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**Agricultural and forestry
machinery — Environmental
requirements for sprayers —**

**Part 2:
Horizontal boom sprayers**

iTeh STANDARD PREVIEW
Matériel agricole et forestier — Exigences environnementales pour les pulvérisateurs —
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Partie 2: Pulvérisateurs à rampe horizontale

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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This document was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 144, *Tractors and machinery for agriculture and forestry*, in collaboration with ISO Technical Committee TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 6, *Equipment for crop protection*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This corrected version of ISO 16119-2:2013 incorporates the following corrections:

- ISO 22401 has been added to Clause 2;
- ISO 22369-3 has been replaced by ISO 22401 in the last paragraph of 5.3.2;
- ISO 22401 has been added to the last column of Table 3, row 5.3.2;
- ISO 22369-3 has been removed from the Bibliography.

A list of all parts in the ISO 16119 series can be found on the ISO website.

Introduction

The requirements of this part of ISO 16119 are based on the test methods given in ISO 5682-2:1997, which were primarily developed for hydraulic sprayers. For other types of sprayers, other test methods and/or test criteria may be needed and may be the subject of future investigation and a revision of this part of ISO 16119.

This document is a type C standard as stated in ISO 12100.

The machinery concerned and the extent to which hazards, hazardous situations and hazardous events are covered are indicated in the scope of this document.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

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Agricultural and forestry machinery — Environmental requirements for sprayers —

Part 2: Horizontal boom sprayers

1 Scope

This part of ISO 16119 specifies requirements and the means for their verification for the design and performance of horizontal boom sprayers, as defined in 3.1, with regard to minimizing the potential risk of environmental contamination during use, including misuse foreseeable by the manufacturer.

It is intended to be used with ISO 16119-1, which gives general requirements common to all the sprayer types covered by ISO 16119. When requirements of this part of ISO 16119 are different from those which are stated in ISO 16119-1, the requirements of this part of ISO 16119 take precedence over the requirements of ISO 16119-1 for machines within the scope of this part of ISO 16119. It does not cover safety aspects (see ISO 4254-6).

This part of ISO 16119 is not applicable to sprayers manufactured before the date of its publication.

2 Normative references (standards.iteh.ai)

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4102, *Equipment for crop protection — Sprayers — Connection threading*

ISO 4254-6:2009, *Agricultural machinery — Safety — Part 6: Sprayers and liquid fertilizer distributors*

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

ISO 5681, *Equipment for crop protection — Vocabulary*

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

ISO 5682-2:1997, *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 residual*

ISO 16119-1:2013, *Agricultural and forestry machinery — Environmental requirements for sprayers — Part 1: General*

ISO 21278-1, *Equipment for crop protection — Induction hoppers — Part 1: Test methods*

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ISO 21278-2, *Equipment for crop protection — Induction hoppers — Part 2: General requirements and performance limits*

ISO 22368-1, *Crop protection equipment — Test methods for the evaluation of cleaning systems — Part 1: Internal cleaning of complete sprayers*

ISO 22368-3, *Crop protection equipment — Test methods for the evaluation of cleaning systems — Part 3: Internal cleaning of tank*

ISO 22369-2:2010, *Crop protection equipment — Drift classification of spraying equipment — Part 2: Classification of field crop sprayers by field measurements*

ISO 22401, *Equipment for crop protection — Method for measurement of potential spray drift from horizontal boom sprayers by the use of a test bench*

ISO 22856, *Equipment for crop protection — Methods for the laboratory measurement of spray drift — Wind tunnels*

ISO 22866, *Equipment for crop protection — Methods for field measurement of spray drift*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5681 and the following apply.

3.1 horizontal boom sprayer machine for spraying plant protection products, along a boom or in bands, with a spray generally directed downwards onto/into the target
(standards.iteh.ai)

3.2 plant protection product container collective name for plant protection product packaging
<https://standards.iteh.ai/catalog/standards/sist/eb9a3361-e7a9-45a8-838e-e15ca211b5/iso-16119-2-2013>

EXAMPLE Can, bottle, bag, sack, box.

3.3 cleaning device device for cleaning the insides of empty plant protection product containers

Note 1 to entry: The device may be an integral part of the sprayer or an independent installation (e.g. stationary equipment).

4 List of significant hazards

[Table 1](#) specifies the significant hazards, the significant hazardous situations and significant hazardous event(s) covered by this part of ISO 16119 that have been identified by risk assessment as being relevant for this type of machine with regard to environmental contamination, and which require specific action by the designer or manufacturer to eliminate or to reduce environmental contamination.

Attention is drawn to the necessity to verify that the environmental requirements specified in both ISO 16119-1 and this part of ISO 16119 apply to each significant hazard presented by a given machine and to validate that the risk assessment is complete.

Table 1 — List of significant hazards

Hazard		Hazardous situation/ event	Clause/subclause of this part of ISO 16119
4.1	Spillages	Filling	5.1.1.2; 8
		Induction of plant protection product	5.1.1.2; 8
4.2	Contamination of the water supply	Filling	5.1.1.2
4.3	Leakages	Transport and application	5.1.1.2; 5.1.2
		Contact with obstacles	5.1.3.3; 5.1.5
4.4	Overfilling	Filling	5.1.1.2; 5.1.1.4; 8
4.5	Dispersal of spray mixture residues or plant protection products	Drainage	5.1.1.3.1; 5.1.1.4; 8
		Cleaning and rinsing	5.1.1.1; 5.4; 5.5; 8
4.6	Accidental leakages	Accidental opening of tank outlet	5.1.1.3.2
4.7	Over-dosing	Heterogeneous mixing	5.1.1.5; 8
		Overlapping	5.1.3.1
		Sprayer adjustment/control	5.1.1.4; 5.1.2; 5.1.6; 5.2; 5.7; 8
		Sprayer maintenance/service	5.1.7; 7; 8
4.8	Unintended spraying outside the target area	Unintended deposition	5.3.1; 5.1.3.2; 5.6.3
		Deposition outside the target area	5.1.3.1; 5.6.1; 5.6.2
4.9	Drift	Spraying stop control	5.1.2; 5.7
		Spraying	5.1.3.2; 5.3.2; 7; 8
4.10	Dispersal of spray mixture	Intervention on the sprayer during application or service	5.1.4; 7; 8
4.11	Dripping	Spraying stop control	5.1.5

5 Requirements

5.1 General

5.1.1 Spray tank

5.1.1.1 Surfaces

The depth of roughness, R_z , (see ISO 4287) of the inner and outer walls of the tank shall be such that $R_z \leq 100 \mu\text{m}$, measured according to ISO 4288.

5.1.1.2 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 seal sufficiently to prevent leakage/spillage when closed.

The total tank volume shall be at least 5 % more than its nominal volume, to prevent spillage as a result of overfilling. Tanks with a 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 2 and measured according to Figure 1.

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

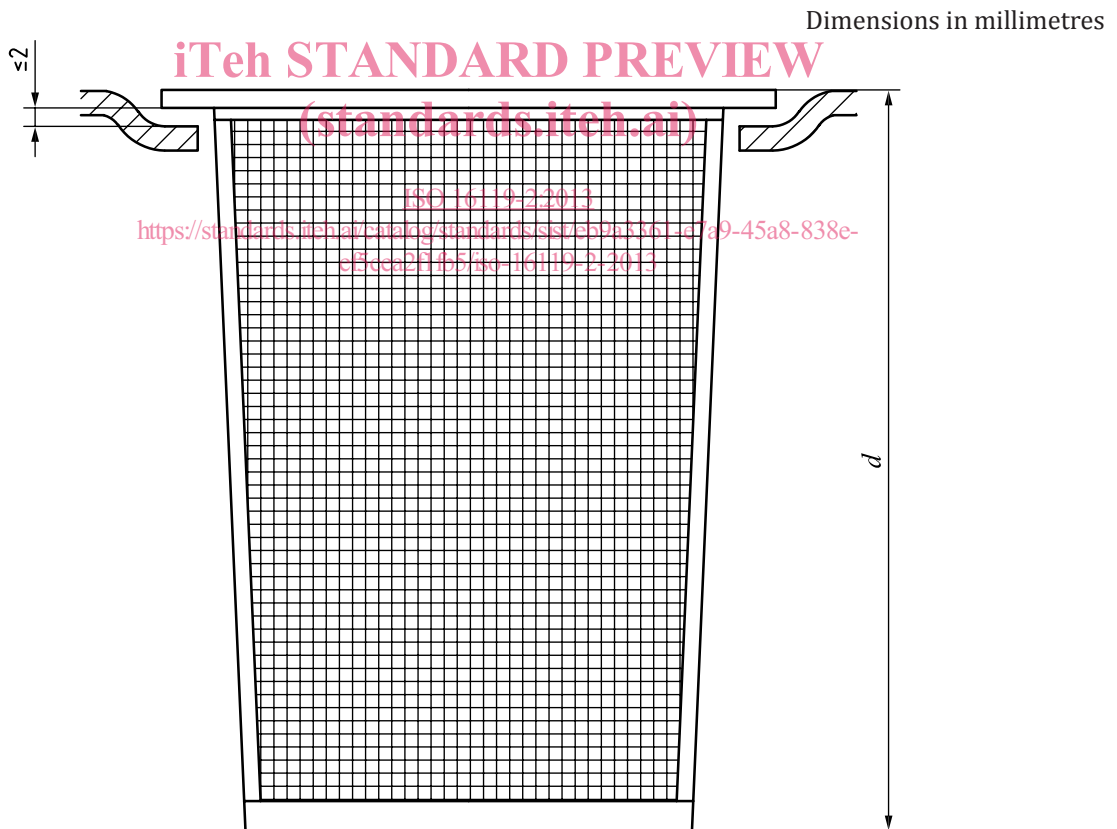
The filling capacity of the tank with strainer when filled with water shall be at least 100 l/min for tanks with a nominal volume of 100 l or more. For tanks with a nominal volume of less than 100 l, it shall be possible to fill the tank within 1 min.

Induction hoppers shall comply with ISO 21278-2.

Table 2 — Minimum depth of strainers

Nominal tank capacity C l	Minimum depth ^a d mm
$C \leq 150$	60
$150 < C \leq 400$	100
$400 < C \leq 600$	150
$C > 600$	250

^a Measured from the upper edge of the strainer down to its bottom.



Key
 d minimum depth

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

5.1.1.3 Emptying

5.1.1.3.1 Residual volume

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

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

5.1.1.3.2 Tank emptying device

An emptying device in accordance with ISO 4254-6:2009, 5.4.3 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 considered to have been achieved when 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 environment or equipment parts, e.g. stays.

The tank outlet shall be guarded against accidental opening.

5.1.1.4 Tank contents indicator(s)

The indication of contents shall correspond to ISO 9357. It shall be durable and easily readable from the driver's position and from where the tank is filled. Turning of the head and the upper body is acceptable.

The acceptable tolerances of the indication are

- ± 15 % for each graduation mark/read-out value for volumes up to 10 % of the nominal tank volume,
- $\pm 7,5$ % for each graduation mark/read-out value for volumes from 10 % to 20 % of the nominal tank volume, and
- ± 5 % for each graduation mark/read-out value 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.

5.1.1.5 Mixing

Tanks shall be designed (e.g. including agitators) to ensure an even concentration of mixture. The maximum allowable deviation is ± 15 %, tested in accordance with ISO 5682-2.

5.1.2 Lines (hoses and pipes)

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

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

The maximum working pressure of hoses and the maximum working pressure of connecting devices shall be at least equal to the maximum working pressure of the circuit. See also ISO 16119-1:—, Clause 6 h).

5.1.3 Spray boom

5.1.3.1 Spraying section widths

The maximum spraying section widths shall be

- 4,5 m for boom widths less than 24 m, and