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Land- und Forstmaschinen - Umweltanforderungen an Pflanzenschutzgeräte - Teil 5: Spraysysteme (ISO/DIS 16119-5:2021)

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Part 5:
Aerial spray systems

Matériel agricole et forestier — Exigences environnementales pour les pulvérisateurs —

Partie 5: Système aérien de pulvérisation

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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).

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 6, *Equipment for crop protection*.

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Significant areas are sprayed globally by fixed wing and rotary aircraft in order to overcome serious pest threats to agriculture and forestry. Aerial application is used where difficult terrain or crop (forests) dictate as well as for timely application to large areas, in order to maximize efficient use of crop protection products and minimize environmental impact. This document specifies requirements and methods for verification, design and performance which are often unique from other sprayer equipment. This does not cover aircraft safety and design criteria for air worthiness and aircraft registration nor pilot or operator requirements all of which will be specified separately by countries or regions. . Industry stakeholders such as the USA National Agricultural Aviation Association (NAAA) and their partner National Agricultural Aviation Research and Education Fund have provided input to the development

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

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

— machine manufacturers (small, medium and large enterprises);

— health and safety bodies (regulators, accident prevention organizations, market surveillance etc.)

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

— machine users/employers (small, medium and large enterprises);

— machine users/employees (e.g. trade unions, organizations for people with special needs);

— service providers, e.g. for maintenance (small, medium and large enterprises);

— consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

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

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

Agricultural and forestry machinery — Environmental requirements for sprayers —

Part 5: Aerial spray systems

1 Scope

This document specifies requirements and the means for their verification for the design and performance of aerial fixed wing and rotary aircraft spray systems for agriculture, forestry, turf, and vegetation control in transport access ways (such as gas and electric lines) 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 document are different from those stated in ISO 16119-1, the requirements of this document take precedence over the requirements of ISO 16119-1 for machines within the scope of this document.

This document does cover safety of aerial spray equipment not covered by ISO 4254 series.

This document is not applicable to sprayers manufactured before the date of its publication, or unmanned aerial vehicles (such as drones).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1401:2016, *Rubber hoses for agricultural spraying*

ISO 5681:2020, *Equipment for crop protection — Vocabulary*

ISO 5682-1:2017, *Equipment for crop protection — Spraying equipment — Part 1: Test methods for sprayer nozzles*

ISO 5682-2:2017, *Equipment for crop protection — Spraying equipment — Part 2: Test methods to assess the horizontal transverse distribution for hydraulic sprayers*

ISO 5682-3:2017, *Equipment for crop protection — Spraying equipment — Part 3: Test method to assess the performance of volume/area adjustment systems*

ISO 9357:1990, *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 22368-3:2004, *Crop protection equipment — Test methods for the evaluation of cleaning systems — Part 3: Internal cleaning of tank*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
fixed wing aircraft
aircraft with fixed wings approved by local or national authority equipped for the application of plant protection products and fertilizers on crops, including forestry and grasslands

3.2
rotary aircraft
helicopter (rotary propelled) aircraft approved by local or national authority equipped for the application of plant protection products and fertilizers on crops, including forestry and grasslands

3.3
global navigation satellite system
GNSS
generic term for satellite navigation systems that provide autonomous geospatial positioning with global coverage

[SOURCE: ISO/TS 11356:2011, 3.2]

4 List of significant hazards

Table 1 specifies the significant hazards, the significant hazardous situations and significant hazardous event(s) covered by this document 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: 2013 and this document 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 document
4.1	Spillages	Filling, Filters	5.2; 5.2.6; 5.5
		Mixing of plant protection product	5.2.6; 5.11.1
4.2	Contamination of the water supply	Filling	5.2.6; 5.11
4.3	Leakages	Transport and application	5.2.6; 5.6; 5.2
4.4	Overfilling	Filling	5.2; 5.2.4; 5.2.6
4.5	Dispersal of spray mix residues or plant protection products	Drainage	5.2.3; 5.2.4; 5.11.1
		Cleaning and rinsing	5.2.3;5.5; 5.11
4.6	Accidental leakages	Accidental opening of tank outlet Hose leaks	5.2.4; 5.4; 5.2
4.7	Over-dosing	Heterogeneous mixing	5.2.5
....		Overlapping	5.10; 5.9

Table 1 *(continued)*

Hazard		Hazardous situation/event	Clause/subclause of this document
		Sprayer adjustment/control	5.10
		Sprayer maintenance/service	5.8.2; 6
		Unintended deposition	5.5
4.8	Unintended spraying outside the target area	Deposition outside the target area	5.5; 5.10
		Spraying stop control	5.7
4.9	Drift	Spraying	5.10
4.10	Dispersal of spray mix	Intervention on the sprayer during application or service	5.9, 5.10,
4.11	Dripping	Spraying stop control	5.7
4.12	Aircraft collision (wire strikes)	Aircraft working	5.5

5 Requirements

5.1 General

General requirements common to all sprayer types are covered by ISO 16119-1.

5.2 Sprayer tanks

The total tank volume shall be at least 5 % more than its nominal volume for open top filling, to prevent spillage as a result of overfilling. For filling via hose connections, such as auto closing fill valves and closed transfer dry-breaks, the total tank volume shall be at least 1 % more than its nominal volume.

5.2.1 Materials

Materials used shall be resistant to plant protection products (PPP) and approved by manufacture for intended use.

5.2.2 Tank openings

The filling hole and inspection port diameter or width shall be at least 300 mm for spray tanks with a nominal volume smaller than 300 l and preferably greater than 450 mm for bigger spray tanks. Alternate means to inspect tanks may be used for tanks with smaller fill openings. To limit the risk of access into the tank, any tank opening greater than 400 mm in diameter — or, if it is rectangular, of more than 400 mm × 300 mm — shall be provided with a grating which can only be removed by the use of tools. The openings in the grating shall not exceed the above-mentioned dimensions.

Filling hole lids and inspection openings shall sealed sufficiently to avoid spillage.

5.2.3 Emptying

5.2.3.1 Tank emptying device

An emptying device shall allow the complete emptying of the residual in the tank when the aircraft is parked 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.

The tank outlet shall, be guarded against accidental opening.