



Steam Pipe Sizing

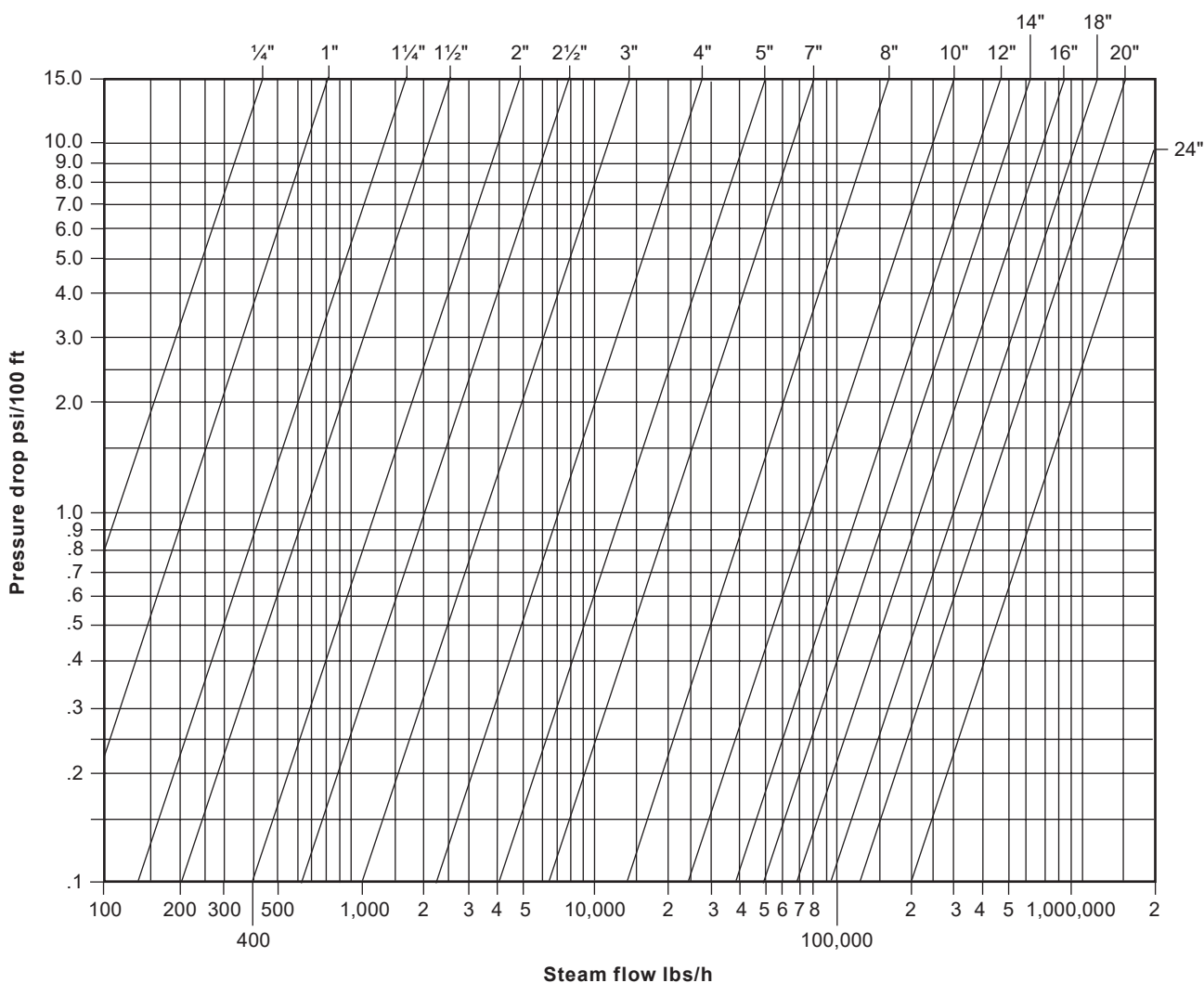
Sizing for Pressure Drop per 100 ft. in Schedule 40 Pipe

Divide "Allowable Drop" by pressure factor and use chart to select pipe size.

Based on 100 psi g saturated steam

For other pressures, multiply chart ØP by factor below

psi g	0	2	5	10	15	20	30	40	60	75	90	100	110	125	150	175	200	225	250	300	350	400	500	600
factor	6.9	6.0	5.2	4.3	3.6	3.1	2.4	2.0	1.5	1.3	1.1	1.0	0.92	0.83	0.70	0.62	0.55	0.49	0.45	0.38	0.33	0.29	0.23	0.19



How to Size Steam Pipes for Various Pressure and Velocity Conditions

To select pipe size in long mains and wherever supply pressure is critical, use the pressure drop chart to assure it is within allowable limits. Most saturated steam lines may be sized for a velocity of 4800 to 7200 ft/min; higher velocities should be avoided unless appreciable superheat is present.

Piping at pressure reducing stations should be sized for the same velocity on both sides of the PRV. This generally results in a valve smaller than the supply piping with still larger downstream pressure piping due to the increase in steam volume (see example below.)

Trap discharge piping contains a bi-phase flash steam/condensate mixture, and a lower velocity of 4000 to 6000 ft/min to the receiver encourages gravity separation. The receiver vent line is sized for the amount of flash vented at atmospheric pressure at a velocity of 3000 to 4000 ft/min.

Velocity Chart Example

Given a steam heating piping system with a 100 psi g inlet pressure ahead of a control valve with a capacity of 1,000 lb/h of steam reduced to 25 psi g, find the smallest sizes of upstream and downstream piping for reasonable quiet steam velocities.

Upstream Pressure Piping Sizing

Enter the velocity chart above at A for steam flow of 1,000 lb/h. Go over to point B where the 100 psi g diagonal line intersects. Follow up vertically to C where an intersection with a diagonal line falls inside the 4,000-to-6,000 ft/min velocity band. Actual velocity at D is about 4,800 ft/min for 1-½" upstream piping. Selecting a smaller pipe size results in greater steam velocity and noise level.

Downstream Piping Sizing

Enter the velocity chart at A for 1,000 lb/h. Go over to point E where the 25 psi g diagonal line intersects. Follow up vertically to F where an intersection with a diagonal line falls inside the 4,000-to-6,000 ft/min velocity band. Actual velocity at G is 5,500 ft/min for 2-½" downstream piping.

Formula for Velocity of Steam in Pipes:

$$V = \frac{2.4Q V_s}{A}$$

Where:

V = Velocity in ft/min

Q = Flow lb/h steam

V_s = Sp. Vol. in cu. ft³/lb at the flowing pressure

A = Internal area of the pipe — in²

Steam velocity chart

