



**SLOVENSKI STANDARD**  
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**Vgrajene naprave za gašenje - Sestavni deli sprinklerskih sistemov in sistemov s pršečo vodo - 14. del: Sprinklerji za uporabo v stanovanjih**

Fixed firefighting systems - Components for sprinkler and water spray systems - Part 14: Sprinklers for residential applications

Ortsfeste Löschanlagen - Bauteile für Sprinkler- und Sprühwasseranlagen - Teil 14: Sprinkler für die Anwendung im Wohnbereich

Installations fixes de lutte contre l'incendie - Composants des systèmes d'extinction du type sprinkleur et à pulvérisation d'eau - Partie 14: Sprinkleurs pour applications résidentielles

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## Fixed firefighting systems - Components for sprinkler and water spray systems - Part 14: Sprinklers for residential applications

Installations fixes de lutte contre l'incendie -  
Composants des systèmes d'extinction du type  
sprinkleur et à pulvérisation d'eau - Partie 14:  
Sprinkleurs pour applications résidentielles

Ortsfeste Löschanlagen - Bauteile für Sprinkler- und  
Sprühwasseranlagen - Teil 14: Sprinkler für die  
Anwendung im Wohnbereich

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 191.

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**prEN 12259-14:2018 (E)****European foreword**

This document (prEN 12259-14:2018) has been prepared by Technical Committee CEN/TC 191 “Fixed firefighting systems”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

It is included in a series of European Standards planned to cover:

- automatic sprinkler systems (EN 12259 and EN 12845);
- gas extinguishing systems (EN 12094);
- powder systems (EN 12416);
- explosion protection systems (EN 26184);
- foam systems (EN 13565);
- hydrant and hose reel systems (EN 671);
- smoke and heat control systems (EN 12101).

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## 1 Scope

This document specifies requirements for the construction and performance of residential sprinklers as well as test methods for their type approval, which are operated by a change of state of an element or bursting of a glass bulb under the influence of heat, for use only in automatic sprinkler systems for domestic and residential applications as defined in EN 16925:<sup>-1</sup>.

This standard does not cover representative fire and other tests for special sprinklers that are intended to provide for specific fire hazards, nor does it cover fire and other tests for sprinklers for commercial and industrial sprinkler systems as in EN 12845. Those test requirements are covered by EN 12259-1.

NOTE 1 All pressure data in this European Standard are given as gauge pressures in bar.

NOTE 2 Sprinklers according to EN12259-1 can also be used in residential and domestic applications if the system is designed according to EN 12845.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12259-1:1999+A1:2001, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*

EN 13501-1, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*

EN16925:<sup>-1</sup>, *Fixed firefighting systems — Automatic residential sprinkler systems — Design, installation and maintenance*

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 49, *Malleable cast iron fittings threaded to ISO 7-1*

ISO 65, *Carbon steel tubes suitable for screwing in accordance with ISO 7-1*

ISO 5660-1:2015, *Reaction-to-fire tests — Heat release, smoke production and mass loss rate — Part 1: Heat release rate (cone calorimeter method) and smoke production rate (dynamic measurement)*

UL 723, *Standard for test for surface burning characteristics of building materials*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

<sup>1</sup> Under preparation. Stage at the time of publication: FprEN 16925:2018

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**3.1  
concealed sprinkler**  
unit (pre-assembled or assembled on site) consisting of a sprinkler, a housing and a cover plate, that ensures that the sprinkler will be installed with all or part of the thermally sensitive element behind the plane of the ceiling

**3.2  
recessed sprinkler**  
unit (pre-assembled or assembled on site) consisting of a sprinkler and a housing, that ensures that the sprinkler will be installed with all or part of the thermally sensitive element above the plane of the ceiling

**3.3  
discharge coefficient “K”**  
known as K-factor

coefficient of discharge in the formula,

$$Q = K \sqrt{p} \quad (1)$$

where

Q is the flow in litres per minute, and

p is the pressure in bar

**3.4  
dry-type sprinkler**  
sprinkler secured in an extension nipple that has a seal at the inlet end to prevent water from entering the nipple until the sprinkler operates

**3.5  
flush sprinkler**  
unit consisting of a sprinkler and housing, that ensures that the sprinkler will be installed partly behind, but with the temperature sensitive element before, the finished plane of the ceiling or wall

**3.6  
heat responsive element**  
that portion of a sprinkler that breaks, melts, or otherwise functions to initiate the automatic operation of the sprinkler when exposed to sufficient heat

**3.7  
heptane**  
commercial grade heptane having the following characteristics:

- a) minimum Initial Boiling Point of 88 °C;
- b) maximum Dry Point of 100 °C; and
- c) specific Gravity (15,6 °C/15,6 °C) of 0,68 - 0,73

**3.8  
orifice**  
opening that controls the amount of water discharged from a sprinkler at a given pressure

**3.9****pendent sprinkler**

sprinkler intended to be installed so that its deflector is located below the orifice and the water flows downward through the orifice

**3.10****residential sprinkler**

sprinkler intended to be installed only in residential occupancies as defined in EN16925:-<sup>1</sup>

**3.11****sidewall sprinkler**

sprinkler intended for installation on or near the wall

**3.12****upright sprinkler**

sprinkler intended to be installed so that its deflector is located above the orifice

**3.13****response time index****RTI**

measure of the thermal sensitivity of the sprinkler expressed in (meters.seconds)<sup>1/2</sup> (m×s)<sup>1/2</sup>

Note 1 to entry: Unlike in EN12259-1, the RTI value is calculated without considering the conductivity factor

**3.14****design lower tolerance limit****DLTL**

glass bulb supplier's specified and assured lowest lower tolerance limit (LTL)

**3.15****design upper tolerance limit****DUTL**

sprinkler supplier's specified and assured highest upper tolerance limit (UTL)

**3.16****fusible link sprinkler**

sprinkler which opens when an element provided for that purpose melts

**3.17****glass bulb sprinkler**

sprinkler which opens when a liquid-filled glass bulb bursts

**3.18****mean design service load**

sprinkler supplier's specified and assured highest mean service load for any batch of 10 or more sprinklers

**3.19****mean design strength**

glass bulb supplier's specified and assured lowest mean bulb strength for any batch of 55 or more bulbs

**prEN 12259-14:2018 (E)****3.20****horizontal sprinkler**

sprinkler in which the nozzle directs the water horizontally

**3.21****lower tolerance limit**

LTL

glass bulb lowest strength determined by test and statistical analysis of a batch of 55 or more bulbs

**3.22****supplier**

company responsible for the design, manufacture and quality assurance of a product

**3.23****upper tolerance limit**

UTL

highest service load determined by test and statistical analysis of a batch of 20 or more sprinklers

**3.24****frame arms**

part of a sprinkler that maintains the thermally sensitive element in load bearing contact with the sprinkler head valve

**4 Construction and performance****4.1 General**

Sprinklers shall only be assembled in such a way that adjustment or dismantling will result in destruction of an element of construction.

It shall be possible to remove the cover of a concealed sprinkler without having to use special tools, e.g. for visual inspections.

**4.2 Dimensions and pressure rating****4.2.1 Dimensions**

Nominal thread sizes shall be suitable for fittings threaded in accordance with ISO 7-1.

It shall be possible for a sphere of (5,0 +0,01/-0) mm diameter to pass through the orifice of the sprinkler

**4.2.2 Pressure ratings**

A residential sprinkler shall have a maximum operating pressure of at least 12 bar

**4.3 Nominal operating temperature**

When tested in accordance with "Test to determine operating temperatures of fusible link sprinklers and glass bulb sprinklers" of EN 12259-1, sprinklers shall operate at a temperature within the range:

$$T_{\text{test}} = [t \pm (0,035 t + 0,62)] \text{ } ^\circ \text{C}$$

where t is the nominal operating temperature.

When cover plates are tested in accordance with the "Test to determine operating temperatures of fusible link sprinklers and glass bulb sprinklers" of EN 12259-1, cover plates shall operate at a temperature within the range:

$$T_{\text{test}} = [t_{\text{cover}} \pm (0,035 t + 0,62)] \text{ } ^\circ \text{C}$$

where  $t_{\text{cover}}$  is the nominal operating temperature of the cover.

This temperature  $t_{\text{cover}}$  shall be 8 °C to 20 °C lower than the nominal operating temperature of its sprinkler head.

#### 4.4 Operating temperatures

The temperature classification, temperature rating, and colour coding of a residential sprinkler shall be as specified in Table 1.

**Table 1 — Nominal operating temperatures and colour codes**

Glass bulb sprinklers		Fusible link sprinklers	
Nominal operating temperature °C	Liquid colour code	Nominal operating temperature within range °C	Frame arms colour code
57	Orange	57 to 77	uncoloured white
68	Red	80 to 107	
79	Yellow		
93	Green		
100	Green		

#### 4.5 Water flow and distribution

##### 4.5.1 K-factor

The nominal K-factor shall be specified by the supplier. The K-factor of the sprinklers shall be within the nominal value  $\pm 5\%$  for other than dry sprinklers and  $\pm 8\%$  for dry sprinklers, when determined in accordance with Annex B.

##### 4.5.2 Water distribution

###### 4.5.2.1 Water distribution test – Horizontal surface

When installed in accordance with the installation instructions and tested as described in C.1 a residential sprinkler shall distribute water over a horizontal surface so that the discharge density for any pan within the design area (the maximum area the sprinkler is intended to protect) shall be at least 0,8 mm/min except that:

- No more than two pans (0,5m x 0,5m) or not more than 4 pans (0,3m x 0,3m) for each quadrant shall be allowed to be at least 0,6 mm/min for upright and pendant sprinklers; and
- No more than eight pans (0,3m x 0,3m) or three pans (0,5m x 0,5m) shall be allowed to be at least 0,6 mm/min for each half (split along the sprinkler centreline) of the maximum area a sidewall sprinkler is intended to protect

###### 4.5.2.2 Water distribution test – Vertical surface

When installed in accordance with the installation instructions and tested as described in C.2, a residential sprinkler shall distribute water in a uniform manner over vertical surfaces as follows:

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- a) Walls within the coverage area shall be completely wetted to at least within 660 mm of the ceiling with one sprinkler discharging water at the specified design flow rate.
- b) For square coverage areas, each wall within the coverage area shall be wetted with at least 5 percent of the sprinkler flow; for rectangular coverage areas, each wall within the coverage area shall be wetted with a proportional water amount based on 20 % of the total sprinkler discharge in accordance with the following formula:

$$WW - 20 \% (D / P) \quad (2)$$

where

- WW* is required amount of water collected on a wall, percent;  
*D* is wall length, metres;  
*P* is total perimeter of coverage area, metres.

**4.5.3 Water Impingement Test**

When tested in accordance with C and while discharging water at a service pressure of 0,5 bar less than the maximum operating pressure, a residential sprinkler shall not prevent the operation of an adjacent residential sprinkler.

**4.6 Function**

When tested in accordance with Annex E each of the residential sprinklers shall operate at service pressures of 0,5 bar to the maximum operating pressure. The sprinkler shall open and within 5 s of release of the thermally sensitive element shall operate satisfactorily. Any lodgement of released parts shall be cleared within 60 s of the release of the thermally sensitive element. After testing in accordance with Annex E the sprinkler shall conform to the requirements of 4.5.2.

NOTE In most instances visual examination of the equipment will be sufficient to establish conformity with the requirements of 4.5.2.

**4.7 Fire Test**

When fire tested as described in Annex D a residential sprinkler shall limit temperatures as specified below when tested at each spacing referenced in the installation instructions. Additionally, a maximum of two residential sprinklers shall operate. The sprinklers shall limit temperatures as follows:

- a) The maximum temperature 76 mm below the ceiling at locations 4 and 5 as illustrated in Figure D.1, Figure D.2 and Figure D.3 shall not exceed 316 °C.
- b) The maximum temperature 1,6 m above the floor at location 4 shall not exceed 93 °C.
- c) The temperature at the location described in (b) shall not exceed 54 °C for more than any continuous 2 minute period.
- d) The maximum ceiling material temperature 6 mm behind the finished ceiling surface shall not exceed 260 °C.

NOTE The thermocouple 76 mm below the ceiling, located above the fire source, is for reference purposes only.

See Figure D.1, (pendant, upright, flush, recessed pendant, and concealed sprinklers) or Figure D.2 and Figure D.3 (sidewall sprinklers) for temperature measuring locations.

## 4.8 Strength of sprinkler body and deflector

### 4.8.1 Strength of frame

The sprinkler body shall not show permanent elongation of more than 0,2 % between the load-bearing parts when subjected to twice the average service load when tested in accordance with F.1.

### 4.8.2 Flow endurance

A residential sprinkler shall withstand for 30 min, without evidence of cracking, deformation, or separation of any part a waterflow at a pressure equal to the maximum operating pressure plus 2 bar, when tested in accordance with F.2.

### 4.8.3 Strength of deflector

The sprinkler deflector and its supporting parts shall withstand an applied force of 70 N without permanent deformation when tested in accordance with F.3.

## 4.9 Strength of release element

### 4.9.1 Glass bulb sprinklers

When evaluated and tested in accordance with Annex G, glass bulb sprinklers shall have:

- a mean design bulb strength of at least six times the mean design service load;
- a mean bulb strength not less than the mean design bulb strength;
- a mean service load not more than the mean design service load;
- a design lower tolerance limit (DLTL) on the distribution curve of at least two times the design upper tolerance limit (DUTL) of the service load distribution curve;
- an upper tolerance limit (UTL) less than or equal to the design upper tolerance limit (DUTL);
- a lower tolerance limit (LTL) greater than or equal to the design lower tolerance limit (DLTL) see Figure 1.