Neon Controls

Finding the right size regulator for your application

When trying to select the correct pressure regulator for an application, one of the most important considerations is sizing the Cv [Flow Coefficient] of the regulator.

Formulae that will enable you to determine what flow rate you can get for a given Cv value or what minimum Cv you require to insure delivery of a given flow rate are available from a number of different sources. They are provided as an appendix to this document.

Neon Controls provides an Excel Spreadsheet that does all of these calculations for you with the appropriate inputs. In addition, we calculate an adjusted value after applying an appropriate safety factor for our regulators. To use the calculator select the formula desired either from the home page and using the available hyperlink or by selecting the desired tab at the bottom of the worksheets.

Simply fill in the highlighted yellow boxes with the requested values. For specific gravity you can either input the value directly or select from a drop down list common gases or liquids and their specific gravity value will be used.

Values are entered in common PSIG or °F values for pressure and temperature.

The formulae are calculated, adjusted for safety factor, and calculated in metric units as well.

Cv options for the 10, 15 and 85 series regulators are 0.03, 0.07, 0.24, and 0.30.

When working with the 85 series – remember that you are working in essence with two single stage regulators in series. The output of the first stage is typically set at 150 PSI above the nominal range of the second stage. In other words for a 100 PSI series 85, the inlet to the second stage is 250 PSI – NOT THE FULL BOTTLE PRESSURE.

We hope that you find this information helpful, but please call us at 1-909-590-0408 or contact at sales@neoncontrols.com if you have any questions. Our trained and helpful staff look forward to any opportunity to be of service.

Formula to find flow rate for a gas when $\Delta P < .5P_1$

$$Q^1 = 16.03\ Cv \sqrt{\frac{\Delta P\ (P_1\ +\ P_{2)}}{T\ \ S_g}}$$

Formula to find flow rate for a gas when $\Delta P \geq .5P_1$ [Sonic Flow]

$$Q^1 = \frac{13.9\ P_1\ C_v}{\sqrt{S_g\ T}}$$

Formula to find flow rate for liquid

$$Q = C_v \sqrt{\frac{\Delta P}{S}}$$

Formula to find Flow Coefficient for a gas when $\Delta P < .5P_1$

$$C_v = \frac{Q^1\ \sqrt{Sg}}{\sqrt{P_2\ \Delta P}}$$

Formula to find Flow Coefficient when gas is $\Delta P \geq .5P_1$ [Sonic Flow]

$$C_v\ \frac{= Q^1\ \sqrt{G}}{P_1\ /2}$$

Formula to fine Flow Coefficient for liquid

$$C_V = \frac{Q}{\sqrt{\Delta P/S}}$$

Where:

C_v = Flow Coefficient
P_1 = Inlet Pressure – PSIA
P_2 = Outlet Pressure - PSIA
ΔP = Pressure Drop in PSI
Q = Liquid flow in GPM
Q^1 = Gas flow in SCFM at STP
S = Specific Gravity of Liquid relative to water at 60°F
S_g = Specific Gravity of gas relative to air
T = Absolute inlet temperature in degrees Rankine