

SPISE

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Standardized Procedure for the Inspection of Sprayers in Europe

ADVICE

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SPISE Technical Working Group 16

Periodical inspection of fixed and mobile rotary atomisers pesticide application equipment for band application



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This document has been compiled by the SPISE Technical Working Group 16

Authors:

Tom Bals, Micron Sprayers, UK
Jaco Kole, SKL, the Netherlands

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1. Foreword

The SPISE Working Group was established in 2004 during the first SPISE workshop. There the participants welcomed the thought of Dr. Ganzelmeier (JKI) that a working group should work on further steps for the harmonization and mutual acceptance of equipment inspections. In the following years, thanks to SPISE engagement, a constant exchange of information has been made possible within the working group and consultations went on between the EC and MS on improving the sustainability of plant protection.

The 5 members of the SPISE working group came from Belgium, France, Germany, Italy and the Netherlands. They represented the member states with most experience in the fields of inspection of sprayers at that time.

In the ambit of SPISE working Group several Technical Working Groups (TWG) have been recently created with the aim to prepare guidelines about the items taken into account by the EU Directive 128/2009/EC but still not considered in the actual ISO/CEN standards.

SPISE TWG 16 (^o), in particular, has defined guidelines on how inspect pesticide application equipment with Rotary Atomisers (CDA technique). This Advice should be applicable both for Stationary units and mobile ones, mostly used for weed-control.

SPISE TWG 16 members

Chairmen:

Bals, Tom

Kole, Jaco

Members:

Balsari Paolo

Bjugstad Nils

Douzals Jean-Paul

Gil Emilio

Herbst Andreas

Huyghebaert Bruno

Kramer Harald

Langenakens Jan

Marucco Paolo

Nilsson Eskil

Schulze Stentrop Christoph

Wehmann Hans-Joachim

2. Definition:

Electrical, hydraulic and' mechanical driven equipment designed to apply pesticides equipped with one or more rotary atomisers. It concerns both stationary equipment designed to apply a PPP over a product what is moving over a conveyer belt / roll table, as also mobile machines, not designed to apply full-width but to apply the product in bands.

The machine can be a dedicated machine, or the application installation is built on another machine like for example a sowing or planting machine.

3. Brief description

Machines with rotary atomisers are used for purposes where low application volumes have to be dosed with uniform droplets. The size of the droplets created by rotary atomisers is relative constant but depends on the settings of atomiser speed and liquid flow rate NB there are often tight limits of atomiser speed and liquid flow rate to achieve the desired droplet size therefore the manufacturer's instructions/recommendations should be followed!

Application volumes are generally low to very low (or even ultra low) and in some cases, pure pesticide is applied. They can be dedicated machines of the application unit is built into another machine.

Equipment with rotary atomisers can be fixed (stationary) equipment. This machines for example used to treat potatoes on a conveyor belt, before the potatoes go into storage. Machines can be built on hoppers or conveyor belts.

Equipment with rotary atomisers can also be used on mobile machines. This machines are used for weed-control or for haulm-killing in potato growing or other applications like application of PPP during the planting of potatoes.

4. Pictures

Examples of atomisers:



Stationary machines:



Mobile machines:



5. Usage

One of the criticisms of hydraulic nozzles is the wide range of droplet sizes that are produced. For most spray applications there are particular spray droplet sizes which will be most effective in hitting the target and achieving the desired biological result. Very large and very small spray droplets are both wasteful, and will not generally even hit the target. A narrower droplet spectrum can be achieved by using a rotary atomiser or spinning disc. The droplet size range produced depends on the combination of the rotational speed of the atomiser/disc (the primary determinant – with faster speeds producing smaller droplets) and liquid flow rate. The efficiency of CDA allows low, very-low and ultra-low volumes of spray liquid to be used.

CDA technology is used both on stationary machine and mobile machine. The stationary machines are mainly used to apply PPP on a product (like potatoes) moving on a conveyor belt. The machine is then build up a conveyor belt or hoppers. Mobile band sprayers using rotary atomisers can be used for applying herbicides for weed-control or killing potato plants.

6. Working principle

The working principle of a rotary atomiser is that spray liquid fed on to a spinning disc will be thrown of the periphery in droplets of uniform - depending on even liquid feed to the edge of the atomiser disc and an undamaged disc, hence it is very important that the disc is kept both clean and undamaged. Droplet size is determined by diameter of the disc and its rpm. Most rotary atomisers are driven by a small electric motor but hydraulic or other power sources have been used. The spray solution is generally driven by a pump to the spinning disc, this can be a positive displacement pump or a peristaltic pump. In some case, spray liquid can be gravity fed to the spinning disc. Unshrouded rotary atomisers produce a circular hollow cone spray pattern. This is good for spraying around passing obstacles, but not safe to use in a tightly planted shrubbery where the product, as it is project in all directions, can contaminate foliage. A shrouded/segmental atomiser, preferably with a hood or shield to prevent the risk of spray drift, should be used in these cases'.

7. Pre-inspection of the machine before the actual inspection starts

(based on 5.3 of EN-ISO16122-1:2015)

The inspection of the equipment only starts when the inspector has made sure that the machine meets the following requirements:

A. Clean

The machine is both clean from the inside as the outside. There are no traces of pesticides present in the machine. The outside of the sprayer is clean.

Test method:

Visual check

B. Safety

The machine is safe so that the inspection can be performed in a manner what is safe both for the test operator and the environment.

C. Electrical safety (if present):

If present the electrical installation shall be safe, all wires, connections and switches shall be safe.

Test method:

Visual inspection of the electrical installation

8. Requirements

A. Leakage

A.1. Static leakage

With a switched off machine, with the spray tanks half-filled and the pump switched off, there shall be no leakage of liquid at any part of the machine. Beside this, the spray tank has no holes, cracks or other openings through which fluid could possible leak any liquid.

Test method:

Visual check on leakage + visual check of the tank.

A.2. Dynamic leakage

Working at normal conditions there shall be no leakage at any part of the machine.

Test method:

Functional check with a working machine.

B. Pump (if present)

B.1. Condition of the pump

Peristaltic pump

- The drive of the pump is in good condition
- No unusual play on pressure mechanism
- Pump hose(s) is/are in good condition

Positive Displacement pump

- The drive of the pump is in good condition
- Membranes are in good condition
- Pump springs and pump wheels are in good condition.

Test method:

Functional and visual check.

C. Agitation (if present)

C.1. Functioning agitation

There is a clearly visible agitation in the spray liquid tank under the following condition:

- With the spray liquid tank half filled
- With the agitation system switched on according to the instructions of the manufacturer.

Test method:

Visual check on the functioning of the agitation.

D. Spray liquid tank(s)
(applies only if a separate spray liquid tank is present and not if the pure product is directly sucked out of the product container)

D.1. Lid

The spray liquid tank has a lid what is in good condition, well-fitting and not damaged

Test method:

Visual check on presence and condition of the lid

D.2. Strainer

In the opening of the tank is a strainer present. This strainer is well fitting in the hole and is in good condition (no cracks or holes in the material of the strainer)

Test method:

Visual check on presence and condition of the strainer

D.3. Filling installation

If there is a filling installation for plant protections products present on the machine, then:

- Has a provision to prevent objects with a diameter of more than 20 mm to enter the spray tank
- Function well and does not leak

Test method:

Functional check on functioning installation and measurement of the blocking provision.

D.4. Pressure compensation spray liquid tank

There is a well-functioning pressure compensation of the spray liquid tank to prevent over- or under pressure.

Test method:

Visual check on presence and functioning of the pressure compensation

D.5. Marking of the content of the tank

The marking of the level of the liquid in the spray tank or assembly of tanks is clearly visible and readable.

Test method:

Visual check on presence and readability of the content of the tank.

D.6. Emptying of the tank

It is possible of empty the tank(s) completely without the use of special tools or removing part of the machine without the risk of contamination the operator or the environment

Test method:

Functional check on functioning emptying device.

D.7. Filling of the tank

If a filling connection on the machine is present to fill the tank with water, there must be a well-functioning provision be present to prevent the back flow of any water out of the tank to the water source.

Test method:

Functional check on the presence and functioning of this provision.

D.8. Cleaning installation for empty containers – if present

If a cleaning device for cleaning empty containers is present on the machine, this installation shall function properly.

Test method:

Functional check on the functioning of the cleaning installation

D.9. Cleaning

All equipment/provisions on the machine to clean the machine and the inside of the spray tank, cleaning installation for empty containers and the complete machine are in good condition and shall function properly.

Test method:

Functional check on the functioning of this cleaning provisions.

E. Measuring-, control- and operation systems

E.1. Condition and functioning

- All instruments and controls needed for measuring, control and operation of the machine are functioning well.
- The switching on or off of the atomisers function properly, it is possible to switch on or off or atomisers at the same time.

Test method:

Visual en functional check on presence and functioning of controls.

E.2. Reachability

All controls needed to operate during the application or reachable and visible from the operators position.

Test method:

Visual en functional check on reachability and visibility.

E.3. Accuracy measuring systems

Measuring systems like flow- or speed meters needed for the regulation of the liquid flow present on the machine have an accuracy of +/- 10% in relation to a reference instrument/method.

Test method:

Measurement of the meter in relation to a reference instrument/method

F. Lines and hoses

F.1. Condition hoses and line

All hoses and lines are in good condition. There is no extreme bending or wear on the outside. They are free from defect like exceptional wear, cuts, cracks and corrosion. The reinforcement of the hose is not damaged, appearing in swollen hoses.

Couplings are in good condition

Test method:

Visual check on all hoses and line present on the machine.

G. Filtering (if present)

G.1. Condition filter inserts

The filter elements are in good condition, have no holes or cracks in the filter material and the inserts are clean.

Test method:

Visual check on condition filter inserts

G.2. Mesh width inserts

The mesh size of the filter inserts is as prescript by the manufacturer

Test method:

Visual check on the mesh size of the filter inserts.

G.3. Check filters

Filters can be checked without draining the fluid tank.

Test method:

Functional test

G.4. Changeability filter inserts

Filter inserts are changeable.

Test method:

Visual check.

H. Atomiser mounting/connection

H.1. Mounting atomisers

The mounting of the atomisers is in good condition and there is no excessive play on all turning or hinge points caused by wear or damage.

Test method:

Functional check on mounting atomisers and play on turning or hinge points.

H.2. Failures in the construction

There is no excessive play on all turning or hinge points caused by wear or damage

Test method:

Functional check .

H.3. Vertical deviation

Measured with the machine in horizontal position, placed on a flat surface, the difference in distance between the underside of each atomiser and the floor is not more as 10 cm or +/- 5% of the machine width, what is the highest.

Test method:

Measuring of the difference in vertical distances.

I. General / atomisers

I.1. Similarity

All atomisers on the machines are of the same type, size and brand, except when the atomisers are meant for a special function.

Test method:

Visual check

I.2. Dripping

5 seconds after the supply to the atomiser is closed, there is no continuous dripping

Test method:

Functional check.

I.3. 'Spraying' on parts of the machine (except the shields/hoods)

The machine should not be designed so that spray contaminates it directly, except if necessary to function. If needed for the protection and/or the well-functioning of the machine this shall be minimized. Requirements of the shielding see K.2.

Test method:

Functional test

I.4. Uniformity of the spray pattern

All atomisers shall produce a regular and reproducible spray pattern.

Test method:

Visual check on homogeneity of the distribution of the atomisers. (at membrane and peristaltic pumps is always a pulsing visible because of the low pressure of the liquid)

I.5. Height adjustment

If present and needed for a proper functioning, all parts needed to adjust the height of the atomisers are functioning safe and properly.

Test method:

Functional test

J. Flow rate of the metering system or - pump

J.1. Adjustability flow rate

The flow rate is adjustable in a for the user relevant range.

Test method:

Functional test of the settings of the machine.

J.2. Flow rate atomisers.

The flow rate of the individual atomiser is within the range of +/- 10% or the average flow rate of all atomisers of the same.

Test method:

Measuring of the flowrate of all atomisers with an accuracy of 2%.

K. Distribution atomisers

K.1. Adjustment working width

Mobile machines:

The adjustment of the working width by the atomiser, and/or spray shield/hood if present, shall comply with the intended function.

Stationary machines:

The mounting and adjustment, if any, of the atomiser and machine shall allow the intended spray width for the intended use e.g. matching the width of the conveyor belt to ensure correct treatment and minimum waste

Test method:

Functional test

K.2. Adjustment shielding

The adjustment of the shielding is such that the liquid (as less as possible) hits any parts of the machine or other parts (shielding). Advice for stationary machine: leaking gutter in the length direction of the conveyor belt to collect the dripped liquid

Test method:

Functional test

K.3. Disc maintenance

To ensure good performance it is critical that the disc is in good condition so it should be clean and undamaged e.g. no damage to the surface or any serrations/teeth on the disc edge.

Test method:

Functional test

K.4. Shields/hoods

To ensure protection for foliage from spray drift it is critical that all spray shields/hoods are in good condition i.e. undamaged (with no broken bits that could result in spray being emitted).

Test method:

Functional test

K.5. Atomiser/disc rotational speed

It is essential that the atomiser/disc rotates at the correct/recommended speed to produce the correct/desired droplet size range. Discs should spin smoothly at a constant speed with no exceptional play on the motor.

Test method:

Functional test.

9. Example test-report



DEMO INSPECTION REPORT ROTARY ATOMIZERS PESTICIDE APPLICATION EQUIPMENT

Agro Businesspark 24, 6708PW Wageningen Tel: 0317-479706 E-mail: info@sklkeuring.nl Internet: www.sklkeuring.nl

Inspection workshop

Number 999
Name Opleiding keurmeesters AERES Tech Ede
Address Zandlaan 29, 6717LN, Ede, Nederland

SKL inspection on behalf of

Name Abel
Address Waanderweg 64, 7812HZ, Emmen

Sticker number 1000214 . Approved after repairs
Date of inspection 18-12-2020 by Jaco Kole
 The date of the next inspection may vary, depending on national legislation.
Signature

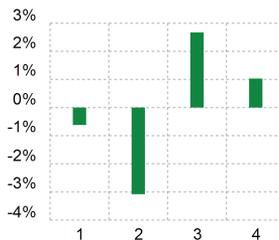
Manufacturer, Type Agricult, Pieperdoes
Serial number 1223 **Constr. year** 2019
Tankcontent 5 liter **Capacity pump** 2 liter/min
Type pump Peristaltical pump
Max. system pressure 1 bar **Working width** 1 meter
Type installation Fixed installation

A Leakage	
1. Static leakage	Good
2. Dynamic leakage	Good
B Pump	
1. Condition of the pump	Good
C Agitation (if present)	
1. Functioning agitation system	Not applicable
D Spray liquid tanks	
1. Lid	Repaired
■ <i>New lid</i>	
2. Strainer	Good
3. Filling installation	Not applicable
4. Pressure compensation in tank	Good
5. Tank content marking	Good
6. Emptying tank	Good
7. Filling tank	Not applicable
8. Cleaning empty packages	Not applicable
9. Functioning cleaning system	Not applicable
E Measuring-, control- and operation systems	
1. Condition and functioning	Good
2. Reachability	Good
3. Accuracy other measuring systems	Good
F Lines and hoses	
1. Connections	Repaired
■ <i>some bad connections repaired</i>	
2. Bended	Good
3. incisions	Good
4. Damages	Good

G Filtering (if present)	
1. Presence	Not applicable
2. Condition filter elements	Not applicable
3. Mesh size filter elements	Not applicable
4. Control possibility filter elements	Not applicable
5. Changeability filter elements	Not applicable
H Boom / connection distributors	
1. Stability boom	Good
2. Failures in the construction	Good
3. Height difference (vertical deviation)	Good
I General - distributors	
1. Uniformity	Good
2. Dripping	Good
3. Spraying on parts of the machine	Good
4. Uniformity distribution of the cone of the distributor	Good
5. Height adjustment	Good
J Flowrate dosing valve or pump	
1. Adjustability of flow rate	Good
2. Flow rate distributors	Good
K Distribution distributors	
1. Adjustment of working width	Good
2. Adjustment of cover	Good
3. Defects in cover or disc	Good
4. Speed disc	Good

Afgifte uitstroomopeningen / verdelers

	1	2	3	4	
Measured amount	121.00	118.00	125.00	123.00	Average: 121.75
Deviation	-0.62%	-3.08%	2.67%	1.03%	



SPISE – Standardized Procedure for the Inspection of Sprayers in Europe

Established in 2004 by founding members from Belgium, France, Germany, Italy and the Netherlands, the SPISE Working Group aims to further the harmonisation and mutual acceptance of equipment inspections. In regular meetings, several Technical Working Groups (TWG) prepare advice about the items taken into account by the EU Directive 128/2009/EC but still not considered in the actual ISO/CEN Standards. The present document is intended to provide technical instructions and describes a procedure which is not mandatory but can be voluntary adopted in the course of inspection or calibration.

Further information can be found at <https://spise.julius-kuehn.de>

An electronic version of this document is freely available at https://www.openagrar.de/receive/openagrar_mods_00033080

Editor-in-Chief

Prof. Paolo Balsari
University of Turin
Department of Agriculture, Forestry and Food Sciences (DISAFA) Largo P. Braccini 2
10095 Grugliasco (TO) (Italy)

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