SLOVENSKI STANDARD
SIST EN 12259-1:2000

01-januar-2000

Vgrajene naprave za gašenje – Sestavni deli sprinklerjev in sistemov s pršečo vodo - 1. del: Sprinklerji

Fixed firefighting systems - Components for sprinkler and water spray systems - Part 1: Sprinklers

Ortsfeste Löschanlagen - Bauteile für Sprinkler- und Sprühwasseranlagen - Teil 1: Sprinkler

Installations fixes de lutte contre l'incendie - Composants des systemes d'extinction du type Sprinkler et a pulvérisation d'eau - Partie 1: Sprinklers

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Fixed firefighting systems - Components for sprinkler and water spray systems - Part 1: Sprinklers

Installations fixes de lutte contre l'incendie - Composants des systèmes d'extinction du type Sprinkler et à pulvérisation d'eau - Partie 1: Sprinklers

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This European Standard was approved by CEN on 2 October 1997.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

This European Standard 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of an identical text or by endorsement, at the latest by december 1999, and conflicting national standards shall be withdrawn at the latest by december 1999.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

It forms one Part of EN 12259, covering components for automatic sprinkler systems and is included in a series of European Standards planned to cover:

a) automatic sprinkler systems (EN 12259)[1]

b) Gaseous extinguishing systems (EN 12094 & EN ISO 14520) [1]

c) powder systems (EN 12416) [1)]

d) explosion protection systems (EN 26 184)

e) foam systems [1]

f) hydrant and hose reel systems (EN 671)

g) smoke and heat control systems (EN 12101) [1]

h) water spray systems [1]

EN 12259 has the general title "Fixed fire fighting systems - Components for sprinkler and water spray systems" and will subdivided as follows*) :

Part 1: Sprinklers.

Part 2: Wet alarm valve assemblies

Part 3: Dry alarm valve assemblies

Part 4: Water motor alarms.

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1) in preparation

Part 5: Water flow detectors.

Part 6: Pipe couplings.

Part 7: Pipe hangers.

Part 8: Pressure switches.

Part 9: Deluge alarm valve assemblies.

Part 10: Multiple controls.

Part 11: Medium and high velocity water sprayers.

Part 12: Sprinkler pump sets.

Users should note that standards undergo revision from time to time and that any reference made herein to any other European or International Standard implies its latest edition, unless otherwise stated.

Where reference is made to the application of components having imperial dimensions it has been necessary to use imperial units where appropriate.

This standard is to be entrusted for use to qualified and experienced organisations which have a capability to design and manufacture to recognised international standards.

1 Scope

This part of EN 12259 specifies requirements for construction and performance of sprinklers which are operated by a change of state of an element or bursting of a glass bulb under the influence of heat, for use in automatic sprinkler systems conforming to EN 12845 Automatic sprinkler systems : Design and installation. [1] Test methods and a recommended test schedule for type approval testing are also given.

NOTE: All pressure data in this European standard are given as gauge pressures in bar[2].

2 Normative references

This European standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

ISO 7-1	1994	-	Pipe threads where pressure-tight joints are made on the threads - Part 1: Dimensions, tolerances and designation.
ISO 49	1994	-	Malleable cast iron fittings threaded to ISO 7-1.
ISO 65	1981	-	Carbon steel tube suitable for screwing in accordance with ISO 7-1
EN ISO 9 000		-	Quality systems

3 Definitions

For the purposes of this standard, the following definitions apply.

3.1 conductivity factor [C]: Measure of the conductance between the sprinkler's heat responsive element and the water filled fitting, expressed in (meters/second)^{½}.

3.2 response time index [RTI]: Measure of the thermal sensitivity of the sprinkler expressed in (meters seconds)^{½}.

3.3 automatic sprinkler: Nozzle with a thermally sensitive sealing device which opens to discharge water for fire fighting.

3.4 ceiling (or flush) pattern sprinkler: Pendent sprinkler for fitting partly above , but with the temperature sensitive element below, the lower plane of the ceiling.

3.5 coated sprinkler: Sprinkler with a coating applied for the purpose of reducing the effects of corrosive environments, excluding decorative paint or painted finishes.

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2) bar = 10^5 Pa

3.6 concealed sprinkler: Recessed sprinkler with a cover plate that disengages when heat is applied.

3.7 conventional pattern sprinkler: Sprinkler which gives a spherical pattern of water discharge.

3.8 design load: Maximum allowable service load, specified by the supplier, including any tolerance.

3.9 dry pendent sprinkler: Sprinkler and dry drop pipe with a valve, at the head of the pipe, held closed by a device maintained in a position by the sprinkler head valve.

3.10 dry upright sprinkler: Sprinkler and dry rise pipe with a valve, at the base of the pipe, held closed by a device maintained in position by the sprinkler head valve.

3.11 flat spray pattern sprinkler: Sprinkler that is similar to a spray pattern sprinkler but with a pattern of water discharge with a proportion of the discharge directed above the level of the deflector.

3.12 fusible link sprinkler: Sprinkler which opens when an element provided for that purpose melts.

3.13 glass bulb sprinkler: Sprinkler which opens when a liquid-filled glass bulb bursts.

3.14 pintle: Metal extension rod extending from the deflector.

3.15 horizontal sprinkler: Sprinkler in which the nozzle directs the water horizontally.

3.16 pendent sprinkler: Sprinkler in which the nozzle directs the water downwards.

3.17 recessed sprinkler: Sprinkler in which all or part of the thermally sensitive element is above the plane of the ceiling.

3.18 sidewall pattern sprinkler: Sprinkler that gives an outward half paraboloid pattern of water discharge.

3.19 spray pattern sprinkler: Sprinkler that gives a downward paraboloid pattern of water discharge.

3.20 supplier: Company responsible for the design, manufacture and quality assurance of a product

3.21 upright sprinkler: Sprinkler in which the nozzle directs the water upwards.

3.22 sprinkler yoke (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 Product assembly

Sprinklers shall only be assembled in the original equipment supplier's factory, in such a way that adjustment or dismantling will result in destruction of an element of construction.

4.2 Dimensions

4.2.1 The nominal diameter of the orifice of the sprinklers and the corresponding thread size of the sprinklers, except dry and flush sprinklers, shall be suitable for use with pipe threads given in Table 1. Dry and flush sprinklers may have larger thread sizes. Nominal thread sizes shall be suitable for fittings threaded in accordance with ISO 7-1.

4.2.2 It shall be possible for a sphere of $8\ ^{+0,01}_{0}$ mm diameter to pass through each water passage in the sprinkler.

Table 1: Orifice and thread dimensions

Nominal diameter of orifice mm	Nominal pipe thread size inches
10	3/8
15 and 20	½
20	¾

4.2.3 Sprinklers having a 20 mm nominal diameter orifice in combination with a ½ inch nominal thread size (normally used for retrofitting purposes), shall have a pintle, (10 ± 2) mm long and having a diameter of (5 ± 2) mm, permanently attached at the deflector for identification purposes.

4.3 Nominal operating temperature

4.3.1 The nominal operating temperatures of glass bulb sprinklers are given in Table 2 column 1.

4.3.2 The nominal operating temperature ranges of fusible link sprinklers are given in Table 2 column 3.

4.3.3 Glass bulb sprinklers and non-plated and non-coated fusible link sprinklers shall be colour coded according to the nominal operating temperature as given in Table 2, columns 2 or 4 as appropriate.

Table 2: Nominal operating temperatures and colour codes

Glass bulb sprinklers		Fusible link sprinklers	
Column 1 Nominal operating temperature °C	Column 2 Liquid colour code	Column 3 Nominal operating temperature within range °C	Column 4 Yoke arms colour code
57	orange	57 to 77	uncoloured
68	red	80 to 107	white
79	yellow	121 to 149	blue
93	green	163 to 191	red
100	green	204 to 246	green
121	blue	260 to 302	orange
141	blue	320 to 343	black
163	mauve		
182	mauve		
204	black		
227	black		
260	black		
286	black		
343	black		

4.4 Operating temperatures

4.4.1 When tested in accordance with annex B, fusible link sprinklers shall operate at a temperature within the range:

$$[t \pm (0{,}035\ t + 0{,}62)]\ °C$$

where t is the nominal operating temperature.

4.4.2 When tested in accordance with annex B, glass bulbs and glass bulb sprinklers shall operate within the temperature range specified in table 3.

Table 3: Operating temperatures for glass bulbs and glass bulb sprinklers

Nominal operating temperature °C	Lowest operating temperature °C	Temperature at or below which at least		Highest operating temperature °C
		25 of the 50 specimens operate °C	40 of the 50 specimens operate °C	
57	54	63	68	74
68	65	74	79	86
79	76	87	92	99
93	90	101	106	113
100	97	108	113	120
121	118	129	134	141
141	138	149	155	163
163	160	171	177	186
182	179	190	196	206
204	201	212	218	228
227	224	235	242	252
260	257	268	275	286
286	283	294	301	313
343	340	351	359	372

4.5 Water flow and distribution

4.5.1 *K-factor*

The K-factor of the sprinklers shall be within the range given in table 4, when determined in accordance with annex C.

Table 4: K-factors

Nominal diameter of orifice mm	K-factor $1 \cdot min^{-1} \cdot bar^{-1/2}$	
	Sprinklers other than dry types	Dry sprinklers
10	57 ± 3	57 ± 5
15	80 ± 4	80 ± 6
20	115 ± 6	115 ± 9

4.5.2 ***Water distribution***

4.5.2.1 *Conventional, spray, flat spray and dry pattern sprinklers*

When sprinklers are tested in accordance with D.1, using the parameters given in columns 2, 3 and 4 of table 5, the number of containers in which the quantity of water corresponds to less than 50% of the water coverage specified in column 5 of table 5 shall not be more than the appropriate maximum specified in column 6 of table 5.

Table 5: Water distribution parameters

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Nominal diameter of orifice mm	Flow rate per sprinkler l/min	Measurement area m^2	Sprinkler spacing m	Water coverage mm/min	Maximum number of containers with a lower content of water
10	50,6	20,25	4,5	2,5	8
15	61,3	12,25	3,5	5,0	5
15	135,0	9,00	3,0	15,0	4
20	90,0	9,00	3,0	10,0	4
20	187,5	6,25	2,5	30,0	3

4.5.2.2 *Sidewall pattern sprinklers*

When sprinklers are tested in accordance with D.2, not more than 10% of the containers shall contain a quantity of water corresponding to less than 1,125 mm/min water coverage, and wetting of adjacent and opposite walls shall be to a level within 1 m below the level of the sprinkler deflector.

4.5.2.3 *Water discharge below the deflector*

When sprinklers are tested in accordance with D.3, the proportion of the water discharge below the deflector shall be within the appropriate limits given in Table 6.

Table 6: Water discharge downwards from the deflector

Type of sprinkler	Proportion of water discharged below the deflector
Conventional pattern sprinkler	40% to 60%
Spray Pattern sprinkler	80% to 100%
Flat spray sprinkler	85% to 100%

4.6 Function

4.6.1 When tested in accordance with E.1 the sprinkler shall open and within 5 s of release of the thermally sensitive element shall operate satisfactorily and shall conform to the requirements of 4.5.1. Any lodgement of released parts shall be cleared within 60 s of the release of the thermally sensitive element and the sprinkler shall conform to the requirements of 4.5.2.

4.6.2 When tested in accordance with E.2 the deflector and its supporting parts 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 Strength of sprinkler body and deflector

4.7.1 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.

4.7.2 The sprinkler deflector and its supporting parts shall withstand an applied force of 70 N without permanent deformation when tested in accordance with F.2.

4.8 Strength of release element

4.8.1 *Glass bulb sprinklers*

The force necessary to break each glass bulb shall be at least 6 times the average service load of the sprinkler when determined in accordance with G.1.

4.8.2 *Fusible link sprinklers*

It shall be determined that:

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

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 G.2.

4.9 Leak resistance

The sprinklers shall not show any sign of failure when hydraulically pressure-tested in accordance with annex H.

4.10 Heat exposure

4.10.1 *Uncoated sprinklers*

When tested in accordance with J.1 the sprinklers shall not operate during the exposure period. After the exposure period four sprinklers shall be tested in accordance with E.3; the sprinklers shall operate such that the waterway is cleared. Any lodgements shall be disregarded. Four sprinklers shall be tested in accordance with annex H and shall comply with 4.9. Four sprinklers shall be tested in accordance with annex B and shall comply with 4.4.

4.10.2 *Coated sprinklers*

The uncoated version of each coated sprinkler shall conform to 4.10.1. When coated sprinklers are tested in accordance with J.2, the coating shall show no visible evidence of damage.

4.10.3 *Glass bulb sprinklers*

There shall be no damage to the glass bulb when sprinklers are tested in accordance with J.3.

4.11 Thermal shock

When glass bulb sprinklers are tested in accordance with annex K, 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.3, operate such that the waterway is cleared; any lodgements shall be disregarded.

4.12 Corrosion

4.12.1 *Stress corrosion*

Sprinklers shall be subjected to a stress corrosion test as described in L.1. Those sprinklers in which cracks, delamination or failure of an operating part is observed shall show no evidence of leakage in the leak resistance test described in L.1. After exposure, when subjected to a function test in accordance with E.3 the sprinkler shall operate such that the waterway is cleared; any lodgements shall be disregarded.

Those sprinklers which show evidence of cracking, delamination or failure of a non-operating part shall show no visible evidence of separation of permanently attached parts when subjected to the flowing test described in L.1.

4.12.2 *Sulphur dioxide corrosion*

Sprinklers shall be subjected to a sulphur dioxide corrosion test in accordance with L.2. After exposure, when subjected to a function test in accordance with E.3 the sprinkler shall operate such that the waterway is cleared; any lodgements shall be disregarded.

4.12.3 *Salt mist corrosion*

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

4.12.4 *Moist air exposure*

Sprinklers shall be subjected to moist air exposure in accordance with L.4. After exposure, when subjected to a function test in accordance with E.3, the sprinkler shall operate such that the waterway is cleared; any lodgements shall be disregarded.

4.13 Integrity of sprinkler coatings

4.13.1 *Volatile matter in wax and bitumen coating materials*

Waxes and bitumens used for coating sprinklers shall not contain volatile matter in sufficient quantities to cause loss in mass exceeding 5 % of the mass of the original sample when tested in accordance with M.1.

4.13.2 *Coating resistance to low temperature*

Any coating (wax, bitumen, paint or metallic) on the sprinkler shall not crack or flake when the coated sprinkler is tested in accordance with M.2.

4.14 Water hammer

Sprinklers shall not leak when subjected to pressure surges in accordance with annex N. After the test, when subjected to a function test in accordance with E.3, the sprinkler shall operate such that the waterway is cleared; any lodgements shall be disregarded.

4.15 Thermal response

4.15.1 *Response in the standard orientation*

When tested in accordance with annex P, in the standard orientation, (see Figure P.1.a) sprinklers shall fall within one of the following categories with regard to their response time index (RTI) and conductivity factor (C) as shown in figure 1:

- quick response; or
- special response; or
- standard response A; or
- standard response B.