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TO: All Concerned

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SUBJECT: Tempered Water Requirements

Sections 413.1, 414.5 and 418.0 of the 2006 UPC require a means of limiting “hot” water temperatures delivered to public-use lavatories, bathtubs (all), and tub-shower combinations (all), to temperatures no greater than 120 degrees F. This temperature control is to be provided by a means other than the thermostat on a boiler or a water heater, which is another way of saying that water temperatures are to be controlled by thermostatic mixing valves designed specifically for this purpose.

Manufacturers produce thermostatic mixing valves for use at individual fixtures, or for use when designing a tempered water system that will serve multiple fixtures. Some of these tempering valves are connected at the supply tubes supplying individual fixtures (e.g., lavatories), others connect at the heat source (water heater or boiler) for supplying a system of tempered water piping that serves all or a portion of a building. The larger systems will typically be equipped with circulating pumps to maintain relatively constant water temperatures throughout the system.

A characteristic of some mixing valves is the requirement that water pressures be no less than 30# psi in order for them to operate correctly. Additionally, tempering valves designed for single fixture application may use a different design standard [ASSE 1016] as opposed to the ASSE 1017 standard applied to hot water source (water heater or boiler) applications. Most of these tempering valves are visible or accessible for adjustment, repair, or replacement; in the case of tub-shower valves these adjustments may be performed behind the escutcheon that covers the face of the tub/shower valve.

It is the Plumbing Inspector’s responsibility to determine that these devices are properly installed and that they are listed for the application. It is *not* the inspector’s responsibility to determine whether these devices are properly set, or that they are functional, any more than we determine whether the water heater or the boiler are functional. The installation instructions will provide guidance regarding the proper routing of water piping into and out of the mixing valves. Many of these valves are temperature-limited regarding inlet temperatures of the hot water, and some are capacity limited regarding the volume [and velocity] of water allowed to flow through them. Most of these concerns will be deferred to the specifying design professional.

The temperature limitations required by Code can result in a number of piping system complexities. Temperatures in the range of 120 degrees F. provide an excellent breeding ground for legionella bacteria, which in turn poses a considerable threat to public health. However, when temperatures are maintained at 140 degrees F. and above, the higher temperature will kill the legionella bacteria. Additionally, circulation of water [even at 120 degrees F.] will discourage colonization of legionella bacteria, therefore elevated water temperatures and circulation of tempered water may be utilized separately or in combination by some designers in an effort to control the growth of this bacteria within the piping system. Other than piping that serves fixtures limited to 120 degree F. hot water, the plumbing system in a building will often transport water to the remaining fixtures at a temperature elevated well *above* the 120 degree F. limitation, partly for the reasons cited above, partly because the operator of the building wants or needs higher temperatures in other parts of the water system. Inspector's have specific concern regarding those fixtures that are restricted to discharge of water with a temperature not to exceed 120 degree F.

Water at a temperature of 160 degrees F. will cause a 3rd degree burn in one (1) second. Water at a temperature of 120 degrees F. will not result in a 3rd degree burn until after roughly 10 *minutes* of continuous exposure. At 130 degrees F. it only takes 30 seconds to result in a third degree burn. Water feels hot to the touch at 106 to 108 degrees. It is obvious that "minor" temperature differentials can have a major impact on the outcome when a person's body is subjected to the higher temperatures. Several thousand "scalding" law-suits are filed every year. More than five thousand of these involve children. Now that the Plumbing Code includes very specific language regarding control of water temperatures, it is essential that, as inspectors, we exercise due diligence regarding the installation of devices designed to address these temperature limitations. Some of these are new Code requirements that address an issue with which the industry may not yet be familiar. During this transition period it is especially important that we make the new Code limitations known as early in the project as possible, and that we make a special effort to assure full compliance with the provisions of these new Code sections.