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**Kmetijski in gozdarski stroji - Škropilnice in naprave za razdeljevanje tekočih gnojil - Varovanje okolja - 3. del: Škropilnice z zračno podporo za grmovnice in drevesa**

Agricultural and forestry machinery - Sprayers and liquid fertilizer distributors - Environmental protection - Part 3: Air-assisted sprayers for bush and tree crops

Land- und Forstmaschinen - Pflanzenschutzgeräte zum Ausbringen von Pflanzenschutzmitteln und flüssigen Düngemitteln - Umweltschutz - Teil 3: Sprühgeräte für Raumkulturen

Matériel agricole et forestier - Pulvérisateurs et distributeurs d'engrais liquide - Protection de l'environnement - Partie 3: Pulvérisateurs à jet porté pour arbustes et arboriculture

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65.060.25	Oprema za skladiščenje, pripravo in razdeljevanje gnojiv	Equipment for storage, preparation and distribution of fertilizers

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EUROPEAN STANDARD  
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**EN 12761-3**

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English version

**Agricultural and forestry machinery - Sprayers and liquid  
fertilizer distributors - Environmental protection - Part 3: Air-  
assisted sprayers for bush and tree crops**

Matériel agricole et forestier - Pulvérisateurs et distributeurs  
d'engrais liquide - Protection de l'environnement - Partie 3:  
Pulvérisateurs à jet porté pour arbustes et arboriculture

Land- und Forstmaschinen - Pflanzenschutzgeräte zum  
Ausbringen von Pflanzenschutzmitteln und flüssigen  
Düngemitteln - Umweltschutz - Teil 3: Sprühgeräte für  
Raumkulturen

This European Standard was approved by CEN on 4 February 2001.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**Management Centre: rue de Stassart, 36 B-1050 Brussels**

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## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 144 "Tractors and machinery for agriculture and forestry", 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 September 2001, and conflicting national standards shall be withdrawn at the latest by September 2001.

This standard consists of the following parts, under the general title *Agricultural and forestry machinery – Sprayers and liquid fertilizer distributors – Environmental protection*:

- *Part 1 : General*
- *Part 2 : Field crop sprayers*
- *Part 3 : Air-assisted sprayers for bush and tree crops*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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## 1 Scope

This standard specifies requirements and methods for their verification for design and performances of air-assisted sprayers for bush and tree crops with respect to minimizing the risk of environmental contamination.

This part applies in connection with EN 12761-1:2001 which contains general guidelines for agricultural sprayers.

## 2 Normative references

This European Standard incorporates, by dated or undated reference, provision from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 907:1997, *Agricultural and forestry machinery – Sprayers and liquid fertilizer distributors – Safety.*

EN 12761-1:2001, *Agricultural and forestry machinery - Sprayers and liquid fertilizer distributors - Environmental protection - Part 1 : General.*

ISO 4102, *Equipment for crop protection – Sprayers - Connection threading.*

ISO 4287, *Geometrical Product specification (GPS) – Surface texture: Profile method – Terms, definition and surface texture parameters.*

ISO 4288, *Geometrical Product Specifications (GPS) – Surface texture: Profile method – Rules and procedures for the assessment of surface texture.*

ISO 5682-1, *Equipment for crop protection – Spraying equipment – Part 1 : Test methods for sprayer nozzles.*

ISO 5682-2, *Equipment for crop protection – Spraying equipment – Part 2 : Test methods for hydraulic sprayers.*

ISO 5682-3:1996, *Equipment for crop protection – Spraying equipment – Part 3 : Test method for volume/hectare adjustment systems of agricultural hydraulic pressure sprayers.*

ISO 9357, *Equipment for crop protection – Agricultural sprayers – Tank nominal volume and filling hole diameter.*

ISO 13440: 1996, *Equipment for crop protection – Agricultural sprayers – Determination of the volume of total residues*

ISO 14710, *Equipment for crop protection – Air-assisted sprayers – Dimensions of nozzle swivel nuts.*

## 3 Terms and definitions

For the purposes of this standard, the terms and definitions given in EN 12761-1:2001 apply.

## 4 Requirements

### 4.1 General

#### 4.1.1 Spray tank

##### 4.1.1.1 Surfaces

Depth of roughness of inner and outer walls of the tank shall be such that  $R_z \leq 100 \mu\text{m}$  as specified in ISO 4287, and measured according to ISO 4288.

**4.1.1.2 Filling**

Filling devices shall be designed to avoid any return of liquid from the tank to the filling supply.

The filling hole diameter shall comply with ISO 9357. The opening lid shall be tightly sealed to avoid spillage.

The total tank volume shall be at least 5 % more than its nominal volume. Tanks with nominal volume greater than 200 l shall have a nominal volume which is a multiple of 100 l.

Strainers shall have a minimum depth  $d$  as given in Table 1 and measured according to Figure 1.

Strainers shall be installed in filling openings and shall have a mesh size less than 2 mm. Also any gap(s) between the tank filling hole and the strainer shall not exceed 2 mm (see Figure 1).

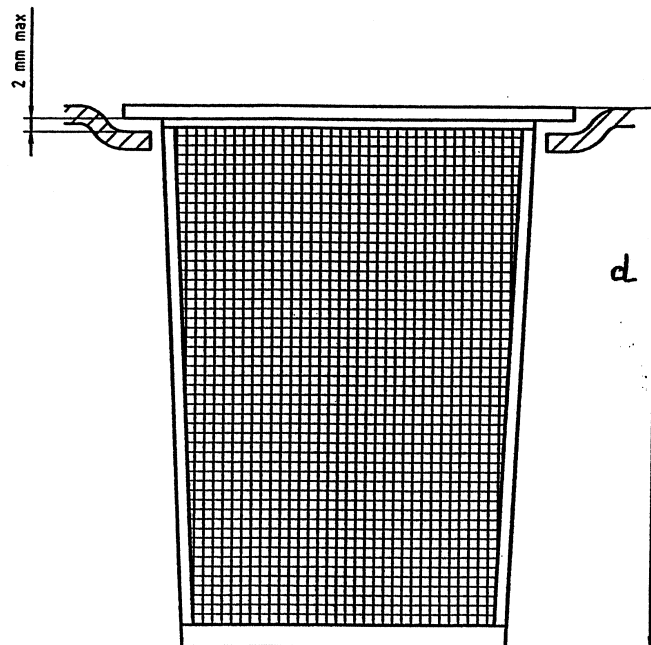
The filling capacity of the tank with strainer when filled with water shall be at least 100 l/min for tanks with a nominal volume of 100 l or more. For tanks with a nominal volume less than 100 l, it shall be possible to fill the tank within 1 min.

Strainers of the chemical introduction bowl, if available, shall have a filter with a maximum mesh size of 20 mm.

**Table 1 — Minimum depth of strainers**

Nominal tank capacity ( $C$ ) l	Minimum depth <sup>1)</sup> ( $d$ ) mm
$C \leq 150$	60
$150 < C \leq 400$	100
$400 < C \leq 600$	150
$C > 600$	250
<sup>1)</sup> measured from the upper edge of the strainer down to its bottom	

Dimensions in millimeters



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**Figure 1 - Determination of the depth of the strainer and width of gaps**

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### 4.1.1.3 Emptying

The volume of total residual as defined in 2.1 of ISO 13440:1996 shall not exceed :

- 4 % of the nominal tank volume for a tank volume less than 400 l ;
- 3 % of the nominal tank volume for a tank volume between 400 l (included) and 1000 l (included) ;
- 2 % of the nominal tank volume for a tank volume more than 1000 l.

The volume of total residual shall be determined in accordance with ISO 13440.

An emptying device in accordance with 4.5.3 of EN 907:1997 shall allow the complete emptying of the residual in the tank when the sprayer is in a horizontal position. Complete emptying of the residual is achieved if there are no visible puddles at the bottom of the tank after 5 min drainage.

It shall be possible to collect the liquid at the outlet without contaminating the operator or equipment parts, e. g. stays.

The tank outlet shall be guarded against accidental opening.

### 4.1.1.4 Tank contents indicator

The indication of contents shall correspond to ISO 9357. It shall be durable and easily visible from the driver's position and from where the tank is filled.

The acceptable tolerances of the indication are:

- a)  $\pm 7,5$  % for each graduation mark for volumes up to 20 % of the nominal tank volume ;



b)  $\pm 5\%$  for each graduation mark for volumes above 20 % of the nominal tank volume.

The tolerances shall be measured with a maximum error on measurement of  $\pm 1\%$  with the sprayer in a horizontal position.

Other means of visually checking the contents of the tank are allowed if they achieve equivalent accuracy.

#### 4.1.1.5 Mixing

Tanks shall be equipped with devices (e.g. agitators) to ensure an even concentration of mixture. The maximum allowable deviation is  $\pm 15\%$  when tested in accordance with ISO 5682-2.

#### 4.1.2 Hoses and lines

The bending radius of hoses shall be within limits recommended by the hose manufacturer. Hoses shall not have any deformation which can disturb the liquid flow.

Pressure lines shall be equipped with quick-acting shut-off valves (e.g. tip-over lever valves).

#### 4.1.3 Filter

Sprayers equipped with a positive displacement pump shall have a suction filter.

On the pressure side, the liquid going to the nozzles shall be filtered by means of central filters or filters in the lines of spraying sections. The mesh size of filters shall correspond to the size of nozzles fitted on the sprayer. This applies also to nozzle and pump filters.

Blockages shall be indicated to the driver, for example by an appropriate positioning of the central pressure filters and pressure gauge.

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Filters shall be easily accessible and filter insets shall be removable. For quick cleaning the filter tissue of the inset shall be easily accessible.

It shall be possible, with the tank filled to its nominal volume, to clean central filters without any spray liquid leaking out except for that which may be present in the filter casing and suction or pressure lines.

#### 4.1.4 Nozzles

It shall be possible to fix nozzles in predetermined positions, to ensure that the spray is correctly directed, by appropriate means such as marking, by using locking systems or patterns.

When the spraying stop control has been activated, the dripping shall not exceed 2 ml per nozzle during 5 min. The measuring is started 8 s after the flow has been shut off.

The flowrate of each individual nozzle, measured according to ISO 5682-1, shall not deviate by more than 5 % from the data of the flowrate tables.

The swivel nuts of nozzles shall correspond to ISO 14710.

#### 4.1.5 Measuring systems

The working pressure, the volume application rate (in l/ha) where relevant, the adjustment controls and the tank volume indication shall be clearly readable from the driver's position. Turning of the head and the upper body is tolerable.

Each measuring system of the sprayer, e.g. for flowrate, forward speed, pressure, shall measure within a maximum error of  $\pm 5\%$  of the true value.

On sprayers which shall be fitted with a pressure gauge complying with 4.6 of EN 907:1997, the accuracy of the pressure gauge shall be :