

Friction Factors & Calculation for Various Materials

<u>Material</u>	<u>C factor</u>
New Steel	130-140
Old Steel	90-100
PVC & CPVC	140-150
Cast Iron;	
New, unlined	130
10 yrs old	107-113
20 yrs old	89-100
30 yrs old	75-90
40 yrs old	64-83
Concrete lined	120-140

$$f = 0.2083 * (100/C)^{1.852} * (Q^{1.852}/Di^{4.8655})$$

Where;

f = ft/100 ft loss for water

C = Hazen-Williams C factor

Q = flowrate in GPM

Di = pipe ID in inches

Ref - Hydraulic Institute, Pipe Friction Manual

$$V = Q/Di^2 * 0.4085$$

Where;

V = velocity in ft/sec