INTERNATIONAL STANDARD

ISO 22368-3

First edition
2004-03-01

Crop protection equipment — Test methods for the evaluation of cleaning systems —

Part 3: Internal cleaning of tank

Matériel de protection des cultures — Méthodes d'essai pour l'évaluation des systèmes de nettoyage —

Partie 3: Nettoyage interne du réservoir

Reference number
ISO 22368-3:2004(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

Contents

Page

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 22368-3 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 6, *Equipment for crop protection*.

ISO 22368 consists of the following parts, under the general title *Crop protection equipment — Test methods for the evaluation of cleaning systems*:

— *Part 1: Internal cleaning of complete sprayers*

— *Part 2: External cleaning of sprayers*

— *Part 3: Internal cleaning of tank*

Introduction

The cleaning of sprayers used in crop protection is becoming increasingly important, especially for the following reasons:

— to avoid contamination of the environment and the operator;

— because of the possibility of accidental release of agrochemicals that could cause crop damage, raise residue fears or lead to the mixing of incompatible crop protection products.

Moreover, it is likely that the relevant sections of the industry are in need of guidance in developing cleaning systems, so that the state of the art and a basis for future specifications can be evaluated.

ISO 22368-1 and ISO 22368-2 specify test methods related to the internal and external cleaning of sprayers, offering the user the means to evaluate the general performance of both inside and outside cleaning systems and a possible basis for defining performance specifications in the future. The standard also offers individual sections for key sprayer components: this part of ISO 22368 enables specific evaluation of the tank cleaning system and provides the means for obtaining detailed results that can be used for that system's improvement.

Crop protection equipment — Test methods for the evaluation of cleaning systems —

Part 3:
Internal cleaning of tank

WARNING — Users of this part of ISO 22368 should be familiar with normal laboratory practice. This part of ISO 22368 does not address all possible safety problems associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and ensure compliance with any national regulatory conditions related to safety and environmental issues.

1 Scope

This part of ISO 22368 specifies a test for determining the performance of the rinsing systems fitted onto sprayers used in crop protection for the internal cleaning of the spray-liquid tank or tanks. It is applicable to mounted, trailed and self-propelled agricultural sprayers used for crop protection and liquid fertilizer applications. It is not applicable to sprayers with direct injection systems.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
rinsing system
integral component of the sprayer for rinsing the inside of the spray liquid tank(s) of the sprayer

3 Test conditions

Testing shall be performed under the following conditions.

Temperature of test liquid: 5 °C to 25 °C.

Air temperature: 5 °C to 25 °C.

Relative humidity of air: > 30 %.

4 Test

SAFETY PRECAUTIONS — Because of possible environmental hazards inherent in this method, recognized precautions shall be observed to eliminate accidental release of test liquids outside the test site. All operations should preferably be carried out such that the test liquids and the water used to clean the sprayer can be collected. If this is not the case, care shall be taken that the spread liquids do not cause any environmental damage.

4.1 General

Testing shall be performed using a 1 % suspension of copper oxychloride test liquid according to Annex A and under the conditions given in Clause 3. Other traced liquids may be used if the same level of measuring performance can be demonstrated.

4.2 Test procedure

4.2.1 The tank shall be clean at the start of the test.

Fill up the tank completely with test liquid while the agitator or agitators are running. Ensure that all internal surfaces — especially the upper ones and the lid — are wetted with the test liquid. Wait for 10 min while the agitator(s) is running. Take three representative samples to check the concentration of the reference test liquid. Each of these samples shall have a volume of at least 50 ml and shall not deviate by more than 5 % from the concentration of the reference liquid.

4.2.2 Simulate emptying the tank as in normal spraying practice. For example, open one of the section inlets and let out the same amount of liquid as would be emitted by all nozzles. Let the residual liquid out of the tank by using its outlet.

4.2.3 Rinse with clean water all parts of the sprayer that are included in the rinsing process, except the main tank (e.g. pump, filter, pump return).

4.2.4 Let the tank dry for 24 h.

4.2.5 Operate the rinsing system of the sprayer according to the manufacturer's instructions. The tank rinsing system may be fed by an external clean water pressure source, under the same operating conditions as the sprayer. After the rinsing operation, let the rinsing liquid out of the tank by using its outlet. Collect it in a separate, clean tank (A). Measure the volume of this rinsed liquid.

4.2.6 After the rinsing operation, clean all inner surfaces of the tank, including lid and strainer, completely, using a high-pressure cleaner. During this operation, collect the rinsed liquid in a second clean tank (B) from the outlet. Measure the volume of this rinsed liquid.

4.2.7 Take three representative samples out of both tanks (A and B) and determine the concentration of the copper using appropriate methods such as atomic-absorption-spectrometry. Calculate the mean value of the samples.

4.2.8 Report the mass of copper, m, rinsed by the rinsing device (mass of copper of the sample of Tank A) as a percentage of the mass of copper after emptying of the tank (total mass of copper of Samples A and B).

4.2.9 Report the data (for an example test report, see Annex B).

Annex A
(normative)

Composition of test powder

A.1 Composition

Copper shall be used in the form of copper oxychloride trihydrate [the test powder is also known under the name Cupravit [1]], as follows:

Compound	Content
($3CuO \cdot CuCl_2 \cdot 3H_2O$)	45 %
Lignosulfonate	5 %
Calcium carbonate ($CaCO_3$)	8 %
Sodium sulfate decahydrate ($Na_2SO_4 \cdot 10H_2O$)	11 %

A.2 Size and distribution of particles

The size and volume distribution of the particles used shall be as follows:

Size	Volume distribution
< 20 µm	98 % min.
< 10 µm	90 % min.
< 5 µm	70 % min.

A.3 Impurities in the technically active material

Impurities shall be limited to the following.

Total impurities: 3,5 % max.

Water: 2 % max.

Ash: 1,5 % max. (in addition to copper).

A.4 Solubility

The test powder shall be slowly soluble in water and organic solvents, soluble in strong mineral acids, and soluble in solutions of ammonia and amines through the formation of complexes.

1) Cupravit is an example of a suitable product available commercially. This information is given for the convenience of users of this part of ISO 22368 and does not constitute an endorsement by ISO of this product.

Annex B
(informative)

Example test report

Sprayer data

Type of sprayer: ....

Nominal tank capacity: l

Rinsing water tank:.. l

Type of rinsing nozzle:

Liquid output of rinsing nozzle:... l/m

Measurement data

Concentration of reference test liquid (see 4.2.1)		
Sample 1 (C_{R1})	mg/l	
Sample 2 (C_{R2})	mg/l	
Sample 3 (C_{R3})	mg/l	
Mean concentration (C_{RM})	mg/l	

Volume of rinsed liquid — Tank A (see 4.2.5)		
Volume, V_A	l	
Sample 1 (C_{A1})	mg/l	
Sample 2 (C_{A2})	mg/l	
Sample 3 (C_{A3})	mg/l	
Mean concentration (C_{AM})	mg/l	

Volume of rinsed liquid — Tank B (see 4.2.6)		
Volume, V_B	l	
Sample 1 (C_{B1})	mg/l	
Sample 2 (C_{B2})	mg/l	
Sample 3 (C_{B3})	mg/l	
Mean concentration (C_{BM})	mg/l	

Mass of copper rinsed by rinsing device as percentage of mass of copper after emptying tank m (see 4.2.8)		
$m = \frac{C_{AM} \times V_A}{C_{AM} \times V_A + C_{BM} \times V_A} \times 100\ \%$	%	

ICS 65.060.40

Price based on 5 pages