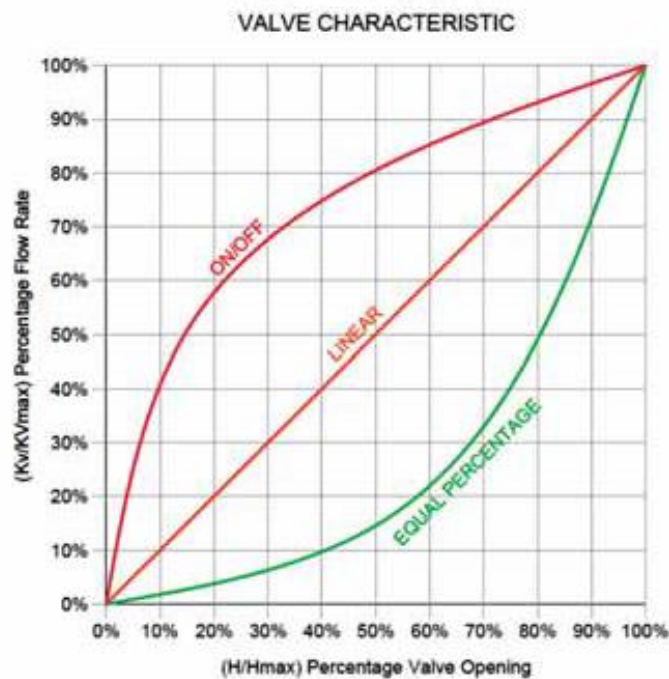


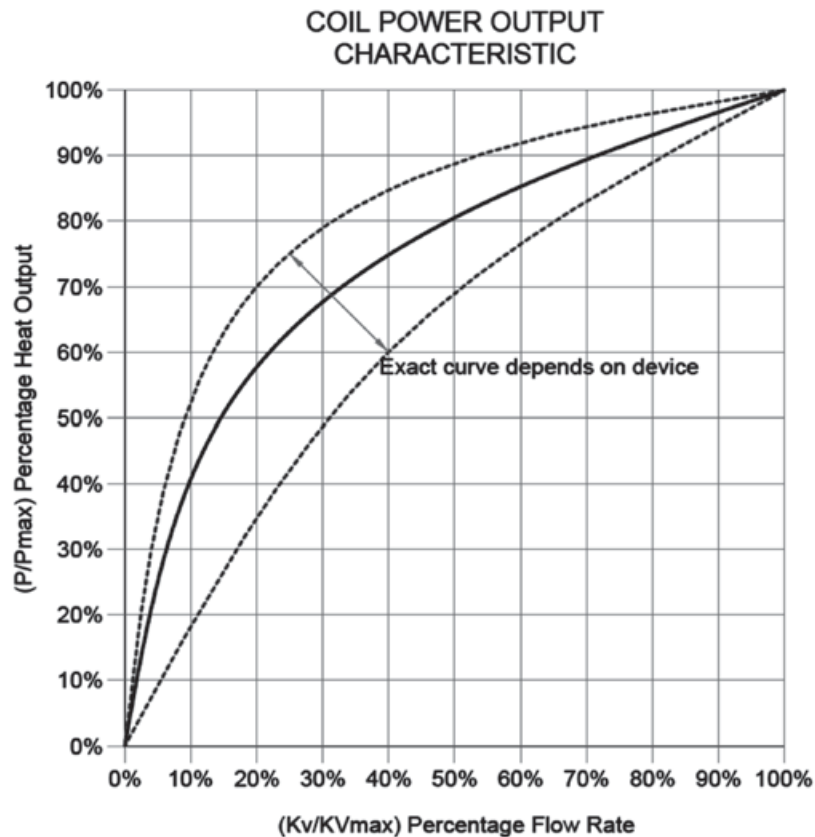
Valve's Characteristic

A valve's "characteristic" is the relationship between the flow through the valve relative to its degree of closure. The valve characteristic is a feature of the design of either the valve itself, or the valve and actuator combination. Typical valve control characteristics are described as on/off (quick acting), linear and equal percentage. These are illustrated graphically in the following figure.



Different valve characteristics: equal percentage, linear and on/off

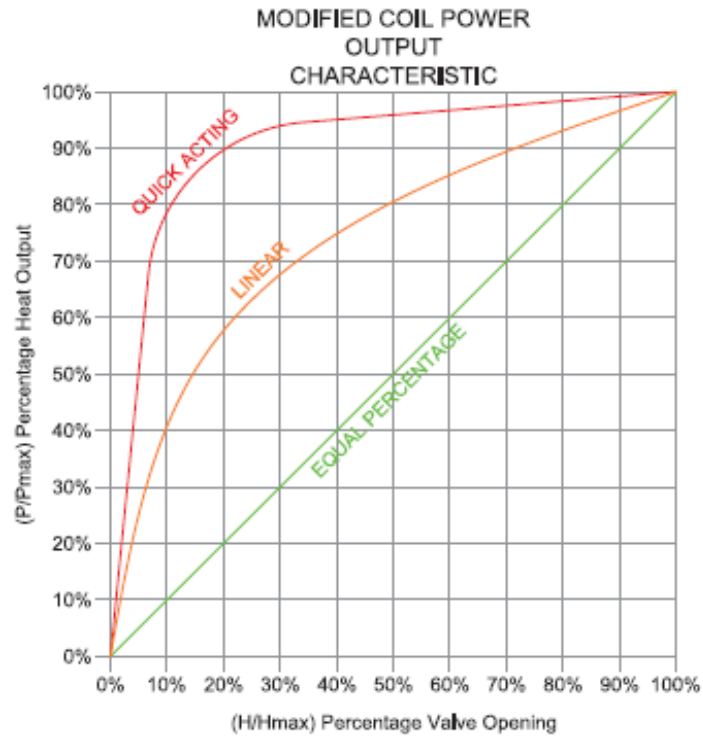
For "forced convection" coils where a fan blows air across the coils, the best solution is an equal percentage characteristic. This is because for these types of coil the heating or cooling output gradually stabilizes as water flow increases until a point is reached where the output becomes unresponsive to further increases in flow. This is illustrated in the following figure. For "passive convection" coils where air is naturally drawn across the coil, characterization is less critical and the level of control will not be improved by fitting an equal percentage control valve. For devices where the power output characteristic is quite linear, such as a plate heat exchanger, a linear control characteristic may be appropriate.



Percentage heat output against percentage flow rate (A.K.A coil power output characteristic)

In order to achieve good modulating control of the sensible heating or cooling output from the coil, the control valve needs a characteristic that mirrors the performance of the coil. It can be seen that the equal percentage characteristic does this. Equal percentage valve characteristics are so called because as the valve opens, for each percentage increment in valve travel, the flow increases by an equal percentage. Hence, they produce small changes in flow when the valve is nearly closed, and large changes in flow when the valve is nearly open.

The next figure shows the way that the heat transfer characteristic of the heating or cooling coil is modified by various control valve characteristics. It can be seen that an equal percentage characteristic gives the best control with each change in heat transfer being equal to each change in valve opening.



Modified coil power output characteristic using three different control valve characteristics: equal percentage, linear and quick acting (on/off)

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