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Agricultural and forestry machinery — Environmental requirements for sprayers —

Part 1: General

Matériel agricole et forestier — Exigences environnementales pour les pulvérisateurs —

Partie 1: Généralités

Reference number
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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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.

ISO 16119-1 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*

Other parts are planned (see Annex A).

Introduction

It is important that biological, ecological and economic considerations are taken into account when carrying out plant protection by spraying. For this, a comprehensive knowledge of liquids for spraying — including the limitations of their use — and suitable sprayers are necessary.

ISO 16119 gives the minimum requirements for sprayers, with particular emphasis on minimizing environmental damage, focusing on

— the deposition of liquid on the target and distribution,

— a minimization of the unintentional spreading of plant protection products into the surrounding environment, and

— an improvement in the use and operation of plant protection equipment.

Agricultural and forestry machinery — Environmental requirements for sprayers —

Part 1: General

1 Scope

This part of ISO 16119 specifies general requirements for the design and performance of sprayers, as defined in ISO 5681, with regard to minimizing the potential risk of environmental contamination during use, including misuse foreseeable by the manufacturer. It also specifies the requirements for identification of the sprayer and certain of its components, and the minimum content of the instruction handbook.

It is intended to be used with each of the other parts of ISO 16119, which give requirements specific to particular types of sprayers (see Annex A). This part of ISO 16119 is applicable to all types of sprayers used in agriculture, horticulture, forestry and other areas, except knapsack sprayers. It does not cover safety aspects (see ISO 4254-6).

NOTE Knapsack sprayers are covered by ISO 19932, which deals with safety as well as environmental aspects.

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.

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

ISO 5681:1992, *Equipment for crop protection — Vocabulary*

ISO 10625, *Equipment for crop protection — Sprayer nozzles — Colour coding for identification*

ISO 19732:2007, *Equipment for crop protection — Sprayer filters — Colour coding for identification*

3 Terms and definitions

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

4 Requirements

4.1 General

Sprayers and their components shall be reliable and so designed that they can be used in accordance with their intended use as described in the instruction handbook, in order to minimize the potential risk of environmental contamination.

They shall be designed so that they can be operated safely, with adequate control of the processes carried out. It shall be possible to stop the application of pesticide immediately from the operator's position.

4.2 Inspections

It shall be possible to connect the necessary measuring instruments to the sprayer to check its correct functioning, e.g. by providing adapters for the connection of test instruments.

4.3 Adjustment of the volume application rate

The adjustment of the volume application rate shall be easy, accurate and repeatable. Adjusting and controlling the intended rate requires

a) means of calibration of the equipment,

b) means of adjustment and control of the volume application rate,

c) adequate and accurate measuring systems,

d) readability of instruments, and

e) instructions for adjusting the volume application rate (see Clause 6).

4.4 Distribution and deposition

Sprayers shall be designed so that a suitable distribution and deposition can be achieved. This shall be characterized, when appropriate, by

a) evenness in concentration of the spray liquid,

b) evenness in flow rate to the means of distribution,

c) evenness in distribution across to the driving direction (transversal distribution),

d) evenness in distribution in the driving direction (longitudinal distribution),

e) evenness in distribution in the vertical direction (vertical distribution), and

f) minimizing losses to non-target areas (see 4.5).

4.5 Losses

The sprayer shall be designed and constructed so as to minimize losses of plant protection products during application and after the application function has been switched off.

4.6 Indication of pesticide in use

Where appropriate, the sprayer shall be fitted with a specific mounting on which the operator can place the name of the plant protection products in use. See Clause 6.

4.7 Filling

The sprayer shall be designed to allow filling with the necessary quantity of plant protection products and water such that

— unintentional dispersal of liquid, and

— contamination of the water source

are avoided.

Filling levels and limits shall be visible. There shall be sufficient difference between the nominal and total volume to prevent overfilling and discharge to the environment.

4.8 Emptying, cleaning and service

The sprayer shall be designed and constructed to allow its complete emptying and easy and thorough cleaning without contaminating the environment.

The sprayer shall be designed and constructed to facilitate the changing of worn parts without contaminating the environment.

5 Marking

5.1 General

In addition to the marking required by ISO 4254-6:2009, 7.2, nozzles (5.2) and filters (5.3) shall be marked. This marking shall be explained in the instruction handbook.

5.2 Nozzles

Nozzles shall be marked in such a way they can be identified. That identification shall include

— the manufacturer's name or sign,

— type, and

— size, identified by a sign and a colour code complying with ISO 10625 or by a specific sign on the nozzle and with corresponding information in the instruction handbook.

5.3 Filters

Filters shall be marked such that they can be identified. This identification shall include the mesh size indicated by a sign and a colour code complying with ISO 19732 or by a specific sign on the filter and corresponding information given in the instruction handbook.

6 Instruction handbook

The manufacturer/supplier of the sprayer shall supply an instruction handbook with the sprayer. In addition to the instructions and information required by ISO 4254-6:2009, 7.1, the instruction handbook shall, at least, provide the following information:

a) necessary preparations for different conditions of use;

b) conditions of use and appropriate adjustment of the sprayer;

c) procedures for checking the volume application rate;

d) recommended procedure and intervals (e.g. time units, sprayed area or sprayed volume) for checking the sprayer by the user (e.g. pump, transmission, filters, hoses, joints);

e) the criteria and method for the replacement of parts subject to wear that affect the correct functioning of the equipment, e.g. nozzles, filters;

f) the need to ensure that the correct filters, complying with the nozzle manufacturer's recommendations, are used with replacement nozzles;

g) indication that national or regional laws may require regular inspection of the sprayers in use;

h) operating limits of the sprayer, e.g. maximum operating speed, pressure and minimum/maximum flow rate;

i) additional equipment or attachments for the sprayer according to the intended use;

j) possibilities of connecting to other equipment and the necessary precautions;

k) the range of types and sizes of nozzles, strainers and filters that can be used;

l) regarding the health and safety instructions, the need to follow the recommendations given by the pesticide manufacturers on the label of the product;

m) regarding the application, the need to take into account the recommendations provided on the label of the product, as well as any other relevant documentation, e.g. local and/or national regulations or code of practice;

n) restriction on the use of plant protection products that may cause incorrect functioning of the sprayer;

o) use of any devices provided and the precautions to be taken during mixing and filling to avoid contamination of the environment;

p) how to use the specific mounting, if provided, on which the operator can place the name of the plant protection products in use;

q) minimizing drift and other off-target deposition, taking into account different parameters such as nozzles, pressure, boom height, wind speed and operating speed;

r) adequate procedures for emptying and cleaning;

s) the volume of total residual.

Annex A
(informative)

Parts of ISO 16119 dealing with specific sprayer types

Table A.1 sets out the subject of each of the other parts of ISO 16119.

Table A.1 — Parts of ISO 16119 dealing with specific sprayer types

Criteria	Part 2	Part 3	Part 4[a]	Subject of a future part of ISO 16119			
	Horizontal boom sprayers	Sprayers for bush and tree crops	Fixed and semi-mobile sprayers	Portable[b] sprayers	Foggers	Train-mounted sprayers	Aerial sprayers
Types of sprayers/driving power							
Tractor-mounted	X	X			X		
Tractor-trailed	X	X			X		
Self-propelled	X	X			X		
Truck/all-terrain vehicle	X	X			X		
Quad-mounted	X	X			X		
Quad-trailed	X	X			X		
Aerial-mounted							X
Train-mounted						X	
Semi-mobile (stationary unit + moving part, e.g. for greenhouses)			X		X		
Carried by the sprayer operator				X	X		
Trailed by the sprayer operator	X	X					
Animal-mounted							
Animal-trailed							
Type of outlet							
Boom horizontal	X		X	X		X	X
Boom vertical		X	X	X		X	
Boom circular		X					
Gun and lance	X	X	X	X	X		
Canon		X	X	X	X		
Droplet production							
Pneumatic	X	X	X	X			
Centrifugal	X	X	X	X			X
Hydraulic nozzle	X	X	X	X	X	X	X

[a] Under preparation.

[b] Except knapsack sprayers (see ISO 19932).

Table A.1 *(continued)*

Criteria	Part 2	Part 3	Part 4[a]	Subject of a future part of ISO 16119			
	Horizontal boom sprayers	Sprayers for bush and tree crops	Fixed and semi-mobile sprayers	Portable[b] sprayers	Foggers	Train-mounted sprayers	Aerial sprayers
Thermal			X		X		
Ultrasonic							
Transportation							
Non-assisted	X	X	X	X	X	X	X
Air-assisted	X	X	X	X			
Electrostatic	X	X					X
Form of application							
Liquid droplets	X	X	X	X	X	X	X
Liquid contact							
Solid							
Gas							
Injection							
Indirect	X	X	X	X	X	X	X
Direct (specific sprayer)	X	X	X			X	
Direct (additional device on conventional sprayer)	X	X	X			X	
No injection (pure liquid)	X			X			
Tunnel							
Without recycling	X	X	X				
With recycling		X	X				
Application targeting							
Full spraying	X	X	X		X	X	X
Localized without sensors (e.g. band sprayers)	X	X	X				
Targeted spraying with sensors	X	X					
Target							
Field crop and low plants (including weed control and non-ag. applications)	X		X		X	X	X
Bush		X	X		X		X
Trees		X			X		X

[a] Under preparation.

[b] Except knapsack sprayers (see ISO 19932).

Bibliography

[1] ISO 16119-2, *Agricultural and forestry machinery — Environmental requirements for sprayers — Part 2: Horizontal boom sprayers*

[2] ISO 16119-3, *Agricultural and forestry machinery — Environmental requirements for sprayers — Part 3: Sprayers for bush and tree crops*

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

[4] ISO 19932-2, *Equipment for crop protection — Knapsack sprayers — Part 2: Test methods*

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