Better Training for Safer Food
Initiative

Application of ISO standards for periodical inspection of PAE in Use

New ISO 16122

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European Commission

Outline of the content:

- Introduction
- History of standards for testing sprayers in Europe
- Structure of EN-ISO 16122
- Content of EN-ISO 16122
- Inspection procedure
- Testing equipment
- Final remarks

- **Introduction**
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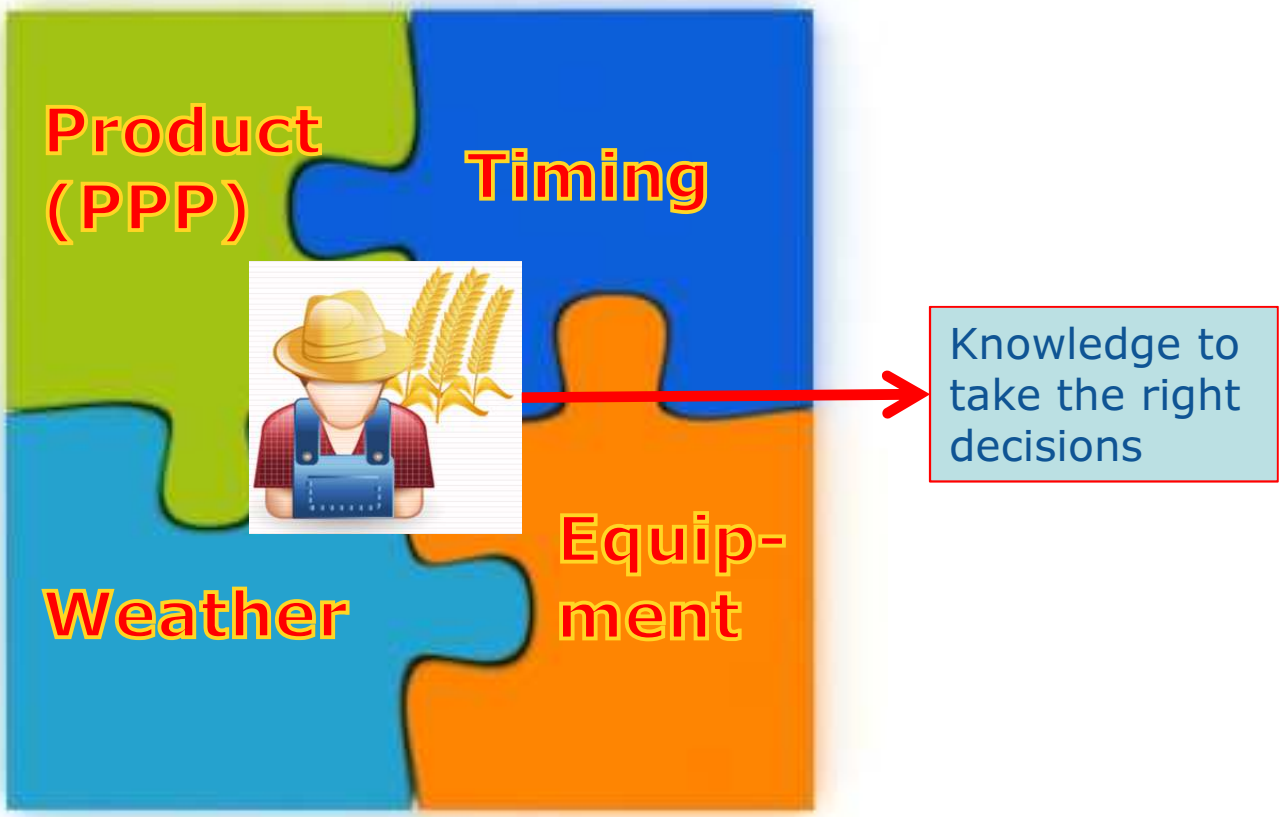
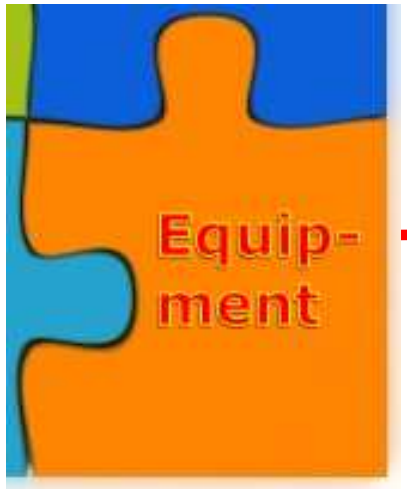
Introduction:

Elements for an efffective crop protection



Role of equipment



- Choice of right equipment
- Condition = State of maintenance
- Calibration

Objective periodical inspection of sprayers:

Improve condition/state of maintenance of sprayers

- Better distribution
  - Distribution spray-fluid
    - Cross-distribution
    - Longitudinal distribution
  - Concentration ppp in spray fluid (agitation)
- No leakages
- Better control

Farmer:
- Lower costs ppp's
- Better spray-quality => more uniform crops
- Less stand still
- Lower mainaintaince costs
- Safer operations

Environment:
- Lower input ppp's
- Lower emissions ppp's

Consumer:
- Safer food
- Less residues

How to perform an inspection:

- **Complete => all relevant parts of machine included**
- **Clear limits => black/white**
- **Balance between costs and profit**
- **Uniform and reproducible**

Standard is needed

With**:**

- Requirements sprayer
- Test method
- Testing equipment needed

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History of standards of testing sprayers in Europe

Testing / inspection of sprayers not new:

1970's => Germany
1980's => Netherlands
1980's => on collective farms Eastern Europe

First: National Standards/Guideliness:

Germany =>BBA guidelines
Netherlands => SKL guidelines
Belgium => Belgium guidelines

End 1990's => Start with European Standard (EN)
2003 => Publication of:

EN 13790:1 : Field crop sprayers
EN 13790:2 : Air-assisted sprayers for bush and tree crops

History of standards of testing sprayers in Europe (2)

EN-13790 based on BBA (German) guidelines

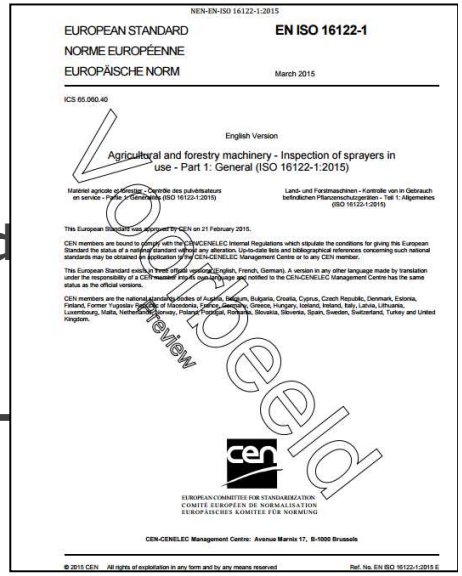
2003 – 2013 EN-13790 used in most EU countries

2009: Mandate EC to CEN to develop harmonized standards

2009-2015: Development EN-ISO 16119 and EN-ISO16122 series within CEN TC144 WG3

2013: Publication of EN-ISO 16119 part 1-3

2015: Publication of EN-ISO 16119 part 4 and EN-ISO 16122 part 1-4


NEN-EN-ISO 16122-1:2015

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 16122-1

March 2015

ICS 65.060.40

English Version

Agricultural and forestry machinery - Inspection of sprayers in use - Part 1: General (ISO 16122-1:2015)

Matériel agricole et forestier - Contrôle des pulvérisateurs en service - Partie 1: Généralités (ISO 16122-1:2015)

Land- und Forstmaschinen - Kontrolle von in Gebrauch befindlichen Pflanzenschutzgeräten - Teil 1: Allgemeines (ISO 16122-1:2015)

This European Standard was approved by CEN on 21 February 2015.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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Under review

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Differences between EN 13790 and EN-ISO 16122

13790

- Only two parts available: boom sprayers and orchard sprayers
- Environmental aspects were not included
- Published before SUD
- New developments (i.e. electronics) were not considered

16122

- Four parts have been developed, trying to accomplish with Annex II of DUS
- Part 1 – General has been developed to considered environmental and safety aspects during inspections
- New test/inspection procedures have been designed to include new developments in the sprayers
- EN standard (European scope) became ISO standard (world global scope)
- Annex ZA included with reference to SUD

Relation between EN-ISO 16119 and EN-ISO 16122

- EN-ISO 16119: requirements for new sprayers
- EN-ISO 16122: requirements for testing sprayers in use
- EN-ISO 16119: general more stricter limits
- Not all requirments in EN-ISO 16119 in EN-ISO16122 (for example: presence clean water tank, presence and performance cleaning system)

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Application equipment covered by EN-ISO 16122

Other equipment (no to be exempted)

Air application => EN-ISO 16122:5 in development

Train sprayers => no standard

Band sprayers/sprayers on seeding equipment => covered by EN-ISO 16122:2

Other equipment (other frequency)

LVM equipment => no standard

Fog equipment => no standard

Soil fumigation equipment => no standard

Granular application equipment => no standard

Injection equipment => covered by EN-ISO 16122:4

Other equipment (can be excempted)

Back-pack sprayers => covered by new standard ISO 19932:3 (in development)

Hand-held sprayers => no standard

How to deal with this PAE during inspection?

National protocols on base of Annex 2 SUD

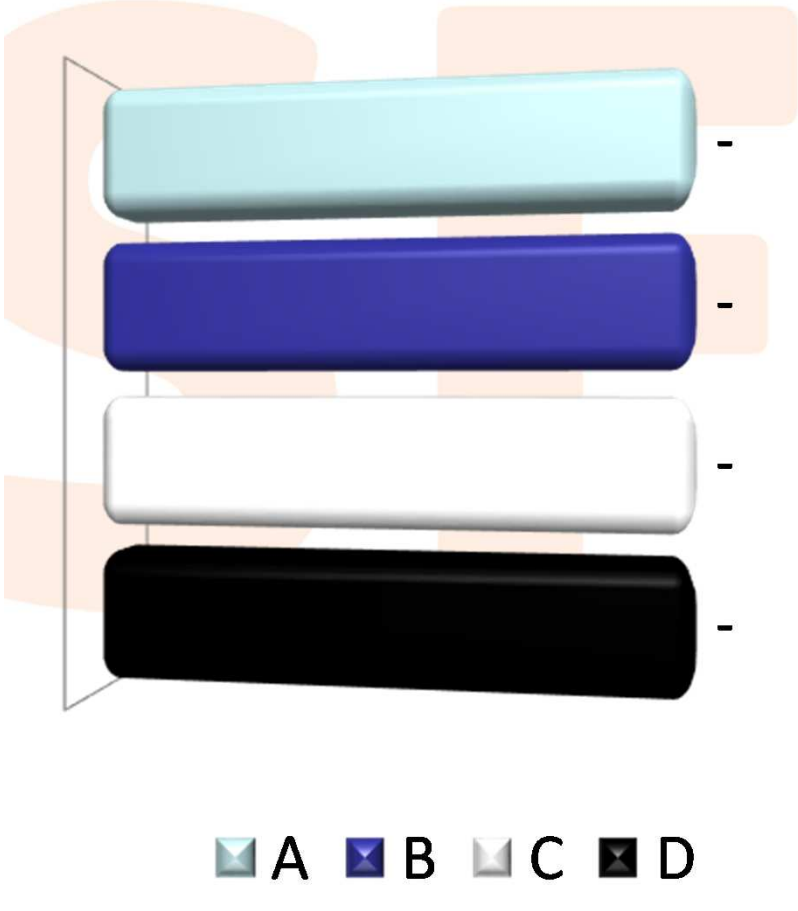
No standards for new equipment, only 2009/127

Need for additional standards

SPISE Advise how to deal with this equipment ?

What is a good base to adapt a longer inspection interval?

A. Number of epuipment in use
B. The effect an inspection has on reducing the risk
C. Quantity of pesticides used with this type of equipment
D. Availability of an harmonized standard



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EN-ISO 16122 series

EN-ISO 16122:2015 – Agricultural and forestry machinery – Inspection of sprayers in use

Part 1. General
Part 2. Horizontal boom sprayers
Part 3. Sprayers for bush and tree crops
Part 4: Fixed and semi-mobile sprayers




EN-ISO 16122:1 General

Classification of sprayers

Place for inspection

- **No risk of pollution envi**
- **No influence external co**
  rain) on results

Pre-inspection

- **Clean**
- **Safe**

	Part 2[a]	Part 3[a]	Part 4[a]	Subject of a future part of ISO 16122			
Criteria	**Horizontal boom sprayers**	**Sprayers for bush and tree crops**	**Fixed and semi mobile sprayers**	**Portable sprayers[b]**	**Foggers**	**Train sprayers**	**Aerial sprayers**
Droplet production							
Pneumatic	X	X	X	X			
Centrifugal	X	X	X	X			X
Hydraulic nozzle	X	X	X	X	X	X	X
Thermal			X		X		
Ultrasonic							
Transportation							
Non assisted	X	X	X	X	X	X	X
Air assisted	X	X	X	X			
Electrostatic	X	X					X

Pre-inspection

Clean

- **Outside**
- **Inside**

Safe

- **Power transmission parts**
- **Moving parts**
- **Pipes and hoses hydraulic (oil) system**
- **Structural parts and framework**
- **Lockable foldable parts**
- **Blower**








Important for **safe** inspection (inspector, workshop and environment)

EN-ISO16122: part2-4

General structure

Scope	*For what sprayers this standard is meant*
Normative references	*Reference to other standards*
Terms and definitions	*Terms and definitions*
Requirements and method of verification	*Requirements of the sprayer and how to verify this requirement*
Test methods	*How to test, what equipment is needed and requirement test equipment*

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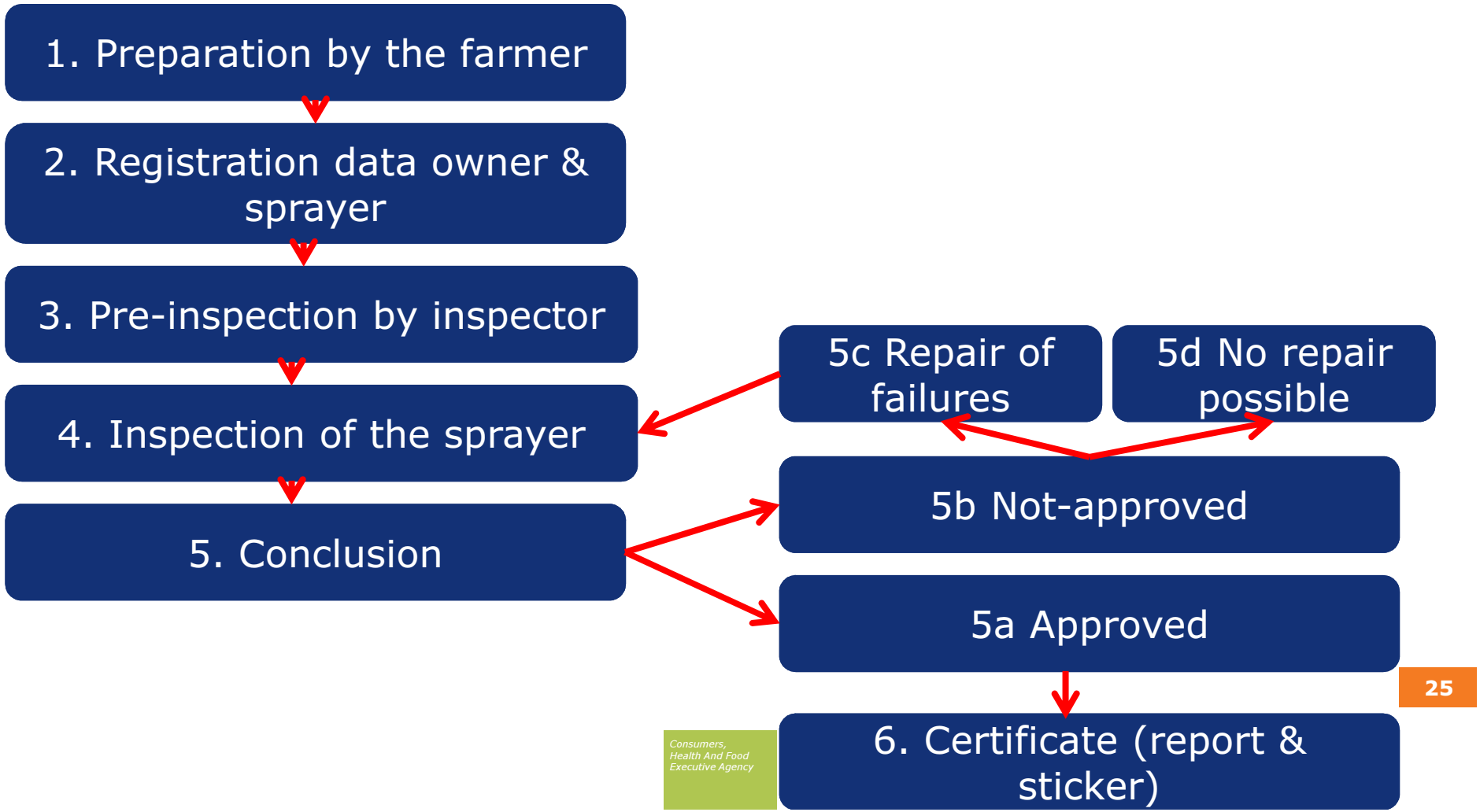
Inspection procedure



Who is performing the inspections

Official (governmental) workshop/test-team

- Independent
- Only inspections – no repairs
- Accreditation acc. ISO17020 possible

Workshop recognized by designated body

- Commercial organizations/companies
- Meeting requirements designated body (equipment, structure, personnel, etc)
- Risk of commercial influences

- **Specialized workshops only performing inspections**
  - More independent
  - Only inspections – repairs difficult
  - Accreditation acc. ISO17020 possible

- **Dealers/manufacturers sprayers**
  - One-stop shopping possible (inspection + repairs)
  - Technical knowledge of sprayers possible
  - Risk of commercial influences
  - Accreditation acc. ISO 17020 not possible

Requirements workshops

- **Trained test-operator (EN-ISO 16122:1)**
- **Test location (EN-ISO 16122:1)**
- **Test-equipment (EN-ISO 16122: part 2-4)**
  - Requirements test-equipment
  - Condition/calibration test-equipment

Inspection procedure

- **Visual control-points**

- **Measurements**
  - With standard equipment (measuring tape)
  - Special testing equipment

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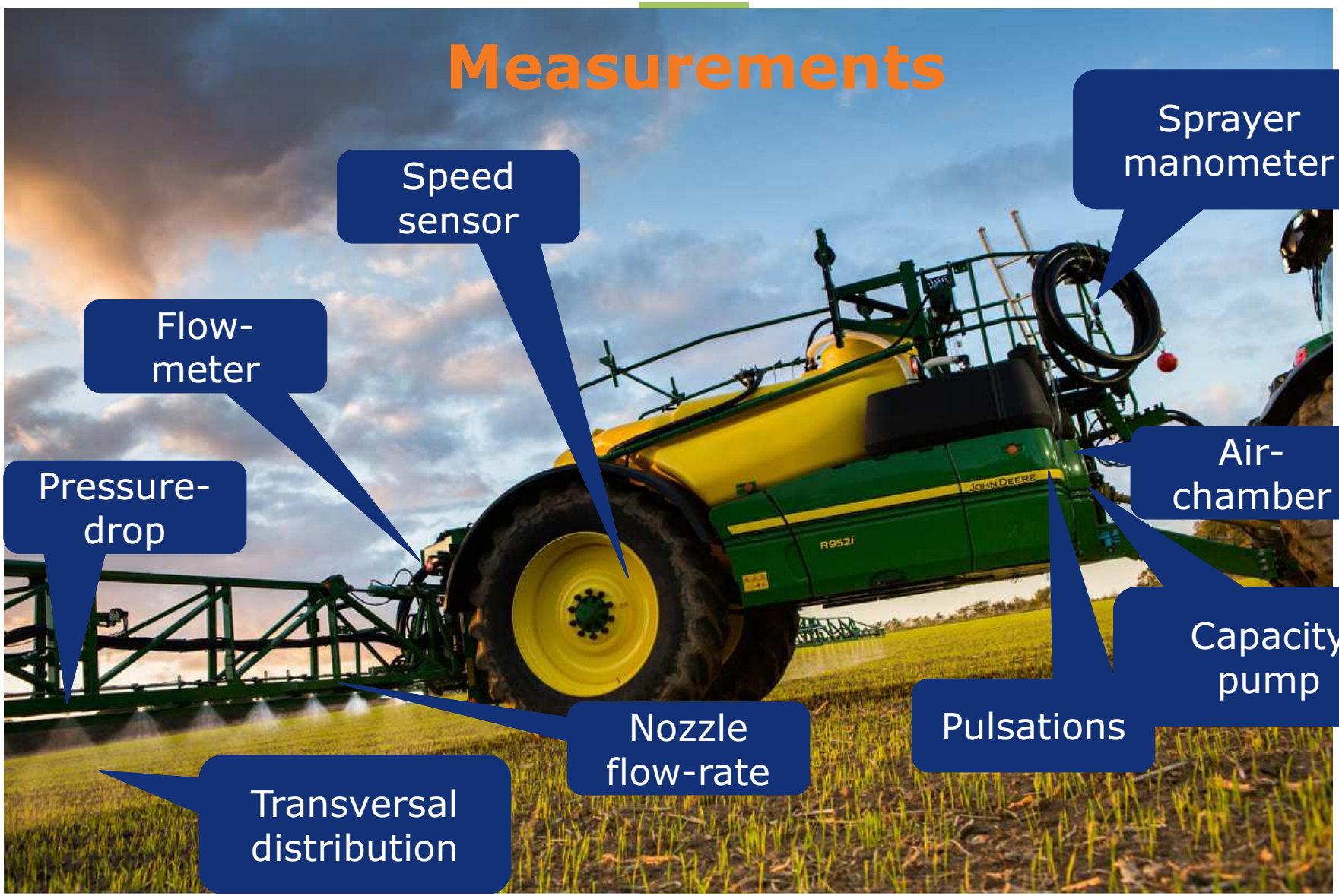
Measurements



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Testing equipment

In EN-ISO 16122 different manners of verification of the requirements

- Different varieties of sprayers
- History in different countries
- Different organizational structures in countries
- Different lay-out of the countries

Requirement	Method in standard	Testing equipment needed
Verification capacity pump of the sprayer	1. Direct measuring of the capacity of the pump(s)	1. Accurate flow meter
	2. Indicative check	2. Calibrated test-manometer
Verification of pulsations	1. Check of the condition of the pump	1. Calibrated test manometer or use of manometer sprayer
Verification pressure in air-chamber	1. Measuring air-pressure in air-chamber	1. Standard tire-pressure manometer
Pressure indicator (manometer/pressure sensor)	1. Check with manometer mounted on the sprayer	1. Calibrated test-manometer
	2. Check with manometer demounted from the sprayer	2. Calibrated test-manometer + manometer test-bench
Verification flow-meter on the sprayer	1. Measuring some nozzles and calculating the total flow	1. Measuring glass
	2. Direct measurement	2. flow-meter
Verification speed indicator	1. Check of accuracy speed sensor	1. Test track of at least 50 m
Verification of the distribution of the spray-liquid (transversal)	1. Direct measurement of distribution	1. Patternator
	2. Indirect measurement of the distribution	2. Measurement of the nozzle flow + measurement pressure distribution
Verification of the nozzle flow-rate	1. Measurement with nozzles mounted on the sprayer	1. Mechanical or electronic nozzle flow-rat tester
	2. Measurement with nozzles dis-mounted from the sprayer	2. Special test-bench
Verification of the pressure drop	1. Measurement of the pressure	1. Calibrated test-manometer

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Testing equipment

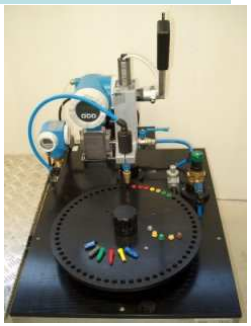
Manometer tester

Horizontal patternator

Pressure measurement

Pump tester

Nozzle flow-rate tester



Vertical patternator

Minimum requirement testing equipment

5.6.1 Specification of horizontal patternators used for verification

This test shall be performed either with nozzles mounted on the boom (see 5.7.2) or removed from the boom (see 5.7.3). It shall be ensured that the spray jets are correctly formed when nozzles are mounted on the boom and before dismounting.

The error in the measured flow shall not exceed ± 2,5 % of the measured value or 2,5 × 10^{-2} l/min, whichever is greater.

100 mm ± 1 mm

5.7.3 Measurement with nozzles removed from the boom

The measurement of the flow rate of each nozzle shall be carried out on a test bench.

The test bench consists of a pump which pumps water with a certain pressure through the nozzle, a pressure regulator, a pressure indicator (analogue or digital) by which the actual pressure can be monitored and a flow meter by which the actual flow rate can be measured.

When passing the measuring track, positioning in single steps shall be completed with an accuracy of ± 20 mm. The measuring error of the volume of the single grooves at a flow volume of 300 ml/min shall be less than ± 4 %. The adjustment and calibration of the patternator shall be in accordance with the patternator manufacturer's instruction handbook.

The size of the patternator shall be suited to the size of the boom to be tested and to the type of sprayer. The patternator shall also ensure that the overlapping range of the spray is measured completely.

			1,0	100

1 bar = 0,1 MPa = 0,1 N/mm² = 10^5 N/m².

Calibration of the testing equipment

- Condition and accuracy of testing equipment very important
  - Good quality inspection
  - Credible inspection
- Periodical inspection and calibration
  - Yearly acc. EN-ISO16122:1 par. 5.1:

> All equipment necessary for the inspection and used by the inspector, for testing the sprayer, (e.g. flow meters, pressure indicators, forward speed sensors) shall be checked at regular intervals, normally at least once a year with certified equipment. Proof of calibration shall be available.

- Who is doing this inspection and calibration:
  - Official labratory
  - Manufacturer of testing equipment
  - Designated body
    - On location
    - Central

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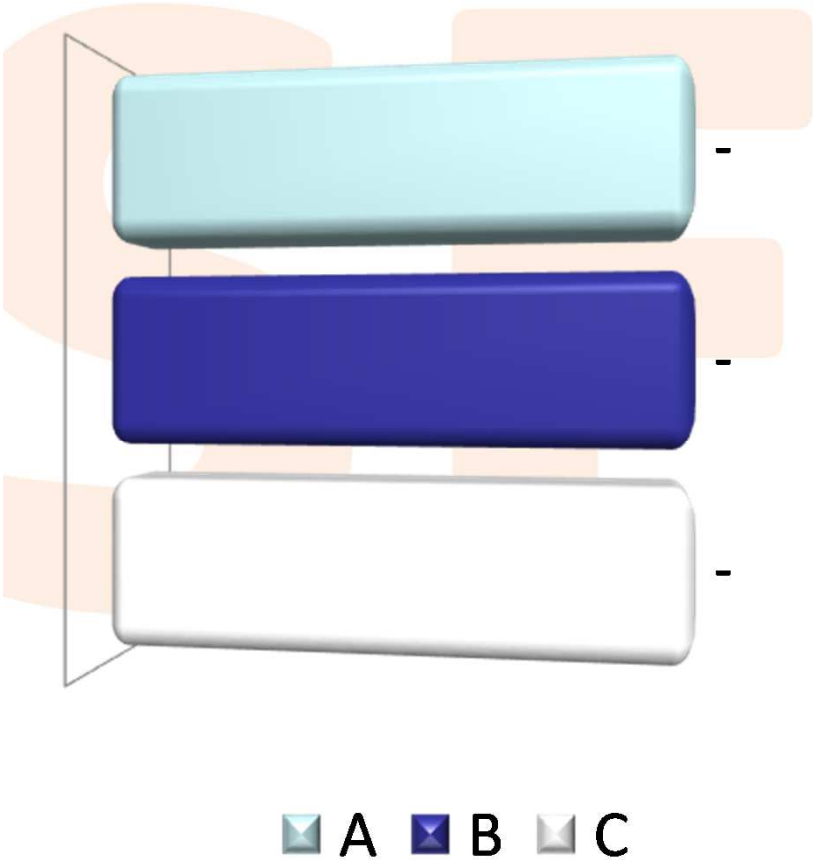
Examples of calibration

What makes the choice of the test method for testing the transveral distribution?

A. History of the inspection scheme
B. Number of and spread of sprayers
C. The requirements in the standard



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Final remarks

Standard EN-ISO 16122 is a useful tool:

- To fore fill Annex 2 of the SUD
- To perform inspections in a uniform way
- To have complete inspections

For 80% of the used equipment EN-ISO16122 can be used, for other types new standards have to be devolved.

Standard EN-ISO 16122 is based on history of existing system therefore different methods to reach the same goal:


Well maintained and adjusted application equipment in order to provide the farmers with the correct tool to produce sufficient, good and safe food with respect to the environment

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Thank you for your attention.

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