SLOVENSKI STANDARD
SIST EN 12259-14:2020+A1:2022

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Vgrajene naprave za gašenje - Sestavni deli sprinklerskih sistemov in sistemov s pršečo vodo - 14. del: Sprinklerji za uporabo v stanovanjih (vključno z dopolnilom A1)

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

Ortsfeste Brandbekämpfungsanlagen - 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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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 12259-14:2020+A1:2022) has been prepared by Technical Committee CEN/TC 191 “Fixed firefighting systems”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2022, and conflicting national standards shall be withdrawn at the latest by November 2022.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document includes Amendment 1 approved by CEN on 13 March 2022.

This document supersedes [A1] EN 12259-14:2020 [A1].

The start and finish of text introduced or altered by amendment is indicated in the text by tags [A1] [A1].

[A1] In comparison with EN 12259-14:2020, technical modifications have been made to clarify the types of sprinkler seal that are covered by this document. [A1]

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);

— foam systems (EN 13565);

— hydrant and hose reel systems (EN 671);

— smoke and heat control systems (EN 12101).

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1 Scope

[A1] 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 and incorporating the following types of water seals:

— conical metal spring with a PTFE gasket or coating;

— metal cap or disc with PTFE gasket or coating;

— copper gasket, with or without a PTFE coating.

Sprinklers in accordance with this document are only used in automatic sprinkler systems for domestic and residential applications as defined in EN 16925. [/A1]

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.

[A1] EN 12259-1:1999+A1:2001[1] [/A1], *Fixed firefighting systems — Components for sprinkler and water spray systems — Part 1: Sprinklers*

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

EN 16925, *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 5658-2:2006, *Reaction to fire tests — Spread of flame — Part 2: Lateral spread on building and transport products in vertical configuration*

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 https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

[1] [A1] As impacted by EN 12259-1:1999+A1:2001/A2:2004 and EN 12259-1:1999+A1:2001/A3:2006. [/A1]

3.1
concealed sprinkler
unit (pre-assembled or assembled on site) consisting of a nozzle with a thermally sensitive sealing device, 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 nozzle with a thermally sensitive sealing device 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
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
nozzle with a thermally sensitive sealing device 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 nozzle with a thermally sensitive sealing device 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
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
nozzle with a thermally sensitive sealing device 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
nozzle with a thermally sensitive sealing device intended to be installed only in residential occupancies as defined in EN 16925

3.11
sidewall sprinkler
nozzle with a thermally sensitive sealing device intended for installation on or near the wall

3.12
upright sprinkler
nozzle with a thermally sensitive sealing device 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)^{½} (m×s)^{½}

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

3.15
design upper tolerance limit
DUTL
sprinkler supplier's specified and assured highest upper tolerance limit

3.16
fusible link sprinkler
nozzle with a thermally sensitive sealing device which opens when an element provided for that purpose melts

3.17
glass bulb sprinkler
nozzle with a thermally sensitive sealing device 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

3.20
horizontal sprinkler
nozzle with a thermally sensitive sealing device 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 ⟦A1⟩ EN 12259-1:1999+A1:2001 ⟨A1⟧, sprinklers shall operate at a temperature within the range:

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

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 [A1] EN 12259-1:1999+A1:2001 [A1], cover plates shall operate at a temperature within the range:

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

where

t_{cover} is the nominal operating temperature of the cover.

This temperature t_{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
68	Red	80 to 107	white
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 ± 5 % for other than dry sprinklers and ± 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:

a) no more than 2 pans (0,5 m × 0,5 m) or not more than 4 pans (0,3m × 0,3m) for each quadrant shall be allowed to be at least 0,6 mm/min for upright and pendant sprinklers; and

b) no more than 8 pans (0,3 m × 0,3 m) or 3 pans (0,5 m × 0,5 m) 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:

a) walls within the coverage area shall be completely wetted to at least within 711 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 % 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

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

where

WW is required amount of water collected on a wall, in %;

D is wall length, in m;

P is total perimeter of coverage area, in m.

4.5.3 Water Impingement Test

When tested in accordance with Annex C and while discharging water at a service pressure of 5,2 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 and the third sprinkler, located near the 1 000 mm wide doorway, shall not operate. The sprinklers shall limit temperatures as follows:

a) The maximum temperature measured 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 measured 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 min period.

d) The maximum ceiling material temperature measured 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 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) a mean design bulb strength of at least six times the mean design service load;

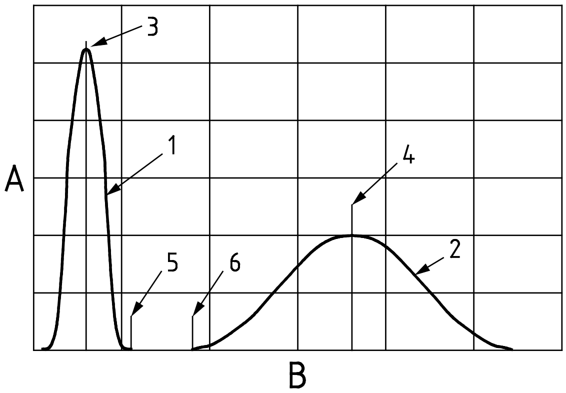
b) a mean bulb strength not less than the mean design bulb strength;

c) a mean service load not more than the mean design service load;

d) 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;

e) an upper tolerance limit (UTL) less than or equal to the design upper tolerance limit (DUTL);

f) a lower tolerance limit (LTL) greater than or equal to the design lower tolerance limit (DLTL) see Figure 1.



Key

1 service load distribution curve
2 bulb strength distribution curve
3 mean service load
4 mean bulb strength
5 upper tolerance limit (UTL)
6 lower tolerance limit (LTL)
A number of samples
B strength (N)

Figure 1 — Graph of service load and bulb strength distribution curves

4.9.2 Fusible link sprinklers

It shall be determined that:

a) the temperature sensitive elements withstand a load of 15 times the maximum design load for a period of 100 h, without failure; or

b) the estimated time to failure of temperature sensitive elements is not less than 876 600 h at the design load, when tested in accordance with Annex G.

4.10 Leak resistance and hydrostatic strength

Twenty residential sprinklers shall be tested and not leak when tested in accordance with H.1 and, subsequently, shall not rupture, operate or release, when tested in accordance with H.2.

4.11 Heat exposure

4.11.1 General

A residential sprinkler shall withstand for 90 days, without evidence of weakness or malfunction, an exposure to the high-ambient temperature in accordance with I.1.

After the exposure period four sprinklers shall be tested in accordance with E.2; the sprinklers shall operate such that the waterway is cleared. Any lodgements shall be disregarded. Four sprinklers shall be leak tested in accordance with H.1. Four sprinklers shall be tested in accordance with “Test to determine operating temperatures of fusible link sprinklers and glass bulb sprinklers” of A1⟩ EN 12259-1:1999+A1:2001 ⟨A1.

Additionally, after the exposure period four recessed, concealed and flush sprinklers shall be tested in accordance with M.2. Their mean operating time shall be equal to or less than a 1,30 multiple of the mean operating time of the sprinkler tested in accordance with M.2 for compliance with 4.14.2.

4.11.2 Additional heat exposure of glass bulb sprinklers

There shall be no damage to the glass bulb when sprinklers are tested in accordance with I.2.

〚A1〛 *deleted text* 〚A1〛

4.11.3 Thermal shock

When glass bulb sprinklers are tested in accordance with Annex J, the glass bulbs shall either:

— break correctly on cooling such that the waterway is cleared; or

— remain intact. After immersion when subjected to a function test in accordance with E.2, the sprinkler shall operate in such way that the waterway is cleared; any lodgements shall be disregarded.

4.12 Corrosion

4.12.1 Stress corrosion

After being subjected for 10 days to a moist ammonia exposure as described in K.1 a residential sprinkler having copper alloy parts shall:

a) show no evidence of cracking, delamination, or degradation; and

b) perform as intended when tested as described in K.1.

If the application of a 12 bar water pressure to the inlet of the sprinkler increases the assembly load by more than 10 %, the additional load is to be applied during the moist ammonia-air mixture exposure specified in K.1.

4.12.2 Sulphur dioxide corrosion

Residential sprinklers shall be subjected to a sulphur dioxide corrosion test in accordance with K.2. After exposure, when subjected to a function test in accordance with E.2 the sprinkler shall operate such that the waterway is cleared; any lodgements shall be disregarded.

4.12.3 Salt mist corrosion

Residential sprinklers shall be subjected to a salt mist corrosion test in accordance with K.3. After exposure, when subjected to a function test in accordance with E.2, the sprinkler shall operate such that the waterway is cleared; any lodgements shall be disregarded.

4.12.4 Moist air

Residential sprinklers shall withstand an exposure to moist air atmospheres when tested in accordance with K.4.

4.13 Water hammer

Sprinklers shall not leak when subjected to pressure surges in accordance with Annex L. After the test, when subjected to a function test in accordance with E.2, the sprinkler shall operate such that the waterway is cleared; any lodgements shall be disregarded.