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Equipment for crop protection - Knapsack sprayers - Part 2: Test methods (ISO/DIS 19932-2:2022)

Pflanzenschutzgeräte - Tragbare Geräte - Teil 2: Prüfverfahren (ISO/DIS 19932-2:2022)

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Equipment for crop protection — Knapsack sprayers —

Part 2:
Test methods

Matériel de protection des cultures — Pulvérisateurs à dos —

Partie 2: Méthodes d'essai

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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*.

This third edition cancels and replaces the second edition (ISO 19932-2:2013), which has been technically revised. The main changes compared to the previous edition 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.

— The test methods have been aligned with the modified requirements of ISO 19932-1.

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.

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 test methods for the verification of requirements for equipment to ensure safe use and protect the environment.

Implementation of ISO 19932-1:20XX and ISO 19932-2:20XX will achieve an appropriate level of operator safety and avoid unnecessary dispersal of plant protection products into the environment.

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.

Equipment for crop protection — Knapsack sprayers —

Part 2: Test methods

1 Scope

This document specifies particular test methods for the verification of requirements of ISO 19932-1:20XX for knapsack sprayers carried on the back or shoulder of the operator for use with plant protection products.

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

It does not apply to knapsack combustion engine-driven air-blast sprayers covered by ISO 28139.

To give presumption of conformity with the Essential Requirements of EU Directive 2006/42/EC, this document shall only be applied in conjunction with ISO 19932-1:20XX.

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.

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

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5681:2020 and ISO 19932-1:20XX 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/

4 Test liquids and equipment

4.1 Water, clean and free from solids.

4.2 Preconditioning device, allowing holding of the sprayer and the operation of the lever-operated knapsack sprayer pump lever continuously. The stroke and frequency shall be adjustable. An example is given in Annex A.

1) Under revision

4.3 Shut-off device test equipment, consisting of a frame to fix the hand-held part of the shut-off device and a unit for moving the shut-off device control, e.g. valve lever, to open it periodically with an induced flow at the prescribed rate and pressure. The stroke shall be adjustable. An example is given in Annex B.

4.4 Strap test device, capable of dropping the sprayer, vertically guided, onto each strap from a height of 200 mm using a horizontal restraining bar that is 75 mm in diameter. The device is to be capable of testing sprayers with one or two upper and/or lower fixing points. An example is given in Annex C. Other devices with equivalent performance can be used.

WARNING — This test device presents an element of risk when the test is underway. All personnel shall either be kept out of the test area or otherwise protected from hazards such as parts displaced from the sprayer on test.

4.5 Drop test device, to drop the upright sprayer, vertically guided, from a height of (600 ± 20) mm onto a flat level surface, 800 mm × 800 mm × 50 mm in height, made of high-density polythene (HDPE) or hard wood placed on a flat level floor. The device shall not affect the impact force of the dropped sprayer. An example is given in Annex D. Other devices with equivalent performance can be used.

4.6 Filling device, by which the volume and flow of water or test liquid can be controlled and adjusted. An example is given in Annex E. Other devices with equivalent performance can be used.

4.7 Weighing devices, with the ability to weigh up to:

a) 50 kg with a maximum error of ±10 g;

b) 2 kg with a maximum error of ±0,1 g.

4.8 Measuring cylinder, for measuring volumes of up to 1 l with a maximum error of ±10 ml.

4.9 Timer (stop watch), with a maximum error of ±0,5 s for measuring periods up to 5 min.

4.10 Pressure supply device, to place the sprayer under pressure using air or water. The pressure shall be adjustable up to 15 bar with a maximum error of ±5 % of the measured value, except when measuring engine-driven sprayers when it shall be adjustable up to 50 bar with a maximum error of ±5 % of the measured value.

4.11 Pressure gauges, to measure the pressure with a maximum error of 5 %.

4.12 Polythene bags, the size of which shall be at least 30 cm × 40 cm.

4.13 Polythene sheets, the size of which shall be at least 2 m × 1 m.

5 General

5.1 Test conditions

The tests shall be performed with one new specimen of the sprayer type at an air temperature of 10 °C to 30 °C and relative air humidity of at least 30 %, with no influence of wind or sunlight.

5.2 Sprayer

Assemble the knapsack sprayer in accordance with the instruction handbook. Inspect for tightness of the filling cap, gland nut and other operator-controlled couplings. Weigh the complete empty sprayer using a weighing device according to 4.7 a) and record the mass in kilograms.

5.3 Functional tests

5.3.1 Shut-off device reliability

Detach the shut-off device assembly with the spray lance from the sprayer and mount it on a frame according to 4.3. Connect the shut-off device to a pressurized water supply of (3 ± 0,2) bar. Fully activate the shut-off device using a frequency of (15 ± 5) cycles/min for a total duration of 25 000 cycles. Inspect functionality and record any leakage occurring within 1 min ± 5 s after completion of the last cycle.

5.3.2 Spray liquid output

The spray liquid output rate, q_m, of the sprayer for each nozzle supplied for use with the sprayer shall be measured with a maximum error of ±1 % at the optimum spray pressure specified in the instruction handbook or at the setting specified in the instruction handbook. Record the spray liquid output and calculate the percentage deviation, σ, from the values, q_s, specified in the instruction handbook using Formula (1):

$$\sigma = \frac{(q_m - q_s)}{q_s} \times 100\,\% \tag{1}$$

5.3.3 Load carrying straps and their fixation points

WARNING — This test has an element of risk. All personnel shall either be kept out of the test area or otherwise protected from hazards such as parts displaced from the sprayer on test.

Fill the spray tank with water so that the total mass of the sprayer is 7 kg ± 100 g. If the empty mass of the sprayer is over 7 kg the test shall be carried out with the sprayer empty and if the maximum mass of the sprayer filled to the nominal volume is below 7 kg record the mass and test at this mass. Attach the sprayer to a strap test device according to 4.4 so that each load carrying strap can be tested individually. From the position where the sprayer is carried by a strap in the device, lift the sprayer vertically (200 ± 20) mm and let the sprayer drop. Repeat this 10 times for each load carrying strap.

Inspect for and record any damage.

5.3.4 Stability

Position the empty sprayer on a flat hard surface with an incline of 8,5° ± 0,2° so that the load carrying straps are facing down the slope. Set any lever and the lance in the park position specified by the manufacturer. If there are no park positions, set the lever in its highest position with the lance down the slope.

Check the stability of the sprayer by rotating it at 90° intervals.

Repeat the test with the spray tank filled to the nominal volume.

Record any position in which the sprayer does not remain upright without being touched.

5.3.5 Contents gauge scale and total volume

Place the empty sprayer in an upright position on a flat horizontal surface with any lever in the park position.

Measure and record the volume between the graduations on the spray tank contents gauge scale when filling the spray tank using a measuring cylinder according to 4.8 or using a device according to 4.7. Continue until the spray tank is filled to its nominal volume.

Determine the scale error, E, in percentage using Formula (2):

$$E = \frac{V_s - V_m}{V_s} \times 100\,\% \quad (2)$$

where

V_s is the volume according to the spray tank scale, in millilitres (ml);

V_m is the measured volume of water filled into the spray tank, in millilitres (ml).

As a second part of the test, fill the spray tank to the upper edge of the filling opening.

For lever-operated sprayer and engine- or motor-driven sprayers, insert the filling strainer and close the tank lid.

For compression sprayers, insert and tighten the air pump and remove all liquid from an integrated filling funnel. If the filling opening is situated below any parts of the spray tank, so that air pockets are formed, remove the hose and fill the sprayer through the spray tank outlet opening with air pump mounted.

Weigh the sprayer using a device according to 4.7 a).

Determine the total volume, V_t, by the difference between the mass of the completely-filled sprayer and the mass registered in 5.2.

Calculate the additional volume, V_A, of the spray tank in percentage using Formula (3):

$$V_A = \frac{V_t - V_n}{V_n} \times 100\,\% \quad (3)$$

where V_n is the nominal volume.

5.3.6 Filling rate

This test shall be carried out on a complete sprayer, empty at the start of the test, as described in 5.2.

Wash all external surfaces of the sprayer with a non-ionic surfactant aqueous solution of 0,5 % and then dry them.

Put any lever and spray lance in the park position. Remove the spray-tank lid or the air pump, as appropriate, but keep the filling strainer in position.

Position the sprayer in the centre of a polythene sheet according to 4.13.

Position a filling device according to 4.6 with its outlet placed 100 mm ± 5 mm above the filling opening. The sprayer shall be positioned with its straps opposite to the filling device with the line connecting the upper strap fixing points orientated perpendicularly to the axis of the filling device (see Annex E). The impact point of the test liquid shall be the middle of the filling opening.

Fill the filling device with a volume of water to its maximum volume without overspill.

Pour a volume of water that equates to the nominal spray-tank volume from the filling device into the filling opening of the sprayer to simulate filling of the sprayer. The flow rate from the filling device shall be such that the nominal tank volume will be poured within 60 s with a maximum flow rate deviation of 10 %.

Wipe off any external residues on the sprayer with a tissue. Determine the amount of splashes as the mass of the collected splashes on the polythene sheet according to 4.13 and the tissue, considering their tare, using a weighing device according to 4.7 b).