

Adjustment of Automatic Compensating Valves to Prevent Potential Scald Hazards



A White Paper

Developed by the ASSE International Scald Awareness Task Group

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Executive Summary

The ASSE International Scald Awareness Task Group was formed to educate and give guidance to the general public and the plumbing industry on potential scalding hazards associated with domestic hot water at the point of use.

Scald burns from hot bath or shower water temperatures can happen to anyone at any time; however, young children, older adults and people with disabilities are more susceptible to injuries from hot water. The severity of scald injuries is dependent on the temperature of the hot water and the length of exposure.

Scald injuries caused by hot water at the tap are almost completely preventable.

Model plumbing codes, for many years now, have required the installation of automatic compensating-type shower or tub/shower combination valves in both new and replacement applications. This type of valve has a temperature-limiting feature that controls the maximum temperature of the bath or shower water at the point of use. The temperature-limiting feature, the limit stop, must be set to the desired temperature by the installer. Every manufacturer includes detailed instructions with their products for the setting of the limit stop.

In many instances the installer does not take time to read and follow the manufacturer's installation instructions, or is otherwise not aware that the device includes a temperature limit stop that requires setting. Also, in many installations, hot water may not be available at the time of completing the installation of the valve; in this case, it is the responsibility of the installer to return when hot water is available to set the limit stop.

From the installer to the homeowner to the handyman to the end user, this white paper is intended to make everyone aware that the limit stop must be set to maintain a safe water temperature for bathing purposes. The maximum safe water temperature, usually 120 degrees Fahrenheit, is mandated by the local code, but the limit stop may be set to a lower temperature at the preference of the homeowner or end user.


Although the primary focus of this paper is with shower and tub/shower combination type valves that meet ASSE 1016-2011/ASME A112.1016-2011/CSA B125.16-11, *Performance Requirements for Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations*, there are two other types of devices, described in Section 2, that also have limit stop features that must be set at the time of installation.

NOTE:

ASSE *ASSE International*

ASME *American Society of Mechanical Engineers*

CSA *Canadian Standards Association*

Section 2

Purpose

The ASSE International Scald Awareness Task Group was formed to provide cautionary information on the many ways that people can be exposed to the potentially scalding hazards of domestic hot water at the point of use.

The primary purpose of this paper is to educate (or possibly the better word is “re-educate”) the general public and the plumbing industry on the necessity of properly setting limit stops on water temperature control devices. This paper does not attempt to determine which device should be used in which application, nor does it attempt to determine if one type, style, or manufacturer is better than another.

“Adjustment of Automatic Compensating Valves to Prevent Potential Scald Hazards” defines what limit stops do and explains why they must be properly set. Since limit stop adjustments may be different depending on the manufacturer of the device, the paper does not describe how to adjust the limit stops, but it does tell readers where they can find that information. The ASSE Scald Awareness Task Group’s primary concern is with shower and tub/shower combination valves. However, other end point applications, such as for Roman tubs (whirlpool tubs), sitz baths, or gang showers, also require the installation of a device with a limit stop feature to control the maximum water temperature. Limit stops on these other end point applications must also be set at the time of installation.

There are three main valves (devices) that automatically control water outlet temperatures at plumbing fixtures once the valve is properly installed and the limit stop is properly set. These three valves (devices) are:

1. Shower and tub/shower automatic compensating mixing valves conforming to ASSE 1016-2011/ASME A112.1016-2011/CSA B125.16-11, *Performance Requirements for Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations*. There are three types of shower and tub/shower automatic compensating mixing valves:
 - Type P – *Pressure-Balancing Compensating Valve*
 - Type T – *Thermostatic Compensating Valve*
 - Type T/P – *Combination Pressure-Balancing and Thermostatic Compensating Valve*

NOTE:

Not all shower valves have a maximum temperature limit adjustment. Older valves may also be non-compensating types, such as a two-handle shower or tub/shower valve. Check to see if the valve(s) in your installation has a compensating feature or a limit stop; examining the manufacturer’s installation literature can accomplish this. If literature is not available, try searching online using the manufacturer’s model number. If you still cannot find the literature, consult with a licensed master plumber or a plumbing engineer who is certified in plumbing design (CPD) to see if the fixture has a compensating feature or limit stop, and for instructions on how to adjust the maximum limit stop to prevent scalding.

2. Automatic temperature control mixing valves conforming to ASSE 1069-2005, *Performance Requirements for Automatic Temperature Control Mixing Valves*. Typical application is for devices that service end use fittings, including, but not limited to, multiple shower units (gang) or sitz baths.
3. Temperature limiting devices conforming to ASSE 1070-2004, *Performance Requirements for Water Temperature Limiting Devices*, or CSA B125.3-11, *Plumbing Products and Materials*. Typical application is to supply and maintain tempered water to sinks and baths.



The Problem

There may be a multitude of conditions that create the problem of not having properly set limit stops on temperature limiting devices. Some of the most common:

1. Installation errors by the installer, whether that installer is a do-it-yourself homeowner or a plumber. Even though every manufacturer includes instructions with every valve on how to properly set the limit stops of their devices, it seems that, for a multitude of reasons, limit stops are not being properly set.
2. Hot water may not be available at the time of device installation. This is true on many commercial/institutional installations. However, this is not an excuse for the installer to not return to set the limit stops when the hot water is available.
3. Often these valves are installed before water is available, which leads to limit stops not being adjusted. This leads to inadequate or incomplete final testing upon the valve's installation.
4. The homeowner or installer may not be aware that any change in the supply hot water temperature may necessitate a change to the setting of the limit stops.
5. Normal regional/seasonal water temperature variations may necessitate the resetting of the limit stop.
6. The end users may not be aware of the importance of temperature limit stops and how to maintain a proper setting.
7. Some current installations may not have temperature limiting devices to control the final water temperature at the point of use.

Solutions to the Problem

1. The main purpose of this paper is to re-educate the plumbing industry and educate the do-it-yourselfer on the necessity and reasons for properly setting the limit stop on a valve.
2. If hot water is not available at time of final inspection, the plumbing contractor should leave their contact information and instructions for the end user. The plumbing inspector should also note on the final inspection report that the hot water was not available at time of inspection and the limit stops have not been set or checked.
3. Once the valve has been completely installed and hot water is available, the valve must be tested at, or below, the temperature setting allowed by the plumbing code. This is not only true for new installations, but also for retrofit installations.
4. Any significant change in the incoming water temperature, either cold or hot, may require the limit stop to be reset. The ultimate solution is to check the outlet temperature of the valve (using a thermometer) when the temperature setting of the water heater or thermostatic mixing valve is adjusted, or when the water heater is replaced. In some climates, the incoming cold water temperature can change significantly from winter to summer and summer to winter. This seasonal change in cold water temperature may affect the mixed water or outlet temperature, which may require an adjustment to the maximum temperature limit stop.
5. To determine if your device requires resetting, test the highest temperature available during the coldest and hottest months. If the temperature at either test exceeds the maximum setting allowed by local plumbing codes, then you should consider resetting the limit stop.
6. The ultimate solution here is to have the installer leave the manufacturer's instructions, explaining the purpose of the limit stop, with the end user. In the absence of this information, the end user or homeowner should consult the manufacturer's website for the required information.
7. If you do not have temperature limiting devices to control the final water temperature at the point of use, replace the non-code-compliant, non-compensating type individual shower valve or tub/shower combination with a code-compliant automatic compensating type shower valve or tub/shower combination.

Definitions

Automatic Compensating Valve – A water-mixing valve that is supplied with hot and cold water, and that provides a means of automatically maintaining the water temperature selected for an outlet.

NOTE: Automatic compensating valves are used to reduce the risk of scalding and thermal shock.

Combination Pressure-Balancing and Thermostatic Compensating Valve (Type T/P) – A compensating valve that senses inlet supply hot and cold water pressures before mixing, senses the water temperature at the outlet, and compensates for pressure and thermal variations to maintain the water temperature at the outlet.

Pressure-Balancing Compensating Valve (Type P) – A compensating valve that senses inlet supply hot and cold water pressures and compensates for variations in the inlet supply pressures to maintain the water temperature at the outlet.

Thermostatic Compensating Valve (Type T) – A compensating valve that senses the water temperature at the outlet and compensates for thermal variations to maintain the water temperature at the outlet.

Limit Stop – An adjustable and lockable means to limit the maximum setting of a device towards the hot position, limiting the maximum discharge temperature.

Task Group Members

ASSE International expresses its sincerest gratitude to all of the members of this Scald Awareness Task Group for their dedication and contributions to this project.

A total of 25 industry professionals contributed both time and expertise to the development of this paper. The group included: manufacturers, engineers, industry association members, master plumbers, general interest individuals, inspectors and labor representatives. Some of the participants requested that their names and/or companies/affiliations not be mentioned in the paper.

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