

Commonly Used Formula in Hydraulics

Darcy Weisbach formula

Darcy Weisbach formula which is valid for laminar or turbulent flow in all fluids is one of the most commonly used formula for determining the head loss.

$$h_f = [fLV^2]/2Gd$$

where

h_f = head loss due to friction, ft (m)

f = friction factor

L = length of pipe, ft (m)

D = diameter of pipe, ft (m)

V = velocity of fluid, ft/s (m/s)

g = acceleration due to gravity, 32.2 ft/s² (9.81 m/s²)

Chezy Formula

This Equation holds good for head loss in conduits and gives good results for high Reynolds numbers:

$$V = C(RS)^{1/2}$$

where

V = velocity, ft/s (m/s)

C = coefficient depending on surface roughness of conduit

S = slope of energy grade line or head loss due to friction of conduit

R = hydraulic radius, ft (m)

Generally R = Area/wetted perimeter

Manning's Formula

According to this

$$C=1.486R^{1/6}/n$$

where

n=coefficient depending on surface roughness. Now with this value of $R=D/4$ we can calculate V and Q.

Hazen Williams Formula

This is one of the most widely used formula and is given below:

$$V=1.318C_1R^{0.63}S^{0.54}$$

R= hydraulic radius, ft (m)

S= head loss due to friction, ft/ft (m/m) of pipe

D= diameter of pipe, ft (m)

L= length of pipe, ft (m)

Q= discharge, ft³/s (m³/s)

hf =friction loss, ft (m)

Source: <http://www.engineeringcivil.com/commonly-used-formula-in-hydraulics.html>