

Methods for Calculating Service Size – MN PC 2015

SIZE OF METER AND BUILDING SUPPLY PIPE (TABLE 610.4)

- This typically applies to building piping for residential services (less than 3-inches)
- Parameters
 - System pressure (A): Water main or meter (psi)
 - Elevation (B): Elevation difference (ft) between water main or meter and highest fixture unit(s). Multiply this difference by 0.5 (psi)
 - Pressure range (C): $A - B$ (psi)
 - Pipe length to furthest and highest fixture unit (ft)
 - Calculate fixture units in Table 610.4

MN PLUMBING CODE 610.12 – SIZING FOR VELOCITY

- No greater than 8 ft/s for copper tubing

MN PLUMBING CODE APPENDIX A: A 4.0 SIZE OF BUILDING SERVICE

- Parameters
 - Demand load
 - Total fixture units and corresponding GPM
 - Permissible friction loss per 100 feet + $(D/E) \times 100$
 - Variables
 - System pressure (A): Measured pressure in the water main
 - Residual pressure (B): Desired pressure at furthest and highest fixture
 - Elevation (C): Elevation difference (ft) between water main and highest fixture unit(s). Multiply this difference by 0.43
 - Available pressure (D): $A - B - C - \text{meter friction loss}$
 - Developed length ϵ : Length of pipe from water main to the furthest and highest fixture unit
- Charts 4.1 (1) through 4.1(3)
 - Pipe type
 - Demand load
 - Permissible friction loss
 - Velocity less than 10 ft/s

Water Pipe Sizing – EXAMPLE 1

Flush tank predominates	Quantity	Hot	Cold	Total
Bathtub ½"	51	153	153	204
Bathtub ¾"	---	---	---	---
WMOB	51	153	153	204
Dishwasher	51	76.5	---	76.5
Drinking fountain	---	---	---	---
Hose bibb – first one	1	---	2.5	2.5
Hose bibb - additional	5	---	5	5
Lavatory	51	38.25	38.25	51
Bar sink - public	---	---	---	---
Bar sink - private	---	---	---	---
Kitchen sink	51	57.375	57.375	76.5
Laundry sink	---	---	---	---
Service sink – public	1	2.25	2.25	3
Shower	---	---	---	---
Urinal – 1.0 gpf	---	---	---	---
WC 1.6 gravity	51	---	127.5	127.5
Total WFU		480.375	538.875	750
Total GPM		120	131	170

Street Pressure:

Tap			65.00
Meter			0.25
Rise	55.0	0.43	23.65
Service Loss	100.0	2.0339	2.03
Required at fixture			20.0
Remainder for piping			16.07
Piping length	225.0		7.14 psi per 100'

Water Pipe Sizing – EXAMPLE 2

WATER DESIGN REQUIREMENT	
PROVIDER: WATER COMPANY	
PRESSURE AVAILABLE: (VERIFY IN FIELD PRIOR TO WORK)	ESTIMATED 65 PSI
(A) TOTAL FIXTURES:	192 F.U.
(B) WATER DEMAND:	
1. DOMESTIC	90 GPM
2. IRRIGATION (NIGHT USE)	NA GPM
3. MISC.	NA GPM
(C) RESIDUAL PRESSURE REQUIRED AT FARTHEST OUTLET:	35 PSI
(D) PRESSURE LOSS DUE TO HEIGHT 20 FT X .434	8.68 PSI
(E) PRESSURE FALL OFF THROUGH 1" PRV AND STRAINER:	NA PSI
(F) PRESSURE LOSS THROUGH 1-1/2" BACKFLOW PREVENTOR:	12 PSI
(G) PRESSURE LOSS THROUGH 1-1/2" METER:	3 PSI
(H) PRESSURE LOSS THROUGH WATER SOFTENER:	NA PSI
(I) PRESSURE LOSS THROUGH WATER HEATER	NA PSI
(J) TOTAL PRESSURE LOSS FROM ABOVE (D+E+F+G+H+I):	58.68 PSI
(K) MINIMUM PRESSURE AVAILABLE (FROM A):	65 PSI
(L) PRESSURE AVAILABLE FOR FRICTION LOSS (L-K):	11.5 PSI
(M) DEVELOPED PIPE LENGTH	
1. LENGTH OF RUN (MAIN TO LAST FIXTURE) :	70 FEET
2. EQUIVALENT LENGTH FOR FITTINGS 25%:	35 FEET
3. TOTAL DEVELOPED LENGTH:	175 FEET
(N) PRESSURE AVAILABLE FOR FRICTION LOSSES:	
1. $11.5 \text{ PSI REMAINING DIVIDED BY } 87.5 \text{ TOTAL DISTANCE X } 100' =$	$3.6 \text{ PSI}/100'$
AVAILABLE WATER PIPING DESIGN PRESSURE:	$3.6 \text{ PSI}/100'$
DOMESTIC COLD WATER SIZING SHALL NOT EXIT VELOCITIES OF EIGHT FEET PER SECOND DOMESTIC HOT WATER SIZING SHALL NOT EXIT VELOCITIES OF FIVE FEET PER SECOND	
WATER PRESSURE IS SHOWN AS DIAGRAMMATIC ONLY. CONTRACTOR SHALL VERIFY EXISTING WATER PRESSURE IN FIELD PRIOR TO ANY WORK AND PIPING ROUGH IN. IF DISCOVERED ON SITE THAT EXISTING WATER PRESSURE IS LESS THAN 65 PSI RESIDUAL, CONTACT ENGINEER IMMEDIATELY FOR PIPING DESIGN CHANGES. IF PRESSURE IS GREATER THAN 80 PSI PROVIDE PRESSURE REDUCING VALVE AND REDUCE DOWN TO 77 PSI.	