

ANSI/ASABE AD4254-6:2020 MAR2021

Agricultural machinery — Safety — Part 6: Sprayers and liquid fertilizer distributors



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This standard was reviewed for adoption by the ASABE Application Systems technical subcommittee and has been formerly approved by the Power and Machinery Division. Adopted by ASABE August 2013; approved as an American National Standard September 2013; reaffirmed by ASABE and ANSI December 2017. The updated version of this standard was adopted by ASABE and approved as an American National Standard March 2021.

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0 Foreword

0.1 ANSI/ASABE AD4254-6:2020, Agricultural machinery — Safety — Part 6: Sprayers and liquid fertilizer distributors, is an adoption with deviations of the identically titled ISO standard ISO 4254-6:2020, Agricultural machinery — Safety — Part 6: Sprayers and liquid fertilizer distributors.

Deviations noted in the following Foreword sections pertain to those provisions where harmonization could not be achieved between ASABE and the International Standard.

0.2 ANSI/ASABE AD4254-6:2020 is 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 document are different from those which are stated in ISO 4254-1, the requirements of this document take precedence over the requirements of ISO 4254-1 for machines that have been designed and built according to the provisions of this document.

This document, 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 foreseeable by the manufacturer (see Annex A), excepting the hazards arising from:

- protection of the driver against spray when spraying (see Foreword);
- automatically actuated height adjustment systems;
- the environment, other than noise;
- moving parts for power transmission except strength requirements for guards and barriers.

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

0.3 Four normative references are listed in ISO 4254-6:2020. These references have been reviewed and accepted as part of the adoption with deviations of the ISO document in ANSI/ASABE AD4254-6:2020.

0.4 This standard has been approved as an American National standard by ANSI (American National Standards Institute).

0.5 This standard deviates from ISO 4254-6:2020 as follows:

0.5.1 Replace section 4.3.1 with “A safety sign(s) shall be provided to inform of possible overhead power line contact on agricultural equipment that exceeds 4.3 m (14 ft) in height during any mode of operation, transport, or preparation for transport.”

0.5.2 Replace 4.10 paragraph with: “Each machine shall be equipped at the driver's position with a spraying stop control device to safely stop the flow (e.g. by means of two valves placed in series). When the spraying stop control has been actuated, the volume dripping from each nozzle shall be minimized.” (See also clause 5)

0.5.3 In 6.2.3, Remove “maximum pump pressure” and “nominal frequency of rotation”

0.5.4 In 6.2.3, Add “model number”

Text of ISO 4254-6:2020 Agricultural machinery — Safety — Part 6: Sprayers and liquid fertilizer distributors, with deviations noted, follows.

1 Scope

This document, 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.

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

ISO 5681, Equipment for crop protection — Vocabulary

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

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:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

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 that are relevant, but not significant, which are not dealt with by this document.

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 document, 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 in accordance with 6.1 g).

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

Machines equipped with transport rollers for manual handling when dismantled shall be designed to minimize the risk of tipping over (see Clause 5) or unintended rolling down an incline.

4.3 Spray boom folding

~~**4.3.1** 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.~~

4.3.1 A safety sign(s) shall be provided to inform of possible overhead power line contact on agricultural equipment that exceeds 4.3 m (14 ft) in height during any mode of operation, transport, or preparation for transport.

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

4.4 Adjustment of spray boom height

4.4.1 Manual height adjustment

The manual force necessary to adjust the height of the boom shall not exceed 250 N. The height adjustment 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, and
- operable from the ground or from a platform as specified in ISO 4254-1:2013, 4.7.2.

4.4.2 Powered height adjustment

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 500 mm without an intentional and separate action of a safety device.

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.

4.5 Spray tank

4.5.1 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 h) and 6.2.2.

4.5.2 Limitation of contact with chemicals

4.5.2.1 To minimize the risk of exposure to chemicals during filling/cleaning operations 4.5.2.2, 4.5.2.3 or 4.5.2.4 shall be applied.

4.5.2.2 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 an 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.

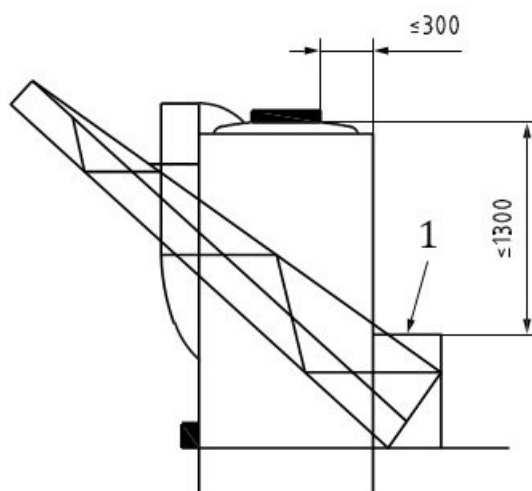
The plant protection product container rinsing device shall be operated by a hold-to-run control. The rinsing device shall operate after a container is correctly positioned on the rinsing device in a way that prevents the discharge of liquid onto the operator. The rinsed liquid shall be directed to release into the induction system so that no liquid shall be ejected outside of the induction system.

4.5.2.3 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).

4.5.2.4 In case of liquid plant protection products, the sprayer shall be equipped with a means for introducing plant protection products that controls the risk of chemical contact and inhalation when introducing plant protection products and when cleaning the plant protection products container.

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

4.5.3 Prevention of spillage and overflow

The actual overall volume of the spray liquid 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;
- fitted with a holding device ensuring a closed position either by means of a positive mechanical action or lids fixed by screwing;
- fitted so as to prevent leakage of the spray mixture, e.g. by means of a seal.

The level of liquid shall be indicated to the operator during filling and emptying. The nominal volume of the tank shall be marked.

A pressure-compensation device shall be fitted on tanks that are not designed to be put under pressure, in order to keep them at atmospheric pressure when emptying and filling [see also 6.1 b)].