

Legionnaire's Disease, Showers and Hot Water Temperature
Lower hot water temperatures mandated under Building Code emergency
measure beginning September 1, 2004: Be prepared
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Beginning September 1, plumbing installations in Ontario will require the inclusion of mixing valves or shut off valves that prevent faucet outlet water temperatures exceeding 49 C (120F). These mixing valves combine a cold water line with a hot water line from the hot water tank. They retail at \$100 and require a plumber to install. Several such valves could be required, depending upon whether or not there are separate distribution lines to clothes washers and dishwashers from the tank. Alternatively shut off valves that retail at \$29 each can be installed at individual taps.

This emergency measure has come about as a result of lobbying by a group known as Safe Kids Canada, its objective being to prevent scalding accidents to children. SKC says that 1000 Canadian children have been scalded in the last 20 years, with some 100 dying as a result of the burns. SKC points out that scalding accidents are also a significant problem for the sick and the elderly.

This new measure cannot simply be implemented by lowering the hot water tank temperature to 49C even if the clothes washer and dishwasher have their own water heaters. That is because hot water tank temperatures of lower than 60 C (140F) allow the tanks to become amplification sites for a naturally occurring bacterium known as *Legionella pneumophila*. This bacterium is the cause of Legionnaire's Disease, a form of pneumonia that constitutes about 1/3 of all pneumonias, and poses significantly higher incidence and lethal risks than scalding, with the sick, the young and the elderly most at risk.

Because LD is difficult to distinguish from other forms of pneumonia, and its treatment is the same, even when detected, it often goes unreported to the public health authority. This is especially true in residential cases as opposed to an outbreak investigation in a hospital ward.

The LD bacterium also causes a self-limited (two- to five-day), flu-like illness without pneumonia, sometimes called Pontiac Fever, after a 1968 outbreak in that Michigan city. Its incidence rate is not known.

Electric water heaters are more at risk to become *Legionella pneumophila* amplification sites than fuel-fired units. A survey conducted in Quebec City found that 69 of 178 houses with electric hot water tanks had a least one water sample that tested positive for *Legionella pneumophila*, while 0 of 33 houses with oil or gas fired hot water heaters tested positive.¹ The thought is that this is because the water at the base of an electrically heated tank where the slime will form is not heated to as high a temperature as in typical fuel fired tanks.

Legionella pneumophila amplification occurs not only in hot water tanks where the water temperature is below 60C. This amplification also occurs in water distribution systems on rubber and plastic washers and the inside of plastic shower hoses. Once established, the bacterium is difficult to eradicate. Hyperchlorination (>25 mg/l free

¹ Canadian Electrical Association Project 618 U 670. Survey of Residential Water Heaters in Quebec City. Final report, April 1992.

chlorine for 48 hours, followed by maintaining free chlorine at 2-3 mg/l plus water flushing at temperature of 75-90 C has been used in hospitals to eradicate the bacterium.²

Bimonthly flushing of the water distribution system through outlets at 75C (167F) is a routine that is also practiced and lends itself to residential and hotel shower disinfection practice. Simply pull the shower curtain and run the shower on full hot for a few minutes. Under the new Code such flushing at the needed water temperature becomes more difficult. Use of easily removed shut off valves would make it possible if mixing valves are not also employed. Alternatively, showerheads and hoses can be dismantled and parts cleaned and disinfected, if LD protection is desired.

There is one obvious coincident measure that could be taken by authorities that would at least partly offset the increased LD incidence possibility with this new regulation. That is to require hot water tank manufacturers to label their tanks with a warning as to the minimum temperature setting required to avoid the tank becoming an amplification site for this pathogenic bacterium.

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² I. Kallings, S. Hoffner, B. Nystrom, Eradication of Legionella Pneumophilia from potable water systems. The Third International Conference on Indoor Air Quality and Climate, Swedish Council for Building Research, Stockholm, Sweden, V3, pp. 283-286, 1984.