Designer's Guide

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A Scalding Hot Topic

Reading the title of an article in a recent trade publication, I was led to believe I was about to learn how I could save thousands of people from getting scalded. I thought to myself, "It's about time! We can put a man on the moon and we can build computers that fit in your hand." I logically assumed the article was going to be about new technology. New technology could have included the new bi-metal anti-scald valves that snap shut when the hot water temperature exceeds a preset maximum safe temperature or new thermostatic mixing valves that control the outlet temperature to within a couple of degrees of the set point.

I was disappointed to find it was someone telling us that hot water causes scalding so don't make hot water. This was not just anyone making this recommendation; it was a professional engineer with a doctorate and experience dealing with scald litigation. I read the article with interest to see what I could learn about this situation. It was nothing new. He was recommending turning the water heater thermostat down to prevent scalding. This reminded me of a skit on the old "Hee Haw" television show when a man walks into the doctors office and says, "Hey doc! Every time I raise my arm like this it hurts." The doctor promptly replies, "Well then, don't do that." The advice given for scalding was to turn the thermostats down on water heaters. That advice does not cure the problem, just as the doctor's advice did not cure the man with the pain in his arm.

His recommendation to turn down the thermostat probably had many maintenance technicians and homeowners rushing to their mechanical rooms to turn down their thermostats. When a thermostat is turned too low on a gas fired water heater, it will create a condition that will cause flue gasses to condense in the inside of the flues and that condensation is pure water that will corrode the flues. When the flues corrode through, carbon monoxide gas can leak into the building and suffocate the occupants. We often hear of families dying being violently ill or dying in their sleep from carbon monoxide poisoning.

Turning the thermostats down on water heaters does not cure the root problem.

The American Society of Plumbing Engineers Research Foundation commissioned a study on storage temperatures in water heaters. The result of the research was a recommendation to store the hot water at 140 degrees Fahrenheit and use a master-mixing valve to blend the water down to any lower utilization temperatures for bathing and washing. The research showed storing at lower temperatures would incubate *Legionella* bacteria. According to the book *Legionellae Control in Health Care Facilities**, *Legionella* bacteria can survive but will remain dormant below 68 F. The growth range for *Legionella*e is between 68 F and 122 F. There is an ideal growth range between 95 F and 115 F. Above 122 F, legionellae survive, but do not multiply. Above 131 F, *Legionella* bacteria die within five to six hours. At 140 F, *Legionella* bacteria die within 32 minutes and at 151 degrees F, the time is reduced to two minutes. The disinfecting temperature range for a piping system is between 158 F and 176 F.

According to a book on *Legionella*, it is estimated that of the 2.4 million people die of pneumonia each year and up to 100,000 possibly of them die from Legionnaire's disease. Many people are never diagnosed with Legionnaire's disease, because the test for Legionnaire's disease is rarely given to pneumonia victims. These statistics are with predominately 140-degree domestic hot water storage systems. It is quite likely with lower storage temperatures, we would see more cases of Legionnaire's disease.

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When a water heater is set at a lower temperature, it can run out of hot water sooner during peak demand periods, buildings would run out of hot water sooner. After running out of hot water, the maintenance person usually turns up the thermostat on the water heater to adjust for the demand. If this is done without readjusting the maximum temperature limit stops on the shower valves, the scald potential will return.

Several years ago, the American Society of Plumbing Engineers' board of directors issued a position statement recommending storing hot water between 135 F and 140 F to control *Legionella* growth in water heaters.

To control scalding, a master mixing valve conforming to ASSE 1017 should be used on hot water lines serving showering, bathing and washing facilities and point-of-use scald prevention valves conforming to ASSE 1016 should be used on shower valves. All faucets and shower valves for bathing and washing purposes should be equipped with maximum temperature limit stops. The maximum limit stops prevent the valve from being turned too far to the hot side. Adjusting the temperature limit stop is done by turning on the faucet or shower and adjusting the hot water to the maximum temperature setting desired. Once this is done, the handle is removed and rotated to where the stop on the handle touches the limiting device on the body of the valve. The handle is then screwed on at that setting and as long as the hot water and cold water temperatures do not change, the maximum temperature setting can be maintained. One word of caution is the cold water temperature can fluctuate as much as 30 degrees or more from summer to winter, so the installer should take into consideration what time of year it is when adjusting the maximum temperature setting on a valve. There are also several manufacturers promoting new bi-metal anti-scald devices that shut off the flow of water to a faucet or showerhead when the water temperature exceeds the maximum setting.

If these hot water system components are utilized properly, they can and will prevent scalding. □

**"Legionellae Control in Health Care Facilities," by Matthew R. Freije, published 1996 by HC Information Resources, Inc., Indianapolis. Available from the ASPE office or by calling 800/801-8050.*

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