# SLOVENSKI STANDARD
# SIST ISO 13440:1999

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**Oprema za zaġļ ito rastlin - Ġkropilnice - Ugotavljanje koliļ ine skupnega tehniļ nega ostanka ġkropiv**

Equipment for crop protection -- Agricultural sprayers -- Determination of the volume of total residual



Matériel de protection des cultures -- Pulvérisateurs agricoles -- Détermination du volume du résidu total



**Ta slovenski standard je istoveten z: ISO 13440:1996**

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65.060.40 Oprema za nego rastlin Plant care equipment

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# INTERNATIONAL STANDARD

# ISO 13440

First edition
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## Equipment for crop protection — Agricultural sprayers — Determination of the volume of total residual

*Matériel de protection des cultures — Pulvérisateurs agricoles — Détermination du volume du résidu total*



Reference number
ISO 13440:1996(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 13440 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, subcommittee SC 6, *Equipment for crop protection*.

Annex A forms an integral part of this International Standard.





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# Equipment for crop protection – Agricultural sprayers – Determination of the volume of total residual

## 1 Scope

This International Standard specifies the test method for the determination of the volume of total residual for mounted, trailed and self-propelled agricultural sprayers used for crop protection and fertilization.

## 2 Definitions

For the purposes of this International Standard, the following definitions apply :

**2.1 volume of total residual**
Volume of the spray mixture remaining in the sprayer which cannot be delivered with the intended application rate and/or pressure, equal to the sum of the volume of residual tank and the dead volume.



**2.2 volume of residual in the tank; dilutible volume**
Part of the total residual that remains in the tank or that can flow back to the tank during normal sprayer operation.



**2.3 dead volume; non dilutible volume**
Part of the total residual that cannot flow back to the tank during normal operation of the sprayer.



**2.4 horizontal position**
Normal operating position of the sprayer on level ground.

## 3 General

**3.1** The test shall be carried out with the sprayer secured in a stationary and horizontal position. The pump shall be driven at nominal speed. The spray boom including liquid lines and nozzles shall be in working position. The boom shall be equipped with one size of nozzles recommended by the manufacturer.

**3.2** The pressure shall be set such that the average liquid output of the nozzles is :

a) 1 l/min for pneumatic sprayers;

b) 2 l/min for field crop sprayers and vineyard sprayers;

c) 4 l/min for orchard sprayers;

d) 6 l/min for hop plantation sprayers.

NOTE — The output values given are for the normal case but other values can be used for particular cases.

The liquid output of each nozzle shall be adjusted with an accuracy of ± 0,1 l/min.

The spray tank shall be half full or contain, at most, 500 l. The liquid used shall be water.

## 4 Procedure

### 4.1 On level ground

Secure the sprayer in a horizontal position and in accordance with 3.1.

Set the pressure and the liquid nozzle output in accordance with 3.2.

Refill the amount of water to be in accordance with 3.2 and start the test.

Let the sprayer discharge the water until the first pressure drop of 25 % for 1 s occurs.

Then immediately stop the sprayer and measure the volume of the residual.

Measure the volume of residual in the the tank and the dead volume, to an accuracy of 0,1 % of the nominal tank volume.

Repeat the measurement and record the average of the two measurements as the value of the volume of total residual.

NOTE — Alternatively, instead of measuring the volume of the residual, the sprayer can be weighed after the test and after the total discharge of the sprayer. The residual volume can then be calculated.

### 4.2 On slopes

#### 4.2.1 8,5° slope



The sprayer shall be inclined to the left and to the right, to the front and to the rear at an angle of 8,5° ± 0,5°. In each of these positions, determine the volume of residual in the tank and the dead volume as stipulated in 4.1.



#### 4.2.2 Maximal slope

Optionally, an additional determination can be performed at an angle corresponding to the maximum slope recommended by the manufacturer.

## 5 Test report

The test results shall be recorded in a test report which conforms to annex A.

# Annex A

(normative)

# Test report for the determination of the volume of total redidual for agricultural sprayers, conforming to ISO 13440

## A.1 Sprayer

Name and address of manufacturer, distributor or importer: .....

.....

.....

Type of sprayer: .....

Year of manufacture: .....

Nominal tank volume: ..... l

Type of pump: .....

Spray pump capacity: .....l/min

Working width (only for field crop sprayers): ..... m

Count of nozzles (only for air assisted sprayers): .....

Nozzle size: .....

Total flowrate of spray liquid: .....l/min

Location of marking: .....

Trade name(s): .....

.....

.....

## A.2 Volume of total residual (calculated values)

On level ground: ..... l

On slopes:

| Direction | 8,5° slope | Maximum slope recommended by the manufacturer[1]: .....° |
|---|---|---|
| **In the contour** | | |
| In direction of travel to the left | ..... l | ..... l |
| In direction of travel to the right | ..... l | ..... l |
| **In the contour gradient** | | |
| Ascending | ..... l | ..... l |
| Descending | ..... l | ..... l |
| 1) For a test in accordance with 4.2.2. | | |

## A.3 Volume of residual in the tank (measured values)

On level ground: ..... l

On slopes:



| Direction | 8,5° slope | Maximum slope recommended by the manufacturer[1]: .....° |
|---|---|---|
| **In the contour** | | |
| In direction of travel to the left | ..... l | ..... l |
| In direction of travel to the right | ..... l | ..... l |
| **In the contour gradient** | | |
| Ascending | ..... l | ..... l |
| Descending | ..... l | ..... l |
| 1) For a test in accordance with 4.2.2. | | |



## A.4 Dead volume (measured values)

On level ground: ..... l

Observations: .....

.....

.....

Measurements made by: .....

Test location: .....

Date of the test: .....