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Agricultural machinery - Safety - Part 6: Sprayers and liquid fertilizer distributors (ISO/DIS 4254-6:2017)

Landmaschinen - Sicherheit - Teil 6: Pflanzenschutzgeräte (ISO/DIS 4254-6:2017)

Matériel agricole - Sécurité - Partie 6: Pulvérisateurs et distributeurs d'engrais liquides (ISO/DIS 4254-6:2017)

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Agricultural machinery — Safety —

Part 6:
Sprayers and liquid fertilizer distributors

Matériel agricole — Sécurité —

Partie 6: Pulvérisateurs et distributeurs d'engrais liquides

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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 4254-6 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 6 and by Technical Committee CEN/TC 144, *Tractors and machinery for agriculture and forestry* in collaboration.

This third edition cancels and replaces the second edition ISO 4254-6:2009, which has been technically revised and contains the following changes:

Compared with the second edition (2009) the following modifications were made

— 1 Scope: some excluded hazards were deleted as they are covered by ISO 4254-1 or this revised edition;

— 4.2.1 General (stability) was deleted as covered by ISO 4254-1;

— 4.4 (protection of the operator against hazardous substances in case of front mounted booms) was modified to allow the application to all types of sprayers;

— 4.5.2: the requirements for chemical inductions bowls were amended to cover foldable devices;

— 4.6 Pressure indicators: requirements for protecting the operator in case of leakages were added;

— New 6.6.2.3 to refer to closed transfer systems;

— New 4.12 to deal with the storage of personal protective equipment;

A list of all parts in the ISO 4254- series, published under the general title *Agricultural machinery — Safety*, can be found on the ISO website.

Introduction

The structure of safety standards in the field of machinery is as follows:

a) type-A standards (basic standards) giving basic concepts, principles for design, and general aspects that can be applied to machinery;

b) type-B standards (generic safety standards) dealing with one safety aspect or one type of safeguards that can be used across a wide range of machinery:

   — type-B1 standards on particular safety aspects (e.g. safety distances, surface temperature, noise),

   — type-B2 standards on safeguards (e.g. two-hand control devices, interlocking devices, pressure sensitive devices, guards);

c) type-C standards (machinery safety standards) dealing with detailed safety requirements for a particular machine or group of machines.

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

When requirements of this type-C standard are different from those which are stated in type-A or 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.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this part of ISO 4254. These hazards are specific to sprayers and liquid fertilizer distributors.

Significant hazards that are common to all the agricultural machines (self-propelled, mounted, semi-mounted and trailed) are dealt with in ISO 4254-1.

Agricultural machinery — Safety —

Part 6: Sprayers and liquid fertilizer distributors

1 Scope

This part of ISO 4254, to be used together with ISO 4254-1, specifies the safety requirements and their verification for the design and construction of mounted, semi-mounted, trailed and self-propelled agricultural sprayers for use with Plant Protection Products (PPP) and liquid fertilizer application, as placed on the market by the manufacturer and designed for a single operator only. In addition, it specifies the type of information on safe working practices (including residual risks) to be provided by the manufacturer.

When requirements of this part of ISO 4254 are different from those which are stated in ISO 4254-1, the requirements of this part of ISO 4254 take precedence over the requirements of ISO 4254-1 for machines that have been designed and built according the provisions of this part of ISO 4254.

This part of ISO 4254, taken together with ISO 4254-1, deals with significant hazards, hazardous situations and events relevant to sprayers and liquid fertilizer distributors when they are used as intended and under the conditions foreseen by the manufacturer (see Annex A), excepting the hazards arising from:

— automatically actuated height adjustment systems;

— the environment, other than noise;

NOTE For environment related hazards, see ISO 16119.

— moving parts for power transmission except strength requirements for guards and barriers;

This part of ISO 4254 is not applicable to sprayers and liquid fertilizer distributors which are manufactured before the date of publication of this document by ISO.

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 4254-1:2013, *Agricultural machinery — Safety — Part 1: General requirements*

ISO 5353:1995, *Earth-moving machinery, and tractors and machinery for agriculture and forestry — Seat index point*

ISO 5681, *Equipment for crop protection — Vocabulary*

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

ISO 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*

ISO 16119-2:2013, *Agricultural and forestry machinery — Environmental requirements for sprayers — Part 2: Horizontal boom sprayers*

ISO 16119-3:2013, *Agricultural and forestry machinery — Environmental requirements for sprayers — Part 3: Sprayers for bush and tree crops*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4254-1, ISO 5681 and ISO 12100 apply.

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

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

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

4 Safety requirements and/or protective measures

4.1 General

4.1.1 Machinery shall comply with the safety requirements and/or protective measures of this clause.

In addition, the machine shall be designed according to the principles of ISO 12100 for hazards relevant, but not significant, which are not dealt with by this part of ISO 4254.

The compliance with the safety requirements and/or measures shall be verified in accordance with Clause 5.

4.1.2 Unless otherwise specified in this part of ISO 4254, the machine shall comply with the requirements of ISO 4254-1.

4.1.3 The machine shall allow for handling and operating, including filling and maintenance, by an operator wearing adequate personal protective equipment as recommended in 6.1 g).

4.2 Stability of machines fitted with rollers for manual handling when dismounted

Machines equipped with transport rollers for manual handling when dismounted shall be designed to minimize the risk of tipping over (see clause 5).

4.3 Protection against spray

In order to protect the operator from spray, the sprayer design should allow the use of protective measures specified by the label of the product to be applied (e.g. protection by operator cabin or personal protective equipment).

4.4 Spray boom folding

4.4.1 To limit the risk associated with overhead power lines during work, the booms shall be capable of folding and unfolding without exceeding a height of 4 m. See also (6.1 d) and 6.1 e)).

This requirement does not apply during release of the folded boom from the transport position, nor during positioning of the folded boom into the transport position.

4.4.2 Booms that can be manually folded/unfolded shall be fitted with two handles located at a distance of at least 300 mm from the nearest articulation. These handles may be integral parts of the boom, provided they are ergonomically designed and clearly identified.

In the case of powered folding/unfolding operation, the control shall be of the hold-to-run type and the manual control shall be located outside the swiveling zone.

A device shall be provided to prevent the boom from moving when it is in the transport position. If this locking device is a hydraulic valve not directly fitted to the cylinder, the lines connecting the valve to the cylinder shall be designed to withstand a pressure of at least four times the rated maximum hydraulic pressure. See also (7.1 d)). The unlocking and the unfolding of booms shall be controlled by means of separate actions by the operator.

4.5 Adjustment of spray boom height

The manual force necessary to adjust the height of the boom shall not exceed 250 N.

Where height adjustment is by a mechanical device, this device shall be self-arresting and able to deal with a nominal load equal to at least 1,3 times the weight of the boom.

This mechanical device shall be operable from the ground or from a platform as specified in ISO 4254-1:2013, 4.7.2.

In the case of powered height adjustment systems that are manually actuated, it shall be possible to actuate the manual control from the driver's position and the control shall be of the hold-to-run type.

In the case of powered height adjustment systems that are automatically actuated, it shall be possible to override the system from the driver's position.

To ensure the protection of the operator against crushing and shearing hazards related to a failure of the control circuit of the height adjustment of the boom, the machine shall be fitted for those purposes with either

a) a device which limits the maximum downward speed of the boom to 10 mm·s^{-1} (measured at the centreline of the machine) during a hydraulic failure, or

b) a device capable of stopping the boom lowering at a minimum height of 500 mm between the boom and the ground.

For b), in those cases where the height needs to be reduced to less than 500 mm, a safety device shall prevent any lowering beneath the chosen height, and it shall only be possible to reduce the height by means of an intentional and separate action.

If these safety devices are hydraulic valves not directly fitted to the cylinder, the lines connecting the valve to the cylinder shall be designed to withstand a pressure of at least four times the rated maximum hydraulic pressure.

4.6 Spray tank

4.6.1 Prevention of whole-body access to the tank

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. See also 6.1 g) and 6.2.2.

4.6.2 Limitation of contact with chemicals

To limit the risk of exposure to chemicals during filling/cleaning operations 4.6.2.1, 4.6.2.2 or 4.6.2.3 shall be applied.

4.6.2.1 Chemical induction bowls which are folded/unfolded manually shall be provided with a handle and locking mechanism for folding/unfolding that can be actuated without presenting a risk to the operator during operation. The handle can be integral part of the chemical induction bowl provided it is suitably designed and clearly identified.

Power-assisted chemical induction bowls shall be able to be operated from a position that prevents the operator contacting the folding induction bowl while operating the folding control. The folding control shall be a hold-to-run control. The unintended unfolding of the chemical induction bowl during transport shall be prevented by a suitable means.

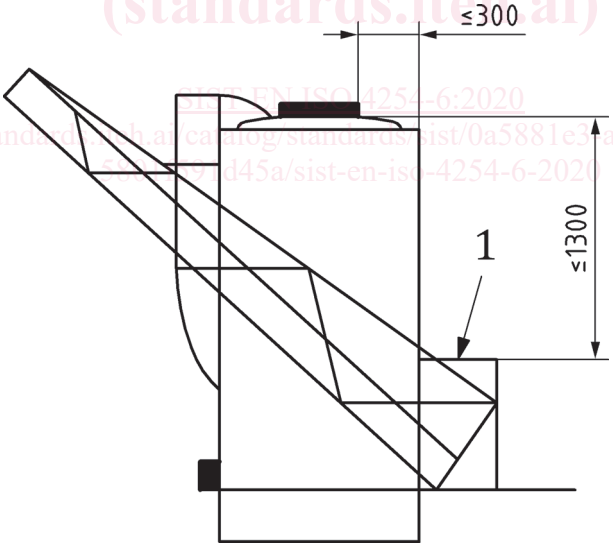
Actuation of the PPP container rinsing device shall be operated by a hold-to-run control, the purpose of which is to prevent operation of the rinsing device unless a PPP container is correctly positioned on the device, prevents the discharge of liquid onto the operator and all liquid released is directed into the induction system, no liquid shall be ejected outside of the induction system.

4.6.2.2 The filling hole of the spray tank shall be so positioned that the height from the ground or platform is not more than 1 300 mm, with the horizontal reach between the rim of the hole and the outer edge of any part of the sprayer which could hinder the operator being not more than 300 mm at the operator filling position (see Figure 1).

4.6.2.3 In case of liquid PPP, the sprayer shall be equipped with a means for introducing PPP's that control the risk of chemical contact and inhalation when dispensing PPP's and when cleaning the PPP container (see e.g. closed transfer systems).

NOTE A closed transfer systems standard is under development.

Dimensions in millimetres



Key

1 operator filling position

Figure 1 — Maximum reach for manually filling chemicals

4.6.3 Prevention of spillage and overflow

The actual overall volume of the tank shall exceed the nominal volume by at least 5 %.

The lid shall be:

— attached to the machine, e.g. by means of a chain;