Flow Data - Water Through Hose

Chart No.1 | 1/4" through 1" I.D. Hose

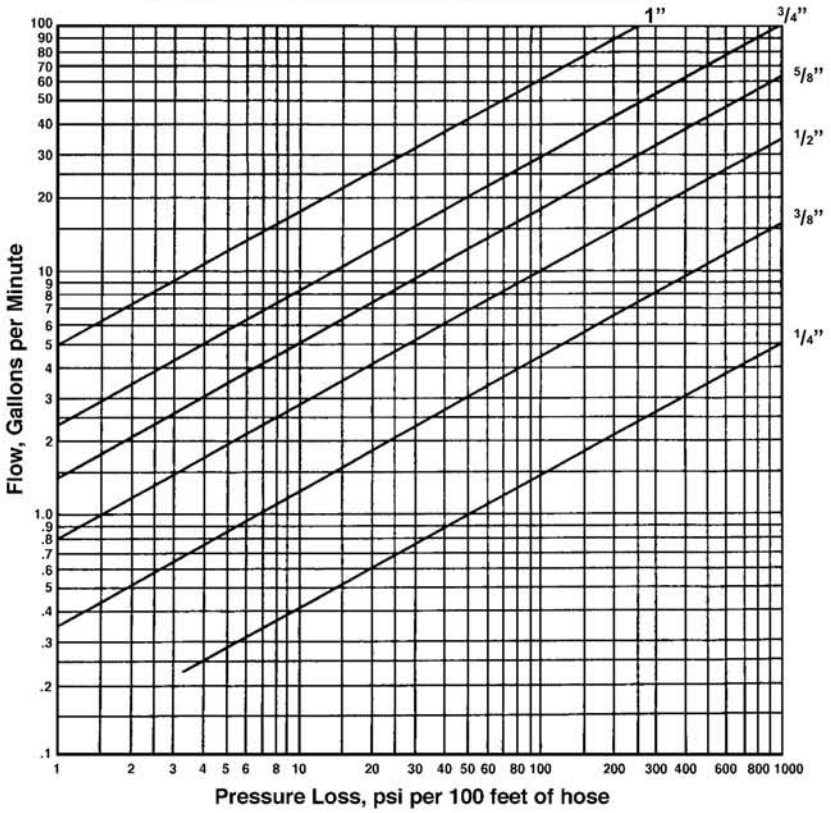
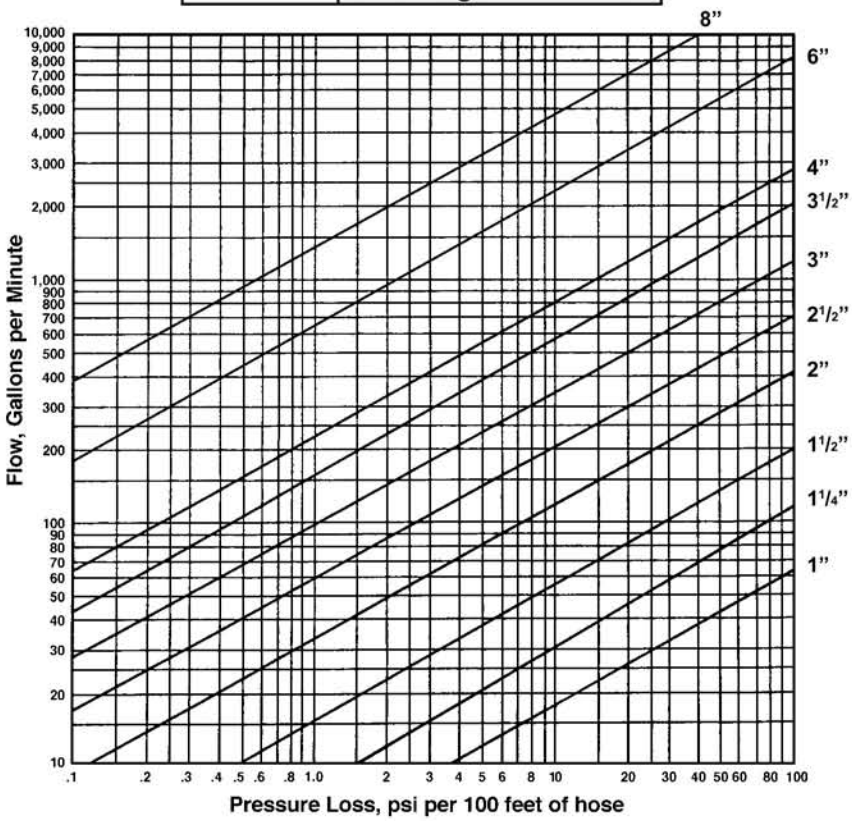


Chart No.2 | 1" through 8" I.D. Hose



Pressure Loss Based on Water @ 68° F.

The flow charts for water show pressure loss for a hose length of 100' **(without couplings)** at various flow rates (gallons per minute). Pressure loss is proportionate to length. The loss shown for 200 feet will be twice that of the 100' shown on the chart. The loss for a 50' length will be one-half that for 100' (assuming a constant flow rate).

Water pressure expressed as feet of head (height of a column, or difference in elevation) can be converted to psi by multiplying by .43.

Couplings of the insert type, attached with bands or clamps are restrictive. Pressure loss resulting from use of these couplings is approximately equal to 5% of the loss through 100' of hose.

Water Flow - Open-End Discharge

When a hose conveying a fluid discharges to the atmosphere, the service is referred to as open-end discharge. Since one end is open, many users mistakenly assume that the pressure is low throughout the length of the hose. This is not always true. The pressure at the inlet will be equal to the pressure in the line to which the hose is connected unless the flow rate is so low that the hose is not completely filled. The principal characteristics of open-end discharge(flow), assuming hose is completely filled with liquid are:

- The pressure in the hose (regardless of length) varies from a maximum at the inlet, to zero at the outlet.
- The pressure loss at any given point in the hose is nearly proportional to the distance from the hose inlet.
- The discharge rate will vary with hose length (for a given inlet pressure).

Conditions that must be known are:

- Inlet pressure, PSI
- Hose inside diameter, inches
- Hose length, feet

The Fluid Flow Charts on this page contain information on pressure loss for water, as related to flow and hose diameter. If you know the flow rate and diameter, the pressure loss for 100' of hose can be read directly from the chart. If, however, you need flow rates, rather than pressure loss, or have lengths other than 100', you cannot read the charts directly. By using the above facts about fluid flow, you can make some simple calculations that will allow you to use these charts. The calculations are based on having a hose of uniform diameter and open-end discharge.

An illustration will show the principles. See Chart No. 1

Example: A 5/8" inside diameter x 100' of hose is coupled to a house faucet which maintains a pressure of 40 PSI. Determine flow rate.

Solution: Enter Chart No. 1 at 40 psi on the bottom scale. Move vertically to the 5/8" diameter line, and then left to the vertical flow rate scale. Read 11 gallons per minute (approximate).

Now assume that the conditions are the same, except the hose is 200' long. Pressure loss remains at 40 psi, but flow rate will decase. You cannot read flow rate directly because the chart is based on 100'. Since the pressure at a given point is proportional to distance from inlet, the pressure at the hose midpoint (100' from faucet is 1/2 the inlet pressure).

$$\frac{100'}{200' \times 40 \text{ psi}} = 20 \text{ psi (for 100 feet)}$$

Entering Chart No. 1 at 20 psi, move vertically to the 5/8" inside diameter line, left to the flow rate scale and read 7.5 gallons per minute (approximate).

Suppose now that conditions are the same, but the hose is 50' long. Pressure loss will remain at 40 psi, but flow rate will increase. Here again, you cannot read flow directly because the chart is based on 100' of hose. By proportion, if the pressure loss in 50' of hose is 40 psi, pressure loss through 100' at the same flow rate would be:

$$\frac{100'}{50' \times 40 \text{ psi}} = 80 \text{ psi (for 100 feet)}$$

Entering Chart No. 1 at 80 psi, move vertically to the 5/8" diameter line, left to the flow rate scale, and read 16 gallons per minute (approximate).