



INDUSTRIES LIMITED

HVAC Tech Note #25 – April 2005

Rangeability & Turndown Ratio

Modulating control valves have an operating characteristic called ‘rangeability factor’. The rangeability factor of a control valve is the ratio of the maximum flow to the minimum controllable flow. This characteristic is measured under laboratory conditions with a constant differential applied to the valve only. A rangeability factor of 10:1 indicates that the valve alone can control to a minimum flow of 10%.

The installed ability of the same valve to control to low flows is the ‘turndown ratio’, calculated by multiplying the rangeability factor times the square root of the valve authority. Hence, a valve that has decent rangeability but poor authority will not have good capability to control down to low flows, and may only be able to provide ‘on-off’ control over a good part of its flow range.

Many globe style HVAC control valves do not have high rangeability factors; a major manufacturer lists values from 6.5:1 to 25:1 for their range of globe valves from ½” to 6”. Most characterized ball control valves, however, have very high rangeability factor (usually >150:1), making them a better choice for some HVAC modulating control applications.

Axiom Industries Ltd. – Specialty Products for Hydronic Systems