

Turn the Water Tank Temp Up or Down? It's a Hot Question.

Is your hot water safe?? Too hot and you can be seriously burned. Not hot enough and your hot water may harbor dangerous bacteria. It's not a simple question!!

What's the "correct" temperature at which to set a water heater? The question is more complicated and more hotly debated than you might imagine. And the answer depends on whether by 'correct' you mean energy-conscious, health-conscious, or safety conscious.

If your primary concern is energy conservation, you would follow the advice offered by the Department of Energy and repeated on virtually every list of energy-saving tips: Set the temperature at 120 degrees, which is well below the industry default setting of 140 degrees. If safety is your primary concern, you would also set the dial at 120 degrees to reduce scalding risks. But if you are worried about Legionnaire's Disease – a form of pneumonia that can be fatal – you wouldn't go a degree below 140, because the higher temperature is required to kill Legionella, the bacteria that causes the disease.

The water temperature debate has raged since 1976 when an outbreak of what was subsequently named Legionnaire's Disease killed 12 people attending an American Legion convention in Philadelphia and sickened 36 others.

People can contract the disease by inhaling droplets of water containing the bacteria, which occurs naturally and harmlessly in fresh water environments, but can become a health hazard when it grows and spreads in systems that supply water to residential or commercial buildings.

Although Legionella outbreaks are relatively rare, they have been increasing. The Centers for Disease Control and Prevention (CDC) estimates that between 8,000 and 18,000 Americans contract the disease annually. Because the illness is often misdiagnosed as flu, health professionals say, estimates are difficult and probably understate the extent of the problem. Approximately 10 percent of the people who contract Legionnaire's Disease die from it.



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Most of the reported outbreaks have occurred in large institutional structures (hotels and hospitals) and multifamily dwellings served by a central water supply. Several have been traced to evaporation from large cooling towers. But the Legionella bacteria can grow in any water environment in which the temperature is too low to kill it, making it a potential risk in single-family residences as well as multi-family dwellings — hence the debate over the recommended temperature in hot water heaters.

The Dilemma: Hot Enough or Too Hot

At 140 degrees, Legionella die within about 30 minutes; at 130 degrees, it can take as long as 6 to 8 hours to kill the bacteria; at 120 degrees — the recommended temperature for conserving energy — Legionella will survive but won't multiply. Temperatures below 120 degrees encourage the bacteria's growth.

But here's another set of numbers to consider. It takes 10 minutes for water heated to 120 degrees to cause a serious burn; it takes only 6 seconds of contact at 140 degrees. For young children or elders with sensitive skin, scalding is a serious risk. But for anyone with a compromised immune system or chronic respiratory disease, Legionnaire's Disease may be an equally serious concern. Raising the temperature will kill Legionella but may burn a child; lowering the temperature will prevent burns and conserve energy (the Department of Energy estimates that reducing the temperature from 140 degrees to 120 degrees can slash energy costs by as much as 10 percent) but it won't kill Legionella. What should you do? Lower the temperature to prevent injury and conserve energy or crank it up to prevent illness?

You might consider the humorous advice of the flight attendant explaining airline safety procedures, who said that adults traveling with a small child should don their own oxygen mask before putting one on the child. "If you're traveling with two children," this attendant joked, "decide which one you like best."

Fortunately, there are better solutions to the high vs. low temperature dilemma. The obvious one: Evaluate the risks applicable to your situation; you may not have a dilemma to resolve.

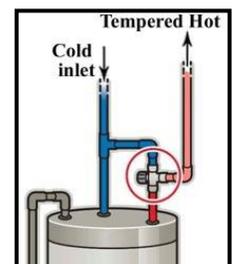
Consider first: If the high-end estimate of 18,000 cases of Legionnaire's Disease annually is correct, in the United States, with a population of 326 million, the risks of contracting Legionnaire's disease are miniscule and probably far outweighed by the scald-prevention and energy-saving advantages of lowering the water temperature. In addition to reducing energy costs, the lower temperature will also slow the buildup of corrosive materials in water heaters and pipes, extending the life of those components.

However, health concerns in your household might well shift the risk-benefit equation in the other direction, with Legionella risks outweighing energy-conservation benefits and arguing for setting the temperature higher.

A Temperate Solution

If you are equally concerned about Legionella and scalding risks, there's a solution for you, as well, and it doesn't require deciding which member of your household you like best. You can install temperature-regulating devices either on the water heater itself or individually on any taps used for washing or bathing.

A thermostatic mixing valve attached to the water heater injects cold water into the heated water coming from the tank, allowing you to set the tank temperature higher than the water that comes out of the shower or sink faucets.



Water tempering-pressure-balanced valves attached individually to the faucets adjust the ratio of hot to cold water coming from the taps to maintain the temperature you select.

Both options achieve the desired result – a temperature high enough to kill *Legionella* in the tank but low enough to prevent scalding at the point of use. But there are some differences.

Thermostatic mixing valves respond more quickly to variations in pressure and water temperature. They will also shut off automatically if the supply of cold water is interrupted to prevent a surge of dangerously hot water, or to prevent “thermal shock” if the supply of hot water is interrupted.

Tempering valves, which respond only to pressure, can’t do this. Because they reduce the amount of hot water drawn from the tank, thermostatic valves can also lower energy costs.

Although thermostatic valves are more expensive – from \$150 to \$250 compared to less than \$50 for some tempering valves – you only need one valve for the water heater, while you’ll need a tempering valve for every faucet you want to regulate. One advantage of individual valves – you can set different temperatures at different outlets for different uses. Thermostatic shower valves provide that increasingly popular option for homeowners. Installation costs will vary depending on the market area but will probably average between \$150 and \$250 for both types of valves.

Managing the Risks

Setting the hot water temperature too low creates the greatest risk of cultivating *Legionella* growth, but not the only one. Water that sits in pipes without moving for a prolonged period may cool sufficiently to support bacteria growth. Sediment that collects at the bottom of an aging water tank can also create a bacteria-friendly environment.

Legionella is a potential concern in both multifamily and single-family residences and water temperature is the first line of defense for both. In a multi-family setting, additional risk-mitigating precautions include:

- Properly insulate pipes and use trace heating to maintain consistent water temperature, preventing overnight cooling.
- Identify and remove structural “dead legs” — lengths of pipe leading to outlets that have been removed entirely or are no longer used. Water can collect in these unused pipes and allow bacteria to grow.
- Eliminate or minimize the use of rubber, plastic and silicone gaskets in the plumbing system. These materials can provide a source of nutrients for *Legionella*.
- Treat hot water tanks periodically with chlorine; treat swimming pools, fountains and other non-potable water features using a metal-infused solution, ozone or ultraviolet radiation, all of which can kill *Legionella*.
- Periodically flush the pipes of units that are vacant for a prolonged period.

Single-family homeowners should:

- Make an informed decision about the appropriate temperature setting on the hot water tank.
- Install anti-scalding devices if the temperature setting on the tank is above 120 degrees.
- Maintain a consistent hot water temperature; don’t turn the setting down when residents go on vacation. The combination of cooler temperatures and dead water (not moving through the pipes) is an invitation for *Legionella* to collect and breed.
- After being away for an extended period, turn on the faucets and let water run for several minutes to clear the pipes. The same advice applies when moving into a new residence.
- Have a plumber inspect the hot water tank and flush it annually to remove sediment. This will extend the life of the equipment and improve its efficiency in addition to discouraging *Legionella* growth.