INTERNATIONAL STANDARD

ISO 19932-2

First edition
2006-03-15

Equipment for crop protection — Knapsack sprayers —

Part 2: Performance limits

Matériel de protection des cultures — Pulvérisateurs à dos —

Partie 2: Limites de performance

Reference number
ISO 19932-2:2006(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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 19932-2 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 6, *Equipment for crop protection*.

ISO 19932 consists of the following parts, under the general title *Equipment for crop protection — Knapsack sprayers*:

— *Part 1: Requirements and test methods*

— *Part 2: Performance limits*

Introduction

The application of crop protection chemicals with knapsack sprayers needs to take into consideration biological, economic, environmental and operator issues, as well as the suitability of the sprayer.

The aim of ISO 19932 is to specify requirements, test methods and performance limits for equipment in order to ensure safe use.

Implementation of ISO 19932 should achieve minimal exposure levels to the operator and avoid unnecessary waste of pesticides into the environment.

Equipment for crop protection — Knapsack sprayers —

Part 2:
Performance limits

1 Scope

This part of ISO 19932 specifies the minimum performance limits for manually operated-knapsack sprayers with a nominal spray tank volume of 5 l or more. It is applicable to lever-operated knapsack sprayers and knapsack compression sprayers for their intended use in, for example, agriculture and horticulture.

2 Normative references

The following referenced documents are indispensable for the application 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 5681:1996, *Equipment for crop protection — Vocabulary*

ISO 5682-1996, *Equipment for crop protection — Spraying equipment — Part 1: Test methods for sprayer nozzles*

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

ISO 19932-1:2006, *Equipment for crop protection — Knapsack sprayers — Part 1: Requirements and test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5681 and ISO 19932-1 apply.

4 Requirements and specifications

4.1 General

Manually operated knapsack sprayers shall be so designed that they can be safely used in accordance with their intended purpose.

They shall be designed so that they can be operated, supervised and switched off immediately.

Sprayers shall comply with the requirements given in 4.2 after a preconditioning period as specified in ISO 19932-1:2006, 5.2, and shall meet the specifications given in 4.3 when tested in accordance with ISO 19932-1.

4.2 Requirements

4.2.1 General

The mass of the equipment with a spray tank filled at nominal volume shall not be more than 25 kg, and one person shall be able to pick it up, carry it and put it down.

The sprayer shall have an adjustable and reproducible spray liquid output.

A reproducible output can be achieved by using a pressure regulator or by changing the pumping frequency.

Parts subject to wear (such as nozzles, filters, anti-drip valves, valves and diaphragms) specified in the instruction handbook shall be easily changeable without special tools, unless the latter are provided with the sprayer.

The sprayer shall be equipped with a means for handling the filled sprayer safely in an upright position.

4.2.2 Straps and their fixation points

Straps shall be made of non-absorbent material.

The straps shall be adjustable in length to meet the needs of the users.

Sprayers carried on the operator's back shall have at least one strap with a quick coupling and release device, capable of being used with one hand.

The load bearing width of the straps shall be at least 30 mm.

Straps shall not self loosen by, for example, force of gravity or through movement.

4.2.3 Spray tank

Non-pressurised spray tanks shall have a pressure compensation means.

The nominal volume shall be specified in whole litres. Additionally, filling levels and limits shall be visible during the filling operation.

Filling openings of lever-operated sprayers shall be at least 100 mm in diameter. Compression sprayers shall be equipped with an integrated filling funnel with an upper diameter of at least 100 mm, or else it shall be possible to attach such a funnel. An appropriate filling funnel, i.e. one containing a strainer with a mesh width of 0,5 mm to 2 mm, shall be provided by the manufacturer, and information to that effect shall be given in the instruction handbook.

Hose nipples fitted to the tank shall be protected against damage.

The spray tank shall have a volumetric contents gauge scale according to ISO 9357.

4.2.4 Adjusting device

Pressure lines shall be equipped with quick-acting shut-off valves. The valve shall be closed when released and shall not be lockable when in the open position. Unintentional opening of the shut-off valve shall be minimised by, for example, a force or locking device.

4.2.5 Tubes

Flexible tubes shall be attached so that there are no sharp bends in all normal working positions.

4.2.6 Filters

Lever-operated sprayers shall have a strainer with a mesh width between 0,5 mm and 2 mm.

For compression sprayers, it shall be possible to attach such filling strainers. Appropriate filling strainers shall be provided by the manufacturer.

The space between the spray tank filling opening and strainer, as well as the diameter of openings within the strainer, shall not exceed 2 mm.

The liquid going to the nozzles shall be filtered on the pressure side. The mesh width of these filters shall be less than the narrowest diameter of the smallest size of nozzle to be used.

Filters shall be installed at a freely accessible place. They shall be capable of being removed and easily cleaned.

4.2.7 Nozzles

The pattern of sprayed liquid shall not change unintentionally during operation.

The nozzle shall be protected from external clogging during storage and filling of the sprayer — for example, by a spray lance parking device.

4.2.8 Pressure gauge

Equipment with pressure nozzles shall have a device indicating (e.g. pressure gauge) or controlling the pressure.

The maximum error of a pressure gauge shall be ± 20 kPa (± 0,2 bar).

The pressure gauge shall be clearly readable and visible when the sprayer is being operated. The pressure indication shall be stable. The scale of the pressure gauge shall be marked every 20 kPa (0,2 bar).

4.3 Specifications

4.3.1 General

The sprayer shall not fall over when tested in accordance with ISO 19932-1:2006, 5.3.6.

For sprayers up to 17 l, the residual volume of liquid shall not exceed 250 ml, while for those that exceed 17 l, this volume shall not exceed 1,5 % of the nominal tank volume, when tested in accordance with ISO 19932-1:2006, 5.3.5.

The sprayer shall give output rates of ± 15 % of the values specified in the instruction handbook when tested in accordance with ISO 19932-1:2006, 5.3.2.

The amount of liquid remaining in the spray shall not exceed 50 ml when tested in accordance with ISO 19932-1:2006, 5.3.9.

Pressurised parts of the sprayer shall withstand the pressure test given in ISO 19932-1:2006, 5.5.

The total volume of leakage for the test in accordance ISO 19932-1:2006, 5.6, shall not exceed

— 0 ml in the upright position,

— 0,5 ml in a 45° position,

— 5 ml in horizontal position,

after the tests according to ISO 19932-1:2006, 5.4 and 5.5.

4.3.2 Straps and their fixation points

There shall be no damage on load-bearing straps and their fixation points that reduces their functionality as a consequence of the drop test according to ISO 19932-1:2006, 5.3.3.

4.3.3 Spray tank

The total volume of all splashes during filling in accordance with ISO 19932-1:2006, 5.3.8, shall not exceed 5 ml.

Spray tanks of lever-operated sprayers shall have an additional volume of at least 5 % of the nominal volume, and spray tanks of compression sprayers shall have an additional volume of at least 25 % of the nominal volume, when tested in accordance with ISO 19932-1:2006, 5.3.7.

The volumetric contents gauge scale shall have a maximum error of ± 7,5 %, up to a filling level of 20 % of the nominal volume, and ± 5 % for the greater filling level, when tested in accordance with ISO 19932-1:2006, 5.3.7.

The external deposit shall not exceed 70 ml when tested in accordance with ISO 19932-1:2006, 5.3.4.

4.3.4 Adjusting device

The cut-off valve shall properly open and close, and it shall not leak after being tested according to ISO 19932-1:2006, 5.3.1.

4.3.5 Nozzles

Nozzles fitted to, or supplied with, the sprayer shall give a flow rate of ± 10 % of the nominal value when tested in accordance with ISO 5682-1:1996, 7.2.