The Handbook of Technical Irrigation Information

A Complete Reference Source for the Professional

Produced by Hunter®

The Irrigation Innovators

Preface

Hunter's Handbook of Technical Irrigation Information is designed to be used as a reference guide for all professionals whose livelihood takes them into the realm of irrigation. Contractors, architects, designers and engineers alike are now able to benefit from the wide spectrum of information that has been gathered from numerous sources into a single document between the covers of this handbook.

Until the completion of the Handbook of Technical Irrigation Information there has not been a single, all-encompassing, up-to-date and reliable source of technical irrigation information. We sincerely hope that the publishing of this guide has helped fill this void and we hope that anything and everything you should ever need to know about the subject can be found herein.

For additional information on subjects within the field of irrigation, Hunter has developed a wide assortment of literature. Please call the Hunter Industries Customer Service Department at 760-744-5240 to obtain the materials to meet your particular needs. And for more information regarding any questions related to irrigation, call our Design And Technical Assistance (DATA) line at 1-800-733-2823 or visit our website at www.HunterIndustries.com

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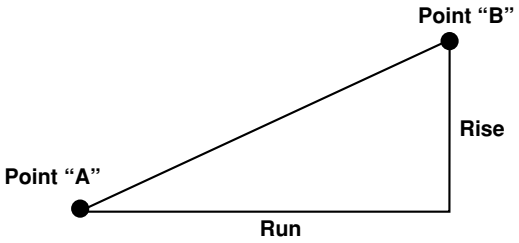
FORMULAS

Slope

Slope, as used in irrigation, is a measure of the incline of an area. It can be described as 1) a percent, formula "A", 2) a degree, formulas "B" and "C", or 3) a ratio, formula "D". The greater the incline, the greater the tendency for runoff.

A) The percent of slope can be determined by dividing the net change in elevation between two points (Rise) by the horizontal distance between those two points (Run).

$$S = \frac{\text{Rise}}{\text{Run}}$$



Where:

S = the percent of slope
Rise = the net elevation change in elevation between two points
Run = the horizontal distance between the two points

Note: The units for Rise and Run can be any unit of linear measure, but they must be the same for both the Rise and Run.

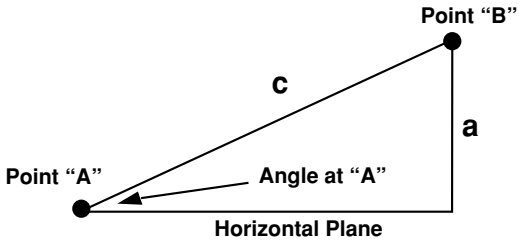
Example:

What is the slope for a bank 40 ft. wide (run) on which the elevation at the top (point "B") is 20 ft. higher than the toe of the slope (point "A")

$$S = \frac{20}{40} \qquad S = 0.50 \text{ or } 50\%$$

B) The degree of slope describes a slope as the angle of the slope (at "A") from the horizontal plane. This method is useful when taking field measurements as "c" represents the measured distance up a slope and "a" equals the elevation change.

$$\sin A = a/c$$



Where:

A = the angle
a = the height of the right triangle
c = the length of the hypotenuse of a right triangle

Example:

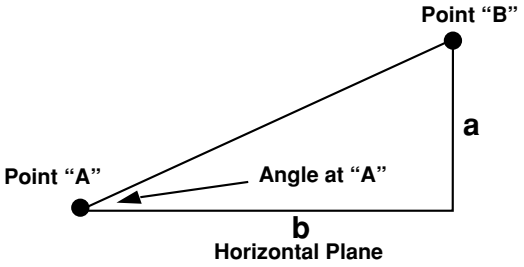
a = 20 feet
c = 44.72 feet

$$\sin A = \frac{20}{44.72} \qquad \sin A = 0.4472 \qquad A = 26° 34'$$

Slope (continued)

C) The degree of slope describes a slope as the angle of the slope (at "A") from the horizontal plane. This method is useful when determining the slope from plot plans that include elevation. In this diagram "b" represents the horizontal distance between point "A" and "B" and "a" equals the elevation change between point "A" and "B."

$$\tan A = a/b$$



Where:

A = the angle
a = the height of the right triangle
b = the horizontal distance

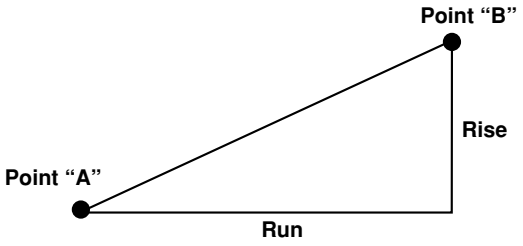
Example:

a = 20.0 feet
b = 40.0 feet

$$\tan A = \frac{20.0}{40.0} \qquad \tan A = 0.4472 \qquad A = 26° 34'$$

D) Describing a slope as a ratio such as 2:1, 1:1 or 4:1, indicates the number of feet of run for every one foot of rise. For instance a 2:1 slope indicates there would be two feet of horizontal distance for every one foot change of elevation. A 1:1 would change one foot of elevation for every one foot of horizontal run. This can be calculated by dividing the amount of elevation change by the horizontal distance over which this change occurred.

$$Sr = \frac{Run}{Rise} : 1$$



Where:

Sr = the slope ratio
Rise = the net elevation change between two points
Run = the horizontal distance between the two points

Note: the units for Rise and Run can be any unit of linear measure, but they must be the same for both the Rise and Run.

Example:

A slope on a project is 20 feet high (rise) over a distance of 40 feet (run). What is the slope ratio?

$$Sr = \frac{Run}{Rise} : 1 \qquad Sr = \frac{40}{20} : 1 \qquad Sr = 2 : 1$$

Note: See pages 57, 58 & 59 for more information on slopes.

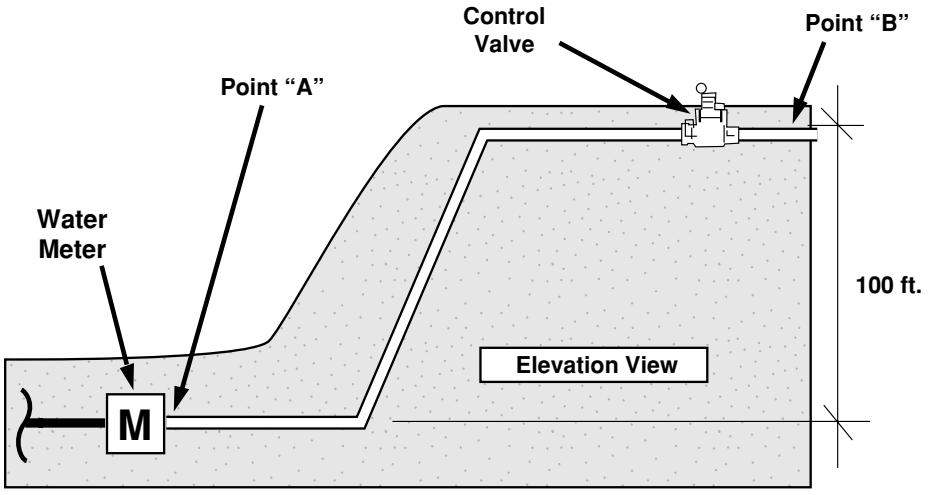
Dynamic Pressure Determination

Dynamic pressure is the pressure when water is flowing in the system. Dynamic pressure in a system can be determined by flow tests, using pressure gauges or by calculation if information on pipe types and sizes, valves, meters or other appurtenances are known. The dynamic pressure can be calculated at a given point in the system by starting with a known dynamic pressure at some point, adjusting for elevation change and subtracting friction losses in pipe, fittings, valves, meters, etc. as shown below:

$$\text{Dynamic Pressure} = (PSI_{dynamic} \pm h_{e\ elevation}) - h_{f\ pipe} - h_{f\ fittings} - h_{f\ valves}$$

Where:

$PSI_{dynamic}$ = the known dynamic pressure at a given point in psi
$h_{e\ elevation}$ = pressure change due to elevation in psi
$h_{f\ pipe}$ = the psi loss due to "friction" losses in the pipe
$h_{f\ fittings}$ = the psi loss due to "friction" losses in fittings
$h_{f\ valves}$ = the psi loss due to "friction" losses in valves, meters or other appurtenances between the source and the given point in the system



Example:

In the diagram above the dynamic pressure at point "A" is 90 psi. The pipe is 2 inch class 315 PVC, 200 ft. from point "A" to point "B" with a flow rate of 50 gpm. According to the manufacturer, the control valve will lose 6.0 psi at 50 gpm.

90.00	psi at point "A"
- 43.30	psi loss due to elevation gain (100 ft. x 0.433 psi per ft.)
46.70	psi at point "B"
- 3.86	psi friction loss in pipe (1.93 psi loss per 100 ft. x 200 ft. / 100)
42.84	Subtotal
- 0.39	psi friction loss in fittings (estimate, 10% of friction loss in pipe)
42.45	Subtotal
- 6.00	psi loss in valve - from manufacturer data
36.45	psi dynamic pressure at point "B"

Friction Factor Pipe Sizing

This Friction Factor is used to determine the maximum flow in gallons per minute through any section of lateral line pipe while not exceeding a predetermined pressure loss (pressure variation). In order to minimize uneven distribution, sprinklers should operate with pressure variation between sprinklers of not more than ± 10 to ± 20% of the desired sprinkler operating pressure.

$$F_f = \frac{P_o \times P_v}{L_c}$$

Where:

F_f = Friction Factor, the allowable pressure loss per 100 feet of pipe, in psi
P_o = sprinkler operating pressure in psi
P_v = Pressure Variation allowed between the valve and the last sprinkler on the circuit being sized, usually 10% or 20% of the desired sprinkler operating pressure
L_c = Critical Length of pipe from control valve to farthest head in hundreds of feet

Example:

A) You must determine the amount of pressure variation you can allow between the valve and the last sprinkler head. This is usually 10% to 20% of the operating pressure of the sprinklers on that particular section. For this example we will use 10% (0.10) variation.

If a control valve operates a group of sprinklers which require 30 psi to operate (operating pressure = P_o) the 10% pressure variation (pressure variation = P_v) would allow a total variation of 3.0 psi from the valve to the farthest head. (.10 x 30 psi = 3.0 psi)

B) Determine the Critical Length (L_c)
Next you must determine the distance the water travels from the control valve to the farthest head. That is not necessarily the total length of pipe in the section but just the length of the pipe through which the water flows from the valve to the farthest head. Divide this number by 100 to determine the hundreds of feet from the valve to the farthest head. This is called the Critical Length and represents the hundreds of feet of pipe in which you can afford to lose the pressure you determined was acceptable for pressure variation in step "A" above.

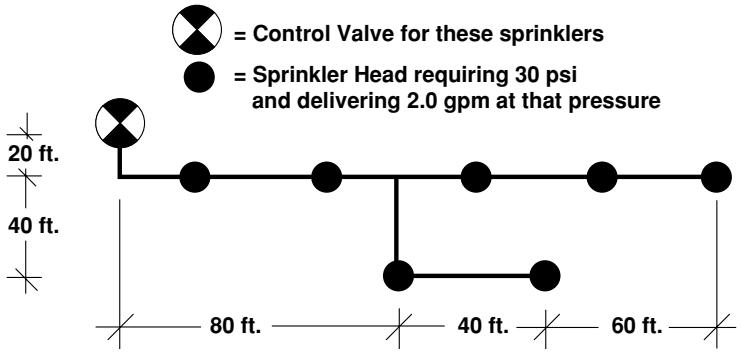


Fig.1

In this diagram you must decide the path the water flows from the valve to the farthest head and calculate that distance in feet. The water flow path is shown below (Fig. 2) and is represented by the pipe with the check pattern. Notice the distance of the branch line is NOT included in the distance. This is because the water flowing to the farthest head does not travel down that length of pipe and therefore any pressure losses occurring in the branch does not affect the pressure in the Critical Length.

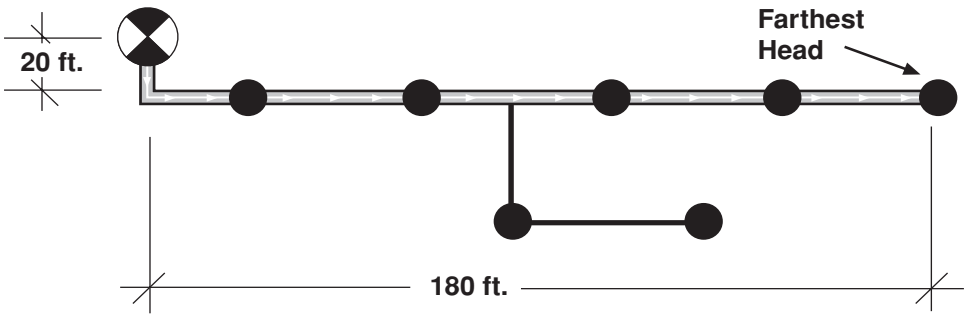


Fig. 2

In Fig. 2 the water traveling from the valve to the farthest head must pass through 200 feet of pipe. This divided by 100 gives a Critical Length (L_c) in hundreds of feet, of 2.0.

C) Determine the rate at which you can lose pressure in the pipe. This is called the Friction Factor (F_f) which is the allowable psi loss per one hundred feet of pipe. We can determine this allowable rate of loss by dividing the allowable pressure loss (in psi) by the critical length (in hundreds of feet) by using the formula below.

The sprinklers mentioned above (Fig. 1) require 30 psi to operate and a distance from the valve to the farthest head of 200 feet. Using the formula below we can determine the Friction Factor.

$$F_f = \frac{P_o \times P_v}{L_c}$$

$$F_f = \frac{30 \times 0.10}{200/100}$$

$$F_f = \frac{3}{2}$$

F_f = 1.5 allowable psi loss per 100 feet of pipe.

The Friction Factor indicates that the pipe is to be sized so that no section of pipe exceeds a pressure loss of 1.5 psi per 100 ft. This insures that over the 200 feet from the valve to the farthest head the total psi loss will not exceed the 3.0 psi allowable loss (10% of the sprinkler operating pressure). The Friction Factor can be used like a budget. It gives us a guideline by which we can size the pipe without having excessive pressure loss in any section.

For the lateral pipes (those downstream of the control valve) use Class 315 PVC for Z\x inch pipe and Class 200 PVC for all larger sizes. Although this requirement for Class 315 and Class 200 is not mandatory and may vary on many larger installations, it is typical for landscape projects from residential through medium commercial projects in the South and Western United States.

At this point turn to the Friction Factor Short Cut charts in the Tables section, page 53. Find the Chart for the Friction Factor closest to the one calculated for your sprinkler system section. (In this case there is a chart for a Friction Factor of 1.5 psi allowable loss per 100 ft. When there is no chart for the exact Friction Factor calculated, round off the Friction Factor to the nearest chart value.)

Figure 3 represents a portion of the Friction Factor Short Cut chart from page 64. The chart in the appendix should look like Fig. 3 shown below.

Friction Factor	1.50 Max. GPM
½" Cl. 315 PV	2.8
¾" Cl. 200 PVC	5.7
1" Cl. 200 PVC	10.8
1¼" Cl. 200 PVC	19.9
1½" Cl. 200 PVC	28.5
2" Cl. 200 PVC	51.1
2½" Cl. 200 PVC	84.3
3" Cl. 200 PVC	141.4

Fig. 3

The "Max. gpm" listed in the chart represent the maximum gpm that each pipe type/size can sustain without exceeding a 1.5 psi loss per 100 ft.

Using the maximum flow rates in the chart as guides the lateral line pipes can be sized with the assurance the total psi loss from the control valve to the farthest sprinkler will not exceed 10% of the sprinkler operating pressure (3.0 psi).

First determine the quantity of water in gpm passing through each section of pipe. A section may need to be sized differently if there is any change in the gpm so it is important to determine the flows carefully. The diagram below (figure 4) lists the gpm flowing through each section of pipe. Notice the section labeled "10" gpm. The 10 gpm is the flow to all sprinkler heads beyond that point and includes both the straight run as well as the branch line.

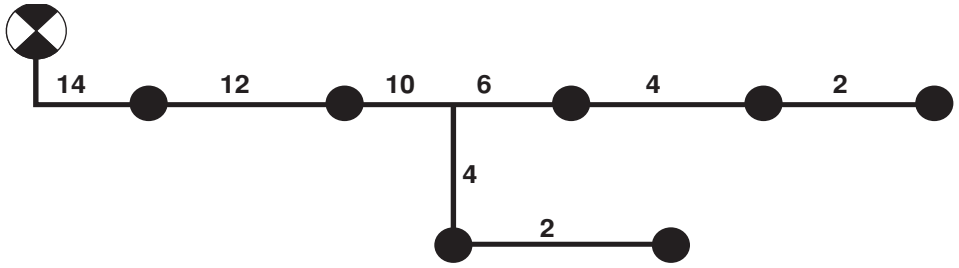


Fig. 4

Using the chart (Fig. 3) as a guide, sizes can be assigned to each pipe section.

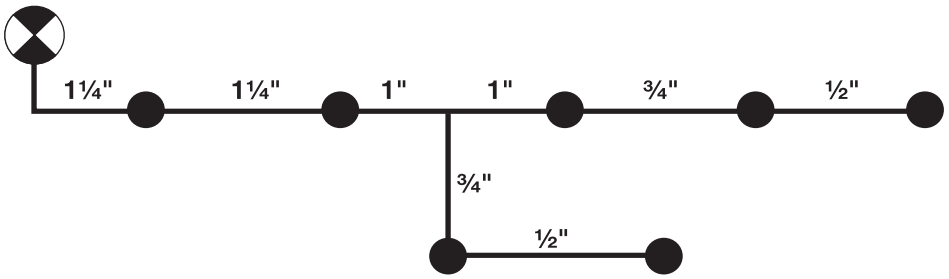


Fig. 5

Note that in the section with 6 gpm we used the 1" pipe. The chart allows up to 5.7 gpm in the ¾" pipe and some designers may choose to use the ¾" instead of the 1". It is acceptable to use ¾" pipe even though it exceeds the allowable loss (the Friction Factor), because pressure is conserved in some sections where the flow is below the maximum allowable.

Friction Loss in Pipe

The Hazen-Williams equation can be expressed as follows and is the most commonly used formula for calculating pressure loss in PVC pipe.

$$h_f = 0.00090194 \left(\frac{100}{C} \right)^{1.852} \frac{Q^{1.852}}{d^{4.866}} L$$

Where:

h_f	=	head loss due to friction in pounds per square inch (psi)
C	=	Hazen Williams coefficient for roughness of the inside of the pipe
Q	=	flow in gallons per minute (gpm)
d	=	inside diameter of pipe in inches
L	=	length of pipe in feet

Example:

A 2-inch class 200 PVC pipe (I.D. = 2.149") 500 ft. in length will deliver 50 GPM to an irrigation system. Compute the friction loss in the pipeline.

$$h_f = 0.00090194 \left(\frac{100}{150} \right)^{1.852} \left(\frac{50^{1.852}}{2.149^{4.866}} \right) 500$$

$$h_f = 7.208 \text{ psi}$$

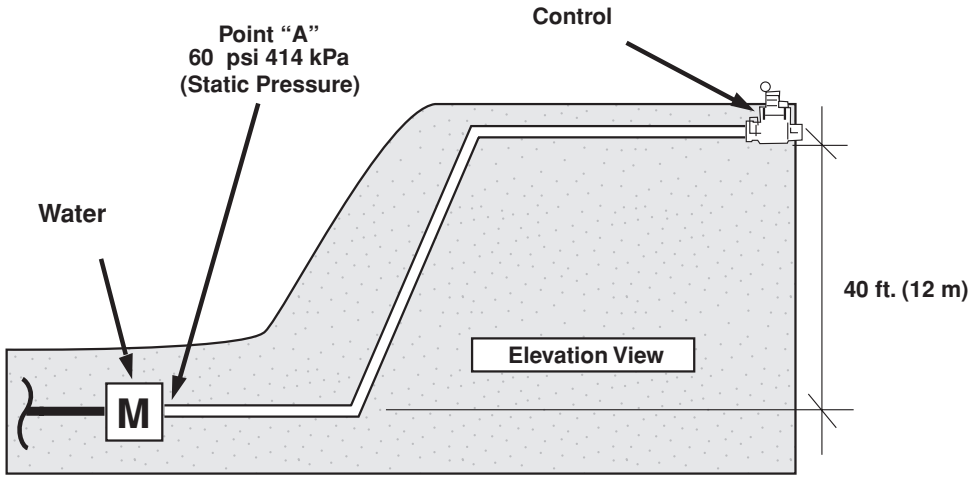
Static Pressure Determination

Static pressure is the measure of pressure when the water is at rest. This pressure is determined by the weight of a column of water resting on one square inch and expressed as the pounds per square inch (psi). The weight of a column of water one foot high will create 0.433 pounds of pressure over every square inch. Static pressure can be determined as follows:

$P_s = A \pm 0.433\ H$

Where:

P_s = static pressure at a given point in the system, in pounds per square inch (psi)
A = static pressure at starting point in psi
0.433 = a constant representing the weight of water in a column one foot high as expressed in pounds per square inch
H = the net vertical change in elevation from the surface of the water to the given point in the system in feet, increase in elevation, uphill, results in psi loss (-0.433) downhill results psi gain (+0.433)



Example:

Determine the static pressure at the entrance to the control valve if the static pressure at the meter is 60 psi. (*Note:* If change in elevation is downhill, the elevation change (H) would be a positive.)

$P_s = 60 - (0.433 \times 40)$

$P_s = 42.68$ psi

For static pressure in metric units use:

$P_s = A - 9.79\ H$

$P_s = 414 - (9.79 \times 12)$

$P_s = 296.52$ kPa

Where:

P_s = static pressure at a given point in the system, in kiloPascals (kPa)
A = static pressure at starting point in kPa
9.79 = a constant representing the weight of water in a column one meter high as expressed in kiloPascals
H = the net vertical change in elevation from the surface of the water to the given point in the system in meters

Velocity Head

The velocity head is the pressure required to move the water through the system.

$H_v = V / 2g$

Where:

H_v = velocity head, the energy required to move the water at the intended velocity, in feet
V = water velocity, in feet per second
g = acceleration due to gravity (32.2)

Example:

What is the Velocity Head required to move 50 GPM through a 2 in. Class 315 PVC pipe?

$H_v = (4.98)^2 / 64.4$

$H_v = 0.39$ ft.

Velocity of Flow

The velocity of flow is a calculation of the speed of water moving in a closed pipe system.

$$V = 0.408 \frac{Q}{d^2}$$

Where:

V = flow velocity in feet per second (fps)
Q = flow in gallons per minute (gpm)
d = inside diameter of pipe in inches
0.408 = constant used to convert units into feet per second

Example:

What is the velocity of flow for a 1 in. class 200 PVC pipe (1.189 inch I.D.) with a flow rate of 10 gpm?

$$V = 0.408 \frac{10}{(1.189)^2}$$

$V = 2.89$ fps

Water Hammer

This formula is used to estimate the total surge pressure developed when there is a sudden reduction or cessation in the velocity of flow. This is typical when a control valve closes.

$$P_t = P_o + \frac{(V \times L \times 0.07)}{t}$$

Where:

P_t = the total pressure developed, in psi
P_o = the operating pressure at the time of valve closing, in psi
V = velocity at the time the reduction in velocity occurred, in feet per second
L = Length of straight pipe between source and point where reduction in velocity occurred, this would be the longest section, in feet (straight pipe means no tee or ell fittings)
t = seconds during which the velocity was reduced, for example, a valve that closes in a half second would have a value for "t" of 0.5
0.07 = constant used to convert velocity, length and time into pressure

Example:

An electric remote control valve has a hydraulic closure time of 0.8 seconds. The main line leading to the valve is 450 ft. long with a velocity of 4.2 fps. The system is operating at 65 psi at the time of valve closure. What is the total surge pressure?

$$P_t = 65 + \frac{(4.2 \times 450 \times 0.07)}{0.8}$$

$$P_t = 65 + \frac{132.3}{0.8}$$

$$P_t = 230.38 \text{ psi}$$

AB 325, California Calculation of Estimated Applied Water Use (EWU)

This formula is used to calculate the estimated amount of water used in one hydrozone of a landscape (the hydrozone may be one control valve or several with similar water requirements). All hydrozones would be added together to determine the Estimated Applied Water Use (EWU) for an entire project. The EWU must be less than the Maximum Applied Water Allowance (MAWA), as shown in the next formula, in order to receive project approval. The use of this formula was mandated by California State assembly bill 325.

$$EWU = \frac{Et_o \times PF \times HA \times 0.62}{IE}$$

Where:

EWU = the estimated water use in gallons per day
Et_o = potential daily evapotranspiration for the worst case scenario, in inchesper day
PF = Plant Factor (Crop Coefficient), percent in decimal form
HA = hydrozone area in square feet
IE = Irrigation Efficiency or Distribution Uniformity, percent in decimal form
0.62 = constant for conversion of units to gallons per day

Example:

You want to determine the EWU for a rectangular lawn area with the following characteristics

- the estimated worst case Et_o is 0.40 inches per day
- for the warm season turf you are using, the crop coefficient has been determined to be 60% (0.60)
- 380 ft. long by 260 ft. wide (98,800 sq. ft.)
- the system efficiency has been estimated at 75% (0.75)

$$EWU = \frac{0.40 \times 0.60 \times 98{,}800 \times 0.62}{0.75}$$

$$EWU = \frac{14{,}701.44}{0.75}$$

EWU = 19,601.92 gallons per day

AB 325, California Calculation of Maximum Applied Water Allowance (MAWA)

The Maximum Applied Water Allowance (MAWA) is used to determine the amount of water a project will be allowed to use for landscape purposes. This amount determines the limit for projected water use (EWU). Projects must be designed with an Estimated Applied Water Use (EWU) less than the limit allowed in the MAWA calculation. The use of this formula was mandated by California State assembly bill 325.

$$MAWA = Et_o \times LA \times 0.496$$

Where:

MAWA	=	Maximum Applied Water Allowance in gallons per day
Et_o	=	potential daily evapotranspiration for the worst case scenario, in inches per day
LA	=	landscaped area in square feet
0.496	=	constant to convert area and evapotranspiration to gallons and then multiplied by 0.8 as required by the model ordinance

Example:

You want to determine the MAWA for the project containing the lawn area mentioned in the example with formula 1 above.

- the estimated worst case Et_o is 0.40 inches per day
- 380 ft. long by 260 ft. wide (98,800 sq. ft.)

$$MAWA = 0.40 \times 98{,}800 \times 0.496$$

$$MAWA = 19{,}601.92 \text{ gallons per day}$$

Maximum System Capacity Requirement

The following formula is to be used to determine the gallons per minute (gpm) necessary for peak water demand periods. While an area might survive for short periods with less water by utilizing soil moisture reserves, extended periods of drought would require the maximum system capacity. The formulas below (#10, #11, #12) are a guide and it should be remembered the answer is no better than the factors that go into the formula (e.g. Reference Evapotranspiration Rate, Area, Distribution Uniformity, etc.).

Maximum System Capacity Requirement - GPM per Hydrozone(s)

This formula is used to determine the maximum water required, in GPM, from the source based on the hydrozone's characteristics.

$$GPM = \frac{0.0104 \times Et_o \times Area \times K_c}{DU \times Hrs.\ Available}$$

Variable Value Ranges:

GPM	=	gallons per minute required
Eto	=	peak daily evapotranspiration for the worst case scenario in inches
Area	=	area to be irrigated in square feet
Kc	=	Crop Coefficient - use 1.0 if actual crop coefficient is not known
DU	=	distribution uniformity or irrigation efficiency
Hrs. Available	=	hours available for irrigation each day in the worst case
0.0104	=	constant for conversion of area, flow and inches per day, etc. into common units

Example:

A park has been designed with 450,000 sq. ft. of turf, and all areas must be irrigated between 10 p.m. and 6 a.m. The crop coefficient is 60% (0.6) with an average peak evapotranspiration rate of 0.35 inches per day. The system distribution uniformity has been estimated to be 65%. What will be the maximum gpm required for the park?

$$GPM = \frac{0.0104 \times 0.35 \times 450{,}000 \times 0.60}{0.65 \times 8}$$

$$GPM = 189$$

Maximum System Capacity Requirement - Total Area For Given GPM

This formula may be used to to determine the area that can be irrigated if you know the gallons per minute of the water supply.

$$\text{Area} = \frac{\text{GPM} \times \text{DU} \times \text{Hrs. Available}}{0.0104 \times Et_o \times K_c}$$

Where:

Area	=	area to be irrigated in square feet
GPM	=	gallons per minute available from the water supply
DU	=	Distribution Uniformity or Irrigation Efficiency
Hrs. Available	=	hours available for irrigation on the "Worst Case" day
Et_o	=	peak daily evapotranspiration for the worst case scenario
K_c	=	Crop Coefficient - use 1.0 if actual crop coefficient is not known
0.0104	=	constant for conversion of area, flow and inches per day etc. into common units

Example:

A developer has a well on the site of a proposed golf course. The well will produce 350 gpm. The course will be designed with a distribution uniformity of 75%, and a watering window of 12 hours. The peak evapotranspiration rate in her area is 0.30 inches per day and the turf has a crop coefficient of 80% (0.80). How large an area can she water with the existing well?

$$\text{Area} = \frac{350 \times 0.75 \times 12}{0.0104 \times 0.30 \times 0.80}$$

Area = 1,262,019 sq. ft. (approximately 29 acres)

Maximum System Capacity Requirement - Total Area For Given Gallons Per Day

This formula may be used to to determine the area that can be irrigated if you know the gallons available per day. This is the case in some water rationing systems or where a well capacity is the limiting factor.

$$\text{Area} = \frac{DU \times \text{Gallons}}{0.62333 \times Et_o \times K_c}$$

Where:

Area	=	area to be irrigated in square feet
DU	=	Distribution Uniformity or Irrigation Efficiency
Gallons	=	gallons available from the water supply on the "Worst Case" day
Et_o	=	evapotranspiration for the worst case scenario
K_c	=	Crop Coefficient - use 1.0 if actual crop coefficient is not known
0.62333	=	constant for conversion of area, flow and inches per day, etc. into common units

Example:

The city has developed guidelines that allot a commercial project 36,000 gallons of water per day during an extended drought. The area being watered has a distribution uniformity of 60%, an average evapotranspiration rate of 0.22 inches per day and an average crop coefficient of 70% (0.70). How much of their project can be sustained with the city's water allotment?

$$\text{Area} = \frac{0.60 \times 36{,}000}{0.62333 \times 0.22 \times 0.70}$$

Area = 225,017 sq. ft. (approximately 5.2 acres)

Brake Horsepower

This formula determines the amount of power required at the pump shaft based on the pump efficiency. It does not take into account any losses in the engine or electric motor.

$$BHP = \frac{Q \times h}{3960 \times E_f}$$

Where:

BHP = brake horsepower (1 HP = 550 ft-lbs/sec)
Q = pump discharge in gallons per minute (gpm)
h = total dynamic head in feet
3960 = constant for conversion of units to brake horsepower
E_f = pump efficiency (decimal)

Example:

A pump with an efficiency of 85% is pumping 500 gpm with a total dynamic head of 230 ft. What is the brake horsepower required to drive the pump?

$$BHP = \frac{500 \times 230}{3960 \times 0.85}$$

$$BHP = 34.17$$

Horsepower Required in Pumping Water

This formula is used to determine the brake horsepower requirements.

$$BHP = \frac{ft \times GPM}{3960 \times E_f}$$

Where:

BHP = Brake Horsepower
ft = the number of feet the water is lifted from the surface of the water source to the discharge point
GPM = the gallons per minute being pumped
3960 = constant for conversion to horsepower
E_f = pump efficiency (decimal)

Example:

A pump system is needed to pump 500 GPM from a river 70 ft. up to a golf course water reservoir. What is the minimum horsepower required to pump this water? This pump is rated at 75% efficient.

$$HP = \frac{70 \times 500}{3960 \times .75}$$

$$HP = 11.78 \approx 12$$

Brake horsepower is the power required at the pump shaft required to drive the pump.

Net Positive Suction Head Available

The Net Positive Suction Head available is the absolute pressure available at the pump impeller. The Net Positive Suction Head Available (NPSHA) must exceed the Net Positive Suction Head Requirement (NPSHR) or cavitation will cause damage to the pump impeller. The NPSHR is determined by the pump manufacturer and is dependent upon pump design and operating conditions.

$$NPSHA = (H_o - H_v) - H_s - h_f$$

Where:

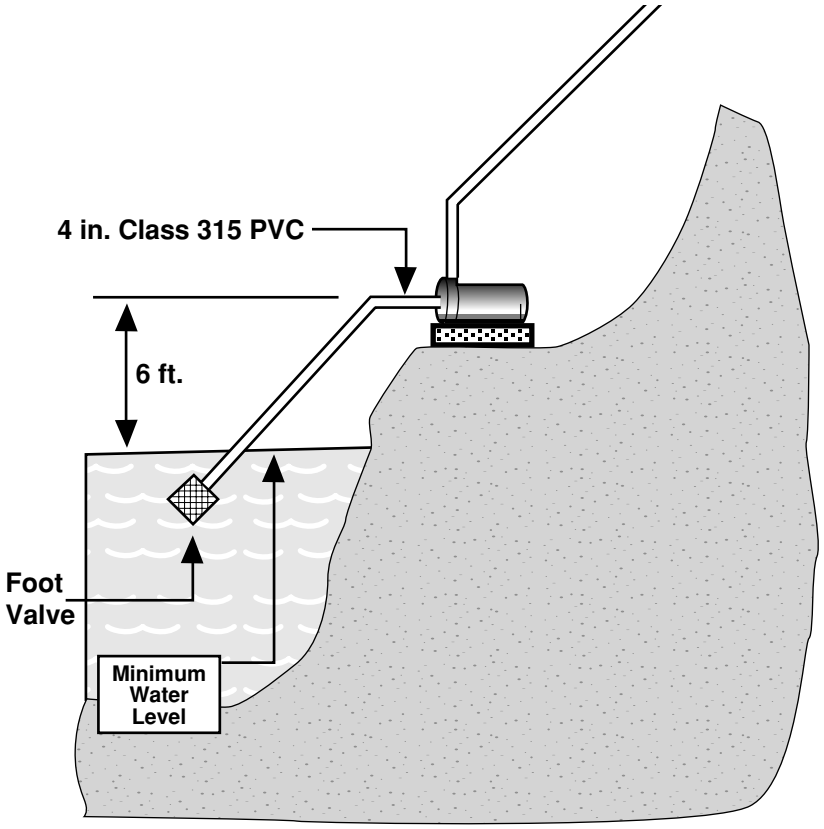
H_o = atmospheric pressure in feet of water
H_v = saturation vapor pressure in feet of water
H_s = vertical height of the impeller eye above the water surface in feet
h_f = pressure loss due to friction in the suction (intake) line in feet of head (pressure losses in psi must be multiplied by 2.31 to convert to feet)

$(H_o - H_v)$ For a Range of Temperatures and Elevations

Water Temp.	Elevation Above Sea Level (ft)						
Degrees F°	0	1000	2000	3000	4000	5000	6000
40	33.7	32.5	31.4	30.3	29.2	28.1	27.0
50	33.6	32.4	31.3	30.2	29.1	28.0	26.9
60	33.4	32.2	31.1	30.0	28.9	27.8	26.7
70	33.2	32.0	30.9	29.8	28.7	27.6	26.5
80	32.8	31.6	31.5	29.4	28.3	27.2	26.1
90	32.4	31.2	30.1	29.0	27.9	26.8	25.7
100	31.8	30.6	29.5	28.4	27.3	26.2	25.1
110	31.1	29.9	28.8	27.7	26.6	25.5	24.4
120	30.1	28.9	27.8	26.7	25.6	24.5	23.4
130	28.9	27.7	26.6	25.5	24.5	23.3	22.2
140	27.3	26.1	25.0	23.9	22.8	21.7	20.6
150	25.4	24.2	23.1	22.0	20.9	19.8	18.7

Example:

Using the diagram below and the chart on page 19 determine the Net Positive Suction Head Available. The pump is located 3000 ft. above sea level, the water temperature is 60° F. The intake line is 20 ft. long and the flow rate is 100 gpm. The pressure loss through the foot valve is 1.5 psi and the pressure loss through the fittings is estimated at 0.5 psi.



NPSHA = 30 - 6 - (1.5 x 2.31) - (0.31 x 0.2 x 2.31) - (0.5 x 2.31)
NPSHA = 19.24 ft. of head

The Net Positive Suction Head Available (NPSHA) can be calculated by the formula above while the Net Positive Suction Head Required (NPSHR) varies from one pump model to another and can be found with the pump performance curves provided by the manufacturer. For any given pumping situation and pump model, the NPSHA must exceed the pump's NPSHR in order for the pump to operate properly and avoid cavitation.

Total Dynamic Head

Total Dynamic Head is the amount of pressure that one pump must generate or be available for proper sprinkler system operation. It represents the total of all pressure losses and requirements including: 1) pressure change due to elevation, 2) sprinkler operating pressure, 3) friction loss in pipes, fittings and valves and 4) the pressure required to move the water.

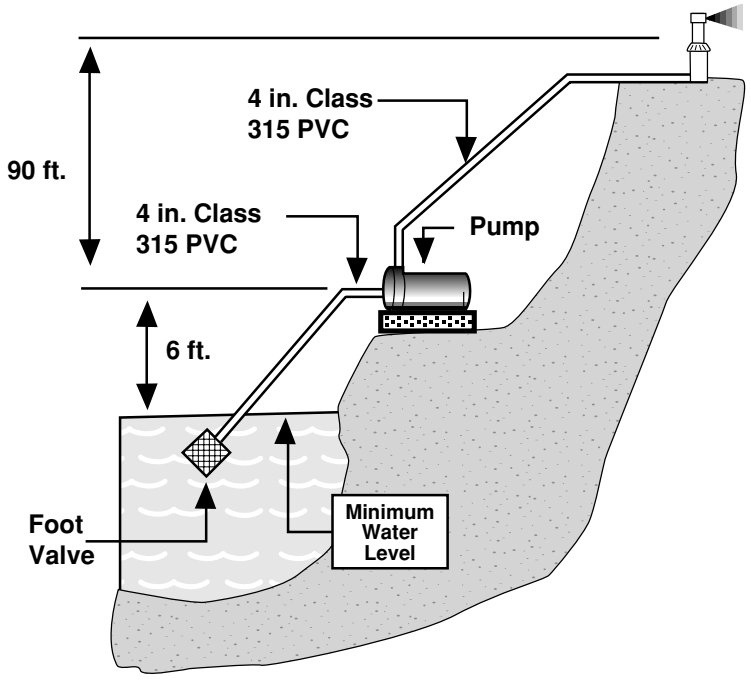
$$TDH = H_s + H_p + h_f + H_v$$

Where:

- TDH = Total Dynamic Head is the maximum pressure the pump will be required to generate.
- H_s = Static Head, the vertical distance in feet from the surface of the water source to the point of discharge, in feet.
- H_p = Pressure Head, the pressure required at the discharge (sprinkler, emitter or discharge pipe) in feet. (If sprinkler psi is used it must be multiplied by 2.31 to convert to feet.)
- h_f = Friction Head, the pressure lost due to friction in pipe, valves and and fittings from the water intake to the discharge point, in feet. (If pressure loss is calculated in psi, it must be multiplied by 2.31 to convert to feet.)
- H_v = Velocity Head, the energy required to move the water at the intended velocity (see velocity head) in feet. Because this is an insignificant loss in Total Dynamic Head, it is sometimes ignored in these calculations.

Example:

Determine the Total Dynamic Head where the sprinkler operating pressure is 50 psi, the maximum flow is 150 gpm, the intake line is 35 ft. long and the discharge line is 450 ft. The pressure loss in the foot valve at that flow rate is given by the manufacturer to be 1 psi. In this sample problem we ignore the pressure loss in fittings.



$$TDH = H_s + H_p + H_f + H_v$$

$$TDH = (90 + 6) + (50 \times 2.31) + \left[(35 + 450) \times \left(\frac{0.66}{100}\right) \times 2.31\right] + (1 \times 2.31) + \frac{4.16^2}{64.4}$$

$$TDH = 221.47 \text{ ft.}$$

Water Horsepower Requirements

This formula, also called Theoretical Horsepower, is used to calculate the amount of power required to pump a given volume of water at a specified head.

$$WHP = \frac{GPM \times TDH}{3960}$$

Where:

WHP = horsepower output required
GPM = gallons per minute flow from the pump
TDH = Total Dynamic Head in feet of head
3960 = constant used to convert flow and head into horsepower

Example:

What is the water horsepower requirement to pump 200 gpm at 350 ft. of head?

$$WHP = \frac{200 \times 350}{3960}$$

$$WHP = 17.7$$

Coefficient of Uniformity

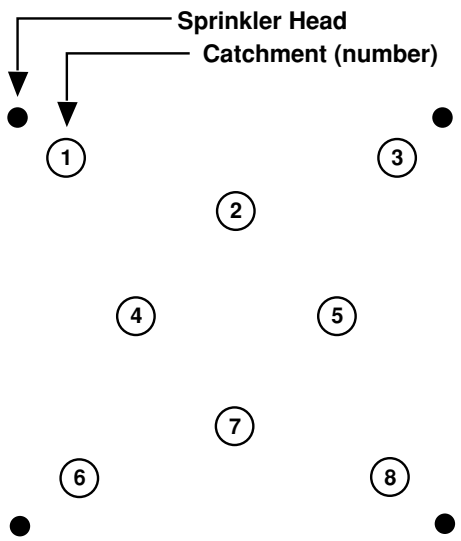
This formula is used to measure the variability of water distribution over a given area. It is calculated by using a series of catchments and comparing the average (mean) catchment and the deviation from that average. This formula was developed by J.E. Christiansen.

$$C_u = 100 \left(1.0 - \frac{\sum x}{mn}\right)$$

Where:

C_u	=	Uniformity Coefficient
x	=	the deviation of individual observations or catchments
$\sum x$	=	the sum of the deviations of individual observations from the mean value, m
m	=	mean value of all observations in the distribution
n	=	number of observations in the distribution
100	=	constant for conversion to percent

Example:



Catchment #	Catchment Quantity (ml)	Deviation From Mean (mean = 46.75 ml)
1	48	1.25
2	51	4.25
3	44	2.75
4	41	5.75
5	45	1.75
6	44	2.75
7	50	3.25
8	51	4.25
	Total	26.00

Note: catchment may be expressed in any convenient unit (i.e. milliliters, ounces, etc.), as long as all catchments are measured in the same units.

In a landscape area, eight catchments are placed between sprinklers and the above observations recorded. What is the Coefficient of Uniformity?

$$C_u = 100 \left(1.0 - \frac{26.00}{46.75 \times 8}\right)$$

$$C_u = 93.0$$

Distribution Uniformity

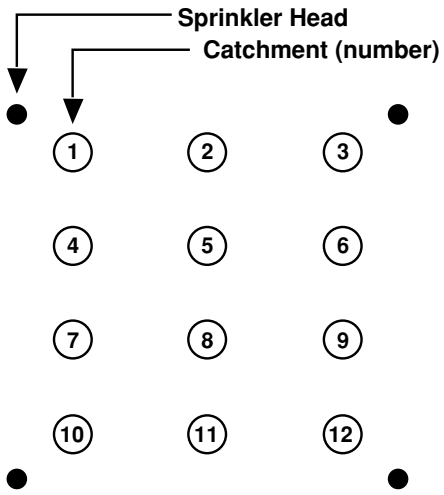
This formula is one of several that are titled Distribution Uniformity. It is used to estimate the variation in water application between sprinklers resulting from pressure variation, improper nozzle selection or lack of maintenance.

$$DU = 100 \times \left(\frac{MQ1}{M}\right)$$

Where:

DU = Distribution Uniformity expressed as a percent
MQ1 = mean of observations in lowest 25% of the distribution
M = mean of distribution
100 = constant for conversion to percent

Example:



Catchment #	Quantity after 15 minutes in milliliters
1	13*
2	18*
3	22
4	17*
5	19
6	23
7	19
8	21
9	22
10	23
11	24
12	22
Total	243
*Lowest 1/4 = 48	

Note: catchment may be measured in any units (inches, ounces, millimeters, etc.)

$$DU = 100 \times \left(\frac{48 \div 3}{243 \div 12}\right)$$

$$DU = 100 \times \left(\frac{16}{20.25}\right)$$

$$DU = 100 \times 0.79$$

$$DU = 79\%$$

Precipitation Rate

Two formulas are shown below, the first is most useful when comparing precipitation rates between different types of sprinklers or calculating precipitation rates on areas with a single type of sprinkler and uniform head and row spacing. The second method is better suited to areas where sprinkler head flows or spacing varies. Metric versions are shown in parenthesis.

Precipitation Rate - Method #1 - Individual Head Method

$$PR = \frac{34650 \times GPM \text{ (for any arc)}}{\text{Degrees Arc} \times \text{Head Spacing} \times \text{Row Spacing}} \qquad \left(PR = \frac{m^3/hr \text{ (for any arc)} \times 360{,}000}{\text{Degrees of arc} \times \text{Head spacing (m)} \times \text{Row Spacing (m)}} = mm/hr\right)$$

$$\left(PR = \frac{1/min \text{ (for any arc)} \times 21{,}600}{\text{Degrees of arc} \times \text{Head spacing (m)} \times \text{Row Spacing (m)}} = mm/hr\right)$$

Where:

PR	=	precipitation rate in inches per hour
GPM	=	flow for a given sprinkler of any arc, in gallons per minute
Degrees Arc	=	the arc of the given sprinkler in degrees
Head Spacing	=	the space between the heads in a row, in feet
Row Spacing	=	the space between rows of heads, in feet
34650	=	constant for conversion of area and flow into common units

Example:

What is the precipitation rate for a 270 degree sprinkler with 6.8 gpm spaced at 28' by 30'?

$$PR = \frac{34{,}650 \times 6.8}{270 \times 28 \times 30}$$

$$PR = 1.04 \text{ in./hr.}$$

Precipitation Rate - Method #2 - Total Area Method

$$PR = \frac{96.25 \times \text{Total GPM}}{\text{Total Area}} \qquad \left(PR = \frac{\text{Total } m^3/hr \times 1{,}000}{\text{Total Area } (m^2)} = mm/hr\right) \qquad \left(PR = \frac{\text{Total } 1/min \times 60}{\text{Total Area } (m^2)} = mm/hr\right)$$

Where:

PR	=	precipitation rate in inches per hour
Total GPM	=	total flow from all sprinklers in the given area in gallons per minute
Total Area	=	the given irrigated area in square feet
96.25	=	constant for conversion of area and flow into common units

Example:

What is the average precipitation rate for a section of turf 325' by 80' if the total flow from all sprinklers in the area is 112 gpm.

$$PR = \frac{96.25 \times 112}{(325 \times 80)}$$

$$PR = 0.41 \text{ in./hr.}$$

Precipitation Rate - Minimum Rate Required

This formula is used to determine the minimum precipitation rate than can be used to deliver the required water during the peak period of water usage.

$$\text{Minimum PR} = \frac{\text{ET} \times \text{Total Acres}}{\text{Hours Avail.} \times \text{Acre per Section} \times \text{Valves} \times \text{Efficiency}}$$

Where:

Minimum PR	=	minimum required precipitation rate in inches per hour
ET	=	amount of water to be applied in inches per day, including crop coefficient
Total Acres	=	the area to be irrigated in acres
Hours Avail.	=	hours available for irrigation each day
Acres per Section	=	average area covered by one control valve in acres
Valves	=	number of valves operating at one time
Efficiency	=	system operating efficiency in decimal equivalent of percent

Example:

What is the minimum precipitation rate that will deliver 0.28 inches of water to 15 acres under the following conditions:

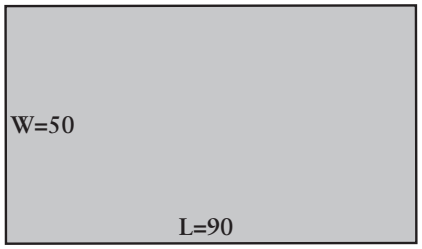
- during a 12 hour period
- the average section is 0.40 acres (17,424 sq. ft.)
- there will be two valves operating at one time
- the system efficiency is 75%

$$\frac{0.28 \times 15}{12 \times 0.40 \times 2 \times .75}$$

= 0.58 in./hr. minimum precipitation rate required

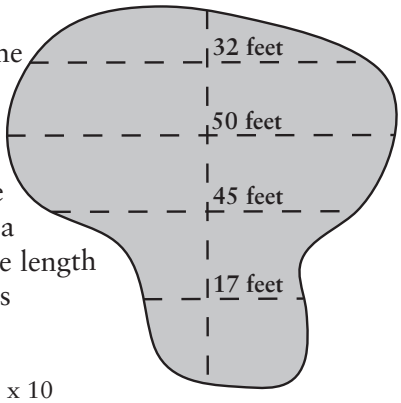
Square or rectangle

Area = L x W
L = length
W = width
A = 90 ft x 50 ft
= 4,500 sq ft



Irregular shapes

Find the length of the longest line across the area. Every 10 ft along the length line, measure the width of the area at right angles to the length line. Total all widths and multiply by 10.

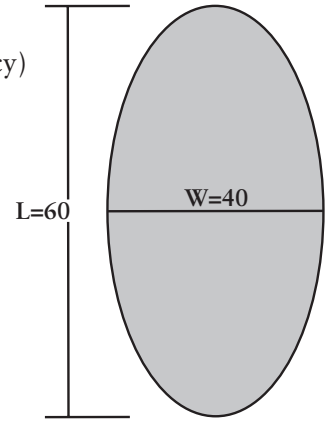


Area = (A + B + C, etc.) x 10
= (32 ft + 50 ft + 45 ft + 17 ft) x 10
= 144 x 10
= 1,440 sq ft

Ovals or egg shapes

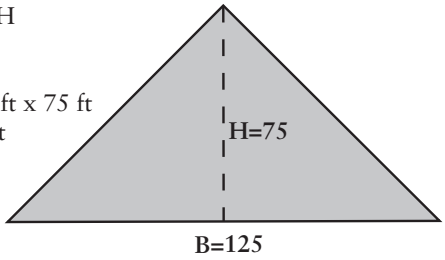
(within 5 percent accuracy)

Area = 0.8 L x W
L = length
W = width at midpoint
Area = 0.8 x 60 x 40 ft
= 1,920 sq ft



Triangle

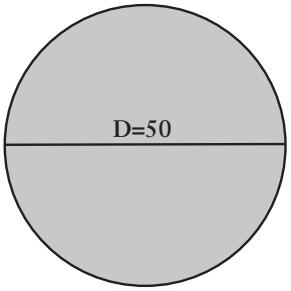
Area = 0.5 x B x H
B = base
H = height
Area = 0.5 x 125 ft x 75 ft
= 4,687 sq ft



Circle

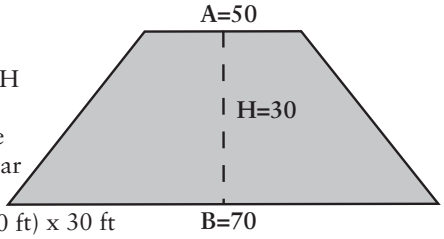
(within 5 percent accuracy)

Area = 0.8 D^2
D = diameter
Area = 0.8 x 50 ft x 50 ft
= 2,000s sq ft



Trapezoid

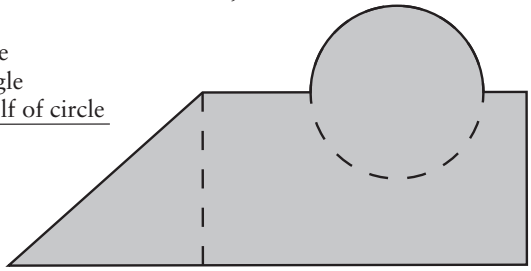
Area = 0.5 x (A + B) x H
A = one parallel side
B = second parallel side
H = height perpendicular to parallel sides
Area = 0.5 x (50 ft + 70 ft) x 30 ft
= 0.5 x 120 ft x 30 ft
= 1,800 sq ft



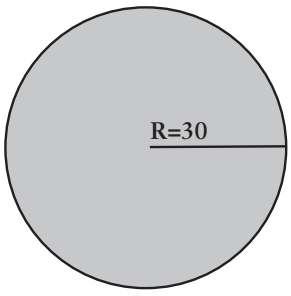
Unusual shapes

Divide the area into sections of regular geometric shapes, calculate the area of each section, then total:

Area of triangle
+ Area of rectangle
+ Area of one-half of circle
= Total area



Circle



Area = πr^2
π = 3.14
R = radius
Area = 3.14 x (30 ft x 30 ft)
= 2,826 sq ft

Scheduling Coefficient

A scheduling coefficient is used to measure the uniformity of water distribution by relating the lowest precipitation rate for any contiguous region within an irrigated area to the overall precipitation rate of the entire area.

$$SC = \frac{PR}{LPR}$$

Where:

SC = Scheduling Coefficient, 1.0 would be perfect uniformity
PR = Precipitation Rate
LPR = Lowest Precipitation Rate in the irrigated area

Example:

In a catchment test, collectors are placed at two foot intervals. The average precipitation rate is calculated to be 1.6 in./hr. The lowest precipitation rate of all catchments was 0.8 in./hr. What is the Scheduling Coefficient?

$$SC = \frac{1.6}{0.8} \qquad SC = 2.0$$

Irrigation Frequency

The Irrigation Frequency Formula calculates the maximum interval allowed between irrigation cycles. This irrigation interval is dependent on soil type, root zone depth and water lost by evapotranspiration of a specific crop.

The frequency, or "Set Days To Water", is calculated using the following formula

$$F = \frac{AWHC \times RZ \times MAD}{Et_o \times K_c}$$

Where:

F = Irrigation frequency
AWHC = Available Water Holding Capacity is the moisture level in the soil which is above the plant's permanent wilting point, and below the soil's field capacity, in inches per foot
RZ = root zone, in feet
MAD = Management Allowable Depletion of water from the AWHC percent. MAD of 30-50% will sustain a healthy landscape.
Et_o = reference evapotranspiration rate, in inches per day
K_c = crop coefficient, decimal

Example:

A zone in your system is irrigating established warm season turf which is growing in a sandy loam on a slight slope with an available water holding capacity of 1" per foot of soil. The root depth of the turf is 9". The average precipitation rate is 0.49 inches/hour. The system is located in San Marcos, CA where the daily moisture loss (ET_o) to be replenished is 0.20 inches. The crop coefficient (K_c) is set at 70%. The allowable water depletion will be 50%.

$$F = \frac{1.0" \times 0.75' \times 50\%}{0.20" \times 0.70} = \frac{1.0 \times 0.75 \times 0.50}{0.20 \times 0.70} = 2.68 = 2 \text{ days}$$

Sprinkler Run Time

The sprinkler run time formula calculates the number of minutes required to apply enough water to replace the water lost by evapotranspiration for a specific crop irrigated with a system at a particular precipitation rate and efficiency.

The "run time" is calculated using the following formula.

$$T = \frac{60 \times D \times Et_o \times K_c}{PR \times IE}$$

Where:

T	=	sprinkler run time in minutes
60	=	constant for conversion of area, flow, inches per hour and inches per day into common units
D	=	watering frequency in days
Et_o	=	reference evapotranspiration rate, in inches per day
K_c	=	crop coefficient, decimal
PR	=	precipitation rate of the area, in inches per hour
IE	=	application efficiency of the system, percent

Example:

Determine the sprinkler run time for an athletic field with a daily Et_o of 0.15 inches and a crop coefficient for the warm season turf of 0.70. The watering schedule is set for every three days. The sprinkler precipitation rate is 0.50 in./hr. with an application efficiency of 75%.

$$T = \frac{60 \times 3 \times 0.15" \times .70}{0.50" \times 75\%} = \frac{60 \times 3 \times 0.15 \times .70}{0.50 \times 0.75}$$

T = 50 minutes every 3 days

CONVERSIONS

Variables and Units

SYMBOL	DEFINITION	ENGLISH UNITS	SI UNITS
a	Cross-sectional area of pipe flow	$in.^2$	mm^2
A_r	Area of land	$ft.^2$ acres	m^2, ha
A_e	Area of land	$ft.^2$	m^2
AW	Available soil water	in.	cm
BP	Barometric pressure	ft	m
C	Hazen-Willimas friction coefficient	none	none
C_u	Christiansen's coefficient of uniformity	%	%
d	Inside diameter of a pipe	in.	mm
d_v	Difference between an observed value and the mean value	$in.^3$	mL
D_t	Diameter of throw of sprinkler	ft.	m
DU	Distribution uniformity	%	%
E	Elevation of a point	ft.	m
EA	Application Efficiency	%	%
ET_c	Crop Evapotranspiration	in./day	mm/day
ET_o	Reference Evapotranspiration	in./day	mm/day
H	Energy head, usually sum of elevation and pressure	ft.	m
I	Electrical current	amps	A
ID	Inside diameter of pipe	in.	mm
h_f	Energy loss due to friction	ft./ft.	m/m
K_c	Crop Coefficient	%	%
kPa	Kilopascals	psi	bars
k_s	Constant used to compute sprinkler spacing	none	none
L	Spacing between lateral lines	ft.	m
MAD	Management allowed depletion	none	none
MC	Maximum coverage for single row sprinklers	ft.	m
n	Number of observations in a uniformity test	none	none
NPSHA	Net positive suction head available	ft.	m
NPSHR	Net positive suction head required	ft.	m
OD	Outside diameter of pipe	in.	mm
P	Pressure of water	$lb./in.^2$ (psi)	kPa, bars
Pal	Allowable loss in pressure	$lb./in.^2$ (psi)	kPa, bars
Pav	Average pressure in a zone	$lb./in.^2$ (psi)	kPa, bars
PET	Potential evapotranspiration	in./day	mm/day
PSI	Pounds per square inch		
PR	Precipitation rate	in./h	mm/h
PL	Pressure losses due to friction	ft.	m
Po	Sprinkler operating pressure	psi	kPa, bars
Pv	Pressure Variation	%	%
P_s	Static Pressure	psi	kPa, bars
Q	Flow of water in a pipe or from a sprinkler	gal/min	L/s
q_e	Flow of water	gal/min	1/min.,m^3/hr
R	Electrical resistance	ohms	
Rt	Radius of throw of sprinkler	ft.	m
RAW	Readily available water	in.	mm
S	Sprinkler spacing	ft.	m
SC	Scheduling coefficient	ratio	ratio
SD	Scalloped distance	ft.	m
t	Time of application or other timed events	h	h
TDH	Total dynamic head	ft.	m
v	Average velocity of water in a pipe	ft/s (fps)	m/s
V_o	Electrical voltage	volts	V
VP	Vapor pressure of water	ft.	m
X	Mean of all values in C_u eq.		
X_{LQ}	Mean of the lower one-fourth of the application values, D_u eq.		
z	Change in elevation between two points	ft.	m

Hunter Industries Conversion Table

Note: Conversions listed in this manual are not exact. Refer to sources such as *Handbook of Chemistry and Physics* and *C.R.C. Standard Math Tables* by the Chemical Rubber Company, *Scientific Tables* by Ciba-Geigy Ltd., *Websters Desk Encyclopedia* by Griesewood and Dempsey, *Field Geologists Manual* by the Australian Institute of Mining and Metallurgy, *Conversion Factors* by Forney's Inc., *Conversions* by Cahn Instruments and *Technical Reference Handbook* by E.P. Rasis for more detailed conversions and specifications.

Convert From	Into	Multiply By
Area		
acres	hectares or sq. hectometer	0.4047
	sq. feet	43,560
	sq. meters	4,047
	sq. miles	0.0015625
	sq. yards	4,840
	sq. inches	6,272,640
hectares	acres	2.471
	sq. cm.	100,000,000
	sq. feet	107,629
	sq. meters	10,000
	sq. miles	0.00386
square centimeters	acres	2.4702×10^{-8}
	sq. feet	0.001076
	sq. inches	0.155
	sq. millimeters	100
	sq. miles	3.861×10^{-11}
	sq. yards	0.0001196
square feet	acres	2.2957×10^{-5}
	sq. centimeters	929.03
	sq. inches	144
	sq. meters	0.0929
	sq. miles	3.58701×10^{-8}
	sq. millimeters	9.29×10^{4}
	sq. yards	0.1111
square inches	acres	1.594×10^{-7}
	sq. centimeters	6.4516
	sq. feet	0.00694
	sq. meters	0.000645
	sq. miles	2.491×10^{-10}
	sq. millimeters	645.16
square kilometers	acres	247.105
	sq. centimeters	1.0×10^{10}
	sq. feet	1.07639×10^{7}
	sq. inches	1.550003×10^{9}
	sq. meters	1.0×10^{6}
	sq. miles	0.3861
	sq. yards	1.196×10^{6}
square meters	acres	0.000247
	hectares	0.0001
	sq. centimeters	10,000
	sq. feet	10.7639
	sq. inches	1,550.003
	sq. kilometers	1.0×10^{-6}
	sq. miles	3.86×10^{-7}
	sq. millimeters	1×10^{6}
	sq. yards	1.195961

Convert From	Into	Multiply By
Area (continued)		
square miles	acres	640
	hectares	258.999
	sq. feet	2.78783×10^{7}
	sq. kilometers	2.58999
	sq. meters	258,999
	sq. yards	3,098,000 (3.098×10^{6})
square millimeters	sq. centimeters	0.01
	sq. feet	1.076×10^{-5}
	sq. inches	0.00155
	sq. meters	1.0×10^{-6}
square yards	acres	0.000207
	hectares	8.3613×10^{-5}
	sq. centimeters	8,361.27
	sq. feet	9
	sq. inches	1296
	sq. meters	0.8361
	sq. miles	3.228×10^{-7}
Concentration		
kilograms/hectare	pounds/acre	0.8924
part per million	grams/liter	0.001
	milligrams/liter	1
	ounces/ton (short)	0.0292
	percent	0.0001
	pounds/millions gallons	8.345
pounds per cu. foot	grams/cu. centimeter	0.016018
	kilograms/cu. meter	16.018
	pounds/cu. inch	5.787×10^{-4}
	pounds/cu. yard	27
Flow		
cu. feet per minute	acre/feet/hr	0.00138
	acre-feet/min	2.2956×10^{-5}
	cu. meters/sec	0.00047195
	gallons (US)/min	7.48052
	liters/sec	0.47193
cu. feet per second	acre-inches/hr	0.99173
	cu. meters/sec	0.02832
	gallons (US)/min	448.83
	liters/min	1,698.96
	liters/sec	28.316
	millions gallons (US)/day	0.64632
gallons (US) per day	cu. feet/hour	0.00557
gallons (British) per hour	cu. meters/minute	7.5768×10^{-5}
gallons (US) per hour	acre-feet/hour	3.0689×10^{-6}
	cu. feet/hour	0.13368
	cu. meters/minute	6.309×10^{-5}
	gallons/minute	0.0166667
	liters/hour	3.7853
gallons (US) per minute	acre-feet/day	0.0044192
	cu. feet/hour	8.0208
	cu. feet/second	0.002228
	cu. meters/hour	0.2268
	cu. meters/second	0.000063
	gallons (US)/hour	60
	liters/minute	3.7853
	liters/second	0.06308

Convert From	Into	Multiply By
Flow (continued)		
liters per minute	cu. feet/minute	0.0353
	cu. feet/second	0.000588
	gallons/minute	0.26418
	gallons/second	0.004403
liters per second	cu. feet/minute	2.1189
	cu. feet/second	0.0353
	cu. yards/minute	0.07848
liters per second-square meter	gallons/minute-sq. foot	1.4726
millions of gallons per day	acre feet/day	3.0689
	acre inches/day	36.8266
	acre inches/hour	1.53444
	cu. feet/hour	5,570.023
	cu. feet/minute	92.834
	cu. feet/second	1.547
	gallons/hour	41,666.667
	gallons/minute	694.4444
pounds of water per minute	cu. feet/second	.000267
Length		
centimeters	feet	0.03281
	inches	0.3937
	meters	0.01
	microns	10,000
	miles (statute)	6.2137×10^{-6}
	millimeters	10
	mils	393.7
	picas (printers)	2.371
	points (printers)	28.4528
	yards	0.01094
feet	centimeters	30.48
	inches	12
	kilometers	3.048×10^{-4}
	meters	0.3048
	microns	304,800
	miles (statute)	0.000189
	millimeters	304.8
	yards	0.333333
inches	centimeters	2.54
	feet	0.08333
	meters	0.0254
	microns	25,400
	miles	1.578×10^{-5}
	millimeters	25.4
	mils	1,000
	yards	0.0278
kilometers	centimeters	100,000
	feet	3,280.84
	inches	39,370
	miles	0.62137
	millimeters	10^6
	yards	1,093.61
meters	centimeters	100
	fathoms	0.54681
	feet	3.28084
	furlongs	0.00497
	inches	39.3701
	kilometers	0.001
	miles	0.000621

Convert From	Into	Multiply By
Length (continued)		
	millimeters	1,000
	mils	39,370.08
	yards	1.0936
microns	centimeters	0.0001
	feet	3.2808×10^{-6}
	inches	3.937×10^{-5}
	meters	1×10^{-6}
	millimeters	0.001
miles (statute)	centimeters	160,934
	feet	5,280
	furlongs	8
	inches	63,360
	kilometers	1.609344
	light years	1.701×10^{-12}
	meters	1,609.344
	yards	1,760
millimeters	centimeters	0.1
	feet	0.00328
	inches	0.03937
	meters	0.001
	mils	39.37
	yards	1.094×10^{-3}
mils	centimeters	2.54×10^{-3}
	feet	8.333×10^{-5}
	inches	0.001
	kilometer	2.54×10^{-8}
	yards	2.778×10^{-5}
yards	centimeters	91.44
	cubits	2
	fathoms	0.5
	feet	3
	furlongs	0.004545
	inches	36
	kilometers	9.144×10^{-4}
	meters	0.9144
	miles	5.682×10^{-4}
	millimeters	914.4
Light Intensity		
foot-candles	foot-lamberts	1
	lumens/sq. foot	1
	lumens/sq. meter	10.7639
	lux	10.7639
lumens	candle power	0.07958
	watt	0.0015
lumens per square foot	foot-candles	1
	foot-lamberts	1
	lumens/sq. meter	10.7639
lumens per square meter	foot-candles	0.0929
	lumens/sq. foot	0.0929
lux	foot-candles	0.0929
	lumens/sq. meter	1

Convert From	Into	Multiply By
Power		
BTU	foot-pounds	777.649
	horsepower-hours	0.00039
	kilowatt-hrs	0.00029287
	kilowatt-hrs. (international)	0.00029283
	joules	1,054.35
	joules (international)	1,054.18
	therms	0.00001
BTU per hour	horsepower/hours	0.00039
	kilowatts	0.00029
	watts	0.29287
BTU per minute	foot-pounds/second	12.96
	horsepower	0.02356
	kilowatts	0.01757
	watts	17.5725
foot-pounds	horsepower-hours	5.05×10^{-7}
	kilowatt-hours	3.766×10^{-7}
horsepower (mechanical)	Btu/minute	42.436
	ft.-pounds/min	33,000
	ft.-pounds/second	550
	horsepower (electric)	0.9996
	horsepower (metric)	1.0139
	horsepower (water)	0.99954
	kg-calories/minute	10.68
	kilowatts	0.7457
	watts	745.7
kilowatts	Btu/hour	3414.4
	foot-pounds/hour	2,655,000
	horsepower	1.341
	horsepower (boiler)	0.1019
	horsepower (electric)	1.34
	horsepower (metric)	1.3596
	kilowatts (international)	0.99983
kilowatt-hours	Btu	3414.4
	horsepower-hours	1.341
	foot-pounds	2,655,000
	kilogram-meters	367,098
watts	Btu/hour	3.4144
	horsepower	0.00134
	horsepower (electric)	0.00134
	horsepower (metric)	0.0013596
	kilowatts	0.001
	watts (international)	0.9998
Pressure		
atmosphere	bars	1.01325
	cm. of mercury @ 0˚ C	76
	cm. of water @ 4˚ C	1,033.26
	dynes/sq. cm	1,013,250
	ft. of water @ 39.2˚ F	33.8995
	in. of mercury @ 32˚ F	29.9213
	kg./sq. cm	1.0332
	kg./sq. meter	10,332
	meters of water @ 4˚ C	10.3326
	mm of mercury @ 0˚ C	760
	pounds/sq. in	14.696

Convert From	Into	Multiply By
Pressure (continued)		
bars	atmospheres	0.98692
	cm. of mercury @ 0˚ C	75.0062
	dynes/sq. cm	1,000,000
	ft. water @ 60˚ F	33.4883
	in. of mercury @ 32˚ F	29.53
	pounds/sq. foot	2,089
	pounds/sq. in	14.5038
dynes per square centimeter	atmospheres	9.869×10^{-7}
	bars	1×10^{-6}
	centimeters of mercury @ 0˚ C	7.500617×10^{-5}
	centimeters of water @ 4˚ C	0.00101975
	inches of mercury @ 32˚ F	2.953×10^{-5}
	inches of water @ 4˚ C	0.000401
	pounds /sq. inch	1.45×10^{-5}
feet of water @ 4˚ C	atmospheres	0.0295
	cm. of mercury @0˚ C	2.2419
	dynes/sq. centimeter	29,889.80
	grams/sq. centimeter	30.479
	inches of mercury @ 32˚ F	0.8826
	kilograms/sq. meter	304.79
	pounds/sq. inch	0.433501
inches of mercury @ 32˚ F	atmospheres	0.03342
	bars	0.03386
	dynes/sq. centimeter	33,864
	ft. of air @ 1 atm, 60˚ F	926.2
	ft. of water @ 39.2˚ F	1.1329
	grams/sq. centimeter	34.532
	kilograms/sq. meter	345.32
	millimeters of mercury @ 60˚ F	25.4
	ounces/sq. inch	7.858
	pounds/sq. inch	70.7264
inches of water @ 4˚ C	atmospheres	0.002458
	dynes/sq. centimeter	2,490.80
	inches of mercury @ 32˚ F	0.07355
	kilograms/sq. centimeter	0.00254
	kilograms/sq. meter	25.399
	ounces/sq. foot	83.235
	ounces/sq. inch	0.57802
	pounds/sq. foot	5.20218
	pounds/sq. inch	0.03613
kilograms per cu. meter	grams/cu centimeter	0.001
	pounds/cu. foot	0.0624
kilograms per sq. centimeter	atmospheres	0.967
	bars	0.98066
	centimeters of mercury @ 0˚ C	73.556
	dynes/sq. centimeter	98,066
	feet of water @ 39.2˚ F	32.809
	inches of mercury @ 32˚ F	28.959
	pounds/sq. foot	2,048
	pounds/sq. inch	14.22
kilograms per sq. meter	atmospheres	9.678×10^{-5}
	bars	9.8066×10^{-5}
	dynes/sq. centimeter	98.066
	feet of water @ 39.2˚ F	0.00328
	inches of mercury @ 32˚ F	0.0029
	kilopascals	9.80665×10^{-3}
	millimeters of mercury @ 0˚ C	0.07356
	pascals	9.8066
	pounds/sq. foot	0.20482
	pounds/sq. inch	0.00142
	pounds/sq. yard	1.8433

Convert From	Into	Multiply By
Pressure (continued)		
kiloPascals (kPa)	bars	0.01
	feet of water	0.33458
	kilograms/sq. centimeter	0.0102
	kilograms/sq. meter	101.97
	meters of head	0.1021
	pounds/sq. inch	0.14503
	centimeters of mercury @ 0˚ C	0.75
	centimeters of water @ 4˚ C	10.197
	dynes/sq. centimeter	10,000
	grams/sq. centimeter	10.197
	inches of mercury @ 32˚ F	0.2953
	inches of water @ 39.2˚ F	4.014788
	pounds/sq. foot	20.88
	millimeter of mercury @ 0˚ C	7.5
millibars	atmospheres	0.000987
	bars	0.001
	dynes/sq. centimeter	1,000
	inches of mercury @ 32˚ F	0.0295
	pounds/sq. foot	2.0885
Newtons	dynes	100,000
	pounds	0.2248089
Pascal	Newton/sq. meter	1
	pounds/sq. inch	0.000145
pounds per square inch	atmospheres	0.06805
	bars	0.06895
	centimeters of mercury @ 0˚ C	5.17149
	centimeters of water @ 4˚ C	70.3089
	dynes/sq. centimeter	68,947
	feet of water	2.307
	grams/sq. centimeter	70.307
	inches of mercury @ 32˚ F	2.036
	inches of water @ 39.2˚ F	27.681
	kilograms/sq. centimeter	0.07031
	kilopascals (kPa)	6.895
	pounds/sq. foot	144
	millimeters of mercury @ 0˚ C	51.715
Pressure Loss		
bars per 100 meters	kilopascals/100 meters	100.004
	meters/100 meters	10.211
	psi/100 feet	4.421
kilopascals (kPa) per 100 meters	bars/100 meters	0.010
	meters/100 meters	0.1021
	psi/100 feet	0.0442
meters per 100 meters	bars/100 meters	0.0979
	kilopascals/100 meters	9.79
	psi/100 feet	0.433
pounds per sq. inch (psi) per 100 feet.	bars/100 meters	0.226
	kilopascals/100 meters	22.621
	meters/100 meters	2.31
Temperature		
Centigrade	Fahrenheit	(˚C x 1.8) + 32
Fahrenheit	Centigrade	(˚F -32) / 1.8

Velocity

Convert From	Into	Multiply By
cu. meters/minute	gallons (British)/min	219.969
	gallons (US)/min	264.172
	liters/min	1000
feet per minute	centimeters/second	0.508
	kilometers/hour	0.018288
	kilometers/minute	0.000348
	meters/minute	0.3048
	meters/second	0.00508
	miles/hour	0.011364
feet per second	centimeters/second	30.48
	kilometers/hour	1.09728
	kilometers/minute	0.01829
	meters/minute	18.288
	meters/second	0.3048
	miles/hour	0.681818
feet per (second x second)	centimeters/(second x second)	30.48
	kilometers/(hr x second)	1.0973
	meters/(second x second)	0.3048
gravity constant	cm/(sec. x sec.)	980.6
	ft./(sec. x sec.)	32.17
inches per hour	centimeters/hour	2.54
	feet/hour	0.0833
	miles/hour	1.5783×10^{-5}
inches per minute	centimeters/hour	152.4
	feet/hour	5
	feet/second	0.0013889
	miles/hour	0.000947
kilometers per hour	centimeters/second	27.778
	feet/hour	3,280.84
	feet/minute	54.6807
	meters/second	0.2778
	miles/hour	0.62137
meters per hour	feet/hour	3.2808
	feet/minute	0.05468
	knots	0.00054
	miles/hour	0.000621
meters per minute	centimeters/second	1.66667
	feet/minute	3.2808
	feet/second	0.05468
	kilometers/hour	0.06
	miles/hour	0.03728
meters per second	feet/minute	196.85
	feet/second	3.2818
	kilometers/hour	3.6
	miles/hour	2.2369
	miles/minute	0.03728
miles her hour	centimeters/second	44.704
	feet/hour	5,280
	feet/minute	88
	feet/second	1.4667
	kilometers/hour	1.6094
	kilometers/minute	0.0268
	knots (international)	0.86897
	meters/minute	26.822
	miles/minute	0.01667

Volume

Convert From	Into	Multiply By
acre-feet	cu. feet	43,560
	cu. meters	1,233.482
	cu. yards	1,613.33
	gallons (US)	325,900
	liters	1,233,455.5
acre inches	cu. feet	3,630
	cu. meters	102.79033
	gallons (US)	27,154.29
bushels (British)	bushels (US)	1.03206
	cu. feet	1.28435
	gallons (British)	8
	liters	36.3677
bushels (US)	bushels (British)	0.96894
	cu. feet	1.24446
	gallons (US dry)	8
	gallons (US liquid)	9.30918
cu. centimeters	cu. feet	3.5315×10^{-5}
	cu inches	0.06102
	cu. meters	1×10^{-6}
	gallons (British)	0.00022
	gallons (US dry)	0.00023
	gallons (US liquid)	0.00026
	liters	0.001
	ounces (British liquid)	0.03519
	ounces (US liquid)	0.03381
cu. feet	acre-feet	2.296×10^{-5}
	cu. centimeters	28,316.8
	cu. inches	1,728
	cu. meters	0.02832
	gallons (US dry)	6.42851
	gallons (US liquid)	7.48052
	liters	28.316
	ounces (British fluid)	996.614
	ounces (US fluid)	957.506
	pints (US dry)	51.4281
	pints (US liquid)	59.8442
	quarts (US dry)	25.714
	quarts (US liquid)	29.922
cu. feet of water @ 60˚ F	pounds of water	63.367
cu. inches	cu. centimeters	16.3871
	cu. meters	1.639×10^{-5}
	cu. yards	2.143×10^{-5}
	gallons (US dry)	0.00372
	gallons (US liquid)	0.00433
	liters	0.01639
	milliliters	16.3866
	ounces (British liquid)	0.57674
	ounces (US liquid)	0.55411
	quarts (US dry)	0.01488
	quarts (US liquid)	0.01732
cu. meters	acre-feet	0.00081
	cu. centimeters	1,000,000
	cu. feet	35.3147
	cu. inches	61,023.70
	cu. yards	1.30795
	gallons (British)	219.969
	gallons (US liquid)	264.172
	liters	1,000
	quarts (US liquid)	1,056.69
cu. yards	cu. feet	27

Convert From	Into	Multiply By
Volume (continued)		
	cu. meters	0.76455
	gallons (British)	168.179
	gallons (US dry)	173.569
	gallons (US liquid)	201.974
	liters	764.533
cup	gallons	0.0625
	pints`	0.5
	milliliters	284.13
	quarts	0.25
	tablespoons	16
	teaspoons	48
gallons (British)	barrels (British)	0.0277
	bushels	0.125
	cu. centimeters	4,546.09
	cu. feet	0.1605
	cu. inches	277.419
	gallons (US liquid)	1.2009
	liters	4.546
	ounces (British liquid)	160
	ounces (US liquid)	153.721
	pounds of water @ 62˚ F	10
gallons (US dry)	barrels (US dry)	0.038096
	barrels (US liquid)	0.03694
	cu. centimeters	4,404.88
	cu. feet	0.15556
	gallons (US liquid)	1.163647
	liters	4.4048
gallons (US liquid)	acre-feet	3.0688×10^{-6}
	barrels (US liquid)	0.031746
	barrels (US petroleum)	0.023809
	cu. centimeters	3,785.41
	cu. feet	0.13368
	cu. inches	231
	cu. meters	0.00378
	cu. yards	0.00495
	gallons (British)	0.83267
	gallons (US dry)	0.85937
	gallons (US wine)	1
	liters	3.7853
	ounces (US liquid)	128
	pints (US liquid)	8
	quarts (US liquid)	4
gallons (US) of water @ 4˚ C	pounds of water	8.34517
gallons (US) of water @ 60˚ F	pounds of water	8.32823
liters	bushels (British)	0.0275
	bushels (US)	0.02838
	cu. centimeters	1,000
	cu. feet	0.03532
	cu. inches	61.002
	cu. meters	0.001
	cu. yards	0.001308
	gallons (British)	0.21998
	gallons (US dry)	0.22703
	gallons (US liquid)	0.26418
	ounces (British fluid)	35.196
	ounces (US fluid)	33.81497
	pints (British)	1.7598
	pints (US dry)	1.8162
	pints (US liquid)	2.1134
	quarts (British)	0.8799

Convert From	Into	Multiply By
Volume (continued)		
liters	quarts (US dry)	0.9081
	quarts (US liquid)	1.0567
ounces (US liquid)	cu. centimeters	29.5737
	cu. inches	1.80469
	cups	0.1698
	cu. meters	2.9574×10^{-5}
	drops	360.14
	gallons (US liquid)	0.00781
	liters	0.02957
	milliliters	29.57
	quarts (US liquid)	0.0312
	teaspoons	6
	tablespoons	2
pint (US liquid)	cu. centimeters	473.176
	cu. feet	0.01671
	cu. inches	28.875
	cups	2
	fifths	0.625
	gallons (US liquid)	0.125
	liters	0.473176
	millimeters	473.163
	ounces (US liquid	16
	quarts (US liquid)	0.5
	teaspoons	96
	tablespoons	32
quarts (US liquid)	cu. centimeters	946.353
	cu. feet	0.0334
	cu. inches	57.75
	cu. meters	0.464×10^{-4}
	cu. yards	0.001238
	fifth	1.25
	gallons (US liquid)	.25
	liters	0.9463
	magnums	0.5
	ounces (US liquid)	32
	pints (US liquid)	2
	quarts (British)	0.859367
	shots	32
tablespoons	cups	0.0625
	drops	180
	ounces (US liquid)	0.5
	quarts	0.01562
	teaspoons	3
teaspoons	cups	0.02083
	drops	60
	ounces (US liquid)	0.1666

Convert From	Into	Multiply By
Volume (continued)		
teaspoons	pinch	3 to 4
	pints	0.01042
	quarts	0.00521
	tablespoons	0.3333
Weight		
dynes	kilograms	1.02×10^{-6}
	pounds	2.248×10^{-6}
grams	dynes	980.66
	ounces	0.03527
	pounds	0.0022046
kilograms	drams	564.38
	dynes	980,665
	grams	1,000
	ounces	35.27396
	pounds	2.20462
	tons (short)	0.001102
milligrams	grams	0.001
	ounces	3.527×10^{-5}
	pounds	2.205×10^{-6}
ounces	grams	28.349
	kilograms	0.02835
	pounds	0.0625
	tons (metric)	2.835×10^{-5}
	tons (short)	3.125×10^{-5}
pounds	drams	256
	dynes	444,800
	grains	7,000
	grams	453.59
	kilograms	0.4536
	ounces	16
	tons (long)	0.0004464
	tons (metric)	0.0004536
	tons (short)	0.0005
pounds of water	cu. feet	0.01602
	cu. inches	27.68
	gallons	0.1198
	liters	0.4545
tons (metric)	dynes	9.807×10^{8}
	kilograms	1,000
	ounces	35,273.95
	pounds	2,204.62
	tons (short)	1.1023
tons (short)	dynes	8.8964×10^{8}
	kilograms	907.18
	ounces	32,000
	pounds	2,000
	tons (long)	0.89286
	tons (metric)	0.90718

Decimal and Metric Equivalents of Common Fractions

Fractions of an Inch	Decimals of an Inch	Millimeters	Fractions of an Inch	Decimals of an Inch	Millimeters
1/64	0.015625	0.397	33/64	0.515625	13.097
1/32	0.03125	0.794	17/32	0.523125	13.494
3/64	0.046875	1.191	35.64	0.546875	13.891
1/16	0.0625	1.588	9/16	0.5625	14.288
5/64	0.078125	1.984	37/64	0.578125	14.684
3/32	0.09375	2.381	19/32	0.59375	15.081
7/64	0.109375	2.778	39/64	0.609375	15.478
1/8	0.125	3.175	5/8	0.625	15.875
9/64	0.140625	3.572	41/64	0.640625	16.272
5/32	0.15625	3.969	21/32	0.65625	16.669
11/64	0.171875	4.366	43/64	0.671875	17.066
3/16	0.1875	4.763	11/16	0.6875	17.463
13/64	0.203125	5.159	45/64	0.703125	17.859
7/32	0.21875	5.556	23/32	0.71875	18.256
15/64	0.234375	5.953	47/64	0.734375	18.653
1/4	0.250	6.350	3/4	0.750	19.050
17/64	0.265625	6.747	49/64	0.765625	19.447
9/32	0.28125	7.144	15/32	0.78125	19.844
19/64	0.296875	7.541	51/64	0.796875	20.241
5/16	0.3125	7.938	13/16	0.8125	20.638
21/64	0.328125	8.334	53/64	0.828125	21.034
11/32	0.34375	8.731	17/32	0.84375	21.431
23/64	0.359375	9.128	55/64	0.859375	21.828
3/8	0.375	9.525	7/8	0.875	22.225
25/64	0.390625	9.922	57/64	0.890625	22.622
13/32	0.40625	10.319	29/32	.090625	23.019
27/64	0.421875	10.716	59.64	0.921875	23.416
7/16	0.4375	11.113	15/16	0.9375	23.813
29/64	0.453125	11.509	61/64	0.953125	24.209
15/32	0.46875	11.906	31/32	0.96875	24.606
31/64	0.484375	12.303	63/64	0.984375	25.003
1/2	0.500	12.700	1	1.000	25.400

TABLES

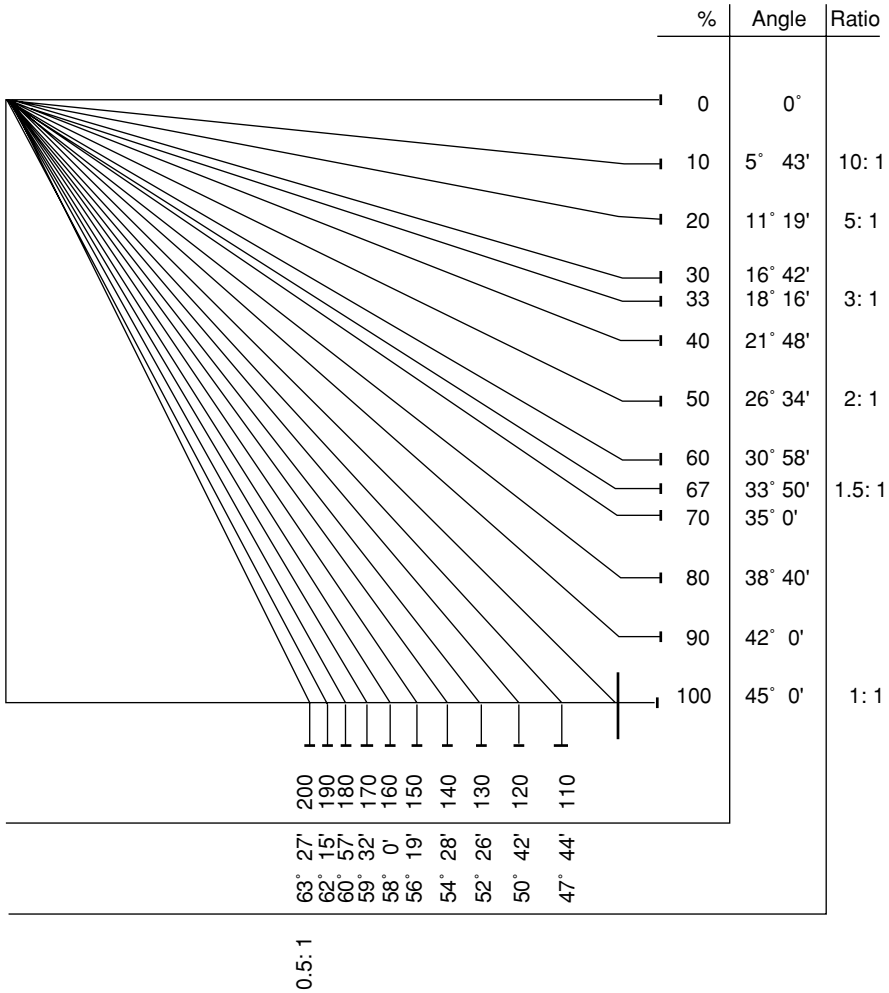
Slope Comparison

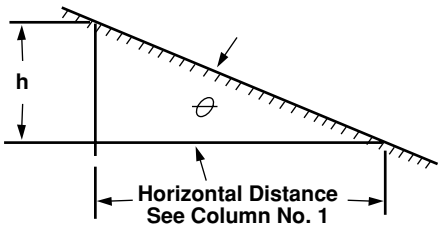
Amount of Rise in 100' of Run	Percent Slope	Slope Ratio	Slope Angle Degrees	Plan to Slope Factor *
5	5	20:1	2˚ 52'	1.001
10	10	10:1	5˚ 43'	1.005
14	14		7˚ 58'	1.010
15	15		8˚ 32'	1.011
17	17		9˚ 39'	1.014
20	20	5:1	11˚ 19'	1.020
25	25	4:1	14˚ 2'	1.031
30	30		16˚ 42'	1.044
33	33	3:1	18˚ 16'	1.053
35	35		19˚ 17'	1.059
40	40	2.5:1	21˚ 48'	1.077
45	45		24˚ 14'	1.097
50	50	2:1	26˚ 34'	1.118
55	55		28˚ 49'	1.141
60	60		30˚ 58'	1.166
65	65	1.5:1	33˚ 1'	1.193
70	70		35˚ 0'	1.221
75	75		36˚ 52'	1.250
80	80		38˚ 40'	1.281
85	85		40˚ 22'	1.312
90	90		41˚ 59'	1.345
95	95		43˚ 32'	1.379
100	100	1:1	45˚ 0'	1.414
105	105		46˚ 24'	1.450
110	110		47˚ 44'	1.487
115	115		48˚ 59'	1.524
120	120		50˚ 12'	1.562
125	125	0.8:1	51˚ 20'	1.601
130	130		52˚ 26'	1.640
135	135		53˚ 28'	1.680
140	140		54˚ 28'	1.720
145	145		55˚ 24'	1.761
150	150	0.67:1	56˚ 19'	1.803

* Plan to Slope Factor: to convert from a plan dimension (horizontal measure) to actual slope distance, multiply by this factor. For example: plan indicates a 2:1 (50%) slope measuring 100 feet from the top to the toe of the slope on the plan. The actual distance from the top to the toe of the slope is 100 feet x 1.118 = 111.8 feet.

Plan to Slope Factor: to convert from an actual soil measurement, divide by this factor. For example: soil measurement is 12 feet, and the slope ratio is 1.5:1, the actual distance on the plan will be 12 ÷ 1.193 = 10 feet.

Slope Reference Chart
Percent, Angle and Ratio





h = vertical rise in feet

Percent of grade or slope: Equals vertical rise in feet per 100' of horizontal distance

= Angle of slope: Angle of inclination with respect to horizontal plane (ie) tan = h/horizontal distance

Ratio of slope = $\frac{\text{horizontal distance}}{h}$

Maximum Precipitation Rates for Slopes

The maximum precipitation values listed below are those suggested by the United States Department of Agriculture. The values are average and may vary with respect to actual soil condition and condition of ground cover.

Maximum Precipitation Rates: Inches per Hour

	0 to 5% slope		5 to 8% slope		8 to 12% slope		12% + slope	
SOIL TEXTURE	**Cover**	**Bare**	**Cover**	**Bare**	**Cover**	**Bare**	**Cover**	**Bare**
Coarse sandy soils	2.00	2.00	2.00	1.50	1.50	1.00	1.00	0.50
Coarse sandy soils over compact subsoils	1.75	1.50	1.25	1.00	1.00	0.75	0.75	0.40
Light sandy loams uniform	1.75	1.00	1.25	0.80	1.00	0.60	0.75	0.40
Light sandy loams over compact subsoils	1.25	0.75	1.00	0.50	0.75	0.40	0.50	0.30
Uniform silt loams	1.00	0.50	0.80	0.40	0.60	0.30	0.40	0.20
Silt loams over compact subsoil	0.60	0.30	0.50	0.25	0.40	0.15	0.30	0.10
Heavy clay or clay loam	0.20	0.15	0.15	0.10	0.12	0.08	0.10	0.06

Using the "Water Supply Requirements" Table

The "Water Supply Requirements" table (page 61) provides a quick estimate of the gallons per minute (GPM) required to irrigate one acre at 70% efficiency for a variety of potential evapotranspiration (PET) rates for varying hours of operation. This can be used to estimate the water needs of large areas for water service meter size or pump station requirement.

How to Use the Table

1) Determine the approximate PET for the project. This should be the peak ET_o and should include a crop coefficient. For example if the peak ET_o were 0.34 in./day and the irrigated area was a warm season turf grass with a crop coefficient of 60% (0.60) the PET would be 0.20 in./day (0.34 x 0.60 = 0.20).

   Find the PET Average in in./day in the second column from the left.

   Example: 0.20 inches/day

2) Read across to the column under the "Average Hours of Operation/Day"

   Example: 12

3) Under the column for 12 Average Hours of Operation/Day, the "Minimum GPM per Acre" represents the minimum number of gallons per minute required to deliver 0.20 inches of water per day for one acre using an irrigation system with 70% efficiency.

   Example: 10.8 gpm minimum per acre required at peak demand.

4) Multiply the minimum gpm per acre times the number of acres in the project, If the project being designed had a total of 20 acres.

   Example: 20 x 10.8 = 216 gpm

Water Supply Requirements

PET Average in./mo.	PET Average in./day	Gal. per acre/day	Available Hours of Operation per Day: 24 Minimum GPM per acre	20 Minimum GPM per acre	16 Minimum GPM per acre	12 Minimum GPM per acre	10 Minimum GPM per acre	8 Minimum GPM per acre	6 Minimum GPM per acre
0.30	0.01	388	0.3	0.3	0.4	0.5	0.6	0.8	1.1
0.60	0.02	776	0.5	0.6	0.8	1.1	1.3	1.6	2.2
0.90	0.03	1164	0.8	1.0	1.2	1.6	1.9	2.4	3.2
1.20	0.04	1552	1.1	1.3	1.6	2.2	2.6	3.2	4.3
1.50	0.05	1940	1.3	1.6	2.0	2.7	3.2	4.0	5.4
1.80	0.06	2328	1.6	1.9	2.4	3.2	3.9	4.8	6.5
2.10	0.07	2715	1.9	2.3	2.8	3.8	4.5	5.7	7.5
2.40	0.08	3103	2.2	2.6	3.2	4.3	5.2	6.5	8.6
2.70	0.09	3491	2.4	2.9	3.6	4.8	5.8	7.3	9.7
3.00	0.10	3879	2.7	3.2	4.0	5.4	6.5	8.1	10.8
3.30	0.11	4267	3.0	3.6	4.4	5.9	7.1	8.9	11.9
3.60	0.12	4655	3.2	3.9	4.8	6.5	7.8	9.7	12.9
3.90	0.13	5043	3.5	4.2	5.3	7.0	8.4	10.5	14.0
4.20	0.14	5431	3.8	4.5	5.7	7.5	9.1	11.3	15.1
4.50	0.15	5819	4.0	4.8	6.1	8.1	9.7	12.1	16.2
4.80	0.16	6207	4.3	5.2	6.5	8.6	10.3	12.9	17.2
5.10	0.17	6595	4.6	5.5	6.9	9.2	11.0	13.7	18.3
5.40	0.18	6983	4.8	5.8	7.3	9.7	11.6	14.5	19.4
5.70	0.19	7370	5.1	6.1	7.7	10.2	12.3	15.4	20.5
6.00	0.20	7758	5.4	6.5	8.1	10.8	12.9	16.2	21.6
6.30	0.21	8146	5.7	6.8	8.5	11.3	13.6	17.0	22.6
6.60	0.22	8534	5.9	7.1	8.9	11.9	14.2	17.8	23.7
6.90	0.23	8922	6.2	7.4	9.3	12.4	14.9	18.6	24.8
7.20	0.24	9310	6.5	7.8	9.7	12.9	15.5	19.4	25.9
7.50	0.25	9698	6.7	8.1	10.1	13.5	16.2	20.2	26.9
7.80	0.26	10086	7.0	8.4	10.5	14.0	16.8	21.0	28.0
8.40	0.28	10862	7.5	9.1	11.3	15.1	18.1	22.6	30.2
9.00	0.30	11638	8.1	9.7	12.1	16.2	19.4	24.2	32.3
9.60	0.32	12413	8.6	10.3	12.9	17.2	20.7	25.9	34.5
10.20	0.34	13189	9.2	11.0	13.7	18.3	22.0	27.5	36.6
10.80	0.36	13965	9.7	11.6	14.5	19.4	23.3	29.1	38.8
11.40	0.38	14741	10.2	12.3	15.4	20.5	24.6	30.7	40.9
12.00	0.40	15517	10.8	12.9	16.2	21.6	25.9	32.3	43.1
12.60	0.42	16293	11.3	13.6	17.0	22.6	27.2	33.9	45.3
13.20	0.44	17068	11.9	14.2	17.8	23.7	28.4	35.6	47.4

***Note:** Required GPM assumes a 70% system efficiency.

Friction Factor Short Cuts

The Friction Factor Method of sizing lateral line pipe is based on the premise that the operating pressure of all heads on a circuit should not vary by more than 10% to 20% of their designed operating pressure. This will provide the most uniform application of water.

The following is a simplified way to determine the maximum flow (gpm) allowed in lateral lines using the Friction Factor pipe sizing method. The example is based on lateral lines of Class 315 PVC for ½" and Class 200 PVC for ¾" - 3". Additional charts for lateral lines of Class 160 PVC and Polethylene are on pages 66-69.

Determination of appropriate pipe size is dependent upon **1**) the sprinkler operating pressure, psi, **2**) the acceptable pressure variation between sprinklers on the circuit 10% to 20% and **3**) the distance from the valve to the farthest sprinkler head on the circuit (note: in some cases this distance can be the distance between the first and last sprinklers on a circuit).

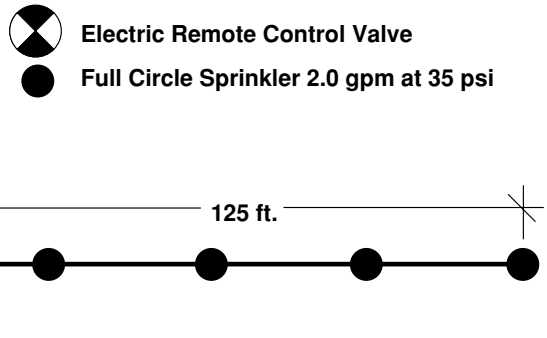
The Friction Factor is the allowable psi loss per 100 feet of pipe. With the Friction Factor, pipe can be sized to avoid excessive pressure losses. The friction factor is calculated by the following formula:

$$\text{Friction Factor} = \frac{\text{Sprinkler Operating Pressure} \times \text{Allowable \% of psi Variation}}{\text{Critical Length (from valve to farthest head) in 100's of feet}}$$

$$F_f = \frac{P_o \times P_v}{L_c}$$

1) Determine the Friction Factor

Example:



Sprinkler operating pressure = 35 psi
Allowable pressure loss = 10%
Critical Length = 125 feet

$$\text{Friction Factor} = \frac{35 \times 0.10}{125 / 100}$$

$$\text{Friction Factor} = \frac{3.5}{1.25}$$

Friction Factor = 2.8 allowable psi loss from valve to farthest head

Round off the Friction Factor to the nearest ¼ psi.

Example: 2.8 is rounded off to 2.75

This represents an allowable rate of psi loss from the valve to the farthest head of 2.75 psi per 100 feet of pipe.

2) Find the Short Cut chart on the following pages that matches the Friction Factor above (2.75 psi loss per 100 ft.).

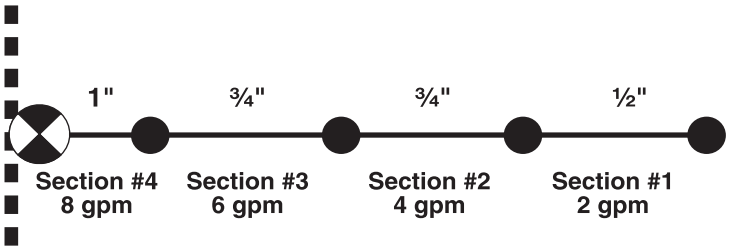
Example:

Friction Factor	**2.75**
	Max. GPM
½" Cl. 315 PVC	3.9
¾" Cl. 200 PVC	7.8
1" Cl. 200 PVC	15.0
1¼" Cl. 200 PVC	27.6
1½" Cl. 200 PVC	39.5
2" Cl. 200 PVC	70.9
2½" Cl. 200 PVC	117.0
3" Cl. 200 PVC	196.1

The "Max. GPM" represents the maximum gpm that can flow through the various sizes of lateral line pipe without exceeding the 2.75 psi allowable loss per 100 ft.

3) Starting with the pipe sections farthest from the valve determine the flow in each section and find the smallest pipe that can carry that flow.

Example:



Pipe section #1 = 2 gpm, lateral line pipe should be ½" Cl. 315 PVC
Pipe section #2 = 4 gpm, lateral line pipe should be ¾" Cl. 200 PVC
Pipe section #3 = 6 gpm, lateral line pipe should be ¾" Cl. 200 PVC
Pipe section #4 = 8 gpm, lateral line pipe should be 1" Cl. 200 PVC

Friction Factor Short Cuts for Class 200 PVC*

Maximum GPM for Various Friction Factors

Friction Factor	0.25 Max. GPM	0.50 Max. GPM	0.75 Max. GPM	1 Max. GPM	1.25 Max. GPM	1.50 Max. GPM	1.75 Max. GPM	2 Max. GPM
½" Cl. 315 PVC	1.1	1.6	2.0	2.3	2.6	2.8	3.1	3.3
¾" Cl. 200 PVC	2.1	3.1	3.9	4.5	5.1	5.7	6.1	6.6
1" Cl. 200 PVC	4.1	6.0	7.4	8.7	9.8	10.8	11.7	12.6
1¼" Cl. 200 PVC	7.6	11.0	13.7	16.0	18.1	19.9	21.7	23.3
1½" Cl. 200 PVC	10.8	15.7	19.6	22.9	25.8	28.5	30.9	33.2
2" Cl. 200 PVC	19.4	28.2	35.1	41.0	46.3	51.1	55.5	59.7
2½" Cl. 200 PVC	32.1	46.6	58.0	67.8	76.4	84.3	91.7	98.5
3" Cl. 200 PVC	53.7	78.1	97.2	113.6	128.1	141.4	153.7	165.1

Friction Factor	2.25 Max. GPM	2.50 Max. GPM	2.75 Max. GPM	3 Max. GPM	3.25 Max. GPM	3.50 Max. GPM	3.75 Max. GPM	4 Max. GPM
½" Cl. 315 PVC	3.5	3.7	3.9	4.1	4.3	4.5	4.7	4.8
¾" Cl. 200 PVC	7.0	7.5	7.8	8.2	8.6	8.9	9.3	9.6
1" Cl. 200 PVC	13.4	14.2	15.0	15.7	16.4	17.0	17.7	18.3
1¼" Cl. 200 PVC	24.8	26.3	27.6	29.0	30.3	31.5	32.7	33.8
1½" Cl. 200 PVC	35.4	37.5	39.5	41.4	43.2	45.0	46.7	48.3
2" Cl. 200 PVC	63.6	67.3	70.9	74.3	77.5	80.7	83.8	86.7
2½" Cl. 200 PVC	105.0	111.1	117.0	122.6	128.1	133.3	138.3	143.2
3" Cl. 200 PVC	176.0	186.3	196.1	205.6	214.6	223.4	231.9	240.1

Friction Factor	4.25 Max. GPM	4.50 Max. GPM	4.75 Max. GPM	5 Max. GPM	5.25 Max. GPM	5.50 Max. GPM	5.75 Max. GPM	6 Max. GPM
½" Cl. 315 PVC	5.0	5.1	5.3	5.5	5.6	5.7	5.9	6.0
¾" Cl. 200 PVC	9.9	10.2	10.5	10.8	11.1	11.4	11.7	12.0
1" Cl. 200 PVC	18.9	19.5	20.1	20.7	21.2	21.8	22.3	22.8
1¼" Cl. 200 PVC	35.0	36.1	37.1	38.2	39.2	40.2	41.2	42.1
1½" Cl. 200 PVC	49.9	51.5	53.0	54.5	56.0	57.4	58.8	60.2
2" Cl. 200 PVC	89.6	92.4	95.2	97.9	100.5	103.0	105.5	108.0
2½" Cl. 200 PVC	148.0	152.7	157.2	161.6	165.9	170.1	174.3	178.3
3" Cl. 200 PVC	248.1	255.9	263.4	270.8	278.1	285.1	292.1	298.9

Friction Factor	6.25 Max. GPM	6.50 Max. GPM	6.75 Max. GPM	7 Max. GPM	7.25 Max. GPM	7.50 Max. GPM	7.75 Max. GPM	8 Max. GPM
½" Cl. 315 PVC	6.1	6.3	6.4	6.5	6.7	6.8	6.9	7.0
¾" Cl. 200 PVC	12.2	12.5	12.7	13.0	13.2	13.5	13.7	14.0
1" Cl. 200 PVC	23.3	23.8	24.3	24.8	25.3	25.7	26.2	26.6
1¼" Cl. 200 PVC	43.1	44.0	44.9	45.8	46.7	47.5	48.4	49.2
1½" Cl. 200 PVC	61.5	62.8	64.1	65.4	66.6	67.9	69.1	70.3
2" Cl. 200 PVC	110.4	112.7	115.1	117.4	119.6	121.8	124.0	126.1
2½" Cl. 200 PVC	182.3	186.2	190.0	193.8	197.5	201.1	204.7	208.3
3" Cl. 200 PVC	305.5	312.1	318.5	324.8	331.0	337.1	343.2	349.1

***Note:** ½" is Class 315 PVC because wall thickness must be at least 0.060" and Class 200 SDR is 21 which would result in a wall thickness in ½" of less than 0.060".

Friction Factor Short Cuts for Class 200 PVC*

Maximum GPM for Various Friction Factors

Friction Factor	8.25 Max. GPM	8.50 Max. GPM	8.75 Max. GPM	9 Max. GPM	9.25 Max. GPM	9.50 Max. GPM	9.75 Max. GPM	10 Max. GPM
½" Cl. 315 PVC	7.1	7.3	7.4	7.5	7.6	7.7	7.8	7.9
¾" Cl. 200 PVC	14.2	14.4	14.7	14.9	15.1	15.3	15.5	15.8
1" Cl. 200 PVC	27.1	27.5	28.0	28.4	28.8	29.2	29.6	30.0
1¼" Cl. 200 PVC	50.0	50.8	51.7	52.4	53.2	54.0	54.8	55.5
1½" Cl. 200 PVC	71.4	72.6	73.7	74.9	76.0	77.1	78.2	79.3
2" Cl. 200 PVC	128.2	130.3	132.4	134.4	136.4	138.4	140.3	142.3
2½" Cl. 200 PVC	211.8	215.2	218.6	221.9	225.3	228.5	231.8	234.9
3" Cl. 200 PVC	354.9	360.7	366.4	372.0	377.6	383.0	388.4	393.8

Friction Factor	10.25 Max. GPM	10.50 Max. GPM	10.75 Max. GPM	11 Max. GPM	11.25 Max. GPM	11.50 Max. GPM	11.75 Max. GPM	12 Max. GPM
½" Cl. 315 PVC	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7
¾" Cl. 200 PVC	16.0	16.2	16.4	16.6	16.8	17.0	17.2	17.4
1" Cl. 200 PVC	30.4	30.8	31.2	31.6	32.0	32.4	32.8	33.2
1¼" Cl. 200 PVC	56.3	57.0	57.7	58.4	59.2	59.9	60.6	61.3
1½" Cl. 200 PVC	80.3	81.4	82.4	83.4	84.5	85.5	86.5	87.5
2" Cl. 200 PVC	144.2	146.1	147.9	149.8	151.6	153.4	155.2	157.0
2½" Cl. 200 PVC	238.1	241.2	244.3	247.3	250.4	253.4	256.3	259.2
3" Cl. 200 PVC	399.1	404.3	409.5	414.6	419.6	424.7	429.6	434.5

Friction Factor	12.25 Max. GPM	12.50 Max. GPM	12.75 Max. GPM	13 Max. GPM	13.25 Max. GPM	13.50 Max. GPM	13.75 Max. GPM	14 Max. GPM
½" Cl. 315 PVC	8.8	8.9	9.0	9.1	9.2	9.3	9.4	9.5
¾" Cl. 200 PVC	17.6	17.8	18.0	18.2	18.3	18.5	18.7	18.9
1" Cl. 200 PVC	33.5	33.9	34.3	34.6	35.0	35.3	35.7	36.0
1¼" Cl. 200 PVC	61.9	62.6	63.3	64.0	64.6	65.3	65.9	66.6
1½" Cl. 200 PVC	88.4	89.4	90.4	91.3	92.3	93.2	94.1	95.0
2" Cl. 200 PVC	158.8	160.5	162.2	163.9	165.6	167.3	169.0	170.6
2½" Cl. 200 PVC	262.1	265.0	267.9	270.7	273.5	276.3	279.0	281.7
3" Cl. 200 PVC	439.4	444.2	449.0	453.7	458.4	463.1	467.7	472.2

Friction Factor	14.25 Max. GPM	14.50 Max. GPM	14.75 Max. GPM	15 Max. GPM	15.25 Max. GPM	15.50 Max. GPM	15.75 Max. GPM	16 Max. GPM
½" Cl. 315 PVC	9.6	9.7	9.8	9.9	10.0	10.0	10.1	10.2
¾" Cl. 200 PVC	19.1	19.3	19.4	19.6	19.8	20.0	20.1	20.3
1" Cl. 200 PVC	36.4	36.7	37.1	37.4	37.7	38.1	38.4	38.7
1¼" Cl. 200 PVC	67.2	67.8	68.5	69.1	69.7	70.3	70.9	71.6
1½" Cl. 200 PVC	96.0	96.9	97.8	98.7	99.5	100.4	101.3	102.2
2" Cl. 200 PVC	172.3	173.9	175.5	177.1	178.7	180.3	181.8	183.4
2½" Cl. 200 PVC	284.5	287.1	289.8	292.4	295.1	297.7	300.2	302.8
3" Cl. 200 PVC	476.8	481.3	485.7	490.2	494.6	498.9	503.3	507.6

***Note:** ½" is Class 315 PVC because wall thickness must be at least 0.060" and Class 200 SDR is 21 which would result in a wall thickness in ½" of less than 0.060".

Friction Factor Short Cuts for Class 160 PVC*

Maximum GPM for Various Friction Factors

Friction Factor	0.25 Max. GPM	0.50 Max. GPM	0.75 Max. GPM	1 Max. GPM	1.25 Max. GPM	1.50 Max. GPM	1.75 Max. GPM	2 Max. GPM
½" Cl. 315 PVC	1.1	1.6	2.0	2.3	2.6	2.8	3.1	3.3
¾" Cl. 200 PVC	2.1	3.1	3.9	4.5	5.1	5.7	6.1	6.6
1" Cl. 160 PVC	4.2	6.0	7.5	8.8	9.9	10.9	11.9	12.8
1¼" Cl. 160 PVC	8.0	11.6	14.4	16.9	19.0	21.0	22.8	24.5
1½" Cl. 160 PVC	11.4	16.6	20.6	24.1	27.1	30.0	32.6	35.0
2" Cl. 160 PVC	20.5	29.8	37.1	43.3	48.8	53.9	58.6	62.9
2½" Cl. 160 PVC	33.8	49.2	61.2	71.5	80.7	89.0	96.8	104.0
3" Cl. 160 PVC	56.6	82.3	102.5	119.7	135.0	149.0	161.9	174.1

Friction Factor	2.25 Max. GPM	2.50 Max. GPM	2.75 Max. GPM	3 Max. GPM	3.25 Max. GPM	3.50 Max. GPM	3.75 Max. GPM	4 Max. GPM
½" Cl. 315 PVC	3.5	3.7	3.9	4.1	4.3	4.5	4.7	4.8
¾" Cl. 200 PVC	7.0	7.5	7.8	8.2	8.6	8.9	9.3	9.6
1" Cl. 160 PVC	13.6	14.4	15.2	15.9	16.6	17.3	17.9	18.6
1¼" Cl. 160 PVC	26.1	27.7	29.1	30.5	31.9	33.2	34.4	35.7
1½" Cl. 160 PVC	37.3	39.5	41.6	43.6	45.5	47.3	49.1	50.9
2" Cl. 160 PVC	67.1	71.0	74.7	78.3	81.8	85.1	88.4	91.5
2½" Cl. 160 PVC	110.8	117.3	123.5	129.4	135.2	140.7	146.0	151.2
3" Cl. 160 PVC	185.5	196.3	206.7	216.7	226.2	235.5	244.4	253.1

Friction Factor	4.25 Max. GPM	4.50 Max. GPM	4.75 Max. GPM	5 Max. GPM	5.25 Max. GPM	5.50 Max. GPM	5.75 Max. GPM	6 Max. GPM
½" Cl. 315 PVC	5.0	5.1	5.3	5.5	5.6	5.7	5.9	6.0
¾" Cl. 200 PVC	9.9	10.2	10.5	10.8	11.1	11.4	11.7	12.0
1" Cl. 160 PVC	19.2	19.8	20.4	20.9	21.5	22.0	22.6	23.1
1¼" Cl. 160 PVC	36.8	38.0	39.1	40.2	41.3	42.3	43.4	44.4
1½" Cl. 160 PVC	52.6	54.2	55.8	57.4	58.9	60.4	61.9	63.3
2" Cl. 160 PVC	94.5	97.5	100.4	103.2	106.0	108.7	111.3	113.9
2½" Cl. 160 PVC	156.2	161.1	165.9	170.6	175.1	179.6	183.9	188.2
3" Cl. 160 PVC	261.5	269.7	277.7	285.5	293.1	300.5	307.8	315.0

Friction Factor	6.25 Max. GPM	6.50 Max. GPM	6.75 Max. GPM	7 Max. GPM	7.25 Max. GPM	7.50 Max. GPM	7.75 Max. GPM	8 Max. GPM
½" Cl. 315 PVC	6.1	6.3	6.4	6.5	6.7	6.8	6.9	7.0
¾" Cl. 200 PVC	12.2	12.5	12.7	13.0	13.2	13.5	13.7	14.0
1" Cl. 160 PVC	23.6	24.1	24.6	25.1	25.6	26.1	26.5	27.0
1¼" Cl. 160 PVC	45.4	46.3	47.3	48.2	49.2	50.1	51.0	51.8
1½" Cl. 160 PVC	64.7	66.1	67.5	68.8	70.1	71.4	72.7	74.0
2" Cl. 160 PVC	116.4	118.9	121.4	123.8	126.1	128.5	130.8	133.0
2½" Cl. 160 PVC	182.4	196.5	200.6	204.5	208.4	212.3	216.1	219.8
3" Cl. 160 PVC	322.0	328.9	335.7	342.3	348.9	355.3	361.7	367.9

***Note:** ½" is Class 315 PVC and ¾" is Cl 200 PVC because wall thickness must be at least 0.060" and Class 160 SDR is 26 which would result in a wall thicknesses in ½" an ¾"of less than 0.060".

Friction Factor Short Cuts for Class 160 PVC*

Maximum GPM for Various Friction Factors

Friction Factor	8.25 Max. GPM	8.50 Max. GPM	8.75 Max. GPM	9 Max. GPM	9.25 Max. GPM	9.50 Max. GPM	9.75 Max. GPM	10 Max. GPM
½" Cl. 315 PVC	7.1	7.3	7.4	7.5	7.6	7.7	7.8	7.9
¾" Cl. 200 PVC	14.2	14.4	14.7	14.9	15.1	15.3	15.5	15.8
1" Cl. 160 PVC	27.4	27.9	28.3	28.8	29.2	29.6	30.0	30.4
1¼" Cl. 160 PVC	52.7	53.6	54.4	55.2	56.1	56.9	57.7	58.5
1½" Cl. 160 PVC	75.2	76.4	77.6	78.8	80.0	81.2	82.3	83.4
2" Cl. 160 PVC	135.3	137.5	139.6	141.8	143.9	146.0	148.0	150.1
2½" Cl. 160 PVC	223.5	227.1	230.7	234.3	237.8	241.2	244.6	248.0
3" Cl. 160 PVC	374.1	380.2	386.2	392.1	397.9	403.7	409.4	415.1

Friction Factor	10.25 Max. GPM	10.50 Max. GPM	10.75 Max. GPM	11 Max. GPM	11.25 Max. GPM	11.50 Max. GPM	11.75 Max. GPM	12 Max. GPM
½" Cl. 315 PVC	8.0	8.1	8.2	8.3	8.4	8.5	8.6	8.7
¾" Cl. 200 PVC	16.0	16.2	16.4	16.6	16.8	17.0	17.2	17.4
1" Cl. 160 PVC	30.9	31.3	31.7	32.1	32.4	32.8	33.2	33.6
1¼" Cl. 160 PVC	59.3	60.0	60.8	61.6	62.3	63.1	63.8	64.5
1½" Cl. 160 PVC	84.6	85.7	86.8	87.8	88.9	90.0	91.0	92.1
2" Cl. 160 PVC	152.1	154.1	156.0	158.0	159.9	161.8	163.7	165.6
2½" Cl. 160 PVC	251.3	254.6	257.8	261.1	264.3	267.4	270.5	273.6
3" Cl. 160 PVC	420.6	426.1	431.6	437.0	442.3	447.6	452.8	458.0

Friction Factor	12.25 Max. GPM	12.50 Max. GPM	12.75 Max. GPM	13 Max. GPM	13.25 Max. GPM	13.50 Max. GPM	13.75 Max. GPM	14 Max. GPM
½" Cl. 315 PVC	8.8	8.9	9.0	9.1	9.2	9.3	9.4	9.5
¾" Cl. 200 PVC	17.6	17.8	18.0	18.2	18.3	18.5	18.7	18.9
1" Cl. 160 PVC	34.0	34.3	34.7	35.1	35.4	35.8	36.2	36.5
1¼" Cl. 160 PVC	65.2	66.0	66.7	67.4	68.1	68.8	69.4	70.1
1½" Cl. 160 PVC	93.1	94.1	95.1	96.1	97.1	98.1	99.1	100.1
2" Cl. 160 PVC	167.4	169.3	171.1	172.9	174.7	176.5	178.2	180.0
2½" Cl. 160 PVC	276.7	279.7	282.7	285.7	288.7	291.6	294.5	297.4
3" Cl. 160 PVC	463.1	468.2	473.2	478.2	483.2	488.1	492.9	497.7

Friction Factor	14.25 Max. GPM	14.50 Max. GPM	14.75 Max. GPM	15 Max. GPM	15.25 Max. GPM	15.50 Max. GPM	15.75 Max. GPM	16 Max. GPM
½" Cl. 315 PVC	9.6	9.7	9.8	9.9	10.0	10.0	10.1	10.2
¾" Cl. 200 PVC	19.1	19.3	19.4	19.6	19.8	20.0	20.1	20.3
1" Cl. 160 PVC	36.9	37.2	37.6	37.9	38.2	38.6	38.9	39.2
1¼" Cl. 160 PVC	70.8	71.5	72.1	72.8	73.4	74.1	74.7	75.4
1½" Cl. 160 PVC	101.0	102.0	102.9	103.9	104.8	105.7	106.6	107.5
2" Cl. 160 PVC	181.7	183.4	185.1	186.8	188.5	190.1	191.8	193.4
2½" Cl. 160 PVC	300.2	303.1	305.9	308.7	311.4	314.2	316.9	319.6
3" Cl. 160 PVC	502.5	507.3	512.0	516.6	521.3	525.9	530.4	535.0

***Note:** ½" is Class 315 PVC and ¾" is Cl 200 PVC because wall thickness must be at least 0.060" and Class 160 SDR is 26 which would result in a wall thickness in ½" an ¾"of less than 0.060".

Friction Factor Short Cuts for Polyethylene (PE) - SDR-7 (IPS) Pressure Rated Tube

Maximum GPM for Various Friction Factors

Friction Factor	0.25 Max. GPM	0.50 Max. GPM	0.75 Max. GPM	1 Max. GPM	1.25 Max. GPM	1.50 Max. GPM	1.75 Max. GPM	2 Max. GPM
½" SDR-Poly	0.7	1.0	1.3	1.5	1.7	1.8	2.0	2.1
¾" SDR-Poly	1.5	2.1	2.6	3.1	3.5	3.8	4.2	4.5
1" SDR-Poly	2.8	4.0	5.0	5.8	6.6	7.2	7.9	8.5
1¼" SDR-Poly	5.7	8.2	10.2	12.0	13.5	14.9	16.2	17.4
1½" SDR-Poly	8.5	12.3	15.4	17.9	20.2	22.3	24.3	26.1
2" SDR-Poly	16.4	23.8	29.6	34.6	39.0	43.0	46.8	50.3
2½" SDR-Poly	26.1	37.9	47.2	55.2	62.2	68.7	74.6	80.2
3" SDR-Poly	46.2	67.1	83.6	97.6	110.1	121.5	132.0	141.9

Friction Factor	2.25 Max. GPM	2.50 Max. GPM	2.75 Max. GPM	3 Max. GPM	3.25 Max. GPM	3.50 Max. GPM	3.75 Max. GPM	4 Max. GPM
½" SDR-Poly	2.3	2.4	2.5	2.7	2.8	2.9	3.0	3.1
¾" SDR-Poly	4.8	5.1	5.3	5.6	5.8	6.1	6.3	6.5
1" SDR-Poly	9.0	9.5	10.0	10.5	11.0	11.4	11.9	12.3
1¼" SDR-Poly	18.5	19.6	20.7	21.6	22.6	23.5	24.4	25.3
1½" SDR-Poly	27.8	29.4	31.0	32.5	33.9	35.3	36.6	37.9
2" SDR-Poly	53.6	56.7	59.7	62.6	65.3	68.0	70.6	73.1
2½" SDR-Poly	85.5	90.5	95.2	99.8	104.2	108.5	112.6	116.6
3" SDR-Poly	151.2	160.1	168.5	176.6	185.5	192.0	199.3	206.3

Friction Factor	4.25 Max. GPM	4.50 Max. GPM	4.75 Max. GPM	5 Max. GPM	5.25 Max. GPM	5.50 Max. GPM	5.75 Max. GPM	6 Max. GPM
½" SDR-Poly	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9
¾" SDR-Poly	6.7	7.0	7.2	7.4	7.6	7.7	7.9	8.1
1" SDR-Poly	12.7	13.1	13.5	13.9	14.2	14.6	15.0	15.3
1¼" SDR-Poly	26.1	26.9	27.7	28.5	29.3	30.0	30.8	31.5
1½" SDR-Poly	39.2	40.4	41.6	42.8	43.9	45.0	46.1	47.2
2" SDR-Poly	75.5	77.9	80.2	82.5	84.7	86.8	88.9	91.0
2½" SDR-Poly	120.5	124.3	127.9	131.6	135.0	138.5	141.8	145.1
3" SDR-Poly	213.2	219.9	226.4	232.7	239.0	245.0	251.0	256.8

Friction Factor	6.25 Max. GPM	6.50 Max. GPM	6.75 Max. GPM	7 Max. GPM	7.25 Max. GPM	7.50 Max. GPM	7.75 Max. GPM	8 Max. GPM
½" SDR-Poly	4.0	4.0	4.1	4.2	4.3	4.4	4.5	4.5
¾" SDR-Poly	8.3	8.5	8.7	8.8	9.0	9.2	9.3	9.5
1" SDR-Poly	15.7	16.0	16.3	16.6	17.0	17.3	17.6	17.9
1¼" SDR-Poly	32.2	32.9	33.5	34.2	34.9	35.5	36.1	36.8
1½" SDR-Poly	48.2	49.3	50.3	51.3	52.3	53.2	54.2	55.1
2" SDR-Poly	93.0	95.0	97.0	98.9	100.8	102.6	104.5	106.3
2½" SDR-Poly	148.4	151.5	154.7	157.7	160.8	163.7	166.6	169.5
3" SDR-Poly	262.5	268.2	273.7	279.1	284.5	289.7	294.9	300.0

Friction Factor Short Cuts for Polyethylene (PE) - SDR-7 (IPS) Pressure Rated Tube

Maximum GPM for Various Friction Factors

Friction Factor	8.25 Max. GPM	8.50 Max. GPM	8.75 Max. GPM	9 Max. GPM	9.25 Max. GPM	9.50 Max. GPM	9.75 Max. GPM	10 Max. GPM
½" SDR-Poly	4.6	4.7	4.8	4.8	4.9	5.0	5.0	5.1
¾" SDR-Poly	9.6	9.8	10.0	10.1	10.3	10.4	10.6	10.7
1" SDR-Poly	18.2	18.5	18.8	19.1	19.3	19.6	19.9	20.2
1¼" SDR-Poly	37.4	38.0	38.6	39.2	39.8	40.3	40.9	41.5
1½" SDR-Poly	56.0	57.0	57.9	58.7	59.6	60.5	61.3	62.2
2" SDR-Poly	108.1	109.8	111.5	113.3	114.9	116.6	118.3	119.9
2½" SDR-Poly	172.4	175.2	177.9	180.7	183.4	186.0	188.6	191.2
3" SDR-Poly	305.0	310.0	314.9	319.7	324.4	329.1	333.8	338.4

Friction Factor	10.25 Max. GPM	10.50 Max. GPM	10.75 Max. GPM	11 Max. GPM	11.25 Max. GPM	11.50 Max. GPM	11.75 Max. GPM	12 Max. GPM
½" SDR-Poly	5.2	5.2	5.3	5.4	5.4	5.5	5.6	5.6
¾" SDR-Poly	10.8	11.0	11.1	11.3	11.4	11.5	11.7	11.8
1" SDR-Poly	20.4	20.7	21.0	21.2	21.5	21.8	22.0	22.3
1¼" SDR-Poly	42.0	42.6	43.1	43.7	44.2	44.7	45.2	45.8
1½" SDR-Poly	63.0	63.8	64.7	65.5	66.3	67.1	67.8	68.6
2" SDR-Poly	121.5	123.1	124.7	126.2	127.8	129.3	130.8	132.3
2½" SDR-Poly	193.8	196.3	198.8	201.3	203.8	206.2	208.6	211.0
3" SDR-Poly	342.9	347.4	351.9	356.3	360.6	364.9	369.2	373.4

Friction Factor	12.25 Max. GPM	12.50 Max. GPM	12.75 Max. GPM	13 Max. GPM	13.25 Max. GPM	13.50 Max. GPM	13.75 Max. GPM	14 Max. GPM
½" SDR-Poly	5.7	5.8	5.8	5.9	5.9	6.0	6.1	9.5
¾" SDR-Poly	11.9	12.1	12.2	12.3	12.5	12.6	12.7	18.9
1" SDR-Poly	22.5	22.8	23.0	23.2	23.5	23.7	24.0	36.5
1¼" SDR-Poly	46.3	46.8	47.3	47.8	48.3	48.8	49.3	70.1
1½" SDR-Poly	69.4	70.1	70.9	71.6	72.4	73.1	73.8	100.1
2" SDR-Poly	133.8	135.2	136.7	138.1	139.6	141.0	142.4	180.0
2½" SDR-Poly	213.4	215.7	218.0	220.3	222.6	224.9	227.1	297.4
3" SDR-Poly	377.6	381.7	385.8	389.9	393.9	397.9	401.9	497.7

Friction Factor	14.25 Max. GPM	14.50 Max. GPM	14.75 Max. GPM	15 Max. GPM	15.25 Max. GPM	15.50 Max. GPM	15.75 Max. GPM	16 Max. GPM
½" SDR-Poly	6.2	6.2	6.3	6.4	6.4	6.5	6.5	6.6
¾" SDR-Poly	13.0	13.1	13.2	13.3	13.4	13.6	13.7	13.8
1" SDR-Poly	24.4	24.7	24.9	25.1	25.3	25.6	25.8	26.0
1¼" SDR-Poly	50.2	50.7	51.2	51.6	52.1	52.5	53.0	53.5
1½" SDR-Poly	75.3	76.0	76.7	77.4	78.1	78.8	79.5	80.1
2" SDR-Poly	145.2	146.5	147.9	149.2	150.6	151.9	153.2	154.5
2½" SDR-Poly	231.5	233.7	235.9	238.0	240.2	242.3	244.4	246.5
3" SDR-Poly	409.7	413.6	417.4	421.2	425.0	428.7	432.5	436.2

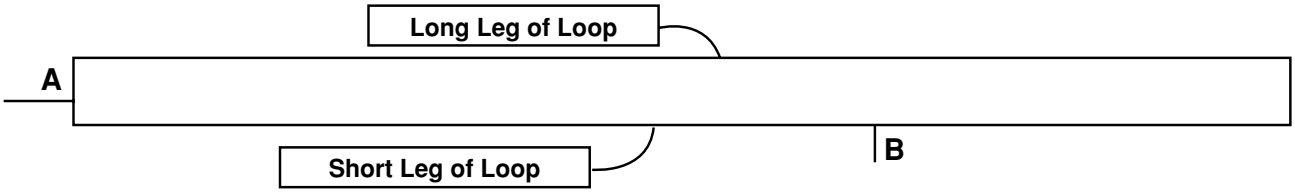
Approximate Flow Rates In Simple Looped Main Lines *

Length Ratio † Long to Short	Flow Rate Short Leg	Flow Rate Long Leg
1 to 1	50.0%	50.0%
2 to 1	59.4%	40.6%
3 to 1	64.4%	35.6%
4 to 1	67.8%	32.2%
5 to 1	70.4%	29.6%
6 to 1	72.4%	27.6%
7 to 1	74.0%	26.0%
8 to 1	75.4%	24.6%
9 to 1	76.6%	23.4%
10 to 1	77.6%	22.4%
12 to 1	79.2%	20.8%
15 to 1	81.2%	18.8%
20 to 1	83.4%	16.6%
25 to 1	85.0%	15.0%
30 to 1	86.2%	13.8%
35 to 1	87.2%	12.8%
40 to 1	88.0%	12.0%
45 to 1	88.6%	11.4%
50 to 1	89.2%	10.8%

* A simple looped main line would have one inlet and one outlet, and all pipe would be the same size. The type of pipe does not affect the flow percentages as long as pipe type and size remain constant.

† The "Length Ratio" is the ratio of the short leg of the loop to the long leg of the loop. To find the "Length Ratio", divide the length of the long leg by the length of the short leg.

Example: If the long leg is 400 feet and the short leg of the loop is 100 feet, the "Length Ratio" is 4 to 1. With a ratio of 4 to 1, the volume of flow in the short leg would be approximately 67.8% and the volume of flow in the long leg would be approximately 32.2% of the total flow.



Example: The entrance to the loop is at point "A" and the outlet is at point "B". Point "B" could be thought of as the location of a remote control valve. In the loop above, the longer side of the loop is about twice as long as the shorter side. In using the chart above, the ratio of 2:1 would indicate the flow in the short leg to be approximately 59.4% and the flow in the long leg to be approximately 40.6% of the total flow in the loop. If the total flow to point "B" is 50 gallons, the flow in the short leg would be approximately 29.7 GPM while the flow in the long leg would be approximately 20.3 GPM. Unequal flow rates occur because the pressure losses in each leg of the loop must be equal.

Average Number of Sprinklers per Acre

Square and/or Rectangular Spacing

Spacing in Feet	Heads Per Acre	Spacing In Feet	Heads Per Acre
10 x 10	435.6	30 x 60	24.2
11 x 11	360.0	40 x 40	27.2
12 x 12	302.4	40 x 50	21.8
13 x 13	257.6	40 x 60	18.2
14 x 14	222.3	40 x 80	13.6
15 x 15	193.5	50 x 50	17.4
16 x 16	170.0	50 x 60	14.5
17 x 17	150.8	50 x 70	12.4
18 x 18	134.3	50 x 80	10.9
19 x 19	120.6	60 x 60	12.1
20 x 20	109.0	60 x 70	10.4
20 x 30	72.7	60 x 80	9.1
20 x 40	54.5	70 x 70	8.9
20 x 50	43.5	70 x 80	7.8
20 x 60	36.3	70 x 90	6.9
25 x 25	69.7	80 x 80	6.8
30 x 30	48.4	80 x 90	6.1
30 x 40	36.3	80 x 100	5.5
30 x 50	29.0	100 x 100	4.4

Average Number of Sprinklers per Acre

Equilateral Triangular Spacing

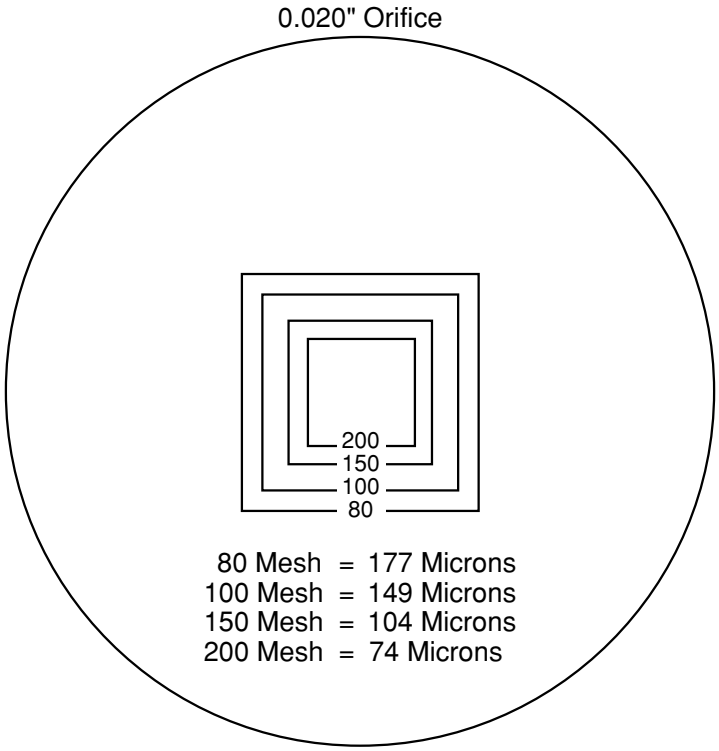
Spacing In Feet	Heads Per Acre	Spacing In Feet	Heads Per Acre
10	504	66	11.5
11	418	68	10.9
12	348	70	10.3
13	296	72	9.7
14	256	74	9.2
15	224	76	8.7
16	196	78	8.3
17	175	80	7.9
18	155	82	7.5
19	140	84	7.1
20	125	86	6.8
21	114	88	6.5
22	105	90	6.2
23	96	92	5.9
24	87	94	5.7
25	80	96	5.5
26	74	98	5.2
27	69	100	5.0
28	64	102	4.8
29	60	104	4.6
30	56	106	4.5
32	49	108	4.3
34	44	110	4.2
36	39	112	4.0
38	35	114	3.9
40	31	116	3.7
42	28.5	118	3.6
44	26.0	120	3.5
46	23.7	122	3.4
48	21.8	124	3.3
50	20.0	126	3.2
52	18.6	128	3.1
54	17.2	130	3.0
56	16.0	132	2.9
58	15.0	134	2.8
60	14.0	136	2.7
62	13.1	138	2.6
64	12.3	140	2.5

The theoretical figures above represent the minimum number of sprinklers required to cover a square acre (208.7' x 208.7') with the most economical placement of sprinklers possible. Actual layouts to match individual field conditions may require additional sprinklers. This table should only be used for estimating purposes.

Screen Filter Mesh Equivalents

Mesh Size	Microns	Inches	mm
4	5205	0.2030	5.16
6	3175	0.125	3.18
8	2487	0.0970	2.46
10	1923	0.0750	1.90
11	1778	0.070	1.78
14	1307	0.0510	1.30
18	1000	0.0394	1.00
20	840	0.0331	0.84
24	813	0.032	0.81
25	710	0.0280	0.71
30	590	0.025	0.59
35	500	0.0197	0.50
40	420	0.0165	0.42
45	350	0.0138	0.35
50	297	0.0117	0.30
60	250	0.0098	0.25
70	210	0.0083	0.21
80	177	0.0070	0.18
100	149	0.0059	0.15
120	125	0.0049	0.12
140	105	0.0041	0.10
170	88	0.0035	0.08
200	74	0.0029	0.07
230	62	0.0024	0.06
270	53	0.0021	0.05
325	44	0.0017	0.04
400	37	0.0015	0.04
550	25	0.0009	0.02
800	15	0.0006	0.01
1250	10	0.0004	0.01

Screen Mesh Sizes Compared to 0.020 inch orifice



Approximate Cost of Pump Operation

Pump Horse Power	Average Kilowatt Hour Input		Approximate Cost of Operation per Hour at Kilowatt Hr. Rate of:															
			$ .0150		$ .0200		$ .0250		$ .0400		$.0500		$.0600		$.0800		$.1000		$.1200	
	Single Phase	Three Phase	Single Phase	Three Phase	Single Phase	Three Phase	Single Phase	Three Phase	Single Phase	Three Phase	Single Phase	Three Phase	Single Phase	Three Phase	Single Phase	Three Phase	Single Phase	Three Phase	Single Phase	Three Phase
¼	0.305		0.0046		0.0062		0.0078		0.0122		0.0153		0.0183		0.0244		0.0305		0.0366	
⅓	0.408		0.0062		0.0082		0.0103		0.0163		0.0204		0.0245		0.0326		0.0408		0.0490	
½	0.535	0.520	0.0081	0.0078	0.0108	0.0104	0.0135	0.0130	0.0214	0.0208	0.0268	0.0260	0.0321	0.0312	0.0428	0.0416	0.0535	0.0520	0.0642	0.0642
¾	0.760	0.768	0.0114	0.0116	0.0152	0.0154	0.0190	0.0193	0.0304	0.0307	0.0380	0.0384	0.0456	0.0461	0.0608	0.0614	0.0760	0.0768	0.0912	0.0922
1	1.000	0.960	0.0150	0.0144	0.0200	0.0192	0.0250	0.0240	0.0400	0.0384	0.0500	0.0480	0.0600	0.0576	0.0800	0.0768	0.1000	0.0960	0.1200	0.1152
1½	1.500	1.42	0.0225	0.0213	0.0300	0.0284	0.0375	0.0335	0.0600	0.0568	0.0750	0.0710	0.0900	0.0852	0.1200	0.1136	0.1500	0.1420	0.1800	0.1704
2	1.980	1.83	0.0297	0.0275	0.0396	0.0366	0.0495	0.0458	0.0792	0.0732	0.0990	0.0915	0.1188	0.1098	0.1584	0.1464	0.1980	0.1830	0.2376	0.2196
3	2.95	2.70	0.0443	0.0405	0.0590	0.0540	0.0738	0.0675	0.1180	0.1080	0.1475	0.1350	0.1770	0.1620	0.2360	0.2160	0.2950	0.2700	0.3540	0.3240
5	4.65	4.50	0.0698	0.0675	0.0930	0.0900	0.1163	0.1125	0.1860	0.1800	0.2325	0.2250	0.2790	0.2700	0.3720	0.3600	0.4650	0.4500	0.5580	0.5400
7½	6.9	6.75	0.1035	0.1013	0.1380	0.1350	0.1725	0.1688	0.2760	0.2700	0.3450	0.3375	0.4140	0.4050	0.5520	0.5400	0.6900	0.6750	0.8280	0.8100
10	9.3	9.0	0.1395	0.1350	0.1860	0.1800	0.2325	0.2250	0.3720	0.3600	0.4650	0.4500	0.5580	0.5400	0.7440	0.7200	0.9300	0.9000	1.1160	1.0800
15		12.8		0.1920		0.2560		0.3200		0.5120		0.6400		0.7680		1.0240		1.2800		1.5360
20		16.9		0.2535		0.3380		0.4225		0.6760		0.8450		1.0140		1.3520		1.6900		2.0280
25		20.8		0.3120		0.4160		0.5200		0.8320		1.0400		1.2480		1.6640		2.0800		2.4960
30		25.0		0.3750		0.5000		0.6250		1.0000		1.2500		1.5000		2.0000		2.5000		3.0000
40		33.2		0.4980		0.6640		0.8300		1.3280		1.6600		1.9920		2.6560		3.3200		3.9840
50		41.3		0.6195		0.8260		1.0325		1.6520		2.0650		2.4780		3.3040		4.1300		4.9560
60		49.5		0.7425		0.9900		1.2375		1.9800		2.4750		2.9700		3.9600		4.9500		5.9400
75		61.5		0.9225		1.2300		1.5375		2.4600		3.0750		3.6900		4.9200		6.1500		7.3800
100		81.5		1.225		1.6300		2.0375		3.2600		4.0750		4.8900		6.5200		8.1500		9.7800

Note: To calculate approximate cost of operation at a cost factor not listed above, multiply the second column rate of $.02 per KWH by the actual rate in effect, and then divide by 2.

Example:

the cost of operating a 3 hp single phase pump at a rate of $0.07 per KWH would be
.0590 x 7 ÷ 2 = $0.2065 per hour

These charts are based upon 100% motor efficiencies.
To determine actual cost factors, divide by actual pump and motor efficiency, as indicated above.

Table of Pump Horsepower Requirements (WHP)

(at 100% Pump Efficiency)

HEAD (feet)	PRESSURE (psi)	FLOW - GPM 25	50	75	100	150	200	250	300	350	400	500
10	4.33	0.063	0.126	0.189	0.253	0.379	0.505	0.631	0.758	0.884	1.01	1.26
15	6.50	0.095	0.189	0.284	0.379	0.568	0.758	0.947	1.136	1.326	1.52	1.89
20	8.66	0.126	0.253	0.379	0.505	0.758	1.010	1.26	1.52	1.77	2.02	2.53
25	10.83	0.158	0.316	0.473	0.631	0.947	1.26	1.58	1.89	2.21	2.53	3.16
30	12.99	0.189	0.379	0.57	0.76	1.14	1.52	1.89	2.27	2.65	3.03	3.79
35	15.16	0.22	0.44	0.66	0.88	1.33	1.77	2.21	2.65	3.09	3.54	4.42
40	17.32	0.25	0.51	0.76	1.01	1.52	2.02	2.53	3.03	3.54	4.04	5.05
45	19.49	0.28	0.57	0.85	1.14	1.70	2.27	2.84	3.41	3.98	4.55	5.68
50	21.65	0.32	0.63	0.95	1.26	1.89	2.53	3.16	3.79	4.42	5.05	6.31
60	25.98	0.38	0.76	1.14	1.52	2.27	3.03	3.79	4.55	5.30	6.06	7.58
70	30.31	0.44	0.88	1.33	1.77	2.65	3.54	4.42	5.30	6.19	7.07	8.84
80	34.64	0.51	1.01	1.52	2.02	3.03	4.04	5.05	6.06	7.07	8.08	10.10
90	38.97	0.57	1.14	1.70	2.27	3.41	4.55	5.68	6.82	7.95	9.09	11.36
100	43.30	0.63	1.26	1.89	2.53	3.79	5.05	6.31	7.58	8.84	10.10	12.63
120	51.96	0.76	1.52	2.27	3.03	4.55	6.06	7.58	9.09	10.61	12.12	15.15
140	60.62	0.88	1.77	2.65	3.54	5.30	7.07	8.84	10.61	12.37	14.14	17.68
160	69.28	1.01	2.02	3.03	4.04	6.06	8.08	10.10	12.12	14.14	16.16	20.20
180	77.94	1.14	2.27	3.41	4.55	6.82	9.09	11.36	13.64	15.91	18.18	22.73
200	86.60	1.26	2.53	3.79	5.05	7.58	10.10	12.63	15.15	17.68	20.20	25.25
220	95.26	1.39	2.78	4.17	5.56	8.33	11.11	13.89	16.67	19.44	22.22	27.78
240	103.92	1.52	3.03	4.55	6.06	9.09	12.12	15.15	18.18	21.21	24.24	30.30
260	112.58	1.64	3.28	4.92	6.57	9.85	13.13	16.41	19.70	22.98	26.26	32.83
280	121.24	1.77	3.54	5.30	7.07	10.61	14.14	17.68	21.21	24.75	28.28	35.35
300	129.90	1.89	3.79	5.68	7.58	11.36	15.15	18.94	22.73	26.52	30.30	37.88
325	140.73	2.05	4.10	6.16	8.21	12.31	16.41	20.52	24.62	28.72	32.83	41.04
350	151.55	2.21	4.42	6.63	8.84	13.26	17.68	22.10	26.52	30.93	35.35	44.19
375	162.38	2.37	4.73	7.10	9.47	14.20	18.94	23.67	28.41	33.14	37.88	47.35
400	173.20	2.53	5.05	7.58	10.10	15.15	20.20	25.25	30.30	35.35	40.40	50.51
425	184.03	2.68	5.37	8.05	10.73	16.10	21.46	26.83	32.20	37.56	42.93	53.66
450	194.85	2.84	5.68	8.52	11.36	17.05	22.73	28.41	34.09	39.77	45.45	56.82
475	205.68	3.00	6.00	9.00	11.99	17.99	23.99	29.99	35.98	41.98	47.98	59.97
500	216.50	3.16	6.31	9.47	12.63	18.94	25.25	31.57	37.88	44.19	50.50	63.13

Notes: 1. The (WHP) water horsepower requirements charted above have been calculated by either of the following formulas.

$$\text{WHP} = \frac{\text{GPM} \times \text{HEAD (feet)}}{3960}$$

$$\text{WHP} = \frac{\text{GPM} \times \text{PRESSURE (psi)}}{1714}$$

2. The specific brake horsepower requirement is calculated by dividing the WHP above by the actual pump efficiency.

$$\text{BHP} = \frac{\text{WHP}}{\text{efficiency}}$$

Example:

100 gpm at 90 feet of head requires 2.27 horsepower at 100% efficiency. If the pump is 70% efficient, the actual (BHP) required is:

$$\frac{2.27}{0.70} = 3.25 \text{ BHP}$$

Wire Data: Standard Annealed Copper at 20° C

American Wire Gauge	Metric Wire Gauge	Diameter Mils	Diameter mm	Resistance Per mft Ohms	Resistance Per km Ohms
1		289.3	7.348	0.9239	0.4065
	7.0		7.000		0.4480
2		257.6	6.543	0.1563	0.5128
	6.0		6.000		0.6098
3		229.4	5.827	0.1971	0.6466
4		204.3	5.189	0.2485	0.8152
	5.0		5.000		0.08781
5		181.9	4.620	0.3134	1.028
	4.5		4.500		1.084
6		162.0	4.115	0.3952	1.297
	4.0		4.000		1.372
7		144.3	3.665	0.4981	1.634
	3.5		3.500		1.792
8		128.5	3.264	0.6281	2.061
	3.0		3.000		2.439
9		114.4	2.906	0.7925	2.600
10		101.9	2.588	0.9988	3.277
	2.5		2.500		3.512
11		90.7	2.30	1.26	4.14
12		80.8	2.05	1.59	5.21
	2.0		2.00		5.49
13		72.0	1.83	2.00	6.56
	1.8		1.80		6.78
14		64.1	1.63	2.52	8.28
	1.6		1.60		8.58
15		57.1	1.45	3.18	10.4
	1.4		1.40		11.2
16		50.8	1.29	4.02	13.2
	1.2		1.20		15.2
17		45.3	1.15	5.05	16.6
18		40.3	1.02	6.39	21.0
	1.0		1.000		22.0
19		35.9	0.912	8.05	26.4
	0.90		0.900		27.1
20		32.0	0.813	10.1	33.2

Table of Voltage Losses for Annealed Copper Wire 25° C (77° F)

(Loss per 1000 feet of wire)

AMPERES	18	16	14	12	10	8	6	4	2
0.1	0.65	0.41	0.26	0.16	0.10	0.06	0.04	0.03	0.02
0.15	0.98	0.61	0.39	0.24	0.15	0.10	0.06	0.04	0.02
0.2	1.30	0.82	0.52	0.32	0.20	0.13	0.08	0.05	0.03
0.25	1.63	1.02	0.65	0.41	0.26	0.16	0.10	0.06	0.04
0.3	1.95	1.23	0.77	0.49	0.31	0.19	0.12	0.08	0.05
0.35	2.28	1.43	0.90	0.57	0.36	0.22	0.14	0.09	0.06
0.4	2.60	1.64	1.03	0.65	0.41	0.26	0.16	0.10	0.06
0.45	2.93	1.84	1.16	0.73	0.46	0.29	0.18	0.11	0.07
0.5	3.26	2.05	1.29	0.81	0.51	0.32	0.20	0.13	0.08
0.6	3.91	2.45	1.55	0.97	0.61	0.38	0.24	0.15	0.10
0.7	4.56	2.86	1.81	1.13	0.71	0.45	0.28	0.18	0.11
0.8	5.21	3.27	2.06	1.30	0.82	0.51	0.32	0.20	0.13
0.9	5.86	3.68	2.32	1.46	0.92	0.58	0.36	0.23	0.14
1.0	6.51	4.09	2.58	1.62	1.02	0.64	0.40	0.25	0.16
1.1	7.16	4.50	2.84	1.78	1.12	0.71	0.44	0.28	0.17
1.2	7.81	4.91	3.10	1.94	1.22	0.77	0.48	0.30	0.19
1.3	8.46	5.32	3.35	2.11	1.33	0.83	0.52	0.33	0.21
1.4	9.11	5.73	3.61	2.27	1.43	0.90	0.56	0.35	0.22
1.5	9.77	6.14	3.87	2.43	1.53	0.96	0.60	0.38	0.24
1.6	10.42	6.54	4.13	2.59	1.63	1.03	0.77	0.40	0.25
1.7	11.07	6.95	4.39	2.75	1.73	1.09	0.69	0.43	0.27
1.8	11.72	7.36	4.64	2.92	1.84	1.15	0.73	0.46	0.29
1.9	12.37	7.77	4.90	3.08	1.94	1.22	0.77	0.48	0.30
2.0	13.02	8.18	5.16	3.24	2.04	1.28	0.81	0.51	0.32
2.1	13.67	8.59	5.42	3.40	2.14	1.35	0.85	0.53	0.33
2.2	14.32	9.00	5.68	3.56	2.24	1.41	0.89	0.56	0.35
2.3	14.97	9.41	5.93	3.73	2.35	1.47	0.93	0.58	0.37
2.4	15.62	9.82	6.19	3.89	2.45	1.54	0.97	0.61	0.38
2.5	16.28	10.23	6.45	4.05	2.55	1.60	1.01	0.63	0.40
2.6	16.93	10.63	6.71	4.21	2.65	1.67	1.05	0.66	0.41
2.7	17.58	11.04	6.97	4.37	2.75	1.73	1.09	0.68	0.43
2.8	18.23	11.45	7.22	4.54	2.86	1.79	1.13	0.71	0.45
2.9	18.88	11.86	7.48	4.70	2.96	1.86	1.17	0.73	0.46
3.0	19.53	12.27	7.74	4.86	3.06	1.92	1.21	0.76	0.48
3.2	20.83	13.09	8.26	5.18	3.26	2.05	1.29	0.81	0.51
3.4	22.13	13.91	8.77	5.51	3.47	2.18	1.37	0.86	0.54
3.6	23.44	14.72	9.29	5.83	3.67	2.31	1.45	0.91	0.57
3.8	24.74	15.54	9.80	6.16	3.88	2.44	1.53	0.96	0.60
4.0	26.04	16.36	10.32	6.48	4.08	2.56	1.61	1.01	0.64
4.2	27.34	17.18	10.84	6.80	4.28	2.69	1.69	1.06	0.67
4.4	28.64	18.00	11.35	7.13	4.49	2.82	1.77	1.11	0.70
4.6	29.95	18.81	11.87	7.45	4.69	2.95	1.85	1.16	0.73
4.8	31.25	19.63	12.38	7.78	4.90	3.08	1.93	1.21	0.76
5.0	32.55	20.45	12.90	8.10	5.10	3.21	2.02	1.27	0.80
5.2	33.85	21.27	13.42	8.42	5.30	3.33	2.10	1.32	0.83
5.4	35.15	22.09	13.93	8.75	5.51	3.46	2.18	1.37	0.86
5.6	36.46	22.90	14.45	9.07	5.71	3.59	2.26	1.42	0.89
5.8	37.76	23.72	14.96	9.40	5.92	3.72	2.34	1.47	0.92
6.0	39.06	24.54	15.48	9.72	6.12	3.85	2.42	1.52	0.95
6.2	40.36	25.36	16.00	10.04	6.32	3.97	2.50	1.57	0.99
6.4	41.66	26.18	16.51	10.37	6.53	4.10	2.58	1.62	1.02
6.6	42.97	26.99	17.03	10.69	6.73	4.23	2.66	1.67	1.05
6.8	44.27	27.81	17.54	11.02	6.94	4.36	2.74	1.72	1.08
7.0	45.57	28.63	18.06	11.34	7.14	4.49	2.82	1.77	1.11

To Use This Chart

To find the voltage loss for a two wire circuit, multiply the loss per 1000 feet figure above by **twice** the actual wire length expressed in thousands.
For a single wire, multiply the loss per 1000 feet value, above by the actual wire length in thousands.

Note: Remember, amperages are additive along a wire where current is demanded by more than one appliance.

Note: Voltage losses are calculated from the formula:

Where: V = IR
I = current in amperes
R = resistance in ohms per 1000 ft
V = voltage

Reference Chart
Approximate Number of Wires to be Installed in Conduit or Tubing

MAXIMUM NO. OF WIRES IN CONDUIT OR SLEEVING

WIRE SIZE (AWG)	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	WIRE SIZE (AWG)
18	6	12	20	35	49	80	110	175					18
16	5	10	16	30	42	67	97	150					16
14	4	6	10	18	25	40	56	88	120	150			14
12	3	5	7	15	20	33	50	75	102	130	205		12
10	1	3	6	13	16	27	40	63	85	110	170		10
8	1	2	4	6	9	16	25	35	50	65	105	150	8
6	1	1	3	3	5	10	15	22	32	40	63	92	6
4		1	1	2	4	7	10	16	24	30	48	70	4
2		1	1	2	2	5	9	12	18	22	36	54	2
0			1	1	2	3	5	8	12	15	24	36	0
00			1	1	1	2	4	7	10	14	21	31	00
000				1	1	2	3	6	8	11	18	26	000
0000				1	1	1	2	5	7	10	15	22	0000

Estimating Pipe Size

Nominal Pipe Size	Copper Pipe	Galvanized (Sch. 40 Steel)	PVC Pipe
	Approximate String Length in Inches		
½"	2"	2⅝"	2⅝"
⅝"	2⅜"	–	–
¾"	2¾"	3⅝16"	3⅝16"
1"	3½"	4⅛"	4⅛"
1¼"	4⅝16"	5⅜16"	5⅜16"
1½"	5⅛"	6"	6"
2"	6¾"	7⅞16"	7⅞16"

To determine the nominal size of a pipe, wrap a string around the pipe and compare its length to the chart above.

Operating Pressures for PVC, Polyethylene Pipe and Copper Tube

Pressure Rating (psi) at 73.4º F (23º C)

Nominal Size	Sch 80 PVC*	Sch 40 PVC*	(SDR 13.5) Cl 315	(SDR 21) Cl 200	(SDR 26) Cl 160	(SDR 32.5) Cl 125	Sch 40 PE
½"	850	600	315	***	***	***	190
¾"	690	480	315	200	***	***	150
1"	630	450	315	200	160	***	140
1¼"	520	370	315	200	160	***	120
1½"	470	330	315	200	160	***	100
2"	400	280	315	200	160	***	90
2½"	420	300	315	200	160	***	100
3"	370	260	315	200	160	125	80
4"	320	220	315	200	160	125	70
6"	280	180	315	200	160	125	60
8"	250	160	315	200	160	125	++
10"	230	140	315	200	160	125	++
12"	230	130	315	200	160	125	++

Note:

1) **Pressure ratings are the maximum that should be applied. Surge pressures should be included.**
2) Pressure ratings must be reduced for temperatures over 23˚ C (73.4˚ F)
3) These ratings do not apply for threaded pipe. Do not thread Sch 40 pipe
4) "***" indicates pipe not listed because wall thickness less than 0.060 minimum
5) Burst pressures are generally about 2.5 to 2.8 times the maximum pressure rating
6) PVC 1120, 1220 code designations
7) Non-threaded pipe
8) "*"Sch 80 & Sch 40 pipe rounded to the nearest ten.

Copper Tube

Nominal Size	Type M		Type L		Type K	
	Annealed	Hard Drawn	Annealed	Hard Drawn	Annealed	Hard Drawn
½"	430	760	625	1105	780	1375
¾"	350	610	495	875	750	1315
1"	295	515	440	770	575	1010
1¼"	295	515	385	680	465	820
1½"	290	510	355	630	435	765
2"	300	450	315	555	380	665
2½"	235	410	295	520	355	520
3"	220	385	275	490	340	605
4"	215	380	255	450	315	555
6"	190	335	215	385	305	540
8"	200	350	240	420	325	580
10"	205	355	240	425	330	585
12"	205	360	225	395	330	585

Rated Internal Working Pressure for Copper Tube for Service Temperatures up to 150˚F, psi

PVC Schedule 40 and Schedule 80 Pipe & Injection Molded Fittings Suggested Maximum Internal Pressure Ratings

Pressure Rating (psi) at 73.4° F (23° C)

Nominal Size	Suggested PVC Pipe & Injection Molded Fittings Internal Pressure Ratings					
	Schedule 40			Schedule 80		
	Pipe	Solvent Cemented Joint	Threaded Joint	Pipe	Solvent Cemented Joint	Threaded Joint
½"	596	358	179	848	509	254
¾"	482	289	144	688	413	206
1"	450	270	135	630	378	189
1¼"	368	221	110	520	312	156
1½"	330	198	99	471	282	141
2"	277	166	83	404	243	121
2½"	304	182	91	425	255	127
3"	263	158	79	375	225	112
3½"	240	144	72	345	207	103
4"	222	133	66	324	194	97
6"	177	106	53	279	167	83
8"	155	93	46	246	148	—
10"	141	150	—	234	200	—
12"	132	150	—	228	200	—

This table is for use as a general guide only. Actual Internal Pressure Ratings may vary widely with field conditions. Elevated operating temperatures will necessitate a devaluation of the above ratings.

Note: Historically, manufactures have assumed that fittings have the same internal pressure rating as pipe. A recent engineering study* by Keller-Bleisner Engineering of Logan, Utah, indicates that while the fittings do meet the minimum burst requirements of pipe, actual operating conditions may require a devaluation of the internal pressure rating for fittings. The devaluation is due to the applied stress loads to the fitting caused by the operating parameters of the system. The maximum internal pressure ratings are admittedly based on limited data but it is most resent study pertaining to fitting internal pressure ratings.

*The above study was funded by Dura, Eslon, LCP, Lasco, Nibco, R&G Sloane, and Spears.

The Affinity Laws

The total dynamic head (TDH) discharge capacity (flow) and brake horsepower (BHP) from a pump are a function of the impeller diameter and rotational speed (RPM). When selecting a pump model it is uncommon to find the exact match of TDH and capacity. The Affinity Laws can be used to determine the appropriate RPM, impeller diameter or brake horsepower (BHP) for a given flow and TDH requirement.

The relationship between pump capacity, TDH, BHP and horsepower for different RPM's and impeller diameters are as follows: the flow varies directly with speed (or impeller diameter), pressure varies as the square of speed (or impeller diameter), and power varies as the square of speed (or impeller diameter), and power varies as the cube of speed (or impeller diameter). A mathematical representation of the Affinity Laws is shown below:

$$\frac{Q_1}{Q_2} = \left[\frac{N_1}{N_2}\right] \qquad \frac{H_1}{H_2} = \left[\frac{N_1}{N_2}\right]^2 \qquad \frac{BHP_1}{BHP_2} = \left[\frac{N_1}{N_2}\right]^3$$

$$\frac{Q_1}{Q_2} = \left[\frac{D_1}{D_2}\right] \qquad \frac{H_1}{H_2} = \left[\frac{D_1}{D_2}\right]^2 \qquad \frac{BHP_1}{BHP_2} = \left[\frac{H_1}{H_2}\right]^3$$

Where:

Q	=	Pump Capacity (gpm)
H	=	Total Dynamic Head (ft)
BHP	=	Brake Horsepower (ft-lb/sec)
N	=	Impeller Rotational Velocity (rpm)
D	=	Impeller Diameter (inches)

FRICTION LOSS CHARTS

Class 100 IPS U.S. PVC Plastic Pipe

(1120,1220) C=150 SDR 41

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 3½" THRU 12"

Nominal Size		4"		6"		8"		10"		12"		Nominal Size
Pipe ID		4.280		6.30		8.20		10.266		12.128		Pipe ID
Pipe OD		4.500		6.625		8.625		10.750		12.750		Pipe OD
Wall Thick		0.110		0.162		0.210		0.262		0.311		Wall Thick
Flow GPM		Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
10		0.22	**0.00**									10
15		0.33	**0.01**									15
20		0.45	**0.01**									20
25		0.56	**0.00**									25
30		0.67	**0.01**									30
35		0.78	**0.03**	0.36	**0.00**							35
40		0.89	**0.03**	0.41	**0.01**							40
45		1.00	**0.04**	0.46	**0.01**							45
50		1.11	**0.05**	0.51	**0.01**							50
55		1.22	**0.06**	0.57	**0.01**							55
60		1.34	**0.07**	0.62	**0.01**							60
65		1.45	**0.08**	0.67	**0.01**							65
70		1.56	**0.09**	0.72	**0.01**							70
75		1.67	**0.11**	0.77	**0.02**	0.45	**0.00**					75
80		1.78	**0.12**	0.82	**0.02**	0.48	**0.01**					80
85		1.89	**0.13**	0.87	**0.02**	0.52	**0.01**					85
90		2.00	**0.15**	0.92	**0.02**	0.55	**0.01**					90
95		2.12	**0.17**	0.98	**0.03**	0.58	**0.01**					95
100		2.23	**0.18**	1.03	**0.03**	0.61	**0.01**					100
110		2.45	**0.22**	1.13	**0.03**	0.67	**0.01**					110
120		2.67	**0.26**	1.23	**0.04**	0.73	**0.01**					120
130		2.90	**0.30**	1.34	**0.05**	0.79	**0.01**					130
140		3.12	**0.34**	1.44	**0.05**	0.85	**0.01**	0.54	**0.00**			140
150		3.34	**0.39**	1.54	**0.06**	0.91	**0.02**	0.58	**0.01**			150
160		3.56	**0.43**	1.64	**0.07**	0.97	**0.02**	0.62	**0.01**			160
170		3.79	**0.49**	1.75	**0.07**	1.03	**0.02**	0.66	**0.01**			170
180		4.01	**0.54**	1.85	**0.08**	1.09	**0.02**	0.70	**0.01**			180
190		4.23	**0.60**	1.95	**0.09**	1.15	**0.03**	0.74	**0.01**			190
200		4.45	**0.66**	2.06	**0.10**	1.21	**0.03**	0.77	**0.01**	0.55	**0.00**	200
225		5.01	**0.82**	2.31	**0.12**	1.36	**0.03**	0.87	**0.01**	0.62	**0.01**	225
250		5.57	**0.99**	2.57	**0.15**	1.52	**0.04**	0.97	**0.01**	0.69	**0.01**	250
300		6.68	**1.39**	3.08	**0.21**	1.82	**0.06**	1.16	**0.02**	0.83	**0.01**	300
350		7.80	**1.85**	3.60	**0.28**	2.12	**0.08**	1.35	**0.03**	0.97	**0.01**	350
400		8.91	**2.37**	4.11	**0.36**	2.42	**0.10**	1.55	**0.03**	1.11	**0.01**	400
450		10.02	**2.95**	4.62	**0.45**	2.73	**0.12**	1.74	**0.04**	1.25	**0.02**	450
500		11.14	**3.59**	5.14	**0.55**	3.03	**0.15**	1.94	**0.05**	1.39	**0.02**	500
550		12.25	**4.28**	5.65	**0.65**	3.33	**0.18**	2.13	**0.06**	1.53	**0.03**	550
600		13.36	**5.03**	6.17	**0.77**	3.64	**0.21**	2.32	**0.07**	1.66	**0.03**	600
650		14.48	**5.83**	6.68	**0.89**	3.94	**0.25**	2.52	**0.08**	1.80	**0.04**	650
700		15.59	**6.69**	7.19	**1.02**	4.24	**0.28**	2.71	**0.09**	1.94	**0.04**	700
750		16.70	**7.60**	7.71	**1.16**	4.55	**0.32**	2.90	**0.11**	2.08	**0.05**	750
800		17.82	**8.57**	8.22	**1.31**	4.85	**0.36**	3.10	**0.12**	2.22	**0.05**	800
850		18.93	**9.59**	8.73	**1.46**	5.15	**0.40**	3.29	**0.14**	2.36	**0.06**	850
900				9.25	**1.62**	5.45	**0.45**	3.48	**0.15**	2.50	**0.07**	900
950				9.76	**1.79**	5.76	**0.50**	3.68	**0.17**	2.64	**0.07**	950
1000				10.28	**1.97**	6.06	**0.55**	3.87	**0.18**	2.77	**0.08**	1000
1050				10.79	**2.16**	6.36	**0.60**	4.06	**0.20**	2.91	**0.09**	1050
1100				11.30	**2.35**	6.67	**0.65**	4.26	**0.22**	3.05	**0.10**	1100
1150				11.82	**2.56**	6.97	**0.71**	4.45	**0.24**	3.19	**0.11**	1150
1200				12.33	**2.77**	7.27	**0.77**	4.65	**0.26**	3.33	**0.11**	1200
1250				12.85	**2.98**	7.58	**0.83**	4.84	**0.28**	3.47	**0.12**	1250
1300				13.36	**3.21**	7.88	**0.89**	5.03	**0.30**	3.61	**0.13**	1300
1350				13.87	**3.44**	8.18	**0.95**	5.23	**0.32**	3.74	**0.14**	1350
1400				14.39	**3.68**	8.48	**1.02**	5.42	**0.34**	3.88	**0.15**	1400
1450				14.90	**3.93**	8.79	**1.09**	5.61	**0.37**	4.02	**0.16**	1450
Nominal **Size**		**10"**		**12"**		15.41	**4.18**	9.09	**1.16**	5.81	**0.39**	4.16	**0.17**	1500
Pipe ID		10.266		12.128		15.93	**4.44**	9.39	**1.23**	6.00	**0.41**	4.30	**0.18**	1550
Pipe OD		10.750		12.750		16.44	**4.71**	9.70	**1.30**	6.19	**0.44**	4.44	**0.19**	1600
Wall Thick		0.262		0.311		16.96	**4.99**	10.00	**1.38**	6.39	**0.46**	4.58	**0.21**	1650
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**		17.47	**5.27**	10.30	**1.46**	6.58	**0.49**	4.72	**0.22**	1700
						17.98	**5.56**	10.61	**1.54**	6.77	**0.52**	4.85	**0.23**	1750
						18.50	**5.86**	10.91	**1.62**	6.97	**0.54**	4.99	**0.24**	1800
						19.01	**6.16**	11.21	**1.71**	7.16	**0.57**	5.13	**0.25**	1850
3500	13.55	**1.87**	9.71	**0.83**		19.53	**6.48**	11.51	**1.79**	7.36	**0.60**	5.27	**0.27**	1900
3600	13.94	**1.97**	9.99	**0.87**				11.82	**1.88**	7.55	**0.63**	5.41	**0.28**	1950
3700	14.32	**2.07**	10.26	**0.92**				12.12	**1.97**	7.74	**0.66**	5.55	**0.29**	2000
3800	14.71	**2.17**	10.54	**0.97**				12.73	**2.16**	8.13	**0.72**	5.83	**0.32**	2100
3900	15.10	**2.28**	10.82	**1.01**				13.33	**2.35**	8.52	**0.79**	6.10	**0.35**	2200
4000	15.49	**2.39**	11.10	**1.06**				13.94	**2.55**	8.90	**0.86**	6.38	**0.38**	2300
4100	15.87	**2.50**	11.37	**1.11**				14.55	**2.76**	9.29	**0.93**	6.66	**0.41**	2400
4200	16.26	**2.62**	11.65	**1.16**				15.15	**2.98**	9.68	**1.00**	6.93	**0.44**	2500
4300	16.65	**2.73**	11.93	**1.21**				15.76	**3.20**	10.07	**1.08**	7.21	**0.48**	2600
4400	17.03	**2.85**	12.20	**1.27**				16.36	**3.44**	10.45	**1.15**	7.49	**0.51**	2700
4500	17.42	**2.97**	12.48	**1.32**				16.97	**3.68**	10.84	**1.24**	7.77	**0.55**	2800
4600	17.81	**3.10**	12.76	**1.38**				17.58	**3.92**	11.23	**1.32**	8.04	**0.59**	2900

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Class 125 IPS U.S. PVC Plastic Pipe

(1120,1220) C=150 SDR 32.5

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 1" THRU 5"

Nominal Size	1"		1¼"		1½"		2"		2½"		3"		4"		Nominal Size
Pipe ID	1.211		1.548		1.784		2.229		2.699		3.284		4.224		Pipe ID
Pipe OD	1.315		1.660		1.900		2.375		2.875		3.500		4.500		Pipe OD
Wall Thick	0.052		0.056		0.058		0.073		0.088		0.108		0.138		Wall Thick
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
1	0.28	**0.02**	0.17	**0.01**	0.13	**0.00**									1
2	0.56	**0.06**	0.34	**0.02**	0.26	**0.01**	0.16	**0.00**							2
3	0.83	**0.13**	0.51	**0.04**	0.38	**0.02**	0.25	**0.01**							3
4	1.11	**0.22**	0.68	**0.07**	0.51	**0.03**	0.33	**0.01**	0.22	**0.00**					4
5	1.39	**0.33**	0.85	**0.10**	0.64	**0.05**	0.41	**0.02**	0.28	**0.01**					5
6	1.67	**0.46**	1.02	**0.14**	0.77	**0.07**	0.49	**0.02**	0.34	**0.01**					6
7	1.95	**0.62**	1.19	**0.19**	0.90	**0.09**	0.57	**0.03**	0.39	**0.01**	0.26	**0.00**			7
8	2.23	**0.79**	1.36	**0.24**	1.03	**0.12**	0.66	**0.04**	0.45	**0.02**	0.30	**0.01**			8
9	2.50	**0.98**	1.53	**0.30**	1.15	**0.15**	0.74	**0.05**	0.50	**0.02**	0.34	**0.01**			9
10	2.78	**1.19**	1.70	**0.36**	1.28	**0.18**	0.82	**0.06**	0.56	**0.02**	0.38	**0.01**			10
11	3.06	**1.42**	1.87	**0.43**	1.41	**0.22**	0.90	**0.07**	0.62	**0.03**	0.42	**0.01**			11
12	3.34	**1.67**	2.04	**0.51**	1.54	**0.25**	0.99	**0.09**	0.67	**0.03**	0.45	**0.01**			12
13	3.62	**1.94**	2.21	**0.59**	1.67	**0.29**	1.07	**0.10**	0.73	**0.04**	0.49	**0.02**	0.30	**0.00**	13
14	3.89	**2.22**	2.38	**0.67**	1.79	**0.34**	1.15	**0.11**	0.78	**0.05**	0.53	**0.02**	0.32	**0.01**	14
15	4.17	**2.53**	2.55	**0.77**	1.92	**0.38**	1.23	**0.13**	0.84	**0.05**	0.57	**0.02**	0.34	**0.01**	15
16	4.45	**2.85**	2.72	**0.86**	2.05	**0.43**	1.31	**0.15**	0.90	**0.06**	0.61	**0.02**	0.37	**0.01**	16
17	4.73	**3.19**	2.89	**0.96**	2.18	**0.48**	1.40	**0.16**	0.95	**0.06**	0.64	**0.02**	0.39	**0.01**	17
18	5.01	**3.54**	3.06	**1.07**	2.31	**0.54**	1.48	**0.18**	1.01	**0.07**	0.68	**0.03**	0.41	**0.01**	18
19	5.29	**3.91**	3.23	**1.19**	2.44	**0.59**	1.56	**0.20**	1.06	**0.08**	0.72	**0.03**	0.43	**0.01**	19
20	5.56	**4.31**	3.41	**1.30**	2.56	**0.65**	1.64	**0.22**	1.12	**0.09**	0.76	**0.03**	0.46	**0.01**	20
22	6.12	**5.14**	3.75	**1.56**	2.82	**0.78**	1.81	**0.26**	1.23	**0.10**	0.83	**0.04**	0.50	**0.01**	22
24	6.68	**6.03**	4.09	**1.83**	3.08	**0.92**	1.97	**0.31**	1.34	**0.12**	0.91	**0.05**	0.55	**0.01**	24
25	6.96	**6.51**	4.26	**1.97**	3.20	**0.99**	2.05	**0.33**	1.40	**0.13**	0.95	**0.05**	0.57	**0.01**	25
26	7.23	**7.00**	4.43	**2.12**	3.33	**1.06**	2.14	**0.36**	1.46	**0.14**	0.98	**0.05**	0.59	**0.02**	26
28	7.79	**8.03**	4.77	**2.43**	3.59	**1.22**	2.30	**0.41**	1.57	**0.16**	1.06	**0.06**	0.64	**0.02**	28
30	8.35	**9.12**	5.11	**2.76**	3.85	**1.38**	2.46	**0.47**	1.68	**0.18**	1.13	**0.07**	0.69	**0.02**	30
32	8.90	**10.28**	5.45	**3.11**	4.10	**1.56**	2.63	**0.53**	1.79	**0.21**	1.21	**0.08**	0.73	**0.02**	32
34	9.46	**11.50**	5.79	**3.48**	4.36	**1.75**	2.79	**0.59**	1.90	**0.23**	1.29	**0.09**	0.78	**0.03**	34
35	9.74	**12.14**	5.96	**3.67**	4.49	**1.84**	2.87	**0.62**	1.96	**0.25**	1.32	**0.09**	0.80	**0.03**	35
36	10.02	**12.79**	6.13	**3.87**	4.62	**1.94**	2.96	**0.66**	2.02	**0.26**	1.36	**0.10**	0.82	**0.03**	36
38	10.57	**14.13**	6.47	**4.28**	4.87	**2.15**	3.12	**0.73**	2.13	**0.29**	1.44	**0.11**	0.87	**0.03**	38
40	11.13	**15.54**	6.81	**4.71**	5.13	**2.36**	3.28	**0.80**	2.24	**0.31**	1.51	**0.12**	0.91	**0.04**	40
42	11.68	**17.01**	7.15	**5.15**	5.38	**2.58**	3.45	**0.87**	2.35	**0.34**	1.59	**0.13**	0.96	**0.04**	42
44	12.24	**18.54**	7.49	**5.61**	5.64	**2.81**	3.61	**0.95**	2.46	**0.38**	1.66	**0.14**	1.01	**0.04**	44
45	12.52	**19.33**	7.66	**5.85**	5.77	**2.93**	3.70	**0.99**	2.52	**0.39**	1.70	**0.15**	1.03	**0.04**	45
46	12.80	**20.13**	7.83	**6.10**	5.90	**3.06**	3.78	**1.03**	2.58	**0.41**	1.74	**0.16**	1.05	**0.05**	46
48	13.35	**21.78**	8.17	**6.60**	6.15	**3.31**	3.94	**1.12**	2.69	**0.44**	1.82	**0.17**	1.10	**0.05**	48
50	13.91	**23.49**	8.51	**7.11**	6.41	**3.57**	4.11	**1.21**	2.80	**0.48**	1.89	**0.18**	1.14	**0.05**	50
55	15.30	**28.03**	9.36	**8.49**	7.05	**4.26**	4.52	**1.44**	3.08	**0.57**	2.08	**0.22**	1.26	**0.06**	55
60	16.69	**32.93**	10.22	**9.97**	7.69	**5.00**	4.93	**1.69**	3.36	**0.67**	2.27	**0.26**	1.37	**0.08**	60
65	18.08	**38.19**	11.07	**11.57**	8.33	**5.80**	5.34	**1.96**	3.64	**0.77**	2.46	**0.30**	1.49	**0.09**	65
70	19.47	**43.81**	11.92	**13.27**	8.97	**6.65**	5.75	**2.25**	3.92	**0.89**	2.65	**0.34**	1.60	**0.10**	70
75			12.77	**15.07**	9.61	**7.56**	6.16	**2.56**	4.20	**1.01**	2.84	**0.39**	1.72	**0.11**	75
80			13.62	**16.99**	10.26	**8.52**	6.57	**2.88**	4.48	**1.14**	3.03	**0.44**	1.83	**0.13**	80
85			14.47	**19.01**	10.90	**9.53**	6.98	**3.22**	4.76	**1.27**	3.22	**0.49**	1.94	**0.14**	85
90			15.32	**21.13**	11.54	**10.59**	7.39	**3.58**	5.04	**1.41**	3.40	**0.54**	2.06	**0.16**	90
95			16.17	**23.35**	12.18	**11.71**	7.80	**3.96**	5.32	**1.56**	3.59	**0.60**	2.17	**0.18**	95
100			17.03	**25.68**	12.82	**12.88**	8.21	**4.36**	5.60	**1.72**	3.78	**0.66**	2.29	**0.19**	100
110			18.73	**30.64**	14.10	**15.36**	9.03	**5.20**	6.16	**2.05**	4.16	**0.79**	2.52	**0.23**	110
120					15.38	**18.05**	9.85	**6.11**	6.72	**2.41**	4.54	**0.93**	2.74	**0.27**	120
130					16.67	**20.93**	10.68	**7.08**	7.28	**2.79**	4.92	**1.07**	2.97	**0.32**	130
140					17.95	**24.01**	11.50	**8.12**	7.84	**3.20**	5.30	**1.23**	3.20	**0.36**	140
150					19.23	**27.28**	12.32	**9.23**	8.40	**3.64**	5.67	**1.40**	3.43	**0.41**	150
160							13.14	**10.40**	8.96	**4.10**	6.05	**1.58**	3.66	**0.46**	160
170							13.96	**11.64**	9.52	**4.59**	6.43	**1.77**	3.89	**0.52**	170
180							14.78	**12.94**	10.08	**5.10**	6.81	**1.96**	4.12	**0.58**	180
190							15.60	**14.30**	10.64	**5.64**	7.19	**2.17**	4.34	**0.64**	190
200							16.42	**15.73**	11.20	**6.20**	7.57	**2.39**	4.57	**0.70**	200
225							18.48	**19.56**	12.60	**7.71**	8.51	**2.97**	5.15	**0.87**	225
250									14.00	**9.37**	9.46	**3.61**	5.72	**1.06**	250
275									15.40	**11.18**	10.40	**4.30**	6.29	**1.26**	275
300									16.80	**13.14**	11.35	**5.06**	6.86	**1.49**	300
325									18.20	**15.23**	12.30	**5.86**	7.43	**1.72**	325
350									19.60	**17.48**	13.24	**6.73**	8.00	**1.98**	350
375											14.19	**7.64**	8.58	**2.25**	375
400											15.13	**8.61**	9.15	**2.53**	400
425											16.08	**9.64**	9.72	**2.83**	425
450											17.02	**10.71**	10.29	**3.15**	450
475											17.97	**11.84**	10.86	**3.48**	475
500											18.92	**13.02**	11.43	**3.83**	500
550													12.58	**4.56**	550
600													13.72	**5.36**	600
650													14.86	**6.22**	650
700													16.01	**7.14**	700
750													17.15	**8.11**	750

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Class 125 IPS U.S. PVC Plastic Pipe

(1120,1220) C=150 SDR 32.5

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 6" THRU 12"

Nominal Size	6"		8"		10"		12"	
Pipe ID	6.217		8.095		10.088		11.966	
Pipe OD	6.625		8.625		10.750		12.750	
Wall Thick	0.204		0.265		0.331		0.392	
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS
40	0.42	**0.01**						
45	0.48	**0.01**						
50	0.53	**0.01**						
55	0.58	**0.01**						
60	0.63	**0.01**						
65	0.69	**0.01**						
70	0.74	**0.02**						
75	0.79	**0.02**	0.47	**0.00**				
80	0.84	**0.02**	0.50	**0.01**				
85	0.90	**0.02**	0.53	**0.01**				
90	0.95	**0.02**	0.56	**0.01**				
95	1.00	**0.03**	0.59	**0.01**				
100	1.06	**0.03**	0.62	**0.01**				
110	1.16	**0.04**	0.68	**0.01**				
120	1.27	**0.04**	0.75	**0.01**				
130	1.37	**0.05**	0.81	**0.01**	0.52	**0.00**		
140	1.48	**0.06**	0.87	**0.02**	0.56	**0.01**		
150	1.58	**0.06**	0.93	**0.02**	0.60	**0.01**		
160	1.69	**0.07**	1.00	**0.02**	0.64	**0.01**		
170	1.79	**0.08**	1.06	**0.02**	0.68	**0.01**		
180	1.90	**0.09**	1.12	**0.02**	0.72	**0.01**		
190	2.01	**0.10**	1.18	**0.03**	0.76	**0.01**		
200	2.11	**0.11**	1.25	**0.03**	0.80	**0.01**	0.57	**0.00**
225	2.38	**0.13**	1.40	**0.04**	0.90	**0.01**	0.64	**0.01**
250	2.64	**0.16**	1.56	**0.04**	1.00	**0.02**	0.71	**0.01**
275	2.90	**0.19**	1.71	**0.05**	1.10	**0.02**	0.78	**0.01**
300	3.17	**0.23**	1.87	**0.06**	1.20	**0.02**	0.85	**0.01**
325	3.43	**0.26**	2.02	**0.07**	1.30	**0.02**	0.93	**0.01**
350	3.69	**0.30**	2.18	**0.08**	1.40	**0.03**	1.00	**0.01**
375	3.96	**0.34**	2.33	**0.09**	1.50	**0.03**	1.07	**0.01**
400	4.22	**0.39**	2.49	**0.11**	1.60	**0.04**	1.14	**0.02**
425	4.49	**0.43**	2.65	**0.12**	1.70	**0.04**	1.21	**0.02**
450	4.75	**0.48**	2.80	**0.13**	1.80	**0.05**	1.28	**0.02**
475	5.01	**0.53**	2.96	**0.15**	1.90	**0.05**	1.35	**0.02**
500	5.28	**0.58**	3.11	**0.16**	2.00	**0.06**	1.42	**0.02**
550	5.81	**0.70**	3.42	**0.19**	2.21	**0.07**	1.57	**0.03**
600	6.33	**0.82**	3.74	**0.23**	2.41	**0.08**	1.71	**0.03**
650	6.86	**0.95**	4.05	**0.26**	2.61	**0.09**	1.85	**0.04**
700	7.39	**1.09**	4.36	**0.30**	2.81	**0.10**	1.99	**0.04**
750	7.92	**1.24**	4.67	**0.34**	3.01	**0.12**	2.14	**0.05**
800	8.44	**1.39**	4.98	**0.39**	3.21	**0.13**	2.28	**0.06**
850	8.97	**1.56**	5.29	**0.43**	3.41	**0.15**	2.42	**0.06**
900	9.50	**1.73**	5.60	**0.48**	3.61	**0.16**	2.56	**0.07**
1000	10.56	**2.11**	6.23	**0.58**	4.01	**0.20**	2.85	**0.09**
1050	11.08	**2.31**	6.54	**0.64**	4.21	**0.22**	2.99	**0.10**
1100	11.61	**2.51**	6.85	**0.70**	4.41	**0.24**	3.13	**0.10**
1150	12.14	**2.73**	7.16	**0.76**	4.61	**0.26**	3.28	**0.11**
1200	12.67	**2.95**	7.47	**0.82**	4.81	**0.28**	3.42	**0.12**
1250	13.19	**3.18**	7.78	**0.88**	5.01	**0.30**	3.56	**0.13**
1300	13.72	**3.42**	8.09	**0.95**	5.21	**0.32**	3.70	**0.14**
1350	14.25	**3.67**	8.41	**1.02**	5.41	**0.35**	3.85	**0.15**
1400	14.78	**3.93**	8.72	**1.09**	5.61	**0.37**	3.99	**0.16**
1450	15.31	**4.19**	9.03	**1.16**	5.81	**0.40**	4.13	**0.17**
1500	15.83	**4.46**	9.34	**1.24**	6.01	**0.42**	4.27	**0.18**
1550	16.36	**4.74**	9.65	**1.31**	6.21	**0.45**	4.42	**0.20**
1600	16.89	**5.03**	9.96	**1.39**	6.41	**0.48**	4.56	**0.21**
1650	17.42	**5.32**	10.27	**1.47**	6.62	**0.51**	4.70	**0.22**
1700	17.95	**5.63**	10.58	**1.56**	6.82	**0.53**	4.84	**0.23**
1750	18.47	**5.94**	10.90	**1.64**	7.02	**0.56**	4.99	**0.25**
1800	19.00	**6.26**	11.21	**1.73**	7.22	**0.59**	5.13	**0.26**

Nominal Size	8"		10"		12"	
Pipe ID	8.095		10.088		11.966	
Pipe OD	8.625		10.750		12.750	
Wall Thick	0.265		0.331		0.392	
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS
1850	11.52	**1.82**	7.42	**0.62**	5.27	**0.27**
1900	11.83	**1.91**	7.62	**0.66**	5.41	**0.29**
1950	12.14	**2.01**	7.82	**0.69**	5.56	**0.30**
2000	12.45	**2.10**	8.02	**0.72**	5.70	**0.31**
2050	12.76	**2.20**	8.22	**0.75**	5.84	**0.33**
2100	13.08	**2.30**	8.42	**0.79**	5.98	**0.34**
2150	13.39	**2.41**	8.62	**0.82**	6.13	**0.36**
2200	13.70	**2.51**	8.82	**0.86**	6.27	**0.37**
2250	14.01	**2.62**	9.02	**0.90**	6.41	**0.39**
2300	14.32	**2.73**	9.22	**0.93**	6.55	**0.41**
2350	14.63	**2.84**	9.42	**0.97**	6.70	**0.42**
2400	14.94	**2.95**	9.62	**1.01**	6.84	**0.44**
2450	15.25	**3.06**	9.82	**1.05**	6.98	**0.46**
2500	15.57	**3.18**	10.02	**1.09**	7.12	**0.48**
2550	15.88	**3.30**	10.22	**1.13**	7.27	**0.49**
2600	16.19	**3.42**	10.42	**1.17**	7.41	**0.51**
2650	16.50	**3.54**	10.62	**1.21**	7.55	**0.53**
2700	16.81	**3.67**	10.82	**1.26**	7.69	**0.55**
2750	17.12	**3.80**	11.03	**1.30**	7.84	**0.57**
2800	17.43	**3.92**	11.23	**1.34**	7.98	**0.59**
2850	17.74	**4.06**	11.43	**1.39**	8.12	**0.61**
2900	18.06	**4.19**	11.63	**1.44**	8.26	**0.63**
2950	18.37	**4.32**	11.83	**1.48**	8.41	**0.65**
3000	18.68	**4.46**	12.03	**1.53**	8.55	**0.67**
3050	18.99	**4.60**	12.23	**1.58**	8.69	**0.69**
3100	19.30	**4.74**	12.43	**1.62**	8.83	**0.71**
3150	19.61	**4.88**	12.63	**1.67**	8.98	**0.73**
3200	19.92	**5.03**	12.83	**1.72**	9.12	**0.75**
3250			13.03	**1.77**	9.26	**0.77**
3300			13.23	**1.82**	9.40	**0.79**
3350			13.43	**1.87**	9.55	**0.82**
3400			13.63	**1.93**	9.69	**0.84**
3450			13.83	**1.98**	9.83	**0.86**
3500			14.03	**2.03**	9.97	**0.89**
3550			14.23	**2.09**	10.12	**0.91**
3600			14.43	**2.14**	10.26	**0.93**
3700			14.83	**2.25**	10.54	**0.98**
3800			15.23	**2.37**	10.83	**1.03**
3900			15.64	**2.48**	11.11	**1.08**
4000			16.04	**2.60**	11.40	**1.13**
4100			16.44	**2.73**	11.68	**1.19**
4200			16.84	**2.85**	11.97	**1.24**
4300			17.24	**2.98**	12.25	**1.30**
4400			17.64	**3.11**	12.54	**1.35**
4500			18.04	**3.24**	12.82	**1.41**
4600			18.44	**3.37**	13.11	**1.47**
4700			18.84	**3.51**	13.39	**1.53**
4800			19.24	**3.65**	13.68	**1.59**
4900			19.64	**3.79**	13.96	**1.65**
5000					14.25	**1.71**
5100					14.53	**1.78**
5200					14.82	**1.84**
5300					15.10	**1.91**
5400					15.39	**1.98**
5600					15.96	**2.12**
5800					16.53	**2.26**
6000					17.10	**2.40**
6500					18.52	**2.79**
7000					19.95	**3.20**

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Class 160 IPS U.S. PVC Plastic Pipe

(1120,1220) C=150 SDR 26

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 1" THRU 5"

Nominal Size	1"		1¼"		1½"		2"		2½"		3"		4"		Nominal Size
Pipe ID	1.195		1.532		1.754		2.193		2.655		3.230		4.154		Pipe ID
Pipe OD	1.315		1.660		1.900		2.375		2.875		3.500		4.500		Pipe OD
Wall Thick	0.060		0.064		0.073		0.091		0.110		0.135		0.173		Wall Thick
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Flow GPM
1	0.29	**0.02**	0.17	**0.01**	0.13	**0.00**									1
2	0.57	**0.06**	0.35	**0.02**	0.27	**0.01**	0.17	**0.00**							2
3	0.86	**0.14**	0.52	**0.04**	0.40	**0.02**	0.25	**0.01**							3
4	1.14	**0.23**	0.70	**0.07**	0.53	**0.04**	0.34	**0.01**	0.23	**0.00**					4
5	1.43	**0.35**	0.87	**0.11**	0.66	**0.05**	0.42	**0.02**	0.29	**0.01**					5
6	1.71	**0.49**	1.04	**0.15**	0.80	**0.08**	0.51	**0.03**	0.35	**0.01**	0.23	**0.00**			6
7	2.00	**0.66**	1.22	**0.20**	0.93	**0.10**	0.59	**0.03**	0.41	**0.01**	0.27	**0.01**			7
8	2.29	**0.84**	1.39	**0.25**	1.06	**0.13**	0.68	**0.04**	0.46	**0.02**	0.31	**0.01**			8
9	2.57	**1.05**	1.56	**0.31**	1.19	**0.16**	0.76	**0.05**	0.52	**0.02**	0.35	**0.01**			9
10	2.86	**1.27**	1.74	**0.38**	1.33	**0.20**	0.85	**0.07**	0.58	**0.03**	0.39	**0.01**			10
11	3.14	**1.52**	1.91	**0.45**	1.46	**0.23**	0.93	**0.08**	0.64	**0.03**	0.43	**0.01**			11
12	3.43	**1.78**	2.09	**0.53**	1.59	**0.28**	1.02	**0.09**	0.69	**0.04**	0.47	**0.01**			12
13	3.71	**2.07**	2.26	**0.62**	1.72	**0.32**	1.10	**0.11**	0.75	**0.04**	0.51	**0.02**	0.31	**0.00**	13
14	4.00	**2.37**	2.43	**0.71**	1.86	**0.37**	1.19	**0.12**	0.81	**0.05**	0.55	**0.02**	0.33	**0.01**	14
15	4.29	**2.70**	2.61	**0.80**	1.99	**0.42**	1.27	**0.14**	0.87	**0.06**	0.59	**0.02**	0.35	**0.01**	15
16	4.57	**3.04**	2.78	**0.91**	2.12	**0.47**	1.36	**0.16**	0.93	**0.06**	0.63	**0.02**	0.38	**0.01**	16
17	4.86	**3.40**	2.96	**1.01**	2.25	**0.53**	1.44	**0.18**	0.98	**0.07**	0.66	**0.03**	0.40	**0.01**	17
18	5.14	**3.78**	3.13	**1.13**	2.39	**0.58**	1.53	**0.20**	1.04	**0.08**	0.70	**0.03**	0.43	**0.01**	18
19	5.43	**4.18**	3.30	**1.25**	2.52	**0.65**	1.60	**0.22**	1.10	**0.09**	0.74	**0.03**	0.45	**0.01**	19
20	5.71	**4.59**	3.48	**1.37**	2.65	**0.71**	1.70	**0.24**	1.16	**0.09**	0.78	**0.04**	0.47	**0.01**	20
22	6.29	**5.48**	3.82	**1.64**	2.92	**0.85**	1.87	**0.29**	1.27	**0.11**	0.86	**0.04**	0.52	**0.01**	22
24	6.86	**6.44**	4.17	**1.92**	3.18	**0.99**	2.04	**0.34**	1.39	**0.13**	0.94	**0.05**	0.57	**0.01**	24
25	7.14	**6.94**	4.35	**2.07**	3.32	**1.07**	2.12	**0.36**	1.45	**0.14**	0.98	**0.05**	0.59	**0.02**	25
26	7.43	**7.47**	4.52	**2.23**	3.45	**1.15**	2.21	**0.39**	1.50	**0.15**	1.02	**0.06**	0.61	**0.02**	26
28	8.00	**8.56**	4.87	**2.56**	3.71	**1.32**	2.38	**0.45**	1.62	**0.18**	1.09	**0.07**	0.66	**0.02**	28
30	8.57	**9.73**	5.22	**2.91**	3.98	**1.50**	2.55	**0.51**	1.74	**0.20**	1.17	**0.08**	0.71	**0.02**	30
32	9.14	**10.97**	5.56	**3.27**	4.24	**1.69**	2.71	**0.57**	1.85	**0.23**	1.25	**0.09**	0.76	**0.03**	32
34	9.71	**12.27**	5.91	**3.66**	4.51	**1.90**	2.88	**0.64**	1.97	**0.25**	1.33	**0.10**	0.80	**0.03**	34
35	10.00	**12.95**	6.08	**3.87**	4.64	**2.00**	2.97	**0.67**	2.03	**0.27**	1.37	**0.10**	0.83	**0.03**	35
36	10.29	**13.64**	6.26	**4.07**	4.77	**2.11**	3.05	**0.71**	2.08	**0.28**	1.41	**0.11**	0.85	**0.03**	36
38	10.86	**15.08**	6.61	**4.50**	5.04	**2.33**	3.22	**0.79**	2.20	**0.31**	1.49	**0.12**	0.90	**0.04**	38
40	11.43	**16.58**	6.95	**4.95**	5.30	**2.56**	3.39	**0.86**	2.32	**0.34**	1.56	**0.13**	0.95	**0.04**	40
42	12.00	**18.15**	7.30	**5.42**	5.57	**2.80**	3.56	**0.95**	2.43	**0.37**	1.64	**0.14**	0.99	**0.04**	42
44	12.57	**19.78**	7.65	**5.91**	5.84	**3.06**	3.73	**1.03**	2.55	**0.41**	1.72	**0.16**	1.04	**0.05**	44
45	12.86	**20.62**	7.82	**6.16**	5.90	**3.19**	3.82	**1.07**	2.60	**0.42**	1.76	**0.16**	1.06	**0.05**	45
46	13.14	**21.48**	8.00	**6.41**	6.10	**3.32**	3.90	**1.12**	2.66	**0.44**	1.80	**0.17**	1.09	**0.05**	46
48	13.71	**23.24**	8.34	**6.94**	6.37	**3.59**	4.07	**1.21**	2.78	**0.48**	1.88	**0.18**	1.13	**0.05**	48
50	14.29	**25.07**	8.69	**7.48**	6.63	**3.87**	4.24	**1.31**	2.89	**0.52**	1.96	**0.20**	1.18	**0.06**	50
55	15.71	**29.90**	9.56	**8.93**	7.29	**4.62**	4.67	**1.56**	3.10	**0.61**	2.15	**0.24**	1.30	**0.07**	55
60	17.14	**35.13**	10.43	**10.49**	7.96	**5.43**	5.09	**1.83**	3.47	**0.72**	2.35	**0.28**	1.42	**0.08**	60
65	18.57	**40.75**	11.30	**12.16**	8.62	**6.30**	5.51	**2.12**	3.76	**0.84**	2.54	**0.32**	1.54	**0.09**	65
70			12.17	**13.95**	9.28	**7.22**	5.94	**2.44**	4.05	**0.96**	2.74	**0.37**	1.66	**0.11**	70
75			13.04	**15.86**	9.95	**8.21**	6.36	**2.77**	4.34	**1.09**	2.93	**0.42**	1.77	**0.12**	75
80			13.91	**17.87**	10.61	**9.25**	6.79	**3.12**	4.63	**1.23**	3.13	**0.47**	1.89	**0.14**	80
85			14.78	**19.99**	11.27	**10.35**	7.21	**3.49**	4.92	**1.38**	3.32	**0.53**	2.01	**0.16**	85
90			15.65	**22.23**	11.94	**11.50**	7.64	**3.88**	5.21	**1.53**	3.52	**0.59**	2.13	**0.17**	90
95			16.51	**24.57**	12.60	**12.72**	8.06	**4.29**	5.50	**1.69**	3.72	**0.65**	2.25	**0.19**	95
100			17.38	**27.01**	13.26	**13.98**	8.48	**4.72**	5.79	**1.86**	3.91	**0.72**	2.36	**0.21**	100
110			19.12	**32.23**	14.59	**16.68**	9.33	**5.63**	6.37	**2.22**	4.30	**0.85**	2.60	**0.25**	110
120					15.91	**19.60**	10.18	**6.61**	6.95	**2.61**	4.69	**1.00**	2.84	**0.30**	120
130					17.24	**22.73**	11.03	**7.67**	7.52	**3.02**	5.08	**1.16**	3.07	**0.34**	130
140					18.57	**26.08**	11.88	**8.79**	8.10	**3.47**	5.47	**1.34**	3.31	**0.39**	140
150					19.89	**29.63**	12.73	**9.99**	8.68	**3.94**	5.87	**1.52**	3.55	**0.45**	150
160							13.57	**11.26**	9.26	**4.44**	6.26	**1.71**	3.78	**0.50**	160
170							14.42	**12.60**	9.84	**4.97**	6.65	**1.91**	4.02	**0.56**	170
180							15.27	**14.01**	10.42	**5.52**	7.04	**2.13**	4.26	**0.63**	180
190							16.12	**15.48**	11.00	**6.11**	7.43	**2.35**	4.49	**0.69**	190
200							16.97	**17.02**	11.58	**6.72**	7.82	**2.59**	4.73	**0.76**	200
225							19.09	**21.17**	13.02	**8.35**	8.80	**3.22**	5.32	**0.95**	225
250									14.47	**10.15**	9.78	**3.91**	5.91	**1.15**	250
275									15.92	**12.11**	10.75	**4.67**	6.50	**1.37**	275
300									17.36	**14.23**	11.73	**5.48**	7.09	**1.61**	300
325									18.81	**16.50**	12.71	**6.36**	7.68	**1.87**	325
350											13.69	**7.29**	8.28	**2.14**	350
375											14.67	**8.29**	8.87	**2.44**	375
400											15.64	**9.34**	9.46	**2.75**	400
425											16.62	**10.45**	10.05	**3.07**	425
450											17.60	**11.62**	10.64	**3.41**	450
475											18.58	**12.84**	11.23	**3.77**	475
500													11.82	**4.15**	500

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Class 160 IPS U.S. PVC Plastic Pipe

(1120,1220) C=150 SDR 26

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 6" THRU 12"

Nominal Size	6"		8"		10"		12"	
Pipe ID	6.115		7.961		9.924		11.770	
Pipe OD	6.625		8.625		10.750		12.750	
Wall Thick	0.225		0.332		0.413		0.490	
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS
40	0.44	0.01						
45	0.49	0.01						
50	0.55	0.01						
55	0.60	0.01						
60	0.65	0.01						
65	0.71	0.01						
70	0.76	0.02	0.45	0.00				
75	0.82	0.02	0.48	0.01				
80	0.87	0.02	0.52	0.01				
85	0.93	0.02	0.55	0.01				
90	0.98	0.03	0.58	0.01				
95	1.04	0.03	0.61	0.01				
100	1.09	0.03	0.64	0.01				
110	1.20	0.04	0.71	0.01				
120	1.31	0.04	0.77	0.01				
130	1.42	0.05	0.84	0.01	0.54	0.00		
140	1.53	0.06	0.90	0.02	0.58	0.01		
150	1.64	0.07	0.97	0.02	0.62	0.01		
160	1.75	0.08	1.03	0.02	0.66	0.01		
170	1.85	0.09	1.09	0.02	0.70	0.01		
180	1.96	0.10	1.16	0.03	0.75	0.01		
190	2.07	0.11	1.22	0.03	0.79	0.01		
200	2.18	0.12	1.29	0.03	0.83	0.01	0.59	0.00
225	2.45	0.14	1.45	0.04	0.93	0.01	0.66	0.01
250	2.73	0.18	1.61	0.05	1.04	0.02	0.74	0.01
275	3.00	0.21	1.77	0.06	1.14	0.02	0.81	0.01
300	3.27	0.25	1.93	0.07	1.24	0.02	0.88	0.01
325	3.55	0.28	2.09	0.08	1.35	0.03	0.96	0.01
350	3.82	0.33	2.25	0.09	1.45	0.03	1.03	0.01
375	4.09	0.37	2.41	0.10	1.55	0.04	1.10	0.02
400	4.36	0.42	2.58	0.12	1.66	0.04	1.18	0.02
425	4.64	0.47	2.74	0.13	1.76	0.04	1.25	0.02
450	4.91	0.52	2.90	0.14	1.86	0.05	1.33	0.02
475	5.18	0.58	3.06	0.16	1.97	0.05	1.40	0.02
500	5.46	0.63	3.22	0.18	2.07	0.06	1.47	0.03
550	6.00	0.75	3.54	0.21	2.28	0.07	1.62	0.03
600	6.55	0.89	3.86	0.25	2.49	0.08	1.77	0.04
650	7.09	1.03	4.18	0.28	2.69	0.10	1.91	0.04
700	7.64	1.18	4.51	0.33	2.90	0.11	2.06	0.05
750	8.18	1.34	4.83	0.37	3.11	0.13	2.21	0.06
800	8.73	1.51	5.15	0.42	3.31	0.14	2.36	0.06
850	9.27	1.69	5.47	0.47	3.52	0.16	2.50	0.07
900	9.82	1.88	5.79	0.52	3.73	0.18	2.65	0.08
1000	10.91	2.28	6.44	0.63	4.14	0.22	2.95	0.09
1050	11.46	2.50	6.76	0.69	4.35	0.24	3.09	0.10
1100	12.00	2.72	7.08	0.75	4.56	0.26	3.24	0.11
1150	12.55	2.96	7.40	0.82	4.76	0.28	3.39	0.12
1200	13.09	3.20	7.73	0.89	4.97	0.30	3.53	0.13
1250	13.64	3.45	8.05	0.96	5.18	0.33	3.68	0.14
1300	14.18	3.71	8.37	1.03	5.39	0.35	3.83	0.15
1350	14.73	3.98	8.69	1.10	5.59	0.38	3.98	0.16
1400	15.28	4.26	9.01	1.18	5.80	0.40	4.12	0.18
1450	15.82	4.54	9.33	1.26	6.01	0.43	4.27	0.19
1500	16.37	4.84	9.66	1.34	6.21	0.46	4.42	0.20
1550	16.91	5.14	9.98	1.42	6.42	0.49	4.56	0.21
1600	17.46	5.45	10.30	1.51	6.63	0.52	4.71	0.23
1650	18.00	5.77	10.62	1.60	6.84	0.55	4.86	0.24
1700	18.55	6.10	10.94	1.69	7.04	0.58	5.01	0.25
1750	19.09	6.44	11.27	1.78	7.25	0.61	5.15	0.27
1800	19.64	6.78	11.59	1.88	7.46	0.64	5.30	0.28

Nominal Size	8"		10"		12"	
Pipe ID	7.961		9.924		11.770	
Pipe OD	8.625		10.750		12.750	
Wall Thick	0.332		0.413		0.490	
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS
1850	11.91	1.98	7.66	0.68	5.45	0.29
1900	12.23	2.08	7.87	0.71	5.60	0.31
1950	12.55	2.18	8.08	0.75	5.74	0.32
2000	12.88	2.28	8.29	0.78	5.89	0.34
2050	13.20	2.39	8.49	0.82	6.04	0.36
2100	13.52	2.50	8.70	0.85	6.18	0.37
2150	13.84	2.61	8.91	0.89	6.33	0.39
2200	14.16	2.72	9.11	0.93	6.48	0.41
2250	14.48	2.84	9.32	0.97	6.63	0.42
2300	14.81	2.96	9.53	1.01	6.77	0.44
2350	15.13	3.08	9.74	1.05	6.92	0.46
2400	15.45	3.20	9.94	1.09	7.07	0.48
2450	15.77	3.32	10.15	1.14	7.22	0.50
2500	16.09	3.45	10.36	1.18	7.36	0.51
2550	16.42	3.58	10.56	1.22	7.51	0.53
2600	16.74	3.71	10.77	1.27	7.66	0.55
2650	17.06	3.84	10.98	1.32	7.80	0.57
2700	17.38	3.98	11.19	1.36	7.95	0.59
2750	17.70	4.12	11.39	1.41	8.10	0.61
2800	18.03	4.26	11.60	1.46	8.25	0.64
2850	18.35	4.40	11.81	1.51	8.39	0.66
2900	18.67	4.54	12.01	1.55	8.54	0.68
2950	18.99	4.69	12.22	1.60	8.69	0.70
3000	19.31	4.84	12.43	1.66	8.84	0.72
3050	19.63	4.99	12.64	1.71	8.98	0.74
3100	19.96	5.14	12.84	1.76	9.13	0.77
3150			13.05	1.81	9.28	0.79
3200			13.26	1.87	9.42	0.81
3250			13.46	1.92	9.57	0.84
3300			13.67	1.97	9.72	0.86
3350			13.88	2.03	9.87	0.89
3400			14.09	2.09	10.01	0.91
3450			14.29	2.14	10.16	0.93
3500			14.50	2.20	10.31	0.96
3550			14.71	2.26	10.46	0.99
3600			14.91	2.32	10.60	1.01
3700			15.33	2.44	10.90	1.06
3800			15.74	2.56	11.19	1.12
3900			16.16	2.69	11.49	1.17
4000			16.57	2.82	11.78	1.23
4100			16.99	2.95	12.08	1.29
4200			17.40	3.09	12.37	1.35
4300			17.81	3.22	12.66	1.41
4400			18.23	3.36	12.96	1.47
4500			18.64	3.51	13.25	1.53
4600			19.06	3.65	13.55	1.59
4700			19.47	3.80	13.84	1.66
4800			19.89	3.95	14.14	1.72
4900					14.43	1.79
5000					14.73	1.86
5100					15.02	1.93
5200					15.31	2.00
5300					15.61	2.07
5400					15.90	2.14
5600					16.49	2.29
5800					17.08	2.45
6000					17.67	2.60
6200					18.26	2.77
6400					18.85	2.94
6600					19.44	3.11

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Class 200 IPS U.S. PVC Plastic Pipe

(1120, 1220) C=150 SDR 21

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES ¾" THRU 4"

Nominal Size	¾"		1"		1¼"		1½"		2"		2½"		3"		4"		Nominal Size
Pipe ID	0.930		1.189		1.502		1.720		2.149		2.601		3.166		4.072		Pipe ID
Pipe OD	1.050		1.315		1.660		1.900		2.375		2.875		3.500		4.500		Pipe OD
Wall Thick	0.060		0.063		0.079		0.090		0.113		0.137		0.167		0.214		Wall Thick
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
1	0.47	**0.06**	0.29	**0.02**	0.18	**0.01**	0.14	**0.00**									1
2	0.94	**0.22**	0.58	**0.07**	0.36	**0.02**	0.28	**0.01**	0.18	**0.00**							2
3	1.42	**0.46**	0.87	**0.14**	0.54	**0.04**	0.41	**0.02**	0.27	**0.01**	0.18	**0.00**					3
4	1.89	**0.79**	1.15	**0.24**	0.72	**0.08**	0.55	**0.04**	0.35	**0.01**	0.24	**0.01**					4
5	2.36	**1.19**	1.44	**0.36**	0.90	**0.12**	0.69	**0.06**	0.44	**0.02**	0.30	**0.01**					5
6	2.83	**1.67**	1.73	**0.51**	1.09	**0.16**	0.83	**0.08**	0.53	**0.03**	0.36	**0.01**	0.24	**0.00**			6
7	3.30	**2.23**	2.02	**0.67**	1.27	**0.22**	0.97	**0.11**	0.62	**0.04**	0.42	**0.01**	0.28	**0.01**			7
8	3.77	**2.85**	2.31	**0.86**	1.45	**0.28**	1.10	**0.14**	0.71	**0.05**	0.48	**0.02**	0.33	**0.01**			8
9	4.25	**3.55**	2.60	**1.07**	1.63	**0.34**	1.24	**0.18**	0.80	**0.06**	0.54	**0.02**	0.37	**0.01**			9
10	4.72	**4.31**	2.89	**1.30**	1.81	**0.42**	1.38	**0.22**	0.88	**0.07**	0.60	**0.03**	0.41	**0.01**			10
12	5.66	**6.04**	3.46	**1.83**	2.17	**0.59**	1.65	**0.30**	1.06	**0.10**	0.72	**0.04**	0.49	**0.02**	0.30	**0.00**	12
14	6.60	**8.04**	4.04	**2.43**	2.53	**0.78**	1.93	**0.40**	1.24	**0.14**	0.84	**0.05**	0.57	**0.02**	0.34	**0.01**	14
15	7.08	**9.13**	4.33	**2.76**	2.71	**0.89**	2.07	**0.46**	1.33	**0.16**	0.90	**0.06**	0.61	**0.02**	0.37	**0.01**	15
16	7.55	**10.29**	4.62	**3.11**	2.89	**1.00**	2.21	**0.52**	1.41	**0.17**	0.96	**0.07**	0.65	**0.03**	0.39	**0.01**	16
18	8.49	**12.80**	5.19	**3.87**	3.26	**1.24**	2.48	**0.64**	1.59	**0.22**	1.09	**0.09**	0.73	**0.03**	0.44	**0.01**	18
20	9.43	**15.56**	5.77	**4.71**	3.62	**1.51**	2.76	**0.78**	1.77	**0.26**	1.21	**0.10**	0.81	**0.04**	0.49	**0.01**	20
22	10.38	**18.56**	6.35	**5.62**	3.98	**1.80**	3.03	**0.93**	1.94	**0.32**	1.33	**0.12**	0.90	**0.05**	0.54	**0.01**	22
24	11.32	**21.81**	6.93	**6.60**	4.34	**2.12**	3.31	**1.09**	2.12	**0.37**	1.45	**0.15**	0.98	**0.06**	0.59	**0.02**	24
25	11.79	**23.52**	7.22	**7.12**	4.52	**2.28**	3.45	**1.18**	2.21	**0.40**	1.51	**0.16**	1.02	**0.06**	0.62	**0.02**	25
26	12.27	**25.29**	7.50	**7.65**	4.70	**2.45**	3.59	**1.27**	2.30	**0.43**	1.57	**0.17**	1.06	**0.07**	0.64	**0.02**	26
28	13.21	**29.01**	8.08	**8.78**	5.06	**2.82**	3.86	**1.46**	2.47	**0.49**	1.69	**0.19**	1.14	**0.07**	0.69	**0.02**	28
30	14.15	**32.96**	8.66	**9.97**	5.43	**3.20**	4.14	**1.65**	2.65	**0.56**	1.81	**0.22**	1.22	**0.08**	0.74	**0.02**	30
32	15.10	**37.15**	9.24	**11.24**	5.79	**3.61**	4.41	**1.86**	2.83	**0.63**	1.93	**0.25**	1.30	**0.10**	0.79	**0.03**	32
34	16.04	**41.56**	9.81	**12.58**	6.15	**4.03**	4.69	**2.09**	3.00	**0.71**	2.05	**0.28**	1.38	**0.11**	0.84	**0.03**	34
35	16.51	**43.86**	10.10	**13.27**	6.33	**4.26**	4.83	**2.20**	3.09	**0.74**	2.11	**0.29**	1.42	**0.11**	0.86	**0.03**	35
36	16.98	**46.21**	10.39	**13.98**	6.51	**4.48**	4.96	**2.32**	3.18	**0.78**	2.17	**0.31**	1.47	**0.12**	0.89	**0.03**	36
38	17.93	**51.07**	10.97	**15.45**	6.87	**4.96**	5.24	**2.56**	3.36	**0.87**	2.29	**0.34**	1.55	**0.13**	0.94	**0.04**	38
40	18.87	**56.16**	11.54	**16.99**	7.23	**5.45**	5.52	**2.82**	3.53	**0.95**	2.41	**0.38**	1.63	**0.14**	0.98	**0.04**	40
42	19.81	**61.47**	12.12	**18.60**	7.60	**5.97**	5.79	**3.08**	3.71	**1.04**	2.53	**0.41**	1.71	**0.16**	1.03	**0.05**	42
44	20.76	**67.00**	12.70	**20.27**	7.96	**6.50**	6.07	**3.36**	3.89	**1.14**	2.65	**0.45**	1.79	**0.17**	1.08	**0.05**	44
45			12.99	**21.13**	8.14	**6.78**	6.21	**3.51**	3.98	**1.19**	2.71	**0.47**	1.83	**0.18**	1.11	**0.05**	45
46			13.28	**22.01**	8.32	**7.06**	6.34	**3.65**	4.06	**1.24**	2.77	**0.49**	1.87	**0.19**	1.13	**0.06**	46
48			13.85	**23.82**	8.68	**7.64**	6.62	**3.95**	4.24	**1.34**	2.89	**0.53**	1.95	**0.20**	1.18	**0.06**	48
50			14.43	**25.69**	9.04	**8.24**	6.90	**4.26**	4.42	**1.44**	3.02	**0.57**	2.04	**0.22**	1.23	**0.06**	50
55			15.87	**30.65**	9.95	**9.83**	7.59	**5.08**	4.86	**1.72**	3.32	**0.68**	2.24	**0.26**	1.35	**0.08**	55
60			17.32	**36.00**	10.85	**11.55**	8.27	**5.97**	5.30	**2.02**	3.62	**0.80**	2.44	**0.31**	1.48	**0.09**	60
65			18.76	**41.76**	11.76	**13.39**	8.96	**6.93**	5.74	**2.34**	3.92	**0.93**	2.65	**0.36**	1.60	**0.10**	65
70					12.66	**15.36**	9.65	**7.95**	6.18	**2.69**	4.22	**1.06**	2.85	**0.41**	1.72	**0.12**	70
75					13.56	**17.46**	10.34	**9.03**	6.63	**3.05**	4.52	**1.21**	3.05	**0.46**	1.85	**0.14**	75
80					14.47	**19.67**	11.03	**10.17**	7.07	**3.44**	4.82	**1.36**	3.26	**0.52**	1.97	**0.15**	80
85					15.37	**22.01**	11.72	**11.38**	7.51	**3.85**	5.13	**1.52**	3.46	**0.58**	2.09	**0.17**	85
90					16.28	**24.47**	12.41	**12.65**	7.95	**4.28**	5.43	**1.69**	3.66	**0.65**	2.21	**0.19**	90
95					17.18	**27.05**	13.10	**13.99**	8.39	**4.73**	5.73	**1.87**	3.87	**0.72**	2.34	**0.21**	95
100					18.09	**29.74**	13.79	**15.38**	8.83	**5.20**	6.03	**2.06**	4.07	**0.79**	2.46	**0.23**	100
110					19.89	**35.48**	15.17	**18.35**	9.72	**6.21**	6.63	**2.45**	4.48	**0.94**	2.71	**0.28**	110
120							16.55	**21.56**	10.60	**7.30**	7.24	**2.88**	4.88	**1.11**	2.95	**0.33**	120
130							17.93	**25.00**	11.48	**8.46**	7.84	**3.34**	5.29	**1.28**	3.20	**0.38**	130
140							19.31	**28.68**	12.37	**9.71**	8.44	**3.83**	5.70	**1.47**	3.44	**0.43**	140
150									13.25	**11.03**	9.05	**4.36**	6.11	**1.67**	3.69	**0.49**	150
175									15.46	**14.67**	10.55	**5.80**	7.12	**2.23**	4.31	**0.65**	175
200									17.67	**18.79**	12.06	**7.42**	8.14	**2.85**	4.92	**0.84**	200
225									19.88	**23.37**	13.57	**9.23**	9.16	**3.55**	5.54	**1.04**	225
250											15.08	**11.22**	10.18	**4.31**	6.15	**1.27**	250
275											16.58	**13.39**	11.19	**5.14**	6.77	**1.51**	275
300											18.09	**15.73**	12.21	**6.04**	7.38	**1.78**	300
350													14.25	**8.04**	8.61	**2.36**	350
400													16.28	**10.29**	9.84	**3.03**	400
450													18.32	**12.80s**	11.07	**3.76**	450
500															12.30	**4.57**	500
550															13.53	**5.46**	550
600															14.76	**6.41**	600
700															17.22	**8.53**	700
800															19.68	**10.92**	800

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Class 200 IPS U.S. PVC Plastic Pipe

(1120,1220) C=150 SDR 21

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 5" THRU 12"

Nominal Size	6"		8"		10"		12"	
Pipe ID	5.993		7.805		9.728		11.538	
Pipe OD	6.625		8.625		10.750		12.750	
Wall Thick	0.316		0.410		0.511		0.606	
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS
30								
32								
34	0.39	**0.00**						
36	0.41	**0.01**						
38	0.43	**0.01**						
40	0.45	**0.01**						
42	0.48	**0.01**						
44	0.50	**0.01**						
46	0.52	**0.01**						
48	0.55	**0.01**						
50	0.57	**0.01**						
55	0.62	**0.01**						
60	0.68	**0.01**						
65	0.74	**0.02**	0.44	**0.00**				
70	0.80	**0.02**	0.47	**0.01**				
75	0.85	**0.02**	0.50	**0.01**				
80	0.91	**0.02**	0.54	**0.01**				
85	0.97	**0.03**	0.57	**0.01**				
90	1.02	**0.03**	0.60	**0.01**				
95	1.08	**0.03**	0.64	**0.01**				
100	1.14	**0.04**	0.67	**0.01**				
110	1.25	**0.04**	0.74	**0.01**				
120	1.36	**0.05**	0.80	**0.01**	0.52	**0.00**		
130	1.48	**0.06**	0.87	**0.02**	0.56	**0.01**		
140	1.59	**0.07**	0.94	**0.02**	0.60	**0.01**		
150	1.70	**0.08**	1.00	**0.02**	0.65	**0.01**		
160	1.82	**0.08**	1.07	**0.02**	0.69	**0.01**		
170	1.93	**0.09**	1.14	**0.03**	0.73	**0.01**		
180	2.04	**0.11**	1.21	**0.03**	0.78	**0.01**		
190	2.16	**0.12**	1.27	**0.03**	0.82	**0.01**	0.58	**0.00**
200	2.27	**0.13**	1.34	**0.04**	0.86	**0.01**	0.61	**0.01**
225	2.56	**0.16**	1.51	**0.04**	0.97	**0.02**	0.69	**0.01**
250	2.84	**0.19**	1.67	**0.05**	1.08	**0.02**	0.77	**0.01**
275	3.12	**0.23**	1.84	**0.06**	1.19	**0.02**	0.84	**0.01**
300	3.41	**0.27**	2.01	**0.07**	1.29	**0.03**	0.92	**0.01**
325	3.69	**0.31**	2.18	**0.09**	1.40	**0.03**	1.00	**0.01**
350	3.98	**0.36**	2.34	**0.10**	1.51	**0.03**	1.07	**0.01**
375	4.26	**0.41**	2.51	**0.11**	1.62	**0.04**	1.15	**0.02**
400	4.54	**0.46**	2.68	**0.13**	1.72	**0.04**	1.23	**0.02**
425	4.83	**0.52**	2.85	**0.14**	1.83	**0.05**	1.30	**0.02**
450	5.11	**0.57**	3.01	**0.16**	1.94	**0.05**	1.38	**0.02**
475	5.40	**0.63**	3.18	**0.18**	2.05	**0.06**	1.46	**0.03**
500	5.68	**0.70**	3.35	**0.19**	2.16	**0.07**	1.53	**0.03**
550	6.25	**0.83**	3.68	**0.23**	2.37	**0.08**	1.69	**0.03**
600	6.82	**0.98**	4.02	**0.27**	2.59	**0.09**	1.84	**0.04**
650	7.38	**1.13**	4.35	**0.31**	2.80	**0.11**	1.99	**0.05**
700	7.95	**1.30**	4.69	**0.36**	3.02	**0.12**	2.15	**0.05**
750	8.52	**1.48**	5.02	**0.41**	3.23	**0.14**	2.30	**0.06**
800	9.09	**1.67**	5.36	**0.46**	3.45	**0.16**	2.45	**0.07**
850	9.66	**1.86**	5.69	**0.52**	3.66	**0.18**	2.61	**0.08**
900	10.22	**2.07**	6.03	**0.57**	3.88	**0.20**	2.76	**0.09**
950	10.79	**2.29**	6.36	**0.63**	4.10	**0.22**	2.91	**0.09**
1000	11.36	**2.52**	6.70	**0.70**	4.31	**0.24**	3.06	**0.10**
1050	11.93	**2.76**	7.03	**0.76**	4.53	**0.26**	3.22	**0.11**
1100	12.50	**3.00**	7.37	**0.83**	4.74	**0.28**	3.37	**0.12**
1150	13.06	**3.26**	7.70	**0.90**	4.96	**0.31**	3.52	**0.13**
1200	13.63	**3.53**	8.04	**0.98**	5.17	**0.33**	3.68	**0.15**
1250	14.20	**3.81**	8.37	**1.05**	5.39	**0.36**	3.83	**0.16**
1300	14.77	**4.09**	8.71	**1.13**	5.60	**0.39**	3.98	**0.17**
1350	15.34	**4.39**	9.04	**1.21**	5.82	**0.42**	4.14	**0.18**
1400	15.90	**4.70**	9.38	**1.30**	6.04	**0.44**	4.29	**0.19**
1450	16.47	**5.01**	9.71	**1.39**	6.25	**0.47**	4.44	**0.21**
1500	17.04	**5.34**	10.05	**1.48**	6.47	**0.51**	4.60	**0.22**
1550	17.61	**5.67**	10.38	**1.57**	6.68	**0.54**	4.75	**0.23**
1600	18.18	**6.01**	10.72	**1.66**	6.90	**0.57**	4.90	**0.25**
1650	18.74	**6.37**	11.05	**1.76**	7.11	**0.60**	5.06	**0.26**
1700	19.31	**6.73**	11.39	**1.86**	7.33	**0.64**	5.21	**0.28**
1750			11.72	**1.96**	7.54	**0.67**	5.36	**0.29**
1800			12.06	**2.07**	7.76	**0.71**	5.52	**0.31**
1850			12.39	**2.18**	7.98	**0.74**	5.67	**0.32**

Nominal Size	8"		10"		12"	
Pipe ID	7.805		9.728		11.538	
Pipe OD	8.625		10.750		12.750	
Wall Thick	0.410		0.511		0.606	
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS
1900	12.73	**2.29**	8.19	**0.78**	5.82	**0.34**
1950	13.06	**2.40**	8.41	**0.82**	5.98	**0.36**
2000	13.40	**2.51**	8.62	**0.86**	6.13	**0.38**
2050	13.73	**2.63**	8.84	**0.90**	6.28	**0.39**
2100	14.06	**2.75**	9.05	**0.94**	6.44	**0.41**
2150	14.40	**2.87**	9.27	**0.98**	6.59	**0.43**
2200	14.73	**3.00**	9.48	**1.03**	6.74	**0.45**
2250	15.07	**3.13**	9.70	**1.07**	6.90	**0.47**
2300	15.40	**3.26**	9.92	**1.11**	7.05	**0.49**
2350	15.74	**3.39**	10.13	**1.16**	7.20	**0.51**
2400	16.07	**3.52**	10.35	**1.21**	7.36	**0.53**
2450	16.41	**3.66**	10.56	**1.25**	7.51	**0.55**
2500	16.74	**3.80**	10.78	**1.30**	7.66	**0.57**
2550	17.08	**3.94**	10.99	**1.35**	7.82	**0.59**
2600	17.41	**4.09**	11.21	**1.40**	7.97	**0.61**
2650	17.75	**4.23**	11.43	**1.45**	8.12	**0.63**
2700	18.08	**4.38**	11.64	**1.50**	8.27	**0.65**
2750	18.42	**4.53**	11.86	**1.55**	8.43	**0.68**
2800	18.75	**4.69**	12.07	**1.60**	8.58	**0.70**
2850	19.09	**4.84**	12.29	**1.66**	8.73	**0.72**
2900	19.42	**5.00**	12.50	**1.71**	8.89	**0.75**
2950	19.76	**5.16**	12.72	**1.77**	9.04	**0.77**
3000			12.93	**1.82**	9.19	**0.79**
3050			13.15	**1.88**	9.35	**0.82**
3100			13.37	**1.94**	9.50	**0.84**
3150			13.58	**2.00**	9.65	**0.87**
3200			13.80	**2.06**	9.81	**0.90**
3250			14.01	**2.12**	9.96	**0.92**
3300			14.23	**2.18**	10.11	**0.95**
3350			14.44	**2.24**	10.27	**0.98**
3400			14.66	**2.30**	10.42	**1.00**
3450			14.87	**2.36**	10.57	**1.03**
3500			15.09	**2.43**	10.73	**1.06**
3550			15.31	**2.49**	10.88	**1.09**
3600			15.52	**2.56**	11.03	**1.11**
3650			15.74	**2.62**	11.19	**1.14**
3700			15.95	**2.69**	11.34	**1.17**
3750			16.17	**2.76**	11.49	**1.20**
3800			16.38	**2.83**	11.65	**1.23**
3850			16.60	**2.89**	11.80	**1.26**
3900			16.81	**2.96**	11.95	**1.29**
3950			17.03	**3.04**	12.11	**1.32**
4000			17.25	**3.11**	12.26	**1.35**
4050			17.46	**3.18**	12.41	**1.39**
4100			17.68	**3.25**	12.57	**1.42**
4200			18.11	**3.40**	12.87	**1.48**
4300			18.54	**3.55**	13.18	**1.55**
4400			18.97	**3.71**	13.49	**1.62**
4500			19.40	**3.86**	13.79	**1.68**
4600			19.83	**4.02**	14.10	**1.75**
4700					14.40	**1.83**
4800					14.71	**1.90**
4900					15.02	**1.97**
5000					15.32	**2.05**
5100					15.63	**2.12**
5200					15.94	**2.20**
5300					16.24	**2.28**
5400					16.55	**2.36**
5500					16.86	**2.44**
5600					17.16	**2.53**
5700					17.47	**2.61**
5800					17.78	**2.70**
5900					18.08	**2.78**
6000					18.39	**2.87**
6100					18.70	**2.96**
6200					19.00	**3.05**
6300					19.31	**3.14**
6400					19.61	**3.23**
6500					19.92	**3.33**

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Class 315 IPS PVC Plastic Pipe

(1120,1220) C=150 SDR 13.5

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES ½" THRU 3"

Nominal Size	½"		¾"		1"		1¼"		1½"		2"		2½"		3"		Nominal Size
Pipe ID	0.716		0.894		1.121		1.414		1.618		2.023		2.449		2.982		Pipe ID
Pipe OD	0.840		1.050		1.315		1.660		1.900		2.375		2.875		3.500		Pipe OD
Wall Thick	0.062		0.078		0.097		0.123		0.141		0.176		0.213		0.259		Wall Thick
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
1	0.80	**0.22**	0.51	**0.07**	0.32	**0.02**	0.20	**0.01**	0.16	**0.00**							1
2	1.59	**0.78**	1.02	**0.27**	0.65	**0.09**	0.41	**0.03**	0.31	**0.01**	0.20	**0.00**					2
3	2.39	**1.65**	1.53	**0.56**	0.97	**0.19**	0.61	**0.06**	0.47	**0.03**	0.30	**0.01**	0.20	**0.00**			3
4	3.18	**2.82**	2.04	**0.96**	1.30	**0.32**	0.82	**0.10**	0.62	**0.05**	0.40	**0.02**	0.27	**0.01**			4
5	3.97	**4.26**	2.55	**1.45**	1.62	**0.48**	1.02	**0.16**	0.78	**0.08**	0.50	**0.03**	0.34	**0.01**	0.23	**0.00**	5
6	4.77	**5.97**	3.06	**2.03**	1.95	**0.67**	1.22	**0.22**	0.94	**0.11**	0.60	**0.04**	0.41	**0.02**	0.28	**0.01**	6
7	5.57	**7.95**	3.57	**2.70**	2.27	**0.90**	1.43	**0.29**	1.09	**0.15**	0.70	**0.05**	0.48	**0.02**	0.32	**0.01**	7
8	6.37	**10.18**	4.08	**3.45**	2.60	**1.15**	1.63	**0.37**	1.25	**0.19**	0.80	**0.06**	0.54	**0.03**	0.37	**0.01**	8
9	7.16	**12.66**	4.59	**4.30**	2.92	**1.43**	1.84	**0.46**	1.40	**0.24**	0.90	**0.08**	0.61	**0.03**	0.41	**0.01**	9
10	7.96	**15.38**	5.10	**5.22**	3.25	**1.74**	2.04	**0.56**	1.56	**0.29**	1.00	**0.10**	0.68	**0.04**	0.46	**0.01**	10
11	8.75	**18.35**	5.62	**6.23**	3.57	**2.07**	2.24	**0.67**	1.71	**0.35**	1.10	**0.12**	0.75	**0.05**	0.50	**0.02**	11
12	9.55	**21.56**	6.13	**7.32**	3.90	**2.43**	2.45	**0.79**	1.87	**0.41**	1.20	**0.14**	0.82	**0.05**	0.55	**0.02**	12
13	10.35	**25.01**	6.64	**8.49**	4.22	**2.82**	2.65	**0.91**	2.03	**0.47**	1.30	**0.16**	0.88	**0.06**	0.60	**0.02**	13
14	11.14	**28.69**	7.15	**9.74**	4.55	**3.24**	2.86	**1.05**	2.18	**0.54**	1.40	**0.18**	0.95	**0.07**	0.64	**0.03**	14
15	11.94	**32.60**	7.66	**11.07**	4.87	**3.68**	3.06	**1.19**	2.34	**0.62**	1.50	**0.21**	1.02	**0.08**	0.69	**0.03**	15
16	12.73	**36.73**	8.17	**12.47**	5.19	**4.15**	3.26	**1.34**	2.49	**0.70**	1.60	**0.23**	1.09	**0.09**	0.73	**0.04**	16
17	13.53	**41.10**	8.68	**13.95**	5.52	**4.64**	3.47	**1.50**	2.65	**0.78**	1.69	**0.26**	1.16	**0.10**	0.78	**0.04**	17
18	14.33	**45.69**	9.19	**15.51**	5.84	**5.16**	3.67	**1.67**	2.81	**0.86**	1.79	**0.29**	1.22	**0.12**	0.83	**0.04**	18
19	15.12	**50.50**	9.70	**17.14**	6.17	**5.70**	3.88	**1.84**	2.96	**0.96**	1.89	**0.32**	1.29	**0.13**	0.87	**0.05**	19
20	15.92	**55.53**	10.21	**18.85**	6.49	**6.27**	4.08	**2.03**	3.12	**1.05**	1.99	**0.35**	1.36	**0.14**	0.92	**0.05**	20
22	17.51	**66.25**	11.23	**22.49**	7.14	**7.48**	4.49	**2.42**	3.43	**1.25**	2.19	**0.42**	1.50	**0.17**	1.01	**0.06**	22
24	19.10	**77.84**	12.25	**26.42**	7.79	**8.79**	4.90	**2.84**	3.74	**1.47**	2.39	**0.50**	1.63	**0.20**	1.10	**0.08**	24
25			12.76	**28.50**	8.12	**9.48**	5.10	**3.06**	3.90	**1.59**	2.49	**0.54**	1.70	**0.21**	1.15	**0.08**	25
26			13.27	**30.65**	8.44	**10.19**	5.31	**3.29**	4.05	**1.71**	2.59	**0.58**	1.77	**0.23**	1.19	**0.09**	26
28			14.29	**35.15**	9.09	**11.69**	5.71	**3.78**	4.36	**1.96**	2.79	**0.66**	1.90	**0.26**	1.28	**0.10**	28
30			15.31	**39.95**	9.74	**13.28**	6.12	**4.29**	4.68	**2.23**	2.99	**0.75**	2.04	**0.30**	1.38	**0.11**	30
32			16.34	**45.02**	10.39	**14.97**	6.53	**4.84**	4.99	**2.51**	3.19	**0.85**	2.18	**0.33**	1.47	**0.13**	32
34			17.36	**50.37**	11.04	**16.75**	6.94	**5.41**	5.30	**2.81**	3.39	**0.95**	2.31	**0.37**	1.56	**0.14**	34
35			17.87	**53.14**	11.36	**17.67**	7.14	**5.71**	5.45	**2.96**	3.49	**1.00**	2.38	**0.39**	1.61	**0.15**	35
36			18.38	**55.99**	11.69	**18.62**	7.35	**6.02**	5.61	**3.12**	3.59	**1.05**	2.45	**0.42**	1.65	**0.16**	36
38			19.40	**61.89**	12.34	**20.58**	7.75	**6.65**	5.92	**3.45**	3.79	**1.16**	2.59	**0.46**	1.74	**0.18**	38
40					12.99	**22.63**	8.16	**7.31**	6.23	**3.79**	3.99	**1.28**	2.72	**0.50**	1.84	**0.19**	40
42					13.64	**24.77**	8.57	**8.00**	6.55	**4.15**	4.19	**1.40**	2.86	**0.55**	1.93	**0.21**	42
44					14.29	**27.00**	8.98	**8.72**	6.86	**4.53**	4.39	**1.53**	2.99	**0.60**	2.02	**0.23**	44
45					14.61	**28.15**	9.18	**9.09**	7.01	**4.72**	4.49	**1.59**	3.06	**0.63**	2.06	**0.24**	45
46					14.94	**29.32**	9.39	**9.47**	7.17	**4.92**	4.59	**1.66**	3.13	**0.65**	2.11	**0.25**	46
48					15.58	**31.72**	9.79	**10.25**	7.48	**5.32**	4.79	**1.79**	3.27	**0.71**	2.20	**0.27**	48
50					16.23	**34.21**	10.20	**11.05**	7.79	**5.74**	4.98	**1.93**	3.40	**0.76**	2.29	**0.29**	50
55					17.86	**40.82**	11.22	**13.19**	8.57	**6.84**	5.48	**2.31**	3.74	**0.91**	2.52	**0.35**	55
60					19.48	**47.95**	12.24	**15.49**	9.35	**8.04**	5.98	**2.71**	4.08	**1.07**	2.75	**0.41**	60
65							13.26	**17.97**	10.13	**9.33**	6.48	**3.14**	4.42	**1.24**	2.98	**0.48**	65
70							14.28	**20.61**	10.91	**10.70**	6.98	**3.61**	4.76	**1.42**	3.21	**0.55**	70
75							15.30	**23.42**	11.69	**12.16**	7.48	**4.10**	5.10	**1.62**	3.44	**0.62**	75
80							16.32	**26.39**	12.47	**13.70**	7.98	**4.62**	5.44	**1.82**	3.67	**0.70**	80
85							17.35	**29.53**	13.25	**15.33**	8.47	**5.17**	5.78	**2.04**	3.90	**0.78**	85
90							18.37	**32.83**	14.03	**17.04**	8.97	**5.75**	6.12	**2.27**	4.13	**0.87**	90
95							19.39	**36.28**	14.81	**18.83**	9.47	**6.35**	6.46	**2.51**	4.36	**0.96**	95
100									15.58	**20.71**	9.97	**6.98**	6.80	**2.76**	4.59	**1.06**	100
110									17.14	**24.71**	10.97	**8.33**	7.48	**3.29**	5.05	**1.26**	110
120									18.70	**29.03**	11.96	**9.79**	8.16	**3.86**	5.51	**1.48**	120
130											12.96	**11.35**	8.84	**4.48**	5.96	**1.72**	130
140											13.96	**13.02**	9.52	**5.14**	6.42	**1.97**	140
150											14.95	**14.80**	10.20	**5.84**	6.88	**2.24**	150
175											17.45	**19.69**	11.90	**7.77**	8.03	**2.98**	175
200											19.94	**25.21**	13.61	**9.95**	9.18	**3.82**	200
225													15.31	**12.37**	10.32	**4.75**	225
250													17.01	**15.04**	11.47	**5.77**	250
275													18.71	**17.94**	12.62	**6.88**	275
300															13.76	**8.09**	300
325															14.91	**9.38**	325
350															16.06	**10.76**	350
400															18.35	**13.78**	400

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Class 315 IPS PVC Plastic Pipe

(1120,1220) C=150 SDR 13.5

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 3½" THRU 6"

Nominal Size	4"		6"	
Pipe ID	3.834		5.643	
Pipe OD	4.500		6.625	
Wall Thick	0.333		0.491	
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS
6				
7				
8				
9				
10	0.28	**0.00**		
11	0.31	**0.01**		
12	0.33	**0.01**		
13	0.36	**0.01**		
14	0.39	**0.01**		
15	0.42	**0.01**		
16	0.44	**0.01**		
17	0.47	**0.01**		
18	0.50	**0.01**		
19	0.53	**0.01**		
20	0.56	**0.02**		
22	0.61	**0.02**		
24	0.67	**0.02**		
26	0.72	**0.03**		
28	0.78	**0.03**	0.36	**0.00**
30	0.83	**0.03**	0.38	**0.01**
32	0.89	**0.04**	0.41	**0.01**
34	0.94	**0.04**	0.44	**0.01**
36	1.00	**0.05**	0.46	**0.01**
38	1.05	**0.05**	0.49	**0.01**
40	1.11	**0.06**	0.51	**0.01**
42	1.17	**0.06**	0.54	**0.01**
44	1.22	**0.07**	0.56	**0.01**
48	1.33	**0.08**	0.62	**0.01**
50	1.39	**0.09**	0.64	**0.01**
55	1.53	**0.10**	0.70	**0.02**
60	1.67	**0.12**	0.77	**0.02**
65	1.80	**0.14**	0.83	**0.02**
70	1.94	**0.16**	0.90	**0.02**
75	2.08	**0.18**	0.96	**0.03**
80	2.22	**0.21**	1.03	**0.03**
85	2.36	**0.23**	1.09	**0.04**
90	2.50	**0.26**	1.15	**0.04**
95	2.64	**0.28**	1.22	**0.04**
100	2.78	**0.31**	1.28	**0.05**
110	3.05	**0.37**	1.41	**0.06**
120	3.33	**0.44**	1.54	**0.07**
130	3.61	**0.51**	1.67	**0.08**
140	3.89	**0.58**	1.79	**0.09**
150	4.16	**0.66**	1.92	**0.10**
160	4.44	**0.74**	2.05	**0.11**
170	4.72	**0.83**	2.18	**0.13**
180	5.00	**0.92**	2.31	**0.14**
190	5.27	**1.02**	2.43	**0.16**
200	5.55	**1.12**	2.56	**0.17**
210	5.83	**1.23**	2.69	**0.19**
220	6.11	**1.34**	2.82	**0.20**
230	6.38	**1.46**	2.95	**0.22**
240	6.66	**1.57**	3.08	**0.24**
250	6.94	**1.70**	3.20	**0.26**
260	7.22	**1.83**	3.33	**0.28**
270	7.49	**1.96**	3.46	**0.30**
280	7.77	**2.09**	3.59	**0.32**
290	8.05	**2.24**	3.72	**0.34**
300	8.33	**2.38**	3.84	**0.36**
310	8.60	**2.53**	3.97	**0.39**
320	8.88	**2.68**	4.10	**0.41**
330	9.16	**2.84**	4.23	**0.43**

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Nominal Size	4"		6"	
Pipe ID	3.834		5.643	
Pipe OD	4.500		6.625	
Wall Thick	0.333		0.491	
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS
340	9.44	**3.00**	4.36	**0.46**
350	9.71	**3.17**	4.48	**0.48**
360	9.99	**3.34**	4.61	**0.51**
370	10.27	**3.51**	4.74	**0.54**
380	10.55	**3.69**	4.87	**0.56**
390	10.82	**3.87**	5.00	**0.59**
400	11.10	**4.06**	5.13	**0.62**
410	11.38	**4.25**	5.25	**0.65**
420	11.66	**4.44**	5.38	**0.68**
430	11.94	**4.64**	5.51	**0.71**
440	12.21	**4.84**	5.64	**0.74**
450	12.49	**5.04**	5.77	**0.77**
460	12.77	**5.25**	5.89	**0.80**
470	13.05	**5.47**	6.02	**0.83**
480	13.32	**5.68**	6.15	**0.87**
490	13.60	**5.91**	6.28	**0.90**
500	13.88	**6.13**	6.41	**0.93**
510	14.16	**6.36**	6.53	**0.97**
520	14.43	**6.59**	6.66	**1.01**
530	14.71	**6.83**	6.79	**1.04**
540	14.99	**7.07**	6.92	**1.08**
550	15.27	**7.31**	7.05	**1.12**
560	15.54	**7.56**	7.18	**1.15**
570	15.82	**7.81**	7.30	**1.19**
580	16.10	**8.07**	7.43	**1.23**
600	16.65	**8.59**	7.69	**1.31**
625	17.35	**9.27**	8.01	**1.41**
650	18.04	**9.97**	8.33	**1.52**
675	18.74	**10.69**	8.65	**1.63**
700	19.43	**11.43**	8.97	**1.74**
725			9.29	**1.86**
750			9.61	**1.98**
775			9.93	**2.10**
800			10.25	**2.23**
825			10.57	**2.36**
850			10.89	**2.50**
875			11.21	**2.64**
900			11.53	**2.78**
925			11.85	**2.92**
950			12.17	**3.07**
975			12.49	**3.22**
1000			12.81	**3.37**
1025			13.13	**3.53**
1050			13.45	**3.69**
1075			13.77	**3.86**
1100			14.09	**4.03**
1125			14.41	**4.20**
1150			14.73	**4.37**
1175			15.05	**4.55**
1200			15.38	**4.73**
1225			15.70	**4.91**
1250			16.02	**5.10**
1275			16.34	**5.29**
1300			16.66	**5.49**
1325			16.98	**5.68**
1350			17.30	**5.88**
1375			17.62	**6.09**
1400			17.94	**6.29**
1425			18.26	**6.50**
1450			18.58	**6.72**
1475			18.90	**6.93**
1500			19.22	**7.15**

Schedule 40 IPS PVC Plastic Pipe

(1120,1220) C=150

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES ½" THRU 3"

Nominal Size	½"		¾"		1"		1¼"		1½"		2"		2½"		3"		Nominal Size
Pipe ID	0.622		0.824		1.049		1.380		1.610		2.067		2.469		3.068		Pipe ID
Pipe OD	0.840		1.050		1.315		1.660		1.900		2.375		2.875		3.500		Pipe OD
Wall Thick	0.109		0.113		0.133		0.140		0.145		0.154		0.203		0.216		Wall Thick
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Flow GPM
1	1.05	**0.43**	0.60	**0.11**	0.37	**0.03**	0.21	**0.01**	0.16	**0.00**							1
2	2.11	**1.55**	1.20	**0.39**	0.74	**0.12**	0.43	**0.03**	0.31	**0.02**	0.19	**0.00**					2
3	3.16	**3.28**	1.80	**0.84**	1.11	**0.26**	0.64	**0.07**	0.47	**0.03**	0.29	**0.01**	0.20	**0.00**			3
4	4.22	**5.59**	2.40	**1.42**	1.48	**0.44**	0.86	**0.12**	0.63	**0.05**	0.38	**0.02**	0.27	**0.01**			4
5	5.27	**8.45**	3.00	**2.15**	1.85	**0.66**	1.07	**0.17**	0.79	**0.08**	0.48	**0.02**	0.33	**0.01**	0.22	**0.00**	5
6	6.33	**11.85**	3.61	**3.02**	2.22	**0.93**	1.29	**0.25**	0.94	**0.12**	0.57	**0.03**	0.40	**0.01**	0.26	**0.01**	6
7	7.38	**15.76**	4.21	**4.01**	2.60	**1.24**	1.50	**0.33**	1.10	**0.15**	0.67	**0.05**	0.47	**0.02**	0.30	**0.01**	7
8	8.44	**20.18**	4.81	**5.14**	2.97	**1.59**	1.71	**0.42**	1.26	**0.20**	0.76	**0.06**	0.54	**0.02**	0.35	**0.01**	8
9	9.49	**25.10**	5.41	**6.39**	3.34	**1.97**	1.93	**0.52**	1.42	**0.25**	0.86	**0.07**	0.60	**0.03**	0.39	**0.01**	9
10	10.55	**30.51**	6.01	**7.77**	3.71	**2.40**	2.14	**0.63**	1.57	**0.30**	0.95	**0.09**	0.67	**0.04**	0.43	**0.01**	10
11	11.60	**36.40**	6.61	**9.26**	4.08	**2.86**	2.36	**0.75**	1.73	**0.36**	1.05	**0.11**	0.74	**0.04**	0.48	**0.02**	11
12	12.65	**42.77**	7.21	**10.88**	4.45	**3.36**	2.57	**0.89**	1.89	**0.42**	1.15	**0.12**	0.80	**0.05**	0.52	**0.02**	12
13	13.71	**49.60**	7.81	**12.62**	4.82	**3.90**	2.79	**1.03**	2.05	**0.48**	1.24	**0.14**	0.87	**0.06**	0.56	**0.02**	13
14	14.76	**56.90**	8.41	**14.48**	5.19	**4.47**	3.00	**1.18**	2.20	**0.56**	1.34	**0.16**	0.94	**0.07**	0.61	**0.02**	14
15	15.82	**64.65**	9.01	**16.45**	5.56	**5.08**	3.21	**1.34**	2.36	**0.63**	1.43	**0.19**	1.00	**0.08**	0.65	**0.03**	15
16	16.87	**72.86**	9.61	**18.54**	5.93	**5.73**	3.43	**1.51**	2.52	**0.71**	1.53	**0.21**	1.07	**0.09**	0.69	**0.03**	16
17	17.93	**81.52**	10.22	**20.75**	6.30	**6.41**	3.64	**1.69**	2.68	**0.80**	1.62	**0.24**	1.14	**0.10**	0.74	**0.03**	17
18	18.98	**90.62**	10.82	**23.06**	6.67	**7.12**	3.86	**1.88**	2.83	**0.89**	1.72	**0.26**	1.20	**0.11**	0.78	**0.04**	18
19			11.42	**25.49**	7.04	**7.87**	4.07	**2.07**	2.99	**0.98**	1.81	**0.29**	1.27	**0.12**	0.82	**0.04**	19
20			12.02	**28.03**	7.42	**8.66**	4.28	**2.28**	3.15	**1.08**	1.91	**0.32**	1.34	**0.13**	0.87	**0.05**	20
22			13.22	**33.44**	8.16	**10.33**	4.71	**2.72**	3.46	**1.28**	2.10	**0.38**	1.47	**0.16**	0.95	**0.06**	22
24			14.42	**39.29**	8.90	**12.14**	5.14	**3.20**	3.78	**1.51**	2.29	**0.45**	1.61	**0.19**	1.04	**0.07**	24
25			15.02	**42.38**	9.27	**13.09**	5.36	**3.45**	3.94	**1.63**	2.39	**0.48**	1.67	**0.20**	1.08	**0.07**	25
26			15.62	**45.57**	9.64	**14.08**	5.57	**3.71**	4.09	**1.75**	2.48	**0.52**	1.74	**0.22**	1.13	**0.08**	26
28			16.83	**52.27**	10.38	**16.15**	6.00	**4.25**	4.41	**2.01**	2.67	**0.60**	1.87	**0.25**	1.21	**0.09**	28
30			18.03	**59.40**	11.12	**18.35**	6.43	**4.83**	4.72	**2.28**	2.86	**0.68**	2.01	**0.28**	1.30	**0.10**	30
32			19.23	**66.94**	11.86	**20.68**	6.86	**5.44**	5.04	**2.57**	3.06	**0.76**	2.14	**0.32**	1.39	**0.11**	32
34					12.61	**23.13**	7.28	**6.09**	5.35	**2.88**	3.25	**0.85**	2.28	**0.36**	1.47	**0.12**	34
35					12.98	**24.41**	7.50	**6.43**	5.51	**3.04**	3.34	**0.90**	2.34	**0.38**	1.52	**0.13**	35
36					13.35	**25.72**	7.71	**6.77**	5.67	**3.20**	3.44	**0.95**	2.41	**0.40**	1.56	**0.14**	36
38					14.09	**28.43**	8.14	**7.48**	5.98	**3.54**	3.63	**1.05**	2.54	**0.44**	1.65	**0.15**	38
40					14.83	**31.26**	8.57	**8.23**	6.30	**3.89**	3.82	**1.15**	2.68	**0.49**	1.73	**0.17**	40
42					15.57	**34.22**	9.00	**9.01**	6.61	**4.25**	4.01	**1.26**	2.81	**0.53**	1.82	**0.18**	42
44					16.31	**37.29**	9.43	**9.82**	6.93	**4.64**	4.20	**1.37**	2.94	**0.58**	1.91	**0.20**	44
45					16.68	**38.88**	9.64	**10.24**	7.08	**4.83**	4.30	**1.43**	3.01	**0.60**	1.95	**0.21**	45
46					17.06	**40.49**	9.86	**10.66**	7.24	**5.04**	4.39	**1.49**	3.08	**0.63**	1.99	**0.22**	46
48					17.80	**43.81**	10.28	**11.54**	7.56	**5.45**	4.58	**1.62**	3.21	**0.68**	2.08	**0.24**	48
50					18.54	**47.26**	10.71	**12.44**	7.87	**5.88**	4.77	**1.74**	3.35	**0.73**	2.17	**0.25**	50
55							11.78	**14.84**	8.66	**7.01**	5.25	**2.08**	3.68	**0.88**	2.38	**0.30**	55
60							12.85	**17.44**	9.44	**8.24**	5.73	**2.44**	4.02	**1.03**	2.60	**0.36**	60
65							13.93	**20.23**	10.23	**9.55**	6.21	**2.83**	4.35	**1.19**	2.82	**0.41**	65
70							15.00	**23.20**	11.02	**10.96**	6.68	**3.25**	4.69	**1.37**	3.03	**0.48**	70
75							16.07	**26.36**	11.81	**12.45**	7.16	**3.69**	5.02	**1.55**	3.25	**0.54**	75
80							17.14	**29.71**	12.59	**14.03**	7.64	**4.16**	5.35	**1.75**	3.47	**0.61**	80
85							18.21	**33.24**	13.38	**15.70**	8.12	**4.65**	5.69	**1.96**	3.68	**0.68**	85
90							19.28	**36.95**	14.17	**17.45**	8.59	**5.17**	6.02	**2.18**	3.90	**0.76**	90
95									14.95	**19.29**	9.07	**5.72**	6.36	**2.41**	4.12	**0.84**	95
100									15.74	**21.21**	9.55	**6.29**	6.69	**2.65**	4.33	**0.92**	100
110									17.31	**25.31**	10.50	**7.50**	7.36	**3.16**	4.77	**1.10**	110
120									18.89	**29.74**	11.46	**8.82**	8.03	**3.71**	5.20	**1.29**	120
130											12.41	**10.22**	8.70	**4.31**	5.63	**1.50**	130
140											13.37	**11.73**	9.37	**4.94**	6.07	**1.72**	140
150											14.32	**13.33**	10.04	**5.61**	6.50	**1.95**	150
160											15.28	**15.02**	10.71	**6.33**	6.94	**2.20**	160
170											16.23	**16.80**	11.38	**7.08**	7.37	**2.46**	170
180											17.19	**18.68**	12.05	**7.87**	7.80	**2.73**	180
190											18.14	**20.65**	12.72	**8.70**	8.24	**3.02**	190
200											19.10	**22.70**	13.39	**9.56**	8.67	**3.32**	200
225													15.06	**11.89**	9.75	**4.13**	225
250													16.73	**14.46**	10.84	**5.02**	250
275													18.41	**17.25**	11.92	**5.99**	275
300															13.00	**7.04**	300
325															14.09	**8.17**	325
350															15.17	**9.37**	350
375															16.25	**10.64**	375
400															17.34	**12.00**	400

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Schedule 40 IPS PVC Plastic Pipe

(1120,1220) C=150

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 3½" THRU 12"

Nominal Size	4"		6"		8"		10"		12"		Nominal Size
Pipe ID	4.026		6.065		7.981		10.020		11.814		Pipe ID
Pipe OD	4.500		6.625		8.625		10.750		12.750		Pipe OD
Wall Thick	0.237		0.280		0.322		0.365		0.406		Wall Thick
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
20	0.50	**0.01**									20
22	0.55	**0.01**									22
24	0.60	**0.02**									24
25	0.63	**0.02**									25
26	0.65	**0.02**									26
28	0.70	**0.02**									28
30	0.76	**0.03**									30
32	0.81	**0.03**									32
34	0.86	**0.03**									34
35	0.88	**0.04**	0.39	**0.00**							35
36	0.91	**0.04**	0.40	**0.01**							36
38	0.96	**0.04**	0.42	**0.01**							38
40	1.01	**0.04**	0.44	**0.01**							40
42	1.06	**0.05**	0.47	**0.01**							42
44	1.11	**0.05**	0.49	**0.01**							44
45	1.13	**0.06**	0.50	**0.01**							45
46	1.16	**0.06**	0.51	**0.01**							46
48	1.21	**0.06**	0.53	**0.01**							48
50	1.26	**0.07**	0.55	**0.01**							50
55	1.38	**0.08**	0.61	**0.01**							55
60	1.51	**0.10**	0.67	**0.01**							60
65	1.64	**0.11**	0.72	**0.02**							65
70	1.76	**0.13**	0.78	**0.02**	0.45	**0.00**					70
75	1.89	**0.14**	0.83	**0.02**	0.48	**0.01**					75
80	2.01	**0.16**	0.89	**0.02**	0.51	**0.01**					80
85	2.14	**0.18**	0.94	**0.02**	0.54	**0.01**					85
90	2.27	**0.20**	1.00	**0.03**	0.58	**0.01**					90
95	2.39	**0.22**	1.05	**0.03**	0.61	**0.01**					95
100	2.52	**0.25**	1.11	**0.03**	0.64	**0.01**					100
120	3.02	**0.34**	1.33	**0.05**	0.77	**0.01**	0.49	**0.00**			120
140	3.52	**0.46**	1.55	**0.06**	0.90	**0.02**	0.57	**0.01**			140
160	4.03	**0.59**	1.77	**0.08**	1.02	**0.02**	0.65	**0.01**			160
180	4.53	**0.73**	2.00	**0.10**	1.15	**0.03**	0.73	**0.01**			180
200	5.03	**0.89**	2.22	**0.12**	1.28	**0.03**	0.81	**0.01**	0.58	**0.00**	200
250	6.29	**1.34**	2.77	**0.18**	1.60	**0.05**	1.02	**0.02**	0.73	**0.01**	250
300	7.55	**1.88**	3.33	**0.26**	1.92	**0.07**	1.22	**0.02**	0.88	**0.01**	300
350	8.81	**2.50**	3.88	**0.34**	2.24	**0.09**	1.42	**0.03**	1.02	**0.01**	350
400	10.07	**3.20**	4.44	**0.44**	2.56	**0.11**	1.63	**0.04**	1.17	**0.02**	400
450	11.33	**3.98**	4.99	**0.54**	2.88	**0.14**	1.83	**0.05**	1.32	**0.02**	450
500	12.59	**4.83**	5.55	**0.66**	3.20	**0.17**	2.03	**0.06**	1.46	**0.03**	500
600	15.10	**6.77**	6.66	**0.92**	3.84	**0.24**	2.44	**0.08**	1.75	**0.04**	600
700	17.62	**9.01**	7.76	**1.23**	4.48	**0.32**	2.84	**0.11**	2.05	**0.05**	700
800			8.87	**1.57**	5.12	**0.41**	3.25	**0.14**	2.34	**0.06**	800
900			9.98	**1.95**	5.76	**0.51**	3.66	**0.17**	2.63	**0.08**	900
1000			11.09	**2.38**	6.41	**0.62**	4.06	**0.21**	2.92	**0.09**	1000
1200			13.31	**3.33**	7.69	**0.88**	4.88	**0.29**	3.51	**0.13**	1200
1400			15.53	**4.43**	8.97	**1.16**	5.69	**0.39**	4.09	**0.17**	1400
1600			17.75	**5.67**	10.25	**1.49**	6.50	**0.49**	4.68	**0.22**	1600
1800					11.53	**1.86**	7.31	**0.61**	5.26	**0.28**	1800
2000					12.81	**2.26**	8.13	**0.75**	5.85	**0.33**	2000
2200					14.09	**2.69**	8.94	**0.89**	6.43	**0.40**	2200
2400					15.37	**3.16**	9.75	**1.04**	7.02	**0.47**	2400
2600					16.65	**3.67**	10.57	**1.21**	7.60	**0.54**	2600
2800					17.94	**4.21**	11.38	**1.39**	8.19	**0.62**	2800
3000							12.19	**1.58**	8.77	**0.71**	3000
3200							13.00	**1.78**	9.35	**0.80**	3200
3400							13.82	**1.99**	9.94	**0.89**	3400
3600							14.63	**2.21**	10.52	**0.99**	3600
3800							15.44	**2.45**	11.11	**1.10**	3800
4000							16.25	**2.69**	11.69	**1.21**	4000
4500							18.29	**3.35**	13.15	**1.50**	4500
5000									14.62	**1.83**	5000
5500									16.08	**2.18**	5500
6000									17.54	**2.56**	6000
6500									19.00	**2.97**	6500

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Schedule 80 IPS PVC Plastic Pipe

(1120,1220) C=150

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES ½" THRU 3"

Nominal Size	½"		¾"		1"		1¼"		1½"		2"		2½"		3"		Nominal Size
Pipe ID	0.546		0.742		0.957		1.278		1.500		1.939		2.323		2.900		Pipe ID
Pipe OD	0.840		1.050		1.315		1.660		1.900		2.375		2.875		3.500		Pipe OD
Wall Thick	0.147		0.154		0.179		0.191		0.200		0.218		0.276		0.300		Wall Thick
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Flow GPM
1	1.37	**0.81**	0.74	**0.18**	0.45	**0.05**	0.25	**0.01**	0.18	**0.01**	0.11	**0.00**					1
2	2.74	**2.92**	1.48	**0.66**	0.89	**0.19**	0.50	**0.05**	0.36	**0.02**	0.22	**0.01**	0.15	**0.00**			2
3	4.11	**6.19**	2.22	**1.39**	1.34	**0.40**	0.75	**0.10**	0.54	**0.05**	0.33	**0.01**	0.23	**0.01**			3
4	5.47	**10.54**	2.96	**2.37**	1.78	**0.69**	1.00	**0.17**	0.73	**0.08**	0.43	**0.02**	0.30	**0.01**			4
5	6.84	**15.94**	3.71	**3.58**	2.23	**1.04**	1.25	**0.25**	0.91	**0.12**	0.54	**0.03**	0.38	**0.01**	0.24	**0.00**	5
6	8.21	**22.34**	4.45	**5.02**	2.67	**1.46**	1.50	**0.36**	1.09	**0.16**	0.65	**0.05**	0.45	**0.02**	0.29	**0.01**	6
7	9.58	**29.72**	5.19	**6.68**	3.12	**1.94**	1.75	**0.47**	1.27	**0.22**	0.76	**0.06**	0.53	**0.03**	0.34	**0.01**	7
8	10.95	**38.05**	5.93	**8.55**	3.56	**2.48**	2.00	**0.61**	1.45	**0.28**	0.87	**0.08**	0.60	**0.03**	0.39	**0.01**	8
9	12.32	**47.33**	6.67	**10.64**	4.01	**3.08**	2.25	**0.75**	1.63	**0.35**	0.98	**0.10**	0.68	**0.04**	0.44	**0.01**	9
10	13.69	**57.53**	7.41	**12.93**	4.45	**3.75**	2.50	**0.92**	1.81	**0.42**	1.09	**0.12**	0.76	**0.05**	0.49	**0.02**	10
11	15.05	**68.63**	8.15	**15.43**	4.90	**4.47**	2.75	**1.09**	1.99	**0.50**	1.19	**0.14**	0.83	**0.06**	0.53	**0.02**	11
12	16.42	**80.63**	8.89	**18.13**	5.35	**5.26**	3.00	**1.29**	2.18	**0.59**	1.30	**0.17**	0.91	**0.07**	0.58	**0.02**	12
13	17.79	**93.52**	9.63	**21.02**	5.79	**6.09**	3.25	**1.49**	2.36	**0.68**	1.41	**0.20**	0.98	**0.08**	0.63	**0.03**	13
14	19.16	**107.3**	10.37	**24.12**	6.24	**6.99**	3.50	**1.71**	2.54	**0.78**	1.52	**0.23**	1.06	**0.09**	0.68	**0.03**	14
15			11.12	**27.40**	6.68	**7.94**	3.75	**1.94**	2.72	**0.89**	1.63	**0.26**	1.13	**0.11**	0.73	**0.04**	15
16			11.86	**30.88**	7.13	**8.95**	4.00	**2.19**	2.90	**1.01**	1.74	**0.29**	1.21	**0.12**	0.78	**0.04**	16
17			12.60	**34.55**	7.57	**10.02**	4.25	**2.45**	3.08	**1.12**	1.84	**0.32**	1.29	**0.13**	0.82	**0.05**	17
18			13.34	**38.41**	8.02	**11.14**	4.50	**2.73**	3.26	**1.25**	1.95	**0.36**	1.36	**0.15**	0.87	**0.05**	18
19			14.08	**42.45**	8.46	**12.31**	4.75	**3.01**	3.45	**1.38**	2.06	**0.40**	1.44	**0.16**	0.92	**0.06**	19
20			14.82	**46.69**	8.91	**13.53**	5.00	**3.31**	3.63	**1.52**	2.17	**0.44**	1.51	**0.18**	0.97	**0.06**	20
22			16.30	**55.70**	9.80	**16.15**	5.50	**3.95**	3.99	**1.81**	2.39	**0.52**	1.66	**0.22**	1.07	**0.07**	22
24			17.79	**65.44**	10.69	**18.97**	6.00	**4.64**	4.35	**2.13**	2.60	**0.61**	1.81	**0.25**	1.16	**0.09**	24
25			18.53	**70.58**	11.14	**20.46**	6.25	**5.01**	4.53	**2.30**	2.71	**0.66**	1.89	**0.27**	1.21	**0.09**	25
26					11.58	**22.00**	6.49	**5.39**	4.71	**2.47**	2.82	**0.71**	1.97	**0.29**	1.26	**0.10**	26
28					12.47	**25.24**	6.99	**6.18**	5.08	**2.83**	3.04	**0.81**	2.12	**0.34**	1.36	**0.11**	28
30					13.36	**28.68**	7.49	**7.02**	5.44	**3.22**	3.26	**0.92**	2.27	**0.38**	1.46	**0.13**	30
32					14.26	**32.32**	7.99	**7.91**	5.80	**3.63**	3.47	**1.04**	2.42	**0.43**	1.55	**0.15**	32
34					15.15	**36.16**	8.49	**8.85**	6.17	**4.06**	3.69	**1.16**	2.57	**0.48**	1.65	**0.16**	34
35					15.59	**38.16**	8.74	**9.34**	6.35	**4.28**	3.80	**1.23**	2.65	**0.51**	1.70	**0.17**	35
36					16.04	**40.20**	8.99	**9.84**	6.53	**4.51**	3.91	**1.29**	2.72	**0.54**	1.75	**0.18**	36
38					16.93	**44.43**	9.49	**10.88**	6.89	**4.99**	4.12	**1.43**	2.87	**0.59**	1.84	**0.20**	38
40					17.82	**48.86**	9.99	**11.96**	7.25	**5.49**	4.34	**1.57**	3.02	**0.65**	1.94	**0.22**	40
42					18.71	**53.48**	10.49	**13.09**	7.62	**6.00**	4.56	**1.72**	3.18	**0.71**	2.04	**0.24**	42
44							10.99	**14.27**	7.98	**6.54**	4.77	**1.88**	3.33	**0.78**	2.13	**0.26**	44
45							11.24	**14.87**	8.16	**6.82**	4.88	**1.96**	3.40	**0.81**	2.18	**0.28**	45
46							11.49	**15.49**	8.34	**7.11**	4.99	**2.04**	3.48	**0.85**	2.23	**0.29**	46
48							11.99	**16.76**	8.70	**7.69**	5.21	**2.20**	3.63	**0.92**	2.33	**0.31**	48
50							12.49	**18.08**	9.07	**8.29**	5.43	**2.38**	3.78	**0.99**	2.43	**0.34**	50
55							13.74	**21.57**	9.97	**9.89**	5.97	**2.84**	4.16	**1.18**	2.67	**0.40**	55
60							14.99	**25.34**	10.88	**11.62**	6.51	**3.33**	4.54	**1.38**	2.91	**0.47**	60
65							16.24	**29.39**	11.79	**13.48**	7.05	**3.87**	4.91	**1.60**	3.15	**0.55**	65
70							17.49	**33.71**	12.69	**15.46**	7.60	**4.43**	5.29	**1.84**	3.40	**0.63**	70
75							18.74	**38.31**	13.60	**17.57**	8.14	**5.04**	5.67	**2.09**	3.64	**0.71**	75
80									14.51	**19.80**	8.68	**5.68**	6.05	**2.36**	3.88	**0.80**	80
85									15.41	**22.16**	9.22	**6.35**	6.43	**2.64**	4.12	**0.90**	85
90									16.32	**24.63**	9.77	**7.06**	6.80	**2.93**	4.37	**1.00**	90
95									17.23	**27.22**	10.31	**7.81**	7.18	**3.24**	4.61	**1.10**	95
100									18.13	**29.94**	10.85	**8.58**	7.56	**3.56**	4.85	**1.21**	100
110											11.94	**10.24**	8.32	**4.25**	5.34	**1.44**	110
120											13.02	**12.03**	9.07	**4.99**	5.82	**1.70**	120
130											14.11	**13.95**	9.83	**5.79**	6.31	**1.97**	130
140											15.19	**16.01**	10.58	**6.64**	6.79	**2.26**	140
150											16.28	**18.19**	11.34	**7.55**	7.28	**2.57**	150
160											17.36	**20.50**	12.10	**8.51**	7.76	**2.89**	160
170											18.45	**22.93**	12.85	**9.52**	8.25	**3.23**	170
180													13.61	**10.58**	8.73	**3.60**	180
190													14.37	**11.70**	9.22	**3.97**	190
200													15.12	**12.86**	9.70	**4.37**	200
225													17.01	**16.00**	10.92	**5.44**	225
250													18.90	**19.45**	12.13	**6.61**	250
275															13.34	**7.88**	275
300															14.55	**9.26**	300
325															15.77	**10.74**	325
350															16.98	**12.32**	350
375															18.19	**14.00**	375

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Schedule 80 IPS PVC Plastic Pipe

(1120,1220) C=150

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 3½" THRU 12"

Nominal Size	4"		6"		8"		10"		12"		Nominal Size
Pipe ID	3.826		5.761		7.625		9.564		11.376		Pipe ID
Pipe OD	4.500		6.625		8.625		10.750		12.750		Pipe OD
Wall Thick	0.337		0.432		0.500		0.593		0.687		Wall Thick
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
20	0.56	**0.02**									20
22	0.61	**0.02**									22
24	0.67	**0.02**									24
25	0.70	**0.02**									25
26	0.72	**0.03**									26
28	0.78	**0.03**									28
30	0.84	**0.03**	0.37	**0.00**							30
32	0.89	**0.04**	0.39	**0.01**							32
34	0.95	**0.04**	0.42	**0.01**							34
35	0.98	**0.04**	0.43	**0.01**							35
36	1.00	**0.05**	0.44	**0.01**							36
38	1.06	**0.05**	0.47	**0.01**							38
40	1.11	**0.06**	0.49	**0.01**							40
42	1.17	**0.06**	0.52	**0.01**							42
44	1.23	**0.07**	0.54	**0.01**							44
45	1.25	**0.07**	0.55	**0.01**							45
46	1.28	**0.07**	0.57	**0.01**							46
48	1.34	**0.08**	0.59	**0.01**							48
50	1.39	**0.09**	0.61	**0.01**							50
55	1.53	**0.10**	0.68	**0.01**							55
60	1.67	**0.12**	0.74	**0.02**							60
65	1.81	**0.14**	0.80	**0.02**	0.46	**0.00**					65
70	1.95	**0.16**	0.86	**0.02**	0.49	**0.01**					70
75	2.09	**0.18**	0.92	**0.03**	0.53	**0.01**					75
80	2.23	**0.21**	0.98	**0.03**	0.56	**0.01**					80
85	2.37	**0.23**	1.04	**0.03**	0.60	**0.01**					85
90	2.51	**0.26**	1.11	**0.04**	0.63	**0.01**					90
95	2.65	**0.29**	1.17	**0.04**	0.67	**0.01**					95
100	2.79	**0.31**	1.23	**0.04**	0.70	**0.01**	0.45	**0.00**			100
120	3.34	**0.44**	1.48	**0.06**	0.84	**0.02**	0.54	**0.01**			120
140	3.90	**0.59**	1.72	**0.08**	0.98	**0.02**	0.62	**0.01**			140
160	4.46	**0.75**	1.97	**0.10**	1.12	**0.03**	0.71	**0.01**			160
180	5.02	**0.93**	2.21	**0.13**	1.26	**0.03**	0.80	**0.01**	0.57	**0.00**	180
200	5.57	**1.13**	2.46	**0.15**	1.40	**0.04**	0.89	**0.01**	0.63	**0.01**	200
250	6.97	**1.72**	3.07	**0.23**	1.75	**0.06**	1.12	**0.02**	0.79	**0.01**	250
300	8.36	**2.40**	3.69	**0.33**	2.11	**0.08**	1.34	**0.03**	0.95	**0.01**	300
350	9.76	**3.20**	4.30	**0.44**	2.46	**0.11**	1.56	**0.04**	1.10	**0.02**	350
400	11.15	**4.10**	4.92	**0.56**	2.81	**0.14**	1.78	**0.05**	1.26	**0.02**	400
450	12.54	**5.10**	5.53	**0.70**	3.16	**0.18**	2.01	**0.06**	1.42	**0.03**	450
500	13.94	**6.19**	6.15	**0.85**	3.51	**0.22**	2.23	**0.07**	1.58	**0.03**	500
600	16.72	**8.68**	7.38	**1.18**	4.21	**0.30**	2.68	**0.10**	1.89	**0.04**	600
700			8.61	**1.58**	4.91	**0.40**	3.12	**0.13**	2.21	**0.06**	700
800			9.83	**2.02**	5.61	**0.52**	3.57	**0.17**	2.52	**0.07**	800
900			11.06	**2.51**	6.32	**0.64**	4.01	**0.21**	2.84	**0.09**	900
1000			12.29	**3.05**	7.02	**0.78**	4.46	**0.26**	3.15	**0.11**	1000
1200			14.75	**4.28**	8.42	**1.09**	5.35	**0.36**	3.78	**0.16**	1200
1400			17.21	**5.69**	9.82	**1.45**	6.24	**0.48**	4.41	**0.21**	1400
1600					11.23	**1.86**	7.14	**0.62**	5.04	**0.27**	1600
1800					12.63	**2.32**	8.03	**0.77**	5.67	**0.33**	1800
2000					14.03	**2.82**	8.92	**0.93**	6.31	**0.40**	2000
2200					15.44	**3.36**	9.81	**1.12**	6.94	**0.48**	2200
2400					16.84	**3.95**	10.71	**1.31**	7.57	**0.56**	2400
2600					18.25	**4.58**	11.60	**1.52**	8.20	**0.65**	2600
2800							12.49	**1.74**	8.83	**0.75**	2800
3000							13.38	**1.98**	9.46	**0.85**	3000
3200							14.27	**2.23**	10.09	**0.96**	3200
3400							15.17	**2.50**	10.72	**1.07**	3400
3600							16.06	**2.78**	11.35	**1.19**	3600
3800							16.95	**3.07**	11.98	**1.32**	3800
4000							17.84	**3.38**	12.61	**1.45**	4000
4500									14.19	**1.80**	4500
5000									15.76	**2.19**	5000
5500									17.34	**2.62**	5500
6000									18.92	**3.07**	6000
6500											6500

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Polyethylene (PE) Pipe - SDR-7 Pressure Rated Pipe

C=140

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES ½" THRU 2"

Nominal Size / Pipe ID	½" 0.622		¾" 0.824		1" 1.049		1¼" 1.380		1½" 1.610		2" 2.067		Nominal Size / Pipe ID
Note: This is an I.D. controlled pipe, O.D. may vary.													
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
1	1.05	**0.49**	0.60	**0.12**	0.37	**0.04**	0.21	**0.01**	0.16	**0.00**	0.10	**0.00**	1
2	2.11	**1.76**	1.20	**0.45**	0.74	**0.14**	0.43	**0.04**	0.31	**0.02**	0.19	**0.01**	2
3	3.16	**3.73**	1.80	**0.95**	1.11	**0.29**	0.64	**0.08**	0.47	**0.04**	0.29	**0.01**	3
4	4.22	**6.35**	2.40	**1.62**	1.48	**0.50**	0.86	**0.13**	0.63	**0.06**	0.38	**0.02**	4
5	5.27	**9.60**	3.00	**2.44**	1.85	**0.76**	1.07	**0.20**	0.79	**0.09**	0.48	**0.03**	5
6	6.33	**13.46**	3.61	**3.43**	2.22	**1.06**	1.29	**0.28**	0.94	**0.13**	0.57	**0.04**	6
7	7.38	**17.91**	4.21	**4.56**	2.60	**1.41**	1.50	**0.37**	1.10	**0.18**	0.67	**0.05**	7
8	8.44	**22.93**	4.81	**5.84**	2.97	**1.80**	1.71	**0.47**	1.26	**0.22**	0.76	**0.07**	8
9	9.49	**28.52**	5.41	**7.26**	3.34	**2.24**	1.93	**0.59**	1.42	**0.28**	0.86	**0.08**	9
10	10.55	**34.67**	6.01	**8.82**	3.71	**2.73**	2.14	**0.72**	1.57	**0.34**	0.95	**0.10**	10
11	11.60	**41.36**	6.61	**10.53**	4.08	**3.25**	2.36	**0.86**	1.73	**0.40**	1.05	**0.12**	11
12	12.65	**48.60**	7.21	**12.37**	4.45	**3.82**	2.57	**1.01**	1.89	**0.48**	1.15	**0.14**	12
13	13.71	**56.36**	7.81	**14.34**	4.82	**4.43**	2.79	**1.17**	2.05	**0.55**	1.24	**0.16**	13
14	14.76	**64.65**	8.41	**16.45**	5.19	**5.08**	3.00	**1.34**	2.20	**0.63**	1.34	**0.19**	14
15	15.82	**73.47**	9.01	**18.70**	5.56	**5.78**	3.21	**1.52**	2.36	**0.72**	1.43	**0.21**	15
16	16.87	**82.79**	9.61	**21.07**	5.93	**6.51**	3.43	**1.71**	2.52	**0.81**	1.53	**0.24**	16
17	17.93	**92.63**	10.22	**23.57**	6.30	**7.28**	3.64	**1.92**	2.68	**0.91**	1.62	**0.27**	17
18	18.98	**103.00**	10.82	**26.21**	6.67	**8.10**	3.86	**2.13**	2.83	**1.01**	1.72	**0.30**	18
19			11.42	**28.97**	7.04	**8.95**	4.07	**2.36**	2.99	**1.11**	1.81	**0.33**	19
20			12.02	**31.85**	7.42	**9.84**	4.28	**2.59**	3.15	**1.22**	1.91	**0.36**	20
22			13.22	**38.00**	8.16	**11.74**	4.71	**3.09**	3.46	**1.46**	2.10	**0.43**	22
24			14.42	**44.65**	8.90	**13.79**	5.14	**3.63**	3.78	**1.72**	2.29	**0.51**	24
25			15.02	**48.15**	9.27	**14.87**	5.36	**3.92**	3.94	**1.85**	2.39	**0.55**	25
26			15.62	**51.78**	9.64	**16.00**	5.57	**4.21**	4.09	**1.99**	2.48	**0.59**	26
28			16.83	**59.40**	10.38	**18.35**	6.00	**4.83**	4.41	**2.28**	2.67	**0.68**	28
30			18.03	**67.50**	11.12	**20.85**	6.43	**5.49**	4.72	**2.59**	2.86	**0.77**	30
32			19.23	**76.06**	11.86	**23.50**	6.86	**6.19**	5.04	**2.92**	3.06	**0.87**	32
34					12.61	**26.29**	7.28	**6.92**	5.35	**3.27**	3.25	**0.97**	34
35					12.98	**27.74**	7.50	**7.30**	5.51	**3.45**	3.34	**1.02**	35
36					13.35	**29.22**	7.71	**7.69**	5.67	**3.63**	3.44	**1.08**	36
38					14.09	**32.30**	8.14	**8.50**	5.98	**4.02**	3.63	**1.19**	38
40					14.83	**35.52**	8.57	**9.35**	6.30	**4.42**	3.82	**1.31**	40
42					15.57	**38.88**	9.00	**10.24**	6.61	**4.83**	4.01	**1.43**	42
44					16.31	**42.38**	9.43	**11.16**	6.93	**5.27**	4.20	**1.56**	44
45					16.68	**44.18**	9.64	**11.63**	7.08	**5.49**	4.30	**1.63**	45
46					17.06	**46.01**	9.86	**12.12**	7.24	**5.72**	4.39	**1.70**	46
48					17.80	**49.79**	10.28	**13.11**	7.56	**6.19**	4.58	**1.84**	48
50					18.54	**53.70**	10.71	**14.14**	7.87	**6.68**	4.77	**1.98**	50
55							11.78	**16.87**	8.66	**7.97**	5.25	**2.36**	55
60							12.85	**19.82**	9.44	**9.36**	5.73	**2.77**	60
65							13.93	**22.98**	10.23	**10.86**	6.21	**3.22**	65
70							15.00	**26.36**	11.02	**12.45**	6.68	**3.69**	70
75							16.07	**29.96**	11.81	**14.15**	7.16	**4.19**	75
80							17.14	**33.76**	12.59	**15.95**	7.64	**4.73**	80
85							18.21	**37.77**	13.38	**17.84**	8.12	**5.29**	85
90							19.28	**41.99**	14.17	**19.83**	8.59	**5.88**	90
95									14.95	**21.92**	9.07	**6.50**	95
100									15.74	**24.11**	9.55	**7.15**	100
110									17.31	**28.76**	10.50	**8.53**	110
120									18.89	**33.79**	11.46	**10.02**	120
130											12.41	**11.62**	130
140											13.37	**13.33**	140
150											14.32	**15.14**	150
160											15.28	**17.07**	160
170											16.23	**19.09**	170
180											17.19	**21.23**	180
190											18.14	**23.46**	190
200											19.10	**25.80**	200

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Polyethylene (PE) Pipe - SDR-7 Pressure Rated Pipe

C=140

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 2½" THRU 6"

Nominal Size / Pipe ID	2½" 2.469		3" 3.068		4" 4.026		6" 6.065		Nominal Size / Pipe ID
Note: This is an I.D. controlled pipe, O.D. may vary.									
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Flow GPM
10	0.67	**0.04**	0.43	**0.01**	0.25	**0.00**			10
15	1.00	**0.09**	0.65	**0.03**	0.38	**0.01**			15
20	1.34	**0.15**	0.87	**0.05**	0.50	**0.01**			20
25	1.67	**0.23**	1.08	**0.08**	0.63	**0.02**			25
30	2.01	**0.32**	1.30	**0.11**	0.76	**0.03**	0.33	**0.00**	30
35	2.34	**0.43**	1.52	**0.15**	0.88	**0.04**	0.39	**0.01**	35
40	2.68	**0.55**	1.73	**0.19**	1.01	**0.05**	0.44	**0.01**	40
45	3.01	**0.69**	1.95	**0.24**	1.13	**0.06**	0.50	**0.01**	45
50	3.35	**0.83**	2.17	**0.29**	1.26	**0.08**	0.55	**0.01**	50
55	3.68	**0.99**	2.38	**0.35**	1.38	**0.09**	0.61	**0.01**	55
60	4.02	**1.17**	2.60	**0.41**	1.51	**0.11**	0.67	**0.01**	60
65	4.35	**1.36**	2.82	**0.47**	1.64	**0.13**	0.72	**0.02**	65
70	4.69	**1.55**	3.03	**0.54**	1.76	**0.14**	0.78	**0.02**	70
75	5.02	**1.77**	3.25	**0.61**	1.89	**0.16**	0.83	**0.02**	75
80	5.35	**1.99**	3.47	**0.69**	2.01	**0.18**	0.89	**0.03**	80
85	5.69	**2.23**	3.68	**0.77**	2.14	**0.21**	0.94	**0.03**	85
90	6.02	**2.48**	3.90	**0.86**	2.27	**0.23**	1.00	**0.03**	90
95	6.36	**2.74**	4.12	**0.95**	2.39	**0.25**	1.05	**0.03**	95
100	6.69	**3.01**	4.33	**1.05**	2.52	**0.28**	1.11	**0.04**	100
110	7.36	**3.59**	4.77	**1.25**	2.77	**0.33**	1.22	**0.05**	110
120	8.03	**4.22**	5.20	**1.47**	3.02	**0.39**	1.33	**0.05**	120
130	8.70	**4.89**	5.63	**1.70**	3.27	**0.45**	1.44	**0.06**	130
140	9.37	**5.61**	6.07	**1.95**	3.52	**0.52**	1.55	**0.07**	140
150	10.04	**6.38**	6.50	**2.22**	3.78	**0.59**	1.66	**0.08**	150
175	11.71	**8.48**	7.59	**2.95**	4.41	**0.79**	1.94	**0.11**	175
200	13.39	**10.87**	8.67	**3.78**	5.03	**1.01**	2.22	**0.14**	200
225	15.06	**13.51**	9.75	**4.70**	5.66	**1.25**	2.50	**0.17**	225
250	16.73	**16.43**	10.84	**5.71**	6.29	**1.52**	2.77	**0.21**	250
275	18.41	**19.60**	11.92	**6.81**	6.92	**1.81**	3.05	**0.25**	275
300			13.00	**8.00**	7.55	**2.13**	3.33	**0.29**	300
325			14.09	**9.28**	8.18	**2.47**	3.60	**0.34**	325
350			15.17	**10.64**	8.81	**2.84**	3.88	**0.39**	350
375			16.25	**12.10**	9.44	**3.22**	4.16	**0.44**	375
400			17.34	**13.63**	10.07	**3.63**	4.44	**0.49**	400
425			18.42	**15.25**	10.70	**4.06**	4.71	**0.55**	425
450			19.51	**16.95**	11.33	**4.52**	4.99	**0.62**	450
475					11.96	**4.99**	5.27	**0.68**	475
500					12.59	**5.49**	5.55	**0.75**	500
525					13.22	**6.01**	5.82	**0.82**	525
550					13.84	**6.55**	6.10	**0.89**	550
575					14.47	**7.11**	6.38	**0.97**	575
600					15.10	**7.70**	6.66	**1.05**	600
650					16.36	**8.93**	7.21	**1.22**	650
700					17.62	**10.24**	7.76	**1.39**	700
750					18.88	**11.64**	8.32	**1.58**	750
800							8.87	**1.79**	800
850							9.43	**2.00**	850
900							9.98	**2.22**	900
950							10.54	**2.45**	950
1000							11.09	**2.70**	1000
1100							12.20	**3.22**	1100
1200							13.31	**3.78**	1200
1300							14.42	**4.39**	1300
1400							15.53	**5.03**	1400
1500							16.64	**5.72**	1500
1600							17.75	**6.45**	1600
1700							18.86	**7.21**	1700
1800							19.97	**8.02**	1800

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Polyethylene Pipe - Pepco Products

C=140

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 1/16" THRU 3/8"

Pepco Products

Note: 5/16" ID & PSI loss is the same as 11/32" ID.

Nominal Size	1/16"		1/8"		3/16"		7/32"		1/4"		5/16"		3/8"		Nominal Size
Pipe ID	0.040		0.070		0.125		0.160		0.170		0.250		0.375		Pipe ID
Pipe OD	0.080		0.125		0.185		0.220		0.250		0.307		0.455		Pipe OD
Wall Thick	0.020		0.028		0.030		0.030		0.040		0.028		0.040		Wall Thick
Flow GPH	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Flow GPH
0.25	1.06	**11.99**	0.35	**0.79**	0.11	**0.05**	0.07	**0.01**	0.06	**0.01**	0.03	**0.00**			0.25
0.50	2.13	**43.28**	0.69	**2.84**	0.22	**0.17**	0.13	**0.05**	0.12	**0.04**	0.05	**0.01**			0.50
0.75	3.19	**91.71**	1.04	**6.02**	0.33	**0.36**	0.20	**0.11**	0.18	**0.08**	0.08	**0.01**			0.75
1.00	4.25	**156.20**	1.39	**10.26**	0.44	**0.61**	0.27	**0.18**	0.24	**0.14**	0.11	**0.02**			1.00
1.25	5.31	**236.20**	1.73	**15.51**	0.54	**0.92**	0.33	**0.28**	0.29	**0.21**	0.14	**0.03**	0.06	**0.00**	1.25
1.50	6.38	**331.10**	2.08	**21.74**	0.65	**1.29**	0.40	**0.39**	0.35	**0.29**	0.16	**0.04**	0.07	**0.01**	1.50
1.75	7.44	**440.40**	2.43	**28.92**	0.76	**1.72**	0.46	**0.52**	0.41	**0.39**	0.19	**0.06**	0.08	**0.01**	1.75
2.00	8.50	**564.00**	2.78	**37.04**	0.87	**2.20**	0.53	**0.66**	0.47	**0.49**	0.22	**0.08**	0.10	**0.01**	2.00
2.50	10.63	**852.70**	3.47	**56.00**	1.09	**3.33**	0.66	**1.00**	0.59	**0.75**	0.27	**0.11**	0.12	**0.02**	2.50
3.00			4.16	**78.49**	1.31	**4.67**	0.80	**1.41**	0.71	**1.05**	0.33	**0.16**	0.15	**0.02**	3.00
3.5			4.86	**104.40**	1.52	**6.22**	0.93	**1.87**	0.82	**1.39**	0.38	**0.21**	0.17	**0.03**	3.5
4.0	Note: Flows are GPH		5.55	**133.70**	1.74	**7.96**	1.06	**2.39**	0.94	**1.78**	0.44	**0.27**	0.19	**0.04**	4.0
4.5			6.24	**166.30**	1.96	**9.90**	1.20	**2.98**	1.06	**2.22**	0.49	**0.34**	0.22	**0.05**	4.5
5.0			6.94	**202.10**	2.18	**12.03**	1.33	**3.62**	1.18	**2.69**	0.54	**0.41**	0.24	**0.06**	5.0
6.0			8.33	**283.30**	2.61	**16.86**	1.59	**5.07**	1.41	**3.78**	0.65	**0.58**	0.29	**0.08**	6.0
7			9.71	**377.00**	3.05	**22.44**	1.86	**6.75**	1.65	**5.03**	0.76	**0.77**	0.34	**0.11**	7
8			11.10	**482.70**	3.48	**28.73**	2.13	**8.64**	1.88	**6.44**	0.87	**0.99**	0.39	**0.14**	8
9			12.49	**600.40**	3.92	**35.74**	2.39	**10.75**	2.12	**8.00**	0.98	**1.23**	0.44	**0.17**	9
10			13.88	**729.70**	4.35	**43.44**	2.66	**13.07**	2.35	**9.73**	1.09	**1.49**	0.48	**0.21**	10
12					5.22	**60.88**	3.19	**18.32**	2.82	**13.64**	1.31	**2.09**	0.58	**0.29**	12
14					6.09	**81.00**	3.72	**24.37**	3.29	**18.14**	1.52	**2.78**	0.68	**0.39**	14
16					6.96	**103.70**	4.25	**31.20**	3.76	**23.23**	1.74	**3.56**	0.77	**0.49**	16
18					7.83	**129.00**	4.78	**38.81**	4.24	**28.89**	1.96	**4.42**	0.87	**0.62**	18
20					8.70	**156.80**	5.31	**47.17**	4.71	**35.12**	2.18	**5.38**	0.97	**0.75**	20
22					9.57	**187.10**	5.84	**56.28**	5.18	**41.90**	2.39	**6.42**	1.06	**0.89**	22
24					10.44	**219.80**	6.38	**66.12**	5.65	**49.23**	2.61	**7.54**	1.16	**1.05**	24
26					11.32	**254.90**	6.91	**76.68**	6.12	**57.09**	2.83	**8.74**	1.26	**1.22**	26
28					12.19	**292.40**	7.44	**87.96**	6.59	**65.49**	3.05	**10.03**	1.35	**1.39**	28
30					13.06	**332.30**	7.97	**99.95**	7.06	**74.42**	3.26	**11.39**	1.45	**1.58**	30
32					13.93	**374.40**	8.50	**112.60**	7.53	**83.87**	3.48	**12.84**	1.55	**1.79**	32
34					14.80	**418.90**	9.03	**126.00**	8.00	**93.83**	3.70	**14.37**	1.64	**2.00**	34
36					15.67	**465.70**	9.56	**140.10**	8.47	**104.30**	3.92	**15.97**	1.74	**2.22**	36
38					16.54	**514.80**	10.09	**154.90**	8.94	**115.30**	4.13	**17.65**	1.84	**2.45**	38
40					17.41	**566.10**	10.63	**170.30**	9.41	**126.80**	4.35	**19.41**	1.93	**2.70**	40
42					18.28	**619.60**	11.16	**186.40**	9.88	**138.80**	4.57	**21.25**	2.03	**2.95**	42
44					19.15	**675.30**	11.69	**203.20**	10.35	**151.30**	4.79	**23.16**	2.13	**3.22**	44
46							12.22	**220.60**	10.82	**164.20**	5.00	**25.15**	2.22	**3.50**	46
48							12.75	**238.70**	11.29	**177.70**	5.22	**27.21**	2.32	**3.78**	48
50							13.28	**257.40**	11.76	**191.70**	5.44	**29.34**	2.42	**4.08**	50
55							14.61	**307.10**	12.94	**228.70**	5.98	**35.01**	2.66	**4.87**	55
60							15.94	**360.80**	14.12	**268.60**	6.53	**41.13**	2.90	**5.72**	60
65							17.27	**418.50**	15.29	**311.60**	7.07	**47.70**	3.14	**6.63**	65
70							18.59	**480.00**	16.47	**357.40**	7.62	**54.72**	3.38	**7.61**	70
75							19.92	**545.50**	17.65	**406.10**	8.16	**62.18**	3.63	**8.65**	75
80									18.82	**457.70**	8.70	**70.07**	3.87	**9.74**	80
85											9.25	**78.40**	4.11	**10.90**	85
90											9.79	**87.16**	4.35	**12.12**	90
95											10.34	**96.33**	4.59	**13.39**	95
100											10.88	**105.90**	4.84	**14.73**	100
110											11.97	**126.40**	5.32	**17.57**	110
120											13.06	**148.50**	5.80	**20.65**	120
130											14.14	**172.20**	6.29	**23.94**	130
140											15.23	**197.50**	6.77	**27.47**	140
150											16.32	**224.50**	7.25	**31.21**	150
160											17.41	**253.00**	7.74	**35.17**	160
180											19.58	**314.60**	8.70	**43.75**	180
200													9.67	**53.17**	200
225													10.88	**66.13**	225
250													12.09	**80.38**	250
300													14.51	**112.70**	300
350													16.92	**149.90**	350
375													18.13	**170.30**	375
400													19.34	**192.00**	400

Polyethylene Pipe - Pepco Products

C=140

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES ½" THRU 1¼"

Pepco Products

Note: Pepco manufacturers nominal ½": Poly in three different ID's.

Nominal Size	½"	½"	½"	⅝"	¾"	1"	1¼"	Nominal Size
Pipe ID	0.520	0.600	0.620	0.720	0.830	1.060	1.390	Pipe ID
Pipe OD	0.620	0.700(4)	0.710	0.830	0.940	1.200	1.550	Pipe OD
Wall Thick	0.150	0.050(2)	0.045	0.055	0.055	0.070	0.080	Wall Thick

Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Flow GPM
0.25	0.38	**0.09**	0.28	**0.04**	0.27	**0.04**	0.20	**0.02**	0.15	**0.01**	0.09	**0.00**			0.25
0.50	0.75	**0.32**	0.57	**0.16**	0.53	**0.14**	0.39	**0.07**	0.30	**0.03**	0.18	**0.01**	0.11	**0.00**	0.50
0.75	1.13	**0.68**	0.85	**0.34**	0.80	**0.29**	0.59	**0.14**	0.44	**0.07**	0.27	**0.02**	0.16	**0.01**	0.75
1.00	1.51	**1.17**	1.13	**0.58**	1.06	**0.50**	0.79	**0.24**	0.59	**0.12**	0.36	**0.04**	0.21	**0.01**	1.00
1.25	1.89	**1.76**	1.42	**0.88**	1.33	**0.75**	0.98	**0.36**	0.74	**0.18**	0.45	**0.06**	0.26	**0.01**	1.25
1.50	2.26	**2.47**	1.70	**1.23**	1.59	**1.05**	1.18	**0.51**	0.89	**0.25**	0.54	**0.08**	0.32	**0.02**	1.50
1.75	2.64	**3.29**	1.98	**1.64**	1.86	**1.40**	1.38	**0.67**	1.04	**0.34**	0.64	**0.10**	0.37	**0.03**	1.75
2.00	3.02	**4.21**	2.27	**2.10**	2.12	**1.79**	1.57	**0.86**	1.18	**0.43**	0.73	**0.13**	0.42	**0.04**	2.00
2.25	3.39	**5.23**	2.55	**2.61**	2.39	**2.22**	1.77	**1.07**	1.33	**0.54**	0.82	**0.16**	0.48	**0.04**	2.25
2.50	3.77	**6.36**	2.83	**3.17**	2.65	**2.70**	1.97	**1.31**	1.48	**0.65**	0.91	**0.20**	0.53	**0.05**	2.50
2.75	4.15	**7.59**	3.12	**3.78**	2.92	**3.22**	2.16	**1.56**	1.63	**0.78**	1.00	**0.24**	0.58	**0.06**	2.75
3.00	4.53	**8.91**	3.40	**4.44**	3.18	**3.79**	2.36	**1.83**	1.78	**0.92**	1.09	**0.28**	0.63	**0.07**	3.00
3.25	4.90	**10.34**	3.68	**5.15**	3.45	**4.39**	2.56	**2.12**	1.92	**1.06**	1.18	**0.32**	0.69	**0.09**	3.25
3.50	5.28	**11.86**	3.97	**5.91**	3.71	**5.04**	2.75	**2.43**	2.07	**1.22**	1.27	**0.37**	0.74	**0.10**	3.50
3.75	5.66	**13.48**	4.25	**6.72**	3.98	**5.73**	2.95	**2.77**	2.22	**1.38**	1.36	**0.42**	0.79	**0.11**	3.75
4.0	6.04	**15.19**	4.53	**7.57**	4.25	**6.45**	3.15	**3.12**	2.37	**1.56**	1.45	**0.47**	0.84	**0.13**	4.0
4.5	6.79	**18.89**	5.10	**9.41**	4.78	**8.03**	3.54	**3.88**	2.67	**1.94**	1.63	**0.59**	0.95	**0.16**	4.5
5.0	7.54	**22.96**	5.67	**11.44**	5.31	**9.76**	3.94	**4.71**	2.96	**2.36**	1.82	**0.72**	1.06	**0.19**	5.0
5.5	8.30	**27.39**	6.23	**13.65**	5.84	**11.64**	4.33	**5.62**	3.26	**2.81**	2.00	**0.86**	1.16	**0.23**	5.5
6.0	9.05	**32.18**	6.80	**16.04**	6.37	**13.67**	4.72	**6.61**	3.55	**3.31**	2.18	**1.01**	1.27	**0.27**	6.0
6.5	9.81	**37.32**	7.37	**18.60**	6.90	**15.86**	5.12	**7.66**	3.85	**3.84**	2.36	**1.17**	1.37	**0.31**	6.5
7.0	10.56	**42.82**	7.93	**21.34**	7.43	**18.19**	5.51	**8.79**	4.15	**4.40**	2.54	**1.34**	1.48	**0.36**	7.0
7.5	11.32	**48.65**	8.50	**24.25**	7.96	**20.67**	5.90	**9.99**	4.44	**5.00**	2.72	**1.52**	1.58	**0.41**	7.5
8.0	12.07	**54.83**	9.07	**27.33**	8.49	**23.30**	6.30	**11.25**	4.74	**5.63**	2.90	**1.71**	1.69	**0.46**	8.0
8.5	12.83	**61.34**	9.63	**30.57**	9.02	**26.06**	6.69	**12.59**	5.03	**6.30**	3.09	**1.92**	1.79	**0.51**	8.5
9.0	13.58	**68.19**	10.20	**33.99**	9.55	**28.98**	7.08	**14.00**	5.33	**7.01**	3.27	**2.13**	1.90	**0.57**	9.0
9.5	14.33	**75.37**	10.77	**37.57**	10.08	**32.03**	7.48	**15.47**	5.63	**7.75**	3.45	**2.36**	2.01	**0.63**	9.5
10	15.09	**82.88**	11.33	**41.31**	10.61	**35.22**	7.87	**17.01**	5.92	**8.52**	3.63	**2.59**	2.11	**0.69**	10
11	16.60	**98.89**	12.47	**49.29**	11.68	**42.02**	8.66	**20.30**	6.51	**10.16**	3.99	**3.09**	2.32	**0.83**	11
12	18.11	**116.20**	13.60	**57.90**	12.74	**49.36**	9.44	**23.85**	7.11	**11.94**	4.36	**3.63**	2.53	**0.97**	12
13	19.62	**134.7**	14.73	**67.16**	13.80	**57.25**	10.23	**27.66**	7.70	**13.85**	4.72	**4.21**	2.75	**1.13**	13
14			15.87	**77.04**	14.86	**65.67**	11.02	**31.72**	8.29	**15.88**	5.08	**4.83**	2.96	**1.29**	14
15			17.00	**87.54**	15.92	**74.63**	11.81	**36.05**	8.88	**18.05**	5.45	**5.49**	3.17	**1.47**	15
16			18.13	**98.65**	16.98	**84.10**	12.59	**40.63**	9.48	**20.34**	5.81	**6.19**	3.38	**1.65**	16
18					19.11	**104.60**	14.17	**50.53**	10.66	**25.30**	6.54	**7.69**	3.80	**2.06**	18
20							15.74	**61.42**	11.84	**30.75**	7.26	**9.35**	4.22	**2.50**	20
22							17.31	**73.27**	13.03	**36.68**	7.99	**11.16**	4.65	**2.98**	22
24							18.89	**86.08**	14.21	**43.10**	8.71	**13.11**	5.07	**3.51**	24
26									15.40	**49.99**	9.44	**15.20**	5.49	**4.07**	26
28									16.58	**57.34**	10.17	**17.44**	5.91	**4.66**	28
30									17.77	**65.15**	10.89	**19.82**	6.34	**5.30**	30
32									18.95	**73.43**	11.62	**22.33**	6.76	**5.97**	32
34											12.35	**24.99**	7.18	**6.68**	34
36											13.07	**27.78**	7.60	**7.43**	36
38											13.80	**30.70**	8.02	**8.21**	38
40											14.52	**33.76**	8.45	**9.03**	40
42											15.25	**36.95**	8.87	**9.88**	42
44											15.98	**40.28**	9.29	**10.77**	44
46											16.70	**43.74**	9.71	**11.70**	46
48											17.43	**47.32**	10.14	**12.66**	48
50											18.16	**51.04**	10.56	**13.65**	50
55											19.97	**60.89**	11.61	**16.29**	55
60													12.67	**19.13**	60
65													13.73	**22.19**	65
70													14.78	**25.45**	70
75													15.84	**28.92**	75
80													16.89	**32.60**	80
85													17.95	**36.47**	85
90													19.01	**40.54**	90

Polyethylene Pipe - Bowsmith, Inc.

C=140

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES ⅜" THRU 1¼"

Bowsmith, Inc.

Note: Bowsmith manufacturers more than one pipe in similar nominal sizes but with different ID's.

Nominal Size	⅜"	⅜"	½"	½"	½"	½"	½"	Nominal Size
Pipe ID	0.375	0.390	0.525	0.530	0.590	0.600	0.605	Pipe ID
Pipe OD	0.455	0.490	0.625	0.625	0.700	0.700	0.700	Pipe OD
Wall Thick	0.040	0.050	0.050	0.0475	0.055	0.050	0.0475	Wall Thick
Flow GPM	Velocity FPS / **PSI LOSS**	Velocity FPS / **PSI LOSS**	Velocity FPS / **PSI LOSS**	Velocity FPS / **PSI LOSS**	Velocity FPS / **PSI LOSS**	Velocity FPS / **PSI LOSS**	Velocity FPS / **PSI LOSS**	Flow GPM
0.25	0.73 **0.44**	0.67 **0.36**	0.37 **0.09**	0.36 **0.08**	0.29 **0.05**	0.28 **0.04**	0.28 **0.04**	0.25
0.50	1.45 **1.58**	1.34 **1.31**	0.74 **0.31**	0.73 **0.29**	0.59 **0.17**	0.57 **0.16**	0.56 **0.15**	0.50
0.75	2.18 **3.36**	2.01 **2.77**	1.11 **0.65**	1.09 **0.62**	0.88 **0.37**	0.85 **0.34**	0.84 **0.33**	0.75
1.00	2.90 **5.72**	2.68 **4.73**	1.48 **1.11**	1.45 **1.06**	1.17 **0.63**	1.13 **0.58**	1.11 **0.56**	1.00
1.25	3.63 **8.65**	3.35 **7.14**	1.85 **1.68**	1.82 **1.61**	1.47 **0.95**	1.42 **0.88**	1.39 **0.84**	1.25
1.50	4.35 **12.12**	4.02 **10.01**	2.22 **2.36**	2.18 **2.25**	1.76 **1.34**	1.70 **1.23**	1.67 **1.18**	1.50
1.75	5.08 **16.12**	4.69 **13.32**	2.59 **3.14**	2.54 **2.99**	2.05 **1.78**	1.98 **1.64**	1.95 **1.57**	1.75
2.00	5.80 **20.65**	5.36 **17.06**	2.96 **4.02**	2.90 **3.83**	2.34 **2.28**	2.27 **2.10**	2.23 **2.01**	2.00
2.5	7.25 **31.21**	6.71 **25.79**	3.70 **6.07**	3.63 **5.80**	2.93 **3.44**	2.83 **3.17**	2.79 **3.04**	2.5
3.0	8.70 **43.75**	8.05 **36.15**	4.44 **8.51**	4.36 **8.13**	3.52 **4.82**	3.40 **4.44**	3.34 **4.27**	3.0
4	11.61 **74.53**	10.73 **61.58**	5.92 **14.50**	5.81 **13.84**	4.69 **8.21**	4.53 **7.57**	4.46 **7.27**	4
5	14.51 **112.70**	13.41 **93.09**	7.40 **21.92**	7.26 **20.93**	5.86 **12.42**	5.67 **11.44**	5.57 **10.99**	5
6	17.41 **157.90**	16.09 **130.50**	8.88 **30.72**	8.71 **29.33**	7.03 **17.41**	6.80 **16.04**	6.69 **15.41**	6
7		18.78 **173.60**	10.36 **40.87**	10.17 **39.03**	8.20 **23.16**	7.93 **21.34**	7.80 **20.50**	7
8			11.84 **52.33**	11.62 **49.97**	9.38 **29.66**	9.07 **27.33**	8.92 **26.25**	8
9			13.32 **65.09**	13.07 **62.16**	10.55 **36.88**	10.20 **33.99**	10.03 **32.64**	9
10			14.80 **79.11**	14.52 **75.55**	11.72 **44.83**	11.33 **41.31**	11.15 **39.68**	10
12			17.76 **110.90**	17.43 **105.90**	14.06 **62.84**	13.60 **57.90**	13.38 **55.61**	12
14					16.41 **83.60**	15.87 **77.04**	15.61 **73.99**	14
16					18.75 **107.10**	18.13 **98.65**	17.83 **94.75**	16

Nominal Size	⅝"	⅝"	¾"	¾"	1"	1"	1¼"	Nominal Size
Pipe ID	0.625	0.730	0.811	0.818	1.050	1.057	1.360	Pipe ID
Pipe OD	0.720	0.835	0.935	0.935	1.195	1.195	1.530	Pipe OD
Wall Thick	0.475	0.0525	0.0625	0.059	0.0725	0.069	0.085	Wall Thick
Flow GPM	Velocity FPS / **PSI LOSS**	Velocity FPS / **PSI LOSS**	Velocity FPS / **PSI LOSS**	Velocity FPS / **PSI LOSS**	Velocity FPS / **PSI LOSS**	Velocity FPS / **PSI LOSS**	Velocity FPS / **PSI LOSS**	Flow GPM
1	1.04 **0.48**	0.77 **0.22**	0.62 **0.13**	0.61 **0.13**	0.37 **0.04**	0.37 **0.04**	0.22 **0.01**	1.0
2	2.09 **1.72**	1.53 **0.81**	1.24 **0.48**	1.22 **0.46**	0.74 **0.14**	0.73 **0.13**	0.44 **0.04**	2
3	3.13 **3.64**	2.30 **1.71**	1.86 **1.03**	1.83 **0.98**	1.11 **0.29**	1.10 **0.28**	0.66 **0.08**	3
4	4.18 **6.21**	3.06 **2.91**	2.48 **1.75**	2.44 **1.68**	1.48 **0.50**	1.46 **0.48**	0.88 **0.14**	4
5	5.22 **9.38**	3.83 **4.41**	3.10 **2.64**	3.05 **2.53**	1.85 **0.75**	1.83 **0.73**	1.10 **0.21**	5
6	6.27 **13.15**	4.59 **6.18**	3.72 **3.70**	3.66 **3.55**	2.22 **1.05**	2.19 **1.02**	1.32 **0.30**	6
7	7.31 **17.50**	5.36 **8.22**	4.34 **4.92**	4.27 **4.72**	2.59 **1.40**	2.56 **1.36**	1.54 **0.40**	7
8	8.36 **22.40**	6.12 **10.52**	4.96 **6.31**	4.88 **6.05**	2.96 **1.79**	2.92 **1.74**	1.76 **0.51**	8
9	9.40 **27.86**	6.89 **13.09**	5.58 **7.84**	5.49 **7.52**	3.33 **2.23**	3.29 **2.16**	1.99 **0.63**	9
10	10.44 **33.87**	7.66 **15.91**	6.20 **9.53**	6.10 **9.14**	3.70 **2.71**	3.65 **2.63**	2.21 **0.77**	10
12	12.53 **47.47**	9.19 **22.30**	7.44 **13.36**	7.32 **12.82**	4.44 **3.80**	4.38 **3.68**	2.65 **1.08**	12
14	14.62 **63.16**	10.72 **29.67**	8.68 **17.78**	8.54 **17.05**	5.18 **5.06**	5.11 **4.90**	3.09 **1.44**	14
16	16.71 **80.88**	12.25 **37.99**	9.93 **22.77**	9.76 **21.83**	5.92 **6.48**	5.84 **6.27**	3.53 **1.84**	16
18	18.80 **100.60**	13.78 **47.25**	11.17 **28.32**	10.98 **27.16**	6.66 **8.06**	6.57 **7.80**	3.97 **2.29**	18
20		15.31 **57.43**	12.41 **34.42**	12.20 **33.01**	7.40 **9.79**	7.30 **9.48**	4.41 **2.78**	20
22		16.84 **68.52**	13.65 **41.06**	13.41 **39.38**	8.14 **11.68**	8.03 **11.31**	4.85 **3.32**	22
24		18.37 **80.50**	14.89 **48.24**	14.63 **46.26**	8.88 **13.73**	8.76 **13.29**	5.29 **3.90**	24
26		19.91 **93.36**	16.13 **55.95**	15.85 **53.66**	9.62 **15.92**	9.49 **15.41**	5.74 **4.52**	26
28			17.37 **64.18**	17.07 **61.55**	10.36 **18.26**	10.23 **17.68**	6.18 **5.19**	28
30			18.61 **72.93**	18.29 **69.94**	11.10 **20.75**	10.96 **20.09**	6.62 **5.89**	30
32			19.85 **82.18**	19.51 **78.82**	11.84 **23.39**	11.69 **22.64**	7.06 **6.64**	32
34					12.58 **26.17**	12.42 **25.33**	7.50 **7.43**	34
36					13.32 **29.09**	13.15 **28.16**	7.94 **8.26**	36
38					14.06 **32.15**	13.88 **31.13**	8.38 **9.13**	38
40					14.80 **35.36**	14.61 **34.23**	8.82 **10.04**	40
42					15.54 **38.70**	15.34 **37.47**	9.26 **10.99**	42
44					16.28 **42.18**	16.07 **40.84**	9.71 **11.98**	44
46					17.02 **45.80**	16.80 **44.34**	10.15 **13.01**	46
48					17.76 **49.56**	17.53 **47.98**	10.59 **14.07**	48
50					18.50 **53.45**	18.26 **51.75**	11.03 **15.18**	50
55							12.13 **18.11**	55
60							13.24 **21.28**	60
65							14.34 **24.68**	65
70							15.44 **28.31**	70
75							16.54 **32.16**	75
80							17.65 **36.25**	80
85							18.75 **40.55**	85
90							19.85 **45.08**	90

Polyethylene Pipe - Hardie & Rain Bird

C=140

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES ¼" THRU ¾"

	Hardie Dura-Pol™						Rain Bird				
Nominal Size	¼"		½"		¾"		Vinyl Tubing ¼"		Xeri-Tube™700 ½"		Nominal Size
Pipe ID	0.170		0.613		0.810		0.160		0.580		Pipe ID
Pipe OD	0.250		0.709		0.936		0.280		0.700		Pipe OD
Wall Thick	0.040		0.048		0.063		0.060		0.060		Wall Thick
Flow GPH	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPH
1	0.24	**0.14**					0.27	**0.18**			1
2	0.47	**0.49**					0.53	**0.66**	0.07	**0.00**	2
3	0.71	**1.05**					0.80	**1.41**	0.11	**0.01**	3
4	0.94	**1.78**	0.07	**0.00**			1.06	**2.39**	0.14	**0.02**	4
5	1.18	**2.69**	0.09	**0.01**			1.33	**3.62**	0.18	**0.03**	5
6	1.41	**3.78**	0.11	**0.01**			1.59	**5.07**	0.21	**0.04**	6
8	1.88	**6.44**	0.14	**0.01**			2.13	**8.64**	0.28	**0.06**	8
10	2.35	**9.73**	0.18	**0.02**	0.10	**0.00**	2.66	**13.07**	0.35	**0.10**	10
12	2.82	**13.64**	0.22	**0.03**	0.12	**0.01**	3.19	**18.32**	0.42	**0.13**	12
14	3.29	**18.14**	0.25	**0.04**	0.15	**0.01**	3.72	**24.37**	0.49	**0.18**	14
15	3.53	**20.61**	0.27	**0.04**	0.16	**0.01**	3.98	**27.69**	0.53	**0.20**	15
20	4.71	**35.12**	0.36	**0.07**	0.21	**0.02**	5.31	**47.17**	0.70	**0.34**	20
30	7.06	**74.42**	0.54	**0.14**	0.31	**0.04**	7.97	**99.95**	0.61	**0.19**	30
40	9.41	**126.80**	0.72	**0.25**	0.41	**0.06**			1.40	**1.24**	40
50			0.90	**0.37**	0.52	**0.10**			1.76	**1.87**	50
60			1.09	**0.52**	0.62	**0.13**			1.21	**0.69**	60
70			1.27	**0.70**	0.73	**0.18**			2.46	**3.50**	70
80			1.45	**0.89**	0.83	**0.23**			2.81	**4.48**	80
90			1.63	**1.11**	0.93	**0.29**			1.82	**1.45**	90
100	Note: Flows are GPH		1.81	**1.35**	1.04	**0.35**			3.51	**6.77**	100
110			1.99	**1.61**	1.14	**0.41**			3.86	**8.07**	110
120			2.17	**1.89**	1.24	**0.49**			2.43	**2.42**	120
130			2.35	**2.19**	1.35	**0.56**			4.57	**11.00**	130
140			2.53	**2.51**	1.45	**0.65**			4.92	**12.62**	140
150			2.71	**2.86**	1.55	**0.74**			3.03	**3.74**	150
160			2.90	**3.22**	1.66	**0.83**			5.62	**16.16**	160
170			3.08	**3.60**	1.76	**0.93**			5.97	**18.08**	170
180			3.26	**4.00**	1.87	**1.03**			3.64	**5.24**	180
190			3.44	**4.42**	1.97	**1.14**			6.67	**22.21**	190
200			3.62	**4.87**	2.07	**1.25**			7.02	**24.43**	200
210			3.80	**5.33**	2.18	**1.37**			4.24	**6.97**	210
220			3.98	**5.80**	2.28	**1.50**			7.73	**29.14**	220
230			4.16	**6.30**	2.38	**1.62**			8.08	**31.64**	230
240			4.34	**6.82**	2.49	**1.76**			4.85	**8.93**	240
Flow GPM											Flow GPM
4.5			4.89	**8.48**	2.80	**2.19**			5.46	**11.10**	4.5
5.0	Note: Flows are GPM		5.43	**10.31**	3.11	**2.66**			6.06	**13.50**	5.0
5.5			5.97	**12.30**	3.42	**3.17**			6.67	**16.10**	5.5
6.0			6.51	**14.45**	3.73	**3.72**			7.28	**18.93**	6.0
6.5			7.06	**16.76**	4.04	**4.32**			13.70	**84.14**	6.5
7.0			7.60	**19.23**	4.35	**4.95**					7.0
7.5			8.14	**21.85**	4.66	**5.63**					7.5
8.0			8.69	**24.62**	4.97	**6.34**					8.0
8.5			9.23	**27.55**	5.29	**7.10**					8.5
9.0			9.77	**30.62**	5.60	**7.89**					9.0
9.5			10.31	**33.85**	5.91	**8.72**					9.5
10			10.86	**37.22**	6.22	**9.59**					10
11			11.94	**44.40**	6.84	**11.44**					11
12			13.03	**52.17**	7.46	**13.44**					12
13			14.12	**60.50**	8.08	**15.59**					13
14			15.20	**69.41**	8.71	**17.89**					14
15			16.29	**78.87**	9.33	**20.32**					15
16			17.37	**88.88**	9.95	**22.90**					16
17			18.46	**99.44**	10.57	**25.62**					17
18			19.54	**110.50**	11.19	**28.49**					18
19					11.82	**31.49**					19
20					12.44	**34.62**					20
22					13.68	**41.31**					22
24					14.92	**48.53**					24
26					16.17	**56.28**					26
28					17.41	**64.56**					28
30					18.66	**73.36**					30
32					19.90	**82.68**					32

Agricultural Products Flexible PVC

C=150

PRESSURE LOSS PER 100 FEET (PSI) SIZES ½" THRU 1"

	Agriculture Products **IPS Hose**						Agriculture Products **IRRIG Hose**					
Nominal Size	½"		¾"		1"		½"		⅝"		¾"		Nominal Size
Pipe ID	0.546		0.740		0.960		0.500		0.625		0.750		Pipe ID
Pipe OD	0.840		1.050		1.315		0.680		0.825		0.970		Pipe OD
Wall Thick	0.147		0.154		0.179		0.090		0.100		0.110		Wall Thick
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
0.5	0.68	**0.22**	0.37	**0.05**	0.22	**0.01**	0.82	**0.34**	0.52	**0.12**	0.36	**0.05**	0.5
1.0	1.37	**0.81**	0.75	**0.18**	0.44	**0.05**	1.63	**1.24**	1.04	**0.42**	0.73	**0.17**	1.0
1.5	2.05	**1.71**	1.12	**0.39**	0.66	**0.11**	2.45	**2.63**	1.57	**0.89**	1.09	**0.37**	1.5
2.0	2.74	**2.92**	1.49	**0.67**	0.89	**0.19**	3.26	**4.48**	2.09	**1.51**	1.45	**0.62**	2.0
2.5	3.42	**4.41**	1.86	**1.01**	1.11	**0.28**	4.08	**6.77**	2.61	**2.29**	1.81	**0.94**	2.5
3.0	4.11	**6.19**	2.24	**1.41**	1.33	**0.40**	4.90	**9.50**	3.13	**3.21**	2.18	**1.32**	3.0
3.5	4.79	**8.23**	2.61	**1.87**	1.55	**0.53**	5.71	**12.63**	3.66	**4.26**	2.54	**1.76**	3.5
4.0	5.47	**10.54**	2.98	**2.40**	1.77	**0.68**	6.53	**16.18**	4.18	**5.46**	2.90	**2.25**	4.0
4.5	6.16	**13.11**	3.35	**2.99**	1.99	**0.84**	7.34	**20.12**	4.70	**6.79**	3.26	**2.80**	4.5
5.0	6.84	**15.94**	3.73	**3.63**	2.21	**1.02**	8.16	**24.45**	5.22	**8.26**	3.63	**3.40**	5.0
5.5	7.53	**19.01**	4.10	**4.33**	2.43	**1.22**	8.98	**29.18**	5.74	**9.85**	3.99	**4.06**	5.5
6.0	8.21	**22.34**	4.47	**5.09**	2.66	**1.43**	9.79	**34.28**	6.27	**11.57**	4.35	**4.77**	6.0
6.5	8.90	**25.91**	4.84	**5.90**	2.88	**1.66**	10.61	**39.75**	6.79	**13.42**	4.71	**5.53**	6.5
7.0	9.58	**29.72**	5.22	**6.77**	3.10	**1.91**	11.42	**45.60**	7.31	**15.40**	5.08	**6.34**	7.0
7.5	10.26	**33.77**	5.59	**7.69**	3.32	**2.17**	12.24	**51.82**	7.83	**17.50**	5.44	**7.20**	7.5
8.0	10.95	**38.05**	5.96	**8.67**	3.54	**2.44**	13.06	**58.40**	8.36	**19.72**	5.80	**8.12**	8.0
8.5	11.63	**42.58**	6.33	**9.70**	3.76	**2.73**	13.87	**65.34**	8.88	**22.06**	6.17	**9.08**	8.5
9.0	12.32	**47.33**	6.71	**10.78**	3.98	**3.04**	14.69	**72.63**	9.40	**24.52**	6.53	**10.10**	9.0
9.5	13.00	**52.31**	7.08	**11.92**	4.21	**3.36**	15.50	**80.28**	9.92	**27.10**	6.89	**11.16**	9.5
10.0	13.69	**57.53**	7.45	**13.10**	4.43	**3.69**	16.32	**88.28**	10.44	**29.81**	7.25	**12.27**	10.0
11	15.05	**68.63**	8.20	**15.63**	4.87	**4.41**	17.95	**105.30**	11.49	**35.56**	7.98	**14.64**	11
12	16.42	**80.63**	8.94	**18.37**	5.31	**5.18**	19.58	**123.70**	12.53	**41.78**	8.70	**17.20**	12
13	17.79	**93.52**	9.69	**21.30**	5.76	**6.00**			13.58	**48.45**	9.43	**19.95**	13
14	19.16	**107.30**	10.43	**24.43**	6.20	**6.89**			14.62	**55.58**	10.15	**22.89**	14
15			11.18	**27.76**	6.64	**7.82**			15.67	**63.16**	10.88	**26.01**	15
16			11.92	**31.29**	7.08	**8.82**			16.71	**71.18**	11.61	**29.31**	16
17			12.67	**35.01**	7.53	**9.87**			17.76	**79.63**	12.33	**32.79**	17
18			13.41	**38.92**	7.97	**10.97**			18.80	**88.53**	13.06	**36.46**	18
19			14.16	**43.02**	8.41	**12.12**			19.85	**97.85**	13.78	**40.30**	19
20			14.90	**47.30**	8.85	**13.33**					14.51	**44.31**	20
21			15.65	**51.78**	9.30	**14.59**					15.23	**48.50**	21
22			16.39	**56.43**	9.74	**15.90**					15.96	**52.87**	22
23			17.14	**61.28**	10.18	**17.27**					16.68	**57.40**	23
24			17.88	**66.30**	10.63	**18.68**					17.41	**62.11**	24
25			18.63	**71.51**	11.07	**20.15**					18.13	**66.99**	25
26			19.37	**76.90**	11.51	**21.67**					18.86	**72.03**	26
27					11.95	**23.24**					19.58	**77.25**	27
28					12.40	**24.86**							28
29					12.84	**26.53**							29
30					13.28	**28.25**							30
31					13.72	**30.01**							31
32					14.17	**31.83**							32
33					14.61	**33.70**							33
34					15.05	**35.61**							34
35					15.49	**37.58**							35
36					15.94	**39.59**							36
37					16.38	**41.65**							37
38					16.82	**43.76**							38
39					17.27	**45.92**							39
40					17.71	**48.12**							40
41					18.15	**50.37**							41
42					18.59	**52.67**							42
43					19.04	**55.02**							43
44					19.48	**57.41**							44
45					19.92	**59.85**							45

Pepco Flexible PVC

C=150

PRESSURE LOSS PER 100 FEET (PSI) SIZES ½" THRU 1"

Pepco Products **IPS Heavy Hose** | Pepco Products **Flexible Irrigation Hose**

Nominal Size	½"		¾"		1"		1"		½"		⅝"		¾"		Nominal Size
Pipe ID	0.546		0.740		0.960		1.000		0.500		.625		0.750		Pipe ID
Pipe OD	0.840		1.050		1.315		1.315		0.680		.825		0.970		Pipe OD
Wall Thick	0.147		0.154		0.179		0.158		0.090		0.100		0.110		Wall Thick
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
0.5	0.68	**0.22**	0.37	**0.05**	0.22	**0.01**	0.20	**0.01**	0.82	**0.34**	0.52	**0.12**	0.36	**0.05**	0.5
1.0	1.37	**0.81**	0.75	**0.18**	0.44	**0.05**	0.41	**0.04**	1.63	**1.24**	1.04	**0.42**	0.73	**0.17**	1.0
1.5	2.05	**1.71**	1.12	**0.39**	0.66	**0.11**	0.61	**0.09**	2.45	**2.63**	1.57	**0.89**	1.09	**0.37**	1.5
2.0	2.74	**2.92**	1.49	**0.67**	0.89	**0.19**	0.82	**0.15**	3.26	**4.48**	2.09	**1.51**	1.45	**0.62**	2.0
2.5	3.42	**4.41**	1.86	**1.01**	1.11	**0.28**	1.02	**0.23**	4.08	**6.77**	2.61	**2.29**	1.81	**0.94**	2.5
3.0	4.11	**6.19**	2.24	**1.41**	1.33	**0.40**	1.22	**0.33**	4.90	**9.50**	3.13	**3.21**	2.18	**1.32**	3.0
3.5	4.79	**8.23**	2.61	**1.87**	1.55	**0.53**	1.43	**0.43**	5.71	**12.63**	3.66	**4.26**	2.54	**1.76**	3.5
4.0	5.47	**10.54**	2.98	**2.40**	1.77	**0.68**	1.63	**0.55**	6.53	**16.18**	4.18	**5.46**	2.90	**2.25**	4.0
4.5	6.16	**13.11**	3.35	**2.99**	1.99	**0.84**	1.84	**0.69**	7.34	**20.12**	4.70	**6.79**	3.26	**2.80**	4.5
5.0	6.84	**15.94**	3.73	**3.63**	2.21	**1.02**	2.04	**0.84**	8.16	**24.45**	5.22	**8.26**	3.63	**3.40**	5.0
5.5	7.53	**19.01**	4.10	**4.33**	2.43	**1.22**	2.24	**1.00**	8.98	**29.18**	5.74	**9.85**	3.99	**4.06**	5.5
6.0	8.21	**22.34**	4.47	**5.09**	2.66	**1.43**	2.45	**1.18**	9.79	**34.28**	6.27	**11.57**	4.35	**4.77**	6.0
6.5	8.90	**25.91**	4.84	**5.90**	2.88	**1.66**	2.65	**1.36**	10.61	**39.75**	6.79	**13.42**	4.71	**5.53**	6.5
7.0	9.58	**29.72**	5.22	**6.77**	3.10	**1.91**	2.86	**1.56**	11.42	**45.60**	7.31	**15.40**	5.08	**6.34**	7.0
7.5	10.26	**33.77**	5.59	**7.69**	3.32	**2.17**	3.06	**1.78**	12.24	**51.82**	7.83	**17.50**	5.44	**7.20**	7.5
8.0	10.95	**38.05**	5.96	**8.67**	3.54	**2.44**	3.26	**2.00**	13.06	**58.40**	8.36	**19.72**	5.80	**8.12**	8.0
8.5	11.63	**42.58**	6.33	**9.70**	3.76	**2.73**	3.47	**2.24**	13.87	**65.34**	8.88	**22.06**	6.17	**9.08**	8.5
9.0	12.32	**47.33**	6.71	**10.78**	3.98	**3.04**	3.67	**2.49**	14.69	**72.63**	9.40	**24.52**	6.53	**10.10**	9.0
9.5	13.00	**52.31**	7.08	**11.92**	4.21	**3.36**	3.88	**2.75**	15.50	**80.28**	9.92	**27.10**	6.89	**11.16**	9.5
10.0	13.69	**57.53**	7.45	**13.10**	4.43	**3.69**	4.08	**3.03**	16.32	**88.28**	10.44	**29.81**	7.25	**12.27**	10.0
11	15.05	**68.63**	8.20	**15.63**	4.87	**4.41**	4.49	**3.61**	17.95	**105.30**	11.49	**35.56**	7.98	**14.64**	11
12	16.42	**80.63**	8.94	**18.37**	5.31	**5.18**	4.90	**4.24**	19.58	**123.70**	12.53	**41.78**	8.70	**17.20**	12
13	17.79	**93.52**	9.69	**21.30**	5.76	**6.00**	5.30	**4.92**			13.58	**48.45**	9.43	**19.95**	13
14	19.16	**107.30**	10.43	**24.43**	6.20	**6.89**	5.71	**5.65**			14.62	**55.58**	10.15	**22.89**	14
15			11.18	**27.76**	6.64	**7.82**	6.12	**6.41**			15.67	**63.16**	10.88	**26.01**	15
16			11.92	**31.29**	7.08	**8.82**	6.53	**7.23**			16.71	**71.18**	11.61	**29.31**	16
17			12.67	**35.01**	7.53	**9.87**	6.94	**8.09**			17.76	**79.63**	12.33	**32.79**	17
18			13.41	**38.92**	7.97	**10.97**	7.34	**8.99**			18.80	**88.53**	13.06	**36.46**	18
19			14.16	**43.02**	8.41	**12.12**	7.75	**9.94**			19.85	**97.85**	13.78	**40.30**	19
20			14.90	**47.30**	8.85	**13.33**	8.16	**10.93**					14.51	**44.31**	20
21			15.65	**51.78**	9.30	**14.59**	8.57	**11.96**					15.23	**48.50**	21
22			16.39	**56.43**	9.74	**15.90**	8.98	**13.04**					15.96	**52.87**	22
23			17.14	**61.28**	10.18	**17.27**	9.38	**14.16**					16.68	**57.40**	23
24			17.88	**66.30**	10.63	**18.68**	9.79	**15.32**					17.41	**62.11**	24
25			18.63	**71.51**	11.07	**20.15**	10.20	**16.52**					18.13	**66.99**	25
26			19.37	**76.90**	11.51	**21.67**	10.61	**17.77**					18.86	**72.03**	26
27					11.95	**23.24**	11.02	**19.05**					19.58	**77.25**	27
28					12.40	**24.86**	11.42	**20.38**							28
29					12.84	**26.53**	11.83	**21.75**							29
30					13.28	**28.25**	12.24	**23.16**							30
31					13.72	**30.01**	12.65	**24.61**							31
32					14.17	**31.83**	13.06	**26.10**							32
33					14.61	**33.70**	13.46	**27.63**							33
34					15.05	**35.61**	13.87	**29.20**							34
35					15.49	**37.58**	14.28	**30.81**							35
36					15.94	**39.59**	14.69	**32.46**							36
37					16.38	**41.65**	15.10	**34.15**							37
38					16.82	**43.76**	15.50	**35.88**							38
39					17.27	**45.92**	15.91	**37.65**							39
40					17.71	**48.12**	16.32	**39.45**							40
41					18.15	**50.37**	16.73	**41.30**							41
42					18.59	**52.67**	17.14	**43.18**							42
43					19.04	**55.02**	17.54	**45.11**							43
44					19.48	**57.41**	17.95	**47.07**							44
45					19.92	**59.85**	18.36	**49.07**							45
46							18.77	**51.11**							46
47							19.18	**53.18**							47
48							19.58	**55.30**							48
49							19.99	**57.45**							49
50															50

Salco Flexible PVC

C=150

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES ½" THRU 1"

Salco **A/R Flex Hose – PVC**

Nominal Size / Pipe ID / Pipe OD / Wall Thick	½" 0.500 0.600 0.090		¾" 0.750 0.150 0.150		1" 1.000 0.135 0.158		Nominal Size / Pipe ID / Pipe OD / Wall Thick
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
0.5	0.82	**0.34**	0.36	**0.05**	0.20	**0.01**	0.5
1.0	1.63	**1.24**	0.73	**0.17**	0.41	**0.04**	1.0
1.5	2.45	**2.63**	1.09	**0.37**	0.61	**0.09**	1.5
2.0	3.26	**4.48**	1.45	**0.62**	0.82	**0.15**	2.0
2.5	4.08	**6.77**	1.81	**0.94**	1.02	**0.23**	2.5
3.0	4.90	**9.50**	2.18	**1.32**	1.22	**0.33**	3.0
3.5	5.71	**12.63**	2.54	**1.76**	1.43	**0.43**	3.5
4.0	6.53	**16.18**	2.90	**2.25**	1.63	**0.55**	4.0
4.5	7.34	**20.12**	3.26	**2.80**	1.84	**0.69**	4.5
5.0	8.16	**24.45**	3.63	**3.40**	2.04	**0.84**	5.0
5.5	8.98	**29.18**	3.99	**4.06**	2.24	**1.00**	5.5
6.0	9.79	**34.28**	4.35	**4.77**	2.45	**1.18**	6.0
6.5	10.61	**39.75**	4.71	**5.53**	2.65	**1.36**	6.5
7.0	11.42	**45.60**	5.08	**6.34**	2.86	**1.56**	7.0
7.5	12.24	**51.82**	5.44	**7.20**	3.06	**1.78**	7.5
8.0	13.06	**58.40**	5.80	**8.12**	3.26	**2.00**	8.0
8.5	13.87	**65.34**	6.17	**9.08**	3.47	**2.24**	8.5
9.0	14.69	**72.63**	6.53	**10.10**	3.67	**2.49**	9.0
9.5	15.50	**80.28**	6.89	**11.16**	3.88	**2.75**	9.5
10.0	16.32	**88.28**	7.25	**12.27**	4.08	**3.03**	10.0
11	17.95	**105.30**	7.98	**14.64**	4.49	**3.61**	11
12	19.58	**123.70**	8.70	**17.20**	4.90	**4.24**	12
13			9.43	**19.95**	5.30	**4.92**	13
14			10.15	**22.89**	5.71	**5.65**	14
15			10.88	**26.01**	6.12	**6.41**	15
16			11.61	**29.31**	6.53	**7.23**	16
17			12.33	**32.79**	6.94	**8.09**	17
18			13.06	**36.46**	7.34	**8.99**	18
19			13.78	**40.30**	7.75	**9.94**	19
20			14.51	**44.31**	8.16	**10.93**	20
21			15.23	**48.50**	8.57	**11.96**	21
22			15.96	**52.87**	8.98	**13.04**	22
23			16.68	**57.40**	9.38	**14.16**	23
24			17.41	**62.11**	9.79	**15.32**	24
25			18.13	**66.99**	10.20	**16.52**	25
26			18.86	**72.03**	10.61	**17.77**	26
27			19.58	**77.25**	11.02	**19.05**	27
28					11.42	**20.38**	28
29					11.83	**21.75**	29
30					12.24	**23.16**	30
31					12.65	**24.61**	31
32					13.06	**26.10**	32
33					13.46	**27.63**	33
34					13.87	**29.20**	34
35					14.28	**30.81**	35
36					14.69	**32.46**	36
37					15.10	**34.15**	37
38					15.50	**35.88**	38
39					15.91	**37.65**	39
40					16.32	**39.45**	40
41					16.73	**41.30**	41
42					17.14	**43.18**	42
43					17.54	**45.11**	43
44					17.95	**47.07**	44
45					18.36	**49.07**	45
46					18.77	**51.11**	46
47					19.18	**53.18**	47
48					19.58	**55.30**	48
49					19.99	**57.45**	49
50							50

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

AWWA Standard C900 - Class 100 PVC

C=150 SDR 25

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 4" THRU 12"

Nominal Size	4"		6"		8"		10"		12"		Nominal Size
Pipe ID*	4.39		6.31		8.28		10.15		12.08		Pipe ID
Pipe OD	4.80		6.90		9.05		11.10		13.20		Pipe OD
Wall Thick	0.192		0.276		0.362		0.444		0.528		Wall Thick
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Flow GPM
30	0.64	**0.02**									30
35	0.74	**0.02**	0.36	**0.00**							35
40	0.85	**0.03**	0.41	**0.01**							40
45	0.95	**0.04**	0.46	**0.01**							45
50	1.06	**0.04**	0.51	**0.01**							50
60	1.27	**0.06**	0.62	**0.01**							60
70	1.48	**0.08**	0.72	**0.01**							70
80	1.69	**0.11**	0.82	**0.02**	0.48	**0.00**					80
90	1.91	**0.13**	0.93	**0.02**	0.54	**0.01**					90
100	2.12	**0.16**	1.03	**0.03**	0.60	**0.01**					100
125	2.65	**0.24**	1.28	**0.04**	0.74	**0.01**	0.49	**0.00**			125
150	3.18	**0.34**	1.54	**0.06**	0.89	**0.02**	0.59	**0.01**			150
175	3.70	**0.45**	1.80	**0.08**	1.04	**0.02**	0.69	**0.01**			175
200	4.23	**0.58**	2.06	**0.10**	1.19	**0.03**	0.79	**0.01**	0.56	**0.00**	200
225	4.76	**0.72**	2.31	**0.12**	1.34	**0.03**	0.89	**0.01**	0.63	**0.01**	225
250	5.29	**0.88**	2.57	**0.15**	1.49	**0.04**	0.99	**0.01**	0.70	**0.01**	250
275	5.82	**1.05**	2.83	**0.18**	1.64	**0.05**	1.09	**0.02**	0.77	**0.01**	275
300	6.35	**1.23**	3.08	**0.21**	1.79	**0.06**	1.19	**0.02**	0.84	**0.01**	300
325	6.88	**1.43**	3.34	**0.25**	1.93	**0.07**	1.28	**0.02**	0.91	**0.01**	325
350	7.41	**1.64**	3.60	**0.28**	2.08	**0.07**	1.38	**0.03**	0.98	**0.01**	350
400	8.47	**2.10**	4.11	**0.36**	2.38	**0.10**	1.58	**0.04**	1.12	**0.02**	400
450	9.53	**2.61**	4.63	**0.45**	2.68	**0.12**	1.78	**0.04**	1.26	**0.02**	450
500	10.59	**3.17**	5.14	**0.55**	2.98	**0.14**	1.98	**0.05**	1.40	**0.02**	500
600	12.70	**4.45**	6.17	**0.77**	3.57	**0.20**	2.37	**0.07**	1.68	**0.03**	600
700	14.82	**5.91**	7.20	**1.02**	4.17	**0.27**	2.77	**0.10**	1.96	**0.04**	700
800	16.94	**7.57**	8.22	**1.31**	4.76	**0.35**	3.16	**0.13**	2.24	**0.05**	800
900	19.05	**9.42**	9.25	**1.62**	5.36	**0.43**	3.56	**0.16**	2.52	**0.07**	900
1000			10.28	**1.97**	5.95	**0.52**	3.95	**0.19**	2.80	**0.08**	1000
1100			11.31	**2.36**	6.55	**0.62**	4.35	**0.23**	3.08	**0.10**	1100
1300			13.36	**3.21**	7.74	**0.85**	5.14	**0.31**	3.63	**0.14**	1300
1400			14.39	**3.68**	8.33	**0.97**	5.53	**0.36**	3.91	**0.16**	1400
1500			15.42	**4.18**	8.93	**1.11**	5.93	**0.41**	4.19	**0.18**	1500
1600			16.45	**4.72**	9.52	**1.25**	6.32	**0.46**	4.47	**0.20**	1600
1700			17.48	**5.28**	10.12	**1.40**	6.72	**0.52**	4.75	**0.22**	1700
1800			18.50	**5.86**	10.71	**1.55**	7.11	**0.57**	5.03	**0.25**	1800
1900			19.53	**6.48**	11.31	**1.71**	7.51	**0.63**	5.31	**0.27**	1900
2000					11.90	**1.89**	7.91	**0.70**	5.59	**0.30**	2000
2100					12.50	**2.06**	8.30	**0.76**	5.87	**0.33**	2100
2200					13.09	**2.25**	8.70	**0.83**	6.15	**0.36**	2200
2300					13.69	**2.44**	9.09	**0.90**	6.43	**0.39**	2300
2400					14.28	**2.64**	9.49	**0.98**	6.71	**0.42**	2400
2600					15.47	**3.07**	10.28	**1.13**	7.27	**0.49**	2600
2800					16.66	**3.52**	11.07	**1.30**	7.83	**0.56**	2800
3000					17.85	**4.00**	11.86	**1.48**	8.39	**0.64**	3000
3200					19.04	**4.50**	12.65	**1.66**	8.95	**0.72**	3200
3400							13.44	**1.86**	9.51	**0.80**	3400
3600							14.23	**2.07**	10.07	**0.89**	3600
3800							15.02	**2.29**	10.62	**0.99**	3800
4000							15.81	**2.51**	11.18	**1.08**	4000
4200							16.60	**2.75**	11.74	**1.19**	4200
4400							17.39	**3.00**	12.30	**1.29**	4400
4600							18.18	**3.26**	12.86	**1.40**	4600
4800							18.97	**3.53**	13.42	**1.52**	4800
5000							19.76	**3.80**	13.98	**1.64**	5000
5200									14.54	**1.76**	5200
5400									15.10	**1.89**	5400
5600									15.66	**2.02**	5600
5800									16.22	**2.16**	5800
6000									16.78	**2.30**	6000
6200									17.33	**2.44**	6200
6400									17.89	**2.59**	6400
6700									18.73	**2.82**	6700
7000									19.57	**3.05**	7000

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

* These figures allow for manufacturing tolerances.
For operation at temperatures 80°F or higher see chart on page 108.

AWWA Standard C900 - Class 150 PVC

C=150 SDR 18

PRESSURE LOSS PER 100 FEET (PSI) SIZES 4" THRU 12"

Nominal Size	4"		6"		8"		10"		12"		Nominal Size
Pipe ID*	4.23		6.08		7.98		9.78		11.64		Pipe ID
Pipe OD	4.80		6.90		9.05		11.10		13.20		Pipe OD
Wall Thick	0.267		0.383		0.503		0.617		0.733		Wall Thick
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Flow GPM
30	0.68	**0.02**									30
35	0.80	**0.03**	0.39	**0.00**							35
40	0.91	**0.04**	0.44	**0.01**							40
45	1.03	**0.04**	0.50	**0.01**							45
50	1.14	**0.05**	0.55	**0.01**							50
60	1.37	**0.07**	0.66	**0.01**							60
70	1.60	**0.10**	0.77	**0.02**	0.45	**0.00**					70
80	1.82	**0.13**	0.88	**0.02**	0.51	**0.01**					80
90	2.05	**0.16**	0.99	**0.03**	0.58	**0.01**					90
100	2.28	**0.19**	1.10	**0.03**	0.64	**0.01**					100
125	2.85	**0.29**	1.38	**0.05**	0.80	**0.01**	0.53	**0.00**			125
150	3.42	**0.41**	1.65	**0.07**	0.96	**0.02**	0.64	**0.01**			150
175	3.99	**0.54**	1.93	**0.09**	1.12	**0.02**	0.74	**0.01**	0.53	**0.00**	175
200	4.56	**0.70**	2.20	**0.12**	1.28	**0.03**	0.85	**0.01**	0.60	**0.01**	200
225	5.13	**0.87**	2.48	**0.15**	1.44	**0.04**	0.96	**0.01**	0.68	**0.01**	225
250	5.70	**1.05**	2.75	**0.18**	1.60	**0.05**	1.06	**0.02**	0.75	**0.01**	250
275	6.27	**1.26**	3.03	**0.21**	1.76	**0.06**	1.17	**0.02**	0.83	**0.01**	275
300	6.84	**1.48**	3.30	**0.25**	1.92	**0.07**	1.28	**0.02**	0.90	**0.01**	300
325	7.41	**1.71**	3.58	**0.29**	2.08	**0.08**	1.38	**0.03**	0.98	**0.01**	325
350	7.98	**1.96**	3.85	**0.33**	2.24	**0.09**	1.49	**0.03**	1.05	**0.01**	350
400	9.12	**2.51**	4.40	**0.43**	2.56	**0.11**	1.70	**0.04**	1.20	**0.02**	400
450	10.26	**3.13**	4.95	**0.53**	2.88	**0.14**	1.92	**0.05**	1.35	**0.02**	450
500	11.40	**3.80**	5.50	**0.65**	3.20	**0.17**	2.13	**0.06**	1.50	**0.03**	500
600	13.68	**5.33**	6.60	**0.90**	3.84	**0.24**	2.55	**0.09**	1.80	**0.04**	600
700	15.96	**7.09**	7.70	**1.20**	4.48	**0.32**	2.98	**0.12**	2.10	**0.05**	700
800	18.24	**9.07**	8.80	**1.54**	5.13	**0.41**	3.41	**0.15**	2.40	**0.07**	800
900			9.90	**1.92**	5.77	**0.51**	3.83	**0.19**	2.71	**0.08**	900
1000			11.00	**2.33**	6.41	**0.63**	4.26	**0.23**	3.01	**0.10**	1000
1100			12.10	**2.78**	7.05	**0.75**	4.68	**0.28**	3.31	**0.12**	1100
1300			14.30	**3.79**	8.33	**1.02**	5.53	**0.38**	3.91	**0.16**	1300
1400			15.40	**4.34**	8.97	**1.17**	5.96	**0.43**	4.21	**0.18**	1400
1500			16.50	**4.93**	9.61	**1.32**	6.39	**0.49**	4.51	**0.21**	1500
1600			17.60	**5.56**	10.25	**1.49**	6.81	**0.55**	4.81	**0.24**	1600
1700			18.70	**6.22**	10.89	**1.67**	7.24	**0.62**	5.11	**0.26**	1700
1800			19.80	**6.92**	11.53	**1.86**	7.66	**0.69**	5.41	**0.29**	1800
1900					12.17	**2.05**	8.09	**0.76**	5.71	**0.33**	1900
2000					12.81	**2.26**	8.51	**0.83**	6.01	**0.36**	2000
2100					13.45	**2.47**	8.94	**0.91**	6.31	**0.39**	2100
2200					14.10	**2.69**	9.37	**1.00**	6.61	**0.43**	2200
2300					14.74	**2.92**	9.79	**1.08**	6.91	**0.46**	2300
2400					15.38	**3.16**	10.22	**1.17**	7.21	**0.50**	2400
2500					16.02	**3.41**	10.64	**1.26**	7.52	**0.54**	2500
2600					16.66	**3.67**	11.07	**1.36**	7.82	**0.58**	2600
2800					17.94	**4.21**	11.92	**1.56**	8.42	**0.67**	2800
3000					19.22	**4.78**	12.77	**1.77**	9.02	**0.76**	3000
3200							13.62	**1.99**	9.62	**0.85**	3200
3400							14.47	**2.23**	10.22	**0.96**	3400
3600							15.32	**2.48**	10.82	**1.06**	3600
3800							16.18	**2.74**	11.42	**1.18**	3800
4000							17.03	**3.01**	12.02	**1.29**	4000
4200							17.88	**3.30**	12.63	**1.41**	4200
4400							18.73	**3.59**	13.23	**1.54**	4400
4600							19.58	**3.90**	13.83	**1.67**	4600
4800									14.43	**1.81**	4800
5000									15.03	**1.95**	5000
5200									15.63	**2.10**	5200
5400									16.23	**2.25**	5400
5600									16.83	**2.41**	5600
5800									17.44	**2.57**	5800
6000									18.04	**2.74**	6000
6200									18.64	**2.91**	6200
6400									19.24	**3.09**	6400
6600									19.84	**3.27**	6600

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

* These figures allow for manufacturing tolerances.
For operation at temperatures 80˚F or higher see chart on page 108.

AWWA Standard C900 - Class 200 PVC

C=150 SDR 14

PRESSURE LOSS PER 100 FEET (PSI) SIZES 4" THRU 12"

Nominal Size	4"		6"		8"		10"		12"		Nominal Size
Pipe ID*	4.07		5.85		7.67		9.41		11.19		Pipe ID
Pipe OD	4.80		6.90		9.05		11.10		13.20		Pipe OD
Wall Thick	0.343		0.493		0.646		0.793		0.943		Wall Thick
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Flow GPM
30	0.74	**0.03**	0.36	**0.00**							30
35	0.86	**0.03**	0.42	**0.01**							35
40	0.99	**0.04**	0.48	**0.01**							40
45	1.11	**0.05**	0.53	**0.01**							45
50	1.23	**0.06**	0.59	**0.01**							50
60	1.48	**0.09**	0.71	**0.02**							60
70	1.72	**0.12**	0.83	**0.02**	0.46	**0.00**					70
80	1.97	**0.15**	0.95	**0.03**	0.53	**0.01**					80
90	2.22	**0.19**	1.07	**0.03**	0.59	**0.01**					90
100	2.46	**0.23**	1.19	**0.04**	0.66	**0.01**	0.46	**0.00**			100
125	3.08	**0.35**	1.49	**0.06**	0.82	**0.01**	0.57	**0.01**			125
150	3.69	**0.49**	1.78	**0.08**	0.99	**0.02**	0.69	**0.01**			150
175	4.31	**0.66**	2.08	**0.11**	1.15	**0.03**	0.80	**0.01**	0.57	**0.00**	175
200	4.93	**0.84**	2.38	**0.14**	1.31	**0.03**	0.92	**0.01**	0.65	**0.01**	200
225	5.54	**1.04**	2.67	**0.18**	1.48	**0.04**	1.03	**0.02**	0.73	**0.01**	225
250	6.16	**1.27**	2.97	**0.22**	1.64	**0.05**	1.15	**0.02**	0.81	**0.01**	250
275	6.77	**1.52**	3.27	**0.26**	1.81	**0.06**	1.26	**0.03**	0.89	**0.01**	275
300	7.39	**1.78**	3.56	**0.30**	1.97	**0.07**	1.38	**0.03**	0.98	**0.01**	300
325	8.00	**2.06**	3.86	**0.35**	2.14	**0.08**	1.49	**0.03**	1.06	**0.01**	325
350	8.62	**2.37**	4.16	**0.40**	2.30	**0.10**	1.61	**0.04**	1.14	**0.02**	350
375	9.24	**2.69**	4.46	**0.46**	2.46	**0.11**	1.72	**0.05**	1.22	**0.02**	375
400	9.85	**3.03**	4.75	**0.51**	2.63	**0.12**	1.84	**0.05**	1.30	**0.02**	400
425	10.47	**3.39**	5.05	**0.58**	2.79	**0.14**	1.95	**0.06**	1.38	**0.02**	425
450	11.08	**3.77**	5.35	**0.64**	2.96	**0.15**	2.07	**0.06**	1.46	**0.03**	450
475	11.70	**4.17**	5.64	**0.71**	3.12	**0.17**	2.18	**0.07**	1.54	**0.03**	475
500	12.32	**4.58**	5.94	**0.78**	3.29	**0.18**	2.30	**0.08**	1.63	**0.03**	500
550	13.55	**5.47**	6.53	**0.93**	3.61	**0.22**	2.53	**0.09**	1.79	**0.04**	550
600	14.78	**6.43**	7.13	**1.09**	3.94	**0.26**	2.76	**0.11**	1.95	**0.05**	600
650	16.01	**7.45**	7.72	**1.26**	4.27	**0.30**	2.99	**0.13**	2.11	**0.05**	650
700	17.24	**8.55**	8.32	**1.45**	4.60	**0.34**	3.22	**0.14**	2.28	**0.06**	700
800	19.70	**10.95**	9.51	**1.86**	5.26	**0.44**	3.68	**0.18**	2.60	**0.08**	800
900			10.69	**2.31**	5.91	**0.55**	4.14	**0.23**	2.93	**0.10**	900
1000			11.88	**2.81**	6.57	**0.66**	4.60	**0.28**	3.25	**0.12**	1000
1100			13.07	**3.35**	7.23	**0.79**	5.06	**0.33**	3.58	**0.14**	1100
1200			14.26	**3.94**	7.88	**0.93**	5.52	**0.39**	3.90	**0.17**	1200
1300			15.45	**4.57**	8.54	**1.08**	5.98	**0.45**	4.23	**0.20**	1300
1400			16.63	**5.24**	9.20	**1.24**	6.44	**0.52**	4.55	**0.22**	1400
1500			17.82	**5.95**	9.86	**1.41**	6.90	**0.59**	4.88	**0.25**	1500
1600			19.01	**6.71**	10.51	**1.59**	7.36	**0.67**	5.20	**0.29**	1600
1700					11.17	**1.78**	7.82	**0.74**	5.53	**0.32**	1700
1800					11.83	**1.97**	8.28	**0.83**	5.85	**0.36**	1800
2000					13.14	**2.40**	9.20	**1.01**	6.51	**0.43**	2000
2200					14.46	**2.86**	10.12	**1.20**	7.16	**0.52**	2200
2400					15.77	**3.36**	11.03	**1.41**	7.81	**0.61**	2400
2600					17.08	**3.90**	11.95	**1.64**	8.46	**0.70**	2600
2800					18.40	**4.47**	12.87	**1.88**	9.11	**0.81**	2800
3000					19.71	**5.08**	13.79	**2.13**	9.76	**0.92**	3000
3200							14.71	**2.40**	10.41	**1.04**	3200
3400							15.63	**2.69**	11.06	**1.16**	3400
3600							16.55	**2.99**	11.71	**1.29**	3600
3800							17.47	**3.30**	12.36	**1.42**	3800
4000							18.39	**3.63**	13.01	**1.57**	4000
4200							19.31	**3.98**	13.66	**1.71**	4200
4400									14.31	**1.87**	4400
4600									14.96	**2.03**	4600
4800									15.61	**2.19**	4800
5000									16.26	**2.37**	5000
5200									16.91	**2.54**	5200
5400									17.56	**2.73**	5400
5600									18.21	**2.92**	5600
5800									18.86	**3.11**	5800
6000									19.52	**3.32**	6000

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

* These figures allow for manufacturing tolerances.
For operation at temperatures 80˚F or higher see chart on page 108.

AWWA Standard C905 - Class 100 PVC

C=150 SDR 41

PRESSURE LOSS PER 100 FEET OF PIPE (PSI)

Nominal Size	30"
Pipe ID*	30.15
Pipe OD	32.00
Wall Thick	0.780
Flow GPM	Velocity FPS / PSI LOSS
2500	1.11 **0.00**
3000	1.33 **0.00**
3500	1.55 **0.00**
4000	1.77 **0.01**
4500	1.99 **0.02**
5000	2.21 **0.02**
5500	2.44 **0.02**
6000	2.66 **0.03**
6500	2.88 **0.03**
7000	3.10 **0.03**
7500	3.32 **0.04**
8000	3.54 **0.04**
8500	3.76 **0.05**
9000	3.99 **0.05**
9500	4.21 **0.06**
10000	4.43 **0.07**
10500	4.65 **0.07**
11000	4.87 **0.08**
11500	5.09 **0.09**
12000	5.32 **0.09**
12500	5.54 **0.10**
13000	5.76 **0.11**
13500	5.98 **0.12**
14000	6.20 **0.12**
14500	6.42 **0.13**
15000	6.64 **0.14**
15500	6.87 **0.15**
16000	7.09 **0.16**
16500	7.31 **0.17**
17000	7.53 **0.18**
17500	7.75 **0.19**
18000	7.97 **0.20**
18500	8.19 **0.21**
19000	8.42 **0.22**
19500	8.64 **0.23**
20000	8.86 **0.24**
20500	9.08 **0.25**
21000	9.30 **0.26**
21500	9.52 **0.28**
22000	9.74 **0.29**
22500	9.97 **0.30**
23000	10.19 **0.31**
23500	10.41 **0.33**
24000	10.63 **0.34**
24500	10.85 **0.35**
25000	11.07 **0.36**
25500	11.29 **0.38**
26000	11.52 **0.39**
26500	11.74 **0.41**
27000	11.96 **0.42**
28000	12.40 **0.45**
29000	12.85 **0.48**
30000	13.29 **0.51**
31000	13.73 **0.54**
32000	14.17 **0.58**
33000	14.62 **0.61**
34000	15.06 **0.64**
35000	15.50 **0.68**
36000	15.95 **0.72**
37000	16.39 **0.75**
38000	16.83 **0.79**
40000	17.72 **0.87**
42000	18.60 **0.95**
44000	19.49 **1.04**

* These figures allow for manufacturing tolerances.
For operation at temperatures 80°F or higher see above chart.

FOR OPERATION AT TEMPERATURES 80° OR HIGHER, MULTIPLY THE PRESSURE CLASS BY THESE DERATING FACTORS:

Temperature	Derating Factor
80°	0.88
90°	0.75
100°	0.62
110°	0.50
120°	0.40
140°	0.22

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

AWWA Standard C905 - Class 165 PVC

C=150 SDR 25

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 14" THRU 30"

Nominal Size	14"		16"		18"		20"		24"		30"		Nominal Size
Pipe ID*	13.99		15.91		17.83		19.75		23.59		29.11		Pipe ID
Pipe OD	15.30		17.40		19.50		21.60		25.80		32.00		Pipe OD
Wall Thick	0.612		0.696		0.780		0.864		1.032		1.280		Wall Thick
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Flow GPM
400	0.82	**0.01**	0.64	**0.00**									400
600	1.23	**0.02**	0.96	**0.01**	0.76	**0.00**							600
800	1.65	**0.03**	1.27	**0.01**	1.01	**0.01**	0.83	**0.00**					800
1000	2.06	**0.04**	1.59	**0.02**	1.27	**0.01**	1.03	**0.01**					1000
1200	2.47	**0.06**	1.91	**0.03**	1.52	**0.02**	1.24	**0.01**	0.87	**0.00**			1200
1400	2.88	**0.07**	2.23	**0.04**	1.77	**0.02**	1.45	**0.01**	1.01	**0.01**			1400
1600	3.29	**0.09**	2.55	**0.05**	2.03	**0.03**	1.65	**0.02**	1.16	**0.01**			1600
1800	3.70	**0.12**	2.87	**0.06**	2.28	**0.04**	1.86	**0.02**	1.30	**0.01**			1800
2000	4.12	**0.14**	3.18	**0.08**	2.54	**0.04**	2.07	**0.03**	1.45	**0.01**			2000
2200	4.53	**0.17**	3.50	**0.09**	2.79	**0.05**	2.27	**0.03**	1.59	**0.01**	1.05	**0.00**	2200
2400	4.94	**0.20**	3.82	**0.11**	3.04	**0.06**	2.48	**0.04**	1.74	**0.02**	1.14	**0.01**	2400
2600	5.35	**0.23**	4.14	**0.12**	3.30	**0.07**	2.69	**0.04**	1.88	**0.02**	1.24	**0.01**	2600
2800	5.76	**0.27**	4.46	**0.14**	3.55	**0.08**	2.89	**0.05**	2.03	**0.02**	1.33	**0.01**	2800
3000	6.17	**0.30**	4.78	**0.16**	3.80	**0.09**	3.10	**0.06**	2.17	**0.02**	1.43	**0.01**	3000
3200	6.59	**0.34**	5.09	**0.18**	4.06	**0.10**	3.31	**0.06**	2.32	**0.03**	1.52	**0.01**	3200
3500	7.20	**0.40**	5.57	**0.21**	4.44	**0.12**	3.62	**0.08**	2.53	**0.03**	1.67	**0.01**	3500
4000	8.23	**0.51**	6.37	**0.28**	5.07	**0.16**	4.13	**0.10**	2.90	**0.04**	1.90	**0.01**	4000
4500	9.26	**0.64**	7.16	**0.34**	5.70	**0.20**	4.65	**0.12**	3.26	**0.05**	2.14	**0.02**	4500
5000	10.29	**0.78**	7.96	**0.42**	6.34	**0.24**	5.17	**0.15**	3.62	**0.06**	2.38	**0.02**	5000
5500	11.32	**0.93**	8.75	**0.50**	6.97	**0.29**	5.68	**0.17**	3.98	**0.07**	2.62	**0.03**	5500
6000	12.35	**1.09**	9.55	**0.58**	7.61	**0.34**	6.20	**0.20**	4.34	**0.09**	2.86	**0.03**	6000
6500	13.38	**1.26**	10.35	**0.68**	8.24	**0.39**	6.72	**0.24**	4.71	**0.10**	3.09	**0.04**	6500
7000	14.41	**1.45**	11.14	**0.78**	8.87	**0.45**	7.23	**0.27**	5.07	**0.11**	3.33	**0.04**	7000
7500	15.44	**1.65**	11.94	**0.88**	9.51	**0.51**	7.75	**0.31**	5.43	**0.13**	3.57	**0.05**	7500
8000	16.46	**1.86**	12.73	**0.99**	10.14	**0.57**	8.27	**0.35**	5.79	**0.15**	3.81	**0.05**	8000
8500	17.49	**2.08**	13.53	**1.11**	10.78	**0.64**	8.78	**0.39**	6.15	**0.16**	4.05	**0.06**	8500
9000	18.52	**2.31**	14.33	**1.24**	11.41	**0.71**	9.30	**0.43**	6.52	**0.18**	4.28	**0.07**	9000
9500	19.55	**2.55**	15.12	**1.37**	12.04	**0.78**	9.82	**0.48**	6.88	**0.20**	4.52	**0.07**	9500
10000			15.92	**1.50**	12.68	**0.86**	10.33	**0.52**	7.24	**0.22**	4.76	**0.08**	10000
10500			16.71	**1.64**	13.31	**0.94**	10.85	**0.57**	7.60	**0.24**	5.00	**0.09**	10500
11000			17.51	**1.79**	13.94	**1.03**	11.37	**0.63**	7.96	**0.26**	5.23	**0.09**	11000
11500			18.31	**1.94**	14.58	**1.12**	11.88	**0.68**	8.33	**0.29**	5.47	**0.10**	11500
12000			19.10	**2.10**	15.21	**1.21**	12.40	**0.74**	8.69	**0.31**	5.71	**0.11**	12000
12500			19.90	**2.27**	15.85	**1.30**	12.92	**0.79**	9.05	**0.33**	5.95	**0.12**	12500
13000					16.48	**1.40**	13.43	**0.85**	9.41	**0.36**	6.19	**0.13**	13000
14000					17.75	**1.61**	14.47	**0.98**	10.14	**0.41**	6.66	**0.15**	14000
15000					19.02	**1.83**	15.50	**1.11**	10.86	**0.47**	7.14	**0.17**	15000
16000							16.53	**1.25**	11.58	**0.53**	7.61	**0.19**	16000
17000							17.57	**1.40**	12.31	**0.59**	8.09	**0.21**	17000
18000							18.60	**1.56**	13.03	**0.66**	8.57	**0.24**	18000
19000							19.63	**1.72**	13.75	**0.72**	9.04	**0.26**	19000
20000									14.48	**0.80**	9.52	**0.29**	20000
21000									15.20	**0.87**	9.99	**0.31**	21000
22000									15.93	**0.95**	10.47	**0.34**	22000
23000									16.65	**1.03**	10.95	**0.37**	23000
24000									17.37	**1.12**	11.42	**0.40**	24000
25000									18.10	**1.20**	11.90	**0.43**	25000
26000									18.82	**1.30**	12.37	**0.47**	26000
27000									19.55	**1.39**	12.85	**0.50**	27000
28000											13.33	**0.54**	28000
29000											13.80	**0.57**	29000
30000											14.28	**0.61**	30000
31000											14.75	**0.65**	31000
32000											15.23	**0.69**	32000
33000											15.70	**0.73**	33000
34000											16.18	**0.77**	34000
35000											16.66	**0.81**	35000
36000											17.13	**0.85**	36000
37000											17.61	**0.90**	37000
38000											18.08	**0.94**	38000
39000											18.56	**0.99**	39000
40000											19.04	**1.04**	40000
41000											19.51	**1.09**	41000
42000											19.99	**1.13**	42000

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

* These figures allow for manufacturing tolerances.
For operation at temperatures 80°F or higher see chart on page 108.

AWWA Standard C905 - Class 235 PVC

C=150 SDR 18

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 14" THRU 24"

Nominal Size	14"		16"		18"		20"		24"		Nominal Size
Pipe ID*	13.48		15.33		17.18		19.03		22.56		Pipe ID
Pipe OD	15.30		17.40		19.50		21.60		25.80		Pipe OD
Wall Thick	0.850		0.967		1.083		1.200		1.433		Wall Thick
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Flow GPM
400	0.88	**0.01**	0.68	**0.00**							400
500	1.10	**0.01**	0.85	**0.01**	0.68	**0.00**					500
600	1.32	**0.02**	1.02	**0.01**	0.82	**0.01**					600
700	1.54	**0.02**	1.19	**0.01**	0.95	**0.01**	0.77	**0.00**			700
800	1.76	**0.03**	1.37	**0.02**	1.09	**0.01**	0.89	**0.01**			800
900	1.99	**0.04**	1.54	**0.02**	1.22	**0.01**	1.00	**0.01**			900
1000	2.21	**0.05**	1.71	**0.03**	1.36	**0.01**	1.11	**0.01**			1000
1100	2.43	**0.06**	1.88	**0.03**	1.49	**0.02**	1.22	**0.01**	0.87	**0.00**	1100
1200	2.65	**0.07**	2.05	**0.04**	1.63	**0.02**	1.33	**0.01**	0.95	**0.01**	1200
1300	2.87	**0.08**	2.22	**0.04**	1.77	**0.02**	1.44	**0.01**	1.02	**0.01**	1300
1400	3.09	**0.09**	2.39	**0.05**	1.90	**0.03**	1.55	**0.02**	1.10	**0.01**	1400
1500	3.31	**0.10**	2.56	**0.05**	2.04	**0.03**	1.66	**0.02**	1.18	**0.01**	1500
1600	3.53	**0.11**	2.73	**0.06**	2.17	**0.03**	1.77	**0.02**	1.26	**0.01**	1600
1700	3.75	**0.12**	2.90	**0.07**	2.31	**0.04**	1.88	**0.02**	1.34	**0.01**	1700
1800	3.97	**0.14**	3.07	**0.07**	2.45	**0.04**	1.99	**0.03**	1.42	**0.01**	1800
2000	4.41	**0.17**	3.41	**0.09**	2.72	**0.05**	2.21	**0.03**	1.58	**0.01**	2000
2200	4.85	**0.20**	3.76	**0.11**	2.99	**0.06**	2.43	**0.04**	1.73	**0.02**	2200
2400	5.29	**0.24**	4.10	**0.13**	3.26	**0.07**	2.66	**0.04**	1.89	**0.02**	2400
2600	5.74	**0.27**	4.44	**0.15**	3.53	**0.08**	2.88	**0.05**	2.05	**0.02**	2600
2800	6.18	**0.31**	4.78	**0.17**	3.80	**0.10**	3.10	**0.06**	2.21	**0.03**	2800
3000	6.62	**0.36**	5.12	**0.19**	4.08	**0.11**	3.32	**0.07**	2.36	**0.03**	3000
3200	7.06	**0.40**	5.46	**0.22**	4.35	**0.12**	3.54	**0.08**	2.52	**0.03**	3200
3400	7.50	**0.45**	5.80	**0.24**	4.62	**0.14**	3.76	**0.08**	2.68	**0.04**	3400
3600	7.94	**0.50**	6.15	**0.27**	4.89	**0.15**	3.98	**0.09**	2.84	**0.04**	3600
3800	8.38	**0.55**	6.49	**0.30**	5.16	**0.17**	4.21	**0.10**	2.99	**0.05**	3800
4000	8.82	**0.61**	6.83	**0.33**	5.43	**0.19**	4.43	**0.11**	3.15	**0.05**	4000
4200	9.26	**0.67**	7.17	**0.36**	5.71	**0.20**	4.65	**0.12**	3.31	**0.05**	4200
4400	9.71	**0.73**	7.51	**0.39**	5.98	**0.22**	4.87	**0.14**	3.47	**0.06**	4400
4600	10.15	**0.79**	7.85	**0.42**	6.25	**0.24**	5.09	**0.15**	3.62	**0.06**	4600
4800	10.59	**0.85**	8.19	**0.46**	6.52	**0.26**	5.31	**0.16**	3.78	**0.07**	4800
5000	11.03	**0.92**	8.54	**0.49**	6.79	**0.28**	5.53	**0.17**	3.94	**0.08**	5000
5200	11.47	**0.99**	8.88	**0.53**	7.06	**0.30**	5.76	**0.18**	4.10	**0.08**	5200
5400	11.91	**1.06**	9.22	**0.57**	7.34	**0.33**	5.98	**0.20**	4.25	**0.09**	5400
5600	12.35	**1.13**	9.56	**0.61**	7.61	**0.35**	6.20	**0.21**	4.41	**0.09**	5600
5800	12.79	**1.21**	9.90	**0.65**	7.88	**0.37**	6.42	**0.23**	4.57	**0.10**	5800
6000	13.24	**1.29**	10.24	**0.69**	8.15	**0.40**	6.64	**0.24**	4.73	**0.11**	6000
6200	13.68	**1.37**	10.58	**0.73**	8.42	**0.42**	6.86	**0.26**	4.88	**0.11**	6200
6400	14.12	**1.45**	10.92	**0.78**	8.69	**0.45**	7.08	**0.27**	5.04	**0.12**	6400
6600	14.56	**1.54**	11.27	**0.82**	8.97	**0.47**	7.30	**0.29**	5.20	**0.13**	6600
6800	15.00	**1.63**	11.61	**0.87**	9.24	**0.50**	7.53	**0.30**	5.36	**0.13**	6800
7000	15.44	**1.72**	11.95	**0.92**	9.51	**0.53**	7.75	**0.32**	5.51	**0.14**	7000
7500	16.54	**1.95**	12.80	**1.04**	10.19	**0.60**	8.30	**0.36**	5.91	**0.16**	7500
8000	17.65	**2.20**	13.66	**1.18**	10.87	**0.68**	8.85	**0.41**	6.30	**0.18**	8000
8500	18.75	**2.46**	14.51	**1.32**	11.55	**0.76**	9.41	**0.46**	6.69	**0.20**	8500
9000	19.85	**2.73**	15.36	**1.46**	12.23	**0.84**	9.96	**0.51**	7.09	**0.22**	9000
9500			16.22	**1.62**	12.91	**0.93**	10.51	**0.56**	7.48	**0.25**	9500
10000			17.07	**1.78**	13.59	**1.02**	11.07	**0.62**	7.88	**0.27**	10000
10500			17.92	**1.95**	14.26	**1.12**	11.62	**0.68**	8.27	**0.30**	10500
11000			18.78	**2.12**	14.94	**1.22**	12.17	**0.74**	8.66	**0.32**	11000
12000					16.30	**1.43**	13.28	**0.87**	9.45	**0.38**	12000
13000					17.66	**1.66**	14.39	**1.01**	10.24	**0.44**	13000
14000					19.02	**1.90**	15.49	**1.16**	11.03	**0.51**	14000
15000							16.60	**1.31**	11.81	**0.57**	15000
16000							17.71	**1.48**	12.60	**0.65**	16000
17000							18.82	**1.66**	13.39	**0.72**	17000
18000							19.92	**1.84**	14.18	**0.81**	18000
19000									14.96	**0.89**	19000
20000									15.75	**0.98**	20000
21000									16.54	**1.07**	21000
22000									17.33	**1.17**	22000
23000									18.12	**1.27**	23000
24000									18.90	**1.37**	24000
25000									19.69	**1.48**	25000

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

* These figures allow for manufacturing tolerances.
For operation at temperatures 80°F or higher see chart on page 108.

Schedule 40 Standard Steel Pipe

C=100

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES ½" THRU 2"

Nominal Size	½"		¾"		1"		1¼"		1½"		2"		Nominal Size
Pipe ID	0.622		0.824		1.049		1.380		1.610		2.067		Pipe ID
Pipe OD	0.840		1.050		1.315		1.660		1.900		2.375		Pipe OD
Wall Thick	0.109		0.113		0.133		0.140		0.145		0.154		Wall Thick
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
1	1.05	**0.91**	0.60	**0.23**	0.37	**0.07**	0.21	**0.02**	0.16	**0.01**	0.10	**0.00**	1
2	2.11	**3.28**	1.20	**0.84**	0.74	**0.26**	0.43	**0.07**	0.31	**0.03**	0.19	**0.01**	2
3	3.16	**6.95**	1.80	**1.77**	1.11	**0.55**	0.64	**0.14**	0.47	**0.07**	0.29	**0.02**	3
4	4.22	**11.85**	2.40	**3.02**	1.48	**0.93**	0.86	**0.25**	0.63	**0.12**	0.38	**0.03**	4
5	5.27	**17.91**	3.00	**4.56**	1.85	**1.41**	1.07	**0.37**	0.79	**0.18**	0.48	**0.05**	5
6	6.33	**25.10**	3.61	**6.39**	2.22	**1.97**	1.29	**0.52**	0.94	**0.25**	0.57	**0.07**	6
7	7.38	**33.40**	4.21	**8.50**	2.60	**2.63**	1.50	**0.69**	1.10	**0.33**	0.67	**0.10**	7
8	8.44	**42.77**	4.81	**10.88**	2.97	**3.36**	1.71	**0.89**	1.26	**0.42**	0.76	**0.12**	8
9	9.49	**53.19**	5.41	**13.54**	3.34	**4.18**	1.93	**1.10**	1.42	**0.52**	0.86	**0.15**	9
10	10.55	**64.65**	6.01	**16.45**	3.71	**5.08**	2.14	**1.34**	1.57	**0.63**	0.95	**0.19**	10
11	11.60	**77.14**	6.61	**19.63**	4.08	**6.06**	2.36	**1.60**	1.73	**0.75**	1.05	**0.22**	11
12	12.65	**90.62**	7.21	**23.06**	4.45	**7.12**	2.57	**1.88**	1.89	**0.89**	1.15	**0.26**	12
13	13.71	**105.10**	7.81	**26.75**	4.82	**8.26**	2.79	**2.18**	2.05	**1.03**	1.24	**0.30**	13
14	14.76	**120.60**	8.41	**30.68**	5.19	**9.48**	3.00	**2.50**	2.20	**1.18**	1.34	**0.35**	14
15	15.82	**137.00**	9.01	**34.87**	5.56	**10.77**	3.21	**2.84**	2.36	**1.34**	1.43	**0.40**	15
16	16.87	**154.40**	9.61	**39.29**	5.93	**12.14**	3.43	**3.20**	2.52	**1.51**	1.53	**0.45**	16
17	17.93	**172.70**	10.22	**43.96**	6.30	**13.58**	3.64	**3.58**	2.68	**1.69**	1.62	**0.50**	17
18	18.98	**192.00**	10.82	**48.87**	6.67	**15.10**	3.86	**3.97**	2.83	**1.88**	1.72	**0.56**	18
19			11.42	**54.02**	7.04	**16.69**	4.07	**4.39**	2.99	**2.07**	1.81	**0.62**	19
20			12.02	**59.40**	7.42	**18.35**	4.28	**4.83**	3.15	**2.28**	1.91	**0.68**	20
22			13.22	**70.87**	8.16	**21.89**	4.71	**5.76**	3.46	**2.72**	2.10	**0.81**	22
24			14.42	**83.26**	8.90	**25.72**	5.14	**6.77**	3.78	**3.20**	2.29	**0.95**	24
25			15.02	**89.80**	9.27	**27.74**	5.36	**7.30**	3.94	**3.45**	2.39	**1.02**	25
26			15.62	**96.56**	9.64	**29.83**	5.57	**7.85**	4.09	**3.71**	2.48	**1.10**	26
28			16.83	**110.80**	10.38	**34.22**	6.00	**9.01**	4.41	**4.25**	2.67	**1.26**	28
30			18.03	**125.90**	11.12	**38.88**	6.43	**10.24**	4.72	**4.83**	2.86	**1.43**	30
32					11.86	**43.81**	6.86	**11.54**	5.04	**5.45**	3.06	**1.62**	32
34					12.61	**49.02**	7.28	**12.91**	5.35	**6.10**	3.25	**1.81**	34
35					12.98	**51.72**	7.50	**13.62**	5.51	**6.43**	3.34	**1.91**	35
36					13.35	**54.49**	7.71	**14.35**	5.67	**6.78**	3.44	**2.01**	36
38					14.09	**60.23**	8.14	**15.86**	5.98	**7.49**	3.63	**2.22**	38
40					14.83	**66.24**	8.57	**17.44**	6.30	**8.24**	3.82	**2.44**	40
42					15.57	**72.50**	9.00	**19.09**	6.61	**9.02**	4.01	**2.67**	42
44					16.31	**79.02**	9.43	**20.81**	6.93	**9.83**	4.20	**2.91**	44
45					16.68	**82.38**	9.64	**21.69**	7.08	**10.25**	4.30	**3.04**	45
46					17.06	**85.80**	9.86	**22.59**	7.24	**10.67**	4.39	**3.16**	46
48					17.80	**92.84**	10.28	**24.44**	7.56	**11.55**	4.58	**3.42**	48
50					18.54	**100.10**	10.71	**26.36**	7.87	**12.45**	4.77	**3.69**	50
55							11.78	**31.45**	8.66	**14.86**	5.25	**4.40**	55
60							12.85	**36.95**	9.44	**17.45**	5.73	**5.17**	60
65							13.93	**42.86**	10.23	**20.24**	6.21	**6.00**	65
70							15.00	**49.16**	11.02	**23.22**	6.68	**6.88**	70
75							16.07	**55.86**	11.81	**26.39**	7.16	**7.82**	75
80							17.14	**62.96**	12.59	**29.74**	7.64	**8.82**	80
85							18.21	**70.44**	13.38	**33.27**	8.12	**9.86**	85
90									14.17	**36.98**	8.59	**10.96**	90
95									14.95	**40.88**	9.07	**12.12**	95
100									15.74	**44.95**	9.55	**13.33**	100
105									16.53	**49.20**	10.03	**14.59**	105
110									17.31	**53.63**	10.50	**15.90**	110
115									18.10	**58.23**	10.98	**17.26**	115
120									18.89	**63.01**	11.46	**18.68**	120
125									19.68	**67.96**	11.94	**20.15**	125
130											12.41	**21.66**	130
135											12.89	**23.23**	135
140											13.37	**24.85**	140
145											13.85	**26.52**	145
150											14.32	**28.24**	150
155											14.80	**30.01**	155
160											15.28	**31.82**	160
165											15.76	**33.69**	165
170											16.23	**35.61**	170
175											16.71	**37.57**	175
180											17.19	**39.58**	180
185											17.67	**41.64**	185
190											18.14	**43.75**	190

Shaded area represents velocities over 7.5 fps. Use with caution where water hammer is a concern.

Schedule 40 Standard Steel Pipe

C=100

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 2½" THRU 8"

Nominal Size	2½"		3"		4"		6"		8"		Nominal Size
Pipe ID	2.469		3.068		4.026		6.065		7.981		Pipe ID
Pipe OD	2.875		3.500		4.500		6.625		8.625		Pipe OD
Wall Thick	0.203		0.216		0.237		0.280		0.322		Wall Thick
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
10	0.67	**0.08**	0.43	**0.03**	0.25	**0.01**					10
12	0.80	**0.11**	0.52	**0.04**	0.30	**0.01**					12
14	0.94	**0.15**	0.61	**0.05**	0.35	**0.01**					14
16	1.07	**0.19**	0.69	**0.07**	0.40	**0.02**					16
18	1.20	**0.23**	0.78	**0.08**	0.45	**0.02**					18
20	1.34	**0.28**	0.87	**0.10**	0.50	**0.03**					20
22	1.47	**0.34**	0.95	**0.12**	0.55	**0.03**	0.24	**0.00**			22
24	1.61	**0.40**	1.04	**0.14**	0.60	**0.04**	0.27	**0.01**			24
26	1.74	**0.46**	1.13	**0.16**	0.65	**0.04**	0.29	**0.01**			26
28	1.87	**0.53**	1.21	**0.18**	0.70	**0.05**	0.31	**0.01**			28
30	2.01	**0.60**	1.30	**0.21**	0.76	**0.06**	0.33	**0.01**			30
32	2.14	**0.68**	1.39	**0.24**	0.81	**0.06**	0.35	**0.01**			32
34	2.28	**0.76**	1.47	**0.26**	0.86	**0.07**	0.38	**0.01**			34
36	2.41	**0.85**	1.56	**0.29**	0.91	**0.08**	0.40	**0.01**			36
38	2.54	**0.94**	1.65	**0.33**	0.96	**0.09**	0.42	**0.01**			38
40	2.68	**1.03**	1.73	**0.36**	1.01	**0.10**	0.44	**0.01**			40
42	2.81	**1.13**	1.82	**0.39**	1.06	**0.10**	0.47	**0.01**			42
44	2.94	**1.23**	1.91	**0.43**	1.11	**0.11**	0.49	**0.02**			44
46	3.08	**1.33**	1.99	**0.46**	1.16	**0.12**	0.51	**0.02**			46
48	3.21	**1.44**	2.08	**0.50**	1.21	**0.13**	0.53	**0.02**	0.31	**0.00**	48
50	3.35	**1.55**	2.17	**0.54**	1.26	**0.14**	0.55	**0.02**	0.32	**0.01**	50
55	3.68	**1.85**	2.38	**0.64**	1.38	**0.17**	0.61	**0.02**	0.35	**0.01**	55
60	4.02	**2.18**	2.60	**0.76**	1.51	**0.20**	0.67	**0.03**	0.38	**0.01**	60
65	4.35	**2.53**	2.82	**0.88**	1.64	**0.23**	0.72	**0.03**	0.42	**0.01**	65
70	4.69	**2.90**	3.03	**1.01**	1.76	**0.27**	0.78	**0.04**	0.45	**0.01**	70
75	5.02	**3.29**	3.25	**1.14**	1.89	**0.31**	0.83	**0.04**	0.48	**0.01**	75
80	5.35	**3.71**	3.47	**1.29**	2.01	**0.34**	0.89	**0.05**	0.51	**0.01**	80
85	5.69	**4.15**	3.68	**1.44**	2.14	**0.38**	0.94	**0.05**	0.54	**0.01**	85
90	6.02	**4.62**	3.90	**1.60**	2.27	**0.43**	1.00	**0.06**	0.58	**0.02**	90
95	6.36	**5.10**	4.12	**1.77**	2.39	**0.47**	1.05	**0.06**	0.61	**0.02**	95
100	6.69	**5.61**	4.33	**1.95**	2.52	**0.52**	1.11	**0.07**	0.64	**0.02**	100
110	7.36	**6.70**	4.77	**2.33**	2.77	**0.62**	1.22	**0.08**	0.70	**0.02**	110
120	8.03	**7.87**	5.20	**2.73**	3.02	**0.73**	1.33	**0.10**	0.77	**0.03**	120
130	8.70	**9.12**	5.63	**3.17**	3.27	**0.85**	1.44	**0.12**	0.83	**0.03**	130
140	9.37	**10.47**	6.07	**3.64**	3.52	**0.97**	1.55	**0.13**	0.90	**0.03**	140
150	10.04	**11.89**	6.50	**4.13**	3.78	**1.10**	1.66	**0.15**	0.96	**0.04**	150
175	11.71	**15.82**	7.59	**5.50**	4.41	**1.47**	1.94	**0.20**	1.12	**0.05**	175
200	13.39	**20.26**	8.67	**7.04**	5.03	**1.88**	2.22	**0.26**	1.28	**0.07**	200
225	15.06	**25.20**	9.75	**8.76**	5.66	**2.33**	2.50	**0.32**	1.44	**0.08**	225
250	16.73	**30.63**	10.84	**10.64**	6.29	**2.84**	2.77	**0.39**	1.60	**0.10**	250
275	18.41	**36.54**	11.92	**12.70**	6.92	**3.38**	3.05	**0.46**	1.76	**0.12**	275
300			13.00	**14.92**	7.55	**3.98**	3.33	**0.54**	1.92	**0.14**	300
350			15.17	**19.85**	8.81	**5.29**	3.88	**0.72**	2.24	**0.19**	350
400			17.34	**25.42**	10.07	**6.77**	4.44	**0.92**	2.56	**0.24**	400
450			19.51	**31.61**	11.33	**8.43**	4.99	**1.15**	2.88	**0.30**	450
500					12.59	**10.24**	5.55	**1.39**	3.20	**0.37**	500
600					15.10	**14.35**	6.66	**1.95**	3.84	**0.51**	600
700					17.62	**19.10**	7.76	**2.60**	4.48	**0.68**	700
800							8.87	**3.33**	5.12	**0.88**	800
900							9.98	**4.14**	5.76	**1.09**	900
1000							11.09	**5.03**	6.41	**1.32**	1000
1100							12.20	**6.01**	7.05	**1.58**	1100
1200							13.31	**7.06**	7.69	**1.86**	1200
1300							14.42	**8.18**	8.33	**2.15**	1300
1400							15.53	**9.39**	8.97	**2.47**	1400
1500							16.64	**10.67**	9.61	**2.80**	1500
1600							17.75	**12.02**	10.25	**3.16**	1600
1700							18.86	**13.45**	10.89	**3.54**	1700
1800							19.97	**14.95**	11.53	**3.93**	1800
1900									12.17	**4.35**	1900
2000									12.81	**4.78**	2000
2200									14.09	**5.70**	2200
2400									15.37	**6.70**	2400
2600									16.65	**7.77**	2600
2800									17.94	**8.91**	2800
3000									19.22	**10.12**	3000

Shaded area represents velocities over 7.5 fps. Use with caution where water hammer is a concern.

Schedule 40 Standard Steel Pipe

C=100

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 10" THRU 24"

Nominal Size	10"		12"		14"		16"		18"		20"		24"		Nominal Size
Pipe ID	10.020		11.938		13.126		15.000		16.875		18.814		22.626		Pipe ID
Pipe OD	10.750		12.750		14.000		16.000		18.000		20.000		24.000		Pipe OD
Wall Thick	0.365		0.406		0.438		0.500		0.562		0.583		0.687		Wall Thick
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
100	0.41	**0.01**	0.29	**0.00**	0.24	**0.00**									100
200	0.81	**0.02**	0.57	**0.01**	0.47	**0.01**	0.36	**0.00**							200
300	1.22	**0.05**	0.86	**0.02**	0.71	**0.01**	0.54	**0.01**	0.43	**0.00**					300
400	1.63	**0.08**	1.15	**0.03**	0.95	**0.02**	0.73	**0.01**	0.57	**0.01**	0.46	**0.00**			400
500	2.03	**0.12**	1.43	**0.05**	1.18	**0.03**	0.91	**0.02**	0.72	**0.01**	0.58	**0.01**			500
600	2.44	**0.17**	1.72	**0.07**	1.42	**0.05**	1.09	**0.02**	0.86	**0.01**	0.69	**0.01**			600
700	2.84	**0.23**	2.00	**0.10**	1.66	**0.06**	1.27	**0.03**	1.00	**0.02**	0.81	**0.01**	0.56	**0.00**	700
800	3.25	**0.29**	2.29	**0.12**	1.89	**0.08**	1.45	**0.04**	1.15	**0.02**	0.92	**0.01**	0.64	**0.01**	800
900	3.66	**0.36**	2.58	**0.15**	2.13	**0.10**	1.63	**0.05**	1.29	**0.03**	1.04	**0.02**	0.72	**0.01**	900
1000	4.06	**0.44**	2.86	**0.19**	2.37	**0.12**	1.81	**0.06**	1.43	**0.03**	1.15	**0.02**	0.80	**0.01**	1000
1100	4.47	**0.52**	3.15	**0.22**	2.60	**0.14**	1.99	**0.07**	1.58	**0.04**	1.27	**0.02**	0.88	**0.01**	1100
1200	4.88	**0.61**	3.44	**0.26**	2.84	**0.16**	2.18	**0.09**	1.72	**0.05**	1.38	**0.03**	0.96	**0.01**	1200
1300	5.28	**0.71**	3.72	**0.30**	3.08	**0.19**	2.36	**0.10**	1.86	**0.06**	1.50	**0.03**	1.04	**0.01**	1300
1400	5.69	**0.82**	4.01	**0.35**	3.32	**0.22**	2.54	**0.11**	2.01	**0.06**	1.61	**0.04**	1.12	**0.02**	1400
1500	6.10	**0.93**	4.29	**0.40**	3.55	**0.25**	2.72	**0.13**	2.15	**0.07**	1.73	**0.04**	1.20	**0.02**	1500
1600	6.50	**1.04**	4.58	**0.45**	3.79	**0.28**	2.90	**0.15**	2.29	**0.08**	1.84	**0.05**	1.28	**0.02**	1600
1700	6.91	**1.17**	4.87	**0.50**	4.03	**0.31**	3.08	**0.16**	2.44	**0.09**	1.96	**0.05**	1.35	**0.02**	1700
1800	7.31	**1.30**	5.15	**0.55**	4.26	**0.35**	3.26	**0.18**	2.58	**0.10**	2.07	**0.06**	1.43	**0.02**	1800
1900	7.72	**1.44**	5.44	**0.61**	4.50	**0.39**	3.45	**0.20**	2.72	**0.11**	2.19	**0.07**	1.51	**0.03**	1900
2000	8.13	**1.58**	5.73	**0.67**	4.74	**0.42**	3.63	**0.22**	2.87	**0.13**	2.31	**0.07**	1.59	**0.03**	2000
2200	8.94	**1.88**	6.30	**0.80**	5.21	**0.51**	3.99	**0.26**	3.15	**0.15**	2.54	**0.09**	1.75	**0.04**	2200
2400	9.75	**2.21**	6.87	**0.94**	5.68	**0.59**	4.35	**0.31**	3.44	**0.18**	2.77	**0.10**	1.91	**0.04**	2400
2600	10.57	**2.57**	7.44	**1.09**	6.16	**0.69**	4.71	**0.36**	3.73	**0.20**	3.00	**0.12**	2.07	**0.05**	2600
2800	11.38	**2.95**	8.02	**1.26**	6.63	**0.79**	5.08	**0.41**	4.01	**0.23**	3.23	**0.14**	2.23	**0.06**	2800
3000	12.19	**3.35**	8.59	**1.43**	7.10	**0.90**	5.44	**0.47**	4.30	**0.26**	3.46	**0.16**	2.39	**0.06**	3000
3200	13.00	**3.77**	9.16	**1.61**	7.58	**1.01**	5.80	**0.53**	4.58	**0.30**	3.69	**0.18**	2.55	**0.07**	3200
3400	13.82	**4.22**	9.73	**1.80**	8.05	**1.13**	6.17	**0.59**	4.87	**0.33**	3.92	**0.20**	2.71	**0.08**	3400
3600	14.63	**4.69**	10.31	**2.00**	8.53	**1.26**	6.53	**0.66**	5.16	**0.37**	4.15	**0.22**	2.87	**0.09**	3600
3800	15.44	**5.18**	10.88	**2.21**	9.00	**1.39**	6.89	**0.73**	5.44	**0.41**	4.38	**0.24**	3.03	**0.10**	3800
4000	16.25	**5.70**	11.45	**2.43**	9.47	**1.53**	7.25	**0.80**	5.73	**0.45**	4.61	**0.27**	3.19	**0.11**	4000
4200	17.07	**6.24**	12.02	**2.66**	9.95	**1.68**	7.62	**0.88**	6.02	**0.49**	4.84	**0.29**	3.35	**0.12**	4200
4400	17.88	**6.80**	12.60	**2.90**	10.42	**1.83**	7.98	**0.95**	6.30	**0.54**	5.07	**0.32**	3.51	**0.13**	4400
4600	18.69	**7.39**	13.17	**3.15**	10.89	**1.99**	8.34	**1.04**	6.59	**0.58**	5.30	**0.34**	3.67	**0.14**	4600
4800	19.51	**7.99**	13.74	**3.41**	11.37	**2.15**	8.70	**1.12**	6.88	**0.63**	5.53	**0.37**	3.83	**0.15**	4800
5000			14.31	**3.68**	11.84	**2.32**	9.07	**1.21**	7.16	**0.68**	5.76	**0.40**	3.98	**0.16**	5000
5200			14.89	**3.95**	12.31	**2.49**	9.43	**1.30**	7.45	**0.73**	5.99	**0.43**	4.14	**0.18**	5200
5400			15.46	**4.24**	12.79	**2.67**	9.79	**1.40**	7.74	**0.79**	6.22	**0.46**	4.30	**0.19**	5400
5600			16.03	**4.53**	13.26	**2.86**	10.15	**1.49**	8.02	**0.84**	6.45	**0.50**	4.46	**0.20**	5600
5800			16.60	**4.84**	13.73	**3.05**	10.52	**1.59**	8.31	**0.90**	6.69	**0.53**	4.62	**0.22**	5800
6000			17.18	**5.15**	14.21	**3.25**	10.88	**1.70**	8.60	**0.96**	6.92	**0.56**	4.78	**0.23**	6000
6500			18.61	**5.98**	15.39	**3.77**	11.79	**1.97**	9.31	**1.11**	7.49	**0.65**	5.18	**0.27**	6500
7000					16.58	**4.32**	12.69	**2.26**	10.03	**1.27**	8.07	**0.75**	5.58	**0.31**	7000
7500					17.76	**4.91**	13.60	**2.56**	10.75	**1.45**	8.64	**0.85**	5.98	**0.35**	7500
8000					18.94	**5.53**	14.51	**2.89**	11.46	**1.63**	9.22	**0.96**	6.38	**0.39**	8000
8500							15.41	**3.23**	12.18	**1.82**	9.80	**1.07**	6.77	**0.44**	8500
9000							16.32	**3.59**	12.89	**2.03**	10.37	**1.19**	7.17	**0.49**	9000
9500							17.23	**3.97**	13.61	**2.24**	10.95	**1.32**	7.57	**0.54**	9500
10000							18.13	**4.37**	14.33	**2.46**	11.53	**1.45**	7.97	**0.59**	10000
0500							19.04	**4.78**	15.04	**2.70**	12.10	**1.59**	8.37	**0.65**	10500
11000							19.95	**5.21**	15.76	**2.94**	12.68	**1.73**	8.77	**0.71**	11000
11500									16.48	**3.19**	13.26	**1.88**	9.17	**0.77**	11500
12000									17.19	**3.45**	13.83	**2.03**	9.56	**0.83**	12000
12500									17.91	**3.72**	14.41	**2.19**	9.96	**0.89**	12500
13000									18.63	**4.00**	14.98	**2.36**	10.36	**0.96**	13000
13500									19.34	**4.29**	15.56	**2.53**	10.76	**1.03**	13500
14000											16.14	**2.71**	11.16	**1.10**	14000
14500											16.71	**2.89**	11.56	**1.18**	14500
15000											17.29	**3.07**	11.95	**1.25**	15000
15500											17.87	**3.27**	12.35	**1.33**	15500
16000											18.44	**3.46**	12.75	**1.41**	16000
16500													13.15	**1.49**	16500
7000													13.55	**1.58**	17000
17500													13.95	**1.67**	17500
18000													14.35	**1.76**	18000
18500													14.74	**1.85**	18500
19000													15.14	**1.94**	19000
20000													15.94	**2.13**	20000
21000													16.74	**2.34**	21000
22000													17.53	**2.55**	22000
23000													18.33	**2.76**	23000

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Schedule 80 Standard Steel Pipe

C=100

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES ½" THRU 2"

Nominal Size	½"		¾"		1"		1¼"		1½"		2"		Nominal Size
Pipe ID	0.546		0.742		0.957		1.278		1.500		1.939		Pipe ID
Pipe OD	0.840		1.050		1.315		1.660		1.900		2.375		Pipe OD
Wall Thick	0.147		0.154		0.179		0.191		0.200		0.218		Wall Thick
Flow GPH	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPH
1	1.37	**1.71**	0.74	**0.39**	0.45	**0.11**	0.25	**0.03**	0.18	**0.01**	0.11	**0.00**	1
2	2.74	**6.19**	1.48	**1.39**	0.89	**0.40**	0.50	**0.10**	0.36	**0.05**	0.22	**0.01**	2
3	4.11	**13.11**	2.22	**2.95**	1.34	**0.85**	0.75	**0.21**	0.54	**0.10**	0.33	**0.03**	3
4	5.47	**22.34**	2.96	**5.02**	1.78	**1.46**	1.00	**0.36**	0.73	**0.16**	0.43	**0.05**	4
5	6.84	**33.77**	3.71	**7.59**	2.23	**2.20**	1.25	**0.54**	0.91	**0.25**	0.54	**0.07**	5
6	8.21	**47.33**	4.45	**10.64**	2.67	**3.08**	1.50	**0.75**	1.09	**0.35**	0.65	**0.10**	6
7	9.58	**62.97**	5.19	**14.16**	3.12	**4.10**	1.75	**1.00**	1.27	**0.46**	0.76	**0.13**	7
8	10.95	**80.63**	5.93	**18.13**	3.56	**5.26**	2.00	**1.29**	1.45	**0.59**	0.87	**0.17**	8
9	12.32	**100.30**	6.67	**22.54**	4.01	**6.54**	2.25	**1.60**	1.63	**0.73**	0.98	**0.21**	9
10	13.69	**121.90**	7.41	**27.40**	4.45	**7.94**	2.50	**1.94**	1.81	**0.89**	1.09	**0.26**	10
11	15.05	**145.40**	8.15	**32.69**	4.90	**9.48**	2.75	**2.32**	1.99	**1.06**	1.19	**0.31**	11
12	16.42	**170.90**	8.89	**38.41**	5.35	**11.14**	3.00	**2.73**	2.18	**1.25**	1.30	**0.36**	12
13	17.79	**198.20**	9.63	**44.55**	5.79	**12.91**	3.25	**3.16**	2.36	**1.45**	1.41	**0.42**	13
14	19.16	**227.30**	10.37	**51.10**	6.24	**14.81**	3.50	**3.63**	2.54	**1.66**	1.52	**0.48**	14
15			11.12	**58.06**	6.68	**16.83**	3.75	**4.12**	2.72	**1.89**	1.63	**0.54**	15
16			11.86	**65.44**	7.13	**18.97**	4.00	**4.64**	2.90	**2.13**	1.74	**0.61**	16
17			12.60	**73.21**	7.57	**21.23**	4.25	**5.20**	3.08	**2.38**	1.84	**0.68**	17
18			13.34	**81.39**	8.02	**23.60**	4.50	**5.78**	3.26	**2.65**	1.95	**0.76**	18
19			14.08	**89.96**	8.46	**26.08**	4.75	**6.38**	3.45	**2.93**	2.06	**0.84**	19
20			14.82	**98.92**	8.91	**28.68**	5.00	**7.02**	3.63	**3.22**	2.17	**0.92**	20
22			16.30	**118.00**	9.80	**34.22**	5.50	**8.37**	3.99	**3.84**	2.39	**1.10**	22
24			17.79	**138.70**	10.69	**40.20**	6.00	**9.84**	4.35	**4.51**	2.60	**1.29**	24
25			18.53	**149.50**	11.14	**43.36**	6.25	**10.61**	4.53	**4.87**	2.71	**1.40**	25
26			19.27	**160.80**	11.58	**46.62**	6.49	**11.41**	4.71	**5.23**	2.82	**1.50**	26
28					12.47	**53.48**	6.99	**13.09**	5.08	**6.00**	3.04	**1.72**	28
30					13.36	**60.77**	7.49	**14.87**	5.44	**6.82**	3.26	**1.96**	30
32					14.26	**68.49**	7.99	**16.76**	5.80	**7.69**	3.47	**2.20**	32
34					15.15	**76.62**	8.49	**18.75**	6.17	**8.60**	3.69	**2.47**	34
35					15.59	**80.85**	8.74	**19.79**	6.35	**9.08**	3.80	**2.60**	35
36					16.04	**85.18**	8.99	**20.85**	6.53	**9.56**	3.91	**2.74**	36
38					16.93	**94.15**	9.49	**23.04**	6.89	**10.57**	4.12	**3.03**	38
40					17.82	**103.50**	9.99	**25.34**	7.25	**11.62**	4.34	**3.33**	40
42					18.71	**113.30**	10.49	**27.74**	7.62	**12.72**	4.56	**3.65**	42
44					19.60	**123.50**	10.99	**30.23**	7.98	**13.87**	4.77	**3.98**	44
45							11.24	**31.52**	8.16	**14.46**	4.88	**4.15**	45
46							11.49	**32.83**	8.34	**15.06**	4.99	**4.32**	46
48							11.99	**35.52**	8.70	**16.29**	5.21	**4.67**	48
50							12.49	**38.31**	9.07	**17.57**	5.43	**5.04**	50
55							13.74	**45.70**	9.97	**20.96**	5.97	**6.01**	55
60							14.99	**53.70**	10.88	**24.63**	6.51	**7.06**	60
65							16.24	**62.27**	11.79	**28.56**	7.05	**8.19**	65
70							17.49	**71.44**	12.69	**32.77**	7.60	**9.40**	70
75							18.74	**81.17**	13.60	**37.23**	8.14	**10.68**	75
80							19.98	**91.48**	14.51	**41.96**	8.68	**12.03**	80
85									15.41	**46.95**	9.22	**13.46**	85
90									16.32	**52.19**	9.77	**14.97**	90
95									17.23	**57.68**	10.31	**16.54**	95
100									18.13	**63.43**	10.85	**18.19**	100
110									19.95	**75.68**	11.94	**21.70**	110
120											13.02	**25.50**	120
130											14.11	**29.57**	130
140											15.19	**33.92**	140
150											16.28	**38.54**	150
160											17.36	**43.44**	160
170											18.45	**48.60**	170
180											19.53	**54.02**	180

Shaded area represents velocities over 7.5 fps. Use with caution where water hammer is a concern.

Schedule 80 Standard Steel Pipe

C=100

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 2½" THRU 8"

Nominal Size	2½"		3"		4"		6"		8"		Nominal Size
Pipe ID	2.323		2.900		3.826		5.761		7.625		Pipe ID
Pipe OD	2.875		3.500		4.500		6.625		8.625		Pipe OD
Wall Thick	0.276		0.300		0.337		0.432		0.500		Wall Thick
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Flow GPM
5	0.38	**0.03**	0.24	**0.01**	0.14	**0.00**					5
10	0.76	**0.11**	0.49	**0.04**	0.28	**0.01**					10
15	1.13	**0.22**	0.73	**0.08**	0.42	**0.02**					15
20	1.51	**0.38**	0.97	**0.13**	0.56	**0.03**	0.25	**0.00**			20
25	1.89	**0.58**	1.21	**0.20**	0.70	**0.05**	0.31	**0.01**			25
30	2.27	**0.81**	1.46	**0.28**	0.84	**0.07**	0.37	**0.01**			30
35	2.65	**1.08**	1.70	**0.37**	0.98	**0.10**	0.43	**0.01**			35
40	3.02	**1.38**	1.94	**0.47**	1.11	**0.12**	0.49	**0.02**	0.28	**0.00**	40
45	3.40	**1.72**	2.18	**0.58**	1.25	**0.15**	0.55	**0.02**	0.32	**0.01**	45
50	3.78	**2.09**	2.43	**0.71**	1.39	**0.18**	0.61	**0.03**	0.35	**0.01**	50
55	4.16	**2.50**	2.67	**0.85**	1.53	**0.22**	0.68	**0.03**	0.39	**0.01**	55
60	4.54	**2.93**	2.91	**1.00**	1.67	**0.26**	0.74	**0.04**	0.42	**0.01**	60
65	4.91	**3.40**	3.15	**1.16**	1.81	**0.30**	0.80	**0.04**	0.46	**0.01**	65
70	5.29	**3.90**	3.40	**1.33**	1.95	**0.34**	0.86	**0.05**	0.49	**0.01**	70
75	5.67	**4.43**	3.64	**1.51**	2.09	**0.39**	0.92	**0.05**	0.53	**0.01**	75
80	6.05	**4.99**	3.88	**1.70**	2.23	**0.44**	0.98	**0.06**	0.56	**0.02**	80
85	6.43	**5.59**	4.12	**1.90**	2.37	**0.49**	1.04	**0.07**	0.60	**0.02**	85
90	6.80	**6.21**	4.37	**2.11**	2.51	**0.55**	1.11	**0.07**	0.63	**0.02**	90
95	7.18	**6.87**	4.61	**2.33**	2.65	**0.61**	1.17	**0.08**	0.67	**0.02**	95
100	7.56	**7.55**	4.85	**2.57**	2.79	**0.67**	1.23	**0.09**	0.70	**0.02**	100
110	8.32	**9.01**	5.34	**3.06**	3.07	**0.79**	1.35	**0.11**	0.77	**0.03**	110
120	9.07	**10.58**	5.82	**3.60**	3.34	**0.93**	1.48	**0.13**	0.84	**0.03**	120
130	9.83	**12.27**	6.31	**4.17**	3.62	**1.08**	1.60	**0.15**	0.91	**0.04**	130
140	10.58	**14.08**	6.79	**4.78**	3.90	**1.24**	1.72	**0.17**	0.98	**0.04**	140
150	11.34	**16.00**	7.28	**5.44**	4.18	**1.41**	1.84	**0.19**	1.05	**0.05**	150
160	12.10	**18.03**	7.76	**6.13**	4.46	**1.59**	1.97	**0.22**	1.12	**0.06**	160
180	13.61	**22.43**	8.73	**7.62**	5.02	**1.98**	2.21	**0.27**	1.26	**0.07**	180
200	15.12	**27.26**	9.70	**9.26**	5.57	**2.40**	2.46	**0.33**	1.40	**0.08**	200
220	16.63	**32.52**	10.67	**11.05**	6.13	**2.87**	2.70	**0.39**	1.54	**0.10**	220
250	18.90	**41.21**	12.13	**14.00**	6.97	**3.64**	3.07	**0.50**	1.75	**0.13**	250
300			14.55	**19.62**	8.36	**5.10**	3.69	**0.70**	2.11	**0.18**	300
350			16.98	**26.11**	9.76	**6.78**	4.30	**0.93**	2.46	**0.24**	350
400			19.41	**33.43**	11.15	**8.68**	4.92	**1.18**	2.81	**0.30**	400
450					12.54	**10.80**	5.53	**1.47**	3.16	**0.38**	450
500					13.94	**13.12**	6.15	**1.79**	3.51	**0.46**	500
600					16.72	**18.39**	7.38	**2.51**	4.21	**0.64**	600
700					19.51	**24.47**	8.61	**3.34**	4.91	**0.85**	700
800							9.83	**4.28**	5.61	**1.09**	800
900							11.06	**5.32**	6.32	**1.36**	900
1000							12.29	**6.47**	7.02	**1.65**	1000
1100							13.52	**7.71**	7.72	**1.97**	1100
1200							14.75	**9.06**	8.42	**2.32**	1200
1300							15.98	**10.51**	9.12	**2.69**	1300
1400							17.21	**12.06**	9.82	**3.08**	1400
1500							18.44	**13.70**	10.53	**3.50**	1500
1600							19.67	**15.44**	11.23	**3.95**	1600
1700									11.93	**4.42**	1700
1800									12.63	**4.91**	1800
1900									13.33	**5.43**	1900
2000									14.03	**5.97**	2000
2100									14.74	**6.53**	2100
2200									15.44	**7.12**	2200
2300									16.14	**7.73**	2300
2400									16.84	**8.36**	2400
2500									17.54	**9.02**	2500
2700									18.95	**10.40**	2700

Shaded area represents velocities over 7.5 fps. Use with caution where water hammer is a concern.

Schedule 80 Standard Steel Pipe

C=100

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 10" THRU 24"

Nominal Size	10"		12"		14"		16"		18"		20"		24"		Nominal Size
Pipe ID	9.564		11.376		12.500		14.314		16.126		17.938		21.564		Pipe ID
Pipe OD	10.750		12.750		14.000		16.000		18.000		20.000		24.000		Pipe OD
Wall Thick	0.593		0.687		0.750		0.843		0.937		1.031		1.218		Wall Thick
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
100	0.45	**0.01**	0.32	**0.00**	0.26	**0.00**									100
200	0.89	**0.03**	0.63	**0.01**	0.52	**0.01**	0.40	**0.00**							200
300	1.34	**0.06**	0.95	**0.03**	0.78	**0.02**	0.60	**0.01**	0.47	**0.00**					300
400	1.78	**0.10**	1.26	**0.04**	1.04	**0.03**	0.80	**0.01**	0.63	**0.01**	0.51	**0.00**			400
500	2.23	**0.15**	1.58	**0.07**	1.31	**0.04**	1.00	**0.02**	0.78	**0.01**	0.63	**0.01**			500
600	2.68	**0.21**	1.89	**0.09**	1.57	**0.06**	1.19	**0.03**	0.94	**0.02**	0.76	**0.01**	0.53	**0.00**	600
700	3.12	**0.28**	2.21	**0.12**	1.83	**0.08**	1.39	**0.04**	1.10	**0.02**	0.89	**0.01**	0.61	**0.01**	700
800	3.57	**0.36**	2.52	**0.16**	2.09	**0.10**	1.59	**0.05**	1.26	**0.03**	1.01	**0.02**	0.70	**0.01**	800
900	4.01	**0.45**	2.84	**0.19**	2.35	**0.12**	1.79	**0.06**	1.41	**0.04**	1.14	**0.02**	0.79	**0.01**	900
1000	4.46	**0.55**	3.15	**0.24**	2.61	**0.15**	1.99	**0.08**	1.57	**0.04**	1.27	**0.03**	0.88	**0.01**	1000
1200	5.35	**0.77**	3.78	**0.33**	3.13	**0.21**	2.39	**0.11**	1.88	**0.06**	1.52	**0.04**	1.05	**0.01**	1200
1400	6.24	**1.02**	4.41	**0.44**	3.66	**0.28**	2.79	**0.14**	2.20	**0.08**	1.78	**0.05**	1.23	**0.02**	1400
1600	7.14	**1.31**	5.04	**0.56**	4.18	**0.36**	3.19	**0.18**	2.51	**0.10**	2.03	**0.06**	1.40	**0.03**	1600
1800	8.03	**1.63**	5.67	**0.70**	4.70	**0.44**	3.58	**0.23**	2.82	**0.13**	2.28	**0.08**	1.58	**0.03**	1800
2000	8.92	**1.98**	6.31	**0.85**	5.22	**0.54**	3.98	**0.28**	3.14	**0.16**	2.54	**0.09**	1.75	**0.04**	2000
2200	9.81	**2.36**	6.94	**1.02**	5.74	**0.64**	4.38	**0.33**	3.45	**0.19**	2.79	**0.11**	1.93	**0.05**	2200
2400	10.71	**2.78**	7.57	**1.19**	6.27	**0.75**	4.78	**0.39**	3.77	**0.22**	3.04	**0.13**	2.11	**0.05**	2400
2600	11.60	**3.22**	8.20	**1.38**	6.79	**0.88**	5.18	**0.45**	4.08	**0.25**	3.30	**0.15**	2.28	**0.06**	2600
2800	12.49	**3.69**	8.83	**1.59**	7.31	**1.00**	5.58	**0.52**	4.39	**0.29**	3.55	**0.17**	2.46	**0.07**	2800
3000	13.38	**4.20**	9.46	**1.80**	7.83	**1.14**	5.97	**0.59**	4.71	**0.33**	3.80	**0.20**	2.63	**0.08**	3000
3200	14.27	**4.73**	10.09	**2.03**	8.36	**1.29**	6.37	**0.66**	5.02	**0.37**	4.06	**0.22**	2.81	**0.09**	3200
3400	15.17	**5.29**	10.72	**2.28**	8.88	**1.44**	6.77	**0.74**	5.33	**0.42**	4.31	**0.25**	2.98	**0.10**	3400
3600	16.06	**5.88**	11.35	**2.53**	9.40	**1.60**	7.17	**0.83**	5.65	**0.46**	4.56	**0.28**	3.16	**0.11**	3600
3800	16.95	**6.50**	11.98	**2.80**	9.92	**1.77**	7.57	**0.91**	5.96	**0.51**	4.82	**0.30**	3.33	**0.12**	3800
4000	17.84	**7.15**	12.61	**3.07**	10.44	**1.94**	7.97	**1.01**	6.28	**0.56**	5.07	**0.34**	3.51	**0.14**	4000
4200	18.73	**7.83**	13.24	**3.37**	10.97	**2.13**	8.36	**1.10**	6.59	**0.62**	5.33	**0.37**	3.69	**0.15**	4200
4400	19.63	**8.53**	13.87	**3.67**	11.49	**2.32**	8.76	**1.20**	6.90	**0.67**	5.58	**0.40**	3.86	**0.16**	4400
4600			14.50	**3.98**	12.01	**2.52**	9.16	**1.30**	7.22	**0.73**	5.83	**0.43**	4.04	**0.18**	4600
4800			15.13	**4.31**	12.53	**2.72**	9.56	**1.41**	7.53	**0.79**	6.09	**0.47**	4.21	**0.19**	4800
5000			15.76	**4.65**	13.06	**2.94**	9.96	**1.52**	7.84	**0.85**	6.34	**0.51**	4.39	**0.21**	5000
5200			16.39	**5.00**	13.58	**3.16**	10.35	**1.63**	8.16	**0.91**	6.59	**0.54**	4.56	**0.22**	5200
5400			17.02	**5.36**	14.10	**3.39**	10.75	**1.75**	8.47	**0.98**	6.85	**0.58**	4.74	**0.24**	5400
5600			17.66	**5.73**	14.62	**3.62**	11.15	**1.87**	8.79	**1.05**	7.10	**0.63**	4.91	**0.26**	5600
5800			18.29	**6.12**	15.14	**3.87**	11.55	**2.00**	9.10	**1.12**	7.35	**0.67**	5.09	**0.27**	5800
6000			18.92	**6.51**	15.67	**4.12**	11.95	**2.13**	9.41	**1.19**	7.61	**0.71**	5.26	**0.29**	6000
6200			19.55	**6.92**	16.19	**4.38**	12.35	**2.26**	9.73	**1.27**	7.86	**0.75**	5.44	**0.31**	6200
6400					16.71	**4.64**	12.74	**2.40**	10.04	**1.34**	8.12	**0.80**	5.62	**0.33**	6400
6600					17.23	**4.91**	13.14	**2.54**	10.36	**1.42**	8.37	**0.85**	5.79	**0.35**	6600
6800					17.76	**5.19**	13.54	**2.69**	10.67	**1.50**	8.62	**0.90**	5.97	**0.37**	6800
7000					18.28	**5.48**	13.94	**2.83**	10.98	**1.59**	8.88	**0.95**	6.14	**0.39**	7000
7200					18.80	**5.77**	14.34	**2.99**	11.30	**1.67**	9.13	**1.00**	6.32	**0.41**	7200
7400					19.32	**6.07**	14.74	**3.14**	11.61	**1.76**	9.38	**1.05**	6.49	**0.43**	7400
7600					19.85	**6.38**	15.13	**3.30**	11.92	**1.85**	9.64	**1.10**	6.67	**0.45**	7600
7800							15.53	**3.46**	12.24	**1.94**	9.89	**1.15**	6.84	**0.47**	7800
8000							15.93	**3.63**	12.55	**2.03**	10.14	**1.21**	7.02	**0.49**	8000
8500							16.93	**4.06**	13.34	**2.27**	10.78	**1.35**	7.46	**0.55**	8500
9000							17.92	**4.51**	14.12	**2.53**	11.41	**1.51**	7.90	**0.61**	9000
9500							18.92	**4.99**	14.90	**2.79**	12.05	**1.66**	8.34	**0.68**	9500
10000							19.91	**5.49**	15.69	**3.07**	12.68	**1.83**	8.77	**0.75**	10000
10500									16.47	**3.36**	13.31	**2.00**	9.21	**0.82**	10500
11000									17.26	**3.66**	13.95	**2.18**	9.65	**0.89**	11000
11500									18.04	**3.98**	14.58	**2.37**	10.09	**0.97**	11500
12000									18.83	**4.31**	15.22	**2.56**	10.53	**1.05**	12000
12500									19.61	**4.64**	15.85	**2.77**	10.97	**1.13**	12500
13000											16.48	**2.97**	11.41	**1.21**	13000
13500											17.12	**3.19**	11.85	**1.30**	13500
14000											17.75	**3.41**	12.28	**1.39**	14000
14500											18.39	**3.64**	12.72	**1.49**	14500
15000											19.02	**3.88**	13.16	**1.58**	15000
15500											19.65	**4.12**	13.60	**1.68**	15500
16000													14.04	**1.78**	16000
16500													14.48	**1.89**	16500
17000													14.92	**2.00**	17000
17500													15.35	**2.11**	17500
18000													15.79	**2.22**	18000
18500													16.23	**2.33**	18500
19000													16.67	**2.45**	19000
19500													17.11	**2.57**	19500
20000													17.55	**2.70**	20000
21000													18.43	**2.95**	21000

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Cast Iron Pipe - Class 150

C=100

PRESSURE LOSS PER 100 FEET (PSI) SIZES 3" THRU 12"

Nominal Size / Pipe ID / Pipe OD / Wall Thick	3" 3.32 3.96 0.32		4" 4.10 4.80 0.35		6" 6.14 6.90 0.38		8" 8.23 9.05 0.41		10" 10.22 11.10 0.44		12" 12.24 13.20 0.48		Nominal Size / Pipe ID / Pipe OD / Wall Thick
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Flow GPM
5	0.19	**0.01**	0.12	**0.00**									5
10	0.37	**0.02**	0.24	**0.01**									10
15	0.56	**0.04**	0.36	**0.01**									15
20	0.74	**0.07**	0.49	**0.02**	0.22	**0.00**							20
25	0.93	**0.10**	0.61	**0.04**	0.27	**0.01**							25
30	1.11	**0.14**	0.73	**0.05**	0.32	**0.01**							30
40	1.48	**0.24**	0.97	**0.09**	0.43	**0.01**							40
50	1.85	**0.37**	1.21	**0.13**	0.54	**0.02**	0.30	**0.00**					50
60	2.22	**0.52**	1.46	**0.18**	0.65	**0.03**	0.36	**0.01**					60
70	2.59	**0.69**	1.70	**0.25**	0.76	**0.03**	0.42	**0.01**					70
80	2.96	**0.88**	1.94	**0.31**	0.87	**0.04**	0.48	**0.01**					80
90	3.33	**1.09**	2.18	**0.39**	0.97	**0.05**	0.54	**0.01**	0.35	**0.00**			90
100	3.70	**1.33**	2.43	**0.48**	1.08	**0.07**	0.60	**0.02**	0.39	**0.01**			100
125	4.63	**2.01**	3.03	**0.72**	1.35	**0.10**	0.75	**0.02**	0.49	**0.01**			125
150	5.55	**2.81**	3.64	**1.01**	1.62	**0.14**	0.90	**0.03**	0.59	**0.01**	0.41	**0.00**	150
175	6.48	**3.74**	4.25	**1.34**	1.89	**0.19**	1.05	**0.05**	0.68	**0.02**	0.48	**0.01**	175
200	7.40	**4.80**	4.85	**1.72**	2.16	**0.24**	1.20	**0.06**	0.78	**0.02**	0.54	**0.01**	200
225	8.33	**5.96**	5.46	**2.14**	2.44	**0.30**	1.36	**0.07**	0.88	**0.03**	0.61	**0.01**	225
250	9.25	**7.25**	6.07	**2.60**	2.71	**0.36**	1.51	**0.09**	0.98	**0.03**	0.68	**0.01**	250
275	10.18	**8.65**	6.67	**3.10**	2.98	**0.43**	1.66	**0.10**	1.07	**0.04**	0.75	**0.02**	275
300	11.10	**10.16**	7.28	**3.64**	3.25	**0.51**	1.81	**0.12**	1.17	**0.04**	0.82	**0.02**	300
350	12.96	**13.52**	8.49	**4.84**	3.79	**0.68**	2.11	**0.16**	1.37	**0.06**	0.95	**0.02**	350
400	14.81	**17.31**	9.71	**6.20**	4.33	**0.87**	2.41	**0.21**	1.56	**0.07**	1.09	**0.03**	400
450	16.66	**21.53**	10.92	**7.71**	4.87	**1.08**	2.71	**0.26**	1.76	**0.09**	1.23	**0.04**	450
500	18.51	**26.17**	12.14	**9.37**	5.41	**1.31**	3.01	**0.32**	1.95	**0.11**	1.36	**0.05**	500
550			13.35	**11.18**	5.95	**1.57**	3.31	**0.38**	2.15	**0.13**	1.50	**0.05**	550
600			14.56	**13.14**	6.49	**1.84**	3.61	**0.44**	2.34	**0.15**	1.63	**0.06**	600
650			15.78	**15.24**	7.03	**2.14**	3.92	**0.51**	2.54	**0.18**	1.77	**0.07**	650
700			16.99	**17.48**	7.58	**2.45**	4.22	**0.59**	2.73	**0.21**	1.91	**0.09**	700
750			18.20	**19.86**	8.12	**2.78**	4.52	**0.67**	2.93	**0.23**	2.04	**0.10**	750
800			19.42	**22.38**	8.66	**3.14**	4.82	**0.75**	3.12	**0.26**	2.18	**0.11**	800
900					9.74	**3.90**	5.42	**0.94**	3.52	**0.33**	2.45	**0.14**	900
1000					10.82	**4.74**	6.02	**1.14**	3.91	**0.40**	2.72	**0.17**	1000
1100					11.90	**5.66**	6.63	**1.36**	4.30	**0.47**	3.00	**0.20**	1100
1200					12.99	**6.65**	7.23	**1.60**	4.69	**0.56**	3.27	**0.23**	1200
1300					14.07	**7.71**	7.83	**1.85**	5.08	**0.65**	3.54	**0.27**	1300
1400					15.15	**8.84**	8.43	**2.13**	5.47	**0.74**	3.81	**0.31**	1400
1500					16.23	**10.05**	9.04	**2.42**	5.86	**0.84**	4.08	**0.35**	1500
1600					17.32	**11.32**	9.64	**2.72**	6.25	**0.95**	4.36	**0.39**	1600
1700					18.40	**12.67**	10.24	**3.05**	6.64	**1.06**	4.63	**0.44**	1700
1800					19.48	**14.08**	10.84	**3.39**	7.03	**1.18**	4.90	**0.49**	1800
2000							12.05	**4.11**	7.81	**1.43**	5.45	**0.60**	2000
2200							13.25	**4.91**	8.59	**1.71**	5.99	**0.71**	2200
2400							14.46	**5.77**	9.37	**2.01**	6.54	**0.84**	2400
2600							15.66	**6.69**	10.16	**2.33**	7.08	**0.97**	2600
2800							16.87	**7.67**	10.94	**2.68**	7.63	**1.11**	2800
3000							18.07	**8.72**	11.72	**3.04**	8.17	**1.26**	3000
3200							19.28	**9.83**	12.50	**3.43**	8.71	**1.42**	3200
3400									13.28	**3.83**	9.26	**1.59**	3400
3600									14.06	**4.26**	9.80	**1.77**	3600
3800									14.84	**4.71**	10.35	**1.96**	3800
4000									15.62	**5.18**	10.89	**2.15**	4000
4500									17.58	**6.44**	12.25	**2.68**	4500
5000									19.53	**7.83**	13.62	**3.25**	5000
5500											14.98	**3.88**	5500
6000											16.34	**4.56**	6000
6500											17.70	**5.29**	6500
7000											19.06	**6.07**	7000

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Cast Iron Pipe - Class 150

C=100

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 14" THRU 24"

Nominal Size	14"		16"		18"		20"		24"		Nominal Size
Pipe ID	14.28		16.32		18.34		20.36		24.34		Pipe ID
Pipe OD	15.30		17.40		19.50		21.60		25.80		Pipe OD
Wall Thick	0.51		0.54		0.58		0.62		0.73		Wall Thick
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
200	0.40	**0.00**									200
300	0.60	**0.01**	0.46	**0.00**							300
400	0.80	**0.01**	0.61	**0.01**	0.49	**0.00**					400
500	1.00	**0.02**	0.77	**0.01**	0.61	**0.01**	0.49	**0.00**			500
600	1.20	**0.03**	0.92	**0.02**	0.73	**0.01**	0.59	**0.01**			600
700	1.40	**0.04**	1.07	**0.02**	0.85	**0.01**	0.69	**0.01**			700
800	1.60	**0.05**	1.23	**0.03**	0.97	**0.02**	0.79	**0.01**			800
900	1.80	**0.06**	1.38	**0.03**	1.09	**0.02**	0.89	**0.01**	0.62	**0.00**	900
1000	2.00	**0.08**	1.53	**0.04**	1.21	**0.02**	0.98	**0.01**	0.69	**0.01**	1000
1100	2.20	**0.09**	1.69	**0.05**	1.33	**0.03**	1.08	**0.02**	0.76	**0.01**	1100
1200	2.40	**0.11**	1.84	**0.06**	1.46	**0.03**	1.18	**0.02**	0.83	**0.01**	1200
1300	2.60	**0.13**	1.99	**0.07**	1.58	**0.04**	1.28	**0.02**	0.90	**0.01**	1300
1400	2.80	**0.15**	2.14	**0.08**	1.70	**0.04**	1.38	**0.03**	0.96	**0.01**	1400
1500	3.00	**0.17**	2.30	**0.09**	1.82	**0.05**	1.48	**0.03**	1.03	**0.01**	1500
1600	3.20	**0.19**	2.45	**0.10**	1.94	**0.06**	1.57	**0.03**	1.10	**0.01**	1600
1700	3.40	**0.21**	2.60	**0.11**	2.06	**0.06**	1.67	**0.04**	1.17	**0.02**	1700
1800	3.60	**0.23**	2.76	**0.12**	2.18	**0.07**	1.77	**0.04**	1.24	**0.02**	1800
1900	3.80	**0.26**	2.91	**0.13**	2.30	**0.08**	1.87	**0.05**	1.31	**0.02**	1900
2000	4.00	**0.28**	3.06	**0.15**	2.43	**0.08**	1.97	**0.05**	1.38	**0.02**	2000
2250	4.50	**0.35**	3.45	**0.18**	2.73	**0.10**	2.21	**0.06**	1.55	**0.03**	2250
2500	5.00	**0.43**	3.83	**0.22**	3.03	**0.13**	2.46	**0.08**	1.72	**0.03**	2500
2750	5.50	**0.51**	4.21	**0.27**	3.34	**0.15**	2.71	**0.09**	1.89	**0.04**	2750
3000	6.00	**0.60**	4.60	**0.31**	3.64	**0.18**	2.95	**0.11**	2.07	**0.04**	3000
3250	6.50	**0.69**	4.98	**0.36**	3.94	**0.20**	3.20	**0.12**	2.24	**0.05**	3250
3500	7.00	**0.79**	5.36	**0.41**	4.25	**0.24**	3.44	**0.14**	2.41	**0.06**	3500
3750	7.50	**0.90**	5.74	**0.47**	4.55	**0.27**	3.69	**0.16**	2.58	**0.07**	3750
4000	8.00	**1.02**	6.13	**0.53**	4.85	**0.30**	3.94	**0.18**	2.75	**0.08**	4000
4250	8.50	**1.14**	6.51	**0.59**	5.16	**0.34**	4.18	**0.20**	2.93	**0.08**	4250
4500	9.00	**1.26**	6.89	**0.66**	5.46	**0.37**	4.43	**0.23**	3.10	**0.09**	4500
4750	9.50	**1.40**	7.28	**0.73**	5.76	**0.41**	4.68	**0.25**	3.27	**0.10**	4750
5000	10.00	**1.54**	7.66	**0.80**	6.07	**0.45**	4.92	**0.27**	3.44	**0.11**	5000
5250	10.50	**1.68**	8.04	**0.88**	6.37	**0.50**	5.17	**0.30**	3.62	**0.13**	5250
5500	11.00	**1.83**	8.43	**0.96**	6.67	**0.54**	5.41	**0.33**	3.79	**0.14**	5500
5750	11.50	**1.99**	8.81	**1.04**	6.97	**0.59**	5.66	**0.35**	3.96	**0.15**	5750
6000	12.00	**2.15**	9.19	**1.13**	7.28	**0.64**	5.91	**0.38**	4.13	**0.16**	6000
6500	13.01	**2.50**	9.96	**1.30**	7.88	**0.74**	6.40	**0.44**	4.48	**0.19**	6500
7000	14.01	**2.87**	10.72	**1.50**	8.49	**0.85**	6.89	**0.51**	4.82	**0.21**	7000
7500	15.01	**3.26**	11.49	**1.70**	9.10	**0.96**	7.38	**0.58**	5.17	**0.24**	7500
8000	16.01	**3.67**	12.25	**1.92**	9.70	**1.09**	7.87	**0.65**	5.51	**0.27**	8000
8500	17.01	**4.11**	13.02	**2.14**	10.31	**1.22**	8.37	**0.73**	5.85	**0.31**	8500
9000	18.01	**4.57**	13.79	**2.38**	10.92	**1.35**	8.86	**0.81**	6.20	**0.34**	9000
10000			15.32	**2.90**	12.13	**1.64**	9.84	**0.99**	6.89	**0.41**	10000
11000			16.85	**3.46**	13.34	**1.96**	10.83	**1.18**	7.58	**0.49**	11000
12000			18.38	**4.06**	14.56	**2.30**	11.81	**1.38**	8.26	**0.58**	12000
13000			19.91	**4.71**	15.77	**2.67**	12.80	**1.61**	8.95	**0.67**	13000
14000					16.98	**3.06**	13.78	**1.84**	9.64	**0.77**	14000
15000					18.20	**3.48**	14.76	**2.09**	10.33	**0.88**	15000
16000					19.41	**3.92**	15.75	**2.36**	11.02	**0.99**	16000
17000							16.73	**2.64**	11.71	**1.11**	17000
18000							17.72	**2.93**	12.40	**1.23**	18000
19000							18.70	**3.24**	13.08	**1.36**	19000
20000							19.68	**3.57**	13.77	**1.50**	20000
21000									14.46	**1.64**	21000
22000									15.15	**1.78**	22000
23000									15.84	**1.94**	23000
24000									16.53	**2.10**	24000
25000									17.22	**2.26**	25000
26000									17.91	**2.43**	26000
27000									18.59	**2.61**	27000
28000									19.28	**2.79**	28000
29000									19.97	**2.98**	29000

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Type “K” Copper Water Tube

C = 140

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES ½" THRU 2½"

Nominal Size	½"		⅝"		¾"		1"		1¼"		1½"		2"		2½"		Nominal Size
Pipe ID	0.527		0.652		0.745		0.995		1.245		1.481		1.959		2.435		Pipe ID
Pipe OD	0.625		0.750		0.875		1.125		1.375		1.625		2.125		2.625		Pipe OD
Wall Thick	0.049		0.049		0.065		0.065		0.065		0.072		0.083		0.095		Wall Thick
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Flow GPM
1	1.47	**1.09**	0.96	**0.39**	0.74	**0.20**	0.41	**0.05**	0.26	**0.02**	0.19	**0.01**	0.11	**0.00**			1
2	2.94	**3.94**	1.92	**1.40**	1.47	**0.73**	0.82	**0.18**	0.53	**0.06**	0.37	**0.03**	0.21	**0.01**			2
3	4.41	**8.35**	2.88	**2.97**	2.21	**1.55**	1.24	**0.38**	0.79	**0.13**	0.56	**0.05**	0.32	**0.01**	0.21	**0.00**	3
4	5.88	**14.23**	3.84	**5.05**	2.94	**2.64**	1.65	**0.65**	1.05	**0.22**	0.74	**0.09**	0.43	**0.02**	0.28	**0.01**	4
5	7.35	**21.51**	4.80	**7.64**	3.68	**3.99**	2.06	**0.98**	1.32	**0.33**	0.93	**0.14**	0.53	**0.04**	0.34	**0.01**	5
6	8.81	**30.15**	5.76	**10.70**	4.41	**5.59**	2.47	**1.37**	1.58	**0.46**	1.12	**0.20**	0.64	**0.05**	0.41	**0.02**	6
7	10.28	**40.12**	6.72	**14.24**	5.15	**7.44**	2.88	**1.82**	1.84	**0.61**	1.30	**0.26**	0.74	**0.07**	0.48	**0.02**	7
8	11.75	**51.37**	7.68	**18.24**	5.88	**9.53**	3.30	**2.33**	2.11	**0.78**	1.49	**0.34**	0.85	**0.09**	0.55	**0.03**	8
9	13.22	**63.90**	8.64	**22.68**	6.62	**11.85**	3.71	**2.90**	2.37	**0.97**	1.67	**0.42**	0.96	**0.11**	0.62	**0.04**	9
10	14.69	**77.66**	9.60	**27.57**	7.35	**14.41**	4.12	**3.52**	2.63	**1.18**	1.86	**0.51**	1.06	**0.13**	0.69	**0.05**	10
11	16.16	**92.66**	10.56	**32.89**	8.09	**17.19**	4.53	**4.21**	2.90	**1.41**	2.05	**0.61**	1.17	**0.16**	0.76	**0.05**	11
12	17.63	**108.86**	11.52	**38.64**	8.82	**20.20**	4.95	**4.94**	3.16	**1.66**	2.23	**0.71**	1.28	**0.18**	0.83	**0.06**	12
13	19.10	**126.25**	12.48	**44.82**	9.56	**23.42**	5.36	**5.73**	3.42	**1.93**	2.42	**0.83**	1.38	**0.21**	0.89	**0.07**	13
14			13.44	**51.41**	10.29	**26.87**	5.77	**6.57**	3.69	**2.21**	2.60	**0.95**	1.49	**0.24**	0.96	**0.08**	14
15			14.40	**58.42**	11.03	**30.53**	6.18	**7.47**	3.95	**2.51**	2.79	**1.08**	1.59	**0.28**	1.03	**0.10**	15
16			15.36	**65.83**	11.76	**34.41**	6.59	**8.42**	4.21	**2.83**	2.98	**1.22**	1.70	**0.31**	1.10	**0.11**	16
17			16.32	**73.66**	12.50	**38.50**	7.01	**9.42**	4.47	**3.16**	3.16	**1.36**	1.81	**0.35**	1.17	**0.12**	17
18			17.28	**81.88**	13.23	**42.80**	7.42	**10.47**	4.74	**3.52**	3.35	**1.51**	1.91	**0.39**	1.24	**0.13**	18
19			18.24	**90.50**	13.97	**47.30**	7.83	**11.57**	5.00	**3.89**	3.53	**1.67**	2.02	**0.43**	1.31	**0.15**	19
20			19.20	**99.52**	14.70	**52.02**	8.24	**12.72**	5.26	**4.28**	3.72	**1.84**	2.13	**0.47**	1.38	**0.16**	20
22					16.17	**62.06**	9.07	**15.18**	5.79	**5.10**	4.09	**2.19**	2.34	**0.56**	1.51	**0.19**	22
24					17.64	**72.91**	9.89	**17.84**	6.32	**5.99**	4.46	**2.58**	2.55	**0.66**	1.65	**0.23**	24
25					18.38	**78.64**	10.30	**19.24**	6.58	**6.46**	4.65	**2.78**	2.66	**0.71**	1.72	**0.25**	25
26					19.11	**84.56**	10.71	**20.69**	6.84	**6.95**	4.84	**2.99**	2.76	**0.77**	1.79	**0.27**	26
28							11.54	**23.73**	7.37	**7.97**	5.21	**3.43**	2.98	**0.88**	1.93	**0.30**	28
30							12.36	**26.96**	7.90	**9.06**	5.58	**3.89**	3.19	**1.00**	2.06	**0.35**	30
32							13.19	**30.39**	8.42	**10.21**	5.95	**4.39**	3.40	**1.12**	2.20	**0.39**	32
34							14.01	**34.00**	8.95	**11.42**	6.32	**4.91**	3.61	**1.26**	2.34	**0.44**	34
35							14.42	**35.87**	9.21	**12.05**	6.51	**5.18**	3.72	**1.33**	2.41	**0.46**	35
36							14.84	**37.79**	9.48	**12.70**	6.70	**5.46**	3.83	**1.40**	2.48	**0.49**	36
38							15.66	**41.77**	10.00	**14.04**	7.07	**6.03**	4.04	**1.55**	2.61	**0.54**	38
40							16.48	**45.94**	10.53	**15.43**	7.44	**6.63**	4.25	**1.70**	2.75	**0.59**	40
42							17.31	**50.28**	11.06	**16.89**	7.81	**7.26**	4.47	**1.86**	2.89	**0.65**	42
44							18.13	**54.80**	11.58	**18.41**	8.18	**7.91**	4.68	**2.03**	3.03	**0.70**	44
45							18.54	**57.13**	11.84	**19.20**	8.37	**8.25**	4.78	**2.11**	3.10	**0.73**	45
46							18.96	**59.51**	12.11	**19.99**	8.56	**8.59**	4.89	**2.20**	3.17	**0.76**	46
48							19.78	**64.39**	12.63	**21.63**	8.93	**9.30**	5.10	**2.38**	3.30	**0.83**	48
50									13.16	**23.33**	9.30	**10.03**	5.32	**2.57**	3.44	**0.89**	50
55									14.48	**27.84**	10.23	**11.96**	5.85	**3.07**	3.78	**1.06**	55
60									15.79	**32.70**	11.16	**14.05**	6.38	**3.60**	4.13	**1.25**	60
65									17.11	**37.93**	12.09	**16.30**	6.91	**4.18**	4.47	**1.45**	65
70									18.43	**43.51**	13.02	**18.70**	7.44	**4.79**	4.82	**1.66**	70
75									19.74	**49.44**	13.95	**21.24**	7.97	**5.45**	5.16	**1.89**	75
80											14.88	**23.94**	8.51	**6.14**	5.50	**2.13**	80
85											15.81	**26.79**	9.04	**6.87**	5.85	**2.38**	85
90											16.74	**29.78**	9.57	**7.63**	6.19	**2.65**	90
95											17.67	**32.91**	10.10	**8.44**	6.54	**2.93**	95
100											18.60	**36.19**	10.63	**9.28**	6.88	**3.22**	100
110													11.69	**11.07**	7.57	**3.84**	110
120													12.76	**13.01**	8.26	**4.51**	120
130													13.82	**15.08**	8.95	**5.23**	130
140													14.88	**17.30**	9.63	**6.00**	140
150													15.95	**19.66**	10.32	**6.82**	150
160													17.01	**22.16**	11.01	**7.69**	160
170													18.07	**24.79**	11.70	**8.60**	170
180													19.14	**27.56**	12.39	**9.56**	180
190															13.07	**10.57**	190
200															13.76	**11.62**	200
225															15.48	**14.46**	225
250															17.20	**17.57**	250
275															18.92	**20.96**	275

Shaded area represents velocities over 7.5 fps. Use with caution where water hammer is a concern.

Type “K” Copper Water Tube

C = 140

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 3" THRU 12"

Nominal Size	3"		4"		6"		8"		10"		12"		Nominal Size
Pipe ID	2.907		3.857		5.741		7.583		9.449		11.315		Pipe ID
Pipe OD	3.125		4.125		6.125		8.125		10.125		12.125		Pipe OD
Wall Thick	0.109		0.134		0.192		0.271		0.338		0.405		Wall Thick
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
20	0.97	**0.07**	0.53	**0.02**									20
22	1.06	**0.08**	0.58	**0.02**									2
24	1.16	**0.10**	0.63	**0.02**									24
26	1.26	**0.11**	0.69	**0.03**									26
28	1.35	**0.13**	0.74	**0.03**									28
30	1.45	**0.15**	0.79	**0.03**	0.35	**0.00**							30
32	1.54	**0.16**	0.84	**0.04**	0.38	**0.01**							32
34	1.64	**0.18**	0.90	**0.04**	0.40	**0.01**							34
36	1.74	**0.20**	0.95	**0.05**	0.42	**0.01**							36
38	1.83	**0.23**	1.00	**0.05**	0.45	**0.01**							38
40	1.93	**0.25**	1.05	**0.06**	0.47	**0.01**							40
42	2.03	**0.27**	1.11	**0.06**	0.50	**0.01**							42
44	2.12	**0.30**	1.16	**0.07**	0.52	**0.01**							44
46	2.22	**0.32**	1.21	**0.07**	0.54	**0.01**							46
48	2.32	**0.35**	1.26	**0.08**	0.57	**0.01**							48
50	2.41	**0.38**	1.32	**0.09**	0.59	**0.01**							50
55	2.66	**0.45**	1.45	**0.10**	0.65	**0.01**							55
60	2.90	**0.53**	1.58	**0.12**	0.71	**0.02**	0.40	**0.00**					60
65	3.14	**0.61**	1.71	**0.14**	0.77	**0.02**	0.44	**0.01**					65
70	3.38	**0.70**	1.84	**0.16**	0.83	**0.02**	0.47	**0.01**					70
75	3.62	**0.80**	1.98	**0.18**	0.88	**0.03**	0.50	**0.01**					75
80	3.86	**0.90**	2.11	**0.21**	0.94	**0.03**	0.54	**0.01**					80
85	4.10	**1.01**	2.24	**0.23**	1.00	**0.03**	0.57	**0.01**					85
90	4.35	**1.12**	2.37	**0.26**	1.06	**0.04**	0.61	**0.01**					90
95	4.59	**1.24**	2.50	**0.28**	1.12	**0.04**	0.64	**0.01**					95
100	4.83	**1.36**	2.63	**0.31**	1.18	**0.04**	0.67	**0.01**					100
110	5.31	**1.62**	2.90	**0.37**	1.30	**0.05**	0.74	**0.01**	0.48	**0.00**			110
120	5.79	**1.91**	3.16	**0.44**	1.42	**0.06**	0.81	**0.02**	0.52	**0.01**			120
130	6.28	**2.21**	3.43	**0.51**	1.53	**0.07**	0.88	**0.02**	0.56	**0.01**			130
140	6.76	**2.54**	3.69	**0.58**	1.65	**0.08**	0.94	**0.02**	0.61	**0.01**			140
150	7.24	**2.88**	3.95	**0.66**	1.77	**0.09**	1.01	**0.02**	0.65	**0.01**			150
160	7.72	**3.25**	4.22	**0.74**	1.89	**0.11**	1.08	**0.03**	0.69	**0.01**			160
170	8.21	**3.63**	4.48	**0.83**	2.01	**0.12**	1.14	**0.03**	0.74	**0.01**			170
180	8.69	**4.04**	4.74	**0.93**	2.12	**0.13**	1.21	**0.03**	0.78	**0.01**	0.54	**0.00**	180
190	9.17	**4.46**	5.01	**1.02**	2.24	**0.14**	1.28	**0.04**	0.82	**0.01**	0.57	**0.01**	190
200	9.66	**4.91**	5.27	**1.12**	2.36	**0.16**	1.35	**0.04**	0.87	**0.01**	0.60	**0.01**	200
225	10.86	**6.10**	5.93	**1.40**	2.65	**0.20**	1.51	**0.05**	0.98	**0.02**	0.68	**0.01**	225
250	12.07	**7.42**	6.59	**1.70**	2.95	**0.24**	1.68	**0.06**	1.08	**0.02**	0.76	**0.01**	250
275	13.28	**8.85**	7.25	**2.03**	3.24	**0.29**	1.85	**0.07**	1.19	**0.03**	0.83	**0.01**	275
300	14.48	**10.40**	7.90	**2.38**	3.54	**0.34**	2.02	**0.09**	1.30	**0.03**	0.91	**0.01**	300
350	16.90	**13.84**	9.22	**3.17**	4.13	**0.45**	2.36	**0.11**	1.52	**0.04**	1.06	**0.02**	350
400	19.31	**17.72**	10.54	**4.06**	4.72	**0.57**	2.69	**0.15**	1.73	**0.05**	1.21	**0.02**	400
450			11.86	**5.05**	5.31	**0.71**	3.03	**0.18**	1.95	**0.06**	1.36	**0.03**	450
500			13.17	**6.14**	5.90	**0.87**	3.37	**0.22**	2.17	**0.08**	1.51	**0.03**	500
600			15.81	**8.60**	7.08	**1.22**	4.04	**0.31**	2.60	**0.11**	1.81	**0.04**	600
700			18.44	**11.45**	8.26	**1.62**	4.71	**0.41**	3.03	**0.14**	2.12	**0.06**	700
800					9.44	**2.07**	5.39	**0.53**	3.47	**0.18**	2.42	**0.08**	800
900					10.62	**2.58**	6.06	**0.66**	3.90	**0.23**	2.72	**0.09**	900
1000					11.80	**3.14**	6.73	**0.80**	4.34	**0.27**	3.02	**0.11**	1000
1200					14.16	**4.40**	8.08	**1.12**	5.20	**0.38**	3.63	**0.16**	1200
1400					16.52	**5.85**	9.42	**1.49**	6.07	**0.51**	4.23	**0.21**	1400
1600					18.87	**7.49**	10.77	**1.91**	6.94	**0.66**	4.84	**0.27**	1600
1800							12.12	**2.38**	7.80	**0.82**	5.44	**0.34**	1800
2000							13.46	**2.89**	8.67	**0.99**	6.05	**0.41**	2000
2200							14.81	**3.45**	9.54	**1.18**	6.65	**0.49**	2200
2400							16.16	**4.05**	10.40	**1.39**	7.26	**0.58**	2400
2600							17.50	**4.70**	11.27	**1.61**	7.86	**0.67**	2600
2800							18.85	**5.39**	12.14	**1.85**	8.47	**0.77**	2800
3000									13.01	**2.10**	9.07	**0.87**	3000
3500									15.17	**2.79**	10.58	**1.16**	3500
4000									17.34	**3.58**	12.09	**1.49**	4000
4500									19.51	**4.45**	13.60	**1.85**	4500
5000											15.12	**2.25**	5000
5500											16.63	**2.69**	5500
6000											18.14	**3.15**	6000

Shaded area represents velocities over 5 and 7.5 fps. Use with caution where water hammer is a concern.

Type "L" Copper Water Tube

C = 140

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES ½" THRU 2½"

Nominal Size	½"		⅝"		¾"		1"		1¼"		1½"		2"		2½"		Nominal Size
Pipe ID	0.545		0.666		0.785		1.025		1.265		1.505		1.985		2.465		Pipe ID
Pipe OD	0.625		0.750		0.875		1.125		1.375		1.625		2.125		2.625		Pipe OD
Wall Thick	0.040		0.042		0.045		0.050		0.055		0.060		0.070		0.080		Wall Thick
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Flow GPM
1	1.39	**0.95**	0.92	**0.35**	0.66	**0.16**	0.39	**0.04**	0.25	**0.02**	0.18	**0.01**	0.10	**0.00**			1
2	2.78	**3.44**	1.84	**1.26**	1.32	**0.57**	0.78	**0.15**	0.51	**0.06**	0.36	**0.02**	0.21	**0.01**			2
3	4.17	**7.29**	2.76	**2.67**	1.99	**1.20**	1.17	**0.33**	0.76	**0.12**	0.54	**0.05**	0.31	**0.01**	0.20	**0.00**	3
4	5.56	**12.41**	3.68	**4.56**	2.65	**2.05**	1.55	**0.56**	1.02	**0.20**	0.72	**0.09**	0.41	**0.02**	0.27	**0.01**	4
5	6.94	**18.77**	4.60	**6.89**	3.31	**3.09**	1.94	**0.85**	1.27	**0.30**	0.90	**0.13**	0.52	**0.03**	0.34	**0.01**	5
6	8.33	**26.31**	5.52	**9.65**	3.97	**4.34**	2.33	**1.18**	1.53	**0.43**	1.08	**0.18**	0.62	**0.05**	0.40	**0.02**	6
7	9.72	**35.00**	6.44	**12.84**	4.63	**5.77**	2.72	**1.58**	1.78	**0.57**	1.26	**0.24**	0.72	**0.06**	0.47	**0.02**	7
8	11.11	**44.82**	7.36	**16.45**	5.30	**7.39**	3.11	**2.02**	2.04	**0.72**	1.44	**0.31**	0.83	**0.08**	0.54	**0.03**	8
9	12.50	**55.74**	8.28	**20.45**	5.96	**9.19**	3.50	**2.51**	2.29	**0.90**	1.62	**0.39**	0.93	**0.10**	0.60	**0.04**	9
10	13.89	**67.75**	9.20	**24.86**	6.62	**11.17**	3.88	**3.05**	2.55	**1.10**	1.80	**0.47**	1.04	**0.12**	0.67	**0.04**	10
11	15.28	**80.83**	10.12	**29.66**	7.28	**13.33**	4.27	**3.64**	2.80	**1.31**	1.98	**0.56**	1.14	**0.15**	0.74	**0.05**	11
12	16.67	**94.96**	11.04	**34.85**	7.95	**15.66**	4.66	**4.28**	3.06	**1.54**	2.16	**0.66**	1.24	**0.17**	0.81	**0.06**	12
13	18.06	**110.14**	11.96	**40.42**	8.61	**18.16**	5.05	**4.96**	3.31	**1.78**	2.34	**0.77**	1.35	**0.20**	0.87	**0.07**	13
14	19.44	**126.34**	12.88	**46.36**	9.27	**20.83**	5.44	**5.69**	3.57	**2.04**	2.52	**0.88**	1.45	**0.23**	0.94	**0.08**	14
15			13.80	**52.68**	9.93	**23.67**	5.83	**6.46**	3.82	**2.32**	2.70	**1.00**	1.55	**0.26**	1.01	**0.09**	15
16			14.72	**59.37**	10.59	**26.68**	6.21	**7.28**	4.08	**2.62**	2.88	**1.12**	1.66	**0.29**	1.07	**0.10**	16
17			15.64	**66.42**	11.26	**29.85**	6.60	**8.15**	4.33	**2.93**	3.06	**1.26**	1.76	**0.33**	1.14	**0.11**	17
18			16.56	**73.84**	11.92	**33.18**	6.99	**9.06**	4.59	**3.25**	3.24	**1.40**	1.86	**0.36**	1.21	**0.13**	18
19			17.48	**81.62**	12.58	**36.67**	7.38	**10.01**	4.84	**3.60**	3.42	**1.54**	1.97	**0.40**	1.28	**0.14**	19
20			18.40	**89.75**	13.24	**40.33**	7.77	**11.01**	5.10	**3.96**	3.60	**1.70**	2.07	**0.44**	1.34	**0.15**	20
22					14.57	**48.11**	8.54	**13.14**	5.61	**4.72**	3.96	**2.03**	2.28	**0.53**	1.48	**0.18**	22
24					15.89	**56.53**	9.32	**15.44**	6.12	**5.55**	4.32	**2.38**	2.49	**0.62**	1.61	**0.22**	24
25					16.55	**60.97**	9.71	**16.65**	6.37	**5.98**	4.50	**2.57**	2.59	**0.67**	1.68	**0.23**	25
26					17.21	**65.56**	10.10	**17.90**	6.63	**6.43**	4.68	**2.76**	2.69	**0.72**	1.75	**0.25**	26
28					18.54	**75.21**	10.87	**20.54**	7.14	**7.38**	5.04	**3.17**	2.90	**0.82**	1.88	**0.29**	28
30					19.86	**85.46**	11.65	**23.33**	7.65	**8.38**	5.40	**3.60**	3.11	**0.94**	2.01	**0.33**	30
32							12.43	**26.30**	8.16	**9.45**	5.76	**4.06**	3.31	**1.05**	2.15	**0.37**	32
34							13.20	**29.42**	8.67	**10.57**	6.12	**4.54**	3.52	**1.18**	2.28	**0.41**	34
35							13.59	**31.04**	8.92	**11.15**	6.30	**4.79**	3.62	**1.25**	2.35	**0.43**	35
36							13.98	**32.71**	9.18	**11.75**	6.48	**5.05**	3.73	**1.31**	2.42	**0.46**	36
38							14.76	**36.15**	9.69	**12.99**	6.84	**5.58**	3.93	**1.45**	2.55	**0.51**	38
40							15.53	**39.75**	10.20	**14.28**	7.21	**6.13**	4.14	**1.59**	2.69	**0.56**	40
42							16.31	**43.51**	10.71	**15.63**	7.57	**6.71**	4.35	**1.75**	2.82	**0.61**	42
44							17.09	**47.43**	11.22	**17.04**	7.93	**7.32**	4.56	**1.90**	2.95	**0.66**	44
45							17.48	**49.44**	11.47	**17.76**	8.11	**7.63**	4.66	**1.98**	3.02	**0.69**	45
46							17.86	**51.50**	11.73	**18.50**	8.29	**7.94**	4.76	**2.07**	3.09	**0.72**	46
48							18.64	**55.72**	12.24	**20.02**	8.65	**8.60**	4.97	**2.24**	3.22	**0.78**	48
50							19.42	**60.10**	12.75	**21.59**	9.01	**9.27**	5.18	**2.41**	3.36	**0.84**	50
55									14.02	**25.76**	9.91	**11.06**	5.70	**2.88**	3.69	**1.00**	55
60									15.30	**30.26**	10.81	**13.00**	6.21	**3.38**	4.03	**1.18**	60
65									16.57	**35.10**	11.71	**15.07**	6.73	**3.92**	4.36	**1.37**	65
70									17.85	**40.26**	12.61	**17.29**	7.25	**4.50**	4.70	**1.57**	70
75									19.12	**45.75**	13.51	**19.65**	7.77	**5.11**	5.04	**1.78**	75
80											14.41	**22.14**	8.28	**5.76**	5.37	**2.01**	80
85											15.31	**24.77**	8.80	**6.44**	5.71	**2.25**	85
90											16.21	**27.54**	9.32	**7.16**	6.04	**2.50**	90
95											17.11	**30.44**	9.84	**7.91**	6.38	**2.76**	95
100											18.01	**33.47**	10.35	**8.70**	6.71	**3.03**	100
110											19.81	**39.93**	11.39	**10.38**	7.39	**3.62**	110
120													12.43	**12.20**	8.06	**4.25**	120
130													13.46	**14.15**	8.73	**4.93**	130
140													14.50	**16.23**	9.40	**5.66**	140
150													15.53	**18.44**	10.07	**6.43**	150
160													16.57	**20.78**	10.74	**7.24**	160
170													17.60	**23.25**	11.41	**8.11**	170
180													18.64	**25.85**	12.09	**9.01**	180
190															12.76	**9.96**	190
200															13.43	**10.95**	200
225															15.11	**13.62**	225
250															16.79	**16.56**	250
275															18.47	**19.75**	275
300																	300
325																	325
350																	350
375																	375
400																	400
425																	425

Shaded area represents velocities over 7.5 fps. Use with caution where water hammer is a concern.

Type "L" Copper Water Tube

C = 140

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 3" THRU 12"

Nominal Size	3"		4"		6"		8"		10"		12"		Nominal Size
Pipe ID	2.945		3.905		5.845		7.725		9.625		11.565		Pipe ID
Pipe OD	3.125		4.125		6.125		8.125		10.125		12.125		Pipe OD
Wall Thick	0.090		0.110		0.140		0.200		0.250		0.280		Wall Thick
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Flow GPM
20	0.94	**0.06**	0.54	**0.02**									20
22	1.03	**0.08**	0.59	**0.02**									22
24	1.13	**0.09**	0.64	**0.02**									24
26	1.22	**0.11**	0.70	**0.03**									26
28	1.32	**0.12**	0.75	**0.03**									28
30	1.41	**0.14**	0.80	**0.03**	0.36	**0.00**							30
32	1.51	**0.15**	0.86	**0.04**	0.38	**0.01**							32
34	1.60	**0.17**	0.91	**0.04**	0.41	**0.01**							34
36	1.69	**0.19**	0.96	**0.05**	0.43	**0.01**							36
38	1.79	**0.21**	1.02	**0.05**	0.45	**0.01**							38
40	1.88	**0.23**	1.07	**0.06**	0.48	**0.01**							40
42	1.98	**0.26**	1.12	**0.06**	0.50	**0.01**							42
44	2.07	**0.28**	1.18	**0.07**	0.53	**0.01**							44
46	2.16	**0.30**	1.23	**0.08**	0.55	**0.01**							46
48	2.26	**0.33**	1.28	**0.08**	0.57	**0.01**							48
50	2.35	**0.35**	1.34	**0.09**	0.60	**0.0**							50
55	2.59	**0.42**	1.47	**0.11**	0.66	**0.02**							55
60	2.82	**0.50**	1.61	**0.13**	0.72	**0.02**	0.41	**0.00**					60
65	3.06	**0.57**	1.74	**0.15**	0.78	**0.02**	0.44	**0.01**					65
70	3.29	**0.66**	1.87	**0.17**	0.84	**0.02**	0.48	**0.01**					70
75	3.53	**0.75**	2.01	**0.19**	0.90	**0.03**	0.51	**0.01**					75
80	3.76	**0.84**	2.14	**0.21**	0.96	**0.03**	0.55	**0.01**					80
85	4.00	**0.94**	2.27	**0.24**	1.02	**0.03**	0.58	**0.01**					85
90	4.23	**1.05**	2.41	**0.27**	1.07	**0.04**	0.62	**0.01**					90
95	4.47	**1.16**	2.54	**0.29**	1.13	**0.04**	0.65	**0.01**					95
100	4.70	**1.28**	2.68	**0.32**	1.19	**0.05**	0.68	**0.01**					100
110	5.17	**1.52**	2.94	**0.39**	1.31	**0.05**	0.75	**0.01**	0.48	**0.00**			110
120	5.65	**1.79**	3.21	**0.45**	1.43	**0.06**	0.82	**0.02**	0.53	**0.01**			120
130	6.12	**2.07**	3.48	**0.53**	1.55	**0.07**	0.89	**0.02**	0.57	**0.01**			130
140	6.59	**2.38**	3.75	**0.60**	1.67	**0.08**	0.96	**0.02**	0.62	**0.01**			140
150	7.06	**2.70**	4.01	**0.69**	1.79	**0.10**	1.03	**0.02**	0.66	**0.01**			150
160	7.53	**3.05**	4.28	**0.77**	1.91	**0.11**	1.09	**0.03**	0.70	**0.01**			160
170	8.00	**3.41**	4.55	**0.86**	2.03	**0.12**	1.16	**0.03**	0.75	**0.01**			170
180	8.47	**3.79**	4.82	**0.96**	2.15	**0.13**	1.23	**0.03**	0.79	**0.01**	0.55	**0.00**	180
190	8.94	**4.19**	5.08	**1.06**	2.27	**0.15**	1.30	**0.04**	0.84	**0.01**	0.58	**0.01**	190
200	9.41	**4.61**	5.35	**1.17**	2.39	**0.16**	1.37	**0.04**	0.88	**0.01**	0.61	**0.01**	200
225	10.58	**5.73**	6.02	**1.45**	2.69	**0.20**	1.54	**0.05**	0.99	**0.02**	0.69	**0.01**	225
250	11.76	**6.97**	6.69	**1.76**	2.99	**0.25**	1.71	**0.06**	1.10	**0.02**	0.76	**0.01**	250
275	12.94	**8.31**	7.36	**2.11**	3.28	**0.30**	1.88	**0.08**	1.21	**0.03**	0.84	**0.01**	275
300	14.11	**9.76**	8.03	**2.47**	3.58	**0.35**	2.05	**0.09**	1.32	**0.03**	0.92	**0.01**	300
350	16.46	**12.99**	9.36	**3.29**	4.18	**0.46**	2.39	**0.12**	1.54	**0.04**	1.07	**0.02**	350
400	18.82	**16.63**	10.70	**4.21**	4.78	**0.59**	2.73	**0.15**	1.76	**0.05**	1.22	**0.02**	400
450			12.04	**5.24**	5.37	**0.74**	3.08	**0.19**	1.98	**0.07**	1.37	**0.03**	450
500			13.38	**6.37**	5.97	**0.90**	3.42	**0.23**	2.20	**0.08**	1.53	**0.03**	500
600			16.05	**8.93**	7.17	**1.25**	4.10	**0.32**	2.64	**0.11**	1.83	**0.05**	600
700			18.73	**11.88**	8.36	**1.67**	4.79	**0.43**	3.08	**0.15**	2.14	**0.06**	700
800					9.55	**2.14**	5.47	**0.55**	3.52	**0.19**	2.44	**0.08**	800
900					10.75	**2.66**	6.15	**0.68**	3.96	**0.23**	2.75	**0.10**	900
1000					11.94	**3.23**	6.84	**0.83**	4.40	**0.29**	3.05	**0.12**	1000
1200					14.33	**4.53**	8.20	**1.17**	5.28	**0.40**	3.66	**0.16**	1200
1400					16.72	**6.03**	9.57	**1.55**	6.17	**0.53**	4.27	**0.22**	1400
1600					19.11	**7.72**	10.94	**1.99**	7.05	**0.68**	4.88	**0.28**	1600
1800							12.31	**2.47**	7.93	**0.85**	5.49	**0.35**	1800
2000							13.67	**3.00**	8.81	**1.03**	6.10	**0.42**	2000
2200							15.04	**3.58**	9.69	**1.23**	6.71	**0.50**	2200
2400							16.41	**4.21**	10.57	**1.44**	7.32	**0.59**	2400
2600							17.78	**4.88**	11.45	**1.67**	7.93	**0.69**	2600
2800							19.14	**5.60**	12.33	**1.92**	8.54	**0.79**	2800
3000									13.21	**2.18**	9.15	**0.89**	3000
3500									15.41	**2.90**	10.68	**1.19**	3500
4000									17.62	**3.72**	12.20	**1.52**	4000
4500									19.82	**4.62**	13.73	**1.89**	4500
5000											15.25	**2.30**	5000
5500											16.78	**2.74**	5500
6000											18.30	**3.22**	6000

Shaded area represents velocities over 5 and 7.5fps. Use with caution where water hammer is a concern.

Type "M" Copper Water Tube

C=140

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES ¾" THRU 3"

Nominal Size	¾"		1"		1¼"		1½"		2"		2½"		3"		Nominal Size
Pipe ID	0.811		1.055		1.291		1.527		2.009		2.495		2.981		Pipe ID
Pipe OD	0.875		1.125		1.375		1.625		2.125		2.625		3.125		Pipe OD
Wall Thick	0.032		0.035		0.042		0.049		0.058		0.065		0.072		Wall Thick
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
1	0.62	**0.13**	0.37	**0.04**	0.24	**0.01**	0.17	**0.01**	0.10	**0.00**					1
2	1.24	**0.48**	0.73	**0.13**	0.49	**0.05**	0.35	**0.02**	0.20	**0.01**					2
3	1.86	**1.03**	1.10	**0.29**	0.73	**0.11**	0.52	**0.05**	0.30	**0.01**	0.20	**0.00**			3
4	2.48	**1.75**	1.47	**0.49**	0.98	**0.18**	0.70	**0.08**	0.40	**0.02**	0.26	**0.01**			4
5	3.10	**2.64**	1.83	**0.73**	1.22	**0.27**	0.87	**0.12**	0.51	**0.03**	0.33	**0.01**	0.23	**0.00**	5
6	3.72	**3.70**	2.20	**1.03**	1.47	**0.39**	1.05	**0.17**	0.61	**0.04**	0.39	**0.02**	0.28	**0.01**	6
7	4.34	**4.92**	2.57	**1.37**	1.71	**0.51**	1.22	**0.23**	0.71	**0.06**	0.46	**0.02**	0.32	**0.01**	7
8	4.96	**6.31**	2.93	**1.75**	1.96	**0.66**	1.40	**0.29**	0.81	**0.08**	0.52	**0.03**	0.37	**0.01**	8
9	5.58	**7.84**	3.30	**2.18**	2.20	**0.82**	1.57	**0.36**	0.91	**0.09**	0.59	**0.03**	0.41	**0.01**	9
10	6.20	**9.53**	3.67	**2.65**	2.45	**0.99**	1.75	**0.44**	1.01	**0.12**	0.66	**0.04**	0.46	**0.02**	10
11	6.82	**11.37**	4.03	**3.16**	2.69	**1.18**	1.92	**0.52**	1.11	**0.14**	0.72	**0.05**	0.51	**0.02**	11
12	7.44	**13.36**	4.40	**3.72**	2.94	**1.39**	2.10	**0.61**	1.21	**0.16**	0.79	**0.06**	0.55	**0.02**	12
13	8.06	**15.50**	4.77	**4.31**	3.18	**1.61**	2.27	**0.71**	1.31	**0.19**	0.85	**0.07**	0.60	**0.03**	13
14	8.68	**17.78**	5.13	**4.94**	3.43	**1.85**	2.45	**0.82**	1.42	**0.22**	0.92	**0.07**	0.64	**0.03**	14
15	9.30	**20.20**	5.50	**5.62**	3.67	**2.10**	2.62	**0.93**	1.52	**0.24**	0.98	**0.09**	0.69	**0.04**	15
16	9.93	**22.77**	5.87	**6.33**	3.92	**2.37**	2.80	**1.05**	1.62	**0.28**	1.05	**0.10**	0.73	**0.04**	16
17	10.55	**25.47**	6.23	**7.08**	4.16	**2.65**	2.97	**1.17**	1.72	**0.31**	1.11	**0.11**	0.78	**0.05**	17
18	11.17	**28.32**	6.60	**7.87**	4.41	**2.95**	3.15	**1.30**	1.82	**0.34**	1.18	**0.12**	0.83	**0.05**	18
19	11.79	**31.30**	6.96	**8.70**	4.65	**3.26**	3.32	**1.44**	1.92	**0.38**	1.25	**0.13**	0.87	**0.06**	19
20	12.41	**34.42**	7.33	**9.57**	4.90	**3.58**	3.50	**1.58**	2.02	**0.42**	1.31	**0.15**	0.92	**0.06**	20
22	13.65	**41.06**	8.06	**11.42**	5.39	**4.28**	3.85	**1.89**	2.22	**0.50**	1.44	**0.17**	1.01	**0.07**	22
24	14.89	**48.24**	8.80	**13.41**	5.88	**5.02**	4.20	**2.22**	2.43	**0.58**	1.57	**0.20**	1.10	**0.09**	24
25	15.51	**52.03**	9.16	**14.47**	6.12	**5.42**	4.37	**2.39**	2.53	**0.63**	1.64	**0.22**	1.15	**0.09**	25
26	16.13	**55.95**	9.53	**15.56**	6.36	**5.83**	4.55	**2.57**	2.63	**0.68**	1.70	**0.24**	1.19	**0.10**	26
28	17.37	**64.18**	10.26	**17.85**	6.85	**6.68**	4.90	**2.95**	2.83	**0.78**	1.84	**0.27**	1.29	**0.11**	28
30	18.61	**72.93**	11.00	**20.28**	7.34	**7.59**	5.25	**3.35**	3.03	**0.88**	1.97	**0.31**	1.38	**0.13**	30
32	19.85	**82.18**	11.73	**22.85**	7.83	**8.56**	5.60	**3.78**	3.23	**0.99**	2.10	**0.35**	1.47	**0.15**	32
34			12.46	**25.57**	8.32	**9.57**	5.95	**4.23**	3.44	**1.11**	2.23	**0.39**	1.56	**0.16**	34
35			12.83	**26.98**	8.57	**10.10**	6.12	**4.46**	3.54	**1.17**	2.29	**0.41**	1.61	**0.17**	35
36			13.20	**28.42**	8.81	**10.64**	6.30	**4.70**	3.64	**1.24**	2.36	**0.43**	1.65	**0.18**	36
38			13.93	**31.42**	9.30	**11.76**	6.65	**5.20**	3.84	**1.37**	2.49	**0.48**	1.74	**0.20**	38
40			14.66	**34.55**	9.79	**12.94**	7.00	**5.71**	4.04	**1.50**	2.62	**0.52**	1.84	**0.22**	40
42			15.40	**37.81**	10.28	**14.16**	7.35	**6.26**	4.25	**1.65**	2.75	**0.57**	1.93	**0.24**	42
44			16.13	**41.22**	10.77	**15.43**	7.70	**6.82**	4.45	**1.79**	2.88	**0.63**	2.02	**0.26**	44
45			16.50	**42.97**	11.02	**16.09**	7.87	**7.11**	4.55	**1.87**	2.95	**0.65**	2.07	**0.27**	45
46			16.86	**44.75**	11.26	**16.76**	8.05	**7.40**	4.65	**1.95**	3.01	**0.68**	2.11	**0.29**	46
48			17.60	**48.42**	11.75	**18.13**	8.40	**8.01**	4.85	**2.11**	3.15	**0.73**	2.20	**0.31**	48
50			18.33	**52.23**	12.24	**19.56**	8.75	**8.64**	5.05	**2.27**	3.28	**0.79**	2.30	**0.33**	50
55					13.46	**23.33**	9.62	**10.31**	5.56	**2.71**	3.60	**0.95**	2.53	**0.40**	55
60					14.69	**27.41**	10.50	**12.11**	6.07	**3.19**	3.93	**1.11**	2.75	**0.47**	60
65					15.91	**31.79**	11.37	**14.04**	6.57	**3.70**	4.26	**1.29**	2.98	**0.54**	65
70					17.14	**36.47**	12.25	**16.11**	7.08	**4.24**	4.59	**1.48**	3.21	**0.62**	70
75					18.36	**41.44**	13.12	**18.31**	7.58	**4.82**	4.92	**1.68**	3.44	**0.71**	75
80					19.58	**46.70**	14.00	**20.63**	8.09	**5.43**	5.24	**1.89**	3.67	**0.80**	80
85							14.87	**23.08**	8.59	**6.07**	5.57	**2.12**	3.90	**0.89**	85
90							15.75	**25.66**	9.10	**6.75**	5.90	**2.35**	4.13	**0.99**	90
95							16.62	**28.36**	9.60	**7.46**	6.23	**2.60**	4.36	**1.09**	95
100							17.50	**31.19**	10.11	**8.21**	6.55	**2.86**	4.59	**1.20**	100
110							19.25	**37.21**	11.12	**9.79**	7.21	**3.41**	5.05	**1.44**	110
120									12.13	**11.51**	7.87	**4.01**	5.51	**1.69**	120
130									13.14	**13.34**	8.52	**4.65**	5.97	**1.96**	130
140									14.15	**15.31**	9.18	**5.33**	6.43	**2.24**	140
150									15.16	**17.39**	9.83	**6.06**	6.89	**2.55**	150
160									16.17	**19.60**	10.49	**6.83**	7.35	**2.87**	160
170									17.18	**21.93**	11.14	**7.64**	7.81	**3.21**	170
180									18.20	**24.38**	11.80	**8.50**	8.26	**3.57**	180
190									19.21	**26.95**	12.45	**9.39**	8.72	**3.95**	190
200											13.11	**10.33**	9.18	**4.34**	200
225											14.75	**12.84**	10.33	**5.40**	225
250											16.39	**15.61**	11.48	**6.57**	250
275											18.02	**18.62**	12.63	**7.83**	275
300											19.66	**21.88**	13.77	**9.20**	300
325													14.92	**10.67**	325
350													16.07	**12.24**	350
375													17.22	**13.91**	375
400													18.37	**15.68**	400
425													19.51	**17.54**	425

Shaded area represents velocities over 7.5 fps. Use with caution where water hammer is a concern.

Type “M” Copper Water Tube

C=140

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 3½" THRU 12"

Nominal Size	4"		6"		8"		10"		12"		Nominal Size
Pipe ID	3.935		5.881		7.785		9.701		11.617		Pipe ID
Pipe OD	4.125		6.125		8.125		10.125		12.125		Pipe OD
Wall Thick	0.095		0.122		0.170		0.212		0.254		Wall Thick
Flow GPM	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Velocity FPS	PSI LOSS	Flow GPM
30	0.79	**0.03**	0.35	**0.00**							30
32	0.84	**0.04**	0.38	**0.01**							32
34	0.90	**0.04**	0.40	**0.01**							34
36	0.95	**0.05**	0.42	**0.01**							36
38	1.00	**0.05**	0.45	**0.01**							38
40	1.05	**0.06**	0.47	**0.01**							40
42	1.11	**0.06**	0.50	**0.01**							42
44	1.16	**0.07**	0.52	**0.01**							44
46	1.21	**0.07**	0.54	**0.01**							46
48	1.26	**0.08**	0.57	**0.01**							48
50	1.32	**0.09**	0.59	**0.01**							50
55	1.45	**0.10**	0.65	**0.01**							55
60	1.58	**0.12**	0.71	**0.02**	0.40	**0.00**					60
65	1.71	**0.14**	0.77	**0.02**	0.44	**0.01**					65
70	1.84	**0.16**	0.83	**0.02**	0.47	**0.01**					70
75	1.98	**0.18**	0.88	**0.03**	0.50	**0.01**					75
80	2.11	**0.21**	0.94	**0.03**	0.54	**0.01**					80
85	2.24	**0.23**	1.00	**0.03**	0.57	**0.01**					85
90	2.37	**0.26**	1.06	**0.04**	0.61	**0.01**					90
95	2.50	**0.28**	1.12	**0.04**	0.64	**0.01**					95
100	2.63	**0.31**	1.18	**0.04**	0.67	**0.01**					100
110	2.90	**0.37**	1.30	**0.05**	0.74	**0.01**	0.48	**0.00**			110
120	3.16	**0.44**	1.42	**0.06**	0.81	**0.02**	0.52	**0.01**			120
130	3.43	**0.51**	1.53	**0.07**	0.88	**0.02**	0.56	**0.01**			130
140	3.69	**0.58**	1.65	**0.08**	0.94	**0.02**	0.61	**0.01**			140
150	3.95	**0.66**	1.77	**0.09**	1.01	**0.02**	0.65	**0.01**			150
160	4.22	**0.74**	1.89	**0.11**	1.08	**0.03**	0.69	**0.01**			160
170	4.48	**0.83**	2.01	**0.12**	1.14	**0.03**	0.74	**0.01**			170
180	4.74	**0.93**	2.12	**0.13**	1.21	**0.03**	0.78	**0.01**	0.54	**0.00**	180
190	5.01	**1.02**	2.24	**0.14**	1.28	**0.04**	0.82	**0.01**	0.57	**0.01**	190
200	5.27	**1.12**	2.36	**0.16**	1.35	**0.04**	0.87	**0.01**	0.60	**0.01**	200
225	5.93	**1.40**	2.65	**0.20**	1.51	**0.05**	0.98	**0.02**	0.68	**0.01**	225
250	6.59	**1.70**	2.95	**0.24**	1.68	**0.06**	1.08	**0.02**	0.76	**0.01**	250
275	7.25	**2.03**	3.24	**0.29**	1.85	**0.07**	1.19	**0.03**	0.83	**0.01**	275
300	7.90	**2.38**	3.54	**0.34**	2.02	**0.09**	1.30	**0.03**	0.91	**0.01**	300
325	8.56	**2.76**	3.83	**0.39**	2.19	**0.10**	1.41	**0.03**	0.98	**0.01**	325
350	9.22	**3.17**	4.13	**0.45**	2.36	**0.11**	1.52	**0.04**	1.06	**0.02**	350
375	9.88	**3.60**	4.42	**0.51**	2.52	**0.13**	1.63	**0.04**	1.13	**0.02**	375
400	10.54	**4.06**	4.72	**0.57**	2.69	**0.15**	1.73	**0.05**	1.21	**0.02**	400
450	11.86	**5.05**	5.31	**0.71**	3.03	**0.18**	1.95	**0.06**	1.36	**0.03**	450
500	13.17	**6.14**	5.90	**0.87**	3.37	**0.22**	2.17	**0.08**	1.51	**0.03**	500
550	14.49	**7.32**	6.49	**1.04**	3.70	**0.26**	2.38	**0.09**	1.66	**0.04**	550
600	15.81	**8.60**	7.08	**1.22**	4.04	**0.31**	2.60	**0.11**	1.81	**0.04**	600
750	19.76	**13.01**	8.85	**1.84**	5.05	**0.47**	3.25	**0.16**	2.27	**0.07**	750
800			9.44	**2.07**	5.39	**0.53**	3.47	**0.18**	2.42	**0.08**	800
900			10.62	**2.58**	6.06	**0.66**	3.90	**0.23**	2.72	**0.09**	900
1000			11.80	**3.14**	6.73	**0.80**	4.34	**0.27**	3.02	**0.11**	1000
1100			12.98	**3.74**	7.41	**0.96**	4.77	**0.33**	3.33	**0.14**	1100
1200			14.16	**4.40**	8.08	**1.12**	5.20	**0.38**	3.63	**0.16**	1200
1300			15.34	**5.10**	8.75	**1.30**	5.64	**0.45**	3.93	**0.19**	1300
1400			16.52	**5.85**	9.42	**1.49**	6.07	**0.51**	4.23	**0.21**	1400
1500			17.69	**6.65**	10.10	**1.70**	6.50	**0.58**	4.53	**0.24**	1500
1600			18.87	**7.49**	10.77	**1.91**	6.94	**0.66**	4.84	**0.27**	1600
1800					12.12	**2.38**	7.80	**0.82**	5.44	**0.34**	1800
2000					13.46	**2.89**	8.67	**0.99**	6.05	**0.41**	2000
2200					14.81	**3.45**	9.54	**1.18**	6.65	**0.49**	2200
2400					16.16	**4.05**	10.40	**1.39**	7.26	**0.58**	2400
2600					17.50	**4.70**	11.27	**1.61**	7.86	**0.67**	2600
2800					18.85	**5.39**	12.14	**1.85**	8.47	**0.77**	2800
3000							13.01	**2.10**	9.07	**0.87**	3000
3200							13.87	**2.37**	9.67	**0.98**	3200
3400							14.74	**2.65**	10.28	**1.10**	3400
3600							15.61	**2.94**	10.88	**1.22**	3600
3800							16.47	**3.25**	11.49	**1.35**	3800
4000							17.34	**3.58**	12.09	**1.49**	4000
4500							19.51	**4.45**	13.60	**1.85**	4500
5000							21.68	**5.41**	15.12	**2.25**	5000
5500							23.84	**6.45**	16.63	**2.69**	5500
6000									18.14	**3.15**	6000
6500									19.65	**3.66**	6500

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Class 150 Asbestos-Cement

K = 0.32

PRESSURE LOSS PER 100 FEET IN PIPE (PSI) SIZES 3" THRU 14"

Nominal Size	3"		4"		6"		8"		10"		12"		14"		Nominal Size
Pipe ID	3.00		3.95		5.85		7.85		10.00		12.00		14.00		Pipe ID
Pipe OD	4.03		5.15		7.13		9.45		11.85		14.12		16.40		Pipe OD
Wall Thick	0.515		0.600		0.640		0.800		0.925		0.106		1.200		Wall Thick
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
2	0.09	**0.00**													2
4	0.18	**0.01**													4
6	0.27	**0.01**	0.16	**0.00**											6
8	0.36	**0.02**	0.21	**0.01**											8
10	0.45	**0.03**	0.26	**0.01**											10
15	0.68	**0.07**	0.39	**0.02**											15
20	0.91	**0.12**	0.52	**0.03**	0.24	**0.00**									20
25	1.13	**0.19**	0.65	**0.05**	0.30	**0.01**									25
30	1.36	**0.26**	0.78	**0.07**	0.36	**0.01**									30
35	1.59	**0.35**	0.92	**0.09**	0.42	**0.01**									35
40	1.81	**0.46**	1.05	**0.12**	0.48	**0.02**	0.26	**0.00**							40
50	2.27	**0.70**	1.31	**0.18**	0.60	**0.03**	0.33	**0.01**							50
60	2.72	**0.98**	1.57	**0.26**	0.72	**0.04**	0.40	**0.01**							60
70	3.17	**1.32**	1.83	**0.34**	0.83	**0.05**	0.46	**0.01**							70
80	3.63	**1.70**	2.09	**0.44**	0.95	**0.06**	0.53	**0.01**	0.33	**0.00**					80
90	4.08	**2.13**	2.35	**0.55**	1.07	**0.08**	0.60	**0.02**	0.37	**0.01**					90
100	4.53	**2.60**	2.61	**0.67**	1.19	**0.10**	0.66	**0.02**	0.41	**0.01**					100
110	4.99	**3.11**	2.88	**0.81**	1.31	**0.12**	0.73	**0.03**	0.45	**0.01**					110
120	5.44	**3.67**	3.14	**0.95**	1.43	**0.14**	0.79	**0.03**	0.49	**0.01**					120
130	5.89	**4.28**	3.40	**1.11**	1.55	**0.16**	0.86	**0.04**	0.53	**0.01**	0.37	**0.00**			130
140	6.35	**4.92**	3.66	**1.28**	1.67	**0.19**	0.93	**0.04**	0.57	**0.01**	0.40	**0.01**			140
160	7.25	**6.35**	4.18	**1.65**	1.91	**0.24**	1.06	**0.06**	0.65	**0.02**	0.45	**0.01**			160
180	8.16	**7.94**	4.71	**2.06**	2.15	**0.30**	1.19	**0.07**	0.73	**0.19**	0.51	**0.01**	0.37	**0.00**	180
200	9.07	**9.70**	5.23	**2.52**	2.38	**0.37**	1.32	**0.09**	0.82	**0.03**	0.57	**0.01**	0.42	**0.01**	200
220	9.97	**11.62**	5.75	**3.02**	2.62	**0.44**	1.46	**0.10**	0.90	**0.03**	0.62	**0.01**	0.46	**0.01**	220
240	10.88	**13.71**	6.28	**3.56**	2.86	**0.52**	1.59	**0.12**	0.98	**0.04**	0.68	**0.02**	0.50	**0.01**	240
260	11.79	**15.96**	6.80	**4.15**	3.10	**0.61**	1.72	**0.14**	1.06	**0.04**	0.74	**0.02**	0.54	**0.01**	260
280	12.69	**18.37**	7.32	**4.77**	3.34	**0.70**	1.85	**0.16**	1.14	**0.05**	0.79	**0.02**	0.58	**0.01**	280
300	13.60	**20.95**	7.84	**5.44**	3.58	**0.79**	1.99	**0.19**	1.22	**0.06**	0.85	**0.02**	0.62	**0.01**	300
350	15.87	**28.08**	9.15	**7.29**	4.17	**1.06**	2.32	**0.25**	1.43	**0.08**	0.99	**0.03**	0.73	**0.01**	350
400	18.13	**36.18**	10.46	**9.40**	4.77	**1.37**	2.65	**0.32**	1.63	**0.10**	1.13	**0.04**	0.83	**0.02**	400
450			11.77	**11.76**	5.36	**1.72**	2.98	**0.41**	1.84	**0.12**	1.28	**0.05**	0.94	**0.02**	450
500			13.07	**14.36**	5.96	**2.10**	3.31	**0.50**	2.04	**0.15**	1.42	**0.06**	1.04	**0.03**	500
550			14.38	**17.21**	6.56	**2.51**	3.64	**0.59**	2.24	**0.18**	1.56	**0.07**	1.14	**0.03**	550
600			15.69	**20.31**	7.15	**2.96**	3.97	**0.70**	2.45	**0.21**	1.70	**0.09**	1.25	**0.04**	600
650			17.00	**23.64**	7.75	**3.45**	4.30	**0.82**	2.65	**0.25**	1.84	**0.10**	1.35	**0.05**	650
700			18.30	**27.22**	8.35	**3.97**	4.63	**0.94**	2.86	**0.29**	1.98	**0.12**	1.46	**0.06**	700
750			19.61	**31.03**	8.94	**4.53**	4.97	**1.07**	3.06	**0.33**	2.13	**0.13**	1.56	**0.06**	750
800					9.54	**5.12**	5.30	**1.21**	3.26	**0.37**	2.27	**0.15**	1.67	**0.07**	800
900					10.73	**6.40**	5.96	**1.52**	3.67	**0.46**	2.55	**0.19**	1.87	**0.09**	900
1000					11.92	**7.82**	6.62	**1.85**	4.08	**0.57**	2.83	**0.23**	2.08	**0.11**	1000
1100					13.11	**9.38**	7.28	**2.22**	4.49	**0.68**	3.12	**0.28**	2.29	**0.13**	1100
1200					14.31	**11.06**	7.95	**2.62**	4.90	**0.80**	3.40	**0.33**	2.50	**0.15**	1200
1300					15.50	**12.88**	8.61	**3.05**	5.30	**0.93**	3.68	**0.38**	2.71	**0.18**	1300
1400					16.69	**14.83**	9.27	**3.51**	5.71	**1.07**	3.97	**0.44**	2.91	**0.21**	1400
1500					17.88	**16.90**	9.93	**4.00**	6.12	**1.22**	4.25	**0.50**	3.12	**0.23**	1500
1600					19.08	**19.11**	10.59	**4.52**	6.53	**1.38**	4.53	**0.57**	3.33	**0.27**	1600
1700							11.26	**5.08**	6.94	**1.55**	4.82	**0.63**	3.54	**0.30**	1700
1800							11.92	**5.66**	7.34	**1.73**	5.10	**0.71**	3.75	**0.33**	1800
1900							12.58	**6.27**	7.75	**1.91**	5.38	**0.78**	3.96	**0.37**	1900
2000							13.24	**6.91**	8.16	**2.11**	5.67	**0.86**	4.16	**0.41**	2000
2200							14.57	**8.28**	8.98	**2.53**	6.23	**1.04**	4.58	**0.49**	2200
2400							15.89	**9.77**	9.79	**2.98**	6.80	**1.22**	5.00	**0.57**	2400
2600							17.21	**11.38**	10.61	**3.47**	7.37	**1.42**	5.41	**0.67**	2600
2800							18.54	**13.10**	11.42	**4.00**	7.93	**1.64**	5.83	**0.77**	2800
3000							19.86	**14.93**	12.24	**4.56**	8.50	**1.87**	6.24	**0.88**	3000
3500									14.28	**6.11**	9.92	**2.50**	7.29	**1.18**	3500
4000									16.32	**7.88**	11.33	**3.22**	8.33	**1.51**	4000
4500									18.36	**9.85**	12.75	**4.03**	9.37	**1.89**	4500
5000											14.17	**4.93**	10.41	**2.31**	500
5500											15.58	**5.90**	11.45	**2.77**	5500
6500											18.42	**8.11**	13.53	**3.81**	6500
7500													15.61	**5.00**	7500
8500													17.69	**6.34**	8500
9500													19.78	**7.84**	9500

Friction losses calculated using the Scobey Formula.

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Class 150 Asbestos-Cement

K = 0.32

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 15" THRU 24"

Nominal Size	15"		16"		18"		20"		21"		24"		Nominal Size
Pipe ID	15.00		16.00		18.00		20.00		21.00		24.00		Pipe ID
Pipe OD	17.91		18.65		21.21		23.55		24.94		28.21		Pipe OD
Wall Thick	1.455		1.325		1.605		1.775		1.990		2.105		Wall Thick
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
200	0.36	**0.00**	0.32	**0.00**									200
300	0.54	**0.01**	0.48	**0.01**	0.38	**0.00**							300
400	0.73	**0.01**	0.64	**0.01**	0.50	**0.01**	0.41	**0.00**					400
500	0.91	**0.02**	0.80	**0.02**	0.63	**0.01**	0.51	**0.01**	0.46	**0.00**			500
600	1.09	**0.03**	0.96	**0.02**	0.76	**0.01**	0.61	**0.01**	0.56	**0.01**			600
700	1.27	**0.04**	1.12	**0.03**	0.88	**0.02**	0.71	**0.01**	0.65	**0.01**	0.50	**0.00**	700
800	1.45	**0.05**	1.28	**0.04**	1.01	**0.02**	0.82	**0.01**	0.74	**0.01**	0.57	**0.01**	800
900	1.63	**0.06**	1.43	**0.05**	1.13	**0.03**	0.92	**0.02**	0.83	**0.01**	0.64	**0.01**	900
1000	1.81	**0.08**	1.59	**0.06**	1.26	**0.03**	1.02	**0.02**	0.93	**0.01**	0.71	**0.01**	1000
1200	2.18	**0.11**	1.91	**0.06**	1.51	**0.04**	1.22	**0.03**	1.11	**0.02**	0.85	**0.01**	1200
1400	2.54	**0.15**	2.23	**0.11**	1.76	**0.06**	1.43	**0.04**	1.30	**0.03**	0.99	**0.01**	1400
1600	2.90	**0.19**	2.55	**0.14**	2.01	**0.08**	1.63	**0.05**	1.48	**0.04**	1.13	**0.02**	1600
1800	3.26	**0.24**	2.87	**0.17**	2.27	**0.10**	1.84	**0.06**	1.67	**0.05**	1.28	**0.02**	1800
2000	3.63	**0.29**	3.19	**0.21**	2.52	**0.12**	2.04	**0.07**	1.85	**0.06**	1.42	**0.03**	2000
2200	3.99	**0.35**	3.51	**0.21**	2.77	**0.14**	2.24	**0.08**	2.04	**0.07**	1.56	**0.03**	2200
2400	4.35	**0.41**	3.83	**0.30**	3.02	**0.17**	2.45	**0.10**	2.22	**0.08**	1.70	**0.04**	2400
2600	4.71	**0.48**	4.14	**0.35**	3.27	**0.20**	2.65	**0.12**	2.41	**0.09**	1.84	**0.05**	2600
2800	5.08	**0.55**	4.46	**0.40**	3.53	**0.22**	2.86	**0.13**	2.59	**0.11**	1.98	**0.05**	2800
3000	5.44	**0.63**	4.78	**0.46**	3.78	**0.26**	3.06	**0.15**	2.78	**0.12**	2.13	**0.06**	3000
3200	5.80	**0.71**	5.10	**0.46**	4.03	**0.29**	3.26	**0.17**	2.96	**0.14**	2.27	**0.07**	3200
3400	6.17	**0.79**	5.42	**0.58**	4.28	**0.32**	3.47	**0.19**	3.15	**0.15**	2.41	**0.08**	3400
3600	6.53	**0.88**	5.74	**0.64**	4.53	**0.36**	3.67	**0.22**	3.33	**0.17**	2.55	**0.09**	3600
3800	6.89	**0.98**	6.06	**0.71**	4.79	**0.40**	3.88	**0.24**	3.52	**0.19**	2.69	**0.10**	3800
4000	7.25	**1.08**	6.38	**0.79**	5.04	**0.44**	4.08	**0.26**	3.70	**0.21**	2.83	**0.11**	4000
4500	8.16	**1.35**	7.17	**0.79**	5.67	**0.55**	4.59	**0.33**	4.16	**0.26**	3.19	**0.14**	4500
5000	9.07	**1.65**	7.97	**1.20**	6.30	**0.68**	5.10	**0.40**	4.63	**0.32**	3.54	**0.17**	5000
5500	9.97	**1.98**	8.77	**1.44**	6.93	**0.81**	5.61	**0.48**	5.09	**0.38**	3.90	**0.20**	5500
6000	10.88	**2.33**	9.56	**1.70**	7.56	**0.96**	6.12	**0.57**	5.55	**0.45**	4.25	**0.23**	6000
6500	11.79	**2.72**	10.36	**1.98**	8.19	**1.11**	6.63	**0.66**	6.01	**0.52**	4.60	**0.27**	6500
7000	12.69	**3.13**	11.16	**1.98**	8.81	**1.28**	7.14	**0.76**	6.48	**0.60**	4.96	**0.31**	7000
7500	13.60	**3.57**	11.95	**2.60**	9.44	**1.46**	7.65	**0.87**	6.94	**0.69**	5.31	**0.36**	7500
8000	14.51	**4.03**	12.75	**2.94**	10.07	**1.65**	8.16	**0.98**	7.40	**0.78**	5.67	**0.40**	8000
8500	15.41	**4.52**	13.55	**3.30**	10.70	**1.85**	8.67	**1.10**	7.86	**0.87**	6.02	**0.45**	8500
9000	16.32	**5.04**	14.34	**3.68**	11.33	**2.06**	9.18	**1.23**	8.33	**0.97**	6.38	**0.50**	9000
9500	17.23	**5.59**	15.14	**3.68**	11.96	**2.29**	9.69	**1.36**	8.79	**1.07**	6.73	**0.56**	9500
10000	18.13	**6.16**	15.94	**4.49**	12.59	**2.52**	10.20	**1.50**	9.25	**1.18**	7.08	**0.62**	10000
10500	19.04	**6.76**	16.73	**4.93**	13.22	**2.77**	10.71	**1.65**	9.71	**1.30**	7.44	**0.68**	10500
11000	19.95	**7.38**	17.53	**5.38**	13.85	**3.02**	11.22	**1.80**	10.18	**1.42**	7.79	**0.74**	11000
11500			18.33	**5.86**	14.48	**3.29**	11.73	**1.96**	10.64	**1.55**	8.15	**0.80**	11500
12000			19.13	**5.86**	15.11	**3.57**	12.24	**2.13**	11.10	**1.68**	8.50	**0.87**	12000
12500			19.92	**6.86**	15.74	**3.85**	12.75	**2.30**	11.56	**1.81**	8.85	**0.94**	12500
13000					16.37	**4.15**	13.26	**2.48**	12.03	**1.95**	9.21	**1.01**	13000
13500					17.00	**4.46**	13.77	**2.66**	12.49	**2.10**	9.56	**1.09**	13500
14000					17.63	**4.78**	14.28	**2.85**	12.95	**2.25**	9.92	**1.17**	14000
14500					18.26	**5.11**	14.79	**3.05**	13.41	**2.40**	10.27	**1.25**	14500
15000					18.89	**5.45**	15.30	**3.25**	13.88	**2.56**	10.63	**1.33**	15000
15500					19.52	**5.80**	15.81	**3.46**	14.34	**2.72**	10.98	**1.42**	15500
16000							16.32	**3.68**	14.80	**2.89**	11.33	**1.50**	16000
16500							16.83	**3.90**	15.27	**3.07**	11.69	**1.59**	16500
17000							17.34	**4.12**	15.73	**3.25**	12.04	**1.69**	17000
17500							17.85	**4.36**	16.19	**3.43**	12.40	**1.78**	17500
18000							18.36	**4.60**	16.65	**3.62**	12.75	**1.88**	18000
18500							18.87	**4.84**	17.12	**3.81**	13.10	**1.98**	18500
19000							19.38	**5.09**	17.58	**4.01**	13.46	**2.08**	19000
19500							19.89	**5.35**	18.04	**4.21**	13.81	**2.19**	19500
20000									18.50	**4.42**	14.17	**2.30**	20000
21000									19.43	**4.85**	14.88	**2.52**	21000
22000											15.58	**2.75**	22000
23000											16.29	**3.00**	23000
24000											17.00	**3.25**	24000
25000											17.71	**3.51**	25000
26000											18.42	**3.78**	26000
27000											19.13	**4.06**	27000
28000											19.83	**4.36**	28000
29000													29000

Friction losses calculated using the Scobey Formula.

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Portable Aluminum Pipe With Couplings

K = 0.40

PRESSURE LOSS PER 100 FEET OF PIPE (PSI) SIZES 3" THRU 10"

Nominal Size	3"		4"		6"		7"		8"		10"		Nominal Size
Pipe ID	2.91		3.91		5.88		6.87		7.86		9.82		Pipe ID
Pipe OD	3.00		4.00		6.00		7.00		8.00		10.00		Pipe OD
Wall Thick	0.045		0.045		0.060		0.065		0.070		0.090		Wall Thick
Flow GPM	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Velocity FPS	**PSI LOSS**	Flow GPM
5	0.24	**0.01**	0.13	**0.00**									5
10	0.48	**0.04**	0.27	**0.01**									10
15	0.72	**0.08**	0.40	**0.02**									15
20	0.96	**0.14**	0.53	**0.03**	0.24	**0.00**							20
25	1.20	**0.22**	0.67	**0.03**	0.29	**0.01**							25
30	1.44	**0.30**	0.80	**0.07**	0.35	**0.01**	0.26	**0.00**					30
35	1.68	**0.41**	0.94	**0.10**	0.41	**0.01**	0.30	**0.01**					35
40	1.92	**0.53**	1.07	**0.13**	0.47	**0.02**	0.35	**0.01**	0.26	**0.00**			40
45	2.16	**0.66**	1.20	**0.16**	0.53	**0.02**	0.39	**0.01**	0.30	**0.01**			45
50	2.40	**0.80**	1.34	**0.16**	0.59	**0.03**	0.43	**0.01**	0.33	**0.01**			50
60	2.88	**1.13**	1.60	**0.27**	0.71	**0.04**	0.52	**0.02**	0.40	**0.01**			60
70	3.36	**1.52**	1.87	**0.36**	0.82	**0.05**	0.60	**0.02**	0.46	**0.01**	0.30	**0.00**	70
80	3.84	**1.96**	2.14	**0.47**	0.94	**0.06**	0.69	**0.03**	0.53	**0.02**	0.34	**0.01**	80
90	4.32	**2.45**	2.41	**0.58**	1.06	**0.08**	0.78	**0.04**	0.59	**0.02**	0.38	**0.01**	90
100	4.80	**3.00**	2.67	**0.58**	1.18	**0.10**	0.86	**0.04**	0.66	**0.02**	0.42	**0.01**	100
110	5.29	**3.59**	2.94	**0.85**	1.30	**0.11**	0.95	**0.05**	0.73	**0.03**	0.47	**0.01**	110
120	5.77	**4.24**	3.21	**1.01**	1.41	**0.14**	1.04	**0.06**	0.79	**0.03**	0.51	**0.01**	120
130	6.25	**4.93**	3.48	**1.17**	1.53	**0.16**	1.12	**0.07**	0.86	**0.04**	0.55	**0.01**	130
140	6.73	**5.68**	3.74	**1.35**	1.65	**0.18**	1.21	**0.08**	0.93	**0.04**	0.59	**0.01**	140
150	7.21	**6.47**	4.01	**1.35**	1.77	**0.21**	1.30	**0.10**	0.99	**0.05**	0.63	**0.02**	150
160	7.69	**7.32**	4.28	**1.74**	1.89	**0.23**	1.38	**0.11**	1.06	**0.06**	0.68	**0.02**	160
170	8.17	**8.21**	4.55	**1.95**	2.00	**0.26**	1.47	**0.12**	1.12	**0.06**	0.72	**0.02**	170
180	8.65	**9.15**	4.81	**2.18**	2.12	**0.29**	1.56	**0.14**	1.19	**0.07**	0.76	**0.02**	180
190	9.13	**10.14**	5.08	**2.41**	2.24	**0.32**	1.64	**0.15**	1.26	**0.08**	0.80	**0.03**	190
200	9.61	**11.18**	5.35	**2.41**	2.36	**0.36**	1.73	**0.17**	1.32	**0.09**	0.85	**0.03**	200
225	10.81	**13.98**	6.02	**3.33**	2.65	**0.45**	1.94	**0.21**	1.49	**0.11**	0.95	**0.04**	225
250	12.01	**17.08**	6.69	**4.07**	2.95	**0.55**	2.16	**0.26**	1.65	**0.13**	1.06	**0.04**	250
275	13.21	**20.48**	7.35	**4.87**	3.24	**0.65**	2.38	**0.31**	1.82	**0.16**	1.16	**0.05**	275
300	14.41	**24.16**	8.02	**5.75**	3.54	**0.77**	2.59	**0.36**	1.98	**0.19**	1.27	**0.06**	300
325	15.62	**28.12**	8.69	**5.75**	3.83	**0.90**	2.81	**0.42**	2.15	**0.22**	1.38	**0.07**	325
350	16.82	**32.38**	9.36	**7.70**	4.12	**1.03**	3.02	**0.48**	2.31	**0.25**	1.48	**0.08**	350
375	18.02	**36.91**	10.03	**8.78**	4.42	**1.18**	3.24	**0.55**	2.48	**0.29**	1.59	**0.10**	375
400	19.22	**41.73**	10.70	**9.93**	4.71	**1.33**	3.46	**0.62**	2.64	**0.32**	1.69	**0.11**	400
425			11.37	**11.14**	5.01	**1.50**	3.67	**0.70**	2.81	**0.36**	1.80	**0.12**	425
450			12.03	**11.14**	5.30	**1.67**	3.89	**0.78**	2.97	**0.40**	1.90	**0.14**	450
475			12.70	**13.76**	5.60	**1.85**	4.10	**0.86**	3.14	**0.45**	2.01	**0.15**	475
500			13.37	**15.17**	5.89	**2.04**	4.32	**0.95**	3.31	**0.49**	2.12	**0.17**	500
550			14.71	**18.18**	6.48	**2.44**	4.75	**1.14**	3.64	**0.59**	2.33	**0.20**	550
600			16.05	**21.45**	7.07	**2.88**	5.18	**1.35**	3.97	**0.70**	2.54	**0.23**	600
650			17.38	**21.45**	7.66	**3.35**	5.62	**1.57**	4.30	**0.81**	2.75	**0.27**	650
700			18.72	**28.75**	8.25	**3.86**	6.05	**1.81**	4.63	**0.94**	2.96	**0.31**	700
750					8.84	**4.40**	6.48	**2.06**	4.96	**1.07**	3.17	**0.36**	750
800					9.43	**4.98**	6.91	**2.33**	5.29	**1.21**	3.39	**0.41**	800
850					10.02	**5.58**	7.34	**2.61**	5.62	**1.35**	3.60	**0.45**	850
900					10.61	**6.23**	7.78	**2.91**	5.95	**1.51**	3.81	**0.51**	900
1000					11.78	**7.61**	8.64	**3.55**	6.61	**1.85**	4.23	**0.62**	1000
1100					12.96	**9.11**	9.50	**4.26**	7.27	**2.21**	4.66	**0.74**	1100
1200					14.14	**10.75**	10.37	**5.03**	7.93	**2.61**	5.08	**0.88**	1200
1300					15.32	**12.52**	11.23	**5.85**	8.59	**3.04**	5.50	**1.02**	1300
1400					16.50	**14.41**	12.10	**6.74**	9.26	**3.50**	5.93	**1.17**	1400
1500					17.68	**16.43**	12.96	**7.68**	9.92	**3.99**	6.35	**1.34**	1500
1600					18.86	**18.58**	13.82	**8.68**	10.58	**4.51**	6.77	**1.51**	1600
1700							14.69	**9.74**	11.24	**5.06**	7.20	**1.70**	1700
1800							15.55	**10.86**	11.90	**5.64**	7.62	**1.89**	1800
1900							16.42	**12.03**	12.56	**6.25**	8.04	**2.10**	1900
2000							17.28	**13.27**	13.22	**6.89**	8.47	**2.31**	2000
2250							19.44	**16.59**	14.87	**8.61**	9.52	**2.89**	2250
2500									16.53	**10.52**	10.58	**3.53**	2500
2750									18.18	**12.61**	11.64	**4.23**	2750
3000									19.83	**14.88**	12.70	**4.99**	3000
3250											13.76	**5.81**	3250
3500											14.81	**6.69**	3500
3750											15.87	**7.63**	3750
4000											16.93	**8.62**	4000
4250											17.99	**9.67**	4250

Friction losses calculated using the Scobey Formula.

Shaded area represents velocities over 5 fps. Use with caution where water hammer is a concern.

Australian Standard PVC PN 6 Plastic Pipe

C = 150

PRESSURE LOSS IN BARS PER 100 METRES SIZES 40 mm THRU 80 mm

Nominal Size	40 mm		50 mm		80 mm		Nominal Size	
Pipe ID	45.2		56.7		83.7		Pipe ID	
Pipe OD	48.2		60.3		88.9		Pipe OD	
Wall Thick	1.5		1.8		2.6		Wall Thick	
Flow L/min	Velocity MPS	Bars/ 100 M LOSS	Velocity MPS	Bars/ 100 M LOSS	Velocity MPS	Bars/ 100 M LOSS	Flow Cu. M/Hr	L/sec
12	0.12	**0.00**					0.72	**0.20**
14	0.15	**0.01**					0.84	**0.23**
16	0.17	**0.01**					0.96	**0.27**
18	0.19	**0.01**					1.08	**0.30**
20	0.21	**0.01**					1.20	**0.33**
22	0.23	**0.02**	0.14	**0.00**			1.32	**0.37**
24	0.25	**0.02**	0.16	**0.01**			1.44	**0.40**
26	0.27	**0.02**	0.17	**0.01**			1.56	**0.43**
28	0.29	**0.02**	0.18	**0.01**			1.68	**0.47**
30	0.31	**0.03**	0.20	**0.01**			1.80	**0.50**
32	0.33	**0.03**	0.21	**0.01**			1.92	**0.53**
34	0.35	**0.03**	0.22	**0.01**			2.04	**0.57**
36	0.37	**0.04**	0.24	**0.01**			2.16	**0.60**
38	0.39	**0.04**	0.25	**0.01**			2.28	**0.63**
40	0.41	**0.05**	0.26	**0.02**			2.40	**0.67**
42	0.44	**0.05**	0.28	**0.02**			2.52	**0.70**
44	0.46	**0.05**	0.29	**0.02**			2.64	**0.73**
46	0.48	**0.06**	0.30	**0.02**			2.76	**0.77**
48	0.50	**0.06**	0.32	**0.02**			2.88	**0.80**
50	0.52	**0.07**	0.33	**0.02**			3.00	**0.83**
55	0.57	**0.08**	0.36	**0.03**			3.30	**0.92**
60	0.62	**0.10**	0.39	**0.03**	0.18	**0.00**	3.60	**1.00**
65	0.67	**0.11**	0.43	**0.04**	0.20	**0.01**	3.90	**1.08**
70	0.73	**0.13**	0.46	**0.04**	0.21	**0.01**	4.20	**1.17**
75	0.78	**0.15**	0.49	**0.05**	0.23	**0.01**	4.50	**1.25**
80	0.83	**0.17**	0.53	**0.05**	0.24	**0.01**	4.80	**1.33**
85	0.88	**0.19**	0.56	**0.06**	0.26	**0.01**	5.10	**1.42**
90	0.93	**0.21**	0.59	**0.07**	0.27	**0.01**	5.40	**1.50**
95	0.99	**0.23**	0.62	**0.07**	0.29	**0.01**	5.70	**1.58**
100	1.04	**0.25**	0.66	**0.08**	0.30	**0.01**	6.00	**1.67**
110	1.14	**0.30**	0.72	**0.10**	0.33	**0.01**	6.60	**1.83**
120	1.24	**0.35**	0.79	**0.12**	0.36	**0.02**	7.20	**2.00**
130	1.35	**0.41**	0.85	**0.13**	0.39	**0.02**	7.80	**2.17**
140	1.45	**0.47**	0.92	**0.15**	0.42	**0.02**	8.40	**2.33**
150	1.56	**0.53**	0.99	**0.17**	0.45	**0.03**	9.00	**2.50**
175	1.82	**0.71**	1.15	**0.23**	0.53	**0.04**	10.50	**2.92**
200	2.07	**0.90**	1.31	**0.30**	0.61	**0.05**	12.00	**3.33**
225	2.33	**1.12**	1.48	**0.37**	0.68	**0.06**	13.50	**3.75**
250	2.59	**1.37**	1.64	**0.45**	0.76	**0.07**	15.00	**4.17**
275	2.85	**1.63**	1.81	**0.54**	0.83	**0.08**	16.50	**4.58**
300	3.11	**1.92**	1.97	**0.63**	0.91	**0.10**	18.00	**5.00**
325	3.37	**2.22**	2.14	**0.73**	0.98	**0.11**	19.50	**5.42**
350	3.63	**2.55**	2.30	**0.84**	1.06	**0.13**	21.00	**5.83**
375	3.89	**2.90**	2.46	**0.95**	1.13	**0.14**	22.50	**6.25**
400	4.15	**3.26**	2.63	**1.07**	1.21	**0.16**	24.00	**6.67**
425	4.41	**3.65**	2.79	**1.20**	1.29	**0.18**	25.50	**7.08**
450	4.67	**4.06**	2.96	**1.34**	1.36	**0.20**	27.00	**7.50**
475	4.93	**4.49**	3.12	**1.48**	1.44	**0.22**	28.50	**7.92**
500	5.19	**4.93**	3.28	**1.62**	1.51	**0.25**	30.00	**8.33**
525	5.45	**5.40**	3.45	**1.78**	1.59	**0.27**	31.50	**8.75**
550	5.71	**5.89**	3.61	**1.94**	1.66	**0.29**	33.00	**9.17**
575	5.97	**6.39**	3.78	**2.10**	1.74	**0.32**	34.50	**9.58**
600			3.94	**2.28**	1.82	**0.34**	36.00	**10.0**
650			4.27	**2.64**	1.97	**0.40**	39.00	**10.8**
700			4.60	**3.03**	2.12	**0.46**	42.00	**11.7**
750			4.93	**3.44**	2.27	**0.52**	45.00	**12.5**
800			5.26	**3.88**	2.42	**0.59**	48.00	**13.3**
850					2.57	**0.66**	51.00	**14.2**
900					2.72	**0.73**	54.00	**15.0**
950					2.87	**0.81**	57.00	**15.8**
1000					3.03	**0.89**	60.00	**16.7**
1100					3.33	**1.06**	66.00	**18.3**
1200					3.63	**1.25**	72.00	**20.0**
1300					3.93	**1.44**	78.00	**21.7**
1400					4.24	**1.66**	84.00	**23.3**
1500					4.54	**1.88**	90.00	**25.0**
1600					4.84	**2.12**	96.00	**26.7**
1700					5.14	**2.37**	102.00	**28.3**
1800					5.45	**2.64**	108.00	**30.0**

Shaded area represents velocities over 1.5 mps. Use with caution where water hammer is a concern.

Conversions:
Bars/100 M x 100 = kPa/100 M
Bars/100 M x 10.21 = Metres/100 M
Bars/100 M x 4.42 = psi/100 ft.

Australian Standard PVC PN 6 Plastic Pipe

C = 150

PRESSURE LOSS IN BARS PER 100 METRES SIZES 100 mm THRU 375 mm

Nominal Size	100 mm		150 mm		200 mm		225 mm		250 mm		300 mm		375 mm		Nominal Size	
Pipe ID	107.8		151.3		213.8		236.4		266.2		299.5		380.3		Pipe ID	
Pipe OD	114.3		160.3		225.3		250.4		280.4		315.5		400.5		Pipe OD	
Wall Thick	3.25		4.50		5.25		7.00		7.10		8.00		10.10		Wall Thick	
Flow	Velocity	**Bars/ 100 M**	Velocity	**Bars/ 100 M**	Velocity	**Bars/ 100 M**	Velocity	**Bars/ 100 M**	Velocity	**Bars/ 100 M**	Velocity	**Bars/ 100 M**	Velocity	**Bars/ 100 M**	Flow	
L/min	MPS	**LOSS**	MPS	**LOSS**	MPS	**LOSS**	MPS	**LOSS**	MPS	**LOSS**	MPS	**LOSS**	MPS	**LOSS**	Cu. M/Hr	**L/sec**
100	0.18	**0.00**													6.0	**1.67**
125	0.23	**0.01**													7.5	**2.08**
150	0.27	**0.01**													9.0	**2.50**
175	0.32	**0.01**													10.5	**2.92**
200	0.36	**0.01**													12.0	**3.33**
225	0.41	**0.02**													13.5	**3.75**
250	0.46	**0.02**													15.0	**4.17**
275	0.50	**0.02**	0.25	**0.00**											16.5	**4.58**
300	0.55	**0.03**	0.28	**0.01**											18.0	**5.00**
325	0.59	**0.03**	0.30	**0.01**											19.5	**5.42**
350	0.64	**0.04**	0.32	**0.01**											21.0	**5.83**
375	0.68	**0.04**	0.35	**0.01**											22.5	**6.25**
400	0.73	**0.05**	0.37	**0.01**											24.0	**6.67**
475	0.87	**0.07**	0.44	**0.01**											28.5	**7.92**
500	0.91	**0.07**	0.46	**0.01**											30.0	**8.33**
550	1.00	**0.09**	0.51	**0.02**											33.0	**9.17**
600	1.09	**0.10**	0.56	**0.02**											36.0	**10.0**
650	1.19	**0.12**	0.60	**0.02**											39.0	**10.8**
700	1.28	**0.13**	0.65	**0.03**	0.32	**0.00**									42.0	**11.7**
750	1.37	**0.15**	0.69	**0.03**	0.35	**0.01**									45.0	**12.5**
800	1.46	**0.17**	0.74	**0.03**	0.37	**0.01**									48.0	**13.3**
900	1.64	**0.21**	0.83	**0.04**	0.42	**0.01**	0.34	**0.00**							54.0	**15.0**
1000	1.82	**0.26**	0.93	**0.05**	0.46	**0.01**	0.38	**0.01**							60.0	**16.7**
1100	2.01	**0.31**	1.02	**0.06**	0.51	**0.01**	0.41	**0.01**							66.0	**18.3**
1200	2.19	**0.36**	1.11	**0.07**	0.56	**0.01**	0.45	**0.01**	0.36	**0.00**					72.0	**20.0**
1300	2.37	**0.42**	1.20	**0.08**	0.60	**0.02**	0.49	**0.01**	0.39	**0.01**					78.0	**21.7**
1400	2.55	**0.48**	1.30	**0.09**	0.65	**0.02**	0.53	**0.01**	0.42	**0.01**					84.0	**23.3**
1500	2.74	**0.55**	1.39	**0.11**	0.70	**0.02**	0.56	**0.01**	0.45	**0.01**					90.0	**25.0**
1600	2.92	**0.62**	1.48	**0.12**	0.74	**0.02**	0.60	**0.01**	0.48	**0.01**	0.38	**0.00**			96.0	**26.7**
1800	3.28	**0.77**	1.67	**0.15**	0.83	**0.03**	0.68	**0.02**	0.54	**0.01**	0.43	**0.01**			108	**30.0**
2000	3.65	**0.94**	1.85	**0.18**	0.93	**0.03**	0.75	**0.02**	0.60	**0.01**	0.47	**0.01**			120	**33.3**
2200	4.01	**1.12**	2.04	**0.21**	1.02	**0.04**	0.83	**0.02**	0.66	**0.01**	0.52	**0.01**			132	**36.7**
2400	4.38	**1.31**	2.22	**0.25**	1.11	**0.05**	0.90	**0.03**	0.72	**0.02**	0.57	**0.01**			144	**40.0**
2600	4.74	**1.52**	2.41	**0.29**	1.21	**0.05**	0.98	**0.03**	0.78	**0.02**	0.61	**0.01**			156	**43.3**
2800	5.11	**1.75**	2.59	**0.34**	1.30	**0.06**	1.05	**0.04**	0.84	**0.02**	0.66	**0.01**			168	**46.7**
3000	5.47	**1.98**	2.78	**0.38**	1.39	**0.07**	1.13	**0.04**	0.90	**0.02**	0.71	**0.01**	0.44	**0.00**	180	**50.0**
3500			3.24	**0.51**	1.62	**0.09**	1.31	**0.06**	1.05	**0.03**	0.83	**0.02**	0.51	**0.01**	210	**58.3**
4000			3.70	**0.65**	1.85	**0.12**	1.50	**0.07**	1.20	**0.04**	0.95	**0.02**	0.59	**0.01**	240	**66.7**
4500			4.17	**0.81**	2.09	**0.15**	1.69	**0.09**	1.35	**0.05**	1.06	**0.03**	0.66	**0.01**	270	**75.0**
5000			4.63	**0.98**	2.32	**0.18**	1.88	**0.11**	1.50	**0.06**	1.18	**0.04**	0.73	**0.01**	300	**83.3**
5500			5.09	**1.17**	2.55	**0.22**	2.06	**0.13**	1.65	**0.07**	1.30	**0.04**	0.81	**0.01**	330	**91.7**
6000			5.56	**1.38**	2.78	**0.26**	2.25	**0.15**	1.79	**0.09**	1.42	**0.05**	0.88	**0.02**	360	**100.0**
6500					3.01	**0.30**	2.44	**0.18**	1.94	**0.10**	1.54	**0.06**	0.95	**0.02**	390	**108.3**
7000					3.25	**0.34**	2.63	**0.20**	2.09	**0.12**	1.65	**0.07**	1.03	**0.02**	420	**116.7**
7500					3.48	**0.39**	2.81	**0.23**	2.24	**0.13**	1.77	**0.07**	1.10	**0.02**	450	**125.0**
8000					3.71	**0.44**	3.00	**0.26**	2.39	**0.15**	1.89	**0.08**	1.17	**0.03**	480	**133.3**
8500					3.94	**0.49**	3.19	**0.29**	2.54	**0.17**	2.01	**0.09**	1.25	**0.03**	510	**141.7**
9000					4.17	**0.54**	3.38	**0.32**	2.69	**0.19**	2.13	**0.11**	1.32	**0.03**	540	**150.0**
9500					4.41	**0.60**	3.56	**0.36**	2.84	**0.21**	2.24	**0.12**	1.39	**0.04**	570	**158.3**
10000					4.64	**0.66**	3.75	**0.39**	2.99	**0.23**	2.36	**0.13**	1.47	**0.04**	600	**166.7**
11000					5.10	**0.79**	4.13	**0.47**	3.29	**0.27**	2.60	**0.15**	1.61	**0.05**	660	**183.3**
12000					5.56	**0.92**	4.50	**0.55**	3.59	**0.32**	2.84	**0.18**	1.76	**0.06**	720	**200.0**
13000							4.88	**0.64**	3.89	**0.37**	3.07	**0.21**	1.91	**0.06**	780	**216.7**
14000							5.25	**0.73**	4.19	**0.42**	3.31	**0.24**	2.05	**0.07**	840	**233.3**
15000							5.63	**0.83**	4.49	**0.48**	3.54	**0.27**	2.20	**0.08**	900	**250.0**
16000							6.00	**0.94**	4.79	**0.54**	3.78	**0.31**	2.34	**0.10**	960	**266.7**
17000									5.08	**0.61**	4.02	**0.34**	2.49	**0.11**	1020	**283.3**
18000									5.38	**0.67**	4.25	**0.38**	2.64	**0.12**	1080	**300.0**
19000									5.68	**0.74**	4.49	**0.42**	2.78	**0.13**	1140	**316.7**
20000									5.98	**0.82**	4.73	**0.46**	2.93	**0.14**	1200	**333.3**
22000											5.20	**0.55**	3.22	**0.17**	1320	**366.7**
24000											5.67	**0.65**	3.52	**0.20**	1440	**400.0**
26000													3.81	**0.23**	1560	**433.3**
28000													4.10	**0.27**	1680	**466.7**
30000													4.40	**0.31**	1800	**500.0**
32000													4.69	**0.34**	1920	**533.3**
34000													4.98	**0.39**	2040	**566.7**
36000													5.28	**0.43**	2160	**600.0**
38000													5.57	**0.47**	2280	**633.3**
40000													5.86	**0.52**	2400	**666.7**

Shaded area represents velocities over 1.5 mps. Use with caution where water hammer is a concern.

Conversions:
Bars/100 M x 100 = kPa/100 M
Bars/100 M x 10.21 = Metres/100 M
Bars/100 M x 4.42 = psi/100 ft.

Australian Standard PVC PN 9 Plastic Pipe

C = 150

PRESSURE LOSS IN BARS PER 100 METRES SIZES 25 mm THRU 80 mm

Nominal Size	25 mm		32 mm		40 mm		50 mm		80 mm		Nominal Size	
Pipe ID	30.5		38.4		44.0		55.1		81.3		Pipe ID	
Pipe OD	33.5		42.2		48.2		60.3		88.9		Pipe OD	
Wall Thick	1.50		1.90		2.10		2.60		3.80		Wall Thick	
Flow	Velocity	**Bars/ 100 M**	Velocity	**Bars/ 100 M**	Velocity	**Bars/ 100 M**	Velocity	**Bars/ 100 M**	Velocity	**Bars/ 100 M**	Flow	
L/min	MPS	**LOSS**	MPS	**LOSS**	MPS	**LOSS**	MPS	**LOSS**	MPS	**LOSS**	Cu. M/Hr	**L/sec**
4	0.09	**0.00**									0.24	**0.07**
5	0.11	**0.01**									0.30	**0.08**
6	0.14	**0.01**									0.36	**0.10**
7	0.16	**0.01**	0.10	**0.00**							0.42	**0.12**
8	0.18	**0.02**	0.11	**0.01**							0.48	**0.13**
9	0.21	**0.02**	0.13	**0.01**							0.54	**0.15**
10	0.23	**0.02**	0.14	**0.01**	0.11	**0.00**					0.60	**0.17**
12	0.27	**0.03**	0.17	**0.01**	0.13	**0.01**					0.72	**0.20**
14	0.32	**0.04**	0.20	**0.01**	0.15	**0.01**					0.84	**0.23**
15	0.34	**0.05**	0.21	**0.02**	0.16	**0.01**					0.90	**0.25**
16	0.36	**0.06**	0.23	**0.02**	0.17	**0.01**					0.96	**0.27**
18	0.41	**0.07**	0.26	**0.02**	0.20	**0.01**					1.08	**0.30**
20	0.46	**0.09**	0.29	**0.03**	0.22	**0.01**	0.14	**0.00**			1.20	**0.33**
22	0.50	**0.10**	0.31	**0.03**	0.24	**0.02**	0.15	**0.01**			1.32	**0.37**
24	0.55	**0.12**	0.34	**0.04**	0.26	**0.02**	0.17	**0.01**			1.44	**0.40**
26	0.59	**0.14**	0.37	**0.05**	0.28	**0.02**	0.18	**0.01**			1.56	**0.43**
28	0.64	**0.16**	0.40	**0.05**	0.31	**0.03**	0.19	**0.01**			1.68	**0.47**
30	0.68	**0.18**	0.43	**0.06**	0.33	**0.03**	0.21	**0.01**			1.80	**0.50**
32	0.73	**0.21**	0.46	**0.07**	0.35	**0.03**	0.22	**0.01**			1.92	**0.53**
34	0.77	**0.23**	0.49	**0.07**	0.37	**0.04**	0.24	**0.01**			2.04	**0.57**
36	0.82	**0.26**	0.51	**0.08**	0.39	**0.04**	0.25	**0.01**			2.16	**0.60**
38	0.87	**0.28**	0.54	**0.09**	0.41	**0.05**	0.26	**0.02**			2.28	**0.63**
40	0.91	**0.31**	0.57	**0.10**	0.44	**0.05**	0.28	**0.02**			2.40	**0.67**
42	0.96	**0.34**	0.60	**0.11**	0.46	**0.06**	0.29	**0.02**			2.52	**0.70**
44	1.00	**0.37**	0.63	**0.12**	0.48	**0.06**	0.31	**0.02**			2.64	**0.73**
46	1.05	**0.40**	0.66	**0.13**	0.50	**0.07**	0.32	**0.02**			2.76	**0.77**
48	1.09	**0.44**	0.69	**0.14**	0.52	**0.07**	0.33	**0.02**			2.88	**0.80**
50	1.14	**0.47**	0.71	**0.15**	0.54	**0.08**	0.35	**0.03**			3.00	**0.83**
55	1.25	**0.56**	0.79	**0.18**	0.60	**0.09**	0.38	**0.03**	0.18	**0.00**	3.30	**0.92**
60	1.37	**0.66**	0.86	**0.21**	0.65	**0.11**	0.42	**0.04**	0.19	**0.01**	3.60	**1.00**
65	1.48	**0.76**	0.93	**0.25**	0.71	**0.13**	0.45	**0.04**	0.21	**0.01**	3.90	**1.08**
70	1.59	**0.88**	1.00	**0.28**	0.76	**0.15**	0.49	**0.05**	0.22	**0.01**	4.20	**1.17**
75	1.71	**1.00**	1.07	**0.32**	0.82	**0.17**	0.52	**0.06**	0.24	**0.01**	4.50	**1.25**
80	1.82	**1.12**	1.14	**0.36**	0.87	**0.19**	0.56	**0.06**	0.26	**0.01**	4.80	**1.33**
85	1.94	**1.26**	1.22	**0.40**	0.93	**0.21**	0.59	**0.07**	0.27	**0.01**	5.10	**1.42**
90	2.05	**1.40**	1.29	**0.45**	0.98	**0.23**	0.63	**0.08**	0.29	**0.01**	5.40	**1.50**
95	2.16	**1.54**	1.36	**0.50**	1.04	**0.26**	0.66	**0.09**	0.30	**0.01**	5.70	**1.58**
100	2.28	**1.70**	1.43	**0.55**	1.09	**0.28**	0.70	**0.09**	0.32	**0.01**	6.00	**1.67**
110	2.51	**2.03**	1.57	**0.65**	1.20	**0.34**	0.77	**0.11**	0.35	**0.02**	6.60	**1.83**
120	2.73	**2.38**	1.72	**0.77**	1.31	**0.40**	0.83	**0.13**	0.38	**0.02**	7.20	**2.00**
130	2.96	**2.76**	1.86	**0.89**	1.42	**0.46**	0.90	**0.15**	0.42	**0.02**	7.80	**2.17**
140	3.19	**3.17**	2.00	**1.02**	1.53	**0.53**	0.97	**0.18**	0.45	**0.03**	8.40	**2.33**
150	3.42	**3.60**	2.14	**1.16**	1.63	**0.60**	1.04	**0.20**	0.48	**0.03**	9.00	**2.50**
175	3.99	**4.79**	2.50	**1.54**	1.91	**0.80**	1.22	**0.27**	0.56	**0.04**	10.5	**2.92**
200	4.56	**6.13**	2.86	**1.97**	2.18	**1.02**	1.39	**0.34**	0.64	**0.05**	12.0	**3.33**
225	5.13	**7.62**	3.22	**2.45**	2.45	**1.27**	1.57	**0.43**	0.72	**0.06**	13.5	**3.75**
250	5.70	**9.27**	3.57	**2.98**	2.72	**1.54**	1.74	**0.52**	0.80	**0.08**	15.0	**4.17**
275			3.93	**3.56**	3.00	**1.84**	1.91	**0.62**	0.88	**0.09**	16.5	**4.58**
300			4.29	**4.18**	3.27	**2.16**	2.09	**0.72**	0.96	**0.11**	18.0	**5.00**
325			4.65	**4.85**	3.54	**2.50**	2.26	**0.84**	1.04	**0.13**	19.5	**5.42**
350			5.00	**5.56**	3.81	**2.87**	2.43	**0.96**	1.12	**0.15**	21.0	**5.83**
375			5.36	**6.32**	4.09	**3.26**	2.61	**1.09**	1.20	**0.17**	22.5	**6.25**
400			5.72	**7.12**	4.36	**3.68**	2.78	**1.23**	1.28	**0.19**	24.0	**6.67**
450					4.90	**4.58**	3.13	**1.53**	1.44	**0.23**	27.0	**7.50**
500					5.45	**5.56**	3.48	**1.87**	1.60	**0.28**	30.0	**8.33**
550					5.99	**6.64**	3.83	**2.23**	1.76	**0.34**	33.0	**9.17**
600							4.17	**2.61**	1.92	**0.40**	36.0	**10.0**
650							4.52	**3.03**	2.08	**0.46**	39.0	**10.8**
700							4.87	**3.48**	2.24	**0.53**	42.0	**11.7**
750							5.22	**3.95**	2.41	**0.60**	45.0	**12.5**
800							5.56	**4.45**	2.57	**0.68**	48.0	**13.3**
900									2.89	**0.84**	54.0	**15.0**
1000									3.21	**1.02**	60.0	**16.7**
1100									3.53	**1.22**	66.0	**18.3**
1200									3.85	**1.43**	72.0	**20.0**
1300									4.17	**1.66**	78.0	**21.7**
1400									4.49	**1.91**	84.0	**23.3**
1500									4.81	**2.17**	90.0	**25.0**
1600									5.13	**2.44**	96.0	**26.7**
1700									5.45	**2.73**	102.0	**28.3**

Shaded area represents velocities over 1.5 mps. Use with caution where water hammer is a concern.

Conversions:
Bars/100 M x 100 = kPa/100 M
Bars/100 M x 10.21 = Metres/100 M
Bars/100 M x 4.42 = psi/100 ft.

Australian Standard PVC PN 9 Plastic Pipe

C = 150

PRESSURE LOSS IN BARS PER 100 METRES SIZES 100 mm THRU 375 mm

Nominal Size	100 mm		150 mm		200 mm		225 mm		250 mm		300 mm		375 mm		Nominal Size	
Pipe ID	104.7		146.9		208.5		231.7		259.4		292.0		370.7		Pipe ID	
Pipe OD	114.3		160.3		225.3		250.4		280.4		315.5		400.5		Pipe OD	
Wall Thick	4.8		6.7		8.4		9.3		10.5		11.7		14.9		Wall Thick	
Flow	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Flow	
L/min	MPS	LOSS	MPS	LOSS	MPS	LOSS	MPS	LOSS	MPS	LOSS	MPS	LOSS	MPS	LOSS	Cu. M/Hr	L/sec
100	0.19	**0.00**													6.0	**1.67**
125	0.24	**0.01**													7.5	**2.08**
150	0.29	**0.01**													9.0	**2.50**
175	0.34	**0.01**													10.5	**2.92**
200	0.39	**0.02**													12.0	**3.33**
225	0.44	**0.02**													13.5	**3.75**
250	0.48	**0.02**	0.25	**0.00**											15.0	**4.17**
275	0.53	**0.03**	0.27	**0.01**											16.5	**4.58**
300	0.58	**0.03**	0.29	**0.01**											18.0	**5.00**
325	0.63	**0.04**	0.32	**0.01**											19.5	**5.42**
350	0.68	**0.04**	0.34	**0.01**											21.0	**5.83**
375	0.73	**0.05**	0.37	**0.01**											22.5	**6.25**
400	0.77	**0.06**	0.39	**0.01**											24.0	**6.67**
475	0.92	**0.08**	0.47	**0.01**											28.5	**7.92**
500	0.97	**0.08**	0.49	**0.02**											30.0	**8.33**
550	1.07	**0.10**	0.54	**0.02**											33.0	**9.17**
600	1.16	**0.12**	0.59	**0.02**											36.0	**10.0**
650	1.26	**0.14**	0.64	**0.03**	0.32	**0.00**									39.0	**10.8**
700	1.36	**0.16**	0.69	**0.03**	0.34	**0.01**									42.0	**11.7**
750	1.45	**0.18**	0.74	**0.03**	0.37	**0.01**									45.0	**12.5**
800	1.55	**0.20**	0.79	**0.04**	0.39	**0.01**									48.0	**13.3**
850	1.65	**0.22**	0.83	**0.04**	0.41	**0.01**	0.34	**0.00**							51.0	**14.2**
900	1.74	**0.25**	0.88	**0.05**	0.44	**0.01**	0.36	**0.01**							54.0	**15.0**
950	1.84	**0.27**	0.93	**0.05**	0.46	**0.01**	0.38	**0.01**							57.0	**15.8**
1000	1.94	**0.30**	0.98	**0.06**	0.49	**0.01**	0.39	**0.01**							60.0	**16.7**
1100	2.13	**0.36**	1.08	**0.07**	0.54	**0.01**	0.43	**0.01**	0.35	**0.00**					66.0	**18.3**
1200	2.32	**0.42**	1.18	**0.08**	0.59	**0.01**	0.47	**0.01**	0.38	**0.01**					72.0	**20.0**
1300	2.52	**0.49**	1.28	**0.09**	0.63	**0.02**	0.51	**0.01**	0.41	**0.01**					78.0	**21.7**
1400	2.71	**0.56**	1.38	**0.11**	0.68	**0.02**	0.55	**0.01**	0.44	**0.01**					84.0	**23.3**
1500	2.91	**0.64**	1.47	**0.12**	0.73	**0.02**	0.59	**0.01**	0.47	**0.01**					90.0	**25.0**
1600	3.10	**0.72**	1.57	**0.14**	0.78	**0.02**	0.63	**0.01**	0.50	**0.01**	0.40	**0.00**			96.0	**26.7**
1700	3.29	**0.80**	1.67	**0.15**	0.83	**0.03**	0.67	**0.02**	0.54	**0.01**	0.42	**0.01**			102	**28.3**
1800	3.49	**0.89**	1.77	**0.17**	0.88	**0.03**	0.71	**0.02**	0.57	**0.01**	0.45	**0.01**			108	**30.0**
1900	3.68	**0.99**	1.87	**0.19**	0.93	**0.03**	0.75	**0.02**	0.60	**0.01**	0.47	**0.01**			114	**31.7**
2000	3.87	**1.08**	1.96	**0.21**	0.98	**0.04**	0.79	**0.02**	0.63	**0.01**	0.50	**0.01**			120	**33.3**
2200	4.26	**1.29**	2.16	**0.25**	1.07	**0.05**	0.87	**0.03**	0.69	**0.02**	0.55	**0.01**			132	**36.7**
2400	4.65	**1.52**	2.36	**0.29**	1.17	**0.05**	0.95	**0.03**	0.76	**0.02**	0.60	**0.01**			144	**40.0**
2600	5.04	**1.76**	2.55	**0.34**	1.27	**0.06**	1.03	**0.04**	0.82	**0.02**	0.65	**0.01**			156	**43.3**
2800	5.42	**2.02**	2.75	**0.39**	1.37	**0.07**	1.11	**0.04**	0.88	**0.02**	0.70	**0.01**			168	**46.7**
3000	5.81	**2.30**	2.95	**0.44**	1.46	**0.08**	1.18	**0.05**	0.94	**0.03**	0.75	**0.02**	0.46	**0.00**	180	**50.0**
3200			3.14	**0.50**	1.56	**0.09**	1.26	**0.05**	1.01	**0.03**	0.80	**0.02**	0.49	**0.01**	192	**53.3**
3400			3.34	**0.55**	1.66	**0.10**	1.34	**0.06**	1.07	**0.03**	0.85	**0.02**	0.52	**0.01**	204	**56.7**
3600			3.54	**0.62**	1.76	**0.11**	1.42	**0.07**	1.13	**0.04**	0.89	**0.02**	0.56	**0.01**	216	**60.0**
3800			3.73	**0.68**	1.85	**0.12**	1.50	**0.07**	1.20	**0.04**	0.94	**0.02**	0.59	**0.01**	228	**63.3**
4000			3.93	**0.75**	1.95	**0.14**	1.58	**0.08**	1.26	**0.05**	0.99	**0.03**	0.62	**0.01**	240	**66.7**
4500			4.42	**0.93**	2.19	**0.17**	1.78	**0.10**	1.42	**0.06**	1.12	**0.03**	0.69	**0.01**	270	**75.0**
5000			4.91	**1.13**	2.44	**0.21**	1.97	**0.12**	1.57	**0.07**	1.24	**0.04**	0.77	**0.01**	300	**83.3**
5500			5.40	**1.35**	2.68	**0.25**	2.17	**0.15**	1.73	**0.08**	1.37	**0.05**	0.85	**0.01**	330	**91.7**
6000			5.89	**1.59**	2.93	**0.29**	2.37	**0.17**	1.89	**0.10**	1.49	**0.06**	0.93	**0.02**	360	**100.0**
6500					3.17	**0.34**	2.57	**0.20**	2.05	**0.12**	1.62	**0.07**	1.00	**0.02**	390	**108.3**
7000					3.41	**0.38**	2.76	**0.23**	2.20	**0.13**	1.74	**0.07**	1.08	**0.02**	420	**116.7**
8000					3.90	**0.49**	3.16	**0.29**	2.52	**0.17**	1.99	**0.10**	1.23	**0.03**	480	**133.3**
9000					4.39	**0.61**	3.55	**0.37**	2.83	**0.21**	2.24	**0.12**	1.39	**0.04**	540	**150.0**
10000					4.88	**0.74**	3.95	**0.45**	3.15	**0.26**	2.49	**0.14**	1.54	**0.05**	600	**166.7**
11000					5.36	**0.89**	4.34	**0.53**	3.46	**0.31**	2.73	**0.17**	1.70	**0.05**	660	**183.3**
12000					5.85	**1.04**	4.74	**0.62**	3.78	**0.36**	2.98	**0.20**	1.85	**0.06**	720	**200.0**
14000							5.53	**0.83**	4.41	**0.48**	3.48	**0.27**	2.16	**0.08**	840	**233.3**
16000									5.04	**0.61**	3.98	**0.35**	2.47	**0.11**	960	**266.7**
18000									5.67	**0.76**	4.47	**0.43**	2.78	**0.13**	1080	**300.0**
20000											4.97	**0.52**	3.08	**0.16**	1200	**333.3**
22000											5.47	**0.62**	3.39	**0.19**	1320	**366.7**
26000													4.01	**0.27**	1560	**433.3**
30000													4.63	**0.35**	1800	**500.0**
34000													5.24	**0.44**	2040	**566.7**
38000													5.86	**0.54**	2280	**633.3**

Shaded area represents velocities over 1.5 mps. Use with caution where water hammer is a concern.

Conversions:
Bars/100 M x 100 = kPa/100 M
Bars/100 M x 10.21 = Metres/100 M
Bars/100 M x 4.42 = psi/100 ft.

Australian Standard PVC PN 12 Plastic Pipe

C = 150

PRESSURE LOSS IN BARS PER 100 METRES SIZES 20 mm THRU 80 mm

Nominal Size	20 mm		25 mm		32 mm		40 mm		50 mm		80 mm		Nominal Size	
Pipe ID	23.7		29.7		37.4		42.8		53.7		79.1		Pipe ID	
Pipe OD	26.7		33.5		42.2		48.2		60.3		88.9		Pipe OD	
Wall Thick	1.5		1.9		2.4		2.7		3.3		4.9		Wall Thick	
Flow	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Flow	
L/min	MPS	LOSS	MPS	LOSS	MPS	LOSS	MPS	LOSS	MPS	LOSS	MPS	LOSS	Cu. M/Hr	L/sec
1													0.06	0.02
2	0.08	0.00											0.12	0.03
3	0.11	0.01											0.18	0.05
4	0.15	0.01	0.10	0.00									0.24	0.07
5	0.19	0.02	0.12	0.01									0.30	0.08
6	0.23	0.03	0.14	0.01									0.36	0.10
7	0.26	0.04	0.17	0.01	0.11	0.00							0.42	0.12
8	0.30	0.05	0.19	0.02	0.12	0.01							0.48	0.13
9	0.34	0.07	0.21	0.02	0.14	0.01							0.54	0.15
10	0.38	0.08	0.24	0.03	0.15	0.01	0.12	0.00					0.60	0.17
12	0.45	0.11	0.29	0.04	0.18	0.01	0.14	0.01					0.72	0.20
14	0.53	0.15	0.33	0.05	0.21	0.02	0.16	0.01					0.84	0.23
16	0.60	0.19	0.38	0.06	0.24	0.02	0.19	0.01					0.96	0.27
18	0.68	0.24	0.43	0.08	0.27	0.03	0.21	0.01	0.13	0.00			1.08	0.30
20	0.75	0.29	0.48	0.10	0.30	0.03	0.23	0.02	0.15	0.01			1.20	0.33
22	0.83	0.35	0.53	0.12	0.33	0.04	0.25	0.02	0.16	0.01			1.32	0.37
24	0.91	0.41	0.57	0.14	0.36	0.04	0.28	0.02	0.18	0.01			1.44	0.40
26	0.98	0.48	0.62	0.16	0.39	0.05	0.30	0.03	0.19	0.01			1.56	0.43
28	1.06	0.55	0.67	0.18	0.42	0.06	0.32	0.03	0.21	0.01			1.68	0.47
30	1.13	0.62	0.72	0.20	0.45	0.07	0.35	0.04	0.22	0.01			1.80	0.50
32	1.21	0.70	0.76	0.23	0.48	0.08	0.37	0.04	0.24	0.01			1.92	0.53
34	1.28	0.79	0.81	0.26	0.51	0.08	0.39	0.04	0.25	0.01			2.04	0.57
36	1.36	0.87	0.86	0.29	0.54	0.09	0.42	0.05	0.26	0.02			2.16	0.60
38	1.43	0.97	0.91	0.32	0.57	0.10	0.44	0.05	0.28	0.02			2.28	0.63
40	1.51	1.06	0.95	0.35	0.60	0.11	0.46	0.06	0.29	0.02			2.40	0.67
42	1.58	1.16	1.00	0.38	0.63	0.12	0.49	0.07	0.31	0.02			2.52	0.70
44	1.66	1.27	1.05	0.42	0.66	0.14	0.51	0.07	0.32	0.02			2.64	0.73
46	1.74	1.38	1.10	0.45	0.69	0.15	0.53	0.08	0.34	0.03			2.76	0.77
48	1.81	1.49	1.15	0.49	0.72	0.16	0.56	0.08	0.35	0.03			2.88	0.80
50	1.89	1.61	1.19	0.53	0.75	0.17	0.58	0.09	0.37	0.03	0.17	0.00	3.00	0.83
55	2.08	1.92	1.31	0.63	0.83	0.21	0.64	0.11	0.40	0.04	0.19	0.01	3.30	0.92
60	2.26	2.25	1.43	0.74	0.90	0.24	0.69	0.13	0.44	0.02	0.20	0.01	3.60	1.00
65	2.45	2.61	1.55	0.86	0.98	0.28	0.75	0.15	0.48	0.05	0.22	0.01	3.90	1.08
70	2.64	2.99	1.67	0.98	1.06	0.32	0.81	0.17	0.51	0.06	0.24	0.01	4.20	1.17
75	2.83	3.40	1.79	1.12	1.13	0.36	0.87	0.19	0.55	0.06	0.25	0.01	4.50	1.25
80	3.02	3.83	1.91	1.26	1.21	0.41	0.93	0.22	0.59	0.07	0.27	0.01	4.80	1.33
85	3.21	4.29	2.03	1.41	1.28	0.46	0.98	0.24	0.62	0.08	0.29	0.01	5.10	1.42
90	3.40	4.77	2.15	1.56	1.36	0.51	1.04	0.27	0.66	0.09	0.31	0.01	5.40	1.50
95	3.58	5.27	2.27	1.73	1.43	0.57	1.10	0.30	0.70	0.10	0.32	0.02	5.70	1.58
100	3.77	5.79	2.39	1.90	1.51	0.62	1.16	0.33	0.74	0.11	0.34	0.02	6.00	1.67
110	4.15	6.91	2.63	2.27	1.66	0.74	1.27	0.39	0.81	0.13	0.37	0.02	6.60	1.83
120	4.53	8.12	2.86	2.66	1.81	0.87	1.39	0.46	0.88	0.15	0.41	0.02	7.20	2.00
130	4.91	9.42	3.10	3.09	1.96	1.01	1.50	0.53	0.96	0.18	0.44	0.03	7.80	2.17
140	5.28	10.81	3.34	3.55	2.11	1.16	1.62	0.61	1.03	0.20	0.48	0.03	8.40	2.33
150	5.66	12.28	3.58	4.03	2.26	1.32	1.74	0.69	1.10	0.23	0.51	0.04	9.00	2.50
175			4.18	5.36	2.64	1.75	2.02	0.92	1.29	0.31	0.59	0.05	10.5	2.92
200			4.77	6.86	3.01	2.24	2.31	1.18	1.47	0.39	0.68	0.06	12.0	3.33
225			5.37	8.54	3.39	2.79	2.60	1.47	1.65	0.49	0.76	0.07	13.5	3.75
250			5.97	10.38	3.77	3.39	2.89	1.78	1.84	0.59	0.85	0.09	15.0	4.17
275					4.14	4.05	3.18	2.13	2.02	0.70	0.93	0.11	16.5	4.58
300					4.52	4.75	3.47	2.50	2.21	0.83	1.02	0.13	18.0	5.00
325					4.90	5.51	3.76	2.90	2.39	0.96	1.10	0.15	19.5	5.42
350					5.28	6.32	4.05	3.32	2.57	1.10	1.19	0.17	21.0	5.83
375					5.65	7.19	4.34	3.78	2.76	1.25	1.27	0.19	22.5	6.25
400							4.63	4.26	2.94	1.41	1.36	0.22	24.0	6.67
450							5.21	5.29	3.31	1.75	1.53	0.27	27.0	7.50
500							5.79	6.43	3.68	2.13	1.70	0.33	30.0	8.33
550									4.04	2.54	1.87	0.39	33.0	9.17
600									4.41	2.99	2.04	0.46	36.0	10.0
650									4.78	3.47	2.21	0.53	39.0	10.8
700									5.15	3.98	2.38	0.61	42.0	11.7
750									5.51	4.52	2.55	0.69	45.0	12.5
800									5.88	5.09	2.72	0.78	48.0	13.3
900											3.06	0.97	54.0	15.0
1000											3.40	1.18	60.0	16.7
1100											3.74	1.40	66.0	18.3
1200											4.08	1.65	72.0	20.0
1300											4.42	1.91	78.0	21.7
1400											4.75	2.19	84.0	23.3
1600											5.43	2.81	96.0	26.7

Shaded area represents velocities over 1.5 mps. Use with caution where water hammer is a concern.

Conversions:
Bars/100 M x 100 = kPa/100 M
Bars/100 M x 10.21 = Metres/100 M
Bars/100 M x 4.42 = psi/100 ft.

Australian Standard PVC PN 12 Plastic Pipe

C = 150

PRESSURE LOSS IN BARS PER 100 METRES SIZES 100 mm THRU 375 mm

Nominal Size	100 mm		150 mm		200 mm		225 mm		250 mm		300 mm		375 mm		Nominal Size	
Pipe ID	101.7		142.7		203.1		225.8		252.9		284.5		361.2		Pipe ID	
Pipe OD	114.3		160.3		225.3		250.4		280.4		315.5		400.5		Pipe OD	
Wall Thick	6.3		8.8		11.1		12.3		13.7		15.5		19.7		Wall Thick	
Flow	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Flow	
L/min	MPS	LOSS	MPS	LOSS	MPS	LOSS	MPS	LOSS	MPS	LOSS	MPS	LOSS	MPS	LOSS	Cu. M/Hr	L/sec
100	0.20	**0.00**													6.0	**1.67**
125	0.26	**0.01**													7.5	**2.08**
150	0.31	**0.01**													9.0	**2.50**
175	0.36	**0.01**													10.5	**2.92**
200	0.41	**0.02**													12.0	**3.33**
225	0.46	**0.02**	0.23	**0.00**											13.5	**3.75**
250	0.51	**0.03**	0.26	**0.01**											15.0	**4.17**
275	0.56	**0.03**	0.29	**0.01**											16.5	**4.58**
300	0.61	**0.04**	0.31	**0.01**											18.0	**5.00**
325	0.67	**0.04**	0.34	**0.01**											19.5	**5.42**
350	0.72	**0.05**	0.36	**0.01**											21.0	**5.83**
375	0.77	**0.06**	0.39	**0.01**											22.5	**6.25**
400	0.82	**0.06**	0.42	**0.01**											24.0	**6.67**
475	0.97	**0.09**	0.49	**0.02**											28.5	**7.92**
500	1.02	**0.10**	0.52	**0.02**											30.0	**8.33**
550	1.13	**0.11**	0.57	**0.02**											33.0	**9.17**
600	1.23	**0.13**	0.62	**0.03**	0.31	**0.00**									36.0	**10.0**
650	1.33	**0.16**	0.68	**0.03**	0.33	**0.01**									39.0	**10.8**
700	1.43	**0.18**	0.73	**0.03**	0.36	**0.01**									42.0	**11.7**
750	1.54	**0.20**	0.78	**0.04**	0.39	**0.01**									45.0	**12.5**
800	1.64	**0.23**	0.83	**0.04**	0.41	**0.01**	0.33	**0.00**							48.0	**13.3**
900	1.84	**0.28**	0.94	**0.05**	0.46	**0.01**	0.37	**0.01**							54.0	**15.0**
1000	2.05	**0.34**	1.04	**0.07**	0.51	**0.01**	0.42	**0.01**							60.0	**16.7**
1100	2.25	**0.41**	1.14	**0.08**	0.57	**0.01**	0.46	**0.01**	0.36	**0.00**					66.0	**18.3**
1200	2.46	**0.48**	1.25	**0.09**	0.62	**0.02**	0.50	**0.01**	0.40	**0.01**					72.0	**20.0**
1400	2.87	**0.64**	1.46	**0.12**	0.72	**0.02**	0.58	**0.01**	0.46	**0.01**	0.37	**0.00**			84.0	**23.3**
1600	3.28	**0.82**	1.67	**0.16**	0.82	**0.03**	0.67	**0.02**	0.53	**0.01**	0.42	**0.01**			96.0	**26.7**
1800	3.69	**1.02**	1.87	**0.20**	0.92	**0.04**	0.75	**0.02**	0.60	**0.01**	0.47	**0.01**			108.0	**30.0**
2000	4.10	**1.24**	2.08	**0.24**	1.03	**0.04**	0.83	**0.03**	0.66	**0.01**	0.52	**0.01**			120.0	**33.3**
2200	4.51	**1.48**	2.29	**0.29**	1.13	**0.05**	0.91	**0.03**	0.73	**0.02**	0.58	**0.01**			132.0	**36.7**
2400	4.92	**1.74**	2.50	**0.34**	1.23	**0.06**	1.00	**0.04**	0.80	**0.02**	0.63	**0.01**			144.0	**40.0**
2600	5.33	**2.02**	2.71	**0.39**	1.34	**0.07**	1.08	**0.04**	0.86	**0.02**	0.68	**0.01**			156	**43.3**
2800	5.74	**2.32**	2.91	**0.45**	1.44	**0.08**	1.16	**0.05**	0.93	**0.03**	0.73	**0.02**	0.45	**0.00**	168	**46.7**
3000			3.12	**0.51**	1.54	**0.09**	1.25	**0.05**	0.99	**0.03**	0.79	**0.02**	0.49	**0.01**	180	**50.0**
3200			3.33	**0.57**	1.64	**0.10**	1.33	**0.06**	1.06	**0.04**	0.84	**0.02**	0.52	**0.01**	192	**53.3**
3500			3.64	**0.67**	1.80	**0.12**	1.45	**0.07**	1.16	**0.04**	0.92	**0.02**	0.57	**0.01**	210	**58.3**
4000			4.16	**0.86**	2.06	**0.15**	1.66	**0.09**	1.33	**0.05**	1.05	**0.03**	0.65	**0.01**	240	**66.7**
4500			4.68	**1.07**	2.31	**0.19**	1.87	**0.12**	1.49	**0.07**	1.18	**0.04**	0.73	**0.01**	270	**75.0**
5000			5.20	**1.31**	2.57	**0.23**	2.08	**0.14**	1.66	**0.08**	1.31	**0.05**	0.81	**0.01**	300	**83.3**
5500			5.72	**1.56**	2.83	**0.28**	2.29	**0.17**	1.82	**0.10**	1.44	**0.05**	0.89	**0.02**	330	**91.7**
6000					3.08	**0.33**	2.49	**0.20**	1.99	**0.11**	1.57	**0.06**	0.97	**0.02**	360	**100.0**
6500					3.34	**0.38**	2.70	**0.23**	2.15	**0.13**	1.70	**0.07**	1.06	**0.02**	390	**108.3**
7000					3.60	**0.44**	2.91	**0.26**	2.32	**0.15**	1.83	**0.08**	1.14	**0.03**	420	**116.7**
7500					3.85	**0.50**	3.12	**0.30**	2.49	**0.17**	1.96	**0.10**	1.22	**0.03**	450	**125.0**
8000					4.11	**0.56**	3.33	**0.33**	2.65	**0.19**	2.09	**0.11**	1.30	**0.03**	480	**133.3**
8500					4.37	**0.63**	3.53	**0.37**	2.82	**0.22**	2.23	**0.12**	1.38	**0.04**	510	**141.7**
9000					4.62	**0.70**	3.74	**0.42**	2.98	**0.24**	2.36	**0.13**	1.46	**0.04**	540	**150.0**
9500					4.88	**0.77**	3.95	**0.46**	3.15	**0.26**	2.49	**0.15**	1.54	**0.05**	570	**158.3**
10000					5.14	**0.85**	4.16	**0.51**	3.31	**0.29**	2.62	**0.16**	1.62	**0.05**	600	**166.7**
10500					5.40	**0.93**	4.36	**0.55**	3.48	**0.32**	2.75	**0.18**	1.71	**0.06**	630	**175.0**
11000					5.65	**1.01**	4.57	**0.60**	3.65	**0.35**	2.88	**0.20**	1.79	**0.06**	660	**183.3**
12000							4.99	**0.71**	3.98	**0.41**	3.14	**0.23**	1.95	**0.07**	720	**200.0**
13000							5.40	**0.82**	4.31	**0.47**	3.40	**0.27**	2.11	**0.08**	780	**216.7**
14000							5.82	**0.94**	4.64	**0.54**	3.67	**0.31**	2.27	**0.10**	840	**233.3**
15000									4.97	**0.62**	3.93	**0.35**	2.44	**0.11**	900	**250.0**
16000									5.30	**0.69**	4.19	**0.39**	2.60	**0.12**	960	**266.7**
17000									5.63	**0.78**	4.45	**0.44**	2.76	**0.14**	1020	**283.3**
18000									5.97	**0.86**	4.71	**0.49**	2.92	**0.15**	1080	**300.0**
19000											4.98	**0.54**	3.09	**0.17**	1140	**316.7**
20000											5.24	**0.59**	3.25	**0.19**	1200	**333.3**
21000											5.50	**0.65**	3.41	**0.20**	1260	**350.0**
22000											5.76	**0.71**	3.57	**0.22**	1320	**366.7**
24000													3.90	**0.26**	1440	**400.0**
26000													4.22	**0.30**	1560	**433.3**
28000													4.55	**0.35**	1680	**466.7**
30000													4.87	**0.39**	1800	**500.0**
32000													5.20	**0.44**	1920	**533.3**
34000													5.52	**0.50**	2040	**566.7**
36000													5.85	**0.55**	2160	**600.0**
38000															2280	**633.3**

Shaded area represents velocities over 1.5 mps. Use with caution where water hammer is a concern.

Conversions:
Bars/100 M x 100 = kPa/100 M
Bars/100 M x 10.21 = Metres/100 M
Bars/100 M x 4.42 = psi/100 ft.

Australian Standard PVC PN 15 Plastic Pipe

C = 150

PRESSURE LOSS IN BARS PER 100 METRES SIZES 15 mm THRU 65 mm

Nominal Size	15 mm		20 mm		25 mm		32 mm		40 mm		50 mm		Nominal Size	
Pipe ID	18.3		22.9		28.9		36.4		41.6		52.1		Pipe ID	
Pipe OD	21.3		26.7		33.5		42.2		48.2		60.3		Pipe OD	
Wall Thick	1.5		1.9		2.3		2.9		3.3		4.1		Wall Thick	
Flow	Velocity	**Bars/ 100 M**	Velocity	**Bars/ 100 M**	Velocity	**Bars/ 100 M**	Velocity	**Bars/ 100 M**	Velocity	**Bars/ 100 M**	Velocity	**Bars/ 100 M**	Flow	
L/min	MPS	**LOSS**	MPS	**LOSS**	MPS	**LOSS**	MPS	**LOSS**	MPS	**LOSS**	MPS	**LOSS**	Cu. M/Hr	**L/sec**
1	0.06	**0.00**											0.06	**0.02**
2	0.13	**0.01**	0.08	**0.00**									0.12	**0.03**
3	0.19	**0.03**	0.12	**0.01**	0.08	**0.00**							0.18	**0.05**
4	0.25	**0.05**	0.16	**0.02**	0.10	**0.01**							0.24	**0.07**
5	0.32	**0.08**	0.20	**0.03**	0.13	**0.01**							0.30	**0.08**
6	0.38	**0.11**	0.24	**0.04**	0.15	**0.01**	0.10	**0.00**					0.36	**0.10**
7	0.44	**0.15**	0.28	**0.05**	0.18	**0.02**	0.11	**0.01**					0.42	**0.12**
8	0.51	**0.19**	0.32	**0.06**	0.20	**0.02**	0.13	**0.01**					0.48	**0.13**
9	0.57	**0.24**	0.36	**0.08**	0.23	**0.03**	0.14	**0.01**	0.11	**0.00**			0.54	**0.15**
10	0.63	**0.29**	0.40	**0.09**	0.25	**0.03**	0.16	**0.01**	0.12	**0.01**			0.60	**0.17**
12	0.76	**0.40**	0.48	**0.13**	0.30	**0.04**	0.19	**0.01**	0.15	**0.01**			0.72	**0.20**
14	0.89	**0.53**	0.56	**0.18**	0.35	**0.06**	0.22	**0.02**	0.17	**0.01**			0.84	**0.23**
16	1.01	**0.68**	0.64	**0.23**	0.40	**0.07**	0.26	**0.02**	0.20	**0.01**	0.12	**0.00**	0.96	**0.27**
18	1.14	**0.85**	0.72	**0.28**	0.45	**0.09**	0.29	**0.03**	0.22	**0.02**	0.14	**0.01**	1.08	**0.30**
20	1.27	**1.04**	0.80	**0.34**	0.50	**0.11**	0.32	**0.04**	0.24	**0.02**	0.16	**0.01**	1.20	**0.33**
22	1.39	**1.23**	0.88	**0.41**	0.55	**0.13**	0.35	**0.04**	0.27	**0.02**	0.17	**0.01**	1.32	**0.37**
24	1.52	**1.45**	0.96	**0.48**	0.60	**0.15**	0.38	**0.05**	0.29	**0.03**	0.19	**0.01**	1.44	**0.40**
26	1.65	**1.68**	1.04	**0.55**	0.66	**0.18**	0.42	**0.06**	0.32	**0.03**	0.20	**0.01**	1.56	**0.43**
28	1.77	**1.93**	1.12	**0.63**	0.71	**0.21**	0.45	**0.07**	0.34	**0.04**	0.22	**0.01**	1.68	**0.47**
30	1.90	**2.19**	1.20	**0.72**	0.76	**0.23**	0.48	**0.08**	0.37	**0.04**	0.23	**0.01**	1.80	**0.50**
32	2.03	**2.47**	1.28	**0.81**	0.81	**0.26**	0.51	**0.09**	0.39	**0.05**	0.25	**0.02**	1.92	**0.53**
34	2.15	**2.77**	1.36	**0.91**	0.86	**0.29**	0.54	**0.10**	0.42	**0.05**	0.26	**0.02**	2.04	**0.57**
36	2.28	**3.07**	1.44	**1.01**	0.91	**0.33**	0.58	**0.11**	0.44	**0.06**	0.28	**0.02**	2.16	**0.60**
38	2.41	**3.40**	1.52	**1.12**	0.96	**0.36**	0.61	**0.12**	0.47	**0.06**	0.30	**0.02**	2.28	**0.63**
40	2.53	**3.74**	1.60	**1.23**	1.01	**0.40**	0.64	**0.13**	0.49	**0.07**	0.31	**0.02**	2.40	**0.67**
42	2.66	**4.09**	1.68	**1.34**	1.06	**0.44**	0.67	**0.14**	0.51	**0.08**	0.33	**0.02**	2.52	**0.70**
44	2.78	**4.46**	1.76	**1.47**	1.11	**0.47**	0.70	**0.16**	0.54	**0.08**	0.34	**0.03**	2.64	**0.73**
46	2.91	**4.84**	1.84	**1.59**	1.16	**0.52**	0.74	**0.17**	0.56	**0.09**	0.36	**0.03**	2.76	**0.77**
48	3.04	**5.24**	1.92	**1.72**	1.21	**0.56**	0.77	**0.18**	0.59	**0.10**	0.37	**0.03**	2.88	**0.80**
50	3.16	**5.65**	2.00	**1.86**	1.26	**0.60**	0.80	**0.20**	0.61	**0.10**	0.39	**0.03**	3.00	**0.83**
55	3.48	**6.74**	2.20	**2.22**	1.39	**0.72**	0.88	**0.24**	0.67	**0.12**	0.43	**0.04**	3.30	**0.92**
60	3.80	**7.92**	2.40	**2.60**	1.51	**0.84**	0.96	**0.28**	0.73	**0.15**	0.47	**0.05**	3.60	**1.00**
65	4.11	**9.18**	2.60	**3.02**	1.64	**0.98**	1.04	**0.32**	0.80	**0.17**	0.51	**0.06**	3.90	**1.08**
70	4.43	**10.53**	2.80	**3.46**	1.76	**1.12**	1.12	**0.37**	0.86	**0.19**	0.54	**0.06**	4.20	**1.17**
75	4.75	**11.97**	3.01	**3.94**	1.89	**1.27**	1.20	**0.42**	0.92	**0.22**	0.58	**0.07**	4.50	**1.25**
80	5.06	**13.49**	3.21	**4.44**	2.02	**1.44**	1.28	**0.48**	0.98	**0.25**	0.62	**0.08**	4.80	**1.33**
85	5.38	**15.09**	3.41	**4.96**	2.14	**1.61**	1.36	**0.53**	1.04	**0.28**	0.66	**0.09**	5.10	**1.42**
90	5.70	**16.78**	3.61	**5.52**	2.27	**1.79**	1.44	**0.59**	1.10	**0.31**	0.70	**0.10**	5.40	**1.50**
95			3.81	**6.10**	2.39	**1.97**	1.52	**0.65**	1.16	**0.34**	0.74	**0.11**	5.70	**1.58**
100			4.01	**6.70**	2.52	**2.17**	1.60	**0.72**	1.22	**0.38**	0.78	**0.12**	6.00	**1.67**
110			4.41	**8.00**	2.77	**2.59**	1.76	**0.86**	1.35	**0.45**	0.86	**0.15**	6.60	**1.83**
120			4.81	**9.40**	3.02	**3.04**	1.92	**1.01**	1.47	**0.53**	0.93	**0.17**	7.20	**2.00**
130			5.21	**10.90**	3.28	**3.53**	2.08	**1.17**	1.59	**0.61**	1.01	**0.20**	7.80	**2.17**
140			5.61	**12.50**	3.53	**4.05**	2.24	**1.34**	1.71	**0.70**	1.09	**0.23**	8.40	**2.33**
150					3.78	**4.60**	2.40	**1.52**	1.84	**0.79**	1.17	**0.26**	9.00	**2.50**
175					4.41	**6.12**	2.80	**2.02**	2.14	**1.06**	1.36	**0.35**	10.5	**2.92**
200					5.04	**7.84**	3.20	**2.59**	2.45	**1.35**	1.56	**0.45**	12.0	**3.33**
225					5.67	**9.74**	3.60	**3.22**	2.76	**1.68**	1.75	**0.56**	13.5	**3.75**
250							4.00	**3.92**	3.06	**2.05**	1.94	**0.68**	15.0	**4.17**
275							4.40	**4.68**	3.37	**2.44**	2.14	**0.81**	16.5	**4.58**
300							4.80	**5.49**	3.67	**2.87**	2.33	**0.95**	18.0	**5.00**
325							5.20	**6.37**	3.98	**3.33**	2.53	**1.10**	19.5	**5.42**
350							5.60	**7.31**	4.29	**3.82**	2.72	**1.26**	21.0	**5.83**
375									4.59	**4.34**	2.92	**1.44**	22.5	**6.25**
400									4.90	**4.89**	3.11	**1.62**	24.0	**6.67**
450									5.51	**6.08**	3.50	**2.01**	27.0	**7.50**
500											3.89	**2.45**	30.0	**8.33**
550											4.28	**2.92**	33.0	**9.17**
600											4.67	**3.43**	36.0	**10.0**
650											5.06	**3.98**	39.0	**10.8**
700											5.45	**4.57**	42.0	**11.7**
750											5.83	**5.19**	45.0	**12.5**
800													48.0	**13.3**
900													54.0	**15.0**
1000													60.0	**16.7**
1100													66.0	**18.3**
1200													72.0	**20.0**
1300													78.0	**21.7**
1400													84.0	**23.3**
1500													90.0	**25.0**

Shaded area represents velocities over 1.5 mps. Use with caution where water hammer is a concern.

Conversions:
Bars/100 M x 100 = kPa/100 M
Bars/100 M x 10.21 = Metres/100 M
Bars/100 M x 4.42 = psi/100 ft.

Australian Standard PVC PN 15 Plastic Pipe

C = 150

PRESSURE LOSS IN BARS PER 100 METRES SIZES 80 mm THRU 300 mm

Nominal Size	80 mm		100 mm		150 mm		200 mm		250 mm		300 mm		Nominal Size	
Pipe ID	76.7		98.9		138.7		198.0		246.4		277.3		Pipe ID	
Pipe OD	88.9		114.3		160.3		225.3		280.4		315.5		Pipe OD	
Wall Thick	6.1		7.7		10.8		13.7		17.0		19.1		Wall Thick	
Flow	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Velocity	Bars/ 100 M	Flow	
L/min	MPS	LOSS	MPS	LOSS	MPS	LOSS	MPS	LOSS	MPS	LOSS	MPS	LOSS	Cu. M/Hr	L/sec
100	0.36	**0.02**	0.22	**0.01**									6.0	**1.67**
125	0.45	**0.03**	0.27	**0.01**									7.5	**2.08**
150	0.54	**0.04**	0.33	**0.01**									9.0	**2.50**
175	0.63	**0.05**	0.38	**0.02**									10.5	**2.92**
200	0.72	**0.07**	0.43	**0.02**									12.0	**3.33**
225	0.81	**0.09**	0.49	**0.03**	0.25	**0.00**							13.5	**3.75**
250	0.90	**0.10**	0.54	**0.03**	0.28	**0.01**							15.0	**4.17**
275	0.99	**0.12**	0.60	**0.04**	0.30	**0.01**							16.5	**4.58**
300	1.08	**0.15**	0.65	**0.04**	0.33	**0.01**							18.0	**5.00**
325	1.17	**0.17**	0.71	**0.05**	0.36	**0.01**							19.5	**5.42**
350	1.26	**0.19**	0.76	**0.06**	0.39	**0.01**							21.0	**5.83**
375	1.35	**0.22**	0.81	**0.06**	0.41	**0.01**							22.5	**6.25**
400	1.44	**0.25**	0.87	**0.07**	0.44	**0.01**							24.0	**6.67**
475	1.71	**0.34**	1.03	**0.10**	0.52	**0.02**							28.5	**7.92**
500	1.80	**0.38**	1.09	**0.11**	0.55	**0.02**							30.0	**8.33**
550	1.98	**0.45**	1.19	**0.13**	0.61	**0.03**	0.30	**0.00**					33.0	**9.17**
600	2.16	**0.53**	1.30	**0.15**	0.66	**0.03**	0.32	**0.01**					36.0	**10.0**
650	2.34	**0.61**	1.41	**0.18**	0.72	**0.03**	0.35	**0.01**					39.0	**10.8**
700	2.52	**0.70**	1.52	**0.20**	0.77	**0.04**	0.38	**0.01**					42.0	**11.7**
750	2.70	**0.80**	1.63	**0.23**	0.83	**0.04**	0.41	**0.01**					45.0	**12.5**
800	2.88	**0.90**	1.74	**0.26**	0.88	**0.05**	0.43	**0.01**					48.0	**13.3**
850	3.06	**1.01**	1.85	**0.29**	0.94	**0.06**	0.46	**0.01**					51.0	**14.2**
900	3.24	**1.12**	1.95	**0.33**	0.99	**0.06**	0.49	**0.01**					54.0	**15.0**
950	3.42	**1.24**	2.06	**0.36**	1.05	**0.07**	0.51	**0.01**					57.0	**15.8**
1000	3.60	**1.36**	2.17	**0.40**	1.10	**0.08**	0.54	**0.01**	0.35	**0.00**			60.0	**16.7**
1100	3.96	**1.62**	2.39	**0.47**	1.21	**0.09**	0.59	**0.02**	0.38	**0.01**			66.0	**18.3**
1200	4.32	**1.90**	2.61	**0.56**	1.32	**0.11**	0.65	**0.02**	0.42	**0.01**			72.0	**20.0**
1300	4.68	**2.21**	2.82	**0.64**	1.43	**0.12**	0.70	**0.02**	0.45	**0.01**			78.0	**21.7**
1400	5.04	**2.53**	3.04	**0.74**	1.54	**0.14**	0.76	**0.03**	0.49	**0.01**	0.39	**0.00**	84.0	**23.3**
1500	5.40	**2.88**	3.26	**0.84**	1.65	**0.16**	0.81	**0.03**	0.52	**0.01**	0.41	**0.01**	90.0	**25.0**
1600	5.76	**3.24**	3.47	**0.95**	1.76	**0.18**	0.87	**0.03**	0.56	**0.01**	0.44	**0.01**	96.0	**26.7**
1700			3.69	**1.06**	1.87	**0.20**	0.92	**0.04**	0.59	**0.01**	0.47	**0.01**	102	**28.3**
1800			3.91	**1.18**	1.98	**0.23**	0.97	**0.04**	0.63	**0.01**	0.50	**0.01**	108	**30.0**
1900			4.13	**1.30**	2.09	**0.25**	1.03	**0.04**	0.66	**0.02**	0.52	**0.01**	114	**31.7**
2000			4.34	**1.43**	2.20	**0.27**	1.08	**0.05**	0.70	**0.02**	0.55	**0.01**	120	**33.3**
2200			4.78	**1.71**	2.42	**0.33**	1.19	**0.06**	0.77	**0.02**	0.61	**0.01**	132	**36.7**
2400			5.21	**2.01**	2.64	**0.38**	1.30	**0.07**	0.84	**0.02**	0.66	**0.01**	144	**40.0**
2600			5.65	**2.33**	2.86	**0.45**	1.41	**0.08**	0.91	**0.03**	0.72	**0.02**	156	**43.3**
2800					3.08	**0.51**	1.51	**0.09**	0.98	**0.03**	0.77	**0.02**	168	**46.7**
3000					3.31	**0.58**	1.62	**0.10**	1.05	**0.04**	0.83	**0.02**	180	**50.0**
3200					3.53	**0.66**	1.73	**0.12**	1.12	**0.04**	0.88	**0.02**	192	**53.3**
3400					3.75	**0.73**	1.84	**0.13**	1.19	**0.04**	0.94	**0.03**	204	**56.7**
3600					3.97	**0.82**	1.95	**0.14**	1.26	**0.05**	0.99	**0.03**	216	**60.0**
3800					4.19	**0.90**	2.05	**0.16**	1.33	**0.06**	1.05	**0.03**	228	**63.3**
4000					4.41	**0.99**	2.16	**0.18**	1.40	**0.06**	1.10	**0.03**	240	**66.7**
4500					4.96	**1.23**	2.43	**0.22**	1.57	**0.08**	1.24	**0.04**	270	**75.0**
5000					5.51	**1.50**	2.70	**0.27**	1.75	**0.09**	1.38	**0.05**	300	**83.3**
5500							2.97	**0.32**	1.92	**0.11**	1.52	**0.06**	330	**91.7**
6000							3.24	**0.37**	2.09	**0.13**	1.65	**0.07**	360	**100.0**
6500							3.51	**0.43**	2.27	**0.15**	1.79	**0.08**	390	**108.3**
7000							3.78	**0.49**	2.44	**0.17**	1.93	**0.10**	420	**116.7**
7500							4.05	**0.56**	2.62	**0.19**	2.07	**0.11**	450	**125.0**
8000							4.33	**0.63**	2.79	**0.22**	2.21	**0.12**	480	**133.3**
8500							4.60	**0.71**	2.97	**0.24**	2.34	**0.14**	510	**141.7**
9000							4.87	**0.79**	3.14	**0.27**	2.48	**0.15**	540	**150.0**
9500							5.14	**0.87**	3.32	**0.30**	2.62	**0.17**	570	**158.3**
10000							5.41	**0.96**	3.49	**0.33**	2.76	**0.19**	600	**166.7**
10500							5.68	**1.05**	3.67	**0.36**	2.89	**0.20**	630	**175.0**
11000							5.95	**1.14**	3.84	**0.39**	3.03	**0.22**	660	**183.3**
11500									4.01	**0.43**	3.17	**0.24**	690	**191.7**
12000									4.19	**0.46**	3.31	**0.26**	720	**200.0**
13000									4.54	**0.54**	3.58	**0.30**	780	**216.7**
14000									4.89	**0.62**	3.86	**0.35**	840	**233.3**
15000									5.24	**0.70**	4.13	**0.39**	900	**250.0**
16000									5.59	**0.79**	4.41	**0.44**	960	**266.7**
17000									5.93	**0.88**	4.69	**0.50**	1020	**283.3**
18000											4.96	**0.55**	1080	**300.0**
19000											5.24	**0.61**	1140	**316.7**
20000											5.51	**0.67**	1200	**333.3**
21000											5.79	**0.73**	1260	**350.0**

Shaded area represents velocities over 1.5 mps. Use with caution where water hammer is a concern.

Conversions:
Bars/100 M x 100 = kPa/100 M
Bars/100 M x 10.21 = Metres/100 M
Bars/100 M x 4.42 = psi/100 ft.

Pressure Loss Through Water Meters

PRESSURE LOSS: (psi)

FLOW GPM	NORMAL SIZE							FLOW GPM
	⅝"	¾"	1"	1½"	2"	3"	4"	
1	0.2	0.1						1
2	0.3	0.2						2
3	0.4	0.3						3
4	0.6	0.5	0.1					4
5	0.9	0.6	0.2					5
6	1.3	0.7	0.3					6
7	1.8	0.8	0.4					7
8	2.3	1.0	0.5					8
9	3.0	1.3	0.6					9
10	3.7	1.6	0.7					10
11	4.4	1.9	0.8					11
12	5.1	2.2	0.9					12
13	6.1	2.6	1.0					13
14	7.2	3.1	1.1					14
15	8.3	3.6	1.2					15
16	9.4	4.1	1.4	0.4				16
17	10.7	4.6	1.6	0.5				17
18	12.0	5.2	1.8	0.6				18
19	13.4	5.8	2.0	0.7				19
20	15.0	6.5	2.2	0.8				20
22		7.9	2.8	1.0				22
24		9.5	3.4	1.2				24
26		11.2	4.0	1.4				26
28		13.0	4.6	1.6				28
30		15.0	5.3	1.8				30
32			6.0	2.1	0.8			32
34			6.9	2.4	0.9			34
36			7.8	2.7	1.0			36
38			8.7	3.0	1.2			38
40			9.6	3.3	1.3			40
42			10.6	3.6	1.4			42
44			11.7	3.9	1.5			44
46			12.8	4.2	1.6			46
48			13.9	4.5	1.7			48
50			15.0	4.9	1.9			50
52				5.3	2.1			52
54				5.7	2.2			54
56				6.2	2.3			56
58				6.7	2.5			58
60				7.2	2.7	1.0		60
65				8.3	3.2	1.1		65
70				9.8	3.7	1.3		70
75				11.3	4.3	1.5		75
80				12.8	4.9	1.6	0.7	80
90				16.1	6.2	2.0	0.8	90
100				20.0	7.8	2.5	0.9	100
110					9.5	2.9	1.0	110
120					11.3	3.4	1.2	120
130					13.0	2.9	1.4	130
140					15.1	4.5	1.6	140
150					17.3	5.1	1.8	150
160					20.0	5.8	2.1	160
170						6.5	2.4	170
180						7.2	2.7	180
190						8.0	3.0	190
200						9.0	3.2	200
220						11.0	3.9	220
240						13.0	4.7	240
260						15.0	5.5	260
280						17.3	6.3	280
300						20.0	7.2	300
350							10.0	300
400							13.0	400
450							16.2	450
500							20.0	500

Note: The greatest pressure loss reflects the maximum safe capacity for the meter.

Pressure Loss Through Water Meters

PRESSURE LOSS IN KILOPASCALS: (kPa)

FLOW L/min	METER SIZE 15mm	20mm	25mm	40mm	FLOW L/min
3.8	1.38	0.69			3.8
7.6	2.07	1.38			7.6
11.4	2.76	2.07			11.4
15.1	4.14	3.45	0.69		15.1
19.0	6.21	4.14	1.38		19.0
22.7	8.96	4.83	2.07		22.7
26.5	12.41	5.52	2.76		26.5
30.3	15.86	6.90	3.45		30.3
34.1	20.69	8.96	4.14		34.1
37.8	25.51	11.03	4.83		37.8
41.6	30.34	13.10	5.52		41.6
45.4	35.16	15.17	6.21		45.4
49.2	42.06	17.93	6.90		49.2
53.0	49.64	21.37	7.58		53.0
56.8	57.23	24.82	8.27		56.8
60.6	64.81	28.27	9.65	2.76	60.6
64.4	73.78	31.72	11.03	3.45	64.4
68.1	82.74	35.85	12.41	4.14	68.1
72.0	92.39	39.99	13.79	4.83	72.0
75.7	103.43	44.82	15.17	5.52	75.7
83.3		54.47	19.31	6.90	83.3
90.8		65.50	23.44	8.27	90.8
98.4		77.22	27.58	9.65	98.4
106.0		89.64	31.72	11.03	106.0
113.6		103.43	36.54	12.41	113.6
121.1			41.37	14.48	121.1
128.7			47.58	16.55	128.7
136.3			53.78	18.62	136.3
143.8			59.99	20.69	143.8
151.4			66.19	22.75	151.4
159.0			73.09	24.82	159.0
166.5			80.67	26.89	166.5
174.1			88.26	28.96	174.1
181.7			95.84	31.03	181.7
189.3			103.43	33.79	189.3
196.8				36.54	196.8
204.4				39.30	204.4
212.0				42.75	212.0
219.5				46.20	219.5
227.1				49.64	227.1
246.0				57.23	246.0
265.0				67.57	265.0
283.9				77.91	283.9
302.8				88.26	302.8

Note: The greatest pressure loss reflects the maximum safe capacity for the meter.

Loss of Pressure Due to Friction in Ordinary Rubber Hose

LOSS IN POUNDS PER SQ. INCH (PSI) PER 100 FEET OF LENGTH
SIZES ½" THRU 5"

Flow of Water in U.S. Gal. per Minute	½"	⅝"	¾"	1"	1¼"	1½"	2"	2½"	3"	4"	5"
0.5	0.40										
1.5	3.02	1.01	0.42								
2.5	7.75	2.58	1.08								
5	27.80	9.27	3.86	0.95	0.32	0.13					
10	99.50	33.20	13.80	3.38	1.14	0.47					
15		71.00	29.60	7.25	2.45	1.01	0.25	0.08			
20		121.00	50.30	12.40	4.15	1.71	0.42	.014			
25			76.50	18.70	6.34	2.60	0.64	0.22			
30			108.00	26.50	8.96	3.68	0.90	0.30	0.13		
35			142.00	34.80	11.80	4.83	1.18	0.40	0.17		
40				44.70	15.10	6.20	1.52	0.51	0.21		
45				55.00	18.60	7.65	1.87	0.63	0.26		
50				67.50	22.80	9.35	2.28	0.78	0.32		
60				94.30	31.80	13.10	3.19	1.08	0.45		
70				126.00	42.50	17.50	4.25	1.44	0.60		
80					54.60	22.50	5.48	1.86	0.77		
90					67.50	27.80	6.80	2.30	0.95	0.23	
100					81.50	33.50	8.19	2.78	1.15	0.28	
125					124.00	50/60	12.40	4.20	1.73	0.43	
150						72.10	17.60	5.97	2.46	0.60	0.20
175						94.50	23.10	7.83	3.23	0.79	0.27
200						122.00	29.60	10.10	4.15	1.02	0.34
225							36.80	12.50	5.15	1.26	0.43
250							44.60	15.20	6.25	1.53	0.52
275							55.30	18.10	7.45	1.83	0.62
300							62.50	21.20	8.75	2.15	0.73

Roughness Coefficient C Values for Hazen-Williams Equation

Values of C Type Of Pipe	Range	New Pipe	Design C
PVC	160 - 145	150	150
Polyethylene	150 - 130	140	140
Asbestos-Cement	160 - 140	150	140
Cement-Lined Steel	160 - 140	150	140
Welded Steel	150 - 80	140	100
Riveted Steel	140 - 90	110	100
Concrete	150 - 85	120	100
Wrought or Cast Iron	150 - 80	130	100
Copper, Brass	150 - 120	140	130
Wood Stave	145 - 110	120	110
Vitrified Clay		110	100
Corrugated Steel		60	60

Above values of C for use with Hazen-Williams Equation, friction head losses in psi per foot of pipe length for fresh water at 60 degrees Fahrenheit.

$$H_f = 0.00090194 \left(\frac{100}{C}\right)^{1.852} \frac{Q^{1.852}}{d^{4.866}} L$$

Where:

H_f = head loss due to friction in pounds per square inch (psi)
C = Hazen Williams coefficient for roughness of the inside of the pipe
Q = flow in gallons per minute (gpm)
d = inside diameter of pipe in inches
L = length of pipe in feet

Reference Tables of Selected Data

Head Losses Through Standard Foot Valves

Nominal Pipe Size: Inches

Head Loss Ft H_2O F_f H_2	1.50	2.00	2.50	3.00	4.00	6.00	8.00	10.00	12.00
					Flow: gpm				
1	39	66	96	152	268	632	1122	1805	2603
2	57	97	140	221	390	919	1632	2625	3786
3	71	120	175	275	486	1145	2032	3269	4713
4	83	141	204	322	568	1337	2374	3819	5507
5	94	159	230	363	641	1509	2678	4308	6213
6	104	175	254	401	707	1665	2956	4755	6836
7	113	190	276	435	769	1810	3212	5168	7452
8	121	205	297	468	826	1945	3453	5555	8010
9	129	218	317	499	880	2073	3680	5920	8636
10	137	231	335	528	932	2195	3896	6267	9037

Table of Approximate Pressure Losses for Pipe Fittings

Listed in Equivalent Feet of Pipe

Steel Fitting Type	½"	¾"	1"	1¼"	1½"	2"	2½"	3"	4"	6"	8"
Coupling	0.6	0.8	1.0	1.2	1.5	2.0	2.5	3.0	4.0	6.0	8.0
Run of St. Tee	1.0	1.0	1.5	2.0	2.0	2.5	3.0	4.0	5.0	7.0	10.0
Tee, Side Outlet	3.0	4.5	5.0	7.0	9.0	11.0	13.0	16.0	20.0	31.0	42.0
Tee, Run Reduced ½"	1.5	2.5	3.0	4.0	5.0	6.0	7.0	8.0	12.0	16.0	20.0
Elbow, 90°	1.5	2.5	3.0	4.0	5.0	6.0	7.0	8.0	12.0	16.0	20.0
Elbow, 45°	0.75	1.0	1.3	1.7	2.0	2.5	3.0	3.5	5.0	7.5	10.0
Corporation Stop	9.0	9.0	9.0	9.0	9.0	9.0					
Curb Stop	6.0	6.0	7.0	7.0	8.0	8.0					
Plastic IPS or Copper Fitting Type	**½"**	**¾"**	**1"**	**1¼"**	**1½"**	**2"**	**2½"**	**3"**	**4"**	**6"**	**8"**
Coupling	1.5	2.5	3.0	3.0	4.0	6.0	7.0	8.0	11.0	18.0	24.0
Run of St. Tee	2.5	3.0	4.0	5.0	6.0	8.0	9.0	11.0	15.0	21.0	28.0
Tee, Side Outlet	7.0	9.0	12.0	15.0	18.0	24.0	30.0	36.0	45.0	70.0	90.0
Tee, Run Reduced ½"	3.5	4.5	6.0	8.0	9.0	11.0	14.0	17.0	24.0	34.0	45.0
Elbow, 90°	3.5	4.5	6.0	8.0	9.0	11.0	14.0	17.0	24.0	34.0	45.0
Elbow, 34°	1.5	2.0	3.0	3.5	4.0	5.0	7.0	8.0	10.0	16.0	20.0

TABLE OF APPROXIMATE PRESSURE LOSS

To use this chart, multiply the approximate "equivalent feet of pipe" value by the proper pipe pressure loss per 100 feet rating, then divide by 100. The result is the fitting loss in **psi.**

Note: It is recommended that the above chart be used only when the manufacturers recommended pressure loss values are not available.

Pressure Loss Through Swing Check Valves

Pressure Loss (PSI)

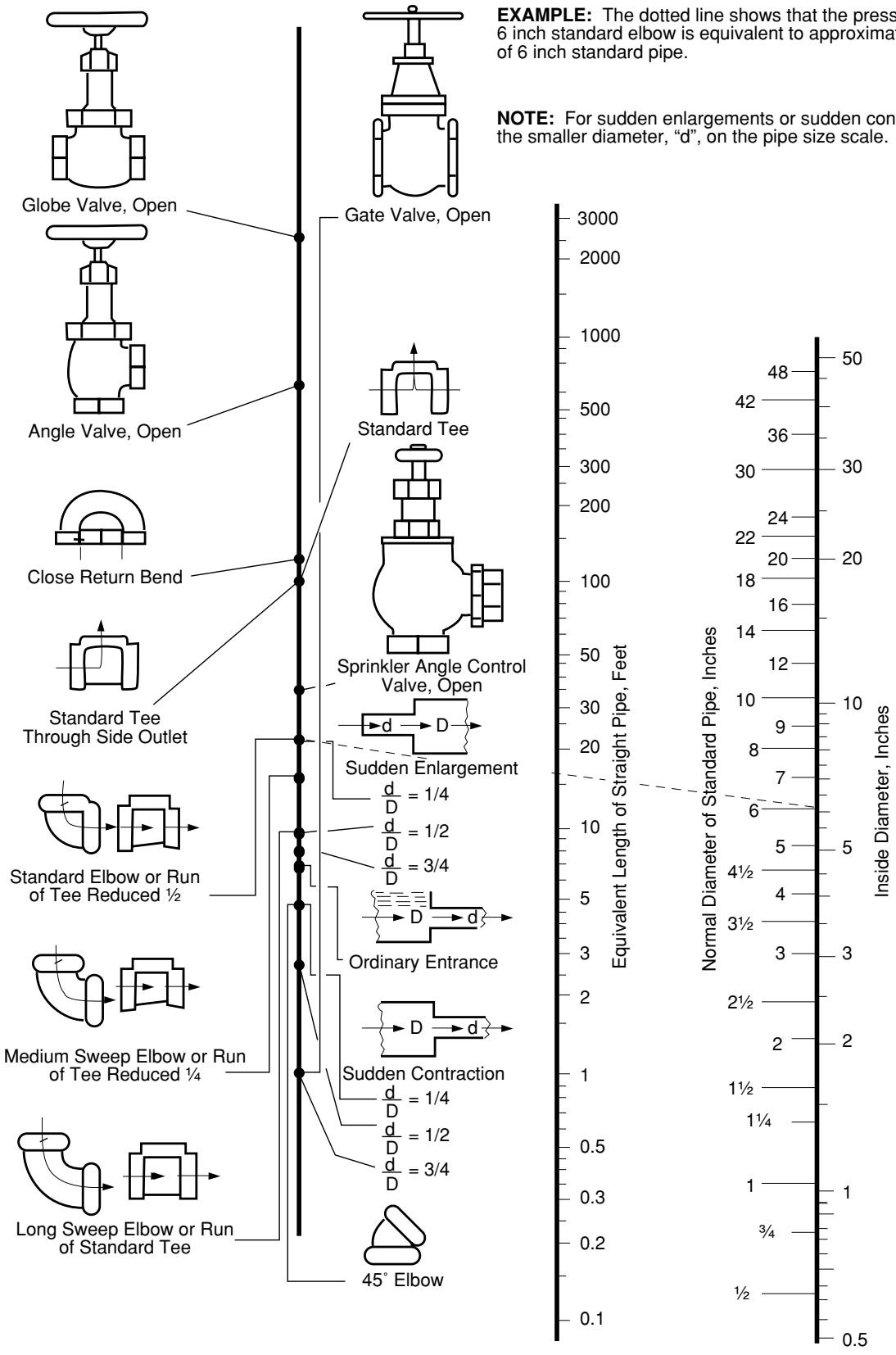
	Valve Size							Valve Size						
FLOW GPM	½"	¾"	1"	1¼"	1½"	2"		FLOW GPM	1¼"	1½"	2"	2½"	3"	4"
2	0.2							46	2.1	1.1	0.4			
3	0.5							48	2.2	1.2	0.5			
6	1.0	0.3						50	2.4	1.3	0.5			
8	1.7	0.5						55	2.9	1.5	0.6			
10	2.6	0.8	0.3					60	3.4	1.8	0.7			
12	3.6	1.1	0.5					65	3.9	2.0	0.8			
14	4.8	1.5	0.6					70	4.5	2.4	0.9	0.4		
16		2.0	0.9					75		2.7	1.0	0.5		
18		2.4	1.0					80		3.0	1.2	0.6		
20		3.0	1.2	0.4				90		3.7	1.5	0.7		
22		3.5	1.4	0.5				100		4.6	1.8	0.9	0.4	
24		4.1	1.7	0.6				120			2.5	1.2	0.5	
26		4.8	2.0	0.7	0.4			140			3.3	1.6	0.7	
28			2.2	0.8	0.5			160			4.3	2.1	0.9	0.3
30			2.5	0.9	0.5			180			5.3	2.6	1.1	0.4
32			2.9	1.1	0.6			200			6.5	3.1	1.4	0.5
34			3.2	1.2	0.6			250				4.7	2.1	0.7
36			3.6	1.3	0.7			300				6.6	2.9	1.0
38			3.9	1.5	0.8			350					3.8	1.3
40			4.3	1.6	0.8	0.3		400					4.9	1.7
42			4.7	1.7	0.9	0.3		450						2.1
44				1.9	1.0	0.4		500						2.6

Pressure Losses Through Copper and Bronze Fittings

Equivalent Feet of Straight Tubing

	Wrought Copper					Cast Bronze					
Nominal Tube Size	90° Elbow	45° Elbow	Tee Run	Tee Side Outlet	90° Bend	180° Bend	90° Elbow	45° Elbow	Tee Run	Tee Side Outlet	Compression Stop
⅜	0.5	0.5	0.5	1	0.5	½	1	0.5	0.5	2	9
½	0.5	0.5	0.5	1	0.5	1	1	1	0.5	2	13
⅝	0.5	0.5	0.5	2	1	1	2	1	0.5	3	17
¾	1	0.5	0.5	2	1	2	2	1	0.5	3	21
1	1	1	0.5	3	2	2	4	2	0.5	5	30
1¼	2	1	0.5	4	2	3	5	2	1	7	-
1½	2	2	1	5	2	4	8	3	1	9	-
2	2	2	1	7	3	8	11	5	2	12	-
2½	2	3	2	9	4	16	14	8	2	16	-
3	3	4	-	-	5	20	18	11	2	20	-
3½	4	-	-	-	7	24	24	14	2	31	-
4	-	-	-	-	8	28	28	17	2	37	-
5	-	-	-	-	10	37	41	22	2	48	-
6	-	-	-	-	13	47	52	28	2	61	-

Pressure Losses in Valves and Fittings



EXAMPLE: The dotted line shows that the pressure loss in a 6 inch standard elbow is equivalent to approximately 16 feet of 6 inch standard pipe.

NOTE: For sudden enlargements or sudden contractions, use the smaller diameter, “d”, on the pipe size scale.

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