SLOVENSKI STANDARD
SIST EN ISO 11545:2001

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Oprema za namakanje kmetijskih povrġin - Naprave z vrtljivimi in boļ nimi krili s ġkropilnimi in razprġilnimi ġobami - Doloļ anje enakomernosti porazdelitve vode (ISO 11545:2001)

Agricultural irrigation equipment - Centre-pivot and moving lateral irrigation machines with sprayer or sprinkler nozzles - Determination of uniformity of water distribution (ISO 11545:2001)

Landwirtschaftliche Bewässerungsausrüstung - Kreis- und Linearberegnungsmaschinen mit Sprühern oder Regnern - Bestimmung der Gleichförmigkeit der Wasserverteilung (ISO 11545:2001)

Matériel agricole d'irrigation - Pivots et rampes frontales équipées de buses d'arrosage ou d'asperseurs - Méthode de détermination de l'uniformité de la distribution d'eau (ISO 11545:2001)

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65.060.35	Namakalna in drenažna oprema	Irrigation and drainage equipment

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English version

Agricultural irrigation equipment - Centre-pivot and moving lateral irrigation machines with sprayer or sprinkler nozzles - Determination of uniformity of water distribution (ISO 11545:2001)

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Landwirtschaftliche Bewässerungsausrüstung - Kreis- und Linearberegnungsmaschinen mit Sprühern oder Regnern - Bestimmung der Gleichförmigkeit der Wasserverteilung (ISO 11545:2001)

This European Standard was approved by CEN on 30 June 2001.

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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 Management Centre 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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Foreword

The text of the International Standard ISO 11545:2001 has been prepared by Technical Committee ISO/TC 23 "Tractors and machinery for agriculture and forestry" in collaboration with Technical Committee CEN/TC 334 "Irrigation techniques", the secretariat of which is held by AFNOR.

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 February 2002, and conflicting national standards shall be withdrawn at the latest by February 2002.

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.

Endorsement notice

The text of the International Standard ISO 11545:2001 was approved by CEN as a European Standard without any modification.

INTERNATIONAL STANDARD

ISO 11545

Second edition
2001-08-01

Agricultural irrigation equipment — Centre-pivot and moving lateral irrigation machines with sprayer or sprinkler nozzles — Determination of uniformity of water distribution

Matériel agricole d'irrigation — Pivots et rampes frontales équipés de buses d'arrosage ou d'asperseurs — Méthode de détermination de l'uniformité de la distribution d'eau

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

International Standard ISO 11545 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 18, *Irrigation and drainage equipment and systems*.

This second edition cancels and replaces the first edition (ISO 11545:1995), which has been technically revised.

Annex A forms a normative part of this International Standard.

Agricultural irrigation equipment — Centre-pivot and moving lateral irrigation machines with sprayer or sprinkler nozzles — Determination of uniformity of water distribution

1 Scope

This International Standard specifies a method for determining the uniformity of water distribution in the field from centre-pivot and moving lateral irrigation machines equipped with sprayer and sprinkler nozzles. The calculation of the coefficient of uniformity is also specified.

This International Standard is applicable to irrigation machines for which the water application device is more than 1,5 m above the soil surface and for which the water distribution from successive devices overlaps.

This International Standard is not applicable to the evaluation of centre-pivot irrigation machines equipped with various corner arm application devices.

2 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

2.1
centre-pivot irrigation machine
automated irrigation machine consisting of a number of self-propelled towers supporting a pipeline rotating around a pivot point and through which water supplied at the pivot point flows radially outward for distribution by sprayer or sprinkler nozzles located along the pipeline

2.2
moving lateral irrigation machine
automated irrigation machine consisting of a number of self-propelled towers supporting a pipeline moving in such a way that the pipeline remains generally in a straight line, traversing the field in a straight path, and through which water supplied to the irrigation machine at any point along the pipeline flows for distribution over a basically rectangular area by sprayer or sprinkler nozzles located along the pipeline

2.3
sprinkler package
collection of devices fitted to the outlets of either centre-pivot or moving lateral irrigation machines, potentially consisting of sprayers or sprinklers and potentially including piping, pressure or flow-control devices and supporting plumbing designed for a specific irrigation machine and set of operating parameters

2.4
endgun
set of one or more sprayer or sprinkler nozzles installed on the distal end(s) of a centre-pivot or moving lateral irrigation machine to increase the irrigated area, and usually operating for only a portion of the time to conform to system boundaries

2.5
test pressure
pressure of a centre-pivot or moving lateral irrigation machine measured at the first available outlet downstream from the elbow or the tee at the top of the inlet structure

2.6
effective radius
radius of the circular-field area to be irrigated by a centre-pivot irrigation machine, conventionally calculated as the distance from the pivot point to the terminal sprayer or sprinkler on the pipeline plus 75 % of the wetted radius of the terminal sprayer or sprinkler

2.7
effective length
dimension parallel to the pipeline of the area to be irrigated by a moving lateral irrigation machine, conventionally calculated as the distance between the two most distant end sprayers or sprinklers on the pipeline plus 75 % of the wetted radius of each end sprayer or sprinkler, except where a portion of the area under the pipeline is used for the water supply system and not crop production, in which case that distance is excluded from the effective length

2.8
wetted radius
distance measured from the centreline of a sprayer or sprinkler to the most remote point at which the application rate of the individual nozzle declines to approximately 1 mm/h, based on tests conducted when there is no wind

2.9
applied depth
d_i
adjusted volume of water caught in each collector in an array of collectors plus the average amount of water that evaporates while the water is in the collector, divided by the area of the collector opening

2.10
collector
receptacle into which the water discharged by a water distribution device is deposited during a test for radius of throw or by several water distribution devices during a test for distribution uniformity

2.11
client
person(s) or organization for whom a test is performed

2.12
tester
person(s) or organization who conduct(s) a test

3 Test conditions and equipment

3.1 Collectors

3.1.1 Ensure that all collectors used for a test are identical and shaped such that water does not splash in or out. Ensure that the lip of the collector is symmetric and without depressions. Ensure that the height of the collectors is at least 120 mm. Ensure that the entrance diameter of each collector is within the range of from half to full height of the collector, but not less than 60 mm. To minimize measurement error, testers are encouraged to use collectors that are as large as practicable.

3.1.2 Place the collectors uniformly along two or more straight lines perpendicular to the direction of travel of the machine. Ensure that the collector spacing within each line is not more than 3 m for sprayers and 5 m for sprinklers. To minimize systematic errors, adjacent lines of collectors should be offset. The offset should be 1/nth the collector spacing, where n is the number of collector lines (see Figure 1 and Figure 2 for collector layout detail). Ensure that the distance between the collectors is not a multiple of the distance between the sprayers or sprinklers. Collectors should be moved to avoid wheel tracks. Record the location of the collectors.

3.1.3 Place the lines of collectors so that the distance between lines is as follows.

For centre-pivot irrigation machines, locate the collectors along two or more lines extending radially from the pivot point. Ensure that the distance between distal ends of the radial lines is no more than 50 m. Record the spacing pattern (Figure 1).

For moving lateral irrigation machines, locate the collectors along two or more lines parallel to the pipeline. Ensure that the lines of the collectors extend across the effective length of the machine and are not more than 50 m apart. Record the spacing pattern (Figure 2).

3.1.4 Locate the collectors so that obstructions, such as the crop canopy, do not interfere with the measurement of water application. When an obstruction is higher than the elevation of the collector, but below the nozzle height, maintain a horizontal unobstructed distance of at least twice the height of the obstruction on both sides of the collector rows (Figure 3, case A). For systems with nozzles that operate below the crop canopy height, maintain a horizontal unobstructed distance of at least 1,25 times the wetted radius of the nozzle on each side of the collector rows (Figure 3, case B).

3.1.5 Ensure that the entrance portion of the collectors is level. When wind velocities during the test are expected to exceed 2 m/s, the entrance of the collectors should be no more than 0,3 m above ground or crop canopy. Ensure that the discharge height of the sprayer or sprinkler is at least 1 m above the elevation of the collector. Record the height of the sprayer or sprinkler nozzles and the entrance to the collectors.

3.2 Wind

3.2.1 Measure wind velocity during the test period with a rotating anemometer or equivalent device.

3.2.2 Determine the wind direction, relative to the line of collectors, with a vane indicating at least eight points of the compass.

3.2.3 Locate the equipment for measuring wind velocity at a height of 2 m and within 200 m of the test site, in a location representative of the wind conditions at the test site.

3.2.4 Ensure that the anemometer has a threshold velocity not exceeding 0,3 m/s and is capable of measuring the actual velocity to within ± 10 %.

3.2.5 The accuracy of the test procedure begins to decrease when the wind velocity exceeds 1 m/s. The test should not be used as a valid measure of the uniformity or performance of a sprinkler package if the wind velocity exceeds 3 m/s. To test at wind velocities greater than 3 m/s, the client and tester must understand the limitations of the test results. Measure and record the wind velocity and the direction prevailing at the time of the test at intervals not longer than 15 min.

3.3 Evaporation

3.3.1 The test should be conducted during periods that minimize the effect of evaporation, such as at night or during early daylight hours. Measure and record dry bulb temperature, as well as either wet bulb temperature, relative humidity or dew point temperature, upwind from the machine and near the beginning and end of the test. Record the time of day for the measurement.

3.3.2 To minimize the effect of evaporation from collectors during the test, measure and record the volume of water in each collector as soon as possible after the collector is no longer within the range of the water pattern. If the volume caught in each collector is to be adjusted for evaporation loss, estimate the time that each collector contains water, i.e. from the time the collector is first within the range of the water pattern until the collector volume is measured.

3.3.3 If an adjustment is made on the collected data to account for evaporation from the collectors, place a minimum of three control collectors containing the anticipated catch at the test site and monitor them to determine the rate of evaporation. Locate the control collectors where the microclimate is essentially unaffected by the operation of the machine. This is normally upwind from the test area. Record the time of day when control collectors are measured.