

# SVENSK STANDARD

## SS 883002:2010

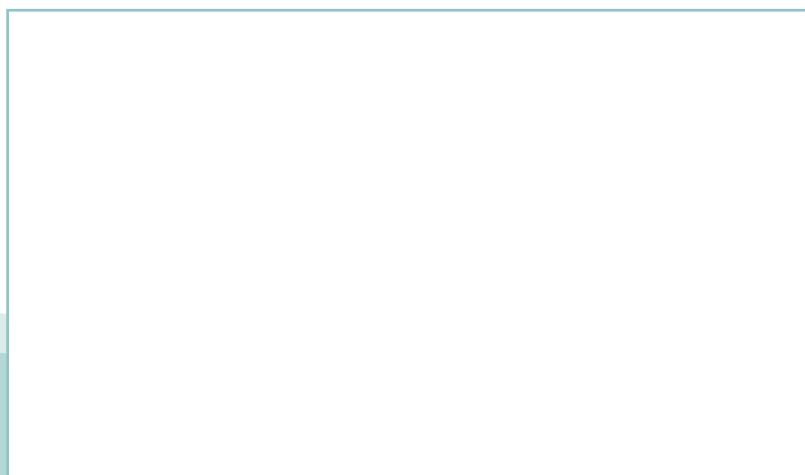


Fastställt/Approved: 2010-09-27  
Publicerad/Published: 2010-11-17  
Utgåva/Edition: 1  
Språk/Language: engelska/English  
ICS: 13.220.10

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### **Brand och räddning – Boendesprinkler – Del 2: Krav och testmetoder för sprinkler och tillhörande brickor**

### **Residential sprinkler systems – Part 2: Requirements and test methods for sprinklers and their accompanying rosettes**



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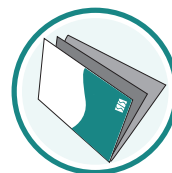
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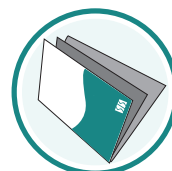
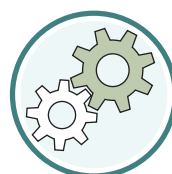
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**SS 883002:2010 (E)****Foreword**

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This standard shall be given the status of a national standard in Denmark, Norway and Sweden either by publication of an identical text or by endorsement.

Standards concerning *Residential sprinkler systems* consists of the following parts.

- Part 1: Design, installation and maintenance;
- Part 2: Requirements and test methods for sprinklers and their accompanying rosettes

**1 Scope**

This part of INSTA 900 specifies requirements for construction and performance of residential sprinklers and their rosettes 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 residential sprinkler systems conforming to INSTA 900-1, Design, installation and maintenance. Test methods and recommended test schedule for type approval testing are also given.

The requirements in this standard are not intended to restrict the application of representative fire and other tests for special sprinklers, as referenced in EN 12845, that are intended to provide protection for specific fire hazards.

A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and that involves a risk of fire or of electric shock or injury to persons must be evaluated using appropriate additional component and end-product requirements to maintain the level of safety as originally anticipated by the intent of this standard. Revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

**2 Normative references**

The following referenced documents are indispensable for the application 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.

ASTM B117, *Standard Practice for Operating Salt Spray (Fog) Apparatus*

ASTM E1354, *Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter*

EN 12845, *Fixed firefighting systems – Automatic sprinkler system – Design, installation and maintenance*

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

INSTA 900-1, *Residential sprinkler system – Part 1: Design, installation and maintenance*

UL 157, *Gaskets and Seals*

UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*

### 3 Terms and definitions

For the purposes of this document the following definitions apply.

#### 3.1

##### **discharge coefficient "K"**

coefficient of discharge in the formula  $Q = K\sqrt{p}$  where:

Q is the flow in litres per minute, and p is the pressure in bar

#### 3.2

##### **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

#### 3.3

##### **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.

#### 3.4

##### **operating temperature**

the temperature at which the heat responsive element of a sprinkler operates when subjected to a 0,5 °C per minute temperature rise while immersed in a liquid bath

#### 3.5

##### **orifice**

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

#### 3.6

##### **residential sprinkler**

a sprinkler intended to be installed in residential occupancies and that opens automatically by operation of a heat-responsive releasing mechanism that maintains the discharge orifice closed. Upon operating at a specified temperature, a discharge of water is distributed in a specific pattern and quantity over a designated area

#### 3.7

##### **residential sprinkler types:**

###### **3.7.1 residential flush ceiling sprinkler**

a sprinkler in which all or part of the body, including the shank thread, is mounted above the lower plane of the ceiling

###### **3.7.2 coated, painted or plated sprinkler**

a sprinkler that has factory applied coatings, paint, or platings for corrosion protection or decorative purposes

**SS 883002:2010 (E)****3.7.3 residential concealed ceiling sprinkler**

a sprinkler assembly having a cover plate

**3.7.4 residential dry-type sprinkler**

a 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. These sprinklers may consist of a pendent, sidewall, ceiling or other types

**3.7.5 residential pendent sprinkler**

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

**3.7.6 residential recessed sprinkler**

a sprinkler assembly in which all or part of the sprinkler body or frame, other than the shank thread, is mounted within a recessed housing

**3.7.7 residential sidewall sprinkler**

a sprinkler intended for installation on or near the wall and near the ceiling, and designed to discharge most of the water away from the nearby wall with a small portion of the discharge directed at the wall behind the sprinkler

**3.7.8 residential upright sprinkler**

a sprinkler intended to be installed so that its deflector is located above the orifice and the water flows upward through the orifice.

**4 Components**

**4.1** Except as indicated in 4.2, a component of a product covered by this standard shall comply with the requirements for that component.

**4.2** A component is not required to comply with a specific requirement that:

- a) involves a feature or characteristic not required in the application of the component in the product covered by this standard, or
- b) is superseded by a requirement in this standard.

**4.3** A component shall be used in accordance with its rating established for the intended conditions of use.

**4.4** Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

**5 Construction****5.1 General**

**5.1.1** A residential sprinkler shall be constructed to effect closure of its water seat for extended periods of time without leakage and to open as intended and release all parts as specified in this standard. The closure of the water seat shall not be achieved by the use of a dynamic O-ring or similar seal (an O-ring or similar seal that moves during operation or is in contact with a component that moves during operation).

**5.1.2** For dry-type pendent and sidewall residential sprinklers, the connection of the extension nipple to the seal assembly at the inlet shall be airtight. See Dry Sprinkler Air Tightness Test, subclause 7.11.

**5.1.3** A sprinkler shall be chemically or mechanically staked to maintain the manufacturer's assembly load. The assembly load shall be incapable of being changed by the use of common hand tools without causing visible damage to the sprinkler.

**5.1.4** Stampings shall show no cracking or splitting and shall be uniformly smooth and clean cut.



**5.1.5** The operation and distribution characteristics of a sprinkler shall not be impaired by the application of any factory applied coating or plating.

**5.1.6** When installed with the intended fittings specified in the installation instructions, see subclause 14.1, dry-type sprinklers installed in dry systems shall be constructed to minimize the potential to accumulate water, scale, and sediment on the sprinkler inlet and shall provide an unobstructed flow path upon operation.

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**5.2 Inlet Threads**

5.2.1 Inlet pipe threads, if provided, shall be suitable for fittings threaded in accordance with ISO 7-1.

Dry-type sprinklers shall be provided with ¾-inch (19,0 mm) or 1-inch (25,4 mm) external nominal pipe thread size.

5.2.2 Threads shall be clean cut and true and free from burrs, scoring, chatter marks, or the like.

**5.3 Temperature Ratings**

5.3.1 The temperature classifications, temperature ratings, and color codings of a residential sprinkler shall be as specified in Table 1. See 13.1.8.

**Table 1 – Temperature classification ratings and color coding**

Temperature classification	Temperature rating	Color code		Maximum ceiling temperature
	C°	Frame arms	Glass bulb	C°
Ordinary	57 – 77	Uncolored or black	Orange 57 ± 2,615 °C or Red 68 ± 3 °C	38
Intermediate	79 – 107	White	Yellow 79 ± 3,385 °C or Green 93 ± 3,875 or Green 107 ± 4,365 °C	66

**5.4 Pressure Rating**

5.4.1 A residential sprinkler shall have a minimum rated pressure of 12 bar, 17 bar, or 21 bar.

**5.5 Nominal “K” Factors**

5.5.1 Sprinkler orifices shall have individual "K" factor values that are within ± 5 percent of the average "K" factor determined at a specific pressure for the dimensional tolerance specified by the manufacturer.

NOTE Exception: A sprinkler with an average "K" factor of less than 80 is able to have individual "K" factor values that are not within ± 5 percent of the average "K" factor if the single "K" factor value is within ± 2,91 units of the average "K" factor value.

5.5.2 The diameter of a discharge orifice or any internal passage of a sprinkler shall be at least 5.3 mm.

**5.6 Protective Covers**

5.6.1 Sprinklers with glass bulb type heat responsive elements shall be equipped with protective covers that are designed to remain in place during installation and be removed before the sprinkler system is placed in service.

Exception: Certain sprinkler designs, such as concealed sprinklers, dry-type sprinklers, and sprinklers with guards, may not be required to have protective covers.

5.6.2 Sprinklers required to be equipped with sprinkler covers shall comply with subclause 7.6 and 13.1.12.

## 6 Performance – General

### 6.1 Details

**6.1.1** To determine compliance with these requirements, the various types of a sprinkler shall be subjected to the performance tests described in clauses 6 to 11.

**6.1.2** When a recessed or concealed sprinkler is tested with an escutcheon during the performance tests, the sprinkler is to be recessed to the maximum depth allowed by the sprinkler/escutcheon combination.

### 6.2 Samples

**6.2.1** The number of samples required for investigation may vary for different sprinkler types. The number of samples required for examination and test are to be determined following a review of detailed drawings, examination of a preliminary sample, or both.

## 7 Performance – Physical strength and leakage tests

### 7.1 Load on Heat Responsive Element Test

**7.1.1** The average and maximum design loads exerted on the heat responsive element, and the overall load tolerance based on the design load for the assembly, are to be determined. When the application of the rated working pressure to the inlet end of the sprinkler increases the assembly load by more than 10 percent, the additional load is to be added to the measured load on the heat responsive element. The information developed is to be used for strength of heat responsive element test, subclause 7.2.

**7.1.2** At least 25 sprinklers are to be tested to determine the average load. An arrangement for measuring the load on the heat responsive element is to be developed for each specific design.

### 7.2 Strength of Heat Responsive Element Test

#### 7.2.1 Fusible-alloy types

**7.2.1.1** A fusible-alloy heat responsive element of a residential sprinkler shall either:

- a) sustain a load of 15 times its maximum design load for 100 hours;
- b) or demonstrate the ability to sustain the maximum design load when tested in accordance with 7.2.1.2 and 7.2.1.3.

**7.2.1.2** Compliance with 7.2.1.1(b) is to be determined by subjecting sample heat-responsive elements to loads in excess of the maximum design load. A minimum of ten samples are to be loaded at various values as required up to 15 times the design load. At least one heat responsive element shall sustain a load for a time greater than 1000 hours. These load and time values shall then be used to derive a least-square, full logarithmic regression curve of load as a function of time, from which the loads at 1 hour and 1000 hours are to be determined. The design load shall comply with the following:

$$L_d \leq 1.02 L_m^2 / L_o$$

where:

$L_d$  is the maximum design load,

$L_m$  is the load at 1000 hours, and

$L_o$  is the load at 1 hour.