INTERNATIONAL STANDARD

# ISO 6686

Second edition
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# Equipment for crop protection — Antidrip devices — Determination of performance

*Matériel de protection des cultures — Antigouttes — Détermination des performances*



INTERNATIONAL ISO

Reference number
ISO 6686:1995(E)

## 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.

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.



International Standard ISO 6686 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 6, *Equipment for crop protection*.



This second edition cancels and replaces the first edition (ISO 6686:1981), of which it constitutes a technical revision.

Annex A forms an integral part of this International Standard.



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# Equipment for crop protection — Antidrip devices — Determination of performance

## 1 Scope

This International Standard specifies a test method to determine, on the one hand, the effect of fitting antidrip devices on nozzle flowrates, and, on the other hand, the opening and closing pressures.

It applies to antidrip devices of agricultural sprayer nozzles, except for hand-held or hand-operated sprayers.



## 2 Test liquid

**2.1 Clean water,** free from solids in suspension.



## 3 Apparatus

**3.1 Pressure gauges**, allowing the pressure to be measured with a precision of ± 1 % within the range of 0,03 MPa to 0,5 MPa.

**3.2 Collection vessel** for each nozzle.

**3.3 Measuring cylinder** or **balance**, to measure the quantity of liquid collected.

**3.4 Stopwatch**.

## 4 General test conditions

### 4.1 Temperature

The temperatures of the water and room air shall be between 10 °C and 25 °C.

### 4.2 Pressures

Each pressure of the liquid shall remain constant with a maximum deviation of ± 2,5 % about the mean pressure.

## 5 Tests

### 5.1 Uniformity of flowrates obtained with two nozzles and different antidrip devices of same type

#### 5.1.1 Choice of nozzles

For a pressure of 0,3 MPa, choose one nozzle with a minimum flowrate of 1 l/min and one nozzle with a maximum flowrate of 5 l/min, where this maximum flowrate is at least three times the minimum flowrate.

The complete designation of the two nozzles used shall appear in the test report.

#### 5.1.2 Sampling of antidrip devices

Select at random 20 antidrip devices of the same type from a batch of 200. The sampling conditions shall be indicated in the test report, in particular the stock size, the place of sampling, etc.

A second sampling of 20 antidrip devices shall be taken by an authorized person of a test centre, to cover the case of a problem with the first sample.

#### 5.1.3 Test procedure

Measure, at the reference pressure of 0,3 MPa, the flowrate of both nozzles without the antidrip devices and the flowrates when the antidrip devices of the sample are attached in succession to the two nozzles.

The volume discharged shall be measured with an error of less than 1 %. The measuring time, measured with an error of less than 1 s, shall be at least 60 s.

#### 5.1.4 Results

The flowrates shall be expressed in litres per minute.

Indicate the flowrates at 0,3 MPa of the two nozzles without an antidrip device, the arithmetic means of the flowrates with the 20 antidrip devices, and the flowrate of each antidrip device, expressed as a mean percentage. Also report the coefficient of variation of the flowrates.

### 5.2 Variation in flowrates according to pressure for two nozzles with antidrip device

#### 5.2.1 Choice of antidrip device

Use the antidrip device which has the flowrate closest to the mean of the flowrates obtained with the various antidrip devices of the sample.

#### 5.2.2 Test procedure

Measure the flowrates of the two nozzles fitted with the antidrip devices and without antidrip devices, at pressures of 0,05 MPa, 0,1 MPa, 0,2 MPa, 0,3 MPa, 0,4 MPa and 0,5 MPa.

#### 5.2.3 Results

The flowrates shall be expressed in litres per minute.

Indicate for each pressure the flowrates obtained with and without antidrip devices.

Indicate the results in the test report in the form of graphs (flowrate on the ordinate and pressure on the abscissa) and/or a table.

### 5.3 Opening and closing pressures

#### 5.3.1 Test procedure

Fit, in succession, the 20 samples taken in 5.1.2 to each of the two nozzles.

Increase the pressure in steps of 0,01 MPa from 0,03 MPa until the antidrip device opens. Record the opening pressure.

Choose a pressure at least 0,05 MPa higher than the opening pressure. Decrease the pressure in steps of 0,01 MPa until the antidrip device closes. Record the closing pressure.

#### 5.3.2 Results

Pressures shall be expressed in megapascals.

For each of the two nozzles, indicate the opening and closing pressures for the 20 samples. Calculate the average opening and closing pressures and indicate their coefficient of variation.



## 6 Test report

An example of a test report is given in annex A.

# Annex A
(normative)

# Example of test report for antidrip devices for sprayers

## A.1 Identification of antidrip devices and nozzles tested

### A.1.1 Antidrip devices



Manufacturer's name: .....

Brand: .....

Antidrip device type: .....



Catalogue reference (dimensions): .....

Material: .....

Batch number: .....

Quantity: .....

Date of manufacture: .....

Place of sampling: .....

### A.1.2 Nozzles

**Nozzle No. 1**

Manufacturer's name: .....

Brand: .....

Nozzle type: .....

Catalogue reference (dimensions): .....

Material: .....

Batch number: .....

Date of manufacture: .....

**Nozzle No. 2**

Manufacturer's name: .....

Brand: .....

Nozzle type: .....

Catalogue reference (dimensions): .....

Material: .....

Batch number: .....

Date of manufacture: .....

## A.2 Test results

The temperatures of the water and the room air were between 10 °C and 25 °C.

The pressures remained constant within ± 2,5 % of the mean pressure.

### A.2.1 Uniformity of flowrates with two nozzles and different antidrip devices

#### A.2.1.1 Results of nozzle flowrates

Flowrate of the two nozzles without antidrip device at a pressure of 0,3 MPa

nozzle No. 1: ..... l/min

nozzle No. 2: ..... l/min



Arithmetic mean of the flowrates obtained with the 20 antidrip devices

nozzle No. 1: ..... l/min

nozzle No. 2: ..... l/min

#### A.2.1.2 Table of results of antidrip device flowrate

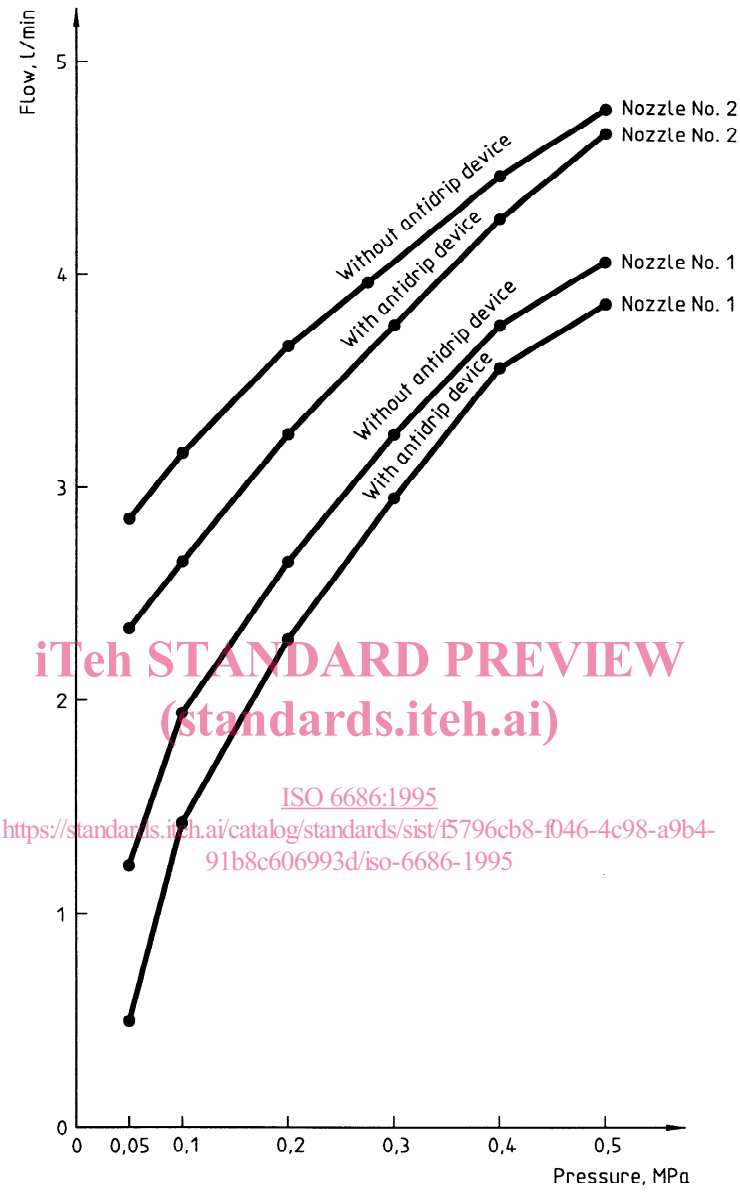
| **Antidrip device No.** | | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Nozzle No. 1** | **Flowrate** as a percentage of mean rate | | | | | | | | | | | | | | | | | | | | |
| | **Coefficient of variation** [1], % | | | | | | | | | | | | | | | | | | | | |
| **Nozzle No. 2** | **Flowrate** as a percentage of mean rate | | | | | | | | | | | | | | | | | | | | |
| | **Coefficient of variation** [1], % | | | | | | | | | | | | | | | | | | | | |

1) $CV = 100 \dfrac{\sqrt{\dfrac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}}{\bar{x}}$, with $\bar{x} = \dfrac{1}{n}\sum_{i=1}^{n} x_i$ and $n = 20$.

For further details see ISO 3534-1:1993, *Statistics — Vocabulary and symbols — Part 1: Probability and general statistical terms.*

### A.2.2 Variation in flowrate according to pressure for two nozzles with antidrip device

#### A.2.2.1 Graph






#### A.2.2.2 Table

| | **Pressure,** MPa | | | | | |
|---|---|---|---|---|---|---|
| | 0,05 | 0,1 | 0,2 | 0,3 | 0,4 | 0,5 |
| **Flowrate of nozzle No. 1 without antidrip device,** l/min | | | | | | |
| **Flowrate of nozzle No. 1 with antidrip device,** l/min | | | | | | |
| **Flowrate of nozzle No. 2 without antidrip device,** l/min | | | | | | |
| **Flowrate of nozzle No. 2 without antidrip device,** l/min | | | | | | |

### A.2.3 Opening and closing pressures

#### A.2.3.1 Results

Mean opening pressure

nozzle No. 1: ..... MPa

nozzle No. 2: ..... MPa

Mean closing pressure

nozzle No. 1: ..... MPa

nozzle No. 2: ..... MPa

#### A.2.3.2 Table

| Antidrip device No. | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nozzle No. 1 | Opening pressure, MPa | | | | | | | | | | | | | | | | | | | | |
| | Coefficient of variation [1], % | | | | | | | | | | | | | | | | | | | | |
| Nozzle No. 2 | Opening pressure, MPa | | | | | | | | | | | | | | | | | | | | |
| | Coefficient of variation [1], % | | | | | | | | | | | | | | | | | | | | |



1) $CV = 100 \frac{\sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}}}{\bar{x}}$, with $\bar{x} = \frac{1}{n} \sum_{i=1}^{n} x_i$ and $n = 20$.



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