



# NATIONAL FIRE CODES®

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## 1.1 \* Scope.

### 1.1.1

This standard shall provide the minimum requirements for the design and installation of automatic fire sprinkler systems and exposure protection sprinkler systems covered within this standard.

### 1.1.2 \*

This standard shall not provide requirements for the design or installation of water mist fire protection systems.

#### 1.1.2.1

Water mist fire protection systems shall not be considered fire sprinkler systems.

#### 1.1.2.2

The design and installation of water mist fire protection systems shall comply with NFPA 750.

### 1.1.3 \*

This standard is written with the assumption that the sprinkler system shall be designed to protect against a single fire originating within the building.

## 1.2 \* Purpose.

### 1.2.1

The purpose of this standard shall be to provide a reasonable degree of protection for life and property from fire through standardization of design, installation, and testing requirements for sprinkler systems, including private fire service mains, based on sound engineering principles, test data, and field experience.

### 1.2.2

Sprinkler systems and private fire service mains are specialized fire protection systems and shall require design and installation by knowledgeable and trained personnel.

## 1.3 Application.

### 1.3.1

This standard shall apply to the following:

- (1) Character and adequacy of water supplies
- (2) Sprinklers
- (3) Fittings
- (4) Piping
- (5) Valves
- (6) All materials and accessories, including the installation of private fire service mains

### 1.3.2 Level of Protection.

A building, where protected by an automatic sprinkler system installation, shall be provided with sprinklers in all areas except where specific sections of this standard permit the omission of sprinklers.

### 1.3.3

This standard shall also apply to “combined service mains” used to carry water for both fire service and other uses as well as to mains for fire service use only.

## 1.4 Retroactivity.

The provisions of this standard reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this standard at the time the standard was issued.

**1.4.1**

Unless otherwise specified, the provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard. Where specified, the provisions of this standard shall be retroactive.

**1.4.2**

In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this standard deemed appropriate.

**1.4.3**

The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided.

**1.5 \* Equivalency.**

Nothing in this standard shall prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

**1.5.1**

Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

**1.5.2**

The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

**1.6 Units and Symbols.****1.6.1 Units.****1.6.1.1 \***

Metric units of measurement in this standard shall be in accordance with the modernized metric system known as the International System of Units (SI).

**1.6.1.2**

These units with conversion factors shall be used as listed in Table 1.6.1.2.

**Table 1.6.1.2 Conversion Factors**

	Name of Unit	Unit Symbol	Conversion Factor
Length	Millimeter	mm	1 in. = 25 mm
	Meter	m	1 ft = 0.3048 m
Area	Square millimeters	mm <sup>2</sup>	1 in. <sup>2</sup> = 645.2 mm <sup>2</sup>
	Square meter	m <sup>2</sup>	1 ft <sup>2</sup> = 0.0929 m <sup>2</sup>
Volume	Cubic millimeter	mm <sup>3</sup>	1 in. <sup>3</sup> = 16,387 mm <sup>3</sup>
	Cubic meter	m <sup>3</sup>	1 ft <sup>3</sup> = 0.02832 m <sup>3</sup>
Fluid capacity	Liter	L	1 fl oz = 0.02957 L
	Liter	L	1 gal = 3.785 L
Flow	Liter per minute	L/min	1 gpm = 3.7848 L/min
Pressure	Bar	bar	1 psi = 0.0689 bar
Discharge density	Millimeter/minute	mm/min	1 gpm/ft <sup>2</sup> = 40.746 mm/min
	Liter/minute/m <sup>2</sup>	(L/min)/m <sup>2</sup>	1 gpm/ft <sup>2</sup> = 40.746 (L/min)/m <sup>2</sup>
K-factor	K-factor	L/min/(bar) <sup>2</sup>	1 gpm/(psi) <sup>2</sup> = 14.285 L/min/(bar) <sup>2</sup>
Weight	Kilogram	kg	1 lb = 0.4536 kg
Density	Kilogram/cubic meter	kg/m <sup>3</sup>	1 lb/ft <sup>3</sup> = 16.02 kg/m <sup>3</sup>

	Name of Unit	Unit Symbol	Conversion Factor
Temperature	Fahrenheit	°F	$F^{\circ} = \frac{9}{5} \times C^{\circ} + 32$
	Celsius	°C	$C^{\circ} = \frac{5}{9} (F^{\circ} - 32)$
Velocity	Kilometers per hour	km/h	1 mph = 1.609 km/h
Pound force	Newtons	N	1 lb force = 4.44822 N
Gauge (sheet steel)	Millimeter	mm	12 gauge = 2.8 mm
			14 gauge = 1.98 mm
			16 gauge = 1.57 mm
			22 gauge = 0.78 mm
			24 gauge = 0.63 mm

Note: For additional conversions and information, see ASTM SI 10, *IEEE/ASTM SI 10 American National Standard for Metric Practice*.

### 1.6.1.3 \*

If a value for measurement as given in this standard is followed by an equivalent value in other units, the first stated shall be regarded as the requirement.

### 1.6.2 Hydraulic Symbols.

The standard abbreviations in Table 1.6.2 shall be used on the hydraulic calculation form discussed in Chapter 28.

**Table 1.6.2 Hydraulic Symbols**

Symbol or Abbreviation	Item
$p$	Pressure in psi
gpm	US gallons per minute
$q$	Flow increment in gpm to be added at a specific location
$Q$	Summation of flow in gpm at a specific location
$P_t$	Total pressure in psi at a point in a pipe
$P_f$	Pressure loss due to friction between points indicated in location column
$P_e$	Pressure due to elevation difference between indicated points. This can be a plus value or a minus value. If minus, the (-) shall be used; if plus, no sign is needed.
$P_v$	Velocity pressure in psi at a point in a pipe
$P_n$	Normal pressure in psi at a point in a pipe
E	90-degree ell
EE	45-degree ell
Lt.E	Long-turn elbow
Cr	Cross
T	Tee-flow turned 90 degrees
GV	Gate valve
BV	Butterfly (wafer) valve
Del V	Deluge valve
ALV	Alarm valve
DPV	Dry pipe valve
CV	Swing check valve
WCV	Butterfly (wafer) check valve

Symbol or Abbreviation	Item
St	Strainer
psi	Pounds per square inch
v	Velocity of water in pipe in feet per second
K	K-factor
C-factor	Friction loss coefficient

**1.6.3 \***

Some dimensions used in this standard are exact and some are not. Nominal dimension are often used, such as the dimensions used for pipe sizes. The metric equivalent shown in this standard might not be an exact conversion to the SI unit, but the nominal metric equivalent is typically used or a reasonably equivalent value or approximate conversion is used. It shall be acceptable to use the exact conversion or the conversions stated in the standard, even though they might not be exact.

**1.7 New Technology.****1.7.1**

Nothing in this standard shall be intended to restrict new technologies or alternate arrangements, provided the level of safety prescribed by this standard is not lowered.

**1.7.2**

Materials or devices not specifically designated by this standard shall be utilized in complete accord with all conditions, requirements, and limitations of their listings.