Determination of Pressure Drop in the Line

Velocity: $v = .409 \frac{Q}{d^2} = .0509 \frac{W}{pd^2} = \frac{q}{.785d^2}$

Reynold's Number: $Re = 124 \frac{dvp}{\mu} = 6.31 \frac{W}{d\mu} = 378 \frac{qp}{d\mu}$

Pressure Drop, Isothermal, Incompressible Flow (Liquids):

$\Delta P = .001\ 294 \frac{fL\ p\ v^2}{d} = .000\ 00336 \frac{fLW^2}{pd^5} = .0121 \frac{fL\ q^2}{d^5}$

Pressure Drop, Isothermal, Compressible, Long Lines (Gases and Vapors):

$$\frac{\Delta P}{P1} = 1 - \sqrt{1 - \frac{fLp\ 1\ v1^2}{12\ g\ d\ P_1}}$$

Symbols and Units for Listed Formulas

d = inside diameter of hose, inches

f = friction coefficient, dimensionless

g = gravitational constant, 32.2 ft./sec.^{2}

P1 = input pressure, PSI

ΔP = pressure difference, PSI

q = rate of flow at flowing condition, cu. ft./min.

Q = rate of flow, gals./min.

Re = Reynolds number, dimensionless

v = flow velocity, ft./sec.

W = rate of flow, lbs./hr.

p = weight density of fluid, lbs./cu. ft.

μ = absolute (dynamic) viscosity, centipoises