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

**Part 4:  
Fixed and semi-mobile sprayers**

**iTeh STANDARD PREVIEW**  
*Matériel agricole et forestier — Exigences environnementales pour les pulvérisateurs —*  
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*Partie 4: Pulvérisateurs fixes et semi-mobiles*

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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](http://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](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword — Supplementary information](#).

ISO 16119-4 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).

ISO 16119 consists of the following parts, under the general title *Agricultural and forestry machinery — Environmental requirements for sprayers*:

- *Part 1: General*
- *Part 2: Horizontal boom sprayers*
- *Part 3: Sprayers for bush and tree crops*
- *Part 4: Fixed and semi-mobile sprayers*

## 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/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 4: Fixed and semi-mobile sprayers

### 1 Scope

This part of ISO 16119 specifies requirements and the means for their verification for the design and performance of fixed and semi-mobile sprayers, as defined in 3.1 and 3.2, with regard to minimizing the potential risk of environmental contamination during use, including misuse foreseeable by the manufacturer.

This type of spraying system is generally a combination of separate elements (main tank, pump and application unit) that can be assembled in fixed installations (fixed sprayers) or with moving parts (semi-mobile sprayers).

It does not apply to application equipment for space/spatial treatments.

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 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. This part of ISO 16119 does not cover safety aspects (see ISO 4254-6). [ISO 16119-4:2014](https://standards.iteh.ai/catalog/standards/sist/6310dc03-ca7e-402d-bde8-661873702226/iso-16119-4-2014)

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

### 2 Normative references

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.

EN 837-1, *Pressure gauges – Part 1: Bourdon tube pressure gauges – Dimensions, metrology, requirements and testing*

ISO 4102:1984, *Equipment for crop protection — Sprayers — Connection threading*

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

ISO 4288:1996, *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 5682-1:1996, *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 16119-4:2014(E)

ISO 8169:1984, *Equipment for crop protection — Sprayers — Connecting dimensions for nozzles and manometers*

ISO 9357:1990, *Equipment for crop protection — Agricultural sprayers — Tank nominal volume and filling hole diameter*

ISO 9898:2000, *Equipment for crop protection — Test methods for air-assisted sprayers for bush and tree crops*

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

ISO 13457:2008, *Agricultural irrigation equipment — Water-driven chemical injector pumps*

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

ISO 16236, *Crop protection equipment — Test method for the determination of drainable volume and its concentration*

ISO 19932-1:2013, *Equipment for crop protection — Knapsack sprayers — Part 1: Safety and environmental requirements*

ISO 21278-1:2008, *Equipment for crop protection — Induction hoppers — Part 1: Test methods*

ISO 21278-2:2008, *Equipment for crop protection — Induction hoppers — Part 2: General requirements and performance limits*

ISO 22368-1:2004, *Crop protection equipment — Test methods for the evaluation of cleaning systems — Part 1: Internal cleaning of complete sprayers*

ISO 22368-3:2004, *Crop protection equipment — Test methods for the evaluation of cleaning systems — Part 3: Internal cleaning of tank*

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### 3 Terms and definitions

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

**3.1 fixed sprayer**  
machine primarily for spraying plant protection products in covered structures, and where the *pump/tank unit* (3.3) and/or *application unit* (3.4) do not move

**3.2 semi-mobile sprayer**  
machine primarily for spraying plant protection products on crops grown in covered structures, and where the *pump/tank unit* (3.3) and *application unit* (3.4) are separately moveable

**3.3 pump/tank unit**  
device comprising at least the pump and the spray liquid tank

Note 1 to entry: They can be built together as one unit or separate units.

**3.4 application unit**  
device consisting of one or more nozzles/spray generators with or without air-assistance, and used with a separate pump/tank unit to which it is connected by a pipeline

Note 1 to entry: There are sprayers where the application unit moves in the crop rows or over the target independently from the pump/tank unit and others where the application unit is stationary and the target is moved.



Note 2 to entry: The application unit can be a spray gun/lance or a horizontal and/or vertical spray boom. The application unit can be equipped with a fan to provide air to transport the spray droplets to the target. The application unit can be moved in the row or over the target (manually or motorized). The spray application controls can be manual or automatic.

#### 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	Subclause of this part of ISO 16119
4.1	Spillages	Filling	5.1.3.2; 8
		Induction of plant protection product	5.1.3.2; 5.5 ;8
4.2	Contamination of the water supply	Filling	5.1.3.2; 5.5
4.3	Leakages	Transport and application	5.1.1; 5.1.3.2; 5.1.5
4.4	Overfilling	Filling	5.1.3.2; 5.1.3.4; 8
4.5	Dispersal of spray mix residues or plant protection products	Drainage	5.1.2; 5.1.3.3; 5.1.3.4; 8
		Cleaning and rinsing	5.1.3.1;5.1.6; 5.4; 5.5; 8
4.6	Accidental leakages	Accidental opening of tank outlet	5.1.3.3
4.7	Over-dosing	Heterogeneous mixing	5.1.3.5; 5.1.4;5.2.3; 8
		Overlapping	5.3.4.1; 5.3.5.1
		Sprayer adjustment / control	5.1.3.4; 5.1.8; 5.2; 5.3.4.2; 5.3.3; 5.3.6; 5.3.7; 8
		Sprayer maintenance / service	5.1.8; 7; 8
		Unintended deposition	5.3.4.1; 5.3.4.3; 5.3.3; 5.3.6; 5.3.7.1
		Direct Injection system	5.2.3
4.8	Unintended spraying outside the target area	Deposition outside the target area	5.3.4.1; 5.3.5.1; 5.3.8
		Spraying stop control	5.1.8; 5.3.6; 5.3.7.1
4.9	Drift	Spraying	5.3.4.1; 5.3.5.1; 5.3.8
4.10	Dispersal of spray mix	Intervention on the sprayer during application or service	5.1.6; 5.1.7; 7; 8
4.11	Dripping	Spraying stop control	5.3.3

## 5 Requirements

### 5.1 Pump/tank unit

#### 5.1.1 Static leaks

With the spray tank filled to its nominal capacity and placed on a horizontal surface (in the case of non-fixed installations) and without running the pump, there shall be no leakage from the tank, pump and associated pipes.

#### 5.1.2 Residual volume

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

- 4 % of the nominal tank volume for a tank volume of less than 400 l;
- 3 % of the nominal tank volume for a tank volume of between 400 l (included) and 1 000 l (included);
- 2 % for a tank volume of more than 1 000 l.

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

#### 5.1.3 Spray tank(s)

##### 5.1.3.1 Surfaces

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

For semi-mobile sprayers, this requirement applies also for the outer walls of the spray tank.

##### 5.1.3.2 Filling

###### 5.1.3.2.1 Semi-mobile sprayers

Filling devices shall be designed to avoid any return of liquid from the spray 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, both with the strainer in position and removed. The lid shall be lockable to avoid unexpected opening. If a vent is provided in the lid, spillage shall be avoided.

The total tank volume shall be at least 5 % more than the 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 be installed in filling openings and shall have a mesh size less than 2 mm. Any gap(s) between the tank filling hole and the strainer shall not exceed 2 mm (see [Figure 1](#)).

Strainers shall have a minimum depth,  $d$ , as given in [Table 2](#) and measured according to [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, if any, shall comply with ISO 21278-2.

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Table 2 — Minimum depth of strainers

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

<sup>a</sup> Measured from the upper edge of the strainer down to its bottom.

Dimensions in millimetres

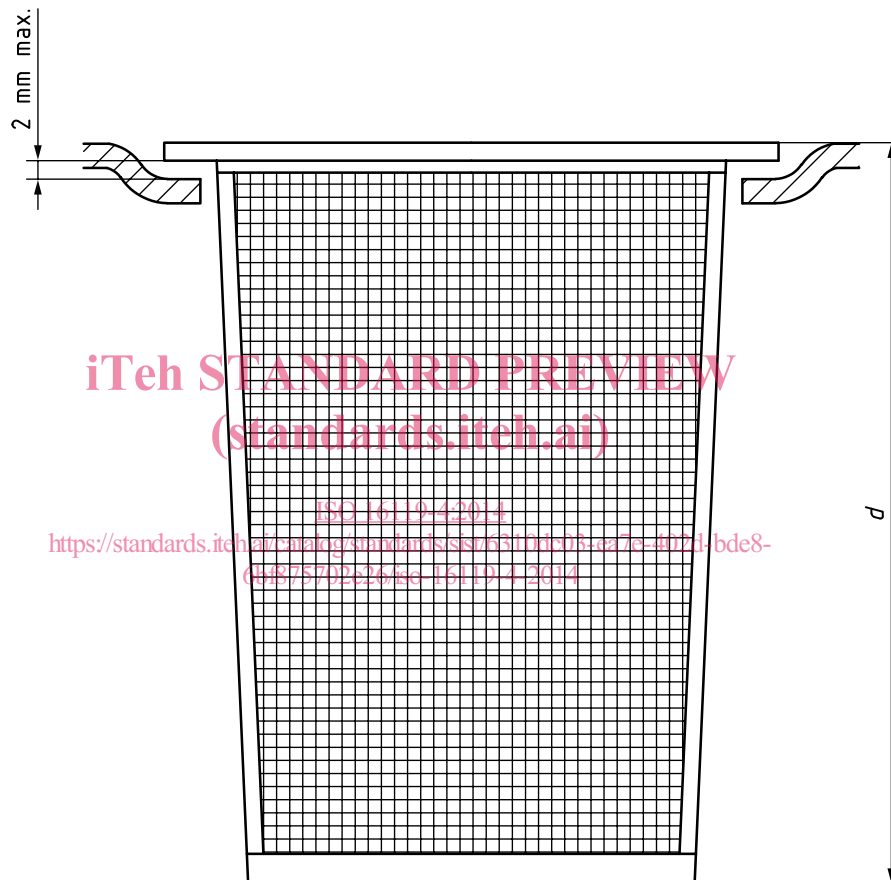
**Key** $d$  Minimum depth

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

**5.1.3.2.2 Fixed sprayers**

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

A tank cover shall be present to prevent objects falling in. The tank cover may be provided with a filling hole. Any filling hole shall be designed in such a way that splashing and spillage of the spray liquid during filling is avoided. The tank cover shall be lockable to avoid unexpected opening.

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