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Equipment for crop protection — Knapsack sprayers —

Part 1: Safety and environmental requirements

Matériel de protection des cultures — Pulvérisateurs à dos —

Partie 1: Exigences environnementales et de sécurité

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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 document 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).

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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*,in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 144, *Tractors and machinery for agriculture and forestry*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 19932-1:2013), which has been technically revised.

The main changes are as follows:

— the scope has been changed to include sprayers with a nominal volume of more than 6 l in order to address sprayers in professional use only;

— cancellation and modification of requirements.

A list of all parts in the ISO 19932 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.

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Introduction

The application of plant protection products with knapsack sprayers should take into consideration biological, economic, environmental and operator issues.

The aim of this document is to specify safety and environmental requirements for equipment.

Implementation of ISO 19932-1:2025 and ISO 19932-2:2025 will achieve an appropriate level of operator safety and avoid unnecessary dispersal of plant protection products into the environment.

This document is a type-C standard as stated in ISO 12100:2010.

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.

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Equipment for crop protection — Knapsack sprayers —

Part 1:
Safety and environmental requirements

1 Scope

This document specifies the safety and environmental requirements and their means of verification for the design and construction of knapsack sprayers carried on the back or shoulder of the operator for use with plant protection products. It also specifies the type of information on safe working practices (including residual risks) to be provided by the manufacturer.

This document is applicable to lever-operated knapsack sprayers, knapsack compression sprayers and knapsack sprayers driven by an engine or electric motor using hydraulic pressure atomisation of the spray liquid intended to be used primarily in agriculture, forestry and horticulture with a nominal volume of more than 6,0 l.

This document is not applicable to knapsack sprayers which are manufactured before the date of publication of this document.

It does not apply to knapsack combustion engine-driven air-blast sprayers according to ISO 28139: 2019+A1:2024.

This document deals with all significant hazards, hazardous situations and hazardous events relevant to knapsack sprayers when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see Annex A), excepting the hazards arising from:

— static electricity;

— explosion or fire from chemicals for spraying; and

— insufficient structural integrity.

Noise is not considered to be a relevant hazard for:

— lever operated knapsack sprayers;

— electric motor driven knapsack sprayers.

This document does not cover electromagnetic compatibility (EMC) requirements.

This document is intended to be applied in conjunction with ISO 19932-2:2025.

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 3767-5:2016, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 5: Symbols for manual portable forestry machines*

ISO 3864-1:2011, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs and safety markings*

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

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

ISO 6385:2016, *Ergonomics principles in the design of work systems*

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

ISO 10626:1991, *Equipment for crop protection — Sprayers — Connecting dimensions for nozzles with bayonet fixing*

ISO 11684:2023, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Safety labels — General principles*

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 13857:2019, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*

ISO 14120:2015, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

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

ISO 19932-2:2025, *Equipment for crop protection — Knapsack sprayers — Part 2: Test methods*

ISO 20599:2024, *Manually portable (hand-held) powered lawn and garden equipment and forest machinery — Engine performance and fuel consumption*

ISO 22867:2021, *Forestry and gardening machinery — Vibration test code for portable hand-held machines with internal combustion engine — Vibration at the handles*

ISO 22868:2021, *Forestry and gardening machinery — Noise test code for portable hand-held machines with internal combustion engine — Engineering method (Grade 2 accuracy)*

IEC 61032:1997, *Protection of persons and equipment by enclosures — Probes for verification*

IEC 62133-1:2017, *Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications — Part 1: Nickel systems*

IEC 62133-2:2017, *Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications — Part 2: Lithium systems*

IEC/EN 62841-1:2014, *Electric motor-operated hand-held tools, transportable tools and lawn and garden machinery — Safety — Part 1: General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5681:2020, ISO 12100:2010 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 https://www.electropedia.org/

3.1
knapsack sprayer
self-contained sprayer carried on the operator's back or shoulder by means of straps or a strap

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