



INDUSTRIES LIMITED

HVAC Tech Note #15 – April 2004

Water Velocity and Heat Transfer

In terminal units like wallfin element and coils that have finned tubes, the effect of water velocity on heat transfer is minimal. According to the 2000 ASHRAE Systems Handbook (page 32.4) the heat output of finned-tube element varies little over the range of 0.5 to 3.0 fps (in a ¾" copper element, 3.0 fps is about 4.5 USgpm). They go on to say, however, that at velocities below this range, output is difficult to predict accurately and that small changes in actual flow have a significant effect on output. The minimum recommended tube water velocities in the same handbook for heating coils is 0.5 fps (page 23.4) and for chilled water coils 1.0 fps (page 21.6).

Problems can arise in terminal units that have low design water velocities that are further reduced by modulating control valves. A 'hair-trigger' response can result at low loads when minor changes in flow, either because of a load change or a change in delta P across the branch, cause dramatic changes in the terminal output.

It's a good idea to be aware of how low the water velocity might actually have to be in any terminal unit that has variable flow.

Axiom Industries Ltd. – Specialty Products for Hydronic Systems