

Traveller irrigation machines —

Part 1: Operational characteristics and laboratory and field test methods

ICS 65.060.35

National foreword

This British Standard is the UK implementation of EN ISO 8224-1:2003+A1:2011. It is identical with ISO 8224-1:2003, incorporating amendment 1:2011. It supersedes BS EN ISO 8224-1:2003 which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to ISO text carry the number of the ISO amendment. For example, text altered by ISO amendment 1 is indicated by **A1** **A1**.

The UK participation in its preparation was entrusted to Technical Committee AGE/30, Irrigation and drainage equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English version

Traveller irrigation machines - Part 1: Operational characteristics and laboratory and field test methods (ISO 8224-1:2003)

Machines d'arrosage mobiles - Partie 1: Caractéristiques opérationnelles et méthodes d'essai en laboratoire et au champ (ISO 8224-1:2003)

Mobile Beregnungsmaschinen - Teil 1: Betriebskennwerte, Prüfverfahren für Labor- und Felduntersuchungen (ISO 8224-1:2003)

This European Standard was approved by CEN on 18 December 2002.

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Foreword

This document (EN ISO 8224-1:2003) 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of an identical text or by endorsement, at the latest by August 2003, and conflicting national standards shall be withdrawn at the latest by August 2003.

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Endorsement notice

The text of ISO 8224-1:2003 has been approved by CEN as EN ISO 8224-1:2003 without any modifications.

NOTE Normative references to International Standards are listed in Annex ZA (normative).

Foreword to amendment A1

This document (EN ISO 8224-1:2003/A1:2011) 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 AENOR.

This Amendment to the European Standard EN ISO 8224-1:2003 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2012, and conflicting national standards shall be withdrawn at the latest by February 2012.

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Endorsement notice

The text of ISO 8224-1:2003/AMD 1:2011 has been approved by CEN as a EN ISO 8224-1:2003/A1:2011 without any modification.

INTERNATIONAL STANDARD

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Second edition
2003-02-01

Traveller irrigation machines —

Part 1: Operational characteristics and laboratory and field test methods

Machines d'arrosage mobiles —

*Partie 1: Caractéristiques opérationnelles et méthodes d'essai en
laboratoire et au champ*



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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.

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ISO 8224-1 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 8224-1:1985), which has been technically revised.

ISO 8224 consists of the following parts, under the general title *Traveller irrigation machines*:

- *Part 1: Operational characteristics and laboratory and field test methods*
- *Part 2: Softwall hose and couplings — Test methods*

Traveller irrigation machines —

Part 1: Operational characteristics and laboratory and field test methods

1 Scope

This part of ISO 8224 specifies the operational characteristics of, and laboratory and field test methods for, traveller irrigation machines. It includes

- user-oriented technical information for inclusion in the manufacturer's accompanying product literature,
- laboratory test procedures for evaluating the uniformity of water application on an irrigated strip by a machine operating within a specified range of conditions and for determining the maximum travelling rates the drive mechanism is able to achieve in response to specified operating conditions, and
- field test procedures for determining the uniformity of water application on a given irrigated strip under local conditions prevailing in the field at time of testing.

It is applicable only to traveller irrigation machines and not to other types of irrigation machine such as centre-pivot and moving lateral irrigation machines.

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.

[A1] ISO 15886-3:2004, *Agricultural irrigation equipment — Sprinklers — Part 3: Characterization of distribution and test methods* **[A1]**

ISO 8026, *Agricultural irrigation equipment — Sprayers — General requirements and test methods*

ISO 11545, *Agricultural irrigation equipment — Centre-pivot and moving lateral irrigation machines with sprayer or sprinkler nozzles — Determination of uniformity of water distribution*

3 Terms, definitions and symbols

For the purposes of this document, the following terms, definitions and symbols (see Table 1) apply.

3.1

traveller irrigation machine

machine designed to irrigate a field sequentially, strip by strip, by causing, through various coiling techniques, a cart equipped with a travelling water distribution system (sprinkler or gun-type sprinkler, combination of sprinklers and guns, boom with set of sprinklers, sprayers or other kinds of water distribution devices) to travel

across a field, and which is intended to be moved to, and operated from, several supply points established in advance in the field

NOTE There are three types of traveller irrigation machine, each having a structure that includes a reel, spool or winch and a travelling water distribution system.

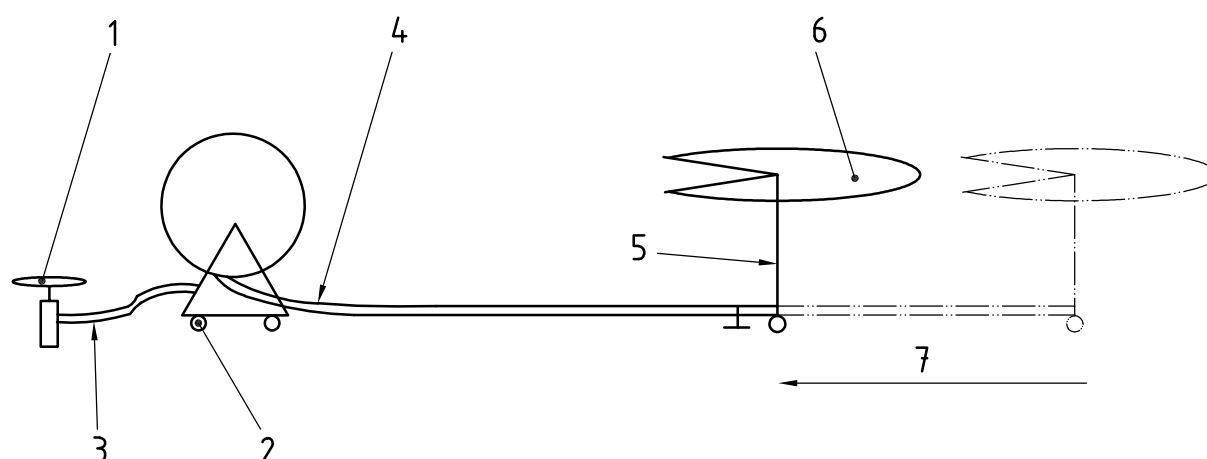
- Type 1 traveller irrigation machines feature a stationary reel with a hydraulic motor that coils and drags a distribution tube and a travelling cart that supports a water distribution system — commonly referred to as “reel machines” (see 3.2).
- Type 2 traveller irrigation machines feature a travelling winch with a hydraulic motor that supports a water distribution system, coils a tow cable and drags a distribution hose — commonly referred to as “travellers” (see 3.3).
- Type 3 traveller irrigation machines feature a travelling reel that supports a water distribution system with self-propelled wheels and coiling a stationary distribution tube — commonly referred to as “self-propelled reel machines” (see 3.4) — or they can be engine-driven machines.

3.2

reel machine

type 1 traveller irrigation machine featuring a stationary reel coiling a distribution tube that drags a travelling cart on which is installed a water distribution system (most often a gun-type sprinkler) and carries water to the water distribution system

See Figure 1.



Key

- 1 water source
- 2 stationary reel
- 3 source connection conduit/hose
- 4 distribution tube — dragged
- 5 cart
- 6 water distribution device or system — gun, sprinkler, boom (on cart)
- 7 direction of movement

Figure 1 — Sketch of operating type 1 traveller irrigation machine — Reel machine

3.3

traveller

type 2 traveller irrigation machine featuring a travelling winch with hydraulic motor supporting a water distribution system, which coils a cable and drags a distribution hose

See Figure 2.

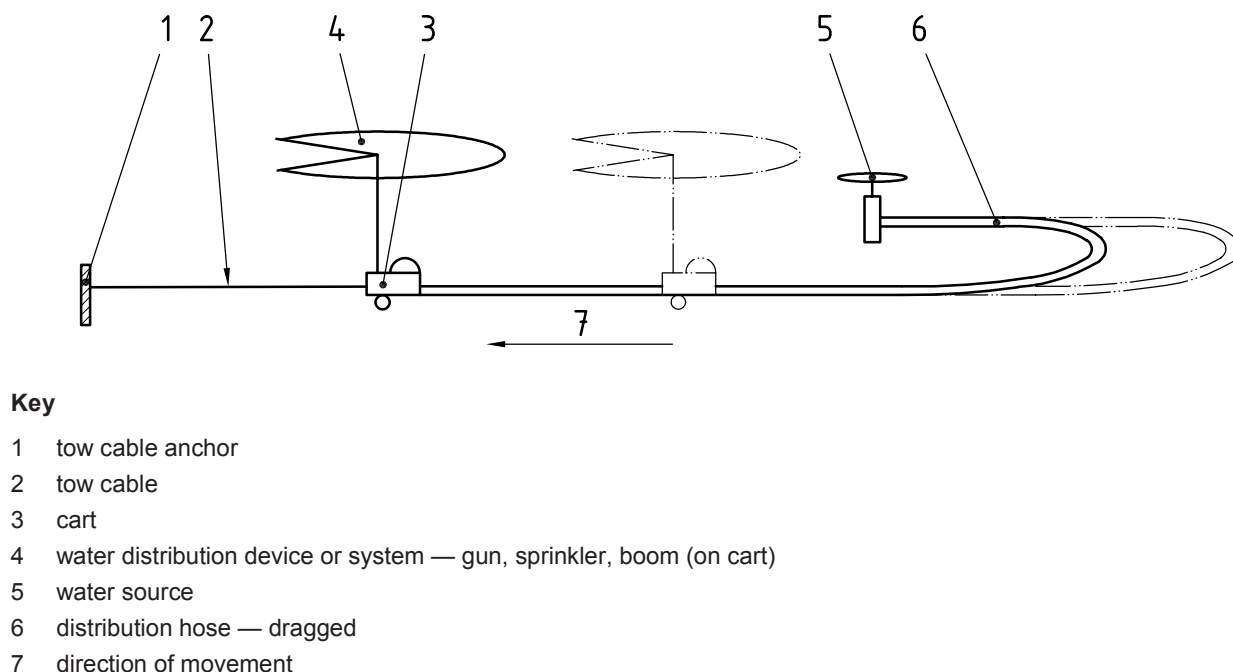


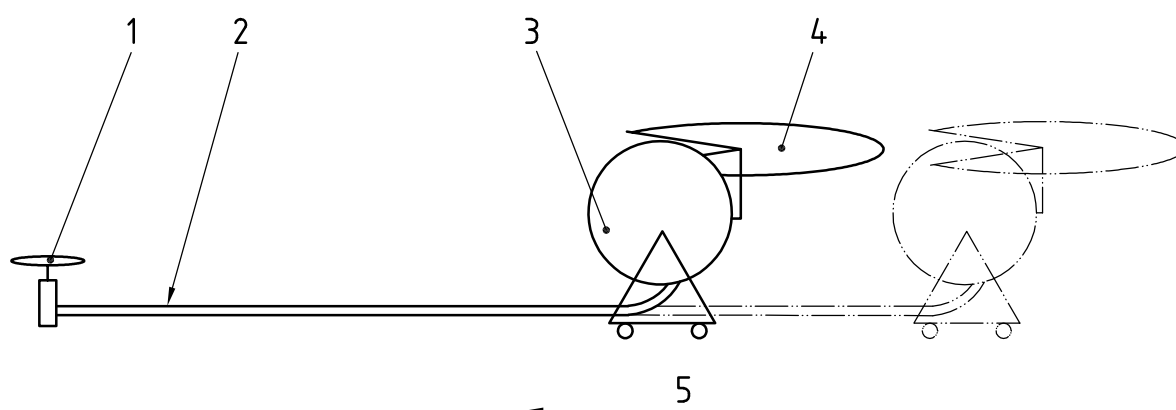
Figure 2 — Sketch of operating type 2 traveller irrigation machine — Traveller

3.4

self-propelled reel machine

type 3 traveller irrigation machine featuring a stationary distribution tube that carries irrigation water to a travelling structure accommodating a reel on which the distribution tube is coiled, a drive train, self-propelled wheels and water distribution system

See Figure 3.



Key

- 1 water source
- 2 distribution tube
- 3 self-propelled structure
- 4 water distribution device or system — gun, sprinkler, boom (on self-propelled structure)
- 5 direction of movement

Figure 3 — Sketch of operating type 3 traveller irrigation machine — Self-propelled reel machine

3.5

water distribution system

sprinkling and travelling part of a traveller irrigation machine through which irrigation water is distributed and applied over a strip

EXAMPLE Sprinkler, gun-type sprinkler, combination of sprinklers and gun-type sprinklers, boom with set of sprinklers or sprayers

3.6

field resistance coefficient

α

coefficient characterizing the resistance drag force exerted by the field on a traveller irrigation machine whose water distribution system is travelling along a strip

3.7

distribution tube

in-field supply tube

polyethylene tube

supply line that conveys irrigation water along an irrigated strip to the water distribution system of a type 1 traveller irrigation machine (reel machine) and to the self-propelled structure of a type 3 traveller irrigation machine (self-propelled reel machine), and which can be partly lying on the field and partly coiled on the spool

3.8

distribution hose

softwall distribution hose

in-field supply hose

supply hose that conveys water from an irrigation water source along a strip to the water distribution system of a type 2 traveller irrigation machine (traveller)

3.9

source connection hose

source connection conduit

supply conduit or hose used to connect an irrigation water source to the stationary structure of a type 1 traveller irrigation machine (reel machine)

3.10

irrigation strip

lane

portion of a field irrigated sequentially by a traveller irrigation machine, typically consisting of a rectangle a few decametres wide by a few hundred metres long with an effective zone wetted by the water distribution system that significantly exceeds the dimensions of the strip and especially the width; some overlapping of the wetted patterns over adjacent strips often being required to maintain an acceptable uniformity of water application over the entire field

3.11

irrigation strip width

lane width

strip spacing

spacing between strips, i.e. distance between two adjacent travel paths of a cart

3.12

travel path

path within a strip where the water distribution system is supported during its irrigation travel on wheels or skids and where the distribution tube, distribution hose or tow cable is laid in contact with the field and dragged

3.13

length of travel

distance a traveller irrigation machine moves along its travel path within a strip, from starting point to final stop position, not exceeding the length of the distribution tube in the case of types 1 and 3 irrigation machines or twice the length of the distribution hose in the case of type 2

3.14

spool

component of a traveller irrigation machine, consisting of a drum with flanges, rotating on an axial shaft and designed for storing the part of the distribution tube (types 1 and 3 irrigation machines) or tow cable (type 2 irrigation machines) not lying in contact with the field; in the case of certain type 2 traveller irrigation machines, an additional component designed for storing the distribution hose when the machine is not irrigating

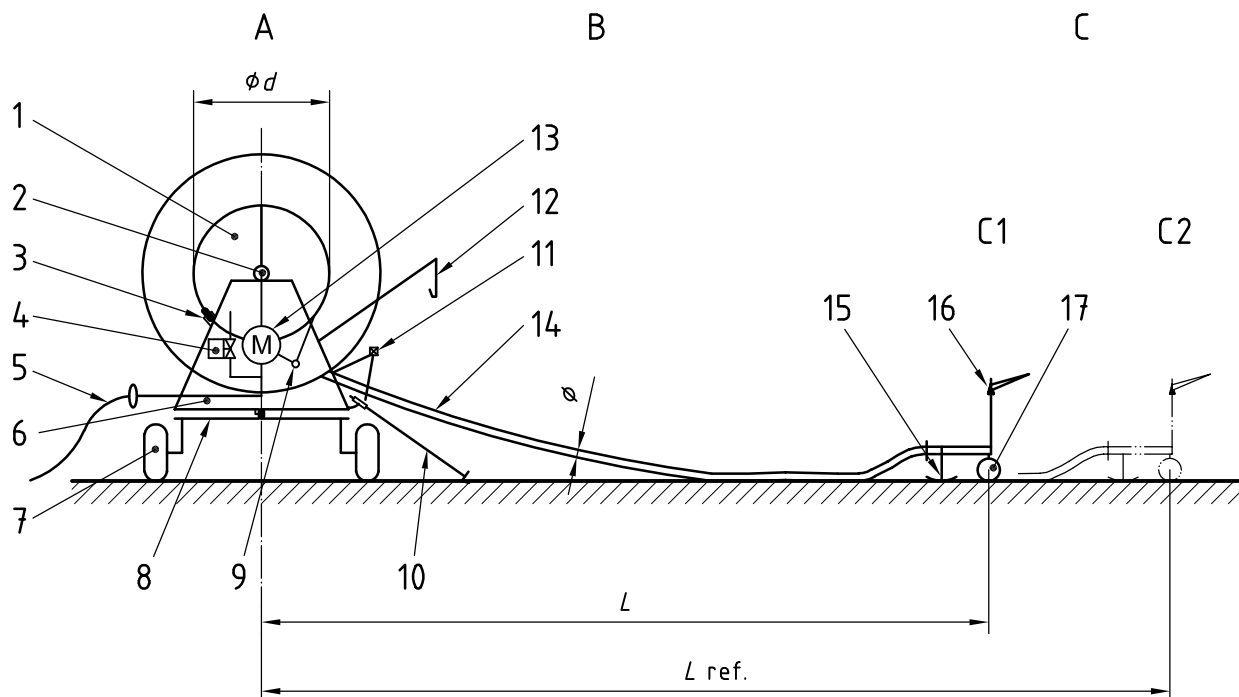
See Figure 4.

3.15

coefficient of variation

C_v

ratio of the standard deviation to the mean of a variable that is repeatedly measured



Key

- A structure
- B distribution tube
- C cart or trolley
- C₁ current cart or trolley position
- C₂ most distant cart or trolley position

- 1 spool drum
- 2 shaft of spool
- 3 brakes of spool
- 4 control device for water distribution system travel
- 5 machine-source connection hose (supply hose)
- 6 spool support — fixed or orientable turntable
- 7 wheel
- 8 chassis
- 9 external power shaft
- 10 stabilizer legs
- 11 distribution tube guide mechanism
- 12 cart (or trolley) lifting device
- 13 hydraulic drive (turbine or piston) and drive train
- 14 distribution tube (usually polyethylene tube)
- 15 cart skid
- 16 water distribution system — irrigation sprinkler(s), sector-adjustable gun-type sprinkler, boom or other system
- 17 cart wheel

- d spool drum diameter
- ϕ distribution tube outer diameter
- L_{ref} distribution tube reference length
- L current length of moving portion of distribution tube laid down and dragged on field

Figure 4 — Type 1 traveller irrigation machine (reel machine) — Main parts