water tempering Myths

Myth #1

A Manufacturer's Stated Minimum Flow Implies Safe Temperature Control (at that Flow)

How Low Can You Go?

All tempering valve manufacturers state a "minimum flow" value for their individual valves and manifolded systems, expressed in gallons per minute (gpm) or the metric counterpart, liters per minute (lpm). Often times, this "number" is used to evaluate valve performance and specification worthiness.

These stated values are typically very low (0.5 – 2.0 gpm) and imply temperature control and bather safety but do they really deliver on that promise? A critical question that must be asked is, *"What do these numbers truly represent and how do they relate to the two critical performance standards – ASSE 1016 and ASSE 1017"?*

Before we tackle that question, we first need to understand the basic operation of tempering valves and their relation to water flow. At the heart of every tempering valve is an element (of varying types) that is responsible for sensing temperature / pressure and reacting to changes in order to maintain safe, blended water to the user. All elements perform best under high flow conditions because greater amounts of water improve thermal transfer (by maximizing surface contact) and thus allow the element and it's thermal mechanism to respond more quickly.

The primary issue with safe temperature control is found at low flows when there is a reduced amount of water to surround and actuate the element. This is a greater issue with larger size elements (and valves) because larger surface areas and smaller volumes of water slow the thermal transfer process. The problem is exaggerated further when slower reacting and less powerful technologies (coils and liquid filled) are utilized. Simply put, less flow usually equates to less control.

So, the next time you see a minimum flow value, the first question you should ask is**, "*control temperature at that flow when tested to the appropriate standard*"?** Any valve can simply "pass" a low volume of water. The key is controlling temperature at low or minimum flows when there is a disturbance to the system (as designated in the applicable performance standard – ASSE 1016 or ASSE 1017).

ASSE and Minimum Flow

At what minimum flow does ASSE 1016 test for temperature control?

Answer: 2.5 gpm. ASSE 1016 is a bath and shower standard that has been adopted by other devices such as those that control water to lavatories. Because showerheads are regulated to 2.5 gpm, the lowest flow required to pass ASSE 1016 is 2.5 gpm. More specifically, a compliant valve must hold ±3°F when subjected to pressure *(types T/P, T & P)* and temperature changes *(types T/P and T).*

Powers new e480 controls to ASSE 1016 - Type T/P down to 0.5 gpm!

If you're below 2.5 gpm, you're relying on the manufacturers' word or implication their valve(s) hold ±3°F when subjected to temperature and pressure changes. Just because a valve is ASSE listed or compliant and has a minimum flow below 2.5 gpm, don't assume it meets the temperature control criteria of the standard. The key question - ask the manufacture how their valve performs (±3, ±5, ±10, ±20F, ± ??) when tested according to 1016 at 0.5 gpm or 1.0 gpm. They should state this in writing and back-up with data.

This is particularly critical for lavatory tempering applications with single or multiple low flow outlets. As we know, lavatories in public rest rooms and schools are often outfitted with 0.5 gpm aerators. Remember, an ASSE 1016 listed valve only insures control to 2.5 gpm. Anything less can result in dramatic changes to outlet temperature if pressure or temperature changes occur.

What about minimum flow and ASSE 1017 (for distribution valves)?

Manufacturers are finally being held more accountable!

Because ASSE 1017 valves come in a wide range of sizes and flow capacities there is no "one size fits all" formula for performance. The capacity / control tradeoff, (i.e. larger valves typically require larger elements that are less effective at lower flows) allows for more generous minimum flow and temperature control requirements as valve capacity increases. *Figure 1* highlights the control parameters valves must hold when tested in accordance with ASSE 1017.

ASSE 1017 Temperature Control	
Flow @ 10 psi Differential	+/-
3 - 5 gpm	3°F
6 - 40 gpm	5°F
Over 40 gpm	7°F

figure 1

ASSE 1017 Minimum Flow Requirement		
Valve	Capacity at 10 psid	Minimum Flow tested
#1	15 gpm	7.5 gpm
#2	30	15
#3	60	30

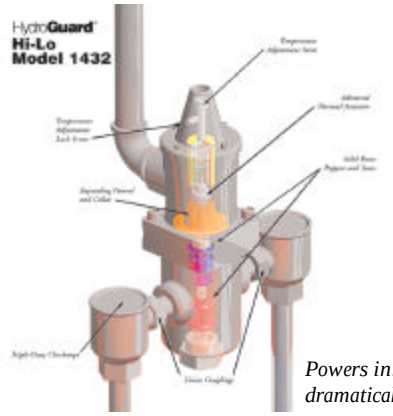
figure 2

Minimum flow for any given valve is tested at 50% of its 10-psid capacity. *See figure 2*. The recently revised ASSE 1017-2003 standard requires valves to be tested at the **"manufacturers minimum advertised flow"** if that flow falls below the above requirement. When finally adopted by the plumbing codes, all manufactures will be help to a "higher standard" of performance.

Under the currently enforced version, we have to take the manufacturer's word for it. For example, if a manufacturer states its' minimum flow for valve #2 is 5.0 gpm, than we know there is a 10 gpm discrepancy between where the valve was tested (to ASSE 1017) and the manufacturer's claim. The next logical question is does the valve actually meets the performance requirements (holding ±5°F or less) when temperature changes occur *(see figure 1)* given the sizable difference. The probability is high the valve will not hold ±5°F as the stated flow is far below the minimum tested value. Again, <u>just because a minimum flow is stated, does not mean it controls temperature at the flow</u>. The manufacturer should provide back-up data to support its' claims.

The Powers Difference

Powers makes a clear distinction in its literature between the minimum flow of a valve and the minimum flow at which the valve safely controls. Clearly marked in our flow charts is a column stating "Minimum Flow to ASSE 1017". This value will always surpass the tested low flow requirements for ASSE 1017. Powers can do this because of its smaller, more powerful paraffin-based elements and innovative designs like our patented, "Expandable Restrictor" which channels even the smallest amount of water around the element for optimum performance.



Powers innovative and patented "expandable restrictor" dramatically enhances low flow performance