



INFORMATION BULLETIN / PLUMBING.

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DOMESTIC WATER PIPE SIZING

This Information Bulletin provides additional information to designers of plumbing systems for sizing domestic water distribution systems of all types of construction in accordance with the method identified in Appendix A of the Los Angeles Plumbing Code. This bulletin includes the following:

1. The telephone numbers from the Department of Water and Power needed to obtain the minimum and maximum daily service pressure in areas within the City of Los Angeles. (See pages 2 through 3).
2. The capacities and pressure losses of domestic water meters that are supplied by the Los Angeles Department of Water and Power. (See pages 4 through 6).
3. A conversion table of the water demand load in fixture units to gallons per minute tabulated based on Chart A-2, of Appendix A of the Los Angeles Plumbing Code. (See pages 7 through 9).
4. Fixture unit allowance table based on allowable friction loss and pipe diameter for various types of materials.
 - a. Plastic pipes capacities have been calculated with the Hazen and Williams equation using Hazen and Williams coefficient $C=150$ and the proper inside pipe diameter.
 - b. The water velocity has been limited to the following values:

Copper pipes and tubes: 8 ft/s for cold water distribution systems and 5 ft/s for hot water distribution systems (UPC Sect. 610.12.1).

Plastic pipes: 10 ft/s for both hot and cold water distribution systems (UPC Appendix A Sect. A 107.1). Some manufacturers may recommend a lower velocity, in which case the manufacturer's recommendations shall be followed.

5. Sizing forms to aid in designing simple domestic water systems. (See pages 39 through 40).

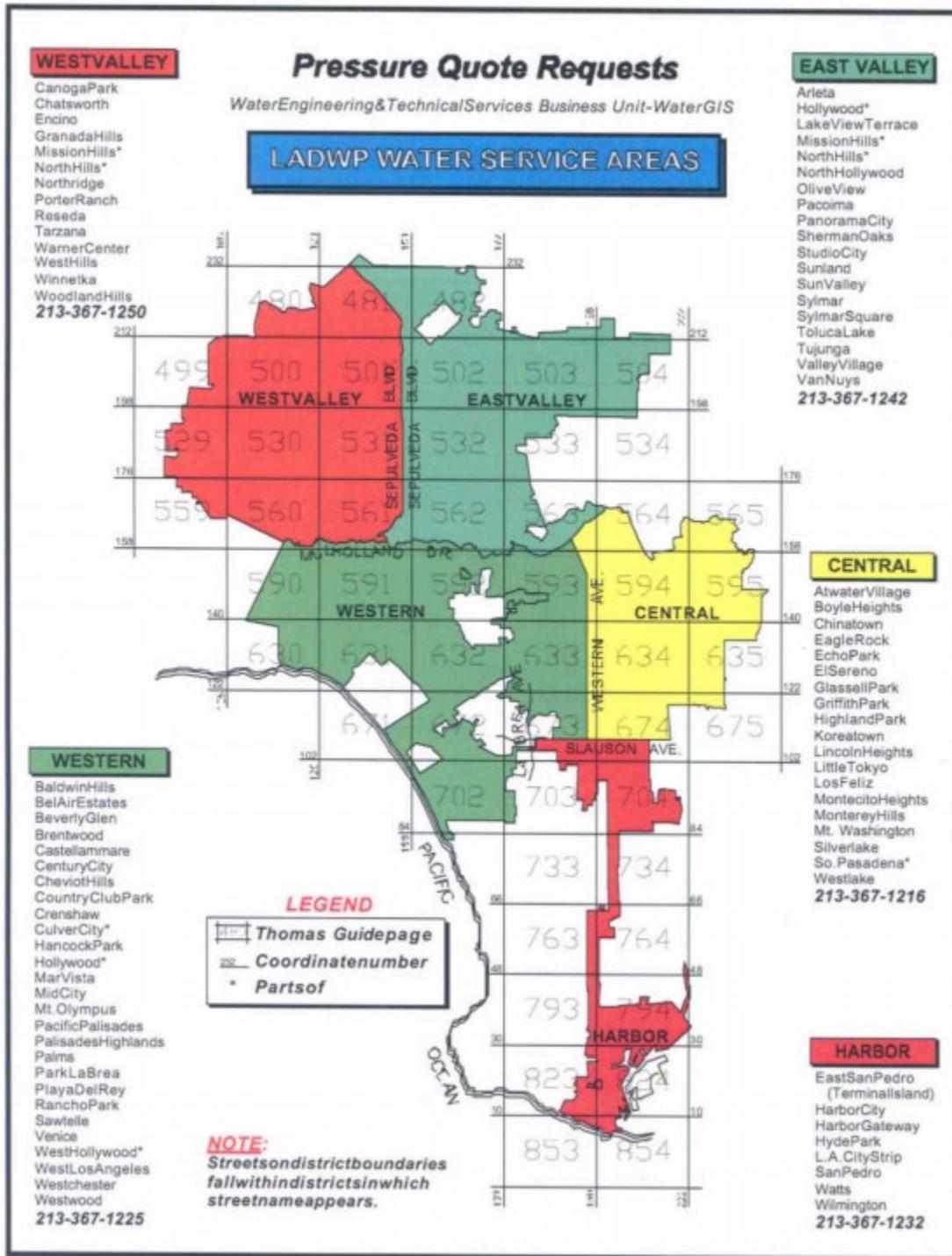
The attached sizing tables provide designers with information consistent with that used by Mechanical Plan Check Engineers during their plan review process.

1. Available Pressure

Information regarding the minimum and maximum daily service pressure is obtained by calling the Los Angeles Department of Water and Power at the following numbers depending on where the service is located. See also the map on the next page for additional reference.

WEST VALLEY (213) 367-1250		EAST VALLEY (213) 367-1242	
West of Sepulveda Blvd. North of Mulholland Dr.		East of Sepulveda Blvd. North of Mulholland Dr.	
Canoga Park Chatsworth Encino Granada Hills Mission Hills North Hills Northridge Porter Ranch Reseda	Tarzana Warner Center West Hills Winnetka Woodland Hills	Arleta Hollywood Lake View Terrace Mission Hills North Hills Olive View Pacoima Panorama City Sherman Oaks	Studio City Sunland Sun Valley Sylmar Sylmar Square Toluca Lake Tujunga Valley Village Van Nuys
WESTERN (213) 367-1225		CENTRAL (213) 367-1216	
West of Western Ave. South of Mulholland Dr.		East of Western Ave. South of Mulholland Dr.	
Baldwin Hills Bel Air Estates Beverly Glen Brentwood Castellammare Century City Cheviot Hills Country Club Park Crenshaw Culver City Hancock Park Hollywood Hyde Park Mar Vista	Mid City Mt. Olympus Pacific Palisades Palisades Highlands Palms Park La Brea Playa Del Rey Rancho Park Sawtelle Venice West Hollywood West Los Angeles Westchester Westwood	Atwater Village Boyle Heights Chinatown Eagle Rock Echo Park El Sereno Glassel Park Griffith Park Highland Park Koreatown Lincoln Heights Little Tokyo Los Feliz Montecito Heights	Monterey Hills Mt. Washington Silverlake So. Pasadena Westlake
HARBOR (213) 367-1232			
South of Slauson Ave			
East San Pedro (Terminal Island)	Harbor City Harbor Gateway	LA City Strip San Pedro	South Los Angeles Wilmington

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NOTE:
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WATERSERVICEAREAS11-04.CDR

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2. Information regarding friction loss relative to the rate of flow for meters in the range allowed to be used.

Domestic Water Meter Capacities and Pressure Losses						
	Pressure Loss in p.s.i.					
Meter Size inches	1"	1 ½ "	2"	3" equivalent	4"	6"
Flow gpm.						
30	3.0	0.9	0.3			
35	4.2	1.3	0.4	0.2	3.9	2.4
40	5.5	1.7	0.6	0.3	3.8	2.5
45	7.0	2.3	0.8	0.3	3.7	2.6
50	8.8	2.8	1.0	0.4	3.6	2.7
56	11.2	3.6	1.2	0.5	3.6	2.8
60	Use larger meter	4.2	1.4	0.6	3.5	2.9
65		5.0	1.7	0.7	3.4	3
70		6.0	2.0	0.8	3.3	3.1
75		6.8	2.3	0.9	3.3	3.2
80		8.0	2.6	1.0	3.2	3.2
85		9.0	3.0	1.2	3.2	3.3
90		10.0	3.4	1.3	3.1	3.4
96		11.5	3.8	1.4	3.0	3.4
100		12.7	4.2	1.4	3.0	3.5
110		Use larger meter	5.3	1.7	3.0	3.6
120			6.4	2.0	3.0	3.6
130			7.6	2.3	3.0	3.7
140			8.9	2.6	3.1	3.7
150			10.2	3.0	3.1	3.7

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Domestic Water Meter Capacities and Pressure Losses						
	Pressure Loss in p.s.i.					
Meter Size inches	1"	1 ½ "	2"	3" equivalent	4"	6"
Flow gpm.						
160			11.7	3.3	3.1	3.7
170			Use larger meter	3.6	3.2	3.8
180				3.8	3.2	3.8
190				4.3	3.3	3.8
200				4.8	3.3	3.8
210				5.4	3.6	3.8
220				6.0	3.8	3.7
230				Use larger meter	4.1	3.7
240					4.4	3.7
250					4.6	3.6
260					4.9	3.6
270					5.2	3.5
280					5.4	3.5
290					5.7	3.4
300					6.0	3.4
310					6.6	3.2
320					7.2	3.1
330					7.8	3.0
340					7.8	3.1
360					7.8	3.0
380					8.5	2.9

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Domestic Water Meter Capacities and Pressure Losses						
	Pressure Loss in p.s.i.					
Meter Size inches	1"	1 ½ "	2"	3" equivalent	4"	6"
Flow gpm.						
400					9.1	2.8
420					Use larger meter	2.7
440						2.8
460						2.9
480						3.2
500						3.5
550						4.3
600						4.9
650						5.8
700						6.7
Over 700						Use larger meter

Meter Size inches	8"	10"		Meter Size inches	8"	10"
Flow gpm				Flow gpm		
300	2.7	2.2		1500	4.0	3.0
600	3.2	2.5		2000	Use larger meter	3.3
900	3.5	2.8		2500		3.6
1200	3.7	2.9		Over 2500		Use larger meter

3. Demand Load (These table may be interpolated)

Fixture Units versus gpm Conversion Table								
Flow	Fixture Units		Flow	Fixture Units		Flow	Fixture Units	
gpm	Flush Tank	Flush Valve	gpm	Flush Tank	Flush Valve	gpm	Flush Tank	Flush Valve
1	0	-	27	46	10	53	141	54
2	1	-	28	49	11	54	146	57
3	3	-	29	51	12	55	151	60
4	4	-	30	54	13	56	155	63
5	6	-	31	56	14	57	160	66
6	7	-	32	58	15	58	165	69
7	8	-	33	60	16	59	170	73
8	10	-	34	63	18	60	175	76
9	12	-	35	66	20	62	185	82
10	13	-	36	69	21	64	195	88
11	15	-	37	74	23	66	205	95
12	16	-	38	78	25	68	215	102
13	18	-	39	83	26	70	225	108
14	20	-	40	86	28	72	236	116
15	21	-	41	90	30	74	245	124
16	23	-	42	95	31	76	254	132
17	24	-	43	99	33	78	264	140
18	26	-	44	103	35	80	275	148
19	28	-	45	107	37	82	284	158
20	30	-	46	111	39	84	294	168
21	32	-	47	115	42	86	305	176
22	34	5	48	119	44	88	315	186
23	36	6	49	123	46	90	325	195
24	39	7	50	127	48	92	337	205
25	42	8	51	130	50	94	348	214
26	44	9	52	135	52	96	359	223

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Fixture Units versus gpm Conversion Table								
Flow	Fixture Units		Flow	Fixture Units		Flow	Fixture Units	
gpm	Flush Tank	Flush Valve	gpm	Flush Tank	Flush Valve	gpm	Flush Tank	Flush Valve
98	370	234	260	1418	1418	1000	8300	8300
100	380	245	270	1500	1500	1100	9320	9320
105	406	270	280	1583	1583	1200	10340	10340
110	431	295	290	1668	1668	1300	11360	11360
115	455	329	300	1755	1755	1400	12380	12380
120	479	365	310	1845	1845	1500	13400	13400
125	506	396	320	1926	1926	1600	14420	14420
130	533	430	330	2018	2018	1700	15440	15440
135	559	460	340	2110	2110	1800	16460	16460
140	585	490	350	2204	2204	1900	17480	17480
145	611	521	360	2298	2298	2000	18500	18500
150	638	559	370	2388	2388	2100	19520	19520
155	665	596	380	2480	2480	2200	20540	20540
160	692	631	390	2575	2575	2300	21560	21560
165	719	666	400	2670	2670	2400	22580	22580
170	748	700	410	2765	2765	2500	23600	23600
175	778	739	420	2862	2862	2600	24620	24620
180	809	775	430	2960	2960	2700	25640	25640
185	840	811	440	3060	3060	<p>The demand factor, defined as the maximum peak load in a given time period divided by the maximum possible load, decreases as the number of fixture units (F.U.) increases, and it reaches 5.265% at 25640 fixture units. In fact, if all the 25640 fixtures were operating simultaneously, the flow would be 2560F.U.X2gpm/fixture =51280 gpm. Instead it is 2700 gpm. This means that the demand factor has dropped to $2700/51280=0.05265$ or 5.265%. This demand factor can be applied when the number of fixture units is in excess of 25640. For example, 30000 fixture units would be $30000F.U. \times 2gpm/F.U. \times 0.05265=3159gpm$.</p>		
190	874	850	450	3150	3150			
200	945	931	500	3620	3620			
210	1018	1009	550	4070	4070			
220	1091	1091	600	4480	4480			
230	1173	1173	700	5380	5380			
240	1254	1254	800	6280	6280			
250	1335	1335	900	7280	7280			

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4. Permissible Friction Loss

- a. Section 608.1 of the Los Angeles Plumbing Code requires a residual pressure of at least 15 psi. Whenever fixtures and/or fixture fittings are installed which require residual pressure higher than 15 psi, that minimum pressure shall be provided.

- b. Sections 610.12.1 and 610.12.2 of the Los Angeles Plumbing Code limit the maximum velocities in copper and copper alloy tubes and fittings to a maximum of 8 ft/s in cold water and 5 ft/s in hot water.

Table 4.1 reports the fixture unit loading in type L copper (the most common) for various allowable friction losses and water velocities not to exceed the maximum allowed. For pressure losses of 19 psi per 100 feet of pipe and higher, the system is limited by the maximum velocity, and at this point a higher allowable pressure loss will make no difference in sizing the water system.

Table 4.2 reports the fixture unit loading in CPVC Schedule 40, Schedule 80 and SDR 11. (There is no difference in sizing cold or hot water.)

- c. For PEX piping fixture unit loading refer to LADBS Research Reports

**Table 4.1
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
TYPE L COPPER**

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
	Internal Pipe Diameter (inches)	0.545	0.785	1.025	1.265	1.505	1.985	2.465	2.945	3.425	3.905
1	Cold Water – Flush Valve	0	0	0	0	0	14	60	186	430	811
	Cold Water – Flush Tank	0	2	6	12	21	56	151	315	533	840
	Hot Water – Flush Tank	0	2	6	12	21	56	151	315	533	840
1.1	Cold Water – Flush Valve	0	0	0	0	0	15	69	205	460	850
	Cold Water – Flush Tank	0	2	6	13	21	58	165	337	559	874
	Hot Water – Flush Tank	0	2	6	13	21	58	165	337	559	840
1.2	Cold Water – Flush Valve	0	0	0	0	0	18	76	223	490	931
	Cold Water – Flush Tank	0	2	7	13	23	63	175	359	585	840
	Hot Water – Flush Tank	0	2	7	13	23	63	175	359	585	840
1.3	Cold Water – Flush Valve	0	0	0	0	0	21	82	245	559	1009
	Cold Water – Flush Tank	0	3	7	13	24	69	185	380	638	1018
	Hot Water – Flush Tank	0	3	7	13	24	69	185	380	585	840
1.4	Cold Water – Flush Valve	0	0	0	0	0	23	95	270	596	1091
	Cold Water – Flush Tank	0	3	7	15	26	74	205	406	585	840
	Hot Water – Flush Tank	0	3	7	15	26	74	205	406	585	840
1.5	Cold Water – Flush Valve	0	0	0	0	0	25	102	270	631	1173
	Cold Water – Flush Tank	0	3	7	15	26	78	215	406	692	1173
	Hot Water – Flush Tank	0	3	7	15	26	78	215	406	585	840
1.6	Cold Water – Flush Valve	0	0	0	0	0	28	108	295	666	1173
	Cold Water – Flush Tank	0	2	8	16	28	86	225	431	719	1173
	Hot Water – Flush Tank	0	2	8	16	28	86	225	406	585	840
1.7	Cold Water – Flush Valve	0	0	0	0	0	30	116	329	700	1254
	Cold Water – Flush Tank	0	2	8	16	30	90	236	455	748	1254
	Hot Water – Flush Tank	0	2	8	16	30	90	236	406	585	840
1.8	Cold Water – Flush Valve	0	0	0	0	0	31	124	365	775	1335
	Cold Water – Flush Tank	0	3	8	18	30	95	245	479	809	1335
	Hot Water – Flush Tank	0	3	8	18	30	95	245	406	585	840
1.9	Cold Water – Flush Valve	0	0	0	0	0	35	140	365	811	1418
	Cold Water – Flush Tank	0	3	8	18	32	103	264	479	840	1418
	Hot Water – Flush Tank	0	3	8	18	32	103	245	406	585	840

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**Table 4.1
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
TYPE L COPPER**

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.545	0.785	1.025	1.265	1.505	1.985	2.465	2.945	3.425	3.905
2	Cold Water – Flush Valve	0	0	0	0	0	37	148	396	850	1418
	Cold Water – Flush Tank	0	3	8	18	32	107	275	506	874	1418
	Hot Water – Flush Tank	0	3	8	18	32	107	245	406	585	840
2.2	Cold Water – Flush Valve	0	0	0	0	6	42	168	460	931	1583
	Cold Water – Flush Tank	0	4	10	20	36	115	294	559	945	1583
	Hot Water – Flush Tank	0	4	10	20	36	115	245	406	585	840
2.4	Cold Water – Flush Valve	0	0	0	0	7	48	186	490	1009	1668
	Cold Water – Flush Tank	0	4	10	21	39	127	315	585	1018	1668
	Hot Water – Flush Tank	0	4	10	21	39	119	245	406	585	840
2.6	Cold Water – Flush Valve	0	0	0	0	8	52	205	521	1091	1668
	Cold Water – Flush Tank	0	4	12	21	42	135	337	611	1091	1668
	Hot Water – Flush Tank	0	4	12	21	42	119	245	406	585	840
2.8	Cold Water – Flush Valve	0	0	0	0	9	57	223	559	1091	1668
	Cold Water – Flush Tank	0	4	12	23	44	146	359	638	1091	1668
	Hot Water – Flush Tank	0	4	12	23	44	119	245	406	585	840
3	Cold Water – Flush Valve	0	0	0	0	10	63	245	596	1091	1668
	Cold Water – Flush Tank	0	4	12	24	46	155	380	665	1091	1668
	Hot Water – Flush Tank	0	4	12	24	46	119	245	406	585	840
3.2	Cold Water – Flush Valve	0	0	0	0	11	69	245	666	1091	1668
	Cold Water – Flush Tank	0	6	13	24	49	165	380	719	1091	1668
	Hot Water – Flush Tank	0	6	13	24	46	119	245	406	585	840
3.4	Cold Water – Flush Valve	0	0	0	0	12	76	270	666	1091	1668
	Cold Water – Flush Tank	1	6	13	26	51	175	406	719	1091	1668
	Hot Water – Flush Tank	1	6	13	26	46	119	245	406	585	840
3.6	Cold Water – Flush Valve	0	0	0	0	13	82	295	666	1091	1668
	Cold Water – Flush Tank	1	6	13	28	54	185	431	719	1091	1668
	Hot Water – Flush Tank	1	6	13	28	46	119	245	406	585	840
3.8	Cold Water – Flush Valve	0	0	0	0	14	88	295	666	1091	1668
	Cold Water – Flush Tank	1	6	15	28	56	195	431	719	1091	1668
	Hot Water – Flush Tank	1	6	15	28	46	119	245	406	585	840

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**Table 4.1
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
TYPE L COPPER**

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.545	0.785	1.025	1.265	1.505	1.985	2.465	2.945	3.425	3.905
4	Cold Water – Flush Valve	0	0	0	0	14	95	329	666	1091	1668
	Cold Water – Flush Tank	1	6	15	30	56	205	455	719	1091	1668
	Hot Water – Flush Tank	1	6	15	28	46	119	245	406	585	840
4.2	Cold Water – Flush Valve	0	0	0	0	15	95	329	666	1091	1668
	Cold Water – Flush Tank	1	6	15	30	58	205	455	719	1091	1668
	Hot Water – Flush Tank	1	6	15	28	46	119	245	406	585	840
4.4	Cold Water – Flush Valve	0	0	0	0	16	102	329	666	1091	1668
	Cold Water – Flush Tank	1	7	16	32	60	215	455	719	1091	1668
	Hot Water – Flush Tank	1	7	16	28	46	119	245	406	585	840
4.6	Cold Water – Flush Valve	0	0	0	0	18	108	329	666	1091	1668
	Cold Water – Flush Tank	1	7	16	32	63	225	455	719	1091	1668
	Hot Water – Flush Tank	1	7	16	28	46	245	245	406	585	840
4.8	Cold Water – Flush Valve	0	0	0	5	20	116	329	666	1091	1668
	Cold Water – Flush Tank	1	7	16	34	66	236	455	719	1091	1668
	Hot Water – Flush Tank	1	7	16	28	46	119	245	406	585	840
5	Cold Water – Flush Valve	0	0	0	5	20	124	329	666	1091	1668
	Cold Water – Flush Tank	1	7	16	34	66	245	455	719	1091	1668
	Hot Water – Flush Tank	1	7	16	28	46	119	245	406	585	840
5.2	Cold Water – Flush Valve	0	0	0	6	21	131	329	666	1091	1668
	Cold Water – Flush Tank	2	7	18	36	69	254	455	719	1091	1668
	Hot Water – Flush Tank	2	7	16	28	46	119	245	406	585	840
5.4	Cold Water – Flush Valve	0	0	0	6	23	132	329	666	1091	1668
	Cold Water – Flush Tank	2	7	18	36	74	254	455	719	1091	1668
	Hot Water – Flush Tank	2	7	16	28	46	119	245	406	585	840
5.6	Cold Water – Flush Valve	0	0	0	7	25	132	329	666	1091	1668
	Cold Water – Flush Tank	2	7	18	36	74	254	455	719	1091	1668
	Hot Water – Flush Tank	2	7	16	28	46	119	245	406	585	840
5.8	Cold Water – Flush Valve	0	0	0	7	25	132	329	666	1091	1668
	Cold Water – Flush Tank	2	8	20	39	78	254	455	719	1091	1668
	Hot Water – Flush Tank	2	8	16	28	46	119	245	406	585	840

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**Table 4.1
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
TYPE L COPPER**

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.545	0.785	1.025	1.265	1.505	1.985	2.465	2.945	3.425	3.905
6	Cold Water – Flush Valve	0	0	0	8	26	132	329	666	1091	1668
	Cold Water – Flush Tank	2	8	20	42	83	254	455	719	1091	1668
	Hot Water – Flush Tank	2	8	16	28	46	119	245	406	585	840
6.2	Cold Water – Flush Valve	0	0	0	8	28	132	329	666	1091	1668
	Cold Water – Flush Tank	2	8	20	42	86	254	455	719	1091	1668
	Hot Water – Flush Tank	2	8	16	28	46	119	245	406	585	840
6.4	Cold Water – Flush Valve	0	0	0	9	30	132	329	666	1091	1668
	Cold Water – Flush Tank	2	8	20	44	90	254	455	719	1091	1668
	Hot Water – Flush Tank	2	8	16	28	46	119	245	406	585	840
6.6	Cold Water – Flush Valve	0	0	0	9	30	132	329	666	1091	1668
	Cold Water – Flush Tank	2	8	21	44	90	254	455	719	1091	1668
	Hot Water – Flush Tank	2	8	16	28	46	119	245	406	585	840
6.8	Cold Water – Flush Valve	0	0	0	9	31	132	329	666	1091	1668
	Cold Water – Flush Tank	2	8	21	44	95	254	455	719	1091	1668
	Hot Water – Flush Tank	2	8	16	28	46	119	245	406	585	840
7	Cold Water – Flush Valve	0	0	0	10	33	132	329	666	1091	1668
	Cold Water – Flush Tank	2	8	21	46	99	254	455	719	1091	1668
	Hot Water – Flush Tank	2	8	16	28	46	119	245	406	585	840
7.2	Cold Water – Flush Valve	0	0	0	10	33	132	329	666	1091	1668
	Cold Water – Flush Tank	3	8	21	46	99	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
7.4	Cold Water – Flush Valve	0	0	0	11	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	10	23	49	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
7.6	Cold Water – Flush Valve	0	0	0	11	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	10	23	49	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
7.8	Cold Water – Flush Valve	0	0	0	11	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	10	23	49	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840

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**Table 4.1
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
TYPE L COPPER**

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
	Internal Pipe Diameter (inches)	0.545	0.785	1.025	1.265	1.505	1.985	2.465	2.945	3.425	3.905
8	Cold Water – Flush Valve	0	0	0	12	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	10	23	51	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
8.2	Cold Water – Flush Valve	0	0	0	12	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	10	24	51	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
8.4	Cold Water – Flush Valve	0	0	0	13	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	10	24	54	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
8.6	Cold Water – Flush Valve	0	0	0	13	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	10	24	54	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
8.8	Cold Water – Flush Valve	0	0	0	13	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	10	24	54	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
9	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	10	24	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
9.2	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	12	26	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
9.4	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	12	26	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
9.8	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	12	26	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840

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**Table 4.1
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
TYPE L COPPER**

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.545	0.785	1.025	1.265	1.505	1.985	2.465	2.945	3.425	3.905
10	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	12	28	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
10.2	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	12	28	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
10.4	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	12	28	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
10.6	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	12	28	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
10.8	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	12	28	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
11	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	12	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
11.2	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	13	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
11.4	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	13	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
11.6	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	13	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
11.8	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	13	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840

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**Table 4.1
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
TYPE L COPPER**

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.545	0.785	1.025	1.265	1.505	1.985	2.465	2.945	3.425	3.905
12	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	3	13	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
12.2	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	4	13	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
12.4	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	4	13	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
12.6	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	4	13	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
12.8	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	4	13	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
13	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	4	13	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
13.2	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	4	13	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
13.4	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	4	15	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
13.6	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	4	15	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
13.8	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	4	15	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840

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Table 4.1
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
TYPE L COPPER

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.545	0.785	1.025	1.265	1.505	1.985	2.465	2.945	3.425	3.905
14	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	4	15	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
14.5	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	4	15	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
15	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	4	15	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
15.5	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	4	15	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
16	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	4	16	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
17	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	4	16	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
18	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	4	16	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
19	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	6	16	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840
>19	Cold Water – Flush Valve	0	0	0	14	35	132	329	666	1091	1668
	Cold Water – Flush Tank	6	16	30	56	103	254	455	719	1091	1668
	Hot Water – Flush Tank	3	8	16	28	46	119	245	406	585	840

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**Table 4.2:
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
CPVC SDR 11**

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.465	0.675	0.881	1.085	1.289	1.693	N/A	N/A	N/A	N/A
1	Systems with Flush Valve	0	0	0	0	0	5				
	Systems with – Flush Tank	0	1	4	8	15	34				
1.1	Systems with Flush Valve	0	0	0	0	0	6				
	Systems with – Flush Tank	0	1	4	8	15	36				
1.2	Systems with Flush Valve	0	0	0	0	0	7				
	Systems with – Flush Tank	0	1	4	10	16	39				
1.3	Systems with Flush Valve	0	0	0	0	0	8				
	Systems with – Flush Tank	0	1	6	10	16	42				
1.4	Systems with Flush Valve	0	0	0	0	0	9				
	Systems with – Flush Tank	0	1	6	10	18	44				
1.5	Systems with Flush Valve	0	0	0	0	0	10				
	Systems with – Flush Tank	0	1	6	12	18	46				
1.6	Systems with Flush Valve	0	0	0	0	0	11				
	Systems with – Flush Tank	0	3	6	12	20	49				
1.7	Systems with Flush Valve	0	0	0	0	0	12				
	Systems with – Flush Tank	0	3	6	12	20	51				
1.8	Systems with Flush Valve	0	0	0	0	0	13				
	Systems with – Flush Tank	0	3	6	12	21	54				
1.9	Systems with Flush Valve	0	0	0	0	0	14				
	Systems with – Flush Tank	0	3	7	13	21	56				
2	Systems with Flush Valve	0	0	0	0	0	15				
	Systems with – Flush Tank	0	3	7	13	23	58				
2.1	Systems with Flush Valve	0	0	0	0	0	16				
	Systems with – Flush Tank	0	3	7	13	23	60				
2.2	Systems with Flush Valve	0	0	0	0	0	18				
	Systems with – Flush Tank	0	3	7	13	23	63				
2.3	Systems with Flush Valve	0	0	0	0	0	20				
	Systems with – Flush Tank	0	3	7	15	24	66				
2.5	Systems with Flush Valve	0	0	0	0	0	21				
	Systems with – Flush Tank	0	3	7	15	26	69				

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**Table 4.2:
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
CPVC SDR 11**

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.465	0.675	0.881	1.085	1.289	1.693	N/A	N/A	N/A	N/A
2.6	Systems with Flush Valve	0	0	0	0	0	23				
	Systems with – Flush Tank	0	3	8	15	26	74				
2.7	Systems with Flush Valve	0	0	0	0	0	25				
	Systems with – Flush Tank	0	3	8	16	26	78				
2.8	Systems with Flush Valve	0	0	0	0	0	25				
	Systems with – Flush Tank	0	3	8	16	28	78				
2.9	Systems with Flush Valve	0	0	0	0	0	26				
	Systems with – Flush Tank	0	3	8	16	28	83				
3.0	Systems with Flush Valve	0	0	0	0	0	28				
	Systems with – Flush Tank	0	4	8	16	28	86				
3.1	Systems with Flush Valve	0	0	0	0	0	30				
	Systems with – Flush Tank	0	4	8	18	30	90				
3.3	Systems with Flush Valve	0	0	0	0	0	30				
	Systems with – Flush Tank	0	4	10	18	32	95				
3.4	Systems with Flush Valve	0	0	0	0	0	33				
	Systems with – Flush Tank	0	4	10	18	32	99				
3.6	Systems with Flush Valve	0	0	0	0	5	35				
	Systems with – Flush Tank	0	4	10	20	34	103				
3.7	Systems with Flush Valve	0	0	0	0	0	37				
	Systems with – Flush Tank	0	4	10	20	34	107				
3.8	Systems with Flush Valve	0	0	0	0	5	37				
	Systems with – Flush Tank	1	4	10	20	34	107				
3.9	Systems with Flush Valve	0	0	0	0	5	39				
	Systems with – Flush Tank	1	4	10	20	34	111				
4.0	Systems with Flush Valve	0	0	0	0	6	42				
	Systems with – Flush Tank	1	4	10	20	36	115				
4.1	Systems with Flush Valve	0	0	0	0	6	42				
	Systems with – Flush Tank	1	4	10	21	36	115				
4.2	Systems with Flush Valve	0	0	0	0	6	44				
	Systems with – Flush Tank	1	4	12	21	36	119				

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Table 4.2
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
CPVC SDR 11
 (Do not interpolate)

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.465	0.675	0.881	1.085	1.289	1.693	N/A	N/A	N/A	N/A
4.3	Systems with Flush Valve	0	0	0	0	7	46				
	Systems with – Flush Tank	1	4	12	21	39	123				
4.5	Systems with Flush Valve	0	0	0	0	7	48				
	Systems with – Flush Tank	1	4	12	21	39	127				
4.6	Systems with Flush Valve	0	0	0	0	8	48				
	Systems with – Flush Tank	1	4	12	23	42	127				
4.7	Systems with Flush Valve	0	0	0	0	8	50				
	Systems with – Flush Tank	1	6	12	23	42	130				
4.9	Systems with Flush Valve	0	0	0	0	8	52				
	Systems with – Flush Tank	1	6	12	23	42	135				
5.0	Systems with Flush Valve	0	0	0	0	9	54				
	Systems with – Flush Tank	1	6	12	23	44	141				
5.1	Systems with Flush Valve	0	0	0	0	9	54				
	Systems with – Flush Tank	1	6	13	24	44	141				
5.2	Systems with Flush Valve	0	0	0	0	9	57				
	Systems with – Flush Tank	1	6	13	24	44	146				
5.3	Systems with Flush Valve	0	0	0	0	10	57				
	Systems with – Flush Tank	1	6	13	24	46	146				
5.4	Systems with Flush Valve	0	0	0	0	10	60				
	Systems with – Flush Tank	1	6	13	24	46	151				
5.6	Systems with Flush Valve	0	0	0	0	10	63				
	Systems with – Flush Tank	1	6	13	24	46	155				
5.7	Systems with Flush Valve	0	0	0	0	11	63				
	Systems with – Flush Tank	1	6	13	26	49	155				
5.8	Systems with Flush Valve	0	0	0	0	11	66				
	Systems with – Flush Tank	1	6	13	25	49	160				
5.9	Systems with Flush Valve	0	0	0	0	11	69				
	Systems with – Flush Tank	1	6	13	26	49	165				

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Table 4.2
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
CPVC SDR 11

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.465	0.675	0.881	1.085	1.289	1.693	N/A	N/A	N/A	N/A
6.1	Systems with Flush Valve	0	0	0	0	12	73				
	Systems with – Flush Tank	1	6	15	26	51	170				
6.3	Systems with Flush Valve	0	0	0	0	12	76				
	Systems with – Flush Tank	1	6	15	28	51	175				
6.5	Systems with Flush Valve	0	0	0	0	13	76				
	Systems with – Flush Tank	1	6	15	28	54	175				
6.7	Systems with Flush Valve	0	0	0	0	13	82				
	Systems with – Flush Tank	1	6	15	28	54	185				
6.9	Systems with Flush Valve	0	0	0	0	14	82				
	Systems with – Flush Tank	1	6	15	28	56	185				
7.0	Systems with Flush Valve	0	0	0	0	14	82				
	Systems with – Flush Tank	1	7	15	30	56	185				
7.1	Systems with Flush Valve	0	0	0	0	14	88				
	Systems with – Flush Tank	1	7	15	30	56	195				
7.3	Systems with Flush Valve	0	0	0	0	15	88				
	Systems with – Flush Tank	1	7	16	30	58	195				
7.5	Systems with Flush Valve	0	0	0	0	15	95				
	Systems with – Flush Tank	1	7	16	30	58	205				
7.7	Systems with Flush Valve	0	0	0	0	15	95				
	Systems with – Flush Tank	1	7	16	32	58	205				
7.8	Systems with Flush Valve	0	0	0	0	15	95				
	Systems with – Flush Tank	1	7	16	32	60	205				
8.0	Systems with Flush Valve	0	0	0	0	16	102				
	Systems with – Flush Tank	1	7	16	32	60	215				
8.2	Systems with Flush Valve	0	0	0	0	18	102				
	Systems with – Flush Tank	1	7	16	32	63	215				
8.4	Systems with Flush Valve	0	0	0	5	18	108				
	Systems with – Flush Tank	1	7	16	34	63	225				

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Table 4.2
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
CPVC SDR 11

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.465	0.675	0.881	1.085	1.289	1.693	N/A	N/A	N/A	N/A
8.5	Systems with Flush Valve	0	0	0	5	18	108				
	Systems with – Flush Tank	1	7	18	34	63	225				
8.7	Systems with Flush Valve	0	0	0	5	20	108				
	Systems with – Flush Tank	1	7	18	34	66	225				
9.1	Systems with Flush Valve	0	0	0	6	20	108				
	Systems with – Flush Tank	1	7	18	36	66	225				
9.2	Systems with Flush Valve	0	0	0	6	21	108				
	Systems with – Flush Tank	1	8	18	36	69	225				
9.6	Systems with Flush Valve	0	0	0	6	23	108				
	Systems with – Flush Tank	3	8	18	36	74	225				
9.7	Systems with Flush Valve	0	0	0	6	23	108				
	Systems with – Flush Tank	3	8	20	36	74	225				
9.9	Systems with Flush Valve	0	0	0	7	23	108				
	Systems with – Flush Tank	3	8	20	39	74	225				
10.1	Systems with Flush Valve	0	0	0	7	25	108				
	Systems with – Flush Tank	3	8	20	39	78	225				
10.3	Systems with Flush Valve	0	0	0	7	25	108				
	Systems with – Flush Tank	3	8	20	39	78	225				
10.6	Systems with Flush Valve	0	0	0	8	26	108				
	Systems with – Flush Tank	3	8	20	42	83	225				
11.1	Systems with Flush Valve	0	0	0	8	28	108				
	Systems with – Flush Tank	3	8	21	42	86	225				
11.5	Systems with Flush Valve	0	0	0	9	28	108				
	Systems with – Flush Tank	3	8	21	44	86	225				
11.7	Systems with Flush Valve	0	0	0	9	30	108				
	Systems with – Flush Tank	3	8	21	44	90	225				
12.0	Systems with Flush Valve	0	0	0	9	30	108				
	Systems with – Flush Tank	3	10	21	44	90	225				

**Table 4.2:
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
CPVC SDR 11**

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
	Internal Pipe Diameter (inches)	0.465	0.675	0.881	1.085	1.289	1.693	N/A	N/A	N/A	N/A
12.3	Systems with Flush Valve	0	0	0	10	30	108				
	Systems with – Flush Tank	3	10	21	46	90	225				
12.6	Systems with Flush Valve	0	0	0	10	30	108				
	Systems with – Flush Tank	3	10	23	46	90	225				
13.2	Systems with Flush Valve	0	0	0	11	30	108				
	Systems with – Flush Tank	3	10	23	49	90	225				
14.1	Systems with Flush Valve	0	0	0	12	30	108				
	Systems with – Flush Tank	3	10	24	51	90	225				
15.1	Systems with Flush Valve	0	0	0	12	30	108				
	Systems with – Flush Tank	3	12	24	51	90	225				
15.7	Systems with Flush Valve	0	0	0	12	30	108				
	Systems with – Flush Tank	3	12	26	51	90	225				
17.4	Systems with Flush Valve	0	0	0	12	30	108				
	Systems with – Flush Tank	3	12	28	51	90	225				
17.9	Systems with Flush Valve	0	0	0	12	30	108				
	Systems with – Flush Tank	4	12	28	51	90	225				
18.5	Systems with Flush Valve	0	0	0	12	30	108				
	Systems with – Flush Tank	4	13	28	51	90	225				
22.3	Systems with Flush Valve	0	0	0	12	30	108				
	Systems with – Flush Tank	4	15	28	51	90	225				
28.5	Systems with Flush Valve	0	0	0	12	30	108				
	Systems with – Flush Tank	6	15	28	51	90	225				
>28.5	Systems with Flush Valve	0	0	0	12	30	108				
	Systems with – Flush Tank	6	15	28	51	90	225				
	Systems with Flush Valve										
	Systems with – Flush Tank										

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Table 4.2
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
CPVC SCHEDULE 40

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	3.548	4.026
1.0	Systems with Flush Valve	0	0	0	0	0	23	76	270	559	1009
	Systems with – Flush Tank	1	3	7	18	28	74	175	406	638	1018
1.1	Systems with Flush Valve	0	0	0	0	0	26	82	295	631	1091
	Systems with – Flush Tank	1	3	8	20	30	83	185	431	692	1091
1.2	Systems with Flush Valve	0	0	0	0	0	30	95	329	700	1173
	Systems with – Flush Tank	1	4	8	20	32	90	205	455	748	1173
1.3	Systems with Flush Valve	0	0	0	0	5	33	102	365	739	1254
	Systems with – Flush Tank	1	4	8	21	34	99	215	479	778	1254
1.4	Systems with Flush Valve	0	0	0	0	6	37	108	396	811	1335
	Systems with – Flush Tank	1	4	10	21	36	107	225	506	840	1335
1.5	Systems with Flush Valve	0	0	0	0	7	39	124	430	850	1418
	Systems with – Flush Tank	1	4	10	23	39	111	245	533	874	1418
1.6	Systems with Flush Valve	0	0	0	0	8	44	132	460	850	1500
	Systems with – Flush Tank	1	4	10	24	42	119	254	559	874	1500
1.7	Systems with Flush Valve	0	0	0	0	9	48	140	490	931	1583
	Systems with – Flush Tank	1	4	10	24	44	127	264	585	945	1583
1.8	Systems with Flush Valve	0	0	0	0	10	50	158	521	1009	1668
	Systems with – Flush Tank	1	6	12	26	46	130	284	611	1018	1668
1.9	Systems with Flush Valve	0	0	0	0	10	54	168	521	1009	1755
	Systems with – Flush Tank	1	6	12	26	46	141	294	611	1018	1755
2.0	Systems with Flush Valve	0	0	0	0	11	57	176	559	1091	1845
	Systems with – Flush Tank	1	6	12	28	49	146	305	638	1091	1845
2.1	Systems with Flush Valve	0	0	0	0	12	63	186	596	1173	1926
	Systems with – Flush Tank	1	6	12	28	51	155	315	665	1173	1926
2.2	Systems with Flush Valve	0	0	0	0	13	66	195	631	1173	2018
	Systems with – Flush Tank	1	6	13	30	54	160	325	692	1173	2018
2.3	Systems with Flush Valve	0	0	0	0	13	69	205	666	1254	2018
	Systems with – Flush Tank	1	6	13	30	54	165	337	719	1254	2018
2.4	Systems with Flush Valve	0	0	0	0	14	76	214	666	1254	2110
	Systems with – Flush Tank	3	6	13	32	56	175	348	719	1254	2110

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Table 4.2
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
CPVC SCHEDULE 40

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	3.548	4.026
2.5	Systems with Flush Valve	0	0	0	0	15	76	234	700	1335	2204
	Systems with – Flush Tank	3	6	13	32	58	175	370	748	1335	2204
2.6	Systems with Flush Valve	0	0	0	5	15	82	245	739	1335	2298
	Systems with – Flush Tank	3	7	13	34	58	185	380	778	1335	2298
2.7	Systems with Flush Valve	0	0	0	55	16	88	245	775	1418	2298
	Systems with – Flush Tank	3	7	15	34	60	195	380	809	1418	2298
2.8	Systems with Flush Valve	0	0	0	55	18	88	245	775	1418	2388
	Systems with – Flush Tank	3	7	15	34	63	195	380	809	1418	2388
2.9	Systems with Flush Valve	0	0	0	65	18	95	270	811	1500	2480
	Systems with – Flush Tank	3	7	15	36	63	205	406	840	1500	2480
3.0	Systems with Flush Valve	0	0	0	65	20	102	270	850	1583	2575
	Systems with – Flush Tank	3	7	15	36	66	215	406	874	1583	2575
3.1	Systems with Flush Valve	0	0	0	75	21	102	295	850	1583	2575
	Systems with – Flush Tank	3	7	16	39	69	215	431	874	1583	2575
3.2	Systems with Flush Valve	0	0	0	75	21	108	295	850	1583	2575
	Systems with – Flush Tank	3	7	16	39	69	225	431	874	1583	2575
3.3	Systems with Flush Valve	0	0	0	85	23	108	295	931	1668	2575
	Systems with – Flush Tank	3	7	16	42	74	225	431	945	1668	2575
3.4	Systems with Flush Valve	0	0	0	85	23	116	329	931	1668	2575
	Systems with – Flush Tank	3	7	16	42	74	236	455	945	1668	2575
3.5	Systems with Flush Valve	0	0	0	85	25	116	329	931	1755	2575
	Systems with – Flush Tank	3	8	16	42	78	236	455	945	1755	2575
3.6	Systems with Flush Valve	0	0	0	95	26	124	329	1009	1755	2575
	Systems with – Flush Tank	3	8	18	44	83	245	455	1018	1755	2575
3.7	Systems with Flush Valve	0	0	0	95	26	132	365	1009	1755	2575
	Systems with – Flush Tank	3	8	18	44	83	254	479	1018	1755	2575
3.8	Systems with Flush Valve	0	0	0	105	28	132	365	1009	1755	2575
	Systems with – Flush Tank	3	8	18	46	86	254	479	1018	1755	2575
4.0	Systems with Flush Valve	0	0	0	105	30	140	396	1091	1755	2575
	Systems with – Flush Tank	3	8	18	46	90	264	506	1091	1755	2575

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CPVC SCHEDULE 40**

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	3.548	4.026
4.1	Systems with Flush Valve	0	0	0	115	30	148	396	1091	1755	2575
	Systems with – Flush Tank	3	8	18	49	90	275	506	1091	1755	2575
4.2	Systems with Flush Valve	0	0	0	115	31	148	396	1091	1755	2575
	Systems with – Flush Tank	3	8	20	49	95	275	506	1091	1755	2575
4.3	Systems with Flush Valve	0	0	0	115	31	158	430	1173	1755	2575
	Systems with – Flush Tank	3	8	20	49	95	284	533	1173	1755	2575
4.4	Systems with Flush Valve	0	0	0	125	33	158	430	1173	1755	2575
	Systems with – Flush Tank	3	8	20	51	99	284	533	1173	1755	2575
4.5	Systems with Flush Valve	0	0	0	125	35	168	430	1173	1755	2575
	Systems with – Flush Tank	3	8	20	51	103	294	533	1173	1755	2575
4.6	Systems with Flush Valve	0	0	0	125	35	168	430	1173	1755	2575
	Systems with – Flush Tank	4	8	20	51	103	294	533	1173	1755	2575
4.7	Systems with Flush Valve	0	0	0	135	37	176	460	1173	1755	2575
	Systems with – Flush Tank	4	10	20	54	107	305	559	1173	1755	2575
4.8	Systems with Flush Valve	0	0	0	135	37	176	460	1173	1755	2575
	Systems with – Flush Tank	4	10	21	54	107	305	559	1173	1755	2575
4.9	Systems with Flush Valve	0	0	0	135	39	186	490	1173	1755	2575
	Systems with – Flush Tank	4	10	21	54	111	315	585	1173	1755	2575
5.0	Systems with Flush Valve	0	0	0	145	39	186	490	1173	1755	2575
	Systems with – Flush Tank	4	10	21	56	111	315	585	1173	1755	2575
5.1	Systems with Flush Valve	0	0	0	145	42	195	490	1173	1755	2575
	Systems with – Flush Tank	4	10	21	56	115	325	585	1173	1755	2575
5.2	Systems with Flush Valve	0	0	0	155	44	195	521	1173	1755	2575
	Systems with – Flush Tank	4	10	21	56	115	325	611	1173	1755	2575
5.3	Systems with Flush Valve	0	0	0	155	44	205	521	1173	1755	2575
	Systems with – Flush Tank	4	10	21	58	119	337	611	1173	1755	2575
5.4	Systems with Flush Valve	0	0	0	155	44	205	521	1173	1755	2575
	Systems with – Flush Tank	4	10	23	58	119	337	611	1173	1755	2575

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CPVC SCHEDULE 40

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	3.548	4.026
5.6	Systems with Flush Valve	0	0	0	165	46	214	521	1173	1755	2575
	Systems with – Flush Tank	4	10	23	60	123	348	611	1173	1755	2575
5.8	Systems with Flush Valve	0	0	0	165	48	223	521	1173	1755	2575
	Systems with – Flush Tank	4	12	23	60	127	359	611	1173	1755	2575
5.9	Systems with Flush Valve	0	0	0	165	48	223	521	1173	1755	2575
	Systems with – Flush Tank	4	12	23	63	127	359	611	1173	1755	2575
6.0	Systems with Flush Valve	0	0	0	165	50	234	521	1173	1755	2575
	Systems with – Flush Tank	4	12	23	63	130	370	611	1173	1755	2575
6.2	Systems with Flush Valve	0	0	0	205	52	245	521	1173	1755	2575
	Systems with – Flush Tank	4	12	24	66	135	380	611	1173	1755	2575
6.4	Systems with Flush Valve	0	0	0	205	54	245	521	1173	1755	2575
	Systems with – Flush Tank	4	12	24	66	141	380	611	1173	1755	2575
6.6	Systems with Flush Valve	0	0	0	215	57	245	521	1173	1755	2575
	Systems with – Flush Tank	4	12	24	69	146	380	611	1173	1755	2575
6.7	Systems with Flush Valve	0	0	0	215	57	245	521	1173	1755	2575
	Systems with – Flush Tank	4	12	26	69	146	380	611	1173	1755	2575
6.8	Systems with Flush Valve	0	0	0	215	57	270	521	1173	1755	2575
	Systems with – Flush Tank	4	12	26	69	146	406	611	1173	1755	2575
6.9	Systems with Flush Valve	0	0	0	235	60	270	521	1173	1755	2575
	Systems with – Flush Tank	4	12	26	74	151	406	611	1173	1755	2575
7.1	Systems with Flush Valve	0	0	0	235	63	270	521	1173	1755	2575
	Systems with – Flush Tank	6	13	26	74	155	406	611	1173	1755	2575
7.3	Systems with Flush Valve	0	0	0	255	66	270	521	1173	1755	2575
	Systems with – Flush Tank	6	13	26	78	160	406	611	1173	1755	2575
7.5	Systems with Flush Valve	0	0	0	255	66	270	521	1173	1755	2575
	Systems with – Flush Tank	6	13	28	78	160	406	611	1173	1755	2575
7.6	Systems with Flush Valve	0	0	0	265	69	270	521	1173	1755	2575
	Systems with – Flush Tank	6	13	28	83	165	406	611	1173	1755	2575

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Table 4.2
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
CPVC SCHEDULE 40

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	3.548	4.026
7.8	Systems with Flush Valve	0	0	0	265	73	270	521	1173	1755	2575
	Systems with – Flush Tank	6	13	28	83	170	406	611	1173	1755	2575
8.0	Systems with Flush Valve	0	0	0	285	73	270	521	1173	1755	2575
	Systems with – Flush Tank	6	13	28	86	170	406	611	1173	1755	2575
8.1	Systems with Flush Valve	0	0	0	285	76	270	521	1173	1755	2575
	Systems with – Flush Tank	6	13	28	86	175	406	611	1173	1755	2575
8.2	Systems with Flush Valve	0	0	0	285	76	270	521	1173	1755	2575
	Systems with – Flush Tank	6	13	30	86	175	406	611	1173	1755	2575
8.4	Systems with Flush Valve	0	0	0	305	76	270	521	1173	1755	2575
	Systems with – Flush Tank	6	13	30	90	175	406	611	1173	1755	2575
8.5	Systems with Flush Valve	0	0	0	305	76	270	521	1173	1755	2575
	Systems with – Flush Tank	6	13	30	90	175	406	611	1173	1755	2575
8.6	Systems with Flush Valve	0	0	0	305	82	270	521	1173	1755	2575
	Systems with – Flush Tank	6	15	30	90	185	406	611	1173	1755	2575
8.8	Systems with Flush Valve	0	0	0	315	82	270	521	1173	1755	2575
	Systems with – Flush Tank	6	15	30	95	185	406	611	1173	1755	2575
9.0	Systems with Flush Valve	0	0	0	315	82	270	521	1173	1755	2575
	Systems with – Flush Tank	6	15	32	95	185	406	611	1173	1755	2575
9.2	Systems with Flush Valve	0	0	0	335	82	270	521	1173	1755	2575
	Systems with – Flush Tank	6	15	32	99	185	406	611	1173	1755	2575
9.6	Systems with Flush Valve	0	0	0	355	82	270	521	1173	1755	2575
	Systems with – Flush Tank	6	15	32	103	185	406	611	1173	1755	2575
9.9	Systems with Flush Valve	0	0	5	355	82	270	521	1173	1755	2575
	Systems with – Flush Tank	6	15	34	103	185	406	611	1173	1755	2575
10.0	Systems with Flush Valve	0	0	5	375	82	270	521	1173	1755	2575
	Systems with – Flush Tank	6	16	34	107	185	406	611	1173	1755	2575
10.1	Systems with Flush Valve	0	0	5	375	82	270	521	1173	1755	2575
	Systems with – Flush Tank	7	16	34	107	185	406	611	1173	1755	2575

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Table 4.2
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
CPVC SCHEDULE 40

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	3.548	4.026
10.4	Systems with Flush Valve	0	0	5	395	82	270	521	1173	1755	2575
	Systems with – Flush Tank	7	16	34	111	185	406	611	1173	1755	2575
10.7	Systems with Flush Valve	0	0	6	395	82	270	521	1173	1755	2575
	Systems with – Flush Tank	7	16	36	111	185	406	611	1173	1755	2575
10.8	Systems with Flush Valve	0	0	6	425	82	270	521	1173	1755	2575
	Systems with – Flush Tank	7	16	36	115	185	406	611	1173	1755	2575
11.6	Systems with Flush Valve	0	0	7	42	82	270	521	1173	1755	2575
	Systems with – Flush Tank	7	16	39	115	185	406	611	1173	1755	2575
11.7	Systems with Flush Valve	0	0	7	425	82	270	521	1173	1755	2575
	Systems with – Flush Tank	7	18	39	115	185	406	611	1173	1755	2575
12.5	Systems with Flush Valve	0	0	8	42	82	270	521	1173	1755	2575
	Systems with – Flush Tank	7	18	42	115	185	406	611	1173	1755	2575
13.5	Systems with Flush Valve	0	0	9	42	82	270	521	1173	1755	2575
	Systems with – Flush Tank	7	20	44	115	185	406	611	1173	1755	2575
13.8	Systems with Flush Valve	0	0	9	42	82	270	521	1173	1755	2575
	Systems with – Flush Tank	8	20	44	115	185	406	611	1173	1755	2575
14.5	Systems with Flush Valve	0	0	10	42	82	270	521	1173	1755	2575
	Systems with – Flush Tank	8	20	46	115	185	406	611	1173	1755	2575
15.4	Systems with Flush Valve	0	0	10	42	82	270	521	1173	1755	2575
	Systems with – Flush Tank	8	21	46	115	185	406	611	1173	1755	2575
17.4	Systems with Flush Valve	0	0	10	42	82	270	521	1173	1755	2575
	Systems with – Flush Tank	8	23	46	115	185	406	611	1173	1755	2575
17.8	Systems with Flush Valve	0	0	10	42	82	270	521	1173	1755	2575
	Systems with – Flush Tank	10	23	46	115	185	406	611	1173	1755	2575
19.5	Systems with Flush Valve	0	0	10	42	82	270	521	1173	1755	2575
	Systems with – Flush Tank	10	24	46	115	185	406	611	1173	1755	2575
22.5	Systems with Flush Valve	0	0	10	42	82	270	521	1173	1755	2575
	Systems with – Flush Tank	12	24	46	115	185	406	611	1173	1755	2575

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**Table 4.2
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
CPVC SCHEDULE 40**

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
	Internal Pipe Diameter (inches)	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	3.548	4.026
>22.5	Systems with Flush Valve	0	0	10	42	82	270	521	1173	1755	2575
	Systems with – Flush Tank	12	24	46	115	185	406	611	1173	1755	2575
	Systems with Flush Valve										
	Systems with – Flush Tank										
	Systems with Flush Valve										
	Systems with – Flush Tank										
	Systems with Flush Valve										
	Systems with – Flush Tank										
	Systems with Flush Valve										
	Systems with – Flush Tank										
	Systems with Flush Valve										
	Systems with – Flush Tank										
	Systems with Flush Valve										
	Systems with – Flush Tank										
	Systems with Flush Valve										
	Systems with – Flush Tank										
	Systems with Flush Valve										
	Systems with – Flush Tank										

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Table 4.2
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
CPVC AND PP SCHEDULE 80

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.546	0.742	0.957	1.278	1.500	1.939	2.323	2.900	3.364	3.826
1	Systems with Flush Valve	0	0	0	0	0	15	50	195	430	811
	Systems with – Flush Tank	0	3	6	15	23	58	130	325	533	840
1.1	Systems with Flush Valve	0	0	0	0	0	16	54	223	490	850
	Systems with – Flush Tank	0	3	6	15	24	60	141	359	585	874
1.2	Systems with Flush Valve	0	0	0	0	0	20	63	245	521	931
	Systems with – Flush Tank	0	3	6	16	26	66	155	380	611	945
1.3	Systems with Flush Valve	0	0	0	0	0	21	69	270	596	1009
	Systems with – Flush Tank	0	3	7	16	26	69	165	406	665	1018
1.4	Systems with Flush Valve	0	0	0	0	0	25	76	270	631	1091
	Systems with – Flush Tank	0	3	7	18	28	78	175	406	692	1091
1.5	Systems with Flush Valve	0	0	0	0	0	26	82	295	666	1173
	Systems with – Flush Tank	0	3	7	18	30	83	185	431	719	1173
1.6	Systems with Flush Valve	0	0	0	0	0	30	88	329	700	1254
	Systems with – Flush Tank	0	3	7	20	32	90	195	455	748	1254
1.7	Systems with Flush Valve	0	0	0	0	0	31	102	365	739	1335
	Systems with – Flush Tank	0	3	8	20	32	95	215	479	778	1335
1.8	Systems with Flush Valve	0	0	0	0	5	33	108	396	775	1335
	Systems with – Flush Tank	1	3	8	20	34	99	225	506	809	1335
1.9	Systems with Flush Valve	0	0	0	0	6	37	116	396	850	1418
	Systems with – Flush Tank	1	4	8	21	36	107	236	506	874	1418
2.0	Systems with Flush Valve	0	0	0	0	6	39	124	430	850	1500
	Systems with – Flush Tank	1	4	8	21	36	111	245	533	874	1500
2.1	Systems with Flush Valve	0	0	0	0	7	42	132	460	931	1583
	Systems with – Flush Tank	1	4	8	23	39	115	254	559	945	1583
2.2	Systems with Flush Valve	0	0	0	0	8	44	140	460	931	1583
	Systems with – Flush Tank	1	4	10	23	42	119	264	559	945	1583
2.3	Systems with Flush Valve	0	0	0	0	8	46	148	490	1009	1668
	Systems with – Flush Tank	1	4	10	24	42	123	275	585	1018	1668

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**Table 4.2
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
CPVC AND PP SCHEDULE 80**

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.546	0.742	0.957	1.278	1.500	1.939	2.323	2.900	3.364	3.826
2.4	Systems with Flush Valve	0	0	0	0	9	50	148	521	1009	1775
	Systems with – Flush Tank	1	4	10	24	44	130	275	611	1018	1775
2.5	Systems with Flush Valve	0	0	0	0	9	52	158	521	1091	1755
	Systems with – Flush Tank	1	4	10	24	44	135	284	611	1091	1755
2.6	Systems with Flush Valve	0	0	0	0	10	54	168	559	1091	1845
	Systems with – Flush Tank	1	4	10	26	46	141	294	638	1091	1845
2.7	Systems with Flush Valve	0	0	0	0	10	57	176	596	1173	1926
	Systems with – Flush Tank	1	4	10	26	46	146	305	665	1173	1926
2.8	Systems with Flush Valve	0	0	0	0	11	60	186	596	1173	1926
	Systems with – Flush Tank	1	4	12	26	49	151	315	665	1173	1926
2.9	Systems with Flush Valve	0	0	0	0	12	63	195	631	1173	2018
	Systems with – Flush Tank	1	4	12	28	51	155	325	692	1173	2018
3.0	Systems with Flush Valve	0	0	0	0	12	66	205	631	1254	2110
	Systems with – Flush Tank	1	4	12	28	51	160	337	692	1254	2110
3.1	Systems with Flush Valve	0	0	0	0	13	69	205	666	1254	2110
	Systems with – Flush Tank	1	6	12	28	54	165	337	719	1254	2110
3.2	Systems with Flush Valve	0	0	0	0	13	73	214	700	1335	2204
	Systems with – Flush Tank	1	6	12	30	54	170	348	748	1335	2204
3.3	Systems with Flush Valve	0	0	0	0	14	76	223	700	1335	2204
	Systems with – Flush Tank	1	6	12	30	56	175	359	748	1335	2204
3.4	Systems with Flush Valve	0	0	0	0	14	76	234	739	1418	2204
	Systems with – Flush Tank	1	6	13	30	56	175	370	778	1418	2204
3.5	Systems with Flush Valve	0	0	0	0	15	82	245	739	1418	2204
	Systems with – Flush Tank	1	6	13	32	58	185	380	778	1418	2204
3.6	Systems with Flush Valve	0	0	0	0	15	82	245	775	1418	2204
	Systems with – Flush Tank	1	6	13	32	58	185	380	809	1418	2204
3.7	Systems with Flush Valve	0	0	0	0	16	88	245	775	1500	2204
	Systems with – Flush Tank	1	6	13	32	60	195	380	809	1500	2204

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Table 4.2
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
CPVC AND PP SCHEDULE 80

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.546	0.742	0.957	1.278	1.500	1.939	2.323	2.900	3.364	3.826
3.8	Systems with Flush Valve	0	0	0	5	16	88	245	811	1500	2204
	Systems with – Flush Tank	1	6	13	34	60	195	380	840	1500	2204
3.9	Systems with Flush Valve	0	0	0	5	16	95	270	811	1500	2204
	Systems with – Flush Tank	1	6	13	34	60	205	406	840	1500	2204
4.0	Systems with Flush Valve	0	0	0	5	18	95	270	850	1500	2204
	Systems with – Flush Tank	1	6	13	34	63	205	406	874	1500	2204
4.1	Systems with Flush Valve	0	0	0	6	18	102	270	850	1500	2204
	Systems with – Flush Tank	1	6	15	36	63	215	406	874	1500	2204
4.3	Systems with Flush Valve	0	0	0	6	20	102	295	931	1500	2204
	Systems with – Flush Tank	1	7	15	36	66	215	431	945	1500	2204
4.4	Systems with Flush Valve	0	0	0	6	21	108	295	931	1500	2204
	Systems with – Flush Tank	3	7	15	36	69	225	431	945	1500	2204
4.5	Systems with Flush Valve	0	0	0	7	21	108	295	931	1500	2204
	Systems with – Flush Tank	3	7	15	39	69	225	431	945	1500	2204
4.6	Systems with Flush Valve	0	0	0	7	23	116	329	931	1500	2204
	Systems with – Flush Tank	3	7	15	39	74	236	455	945	1500	2204
4.8	Systems with Flush Valve	0	0	0	8	23	124	329	931	1500	2204
	Systems with – Flush Tank	3	7	15	42	74	245	455	945	1500	2204
4.9	Systems with Flush Valve	0	0	0	8	25	124	365	931	1500	2204
	Systems with – Flush Tank	3	7	15	42	78	245	479	945	1500	2204
5.0	Systems with Flush Valve	0	0	0	8	25	124	365	931	1500	2204
	Systems with – Flush Tank	3	7	16	42	78	245	479	945	1500	2204
5.1	Systems with Flush Valve	0	0	0	8	26	132	365	931	1500	2204
	Systems with – Flush Tank	3	7	16	42	83	254	479	945	1500	2204
5.2	Systems with Flush Valve	0	0	0	9	26	132	365	931	1500	2204
	Systems with – Flush Tank	3	7	16	44	83	254	479	945	1500	2204
5.3	Systems with Flush Valve	0	0	0	9	26	140	396	931	1500	2204
	Systems with – Flush Tank	3	7	16	44	83	264	506	945	1500	2204

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FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
CPVC AND PP SCHEDULE 80

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.546	0.742	0.957	1.278	1.500	1.939	2.323	2.900	3.364	3.826
5.4	Systems with Flush Valve	0	0	0	9	28	140	396	931	1500	2204
	Systems with – Flush Tank	3	7	16	44	86	264	506	945	1500	2204
5.6	Systems with Flush Valve	0	0	0	10	30	148	396	931	1500	2204
	Systems with – Flush Tank	3	7	16	46	90	275	506	945	1500	2204
5.7	Systems with Flush Valve	0	0	0	10	30	148	430	931	1500	2204
	Systems with – Flush Tank	3	7	18	46	90	275	533	945	1500	2204
5.8	Systems with Flush Valve	0	0	0	10	30	148	430	931	1500	2204
	Systems with – Flush Tank	3	8	18	46	90	275	533	945	1500	2204
5.9	Systems with Flush Valve	0	0	0	10	31	158	430	931	1500	2204
	Systems with – Flush Tank	3	8	18	46	95	284	533	945	1500	2204
6.0	Systems with Flush Valve	0	0	0	11	31	158	430	931	1500	2204
	Systems with – Flush Tank	3	8	18	49	95	284	533	945	1500	2204
6.1	Systems with Flush Valve	0	0	0	11	33	168	430	931	1500	2204
	Systems with – Flush Tank	3	8	18	49	99	294	533	945	1500	2204
6.4	Systems with Flush Valve	0	0	0	12	35	176	430	931	1500	2204
	Systems with – Flush Tank	3	8	18	51	103	305	533	945	1500	2204
6.5	Systems with Flush Valve	0	0	0	12	35	176	430	931	1500	2204
	Systems with – Flush Tank	3	8	20	51	103	305	533	945	1500	2204
6.7	Systems with Flush Valve	0	0	0	12	37	136	430	931	1500	2204
	Systems with – Flush Tank	3	8	20	51	107	315	533	945	1500	2204
6.8	Systems with Flush Valve	0	0	0	13	37	186	430	931	1500	2204
	Systems with – Flush Tank	3	8	20	54	107	315	533	945	1500	2204
6.9	Systems with Flush Valve	0	0	0	13	39	186	430	931	1500	2204
	Systems with – Flush Tank	3	8	20	54	111	315	533	945	1500	2204
7.0	Systems with Flush Valve	0	0	0	13	39	195	430	931	1500	2204
	Systems with – Flush Tank	3	8	20	54	111	325	533	945	1500	2204
7.2	Systems with Flush Valve	0	0	0	14	42	205	430	931	1500	2204
	Systems with – Flush Tank	3	8	20	56	115	337	533	945	1500	2204

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WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
CPVC AND PP SCHEDULE 80

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.546	0.742	0.957	1.278	1.500	1.939	2.323	2.900	3.364	3.826
7.4	Systems with Flush Valve	0	0	0	14	42	205	430	931	1500	2204
	Systems with – Flush Tank	3	8	21	56	115	337	533	945	1500	2204
7.5	Systems with Flush Valve	0	0	0	14	44	205	430	931	1500	2204
	Systems with – Flush Tank	3	8	21	56	119	337	533	945	1500	2204
7.6	Systems with Flush Valve	0	0	0	14	44	205	430	931	1500	2204
	Systems with – Flush Tank	3	10	21	56	119	337	533	945	1500	2204
7.7	Systems with Flush Valve	0	0	0	15	44	205	430	931	1500	2204
	Systems with – Flush Tank	3	10	21	58	119	337	533	945	1500	2204
7.8	Systems with Flush Valve	0	0	0	15	46	205	430	931	1500	2204
	Systems with – Flush Tank	3	10	21	58	123	337	533	945	1500	2204
8.1	Systems with Flush Valve	0	0	0	16	48	205	430	931	1500	2204
	Systems with – Flush Tank	3	10	21	60	127	337	533	945	1500	2204
8.2	Systems with Flush Valve	0	0	0	16	48	205	430	931	1500	2204
	Systems with – Flush Tank	3	10	21	60	127	337	533	945	1500	2204
8.4	Systems with Flush Valve	0	0	0	16	50	205	430	931	1500	2204
	Systems with – Flush Tank	4	10	23	60	130	337	533	945	1500	2204
8.6	Systems with Flush Valve	0	0	0	18	50	205	430	931	1500	2204
	Systems with – Flush Tank	4	10	23	63	130	337	533	945	1500	2204
8.7	Systems with Flush Valve	0	0	0	18	52	205	430	931	1500	2204
	Systems with – Flush Tank	4	10	23	63	135	337	533	945	1500	2204
9.0	Systems with Flush Valve	0	0	0	20	54	205	430	931	1500	2204
	Systems with – Flush Tank	4	10	23	66	141	337	533	945	1500	2204
9.3	Systems with Flush Valve	0	0	0	20	57	205	430	931	1500	2204
	Systems with – Flush Tank	4	10	23	66	146	337	533	945	1500	2204
9.4	Systems with Flush Valve	0	0	0	20	57	205	430	931	1500	2204
	Systems with – Flush Tank	4	10	24	66	146	337	533	945	1500	2204
9.5	Systems with Flush Valve	0	0	0	21	57	205	430	931	1500	2204
	Systems with – Flush Tank	4	12	24	69	146	337	533	945	1500	2204

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Table 4.2
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
CPVC AND PP SCHEDULE 80

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches) Internal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
		0.546	0.742	0.957	1.278	1.500	1.939	2.323	2.900	3.364	3.826
9.7	Systems with Flush Valve	0	0	0	21	60	205	430	931	1500	2204
	Systems with – Flush Tank	4	12	24	69	151	337	533	945	1500	2204
10.0	Systems with Flush Valve	0	0	0	23	60	205	430	931	1500	2204
	Systems with – Flush Tank	4	12	24	74	151	337	533	945	1500	2204
10.5	Systems with Flush Valve	0	0	0	23	60	205	430	931	1500	2204
	Systems with – Flush Tank	4	12	24	74	151	337	533	945	1500	2204
10.6	Systems with Flush Valve	0	0	0	25	60	205	430	931	1500	2204
	Systems with – Flush Tank	4	12	26	78	151	337	533	945	1500	2204
11.1	Systems with Flush Valve	0	0	0	26	60	205	430	931	1500	2204
	Systems with – Flush Tank	4	12	26	83	151	337	533	945	1500	2204
11.6	Systems with Flush Valve	0	0	0	28	60	205	430	931	1500	2204
	Systems with – Flush Tank	4	12	26	86	151	337	533	945	1500	2204
11.7	Systems with Flush Valve	0	0	0	28	60	205	430	931	1500	2204
	Systems with – Flush Tank	4	13	28	86	151	337	533	945	1500	2204
12.8	Systems with Flush Valve	0	0	0	28	60	205	430	931	1500	2204
	Systems with – Flush Tank	4	13	30	86	151	337	533	945	1500	2204
13.1	Systems with Flush Valve	0	0	0	28	60	205	430	931	1500	2204
	Systems with – Flush Tank	6	13	30	86	151	337	533	945	1500	2204
14.1	Systems with Flush Valve	0	0	0	28	60	205	430	931	1500	2204
	Systems with – Flush Tank	6	15	32	86	151	337	533	945	1500	2204
15.4	Systems with Flush Valve	0	0	5	28	60	205	430	931	1500	2204
	Systems with – Flush Tank	6	15	34	86	151	337	533	945	1500	2204
16.7	Systems with Flush Valve	0	0	5	28	60	205	430	931	1500	2204
	Systems with – Flush Tank	6	16	34	86	151	337	533	945	1500	2204
18.9	Systems with Flush Valve	0	0	5	28	60	205	430	931	1500	2204
	Systems with – Flush Tank	7	16	34	86	151	337	533	945	1500	2204
19.4	Systems with Flush Valve	0	0	5	28	60	205	430	931	1500	2204
	Systems with – Flush Tank	7	18	34	86	151	337	533	945	1500	2204

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Table 4.2
WATER PIPES SIZING
FIXTURE UNITS VERSUS FRICTION LOSS (PSI PER 100 FOOT-LENGTH)
CPVC AND PP SCHEDULE 80
 (Do not interpolate)

Friction Loss (psi per 100ft)	Nominal Pipe Diameter (inches)	0.5	0.75	1	1.25	1.5	2	2.5	3	3.5	4
	Internal Pipe Diameter (inches)	0.546	0.742	0.957	1.278	1.500	1.939	2.323	2.900	3.364	3.826
25.8	Systems with Flush Valve	0	0	5	28	60	205	430	931	1500	2204
	Systems with – Flush Tank	8	18	34	86	151	337	533	945	1500	2204
>25.8	Systems with Flush Valve	0	0	5	28	60	205	430	931	1500	2204
	Systems with – Flush Tank	8	18	34	86	151	337	533	945	1500	2204
	Systems with Flush Valve										
	Systems with – Flush Tank										
	Systems with Flush Valve										
	Systems with – Flush Tank										
	Systems with Flush Valve										
	Systems with – Flush Tank										
	Systems with Flush Valve										
	Systems with – Flush Tank										
	Systems with Flush Valve										
	Systems with – Flush Tank										
	Systems with Flush Valve										
	Systems with – Flush Tank										
	Systems with Flush Valve										
	Systems with – Flush Tank										
	Systems with Flush Valve										
	Systems with – Flush Tank										

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A. Simple Sizing Forms

The following forms are provided for sizing simple domestic water systems. These forms do not cover complex water system design features such as a substantial distance or change in elevation between the pressure reducing valve and the building, nor do they allow for designing by branches, node points, down-feed systems, or booster pumps. The engineering of complex systems requires all the expertise of an experienced designer and goes beyond the scope of these forms.

SIMPLE SIZING FORM FOR DOMESTIC WATER SYSTEMS

This is a very simplified form and should not be used for complex design as design by branches, systems with booster pumps, down-feed systems, etc.

JOB ADDRESS

WATER INFORMATION FROM DWP: MAX PRESS. _____ psi MIN PRESS. _____ ft
psi at _____ a.s.l.

GIVEN BY _____ DATE _____

METER SIZE _____ in

_____ F. U. _____ g.p.m. DEVELOPED LENGTH _____ ft

25% OF DEVELOPED LENGTH _____ ft

EQUIVALENT LENGTH (Developed length + 25%) _____ ft

WATER CLOSETS AND URINALS

	With Tank	W/Flush Valve	MAKE	MODEL
WC1				
WC2				
WC3				
WC4				
UR1				
UR2				

SYSTEM COMPONENTS

PIPING MATERIAL COPPER TYPE K _____ L _____ M _____ GALVANIZED IRON _____ OTHER (specify)

PRESSURE REDUCING VALVE SIZE _____ MAKE _____ MODEL _____

BACKFLOW PREVENTION DEVICE SIZE _____ MAKE _____ MODEL _____

HYDRAULIC CALCULATIONS

A.	MINIMUM PRESSURE AT CITY MAIN	psi
B.	SET PRESSURE AT PRESSURE REDUCING VALVE	psi
C.	PRESSURE LOSS THROUGH _____ inch METER	psi
D.	PRESSURE LOSS THROUGH _____ inch REDUCED PRESSURE BACKFLOW PREVENTER	psi
E.	PRESSURE LOSS THROUGH _____ inch PRESSURE REDUCING VALVE	psi
F.	PRESSURE LOSS THROUGH SOFTENER OR OTHER MISCELLANEOUS EQUIPMENT	psi
G.	PRESSURE LOSS DUE TO ELEVATION _____ ftX0.43=	psi
H.	RESIDUAL PRESSURE	psi
I.	TOTAL PRESSURE LOSSES	psi
J.	PRESSURE AVAILABLE FOR FRICTION LOSS IN THE SYSTEM	psi
K.	PRESSURE/100ft (J/EQUIVALENT LENGTH X100)	psi/100ft

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FIXTURE UNIT COUNT				PIPE SIZE SCHEDULE			
FIXTURE UNIT TYPE	F. U. Value	Quantity	TOTAL	PIPE MAT.			
Kitchen Sinks	1.5			PRESS. LOSS psi/100ft			
Dishwashers	1.5			ALLOWED F. U.			
Bar Sinks				Flush Tank		Flush Valve	
Mop or Service Sinks				Size (in.)	Hot Water	Cold Water	Cold Water
Clothes Washers	4			(5ft/s)	(8ft/s)	(8ft/s)	
Lavatories	1			1/2			0
Bathtub	4			3/4			0
Bathtub 3/4 inch fill	10			1			0
Showers	2			1 1/4			
Water Closets				1 1/2			
Water Closets with Flushometer Valve				2			
Urinals with Flushometer Valve				2 1/2			
First Hose Bibb	2.5			3			
Additional Hose Bibbs	1			3 1/2			
				4			
				5			
				6			
TOTAL FIXTURE UNITS				=			g.p.m.
Additional Flow				=			g.p.m.
TOTAL FLOW				=			g.p.m.

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