INTERNATIONAL STANDARD

ISO 21278-2

First edition
2008-11-15

Equipment for crop protection — Induction hoppers —

Part 2: General requirements and performance limits

Matériel de protection des cultures — Incorporateurs —

Partie 2: Exigences générales et limites de performance

Reference number
ISO 21278-2:2008(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 21278-2 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 6, *Equipment for crop protection*.

ISO 21278 consists of the following parts, under the general title *Equipment for crop protection — Induction hoppers*:

— *Part 1: Test methods*

— *Part 2: General requirements and performance limits*

Introduction

The sprayer main tank may be connected to an introduction hopper in order to prevent chemical cross-contamination, contamination of the operator and of the environment.

Currently two main different types of hopper are available on the market:

— introduction hoppers, which are able to transfer the chemical into the main tank of the sprayer;

— induction hoppers, which are able to transfer the chemical product into the sprayer and partially mix the chemical product, and are able to carry out self-cleaning.

ISO 21278 is applicable to induction hoppers for fertilizers and plant protection products for agricultural crop protection machines and is aimed at verifying their functionality.

Equipment for crop protection — Induction hoppers —

Part 2: General requirements and performance limits

1 Scope

This part of ISO 21278 specifies general requirements and performance limits for induction hoppers as specified in ISO 21278-1.

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, *Equipment for crop protection — Vocabulary*

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

ISO 21278-1:2008, *Equipment for crop protection — Induction hoppers — Part 1: Test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5681 and ISO 21278-1 apply.

4 General requirements

4.1 Nominal volume

The nominal volume level shall be permanently marked to show the maximum level to which the induction hopper can be safely filled during normal operations.

4.2 Opening size

The opening size of the induction hopper shall be designed to allow:

— the filling of chemical products without splashing;

— the internal cleaning of cans of volumes up to at least 10 l (as specified in ISO 21278-1:2008, 6.8.2).

4.3 Prevention of internal contamination

The induction hopper shall have means of protection to avoid the introduction of foreign matter when not in use.

It shall be possible to inspect and to maintain the induction hopper when it is fitted with a cover.

4.4 Bowl outlet

The outlet for the mixed solution shall not be so large as to allow a ball of 20 mm diameter to pass through it.

The induction hopper shall allow the operator to safely remove a ball of 20 mm diameter fallen in the induction hopper.

4.5 Free-standing induction hoppers

The filling opening edge for free-standing induction hoppers shall not exceed a height of 1 000 mm from the ground.

The free-standing induction hopper shall be designed to be stable, when used according to the information given in the instruction handbook, on firm ground with an inclination of 8,5° in any direction. This requirement shall be met with the bowl empty, then with the bowl full of water.

4.6 Induction hopper internal washing system

Washing of the induction hopper shall be possible using clean water, either from a clean water tank on the sprayer or from an external source.

4.7 Cleaning device for product cans

The induction hopper shall be equipped with a cleaning device for crop protection product cans, and provided with an automatic shut-off valve for its operation. The activation of the liquid jet, when the can to be washed is in place, shall be safe.

Washing of the can shall be possible using clean water, either from a clean water tank on the sprayer or from an external source.

4.8 Cover

The cover, if any, shall be able to stay in the open position when the induction hopper is in use.

The cover shall be equipped with a closing system able to hold the cover shut tightly when necessary.

The cover shall be attached either to the induction hopper or to the sprayer, so that the cover may not come into contact with the ground.

4.9 Controls

When in operation all controls shall be positioned so that they can be easily and safely operated from the working position.

4.10 Inspection

It shall be possible for the operator to safely inspect the correct functioning of the induction hopper.

4.11 Prevention of back flow

There shall be no back flow from the main tank to the induction hopper.

4.12 Instruction handbook

An instruction handbook shall be provided by the manufacturer.

At least the following information shall be provided:

— type of product (liquid, micro-granules and/or powder) that can be used in the induction hopper;

— correct mounting, safe operation and cleaning (both for the operator and for the environment);

— height for filling the hopper, which shall not exceed 1 000 mm in the operating position, measured either from the ground or from the operator platform.

5 Performance limits

5.1 Nominal volume

The nominal volume of the induction hopper, as specified in ISO 21278-1:2008, 6.1.2, shall deviate less than 5 % from the value declared by the manufacturer.

5.2 Total volume

The total volume of the induction hopper, as specified in ISO 21278-1:2008, 6.2.2, shall exceed the nominal volume by at least 10 %.

5.3 Level indicator

If present, the contents indicator scaling shall be in accordance with ISO 9357. It shall be durable and easily visible from the operator's working position. The precision of the contents gauge scale shall be calculated as specified in ISO 21278-1:2008, 6.3.2.

5.4 Emptying flow rate

The induction hopper tested according to ISO 21278-1:2008, 6.4.1, operating with the minimum inlet flow rate/pressure indicated by the manufacturer and with an outlet pressure of 20 kPa, shall provide an outlet flow rate of at least 60 l/min.

5.5 Emptying performance with powders

When the test is performed according to ISO 21278-1:2008, 6.5.2, the amount of powder residue in the induction hopper bowl at the end of the test shall not exceed 2 % of the amount introduced in the hopper.

5.6 Emptying performance with micro-granular product

When the test is performed according to ISO 21278-1:2008, 6.6.2, the amount of micro-granular residue in the induction hopper bowl at the end of the test shall not exceed 2 % of the amount introduced into the hopper.

5.7 Efficiency of the induction hopper internal washing system

The amount of test material residue in the induction hopper bowl after the washing procedure is carried out according to ISO 21278-1:2008, 6.7.2, shall not exceed 0,10 % of the induction hopper nominal volume.

5.8 Cleaning device for crop protection product cans

After the cleaning procedure is carried out according to ISO 21278-1:2008, 6.8.1, the volume of the test material residue shall be less than 0,01 % of the nominal can volume.

5.9 Evaluation of hydraulic tightness

At the end of the tests carried out according to ISO 21278-1:2008, 6.9, no liquid shall have escaped from the induction hopper.

Bibliography

[1] ISO 5682-2, *Equipment for crop protection — Spraying equipment — Part 2: Test methods for hydraulic sprayers*

[2] ISO 22368 (all parts), *Crop protection equipment — Test methods for the evaluation of cleaning systems*

ICS 65.060.40

Price based on 5 pages