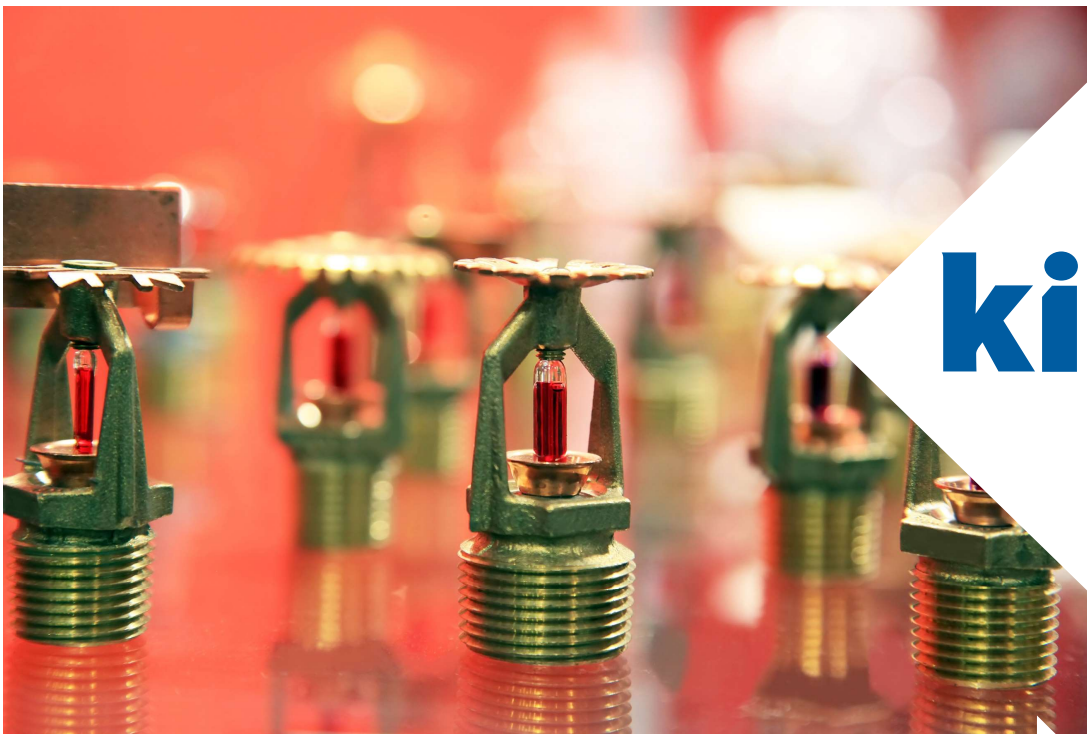


White Paper

Testing Sprinkler Heads



**Trust
Quality
Progress**

Kiwa FSS Testing
Dwarsweg 10
NL-5301 KT ZALTBOMMEL
+31 (0)88 998 51 5100
NL.testlab.fss@kiwa.com



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1 Inspection and testing of sprinkler heads

1.1 Inspection and testing of sprinkler heads is essential

In order to have confidence in the effectiveness of a sprinkler system, it is essential to inspect and test the sprinkler heads. Sprinkler systems are extremely reliable and have a long working life, provided that they were properly configured to the conditions. It is important that the systems are very reliable because it is only possible to tell whether the system is actually working properly in a real fire situation.

So that you can be sure that the system is doing its job properly at such a critical moment, it is extremely important to carry out proper maintenance on all of the components in the system and to evaluate that they are working correctly. Maintenance by certified technicians and an independent inspection of the sprinkler system are important instruments for being able to depend on sprinkler protection. One of most important components in a sprinkler system is the sprinkler head. Extensive testing during manufacturing means you can be sure that the sprinkler heads will activate in time and will then sprinkle the correct quantity of water in the right sprinkle pattern. However, what if these sprinklers were installed a long time ago? Is it still justifiable to trust that these sprinklers will function correctly?

When sprinklers are tested, you get an insight into how well they work. In this regard, the sprinkler requirements set specific periods for when sprinklers need to be tested. These periods depend on the type of sprinkler, but they are always related to the useful life of the sprinkler.

That is why it is important to know when the sprinklers were installed. However, how can you determine this? Furthermore, once you know how old the sprinklers are, how do you know whether the sprinkler head needs to be tested or replaced? We have prepared this white paper to help you find answers to your most burning questions.

2 How do I determine the age of the sprinklers in a system?

There are various ways to determine the age of a sprinkler head. For instance, the year of manufacture is stated on some types of sprinklers. The date of manufacture is a good starting point for determining when the sprinklers will have to be tested.

If the date of manufacture is not stated on the sprinklers, then you will need to study the building documentation. For instance, this may include documents containing basic assumptions, sprinkler diagrams, handover reports or old log books and inspection reports. The maintenance company contracted for the sprinkler installation will often have technical documents for the sprinklers. In some cases, the inspection reports held by your inspection body will specify when the sprinklers were installed and the dates of previous tests.

3 When should I have the sprinklers tested?

It is best to have the sprinklers tested periodically, depending on the age and type of sprinklers in the system.

Although the sprinkler heads have a long working life, they need to be tested more frequently over time as the heads become older. The test frequency that is stated in the requirements is based on the installation date. If you do not know the installation date, you can use the date that the sprinkler heads were manufactured instead (although the date of manufacture may be some time before the installation date).

The obligation to test sprinkler heads depends on the applicable standards and the requirements contained in those standards. In the Netherlands, NEN EN 12845 or NFPA 25 are often used.

NFPA 25 and NEN EN 12845 set out the following requirements with regard to this so-called Field Service Test:

NFPA 25, 2020 edition

A. 5.3.1.1 Sprinklers should be first given a visual inspection in accordance with 5.2.1.1.1 to determine if replacement is required. Sprinklers that have passed these visual inspections should be laboratory tested for sensitivity and functionality. The waterway should clear when sensitivity/functionality are tested.

EN 12845:2015/C:2016 Annex K

The pipes and the sprinklers should be inspected after 25 years.

A number of sprinklers should be removed and tested to ensure that they are fully functional.

The test frequency used will vary according to the type of sprinkler and it is specified in NFPA and EN 12845 as follows.

Test frequencies under NFPA 25 (2020) and EN 12845 (2015)

Type	Frequency under NFPA 25	Frequency under EN 12845
Standard response sprinklers	After 50 years, and then every 10 years	25 years
Dry sprinklers	After 15 years, and then every 10 years	
Sprinklers, fusible link sprinklers with extra high temperature classification ($\geq 163^{\circ}\text{C}$), (semi) continuous exposure to the maximum permitted ambient temperature	5 years	
Fast response sprinklers	After 20 years, and then every 10 years	
Sprinklers in 'heavy-duty' conditions	5 years for regular sprinklers 10 years for listed corrosion-resistant sprinklers	
Sprinklers (all types)	After 75 years and then every 5 years	

Test frequencies under NEN EN 12845 (2015)

NEN EN 12845 does not make a distinction between different types of sprinklers and it takes 25 years as the general frequency for testing sprinklers.

4 How many sprinklers should be tested?

When sprinklers are tested, this is done using a sample. The purpose of testing is to determine whether the effect of being installed for many years has impaired the operation of the sprinkler (aging effect). The batch to be tested must be a representative sample of the other sprinklers, made by the same manufacturer and of the same type. In this way, the test results can be used to gain an overview of the other sprinklers that are still installed. In order to make this comparison, the sprinklers in each batch must be of the same brand, type and model. In other words, the sprinklers in each batch must all have the same Sprinkler Identification Number (SIN) and have been installed under similar conditions. Both NFPA 25 and EN 12845:2015 describe the minimum number of sprinklers that have to be tested for each type of sprinkler^{*)}.

- NFPA specifies a batch composed of a minimum of 4 sprinklers or 1% of the number of sprinklers installed (the largest of these two numbers is decisive) for each type^{*)} of sprinkler installed under similar conditions.
- NEN EN 12845:2015 specifies that 20 sprinklers must be tested for every 5,000 sprinklers of that type^{*)}.

5 When should I replace the sprinkler heads?

All sprinklers in the system that have already been visually rejected must be replaced. Article 5.2.1.1.1 of the NFPA 25 (2020) states that the following characteristics are reasons for replacement:

- Leakage
- Corrosion
- Physical damage
- Loss of moisture from the heat-sensitive element (glass bulb)
- Contamination that impairs the performance of the sprinkler
- Paint

In addition, all sprinklers that have been installed for longer than the periods shown in the table above must be replaced, unless a laboratory test shows that they still function properly. The choice between testing and replacement is often based on economic reasons.

A cost analysis of the two options can provide a definite answer in advance. The deciding factor, in addition to the number of sprinklers, is also the anticipated test result.

However, the following applies in all cases: All sprinklers in the batch that did not make it through the test must be replaced. A batch 'passes the test' if the number of tested sprinklers meets the minimum requirement of the batch and all of the tested sprinklers still demonstrate that they meet the specifications.

6 Kiwa FSS Testing

6.1 Reliable test equipment

Kiwa FSS Testing has reliable test equipment for testing sprinkler heads. In our laboratory in Zaltbommel, we professionally and independently establish whether the sprinkler heads still function in accordance with the original design requirements and the applicable standards.

All of the sprinklers to be tested are identified and labelled (if they were not already labelled) and visually inspected after they have been received.

The sprinkler heads are then tested in accordance with the testing methods described in ISO 6182-1 and ISO 6182-7 or EN 12259-1, and are tested for the following aspects:

- Operating temperature test
- Water flow test (K-factor)
- Functional test (lodgement)

These tests are subject to accreditation.



The type of sprinkler will determine the standard that is chosen. Sprinklers with a K-factor of 160 are assessed under NEN-EN 12259-1, while sprinklers with a K-factor of more than 160 (e.g. the ESFR sprinklers) are assessed against the ISO 6182-7.

The test results are traceable and are recorded in a clear test result. Where relevant, the observations contained in the report are accompanied by photos.

6.2 Sending sprinklers to Kiwa FSS Testing

It is important that sprinklers sent to Kiwa FSS Testing for analysis do not get damaged after removal and during transport. The condition of the sprinkler at the start of the test should still be representative of the sprinkler system from which it was taken.

To make it easier to send the sprinklers, Kiwa FSS Testing provides shipping boxes as standard. You can request for these to be sent to you. These boxes are suitable for standard samples and are supplied with a pre-paid postal label. We recommend that the sprinklers are resealed immediately after they are removed so that the insides remain moist and the internal condition of the sprinklers that are tested in the laboratory is comparable to that of the sprinklers that are still installed.

In order to be able to use the results from the Field Service Test during inspection, it is important that the sprinklers selected for testing are representative of the sprinklers in the respective sprinkler system. It is crucial that the inspector is involved with the selection of the sprinklers so as to avoid any discussions at a later date about whether or not the selection is representative. For the test results to be traceable to the relevant sprinklers, it is important to mark (label) the sprinklers and to keep a record of the position of the sprinklers in the sprinkler system. Kiwa FSS Testing will make the test results and observations traceable in the report to the accompanying sprinkler marking.

6.3 Want to know more?

For more information and a no-obligation quotation, please visit our website:

<https://www.kiwa.com/nl/nl/service/kiwa-fss-testing-testlab-voor-sprinklers/>

Alternatively, contact us by:

- Email: nl.testlab.fss@kiwa.com
- or by telephone: +31 88 998 51 00