The chart below specifies the equivalent Coefficients of Discharge for our products which were capacity certified by the National Board of Boiler and Pressure Vessel Inspectors using the slope method.

These equivalent Coefficients of Discharge (Kd) may be used in capacity sizing equations similar to those found in API RP 520, and ASME Boiler and Pressure Vessel Code, Section VIII.

These equivalent Kd's were derived algebraically by substituting the capacities obtained from slope method calculations into the Kd equations and solving for Kd. Please note that the ball seated valves are low-lift and low-flow valves. The critical area for these valves is not the diameter of the orifice, but rather is a function of the lift of the ball off the seat which creates an annular area called the curtain area. This is to say that the Kd for a ball seated valve is very low when compared to a full-lift disk seated valve.

Note also that for the Section B & C valves on liquid service, and the Section E brass valves for both air/gas and liquid, these valves are not capacity certified by the National board. The values listed were derived by the Hydroseal Engineering department using actual performance test data.

Orifice	Kd gas	Kd liquid
Catalog Section B		
AV/DV 1/4" orifice	NA	.1072
BV/EV 3/8" orifice	.3360	.0715
CRV/FRV 1/2" orifice	.3083	.1273
CXV/FXV 9/16" orifice	.2525	.1483
Catalog Section C		
ARV 1/2" orifice	.3083	.1273
AXV 9/16" orifice	.2525	.1483
BV 3/4" orifice	.3983	.1313
CRV 1" soft seat orifice	.2147	.1475
CV 1" orifice	.2175	.1475
Catalog Section D (old section E)		
FT 5/8" orifice	.871	.725
HC 1" orifice	.877	.877
Catalog Section E (brass)		
A	.1622	.1430
B	.1051	.0965
C	.1445	.1019
D	.1427	.1033
E	.1389	.1013
F	.1180	.0731
G	.1490	.0698
H	.1310	.0654

By using the above Kd values and the actual orifice area for the valves, you can derive the correct capacity of flow.

For example, to find the capacity of air through a 1/2" orifice valve at 100 psig opening pressure (P), the following formula applies:

$$Q_{scfm} = 18.331 * A * (1.1 * P + 14.7) * K_d$$

Substituting:

$$Q_{scfm} = 18.331 * .1964 * (1.1 * 100 + 14.7) * .3083 = 138.4$$

Checking with the slope method:

$$Q_{scfm} = 1.11 * (1.1 * 100 + 14.7) = 138.4$$

For water applications, use the following formula:

$$Q_{gpm} = 38.0 * A * K_D * \sqrt{P}$$

Where P = either 1.1 * Set pressure (psig) or 1.25 * Set pressure (psig)

Use 1.1 * Pset for FT, HC valves and 1.25 * Pset for all other valve types. (This formula assumes that there is no back pressure.)

For example, to find the capacity of water through a 1/2" orifice valve at 100 psig opening pressure (P), the following applies:

$$Q_{gpm} = 38.0 * A * K_D * \sqrt{P}$$

$$Q_{gpm} = 38.0 * .1964 * .1273 * \sqrt{1.25 * 100}$$

Q = 10.62 gpm

Checking with the flow factor method:

$$Q_{gpm} = F\sqrt{1.25P}$$

$$Q_{gpm} = 0.95\sqrt{1.25 * 100}$$

Q = 10.62 gpm