
Kmetijski in gozdarski stroji - Škropilnice in naprave za razdeljevanje tekočih gnojil - Varovanje okolja - 2. del: Škropilnice za poljščine

Agricultural and forestry machinery - Sprayers and liquid fertilizer distributors - Environmental protection - Part 2: Field crop sprayers

Land- und Forstmaschinen - Pflanzenschutzgeräte zum Ausbringen von Pflanzenschutzmitteln und flüssigen Düngemitteln - Umweltschutz - Teil 2: Feldspritzgeräte

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Matériel agricole et forestier - Pulvérisateurs et distributeurs d'engrais liquide - Protection de l'environnement - Partie 2: Pulvérisateurs pour cultures basses

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SIST EN 12761-2:2001**en**

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Agricultural and forestry machinery - Sprayers and liquid fertilizer distributors - Environmental protection - Part 2: Field crop sprayers

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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.

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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of an identical text or by endorsement, at the latest by September 2001, and conflicting national standards shall be withdrawn at the latest by September 2001.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 field crop sprayers with respect to minimizing the risk of environmental contamination.

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

NOTE The requirements are based on the test methods given in ISO 5682-2, primarily developed for hydraulic sprayers. For other sprayers, other test methods and/or test criteria may be needed. This has to be a subject for a future investigation and possible amendment of this standard.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions 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 Specifications (GPS) – Surface texture: Profile method – Terms, definitions and surface texture parameters.*

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

ISO 5682-1:1996, *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.*

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 $Rz \leq 100 \mu\text{m}$ 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)	Minimum depth ¹⁾ (d)
l	mm
$C \leq 150$	60
$150 < C \leq 400$	100
$400 < C \leq 600$	150
$C > 600$	250

¹⁾ measured from the upper edge of the strainer down to its bottom

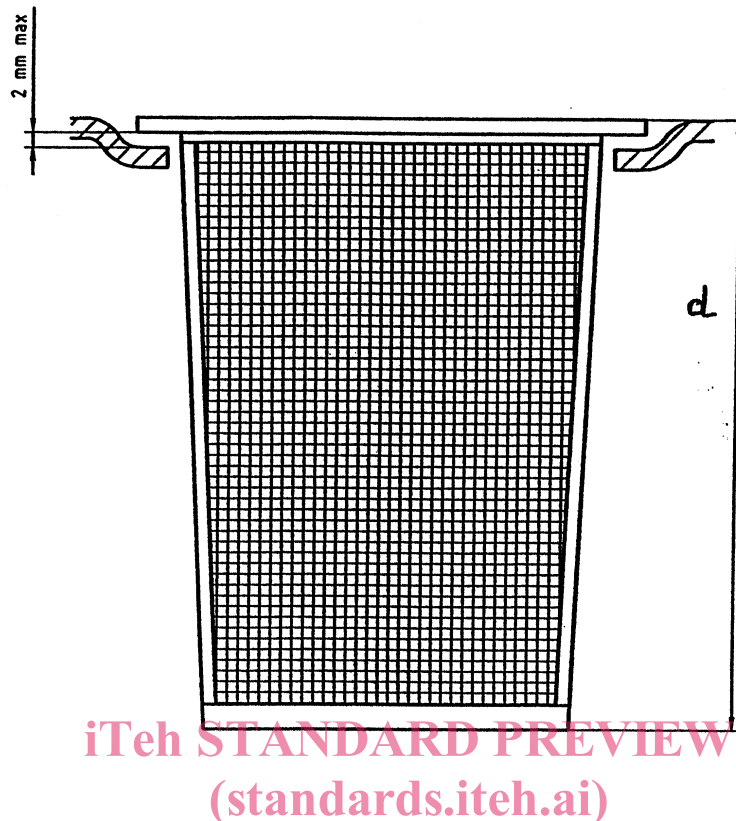


Figure 1 — Determination of the depth of the strainer and width of gap(s)

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4.1.1.3 Emptying

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The volume of total residual as defined in 2.1 of ISO 13440:1996 shall not exceed 0,5 % of the nominal tank volume plus 2 l per metre of the boom. 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) ± 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 ± 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 Spray boom

4.1.3.1 Working and spraying section widths

The working width shall correspond to the usual widths of seed drills, cultivators, etc. and shall be a whole-number multiple of these.

NOTE For information, see ISO 6720 which specifies the recommended working widths for sowing, planting, distributing fertilizers and spraying.

The maximum section widths are:

- 4,5 m for boom width ≤ 24 m;
- 6,0 m for boom width > 24 m.

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It shall be possible to use any individual boom section when required.

4.1.3.2 Adjustment <https://standards.iteh.ai/catalog/standards/sist/752a6a0b-6e8a-4a4e-b9de-618ffefc04a/sist-en-12761-2-2001>

The adjustment range for the spray boom height shall be at least 1,0 m.

It shall be possible to adjust the minimum distance between the nozzles and the target according to the nozzle characteristics. For sprayers that are to be used in crops higher than 1,0 m, the adjustment range of the boom height shall be at least 1,2 m.

For sprayers with a maximum boom width of 21 m, it shall be possible to adjust the distance between the nozzles and ground down to at least 0,5 m.

The boom height shall be adjustable either continuously or by increments not exceeding 0,1 m.

Regardless of the distance of the boom above the ground, no liquid shall be sprayed on to the sprayer itself. This does not apply to components of the sprayers (e.g. sensors) which in order to function are necessarily in contact with the mixture. In these cases, however, dripping shall be minimized.

For spray booms with a working width of more than 13 m, boom movements independent of the sprayer (e.g. pendulum) shall ensure that the boom can be positioned parallel to the ground.

4.1.3.3 Contact with obstacles

Spray booms with a working width up to 10 m shall be able to move backwards in case of contact with obstacles in the field. This requirement shall be checked by moving the sprayer forwards at a speed of $4 \text{ km/h} \pm 0,2 \text{ km/h}$ with the obstacle placed within 90% to 100 % of the half working-width of the boom, measured from the middle of the track (see Figure 2). The spray boom shall be able to give way without being damaged.