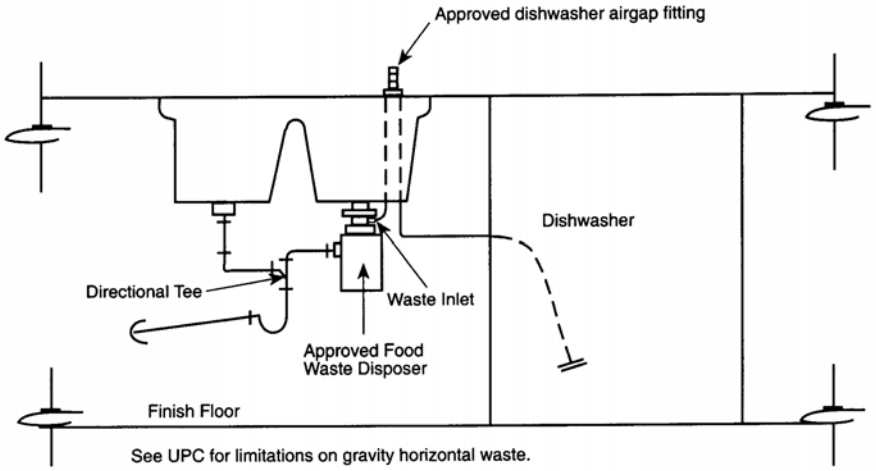
DOMESTIC DISHWASHER HOOKUP



INLET FITINGS FOR DOUBLE FIXTURES

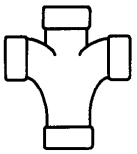
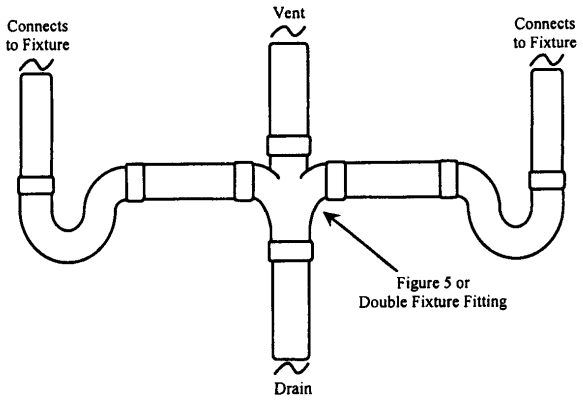


Figure No. 5 Fitting
(Double Fixture Fitting)

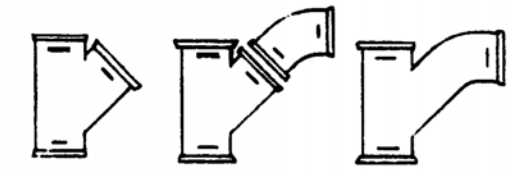


CHANGES IN DIRECTION OF DRAINAGE FLOW

Horizontal to Vertical
Fittings A through E may be used for vertical drain piping picking up horizontal branches.
Fittings F to J may be used for horizontal drain piping changing to a vertical direction.

Vertical to Horizontal
Fittings A, B, C, F, G and& J may be used for this type of change in direction. Fitting J may be used when installed in a true vertical position.

Horizontal to Horizontal
Fittings A, B, C, F, G and I may be used for this type of change in direction.



A. Wye B. Wye & 1/8 Bend C. Combination Wye & 1/8 Bend

D. Sanitary Tee E. Sanitary Tapped Tee F. Long Sweep G. Short Sweep H. 1/4 Bend I. 1/8 Bend J. 1/6 Bend

TABLE 7-6
Cleanouts

Size of Pipe (inches)	Size of Cleanout (inches)	Threads per inch
1-1/2	1-1/2	11-1/2
2	1-1/2	11-1/2
2-1/2	2-1/2	8
3	2-1/2	8
4 & larger	3-1/2	8

TABLE 7-6
Cleanouts (Metric)

Size of Pipe (mm)	Size of Cleanout (mm)	Threads per 25.4 mm
38	38	11-1/2
51	38	11-1/2
64	64	8
76	64	8
102 & larger	89	8

TABLE 10-1

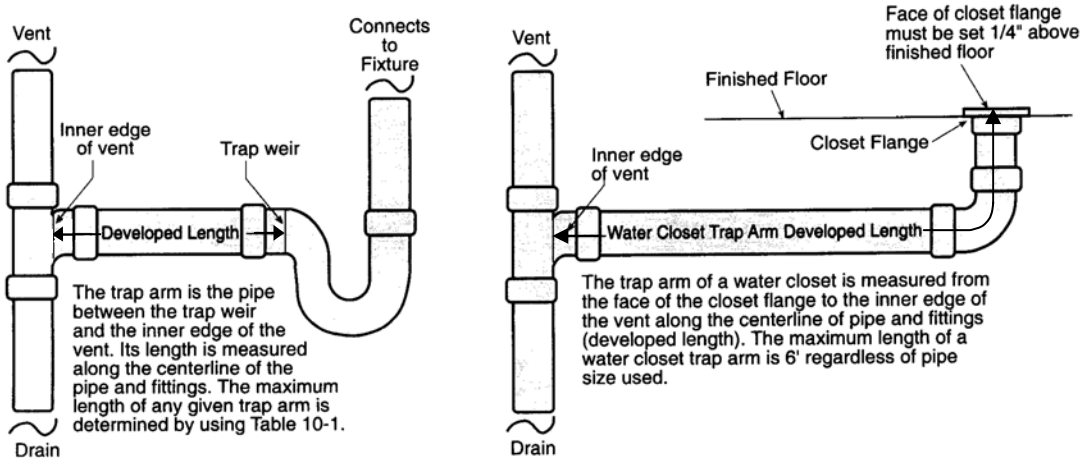
Horizontal Distance of Trap Arms
(Except for water closets and similar fixtures)*

Trap Arm Inches	Distance Trap to Vent Feet	Inches	Trap Arm mm	Distance Trap to Vent mm
1-1/4	2	6	32	762
1-1/2	3	6	40	1067
2	5	0	50	1524
3	6	0	80	1829
4 & larger	10	0	100 & larger	3048

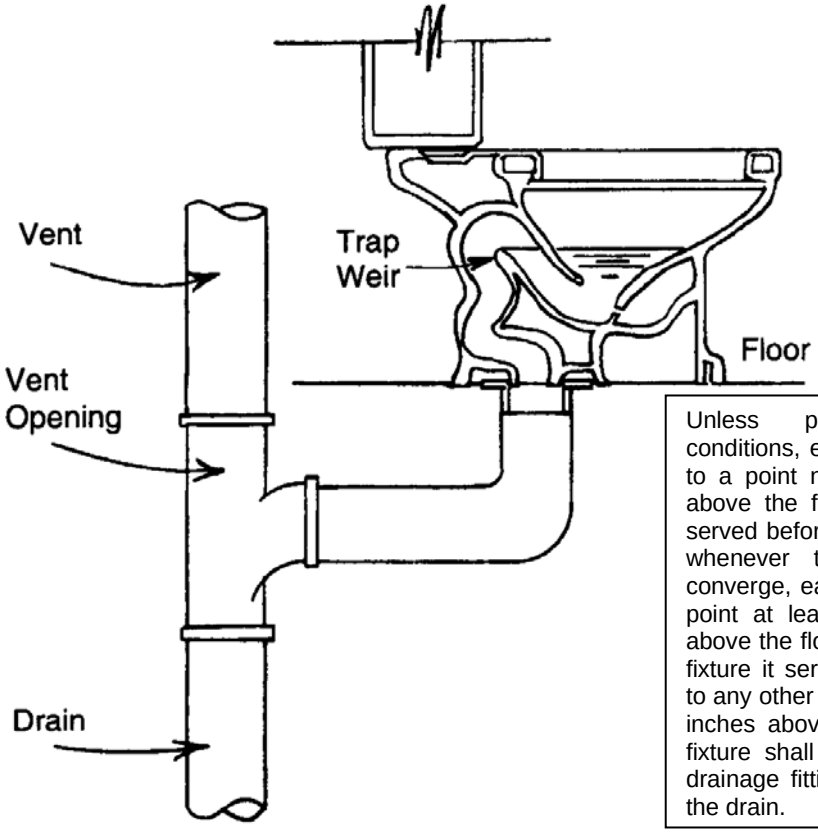
Slope one-fourth (1/4) inch per foot (20.9 mm/m)

*The developed length between the trap of a water closet or similar fixture (measured from the top of the closet ring [closet flange] to the inner edge of the vent) and its vent shall not exceed six (6) feet (1829 mm).

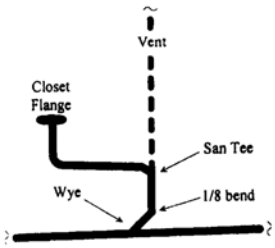
DEVELOPED LENGTHS



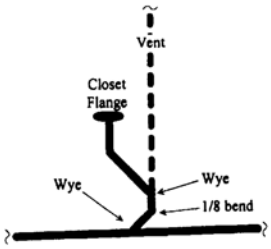
WATER CLOSET ROUGH-IN METHODS MAINTAINING VERTICALLY RISING VENTS



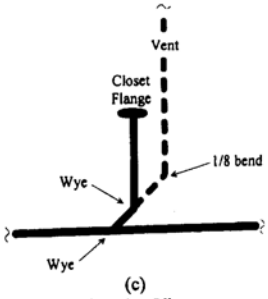
Unless prohibited by structural conditions, each vent shall rise vertically to a point not less than six (6) inches above the flood-level rim of the fixture served before offsetting horizontally, and whenever two or more vent pipes converge, each such vent shall rise to a point at least six (6) inches in height above the flood-level rim of the plumbing fixture it serves before being connected to any other vent. Vents less than six (6) inches above the flood-level rim of the fixture shall be installed with approved drainage fittings, material, and grade to the drain.



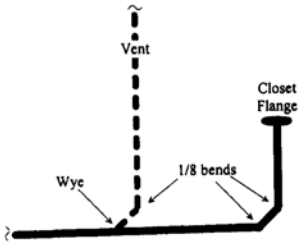
(a)
Elevation View



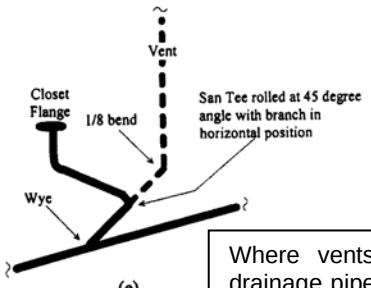
(b)
Elevation View



(c)
Elevation View



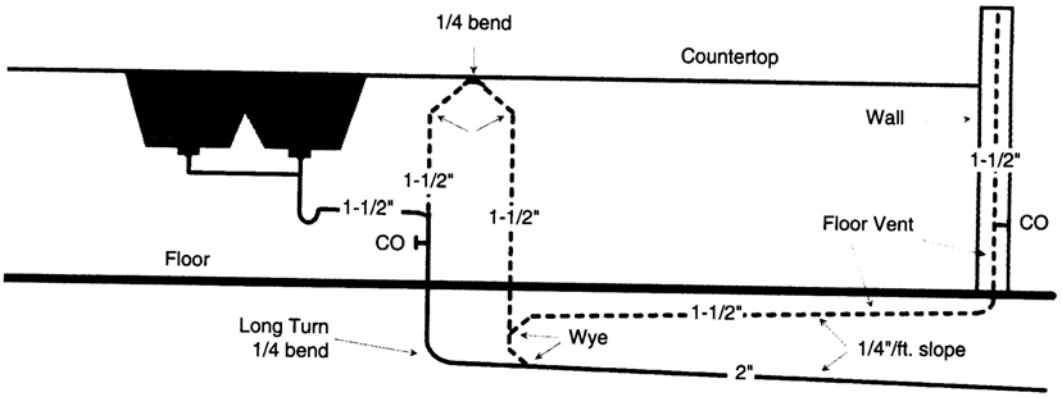
(d)
Elevation View



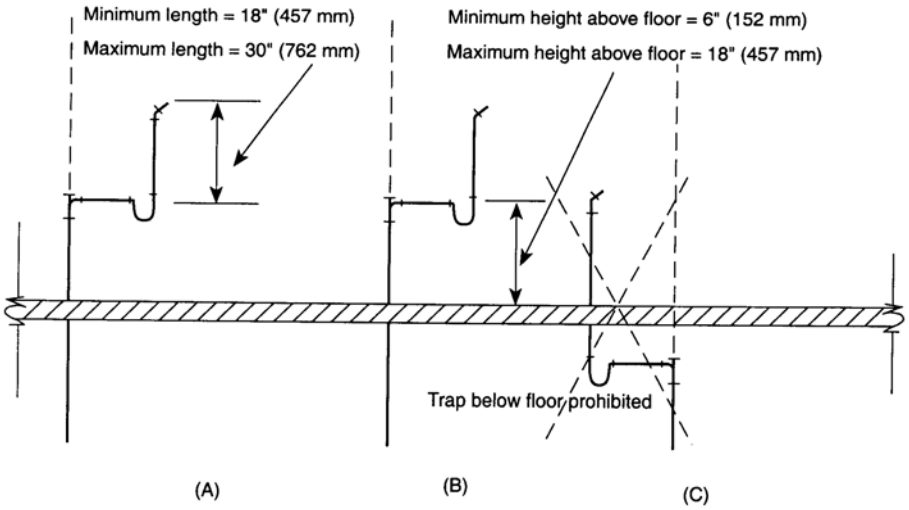
(e)
Isometric View

Where vents connect to a horizontal drainage pipe, each vent pipe shall have its invert taken off the drainage centerline of such pipe downstream of the trap being served.

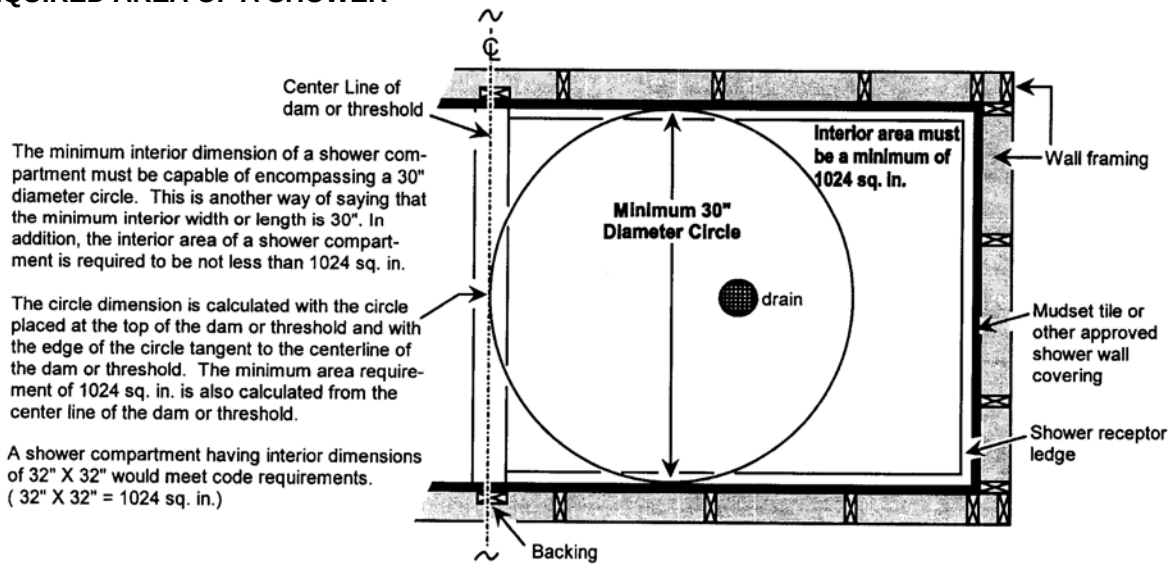
SPECIAL VENTING FOR ISLAND FIXTURES



CLOTHESWASHER STANDPIPE RECEPTOR



REQUIRED AREA OF A SHOWER



Drainage Fixture Unit Values (DFU)

Plumbing Appliance, Appurtenance or Fixture	Min. Size Trap and Trap Arm[7]	Private	Public	Assembly[8]
Bathtub or Combination Bath/Shower	1-1/2"	2.0	2.0	
Bidet	1-1/4"	1.0		
Bidet	1-1/2"	2.0		
Clothes Washer, domestic, standpipe[5]	2"	3.0	3.0	3.0
Dental Unit, cuspidor	1-1/4"		1.0	1.0
Dishwasher, domestic, with independent drain	1-1/2"[2]	2.0	2.0	2.0
Drinking Fountain or Watercooler (per head)	1-1/4"	0.5	0.5	1.0
Food-waste-grinder, commercial	2"		3.0	3.0
Floor Drain, emergency	2"		0.0	0.0
Floor Drain (for additional sizes see Section 702)	2"	2.0	2.0	2.0
Shower single head trap	2"	2.0	2.0	2.0
Multi-head, each additional	2"	1.0	1.0	1.0
Lavatory, single	1-1/4"	1.0	1.0	1.0
Lavatory in sets of two or three	1-1/2"	2.0	2.0	2.0
Washfountain	1-1/2"		2.0	2.0
Washfountain	2"		3.0	3.0
Mobile Home, trap	3"	12.0		
Receptor, indirect waste[1,3]	1-1/2"		See footnote 1,3	
Receptor, indirect waste[1,4]	2"		See footnote 1,4	
Receptor, indirect waste[1]	3"		See footnote 1	
Sinks				
Bar	1-1/2"	1.0		
Bar	1-1/2"[2]		2.0	2.0
Clinical	3"		6.0	6.0
Commercial with food waste	1-1/2"[2]		3.0	3.0
Special Purpose	1-1/2"	2.0	3.0	3.0
Special Purpose	2"	3.0	4.0	4.0
Special Purpose	3"		6.0	6.0
Kitchen, domestic (with or without food-waste-grinder and/or dishwasher)	1-1/2"[2]	2.0	2.0	
Laundry (with or without discharge from a clothes washer)	1-1/2"	2.0	2.0	2.0
Service or Mop Basin	2"		3.0	3.0
Service or Mop Basin	3"		3.0	3.0
Service, flushing rim	3"		6.0	6.0
Wash, each set of faucets			2.0	2.0
Urinal, integral trap 1.0 GPF[2]	2"	2.0	2.0	5.0
Urinal, integral trap greater than 1.0 GPF	2"	2.0	2.0	6.0
Urinal, exposed trap	1-1/2"[2]	2.0	2.0	5.0
Water Closet, 1.6 GPF Gravity Tank[6]	3"	3.0	4.0	6.0
Water Closet, 1.6 GPF Flushometer Tank[6]	3"	3.0	4.0	6.0
Water Closet, 1.6 GPF Flushometer Valve[6]	3"	3.0	4.0	6.0
Water Closet, greater than 1.6 GPF Gravity Tank[6]	3"	4.0	6.0	8.0
Water Closet, greater than 1.6 GPF Flushometer Valve[6]	3"	4.0	6.0	8.0

1. Indirect waste receptors shall be sized based on the total drainage capacity of the fixtures that drain therein to, in accordance with Table 7-4.
2. Provide a 2" (51 mm) minimum drain.
3. For refrigerators, coffee urns, water stations, and similar low demands.
4. For commercial sinks, dishwashers, and similar moderate or heavy demands.
5. Buildings having a clothes washing area with clothes washers in a battery of three (3) or more clothes washers shall be rated at six (6) fixture units each for purposes of sizing common horizontal and vertical drainage piping.
6. Water closets shall be computed as six (6) fixture units when determining septic tank sizes based on Appendix K of this Code.
7. Trap sizes shall not be increased to the point where the fixture discharge may be inadequate to maintain their self-scouring properties.
8. Assembly [Public Use (See Table 4-1)].

Maximum Unit Loading and Maximum Length of Drainage and Vent Piping

Size of Pipe, Inches (mm)	**1-1/4** (32)	**1-1/2** (38)	**2** (51)	**2-1/2** (64)	**3** (76)	**4** (102)	**5** (127)	**6** (152)	**8** (203)	**10** (254)	**12** (305)
Maximum Units											
Drainage Piping[1]											
Vertical	1	2[2]	16[3]	32[3]	48[4]	256	600	1380	3600	5600	8400
Horizontal	1	1	8[3]	14[3]	35[4]	216[5]	428[5]	720[5]	2640[5]	4680[5]	8200[5]
Maximum Length											
Drainage Piping											
Vertical, feet	45	65	85	148	212	300	390	510	750		
(m)	(14)	(20)	(26)	(45)	(65)	(91)	(119)	(155)	(228)		
Horizontal (Unlimited)											
Vent Piping (See note)											
Horizontal and Vertical											
Maximum Units	1	8[3]	24	48	84	256	600	1380	3600		
Maximum Lengths, feet	45	60	120	180	212	300	390	510	750		
(m)	(14)	(18)	(37)	(55)	(65)	(91)	(119)	(155)	(228)		

1 Excluding trap arm.
2 Except sinks, urinals and dishwashers.
3 Except six-unit traps or water closets.
4 Only four water closets or six-unit traps allowed on any vertical pipe or stack; and not to exceed three water closets or six-unit traps on any horizontal branch or drain.
5 Based on 1/4 inch per foot (20.9 mm/m) slope. For 1/8)inch per foot (10.4 mm/m) slope, multiply horizontal fixture units by a factor of 0.8.

Note: The diameter of an individual vent shall not be less than 1-1/4 inches (32 mm) nor less than 1/2 the diameter of the drain to which it is connected. Fixture unit load values for drainage and vent piping shall be computed from Tables 7-3 and 7-4. Not to exceed 1/3 of the total permitted length of any vent may be installed in a horizontal position. When vents are increased one pipe size for their entire length, the maximum length limitations specified in this table do not apply.

Two inch (2") minimum size required.

Water Supply Fixture Units (WSFU) and Minimum Fixture Branch Pipe Sizes[3]

Appliances, Appurtenances or Fixtures[2]	Minimum Fixture Branch Pipe Size[1,4]	Private	Public	Assembly[6]
Bathtub or Combination Bath/Shower (fill)	1/2"	4.0	4.0	
3/4" Bathtub Fill Valve	3/4"	10.0	10.0	
Bidet	1/2"	1.0		
Clotheswasher	1/2"	4.0	4.0	
Dental Unit, cuspidor	1/2"		1.0	
Dishwasher, domestic	1/2"	1.5	1.5	
Drinking Fountain or Watercooler	1/2"	0.5	0.5	0.75
Hose Bibb	1/2"	2.5	2.5	
Hose Bibb, each additional[8]	1/2"	1.0	1.0	
Lavatory	1/2"	1.0	1.0	1.0
Lawn Sprinkler, each head[5]		1.0	1.0	
Mobile Home, each (minimum)		12.0		
Sinks				
Bar	1/2"	1.0	2.0	
Clinic Faucet	1/2"		3.0	
Clinic Flushometer Valve with or without faucet	1"		8.0	
Kitchen, domestic	1/2"	1.5	1.5	
Laundry	1/2"	1.5	1.5	
Service or Mop Basin	1/2"	1.5	3.0	
Washup, each set of faucets	1/2"		2.0	
Shower, per head	1/2"	2.0	2.0	
Urinal, 1.0 GPF Flushometer Valve	3/4"	See Footnote 7		
Urinal, greater than 1.0 GPF Flushometer Valve	3/4"	See Footnote 7		
Urinal, flush tank	1/2"	2.0	2.0	3.0
Washfountain, circular spray	3/4"		4.0	
Water Closet, 1.6 GPF Gravity Tank	1/2"	2.5	2.5	3.5
Water Closet, 1.6 GPF Flushometer Tank	1/2"	2.5	2.5	3.5
Water Closet, 1.6 GPF Flushometer Valve	1"	See Footnote 7		
Water Closet, greater than 1.6 GPF Gravity Tank	1/2"	3.0	5.5	7.0
Water Closet, greater than 1.6 GPF Flushometer Valve	1"	See Footnote 7		

Notes:

1. Size of the cold branch pipe, or both the hot and cold branch pipes.
2. Appliances, Appurtenances or Fixtures not included in this Table may be sized by reference to fixtures having a similar flow rate and frequency of use.
3. The listed fixture unit values represent their load on their cold water service. The separate cold water and hot water fixture unit value for fixtures having both hot and cold water connections may each be taken as three-quarter (3/4) of the listed total value of the fixture.
4. The listed minimum supply branch pipe sizes for individual fixtures are the nominal (I.D.) pipe size.
5. For fixtures or supply connections likely to impose continuous flow demands, determine the required flow in gallons per minute (GPM) and add it separately to the demand (in GPM) for the distribution system or portions thereof.
6. Assembly [Public Use (See Table 4-1)].
7. When sizing flushometer systems see Section 610.10.
8. Reduced fixture unit loading for additional hose bibbs as used is to be used only when sizing total building demand and for pipe sizing when more than one hose bibb is supplied by a segment of water distributing pipe. The fixture branch to each hose bibb shall be sized on the basis of 2.5 fixture units.

Fixture Unit Table for Determining Water Pipe and Meter Sizes

1 in = 25 mm

Pressure Range – 30 to 45 psi (207 to 310 kPa)**

Meter and Street Service, Inches	Building Supply and Branches, Inches	Maximum Allowable Length in Feet (meters)														
		40 (12)	60 (18)	80 (24)	100 (30)	150 (46)	200 (61)	250 (76)	300 (91)	400 (122)	500 (152)	600 (183)	700 (213)	800 (244)	900 (274)	1000 (305)
3/4	1/2***	6	5	4	3	2	1	1	1	0	0	0	0	0	0	0
3/4	3/4	16	16	14	12	9	6	5	5	4	4	3	2	2	2	1
3/4	1	29	25	23	21	17	15	13	12	10	8	6	6	6	6	6
1	1	36	31	27	25	20	17	15	13	12	10	8	6	6	6	6
3/4	1-1/4	36	33	31	28	24	23	21	19	17	16	13	12	12	11	11
1	1-1/4	54	47	42	38	32	28	25	23	19	17	14	12	12	11	11
1-1/2	1-1/4	78	68	57	48	38	32	28	25	21	18	15	12	12	11	11
1	1-1/2	85	84	79	65	56	48	43	38	32	28	26	22	21	20	20
1-1/2	1-1/2	150	124	105	91	70	57	49	45	36	31	26	23	21	20	20
2	1-1/2	151	129	129	110	80	64	53	46	38	32	27	23	21	20	20
1	2	85	85	85	85	85	85	82	80	66	61	57	52	49	46	43
1-1/2	2	220	205	190	176	155	138	127	120	104	85	70	61	57	54	51
2	2	370	327	292	265	217	185	164	147	124	96	70	61	57	54	51
2	2-1/2	445	418	390	370	330	300	280	265	240	220	198	175	158	143	133

Pressure Range – 46 to 60 psi (317 to 414 kPa)**

3/4	1/2***	7	7	6	5	4	3	2	2	1	1	1	0	0	0	0
3/4	3/4	20	20	19	17	14	11	9	8	6	5	4	4	3	3	3
3/4	1	39	39	36	33	28	23	21	19	17	14	12	10	9	8	8
1	1	39	39	39	36	30	25	23	20	18	15	12	10	9	8	8
3/4	1-1/4	39	39	39	39	39	39	34	32	27	25	22	19	19	17	16
1	1-1/4	78	78	76	67	52	44	39	36	30	27	24	20	19	17	16
1-1/2	1-1/4	78	78	78	78	66	52	44	39	33	29	24	20	19	17	16
1	1-1/2	85	85	85	85	85	85	80	67	55	49	41	37	34	32	30
1-1/2	1-1/2	151	151	151	151	128	105	90	78	62	52	42	38	35	32	30
2	1-1/2	151	151	151	151	150	117	98	84	67	55	42	38	35	32	30
1	2	85	85	85	85	85	85	85	85	85	85	85	85	85	83	80
1-1/2	2	370	370	340	318	272	240	220	198	170	150	135	123	110	102	94
2	2	370	370	370	370	368	318	280	250	205	165	142	123	110	102	94
2	2-1/2	654	640	610	580	535	500	470	440	400	365	335	315	285	267	250

Pressure Range – Over 60 psi (414 kPa)**

3/4	1/2***	7	7	7	6	5	4	3	3	2	1	1	1	1	1	0
3/4	3/4	20	20	20	20	17	13	11	10	8	7	6	6	5	4	4
3/4	1	39	39	39	39	35	30	27	24	21	17	14	13	12	12	11
1	1	39	39	39	39	38	32	29	26	22	18	14	13	12	12	11
3/4	1-1/4	39	39	39	39	39	39	39	39	34	28	26	25	23	22	21
1	1-1/4	78	78	78	78	74	62	53	47	39	31	26	25	23	22	21
1-1/2	1- 1/4	78	78	78	78	78	74	65	54	43	34	26	25	23	22	21
1	1-1/2	85	85	85	85	85	85	85	85	81	64	51	48	46	43	40
1-1/2	1-1/2	151	151	151	151	151	151	130	113	88	73	51	51	46	43	40
2	1-1/2	151	151	151	151	151	151	142	122	98	82	64	51	46	43	40
1	2	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
1-1/2	2	370	370	370	370	360	335	305	282	244	212	187	172	153	141	129
2	2	370	370	370	370	370	370	370	340	288	245	204	172	153	141	129
2	2-1/2	654	654	654	654	654	650	610	570	510	460	430	404	380	356	329

**Available static pressure after head loss.

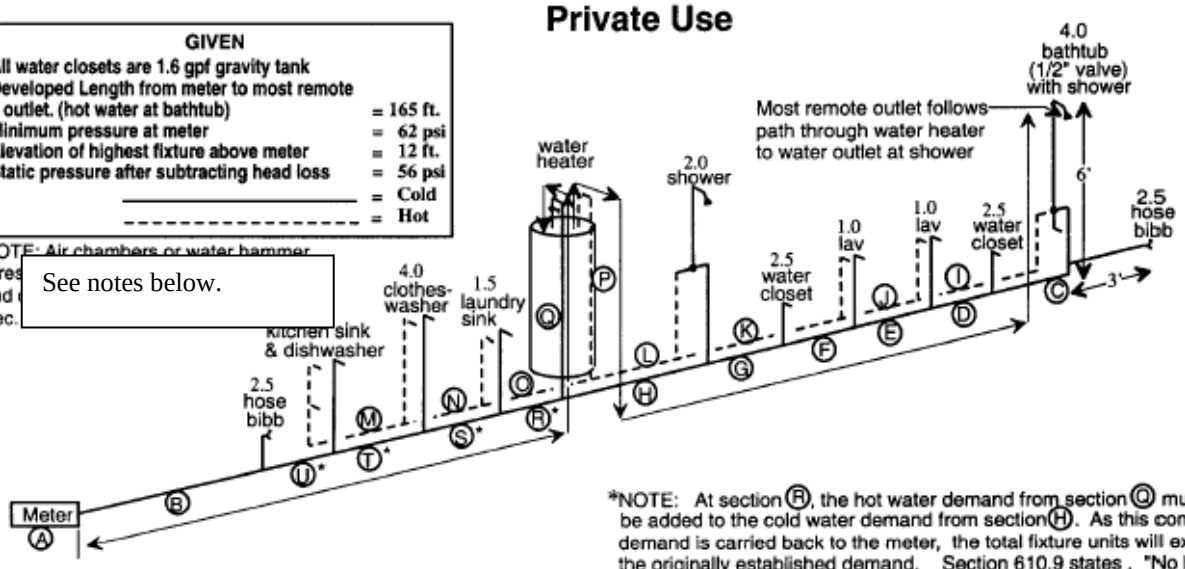
***Building supply, three-quarter (3/4) inch (19.1 mm) nominal size minimum.

Private Use

GIVEN	
All water closets are 1.6 gpf gravity tank	
Developed Length from meter to most remote outlet. (hot water at bathtub)	= 165 ft.
Minimum pressure at meter	= 62 psi
Elevation of highest fixture above meter	= 12 ft.
Static pressure after subtracting head loss	= 56 psi
———	= Cold
- - - - - - - - - - - - - - - - -	= Hot

NOTE: Air chambers or water hammer arres and Sec.

See notes below.



*NOTE: At section (R), the hot water demand from section (Q) must be added to the cold water demand from section (H). As this combined demand is carried back to the meter, the total fixture units will exceed the originally established demand. Section 610.9 states , "No branch piping is required to be larger in size than that required by Table 6-5 for the building supply pipe".

Hose Bibb sizing: Each pipe section serving only one hose bibb is assigned a fixture unit value of 2.5. Section B serves one hose bibb with a rating of 2.5 plus one "additional" hose bibb with a fixture unit value 1.0. The total hose bibb fixture unit value at section B is 3.5. See Note 7 at bottom of Table 6-4.

Demand from Table 6-4				
WC (1.6 GPF)	=	2.5 WSFU	X 2 =	5.0 WSFU
Lav	=	1.0 WSFU	X 2 =	2.0 WSFU
Shower	=	2.0 WSFU	X 1 =	2.0 WSFU
Bathtub with shower	=	4.0 WSFU	X 1 =	4.0 WSFU
Hose Bibb	=	2.5 WSFU	X 1 =	2.5 WSFU
Additional Hose Bibb	=	1.0 WSFU	X 1 =	1.0 WSFU
Laundry Sink	=	1.5 WSFU	X 1 =	1.5 WSFU
Clotheswasher	=	4.0 WSFU	X 1 =	4.0 WSFU
Kitchen Sink	=	1.5 WSFU	X 1 =	1.5 WSFU
Dishwasher	=	1.5 WSFU	X 1 =	1.5 WSFU
		Total Demand	=	25.0 WSFU

...from Table 6-5
Pressure Range - 46 to 60 psi
200 foot column

Pipe Size	Max. Fixture Units
1"	25
3/4"	11
1/2"	3

Pipe Section	Fixture Units	Size	Pipe Section	Fixture Units	Size
A meter	25.0	1"	L	8.0	3/4"
B	25.0	1"	M	3.0	1/2"
C	6.5	3/4"	N	7.0	3/4"
D	9.0	3/4"	O	8.5	3/4"
E	10.0	3/4"	P	16.5	1"
F	11.0	3/4"	Q	16.5	1"
G	13.5	1"	R	32.0*	1"
H	15.5	1"	S	33.5*	1"
I	4.0	3/4"	T	37.5*	1"
J	5.0	3/4"	U	39.0*	1"
K	6.0	3/4"			

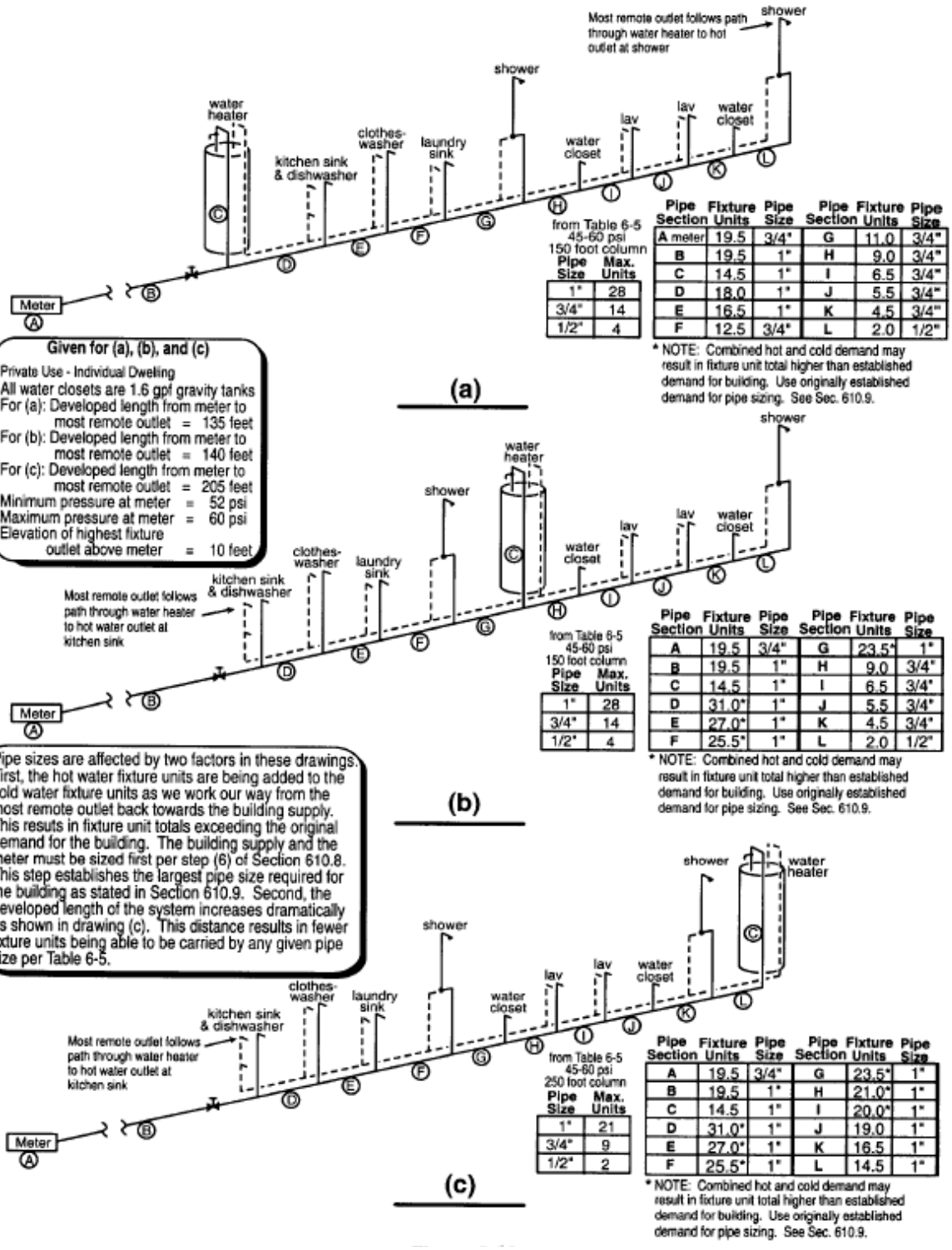
Water Pipe Sizing

Water Pipe Sizing per UPC Section 610.0

609.10 **Water Hammer**. All building water supply systems in which quick-acting valves are installed shall be provided with devices to absorb hammer caused by high pressures resulting from quick closing of valves. Thes pressure-absorbing devices shall be approved mechanical devices. Water pressure-absorbing devices shall be installed as close as possible to quick-acting valves.

609.10.1 **Mechanical Devices**. When listed mechanical devices are used, the manufacturers' specifications as to location and method of installation shall be followed. Mechanical Devices such as: clothes washers, dishwashers and ice maker boxes.

Effect of Water Heater Location



Per UPC

Effect of Water Heater Location on Cold Water Pipe Sizing
In accordance with Sections 610.7 through 610.9

Minimum Demand of Typical Gas Appliances in Btu Per Hour (Watts)

Appliance	Demand in Btu/h	Demand in Watts
Barbecue (residential)	50,000	14,650
Bunsen Burner	3,000	879
Domestic Clothes Dryer	35,000	10,255
Domestic Gas Range	65,000	19,045
Domestic Recessed Oven Section	25,000	7,325
Domestic Recessed Top Burner Section	40,000	11,720
Fireplace Log Lighter (commercial)	50,000	14,650
Fireplace Log Lighter (residential)	25,000	7,325
Gas Engines (per horsepower)	10,000	2,930
Gas Refrigerator	3,000	879
Mobile Homes – each (see Appendix E)	*	*
Steam Boilers (per horsepower)	50,000	14,650
Storage Water Heater up to 30 gallon (114 l) tank	30,000	8,790
Storage Water Heater 40 (151 l) to 50 gallon (189 l) tank	50,000	14,650

Maximum Capacity of Pipe in Thousands of BTU per Hour of Undiluted Liquified Petroleum Gases

(Based on a Pressure Drop of 0.5 Inch Water Column)
Low Pressure 11 Inch Water Column

Length in Feet

Pipe Size, Inches	10	20	30	40	50	60	70	80	90	100	125	150	200
1/2	275	189	152	129	114	103	96	89	83	78	69	63	55
3/4	567	393	315	267	237	217	196	185	173	162	146	132	112
1	1071	732	590	504	448	409	378	346	322	307	275	252	213
1-1/4	2205	1496	1212	1039	913	834	771	724	677	630	567	511	440
1-1/2	3307	2299	1858	1559	1417	1275	1181	1086	1023	976	866	787	675
2	6221	4331	3465	2992	2646	2394	2205	2047	1921	1811	1606	1496	1260

Maximum Capacity of Pipe in Thousands of Watts of Undiluted Liquified Petroleum Gases (Metric)

(Based on a Pressure Drop of 12.7 mm Water Column)
Low Pressure 279.4 mm Water Column

Length in Meters

Pipe Size, mm	3.0	6.1	9.1	12.2	15.2	18.2	21.3	24.3	27.4	30.4	38.0	45.6	60.8
12.7	80.6	55.4	44.5	37.8	33.4	30.2	28.1	26.1	24.3	22.9	20.2	18.5	16.1
19.1	166.1	115.2	92.3	78.2	69.4	63.6	57.4	54.2	50.7	47.5	42.8	38.7	32.8
25.4	313.8	214.5	172.9	147.7	131.3	119.8	110.8	101.4	94.4	90.0	80.6	73.8	62.4
31.8	646.1	438.3	355.1	304.4	267.5	244.4	225.9	212.1	198.4	184.6	166.1	149.7	128.9
38.1	969.0	673.6	544.4	456.8	415.2	373.6	346.0	318.2	299.7	286.0	253.7	230.6	197.8
50.8	1822.8	1269.0	1015.2	876.7	775.3	701.4	646.1	600.0	562.9	530.6	470.6	438.3	369.2