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AGRICULTURAL IRRIGATION EQUIPMENT - CENTRE-PIVOT AND MOVING LATERAL IRRIGATION MACHINES WITH SPRAYER OR SPRINKLER NOZZLES - DETERMINATION OF UNIFORMITY OF WATER DISTRIBUTION

SRI LANKA STANDARDS INSTITUTION

Sri Lanka Standard

AGRICULTURAL IRRIGATION EQUIPMENT — CENTRE-PIVOT AND MOVING LATERAL IRRIGATION MACHINES WITH SPRAYER OR SPRINKLER NOZZLES — DETERMINATION OF UNIFORMITY OF WATER DISTRIBUTION

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This Standard does not purport to include all the necessary provisions of a contract

Sri Lanka Standard
AGRICULTURAL IRRIGATION EQUIPMENT — CENTRE-PIVOT AND MOVING LATERAL IRRIGATION MACHINES WITH SPRAYER OR SPRINKLER NOZZLES — DETERMINATION OF UNIFORMITY OF WATER DISTRIBUTION

NATIONAL FOREWORD

This Sri Lanka Standard was approved by the Sectoral Committee on Agriculture and was authorized for adoption and publication as a Sri Lanka Standard by the Director General as vice chairperson of council on 2020-12-21 in the absence of chairman. This was ratified by the Council of Sri Lanka Standards Institution on 2021-01-13.

This Sri Lanka Standard is identical with **ISO 11545:2009** Agricultural irrigation equipment — Centre-pivot and moving lateral irrigation machines with sprayer or sprinkler nozzles — Determination of uniformity of water distribution, published by the International Organization for Standardization (ISO).

ISO 11545:2009 specifies an in-field method for determining the uniformity of water distribution in the field from center-pivot and moving lateral irrigation machines equipped with sprayer or sprinkler nozzles. The calculation of the coefficient of uniformity is also specified.

It is applicable to agricultural 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. It is not applicable to the evaluation of center-pivot irrigation machines equipped with various corner arm application devices.

Terminology and conventions

The text of the International Standard has been accepted as suitable for publication, without deviation, as a Sri Lanka Standard. However, certain terminology and conventions are not identical with those used in Sri Lanka Standards. Attention is therefore drawn to the following:

a) Wherever the words “International Standard” appear referring to this standard, they should be interpreted as “Sri Lanka Standard”.

b) The comma has been used throughout as a decimal marker. In Sri Lanka Standards it is the current practice to use a full point on the baseline as the decimal marker.

c) Wherever page numbers are quoted, they are ISO page numbers.

The test temperature adopted in Sri Lanka is 27 ± 2 ^{0}C and relative humidity 65 + 5 per cent is recommended.

SLS ISO 11545: 2020

INTERNATIONAL STANDARD

ISO 11545

Third edition
2009-11-15

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 — Détermination de l'uniformité de la distribution d'eau

Reference number
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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 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

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 third edition cancels and replaces the second edition (ISO 11545:2001), which has been technically revised.

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

This International Standard is applicable to agricultural 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.

It 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 document, 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 sprayers or sprinklers located along the pipeline

2.2
moving lateral irrigation machine
automated irrigation machine consisting of a number of self-propelled towers supporting a pipeline transverse to the direction of travel 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 is distributed over a basically rectangular area by sprayers or sprinklers located along the pipeline

2.3
sprinkler
water-distribution device of a variety of sizes and types

EXAMPLE Impact sprinkler, fixed nozzle sprinkler, irrigation gun.

2.4
irrigation sprayer
device that discharges water in the form of fine jets or in a fan shape without rotational movement of its parts

2.5
sprinkler package
collection of water-distribution devices fitted to the outlets of either centre-pivot or moving lateral irrigation machines, either with or without moving components, piping, pressure or flow-control devices and supporting plumbing designed for a specific irrigation machine and set of operating parameters

2.6
endgun
set of one or more sprayers or sprinklers 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 field boundaries

2.7
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 to the pipeline

2.8
effective radius
radius of the circular-field area to be irrigated by a centre-pivot irrigation machine, measured as the distance from the pivot point to the terminal sprayer or sprinkler on the pipeline

2.9
effective length
dimension parallel to the pipeline of a moving lateral machine, measured as the distance between the two most distant end sprayers or sprinklers on the pipeline, except where a portion of the area under the pipeline is used for the water supply system and not for crop production, in which case that distance is excluded

2.10
wetted radius
r_{w}
distance measured from the centreline of a sprayer or sprinkler to the last collector with measurable water or estimated from the manufacturer's catalogue data as half of the diameter of coverage

2.11
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

2.12
collector
receptacle into which the water is deposited during a water distribution test

2.13
client
person(s) or organization for which a test is performed

2.14
tester
person(s) or organization that conduct(s) a test

3 Test conditions and equipment

3.1 Collectors

3.1.1 All collectors used for a test shall be identical and shaped such that water does not splash in or out. The lip of the collector shall be symmetric and without depressions. The height of each collector shall be at least twice the maximum depth of the water collected during the test, but not less than 150 mm. It shall have a circular opening with sharp edges free from deformities. The diameter shall be at least half the height, but shall not be less than 85 mm. To minimize measurement error, it is recommended that testers 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. The maximum collector spacing within each line shall be in accordance with Table 1. Collectors shall not be located where the sprayer or sprinkler pattern is affected by the tower structural components.

Table 1 — Maximum spacing for collectors

Sprayer or sprinkler wetted radius m	**Maximum collector spacing** m
< 10	3
$\geqslant 10$	5

To minimize systematic errors, collectors of adjacent lines should be offset. The offset should be 1/nth the collector spacing, where n is the number of collector lines (see Figures 1 and 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 the collectors so that the distance between the 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 (see 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 (see 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 water-distribution device height, maintain a horizontal unobstructed distance of at least twice the height of the obstruction on both sides of the collector rows (see Figure 3, case A). For systems with water-distribution devices that operate below the crop canopy height, maintain a horizontal unobstructed distance of at least 1,25 times the wetted radius of the sprayer or sprinkler on each side of the collector rows (see Figure 3, case B).

3.1.5 The entrance portion of the collectors shall be 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. The discharge height of the sprayer or sprinkler shall be at least 1 m above the top 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 the 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 $\pm$ 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 5 m/s. To test at wind velocities greater than 5 m/s, the client and tester should understand the limitations of the test results. Measure and record the wind velocity and the direction prevailing at the beginning and end of the test and during 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.

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. To adjust the volume caught in each collector for evaporation loss, estimate the time during which 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 To account for evaporation from the collectors, place a minimum of three control collectors containing the anticipated catch at the test site. Record the volume of water in each collector before and after the test and record the time of day each collector was put in place and when it was recorded after the test. Calculate the mean evaporation rate from the control collectors (E_i) (for reporting, see A.1). The dimensions of the control collectors shall be identical to the collectors specified in 3.1.1. Locate the control collectors where the microclimate is essentially unaffected by the operation of the machine. This is normally upwind from the test area.

3.3.4 Employ appropriate procedures for minimizing evaporation. These include the use of evaporation suppressants or specially designed collectors. Record the methods used to suppress evaporation, including, if applicable, the type of suppressant.

3.4 Elevation

Conduct the test in an area having elevation differences that are within the design specifications of the sprinkler package. Measure elevation differences with an instrument capable of measuring an elevation change of ± 0,2 m over a distance of 50 m. Include a sketch of the ground surface profile along each line of collectors with the test results, unless the ground surface is level.

4 Test procedures

4.1 Before testing an irrigation machine, verify that the sprinkler package has been installed according to the design specifications, unless otherwise specified by the client.

4.2 Adjust and maintain the pressure of the water supplied to the irrigation machine during the test to within ± 5 % of a test pressure mutually agreed upon by client and tester. Ensure that the pressure measurement device is capable of accurate measurement to within ± 2 % of the test pressure. Record the test pressure.

4.3 Operate the irrigation machine at a speed that will deliver an average depth of application of not less than 15 mm, unless otherwise specified by the client.

4.4 Record the application depth data by measuring the volume or, alternatively, the mass or depth of water collected in the collectors. Adjust for evaporation as follows: adjusted catch volume (V_i) equals catch volume recorded in each collector (V_{ci}) plus the average amount of water evaporated from the control collectors during the time (t_i) water was in the specific collector (for reporting, see A.2). Ensure that the measurement device is accurate to within ± 3 % of the average amount of water collected.

4.5 Eliminate any obviously incorrect data points caused by occurrences such as leakage, tipped collectors or other explainable variances from the water distribution analysis. Ensure that the number of eliminated observations does not exceed 3 % of the total number of depth measurements. Report all observations. Record the number of eliminated observations, together with the reasons for their elimination.

4.6 Eliminate from the analysis those observations beyond the effective radius or effective length of the irrigation machine.

4.7 If the sprinkler package is designed with an endgun, perform the test with the endgun operating in the same operational mode as used for designing the sprinkler package. The number of sprayers or sprinklers should remain constant during the test. If desired, the test may also be performed with the endgun not in operation in order to evaluate the water distribution for those conditions.

4.8 The data from up to 20 % of the collectors on the inner portion of the total length of a centre-pivot irrigation machine can be eliminated from the water distribution analysis if mutually agreed upon by the tester and the client. Collectors need not be placed in the inner portion of the centre-pivot irrigation machine if the intent of the test is to determine the water distribution with the inner portion of the centre-pivot irrigation machine excluded from the analysis.

5 Calculations

5.1 Calculate the coefficient of uniformity for a centre-pivot irrigation machine using the modified formula of Heermann and Hein [1]. Additional performance parameters may be used to characterize the water distribution uniformity. The tester shall clearly identify any such additional parameters, including the calculation formula.

The modified formula of Heermann and Hein is:

$$C_{\text{uH}} = 100 \left[1 - \frac{\sum_{i=1}^{n} \left| V_i - \overline{V}_{\text{w}} \right| S_i}{\sum_{i=1}^{n} \left(V_i S_i \right)} \right]$$

where

C_{uH} is the Heermann and Hein coefficient of uniformity;

n is the number of collectors used in the data analysis;

i is a number assigned to identify a particular collector, normally beginning with the collector located nearest the pivot point (i = 1) and ending with $i = n$ for the collector furthest from the pivot point;

V_i is the volume (or, alternatively, the mass or depth) of water collected in the ith collector;

S_i is the distance of the ith collector from the pivot point;

$\overline{V}_{\text{w}}$ is the weighted average volume (or, alternatively, the mass or depth) of water collected, computed as:

$$\overline{V}_{\text{w}} = \frac{\sum_{i=1}^{n} V_i S_i}{\sum_{i=1}^{n} S_i}$$

5.2 Calculate the coefficient of uniformity for a moving lateral irrigation machine using the Christiansen [2] formula. Additional performance parameters may be used to characterize the water distribution uniformity. The tester shall clearly identify any such additional parameters, including the calculation formula.

The Christiansen formula is:

$$C_{\mathrm{uC}} = 100\left[1 - \frac{\sum_{i=1}^{n}\left|V_i - \overline{V}\right|}{\sum_{i=1}^{n} V_i}\right]$$

where

C_{uC} is the Christiansen coefficient of uniformity;

n is the number of collectors used in the data analysis;

V_i is the volume (or, alternatively, the mass or depth) of water collected in the ith collector;

$\overline{V}$ is the arithmetic average of the volume (or, alternatively, the mass or depth) of water collected by all collectors used in the data analysis, computed as:

$$\overline{V} = \frac{\sum_{i=1}^{n} V_i}{n}$$

5.3 Calculate C_{uH} or C_{uC}, whichever is appropriate, for each line of collectors. Calculate a combined coefficient of uniformity, C_{uH} or C_{uC}, using the data from all lines of collectors.

5.4 If an irrigation machine with an endgun is tested, use the procedure given in 4.7 to measure the coefficient of uniformity when the endgun is on, and, optionally, when it is off. To characterize the operation of the endgun, record (see A.1) the approximate area of the field irrigated while the endgun is operating and the approximate area irrigated while the endgun is turned off.

5.5 Prepare a graph showing the volume (or, alternatively, the mass or depth) of water collected in each collector, plotted against the distance from the pivot point or along the lateral, together with the positions of the towers and sprayers or sprinklers. Plot the data from each line of collectors separately.

6 Evaluation

6.1 The calculated coefficient of uniformity shall be used as an indicator of sprinkler package performance with respect to the field, environment, pressure conditions and pressure variations prevailing during the test. The coefficient of uniformity of a new sprinkler package can be used for the comparison of different types of sprinkler packages and as a reference for similar irrigation machines that have been used for a period of time.

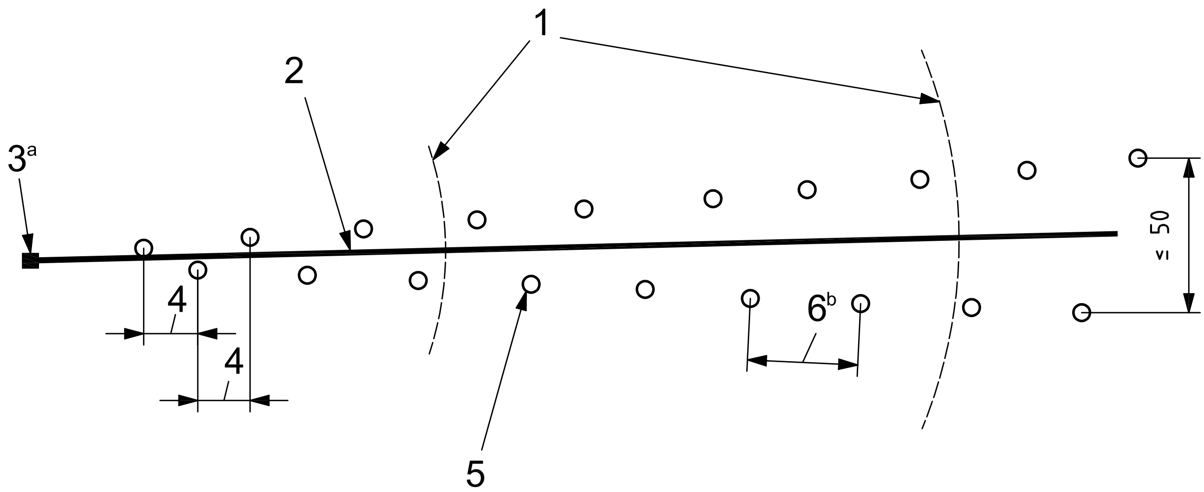
6.2 If the coefficient of uniformity for an installed irrigation machine deviates substantially from the value specified in the initial design, conduct other investigations to determine the cause. A coefficient of uniformity smaller than the design value may indicate worn, broken or malfunctioning water-application devices.

6.3 The graph of the depth applied along the lateral can help identify problems in the operation of an irrigation machine. Locations along the lateral where the depth applied is 10 % higher or lower than the average depth should be investigated to determine the cause of the variation.

7 Reporting of test results

Record the data measured for this test on forms similar to the standard data presentation forms given in A.1 and A.2, and the test summary form shown in A.3. Document and explain special arrangements between the client and the tester. Justify data inconsistencies on the data forms. Include with the test results additional data not required by this International Standard if that data will help characterize uniformity of water distribution.

Dimensions in metres



Key

1 wheel tracks
2 centre-pivot lateral
3 pivot point
4 offset
5 *i*th collector of *j*th line (staggered from other line)
6 collector spacing

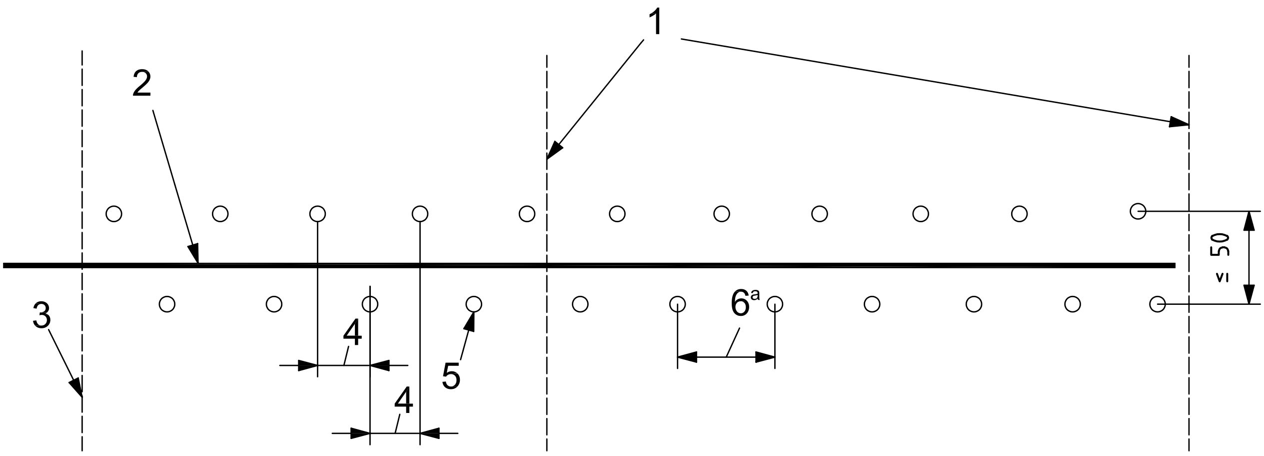
NOTE The collector offset is approximately equal to 1/*n*th the collector spacing, where *n* is the number of collector lines.

[a] Reference point for S_i (distance of *i*th collector from the pivot point).

[b] Maximum spacing for collectors: 3 m for $r_w < 10$ m; 5 m for $r_w \geqslant 10$ m.

Figure 1 — Collector layout for determining water distribution of centre-pivot irrigation machines

Dimensions in metres



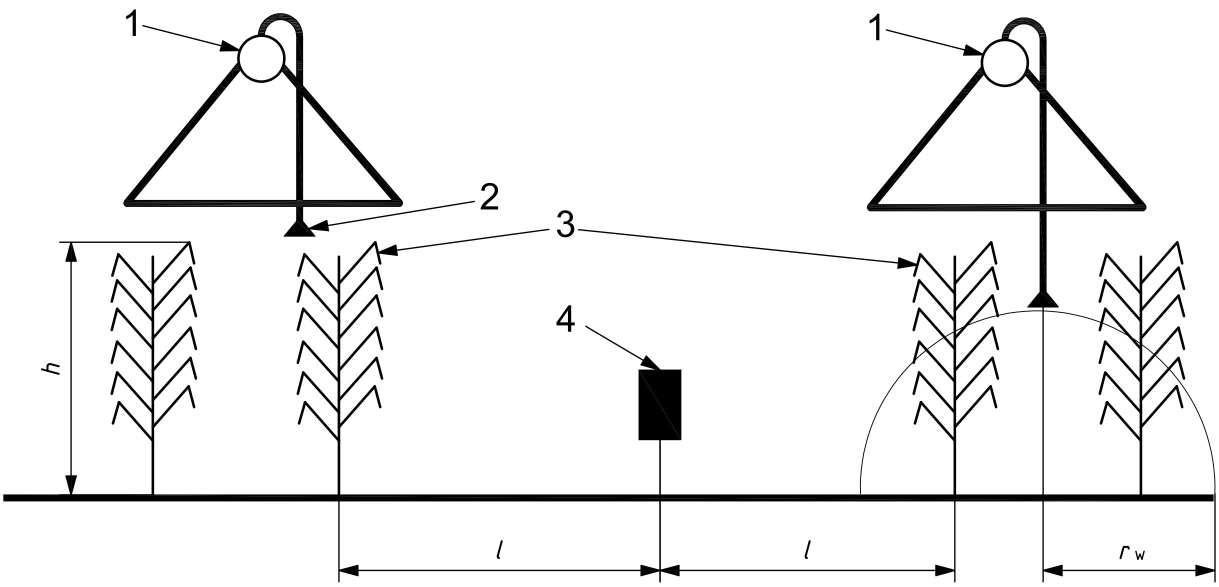
Key

1 wheel tracks
2 moving lateral
3 arbitrary reference position for distance
4 offset
5 ith collector of jth line
6 collector spacing

NOTE The collector offset is approximately equal to $1/n$th the collector spacing, where n is the number of collector lines.

[a] Maximum spacing for collectors: 3 m for $r_w < 10$ m; 5 m for $r_w \geqslant 10$ m.

Figure 2 — Collector layout for determining water distribution of moving lateral irrigation machines



Case A: water-distribution device above crop canopy ($l \geqslant 2$ h)

Case B: water-distribution device below crop canopy ($l \geqslant 1{,}25\ r_w$)

Key

1 pipeline

2 water-distribution device

3 obstruction (crop)

4 collector

r_w wetted radius

h height of obstruction

Figure 3 — Guidelines for placement of collectors with obstructions (e.g. crops) during testing

Annex A
(normative)

Sample data sheets and test report forms for required information

A.1 Field and machine data sheet

Test identification: ....

Location of test: ....

Machine description

Manufacturer/model: ....

Number of towers: ....

Distance between pivot and end tower: .... m

Lateral length

segment 1: .... m   segment 2: .... m   segment 3: ....m

Diameter of lateral pipe

segment 1: .... m   segment 2: .... m   segment 3: ....m

Type of sprinkler package:

Pressure regulators: .... Yes   .... No

Location of pressure regulators: refer to attached drawing

Pressure rating of pressure regulator: refer to attached drawing

Endgun: approximate area irrigated with

— endgun off: ....ha

— endgun on: ....ha

Nominal height of nozzle or distribution plate above ground: .... m

Height of top of collector above ground: .... m

Operating conditions

Test pressure: .... kPa

Machine speed

— elapsed time of test: ....h

— distance end tower travelled: .... m

— centre-pivot end tower: .... m/h

— moving lateral: .... m/h

— timer setting: .... %

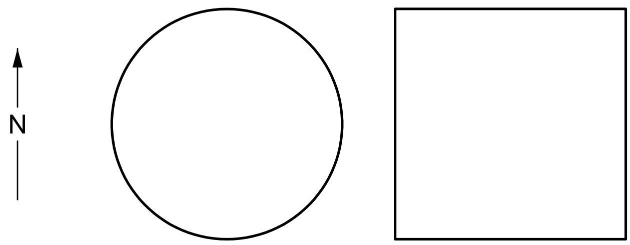
— timer cycle duration (time on+off): ....s

Evaporation calculation from control collectors

Collector No.	Initial volume ml	Time of day collector place h min	Final volume ml	Time of day collector recorded h min	Volume lost ml	Time collector contained water h	Evaporation rate ml/h
1							
2							
3							
Mean evaporation rate, E_i							

Field Layout

Show lateral location during test.



Centre pivot   Moving lateral

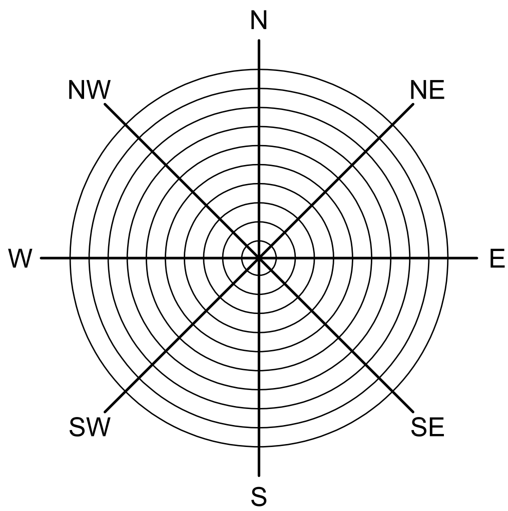
Wind information

Plot wind vector for each wind measurement.

NOTE Each concentric circle is equivalent to 1 m/s, with the outside circle equal to 10 m/s.

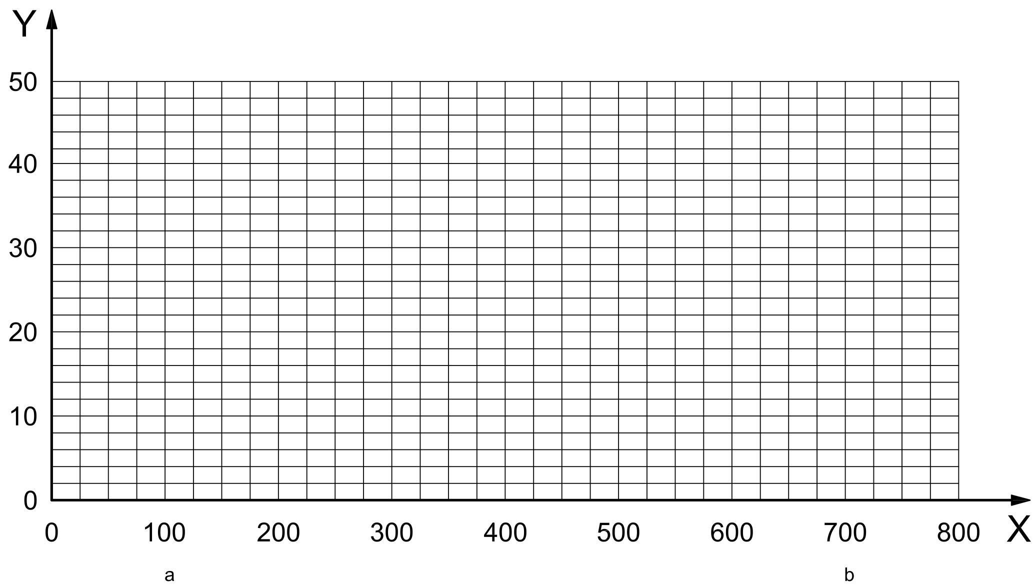
Agreed maximum wind velocity for test: .... m/s

Mean wind velocity during test: .... m/s



Lateral elevation:

Plot the approximate relative field elevation of the lateral during the test on the graph.



Key

X distance along lateral, m

Y difference in field elevation, m

[a] Entrance.

[b] End.

A.2 Sample data sheet to record test results

Test identification: ....

Collector line number: ....

Diameter of collectors (D_c): .... mm

Area of collector opening [$A_c = 0{,}785(D_c)^2$]: .... mm^2

Nominal spacing of collectors: .... m

Nominal spacing between collector lines: .... m

Offset: .... m

Mean evaporation rate from control collectors (E_i): .... ml/h

Collector No. i	**Indication for eliminated data**[a]	**Distance of collector from pivot**[b] S_i m	**Estimated time of day collector first within range of water pattern** h min	**Time of day collector volume measured** h min	**Time collector contained water** t_i h	**Catch volume** V_{ci} ml	**Adjusted catch volume**[c] V_i ml	**Applied depth**[d] d_i mm	**Product of distance and volume**[e] S_iV_i
	$\sum S_i$					$\sum V_i$		$\sum S_iV_i$	

a Mark if data eliminated (see 4.5).

b Ignore this column for moving lateral systems.

c The adjusted volume equals the volume collected in each collector plus the average amount of water evaporated from the control collectors during the time (t_i) water was in the specific collector, i.e.:

$$V_i = V_{ci} + E_i t_i$$

d $d_i = 1\,000\ V_i/A_c$

e The product of distance and volume is used only for calculating the coefficient of uniformity for centre-pivots.

A.3 Test summary sheet

Test identification: ....

Wetted radius of terminal sprayer or sprinkler (2.10): .... m

Centre-pivot

Distance from pivot point to terminal sprayer or sprinkler: .... m

Effective radius (2.8): .... m

Moving lateral

Distance between the two most distant sprayers or sprinklers: .... m

Distance under pipeline used for water supply: .... m

Effective length (2.9): .... m

Number of collectors installed: ....

Number of collectors used in analysis (n): ....

Percentage of collectors omitted from analysis: .... %

Reason(s) for exclusion: ....

....

....

....

Weighted Averages			**Collector Line**				
			1	**2**	**3**	**4**	**Total or combined**
a) Centre-pivot							
Sum of volume (mass or depth) and distance product	$\sum_{i=1}^{n} V_i S_i$	=	______	______	______	______	______
Sum of distances	$\sum_{i=1}^{n} S_i$	=	______	______	______	______	______
Weighted average volume (mass or depth)	$\overline{V}_{\text{w}} = \frac{\sum_{i=1}^{n} V_i S_i}{\sum_{i=1}^{n} S_i}$	=	______	______	______	______	______
Coefficient of uniformity	$C_{\text{uH}} = 100\left[1 - \frac{\sum_{i=1}^{n} \left\lvert V_i - \overline{V}_{\text{w}} \right\rvert S_i}{\sum_{i=1}^{n} (V_i S_i)}\right]$	=	______	______	______	______	______
b) Moving lateral							
Average volume (mass or depth)	$\overline{V} = \frac{\sum_{i=1}^{n} V_i}{n}$	=	______	______	______	______	______
Coefficient of uniformity	$C_{\text{uC}} = 100\left[1 - \frac{\sum_{i=1}^{n} \left\lvert V_i - \overline{V} \right\rvert}{\sum_{i=1}^{n} V_i}\right]$	=	______	______	______	______	______

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[1] HEERMANN, D.F. and HEIN, P.R. Performance characteristics of self-propelled center pivot sprinkler irrigation systems. *Transactions of the ASAE,* 1968, **11**, No. 1, pp. 11-15

[2] CHRISTIANSEN, J.E. *Irrigation by Sprinkling*. Bulletin 670*,* 1942. University of California, College of Agriculture, Agricultural Experiment Station, Berkeley, California

[3] American Society of Agricultural Engineers Standard ASAE S436, *Test Procedure for Determining the Uniformity of Water Distribution of Center Pivot and Lateral Move Irrigation Machines Equipped with Spray or Sprinkler Nozzles*

ICS 65.060.35

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SRI LANKA STANDARDS INSTITUTION

The Sri Lanka Standards Institution (SLSI) is the National Standards Organization of Sri Lanka established under the Sri Lanka Standards Institution Act No. 6 of 1984 which repealed and replaced the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Science & Technology.

The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

The Institution is financed by Government grants, and by the income from the sale of its publications and other services offered for Industry and Business Sector. Financial and administrative control is vested in a Council appointed in accordance with the provisions of the Act.

The development and formulation of National Standards is carried out by Technical Experts and representatives of other interest groups, assisted by the permanent officers of the Institution. These Technical Committees are appointed under the purview of the Sectoral Committees which in turn are appointed by the Council. The Sectoral Committees give the final Technical approval for the Draft National Standards prior to the approval by the Council of the SLSI.

All members of the Technical and Sectoral Committees render their services in an honorary capacity. In this process the Institution endeavours to ensure adequate representation of all view points.

In the International field the Institution represents Sri Lanka in the International Organization for Standardization (ISO), and participates in such fields of standardization as are of special interest to Sri Lanka.

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