



# TECH TIP #40

## DEFINITION OF THE TERM "Cv"

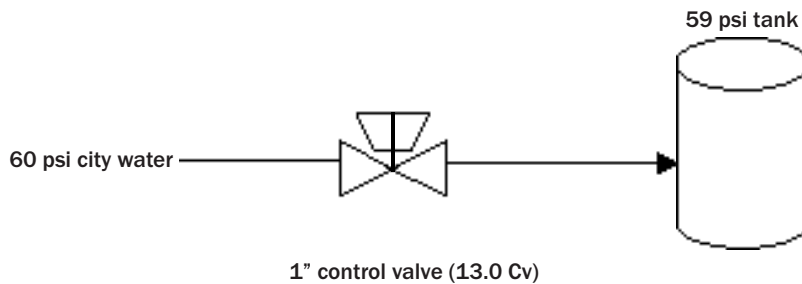
Now here is a term that strikes fear into the heart of experienced HVAC technicians and distributors alike. Let's see if we can help unbundle what it means.

The flow coefficient, or Cv, is a universal capacity index and is simply defined as "the number of US gallons of water per minute at 60F that will flow through a valve with a pressure drop of one psi.

Sometimes "pressure drop" is described as pressure differential or "delta P". Still confused..... well a picture is worth a thousand words, right? Here's the simplest of applications that I think will make the light come on.

APPLICATION: How many gpm will a 1" control valve pass?

- Valve mfg says the control valve has a Cv of 13.0
- City water pressure is 60 psi
- Water is filling a tank that is held at a constant 59 psi



Using the above definition of Cv, this valve will flow 13 gpm because of 1 psi difference between the inlet pressure and outlet pressure of the solenoid valve...1# pressure differential, so the Cv is 13. Now let's change the tank to an open tank with 0 psi. The simplified formula for calculating GPM when you know the Cv of the valve and the delta P is:

$$GPM = Cv \times (\text{square root of the pressure drop})$$

Yuck....I knew I should have paid attention in algebra class! Anyway, the solution is:

- 60# inlet - 0# outlet (remember tank pressure is 0#) = 60# pressure drop
- square root of 60 = 7.75 (remember 7.75 x 7.75 = 60)

$$GPM = 13 \times 7.75 \dots\dots\dots GPM = 100$$

The answer is this 1" valve will flow 100 gpm (provided the piping is large enough to get 100 gpm to the valve inlet at 60 psi delivery pressure, in this instance the piping would need to be 2-1/2") CAUTION: Other issues come into play, such as valve cavitation, minimum/maximum pressure differentials.....consult us to determine valve/piping sizes unless you have had plenty of experience selecting control valves, you can benefit from our 90+ years of selecting the proper control valves.

Cowabunga, now you can begin to see the importance of knowing what the pressure drop, Cv required and a few other parameters are before we can help you size a valve correctly. Undersized valves will cause a problem, but oversizing valves (such as just using a 3" valve on a 3" line) can cause ever more problems; such as premature valve wear, poor control, noise, etc.

ADVANCED TECHIP.....Want to learn more about this subject? Read the TECHTIPS on control valve sizing to see all the criteria that need to be looked at when selecting a control valve. Contact us to request ASCO's sizing guide or Honeywell's control valve sizing booklet. Let us walk you through a valve selection or two to help you get the hang of it. You may want to sign up for some of the training classes we offer throughout the year to get a better understanding of valve sizing & selection principles.