Steam Sizing Chart

Determining the value Cv

Cv calculation is an interactive process requiring knowledge of valve dynamics, piping geometry factors, and outlet velocities. In practice, this sizing chart is based on emperical values and will cater for most applications.

How to use the chart

Example 1 - To find Cv value for critical flow application.

Steam demand	1500 lb/hr
Upstream pressure	55 psi gauge
	70 psi absolute

Refer to selection chart opposite.

1) Draw 1500 lb/hr flow line (A-B)

2) Draw a horizontal line from 70 psi absolute to critical pressure drop line (C-D). At this intersection drop a vertical line.

3) At the crossing point of these two lines, read off the Cv value required, i.e. Cv 13

4) Select valve size required from the appropriate valve type technical information sheet.

Example 2 - To find Cv value for non critical flow application

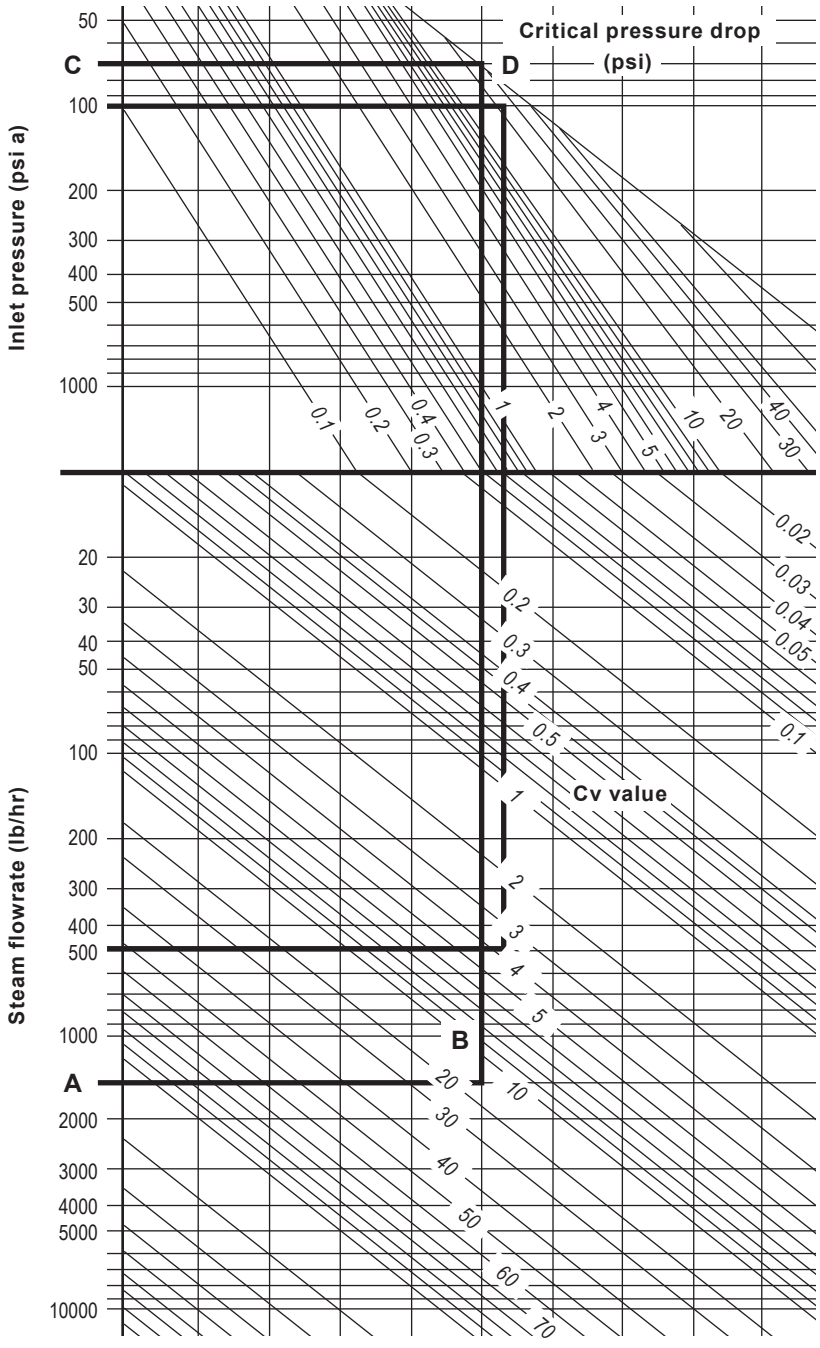
Steam demand	500 lb/hr
Upstream pressure	85 psi gauge
	100 psi absolute
Downstream pressure	65 psi gauge
	85 psi absolute

1) Draw 500 lb/hr flow line.

2) Draw a horizontal line from 100 psi absolute. At the intersection with 20 psi pressure drop, draw a vertical line.

3) At the crossing point with the 500 lb/hr horizontal line read off the Cv value required, i.e. Cv 3.8

4) Select valve size required from the appropriate valve type technical information sheet.



This chart is for example only.
A complete chart for sizing is on page 3.

How to use the formula

Proceed by calculating the required Cv from given flow data, having prior determined whether the flow is critical or sub-critical.

The following equations have been adapted from the ISA S75.01 standard to allow for practical everyday use without significant sacrifice in accuracy.

For steam service

Subcritical flow	Critical flow
When ΔP is less than .81 (P1/2)	When ΔP is greater than .81 (P1/2)

For saturated steam

Subcritical flow	Critical flow
$Cv = \frac{w}{\sqrt{2.1 \quad \Delta P\,(P_1+P_2)}}$	$Cv = \frac{w}{\sqrt{1.647\,(P_1)}}$

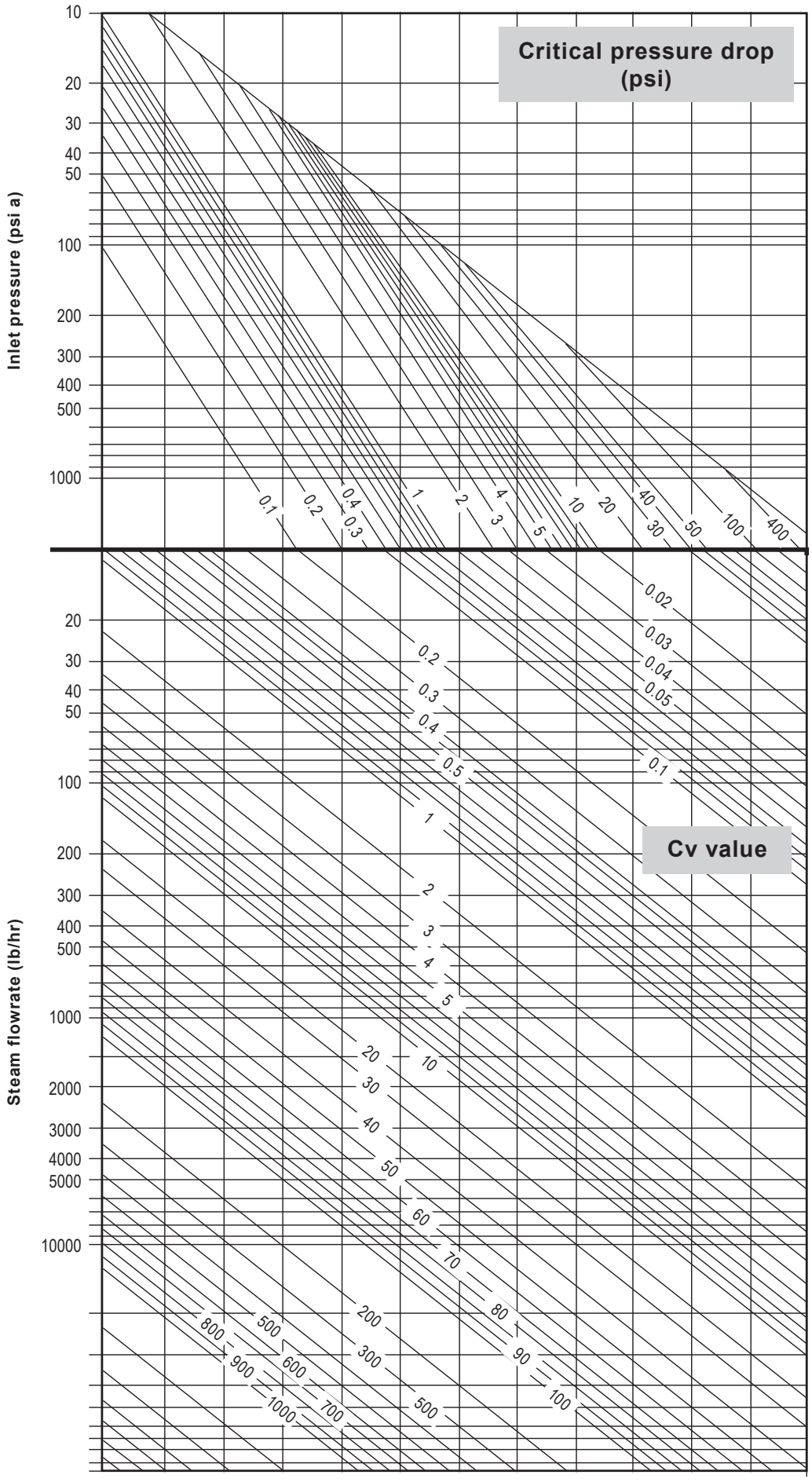
Cv = Valve coefficient

P_1 = Upstream pressure, psi a

P_2 = Downstream pressure, psi a

ΔP = Pressure drop $P_1 - P_2$, psi a

w = Flowrate, lb/h


Critical pressure drop (psi)
Inlet pressure (psi a)
10
20
30
40
50
100
200
300
400
500
1000
0.1
0.2
0.4
0.3
1
2
4
3
5
10
20
40
30
50
100
400
Cv value
Steam flowrate (lb/hr)
20
30
40
50
100
200
300
400
500
1000
2000
3000
4000
5000
10000
0.02
0.03
0.04
0.05
0.2
0.3
0.4
0.5
0.1
1
2
3
4
5
20
10
30
40
50
60
70
80
90
100
200
300
500
800
500
900
600
1000
700