

Irrigation techniques — Solid set sprinkler systems —

Part 2: Test methods

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British Standard

ICS 65.060.35

National foreword

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Foreword

This document (EN 13742-2:2004) has been prepared by Technical Committee CEN/TC 334 "Irrigation techniques", the secretariat of which is held by AENOR.

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1 Scope

This document provides a document to check and test, the proper operation and performance of a solid set irrigation system installed according to relevant design documents specified in EN 13742-1.

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

ISO 7749-1:1995 *Agricultural irrigation equipment - Rotating sprinklers - Part 1: Design and operational requirements.*

ISO 7749-2: 1990, *Irrigation equipment - Rotating sprinklers - Part 2: Uniformity of distribution and test methods*

EN 13742-1:2004, *Irrigation techniques - Solid set sprinkler systems - Part 1: Selection, design, planning and installation.*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13742-1:2004 apply.

4 Inspection and testing before pressurization

Inspect if all the installed material and its location on the site correspond to the detailed bill of materials and to the plans that have been supplied with the installation.

5 Inspection and testing at start-up

5.1 Recommendation

Before pressurization, all pipes shall be flushed to wash out dirt that may have accumulated during network installation.

5.2 Preliminary pressurization of main-lines and sub-mains

Main-lines and sub-mains shall be pressurized at a pressure 1,5 times higher than operating pressure before filling the trenches.

No leak or damage shall be visible.

5.3 Visual inspection

Pressurize the system for normal operation according to design specification and check:

- a) Water tightness after start-up at the network nominal operating pressure specified by the design;
- b) for no leaks shall be between the various system components;
- c) sprinkler operation. Make sure that they all rotate;
- d) risers which shall be vertical and stable;
- e) proper valve operation;
- f) that all material is installed following manufacturer's instructions;

5.4 Hydraulic measurements

After the visual check, measure the following:

- a) pressure at the system inlet;
- b) total flow. It shall correspond to project flow (more or less 5 %);
- c) pressure measurements at lateral sprinklers exposed to highest and lowest pressure.

On a sub-unit, pressure measurements shall be made at the most pressurized and less pressurized sprinkler with an accuracy of more or less 5%. Pressure variation between those two sprinklers shall not exceed 20 % of the design layout plan pressure.

5.5 Distribution uniformity measurements

5.5.1 General

The purpose of the water distribution uniformity tests, performed according to ISO 7749-2, is to verify the performance of the installation according to the original design layout plan.

5.5.2 Characteristics of the test area

The test area shall be of a square pattern and match the spacing of sprinklers and laterals as defined in the design layout plan (triangular, rectangular, spacing 15mx15m, 18mx18m, etc.).

For every irrigation sub-unit two test areas, representative of the most and less pressurized sprinkler zones shall be measured at least.

The surface area on which the collectors are placed shall be unobstructed, so as not to hinder water distribution.

5.5.3 Characteristics of rain gauges

The rain gauges shall be:

- a) approximately cylindrical, for at least the top third of their height;
- b) be of the same size and shape;
- c) have sharp edges on the upper opening;
- d) be constructed so that none of the water collected splashes out.

The height of the rain gauges shall be at least twice the average depth of the water collected during the test and not less than 15 cm.

The diameter of the rain gauges opening shall be half to one times its height, and not less than 8,5 cm.

The openings of all the rain gauges shall be in a plane parallel to the ground, with a vertical tolerance of $\pm 5^\circ$. The difference in height between any two adjacent rain gauges shall not exceed 2 cm.

5.5.4 Characteristics of atmospheric conditions

The maximum allowed wind speed during the test is defined in ISO 7749-1:1995, table 3.

Wind measurement shall be carried out at a distance not greater than 45 m from a side of the test area, and at a height of about 90 % of the maximum trajectory height, but not less than 2 m.

At beginning of the distribution uniformity test and during the test the wind velocity and direction shall be measured in an open field at intervals not exceeding 15 min.

The relative humidity and ambient temperature shall be measured during the test.

5.5.5 Pressure measurement

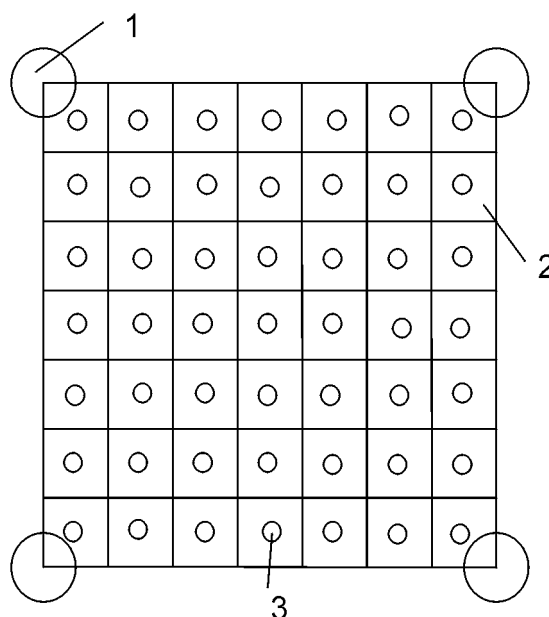
The pressure shall be adjusted to the design layout plan pressure. The pressure shall be measured at the sprinkler inlet, and kept constant over the duration of the test with accuracy of ± 20 kPa.

5.5.6 Duration of test

The minimum test duration shall be 1 hour.

5.5.7 Rain gauges placement pattern

The rain gauges shall be placed over the entire test area (see figure1). The spacing between two collectors shall be in accordance to ISO 7749-2:1990, 4.2.



Key

- 1 Sprinkler
- 2 Calculation spacings
- 3 Collector

Figure 1 Set-up of catch cans (case of square sprinkler spacing)

5.5.8 Processing of the data collected

The coefficient of distribution uniformity shall be computed from the results of the sprinkler distribution tests in the field. The quantity of water collected in each collector, serves as a basis for calculating the Christiansen uniformity coefficient. Following formula is used:

$$CC = 100 \times \left(1 - \frac{\sum |h_m - h_i|}{n \times h_m} \right)$$

where

CC is the Christiansen uniformity coefficient;

n is the number of readings;

h_m is the arithmetic average of the readings;

h_i is the individual reading in each collector;

$\sum |h_m - h_i|$ is the sum of the absolute values of the deviations between the arithmetic average of the readings and the individual reading in each collector.

6 Presentation of test results

The test report shall refer to this document and provide the following information:

- a) results from inspection and testing before pressurization;
- b) results from visual inspection;
- c) results from measurements as in 5.4;
- d) Christiansen uniformity distribution coefficient in % for the different areas of the installation tested.

Bibliography

- [1] *EN 12734, Irrigation techniques - Quick coupling pipes for movable irrigation supply - Technical characteristics and testing.*
- [2] *ISO 8026, Agricultural irrigation equipment - Sprayers – General requirements and test methods.*
- [3] *ISO 11419, Agricultural irrigation equipment - Float type air release valves.*

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