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# Irrigation equipment — Irrigation sprinklers —

## Part 4: Test methods for durability

*Matériel d'irrigation — Sprinklers d'irrigation —*

*Partie 4: Méthodes d'essai concernant la durabilité*

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# Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 18, *Irrigation and drainage equipment and systems*.

A list of all parts in the ISO 15886 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.


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# Irrigation equipment — Irrigation sprinklers —

# Part 4: Test methods for durability

## 1 Scope

This document specifies the conditions and methods for testing the durability of rotating sprinklers for irrigation.

The term sprinkler is used here in a broad generic sense and is meant to cover a wide variety of products as classified in ISO 15886-1, which applies to all irrigation sprinkler classifications having both static parts and moving parts during operation, as defined by the manufacturer.

For any given sprinkler, a wide range of nozzle configurations, operating conditions, and adjustments generates at least a theoretical need for a correspondingly large number of tests. Testing agencies and manufacturers can use interpolation techniques to reduce the number of actual test runs, provided accuracy standards are still being met.

## 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.

ISO 15886-3:2012, *Agricultural irrigation equipment — Sprinklers — Part 3: Characterization of distribution and test methods*

## 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:

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

— IEC Electropedia: available at http://www.electropedia.org/

**3.1**
**ambient temperature**
temperature of the air surrounding a sprinkler

**3.2**
**area of coverage**
area within the wetted boundary from a sprinkler operated within the range of effective application rates specified in the manufacturer's literature

**3.3**
**clean water**
water processed, if necessary, so as to contain suspended particles no larger than 74 microns (200 mesh) equivalent and to contain no dissolved chemicals known to have short-term effects on sprinklers materials

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**3.4**
**distribution curve**
graphical plot of water application depth as a function of distance from a sprinkler along a specified radius

**3.5**
**distribution uniformity**
**DU**
coefficient using the lowest 25 % of water application depths to characterize the uniformity of field-measured or simulated water application from a grid of sprinklers

**3.6**
**flow rate**
volume of water passing through a device per unit of time

**3.7**
**full grid collector arrays**
collectors located at the intersections of a two-dimensional geometric grid pattern sufficient in number to give a desired statistical basis for determining water *distribution uniformity* (3.5)

**3.8**
**inlet connection size**
nominal pipe size designation for commercial purposes or for manufacturer's declaration defined by reference to a recognized standard

**3.9**
**maximum working pressure**
$P_{max}$
highest water pressure at the inlet to a sprinkler recommended by the manufacturer to ensure proper operation

**3.10**
**minimum working pressure**
$P_{min}$
lowest pressure at the inlet to a sprinkler recommended by the manufacturer to ensure proper operation

**3.11**
**nozzle**
aperture of a sprinkler through which the water is discharged

**3.12**
**nozzle pressure**
pressure measured immediately upstream from a *nozzle* (3.11) or as inferred by a Pitot tube measurement at the nozzle orifice

**3.13**
**nozzle size**
numerical size designation used for commercial purposes with no specific relationship to the actual dimensions of a nozzle

**3.14**
**part-circle sprinkler**
sprinkler with an adjustable feature that enables it to irrigate a sector of a circular area, either with or without an attachment which enables it to be adjusted to irrigate another sector or the entire circular area

**3.15**
**regulated sprinkler**
sprinkler that maintains a relatively constant flow rate at varying water pressures at the sprinkler inlet within the limits specified by the manufacturer


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**3.16**
**radius of throw**
distance measured from a centreline of a continuously operating sprinkler to the most remote point at which the sprinkler deposits water at the minimum effective application rate, measured at any arc of coverage except near the arc extremes for *part-circle sprinklers* (3.14), also called wetted radius

**3.17**
**rotating sprinkler**
water distribution device which, as a result of rotating motion around its axis, distributes water over a circular area, part of a circular area or a non-circular area

**3.18**
**statistical uniformity coefficient**
**UCS**
coefficient using standard deviation as a measure of dispersion in statistical theory to characterize the uniformity of field-measured water application from a full grid of sprinklers

**3.19**
**test pressure**
pressure at the inlet of a sprinkler declared by the manufacturer as the pressure to be used for test purposes

**3.20**
**working pressure**
water pressure recommended by the manufacturer to ensure proper operation of a sprinkler

## 4 Installation of sprinklers under test

The sprinkler selected for testing shall be representative of general production capabilities particularly as it relates to speed of rotation.

Mount the test sprinkler in accordance with the manufacturer's installation instructions for normal operation in the field including the manner of installation, tightening torque, maximum/minimum force required to assemble.

Mount the sprinkler on a riser with nominal size designation the same as the sprinkler inlet connection. Ensure that the riser is fixed rigidly vertically and that it does not vibrate enough to cause a visual effect on the sprinkler operation, bend or deviate from the vertical position during the test. The maximum allowable deviation from the vertical position during the test is 2°.

The use of a steel pipe or a rigid plastic riser is recommended to provide the required mechanical strength and facilitate the installation of a standard pressure tap.

If the manufacturer specifies any special operating conditions on items that are provided as standard equipment with the sprinkler, they shall be used.

For a sprinkler which is not riser-mounted as described above, the test mounting shall be as specified by the manufacturer.

## 5 Measurements

### 5.1 Accuracy of measurements

Pressure shall be measured with an accuracy of ±1,0 %.

Flow rate through the sprinkler shall be measured with an accuracy of ±2,0 %.

Temperature shall be measured with an accuracy of ±0,5 °C.

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