



Designation: F445 – 88 (Reapproved 2023)

Standard Consumer Safety Specification for Thermal-Shock-Preventing Devices and Systems in Showering Areas¹

This standard is issued under the fixed designation F445; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

This consumer safety specification addresses certain hazards in connection with shower areas² and is directed toward thermal shock.

The general requirements of this specification are intended to establish a maximum allowable discharge temperature and provide for automatic compensation if that temperature is exceeded, or limit temperature changes that are potentially dangerous, or both.

This specification establishes the necessary requirements to ensure safety from thermal shock during showering for both the normal user capacity and limited user capacity of some aged, infirm, or young. These requirements can be attained through the utilization of devices, series of devices, or plumbing system designs, which are available in the marketplace. Many of these devices are applicable to both new construction and retrofit installations. Specifications for the reliability and testing of these devices and systems are available in most cases from such organizations as the American National Standards Institute or the American Society of Sanitary Engineering.

1. Scope

1.1 This consumer safety specification covers thermal-shock-preventing devices and systems delivering water to showering areas.

1.2 This specification establishes the minimum performance requirements for the devices and systems to minimize the risks associated with the hazards of thermal shock.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This consumer safety specification is under the jurisdiction of ASTM Committee F15 on Consumer Products and is the direct responsibility of Subcommittee F15.03 on Safety Standards for Bathtub and Shower Structures.

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² “A Systematic Program to Reduce the Incidence and Severity of Bathtub and Shower Area Injuries,” Abt Associates, Inc., June 4, 1975.

2. Terminology

2.1 *check valve*—valve designed to allow the flow of water in one direction only.

2.2 *device*—piece of equipment or mechanism designed to serve a special purpose or perform a special function.

2.3 *mixing valve*—device for mixing cold and hot water to produce an intermediate temperature as required, either manually, pressure-equalizing, or thermostatically controlled, and which is adjustable manually or by other means.

2.4 *safety shut-off device*—maximum temperature-limiting device that reduces the flow of water to a specified amount.

2.5 *scald*—first-, second-, or third-degree burn injury caused by the contact of hot water on the skin.

2.6 *showering area*—bathing space that consists of a tub, tub-shower, or shower stall bounded by four walls, real or imaginary, extending vertically to the ceiling from the outside edge of the tub or stall.

2.7 *stop-check valve*—valve designed to allow the flow of water in one direction only and which also has the capability to control the supply of water.

2.8 *stop valve*—valve used for the control of water supply.

2.9 *thermal shock*—change in temperature that is rapid and great enough to produce a potentially hazardous reaction.

2.10 *water outlet*—discharge opening through which water is supplied to a bathing area.

3. Compliance

3.1 No device or system produced after the approval date of this consumer safety specification shall either by label or other means indicate compliance with this specification unless it conforms to all requirements contained herein.

4. Materials

4.1 The materials used in the thermal-shock-preventing devices or systems shall conform to the following:

4.1.1 All parts, external or internal, shall be capable of resisting deterioration in the environment to which they are exposed to the degree that the intended performance of the device or system will not be adversely affected.

4.1.2 Any materials in contact with the water flowing through the device or system that can in any way contaminate the water so that it is injurious to humans are unacceptable.

5. General Requirements

5.1 The thermal-shock-preventing devices or systems shall meet the following minimum requirements:

5.1.1 The maximum allowable temperature at the water outlet to the fixture shall be 120 °F (49 °C) for maximum safety.

5.1.2 The temperature of the water discharging from the water outlet of the devices or systems shall automatically be controlled for maximum safety against rapid fluctuations within a total variation of ± 5 °F (± 2 °C) of the adjusted temperature.

5.1.3 The devices or systems shall be so constructed that when repair is required, it can be effected without disturbing the piping supply system.

5.1.4 Devices or systems shall withstand, without damage or impairment of the performance capabilities, a supply pressure of 125 psi (862 kPa).

6. Instructions

6.1 *Installer's Instructions:*

6.1.1 Complete instructions for installing, adjusting, and maintaining, where applicable, shall be provided with each device/system.

6.1.2 The instructions to installers should prominently display the fact that responsibility for installation and adjustment in accordance with the manufacturer's instructions lies with the installer.

6.1.3 At the time of installation, the installer shall follow the manufacturer's instructions for proper installation and adjustment of the unit. In addition, with mixing valves the instructions shall state the following:

6.1.3.1 When not equipped with an integral shut-off or when there is a shut-off installed after the mixing valve, there shall be stop and check valves on the inlets or in the water distribution piping to the mixing valve. On multiple installations when equipped with integral shut-off, there shall be service stop valves on the inlets.

6.1.4 Instructions for adjusting devices or systems, where required, shall include information on temperature settings based on cold-water variations and hot-water capabilities as a guide to allow the installer to properly set the maximum water-outlet temperature.

NOTE 1—The installer should also affix his name and company affiliation to the warning note in 6.2.2.1.

6.2 *User's Instructions:*

6.2.1 Instructions that describe the operation of the unit and any care requirements necessary to maintain the device or system shall be applied or attached to the device or system by the installer for the user.

6.2.2 The user instructions shall contain the following warning:

6.2.2.1 **Warning**—This device/system has been preset by (to be filled in by the installer) to ensure safe, maximum temperature. Any change in the setting may raise the discharge temperature above the limit considered safe and lead to scalds.

7. Marking

7.1 *Temperature-Control Marking Identification:*

7.1.1 *Single-Handle Devices*—Single-handle, adjustable devices shall have identifiable control markings, such as cold and hot in letters or graphic identification, and shall indicate the direction of knob or handle rotation to regulate the temperature. Markings shall be clear and permanent.

7.1.2 *Dual-Handle Devices*—Dual-handle, adjustable devices shall have color, letter, or graphic markings that will identify the hot and cold handles. Markings shall be clear and permanent.

7.1.3 *Safety Shut-Off Devices*—Safety shut-off devices, for use on any valve, shall have the maximum operating temperature and operating instructions clearly defined in an accompanying instruction sheet. Markings shall be clear and permanent.

7.2 *General*—All devices shall bear the following markings:

7.2.1 Manufacturer's name or trademark,

7.2.2 Water temperature marking as in 7.1, and

7.2.3 Direction of movement of the control knob or handle in accordance with 7.1.1 and 7.1.2.

8. Keywords

8.1 discharge temperature; flow; prevention; safety; showering; thermal shock