	.00300	.275	.194	1.345	672.5	1.47
		160	.219	.612	.572	.00204	.275	.160	0.917	458.5	1.94
		XX	.308	.434	.718	.00103	.275	.114	0.461	230.5	2.44
1	1.315	5S	.065	1.185	.255	.00768	.344	.310	3.449	1725	0.87
		10S	.109	1.097	.413	.00656	.344	.287	2.946	1473	1.40
		40ST, 40S	.133	1.049	.494	.00600	.344	.275	2.690	1345	1.68
		80XS, 80S	.179	0.957	.639	.00499	.344	.250	2.240	1120	2.17
		160	.250	0.815	.836	.00362	.344	.213	1.625	812.5	2.84
		XX	.358	0.599	1.076	.00196	.344	.157	0.878	439.0	3.66
1 1/4	1.660	5S	.065	1.530	0.326	.01277	.435	.401	5.73	2865	1.11
		10S	.109	1.442	0.531	.01134	.435	.378	5.09	2545	1.81
		40ST, 40S	.140	1.380	0.668	.01040	.435	.361	4.57	2285	2.27
		80XS, 80S	.191	1.278	0.881	.00891	.435	.335	3.99	1995	3.00
		160	.250	1.160	1.107	.00734	.435	.304	3.29	1645	3.76
		XX	.382	0.896	1.534	.00438	.435	.235	1.97	985	5.21
1 1/2	1.900	5S	.065	1.770	0.375	.01709	.497	.463	7.67	3835	1.28
		10S	.109	1.682	0.614	.01543	.497	.440	6.94	3465	2.09
		40ST, 40S	.145	1.610	0.800	.01414	.497	.421	6.34	3170	2.72
		80XS, 80S	.200	1.500	1.069	.01225	.497	.393	5.49	2745	3.63
		160	.281	1.338	1.429	.00976	.497	.350	4.38	2190	4.86
		XX	.400	1.100	1.885	.00660	.497	.288	2.96	1480	6.41
2	2.375	5S	.065	2.245	0.472	.02749	.622	.588	12.34	6170	1.61
		10S	.109	2.157	0.776	.02538	.622	.565	11.39	5695	2.64
		40ST, 40S	.154	2.067	1.075	.02330	.622	.541	10.45	5225	3.65
		80ST, 80S	.218	1.939	1.477	.02050	.622	.508	9.20	4600	5.02
		160	.344	1.687	2.195	.01552	.622	.436	6.97	3485	7.46
		XX	.436	1.503	2.656	.01232	.622	.393	5.53	2765	9.03
2 1/2	2.875	5S	.083	2.709	0.728	.04003	.753	.709	17.97	8985	2.48
		10S	.120	2.635	1.039	.03787	.753	.690	17.00	8500	3.53
		40ST, 40S	.203	2.469	1.704	.03322	.753	.647	14.92	7460	5.79
		80XS, 80S	.276	2.323	2.254	.02942	.753	.608	13.20	6600	7.66
		160	.375	2.125	2.945	.02463	.753	.556	11.07	5535	10.01
		XX	.552	1.771	4.028	.01711	.753	.464	7.68	3840	13.69
3	3.500	5S	.083	3.334	0.891	.06063	.916	.873	27.21	13,605	3.03
		10S	.120	3.260	1.274	.05796	.916	.853	26.02	13,010	4.33
		40ST, 40S	.216	3.068	2.228	.05130	.916	.803	23.00	11,500	7.58
		80XS, 80S	.300	2.900	3.016	.04587	.916	.759	20.55	10,275	10.25
		160	.438	2.624	4.213	.03755	.916	.687	16.86	8430	14.32
		XX	.600	2.300	5.466	.02885	.916	.602	12.95	6475	18.58
3 1/4	4.0	5S	.083	3.834	1.021	.08017	1.047	1.004	35.98	17,990	3.48
		10S	.120	3.760	1.463	.07711	1.047	0.984	34.61	17,305	4.97
		40ST, 40S	.226	3.548	2.680	.06870	1.047	0.929	30.80	15,400	9.11
		80XS, 80S	.318	3.364	3.678	.06170	1.047	0.881	27.70	13,850	12.50
4	4.5	5S	.083	4.334	1.152	.10245	1.178	1.135	46.0	23,000	3.92
		10S	.120	4.260	1.651	.09898	1.178	1.115	44.4	22,200	5.61
		40ST, 40S	.237	4.026	3.17	.08840	1.178	1.054	39.6	19,800	10.79

TABLE 10-22 Properties of Steel Pipe (Continued)

Nominal pipe size, in	Outside diameter, in	Schedule no.	Wall thickness, in	Inside diameter, in	Cross-sectional area		Circumference, ft, or surface, ft ² /ft of length		Capacity at 1-ft/s velocity		Weight of plain-end pipe, lb/ft
					Metal, in ²	Flow, ft ²	Outside	Inside	U.S. gal/min	lb/h water	
5	5.563	80XS, 80S	.337	3.826	4.41	.07986	1.178	1.002	35.8	17,900	14.98
		120	0.438	3.624	5.58	0.07170	1.178	0.949	32.2	16,100	19.00
		160	.531	3.438	6.62	.06647	1.178	0.900	28.9	14,450	22.51
		XX	.674	3.152	8.10	.05419	1.178	0.825	24.3	12,150	27.54
		5S	.109	5.345	1.87	.1558	1.456	1.399	69.9	34,950	6.36
		10S	.134	5.295	2.29	.1529	1.456	1.386	68.6	34,300	7.77
		40ST, 40S	.258	5.047	4.30	.1390	1.456	1.321	62.3	31,150	14.62
		80XS, 80S	.375	4.813	6.11	.1263	1.456	1.260	57.7	28,850	20.78
		120	.500	4.563	7.95	.1136	1.456	1.195	51.0	25,500	27.04
		160	.625	4.313	9.70	.1015	1.456	1.129	45.5	22,750	32.96
		XX	.750	4.063	11.34	.0900	1.456	1.064	40.4	20,200	38.55
		6	6.625	5S	.109	6.407	2.23	.2239	1.734	1.677	100.5
10S	.134			6.357	2.73	.2204	1.734	1.664	98.9	49,450	9.29
40ST, 40S	.280			6.065	5.58	.2006	1.734	1.588	90.0	45,000	18.97
80XS, 80S	.432			5.761	8.40	.1810	1.734	1.508	81.1	40,550	28.57
120	.562			5.501	10.70	.1650	1.734	1.440	73.9	36,950	36.39
160	.719			5.187	13.34	.1467	1.734	1.358	65.9	32,950	45.34
XX	.864			4.897	15.64	.1308	1.734	1.282	58.7	29,350	53.16
5S	.109			8.407	2.915	.3855	2.258	2.201	173.0	86,500	9.93
10S	.148			8.329	3.941	.3784	2.258	2.180	169.8	84,900	13.40
20	.250			8.125	6.578	.3601	2.258	2.127	161.5	80,750	22.36
30	.277			8.071	7.265	.3553	2.258	2.113	159.4	79,700	24.70
40ST, 40S	.322			7.981	8.399	.3474	2.258	2.089	155.7	77,850	28.55
60	.406	7.813	10.48	.3329	2.258	2.045	149.4	74,700	35.64		
80XS, 80S	.500	7.625	12.76	.3171	2.258	1.996	142.3	71,150	43.39		
100	.594	7.437	14.99	.3017	2.258	1.947	135.4	67,700	50.95		
120	.719	7.187	17.86	.2817	2.258	1.882	126.4	63,200	60.71		
140	.812	7.001	19.93	.2673	2.258	1.833	120.0	60,000	67.76		
XX	.875	6.875	21.30	.2578	2.258	1.800	115.7	57,850	72.42		
160	.906	6.813	21.97	.2532	2.258	1.784	113.5	56,750	74.69		
10	10.75	5S	.134	10.482	4.47	.5993	2.814	2.744	269.0	134,500	15.19
		10S	.165	10.420	5.49	.5922	2.814	2.728	265.8	132,900	18.65
		20	.250	10.250	8.25	.5731	2.814	2.685	257.0	128,500	28.04
		30	.307	10.136	10.07	.5603	2.814	2.655	252.0	126,000	34.24
		40ST, 40S	.365	10.020	11.91	.5475	2.814	2.620	246.0	123,000	40.48
		80S, 60XS	.500	9.750	16.10	.5185	2.814	2.550	233.0	116,500	54.74
		80	.594	9.562	18.95	.4987	2.814	2.503	223.4	111,700	64.43
		100	.719	9.312	22.66	.4729	2.814	2.438	212.3	106,150	77.03
		120	.844	9.062	26.27	.4479	2.814	2.372	201.0	100,500	89.29
		140, XX	1.000	8.750	30.63	.4176	2.814	2.291	188.0	94,000	104.13
		160	1.125	8.500	34.02	.3941	2.814	2.225	177.0	88,500	115.64
		12	12.75	5S	0.156	12.438	6.17	.8438	3.338	3.26	378.7
10S	0.180			12.390	7.11	.8373	3.338	3.24	375.8	187,900	24.17
20	0.250			12.250	9.82	.8185	3.338	3.21	367.0	183,500	33.38
30	0.330			12.090	12.88	.7972	3.338	3.17	358.0	179,000	43.77
ST, 40S	0.375			12.000	14.58	.7854	3.338	3.14	352.5	176,250	49.56
40	0.406			11.938	15.74	.7773	3.338	3.13	349.0	174,500	53.52
XS, 80S	0.500			11.750	19.24	.7530	3.338	3.08	338.0	169,000	65.42
60	0.562			11.626	21.52	.7372	3.338	3.04	331.0	165,500	73.15
80	0.688			11.374	26.07	.7056	3.338	2.98	316.7	158,350	88.63
100	0.844			11.062	31.57	.6674	3.338	2.90	299.6	149,800	107.32
120, XX	1.000			10.750	36.91	.6303	3.338	2.81	283.0	141,500	125.49
140	1.125			10.500	41.09	.6013	3.338	2.75	270.0	135,000	139.67
160	1.312	10.126	47.14	.5592	3.338	2.65	251.0	125,500	160.27		
14	14	5S	0.156	13.688	6.78	1.0219	3.665	3.58	459	229,500	23.07
		10S	0.188	13.624	8.16	1.0125	3.665	3.57	454	227,000	27.73
		10	0.250	13.500	10.80	0.9940	3.665	3.53	446	223,000	36.71
		20	0.312	13.376	13.42	0.9750	3.665	3.50	438	219,000	45.61
		30, ST	0.375	13.250	16.05	0.9575	3.665	3.47	430	215,000	54.57
		40	0.438	13.124	18.66	0.9397	3.665	3.44	422	211,000	63.44
		XS	0.500	13.000	21.21	0.9218	3.665	3.40	414	207,000	72.09
		60	0.594	12.812	25.02	0.8957	3.665	3.35	402	201,000	85.05
		80	0.750	12.500	31.22	0.8522	3.665	3.27	382	191,000	106.13
		100	0.938	12.124	38.49	0.8017	3.665	3.17	360	180,000	130.85
		120	1.094	11.812	44.36	0.7610	3.665	3.09	342	171,000	150.79
		140	1.250	11.500	50.07	0.7213	3.665	3.01	324	162,000	170.21
160	1.406	11.188	55.63	0.6827	3.665	2.93	306	153,000	189.11		
16	16	5S	0.165	15.670	8.21	1.3393	4.189	4.10	601	300,500	27.90
		10S	0.188	15.624	9.34	1.3314	4.189	4.09	598	299,000	31.75
		10	0.250	15.500	12.37	1.3104	4.189	4.06	587	293,500	42.05

10-80 TRANSPORT AND STORAGE OF FLUIDS

TABLE 10-22 Properties of Steel Pipe (Concluded)

Nominal pipe size, in	Outside diameter, in	Schedule no.	Wall thickness, in	Inside diameter, in	Cross-sectional area		Circumference, ft, or surface, ft ² /ft of length		Capacity at 1-ft/s velocity		Weight of plain-end pipe, lb/ft		
					Metal, in ²	Flow, ft ²	Outside	Inside	U.S. gal/min	lb/h water			
18	18	20	0.312	15.376	15.38	1.2985	4.189	4.03	578	289,000	52.27		
		30, ST	0.375	15.250	18.41	1.2680	4.189	3.99	568	284,000	62.58		
		40, XS	0.500	15.000	24.35	1.2272	4.189	3.93	550	275,000	82.77		
		60	0.656	14.688	31.62	1.1766	4.189	3.85	528	264,000	107.50		
		80	0.844	14.312	40.19	1.1171	4.189	3.75	501	250,500	136.61		
		100	1.031	13.938	48.48	1.0596	4.189	3.65	474	237,000	164.82		
		120	1.219	13.562	56.61	1.0032	4.189	3.55	450	225,000	192.43		
		140	1.438	13.124	65.79	0.9394	4.189	3.44	422	211,000	223.64		
		160	1.594	12.812	72.14	0.8953	4.189	3.35	402	201,000	245.25		
		5S	0.165	17.670	9.25	1.7029	4.712	4.63	764	382,000	31.43		
		10S	0.188	17.624	10.52	1.6941	4.712	4.61	760	379,400	35.76		
		10	0.250	17.500	13.94	1.6703	4.712	4.58	750	375,000	47.39		
		20	0.312	17.376	17.34	1.6468	4.712	4.55	739	369,500	58.94		
		ST	0.375	17.250	20.76	1.6230	4.712	4.52	728	364,000	70.59		
		30	0.438	17.124	24.16	1.5993	4.712	4.48	718	359,000	82.15		
		XS	0.500	17.000	27.49	1.5763	4.712	4.45	707	353,500	93.45		
40	0.562	16.876	30.79	1.5533	4.712	4.42	697	348,500	104.67				
60	0.750	16.500	40.64	1.4849	4.712	4.32	666	333,000	138.17				
80	0.938	16.124	50.28	1.4180	4.712	4.22	636	318,000	170.92				
100	1.156	15.688	61.17	1.3423	4.712	4.11	602	301,000	207.96				
120	1.375	15.250	71.82	1.2684	4.712	3.99	569	284,500	244.14				
140	1.562	14.876	80.66	1.2070	4.712	3.89	540	270,000	274.22				
160	1.781	14.438	90.75	1.1370	4.712	3.78	510	255,000	308.50				
20	20	5S	0.188	19.624	11.70	2.1004	5.236	5.14	943	471,500	39.78		
		10S	0.218	19.564	13.55	2.0878	5.236	5.12	937	467,500	46.06		
		10	0.250	19.500	15.51	2.0740	5.236	5.11	930	465,000	52.73		
		20, ST	0.375	19.250	23.12	2.0211	5.236	5.04	902	451,000	78.60		
		30, XS	0.500	19.000	30.63	1.9689	5.236	4.97	883	441,500	104.13		
		40	0.594	18.812	36.21	1.9302	5.236	4.92	866	433,000	123.11		
		60	0.812	18.376	48.95	1.8417	5.236	4.81	826	413,000	166.40		
		80	1.031	17.938	61.44	1.7550	5.236	4.70	787	393,500	208.87		
		100	1.281	17.438	75.33	1.6585	5.236	4.57	744	372,000	256.10		
		120	1.500	17.000	87.18	1.5763	5.236	4.45	707	353,500	296.37		
		140	1.750	16.500	100.3	1.4849	5.236	4.32	665	332,500	341.09		
		160	1.969	16.062	111.5	1.4071	5.236	4.21	632	316,000	397.17		
		24	24	5S	0.218	23.564	16.29	3.0285	6.283	6.17	1359	679,500	55.37
				10, 10S	0.250	23.500	18.65	3.012	6.283	6.15	1350	675,000	63.41
				20, ST	0.375	23.250	27.83	2.948	6.283	6.09	1325	662,500	94.62
				XS	0.500	23.000	36.90	2.885	6.283	6.02	1295	642,500	125.49
30	0.562			22.876	41.39	2.854	6.283	5.99	1281	640,500	140.68		
40	0.688			22.624	50.39	2.792	6.283	5.92	1253	626,500	171.29		
60	0.969			22.062	70.11	2.655	6.283	5.78	1192	596,000	238.35		
80	1.219			21.562	87.24	2.536	6.283	5.64	1138	569,000	296.58		
100	1.531			20.938	108.1	2.391	6.283	5.48	1073	536,500	367.39		
120	1.812			20.376	126.3	2.264	6.283	5.33	1016	508,000	429.39		
30	30	5S	0.250	29.500	23.37	4.746	7.854	7.72	2130	1,065,000	79.43		
		10, 10S	0.312	29.376	29.10	4.707	7.854	7.69	2110	1,055,000	98.93		
		ST	0.375	29.250	34.90	4.666	7.854	7.66	2094	1,048,000	118.65		
		20, XS	0.500	29.000	46.34	4.587	7.854	7.59	2055	1,027,500	157.53		
		30	0.625	28.750	57.68	4.508	7.854	7.53	2020	1,010,000	196.08		

5S, 10S, 40S, and 80S are extracted from Stainless Steel Pipe, ASME B36.19M-1985, with permission of the publisher, the American Society of Mechanical Engineers, New York. ST = standard wall, XS = extra strong wall, XX = double extra strong wall, and Schedules 10 through 160 are extracted from Welded and Seamless Wrought Steel Pipe, ASME B36.10M-1996, with permission of the same publisher. Refer to these standards for a more comprehensive listing of material sizes and wall thicknesses. Decimal thicknesses for respective pipe sizes represent their nominal or average wall dimensions. Mill tolerances as high as ±12½ percent are permitted.

Plain-end pipe is produced by a square cut. Pipe is also shipped from the mills threaded, with a threaded coupling on one end, or with the ends beveled for welding, or grooved or sized for patented couplings.

To convert inches to millimeters, multiply by 25.4; to convert square inches to square millimeters, multiply by 645; to convert feet to meters, multiply by 0.3048; to convert square feet to square meters, multiply by 0.0929; to convert pounds per foot to kilograms per meter, multiply by 1.49; to convert gallons to cubic meters, multiply by 3.7854 × 10⁻³; and to convert pounds to kilograms, multiply by 0.4536.