

## Quality assurance as a key point in effective sprayer inspection schemes.

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### 1. Introduction

When introducing an inspection scheme for the periodical inspection of sprayers in use, important for the effectiveness of this system and for the support of these inspections amongst the farmers, is the quality and uniformity of the performed inspections. The inspection scheme needs to have checks and balances in order to create this quality and uniformity.

The base of the inspections are the requirements in the European Directive 2009/128 article 8 and Annex 2. These requirements in Annex 2 are for the most common sprayer types in detail specified in the harmonized standards of the EN-ISO 16122 series for the different types of sprayers. The inspections have to be executed by inspectors who are well trained in how to use these standards and from whom the knowledge is also kept up to date by means of periodical refreshing courses. The measuring equipment used during the inspections has to be accurate, in line with the harmonized standards, but it must be ensured that during time, the accuracy and condition of the testing equipment stays on an acceptable level.

To keep the quality of the performed inspections good and the output uniform, a system of quality assurance is needed. This system also has to include elements of quality control, both on the performed inspections as on the testing equipment.

For a good mutual recognition of performed inspections between the different member states in the EU, a uniform basic system of quality assurance in all member states is needed.

This system will include elements like training of the inspectors, requirements of the workshop facilities, inspection procedure, quality control on the performed inspections, calibration of testing equipment, registration of the performed inspections and a procedure about how to deal with non-conformities.

The basic elements of such a quality assurance scheme need to be implemented through all European countries in order to reach a working system of mutual recognition and a meaningful output of the effort to establish a system of periodical inspection of all sprayers in use with support of the users of sprayers.

### 2. Inspection Scheme

How the inspection scheme is organized can differ from country to country and depends on specific demands, history, national legislation and polity. But most general is an organisation where the national body is responsible for the correct organisation and supervision and recognized workshops who inspect the sprayers of the farmers.

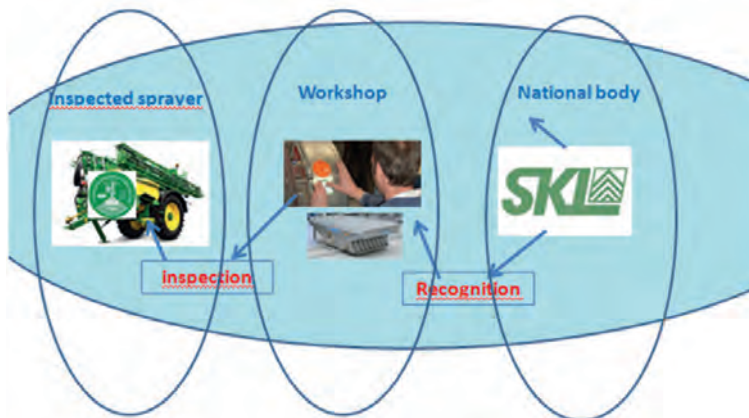


Fig. 1. Example of a sprayer inspection scheme.

### 3. Quality Assurance Scheme

#### a. General

To guarantee the quality and uniformity of the inspected sprayers a Quality Management System is needed, what will cover all aspects and processes of the complete inspection scheme. From the development of criteria to the inspection them self, including the test report and sticker on the machine.

This guideline is not meant to develop a QMS ready for certification for ISO9001 or ISO17020, but is meant to create a QMS to perform the inspections in a right and uniform way. But the general principles of this management systems are included in this guideline.

A general figure for the layout of a QMS system bases on ISO9001 is:

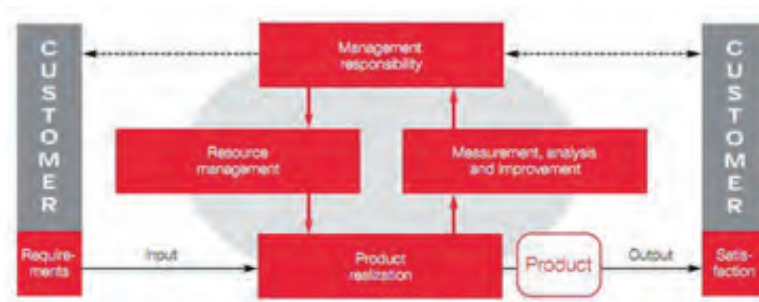


Fig. 2. Typical layout of system acc. to ISO9001.

When this layout is adapted to a sprayer inspection scheme it will be like this:

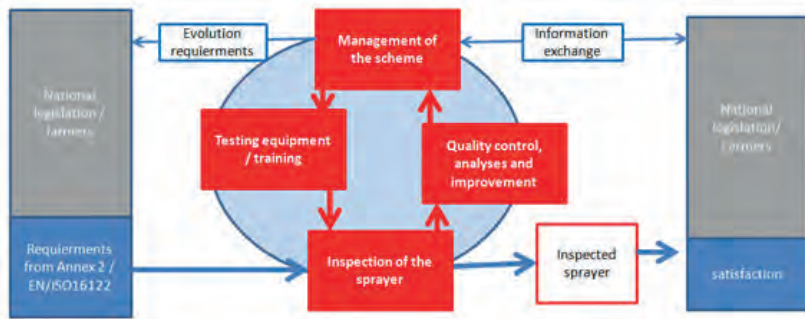


Fig. 3. General layout sprayer inspection scheme.

Where the input is:

- the national implementation of the demands from Article 8 from the EU directive 2009/128/EC (i.e. frequency, types of sprayers what have to be tested, etc.)
- the requirements what are in Annex 2 of 2009/128/EC: Health and safety and environmental requirements relating to the inspection of pesticide application equipment. And for sprayer types where harmonized standards are developed for, the standard EN-ISO 16122.
- Specific national/regional demands, like national legislation, specific demands, specific organisational structures what are already available.

The output is:

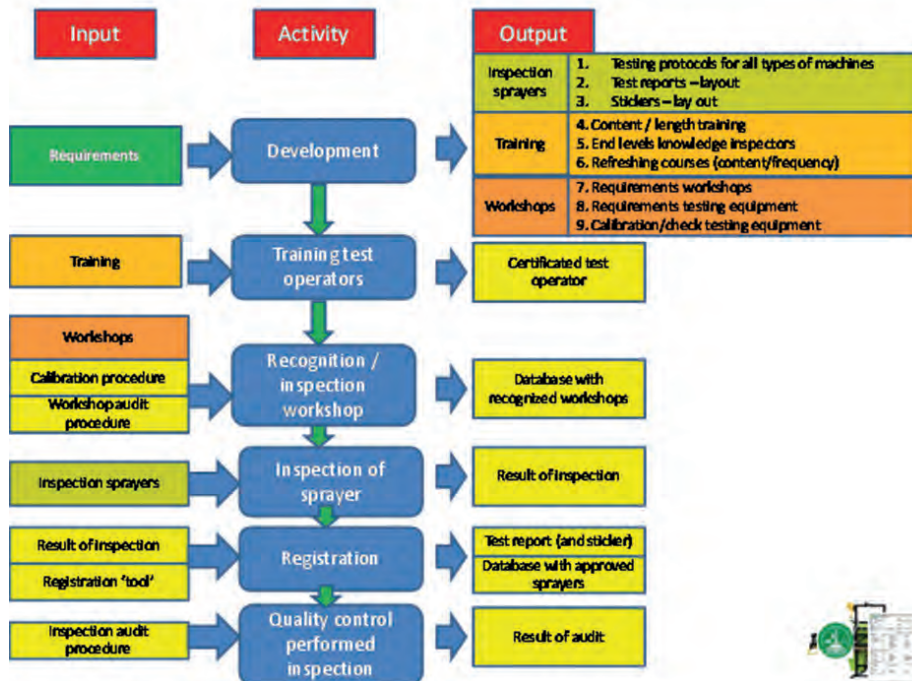
- Inspected and approved sprayer according to the guidelines complete with test report and sticker.

Important is that the QMS is shaped according to the well known Plan-Do-Act circle, that the system is developed for a continuous improving of all elements, procedures and documents.



This means that the feedback from workshops, authorities, inspectors and farmers will be used as input for this improvement.

Outline of the total inspection scheme:



In the following paragraphs the activities, documents and procedures will be described.

b. QMS: Activities

In the Quality Management System (QMS) the following activities are present:

Management/development documents and procedures

The objective of this activity is to manage the system, to develop and maintain the procedures and to develop and maintain the guidelines gathered around 3 theme's:

1. Inspection of sprayers
  - a. Testing protocols for all types of sprayers
  - b. Test –report (content / layout)
  - c. Sticker (content / layout)
2. Training of the inspectors
  - a. Content and length of the training
  - b. Definition of the entrance level and the end level the trainees have to reach.
  - c. Refreshing courses (frequency / content)

### 3. Requirements workshops

- a. Requirements workshops
- b. Requirements testing equipment
- c. Calibration/check testing equipment

#### b. Training of the test-operators

The aim of this activity is a proper training of the test operators. Important is that they have enough skill to perform the inspections in line with the formulated testing protocols, give the correct interpretation of the measuring results of the testing equipment, give the owner of the sprayer a clear advice and fill in the test report in the right way.

Therefore a basic trainings course with both clear entrance – and end levels is needed. To keep the knowledge and skills of the test operators periodical refreshing courses are needed.

#### c. Recognition and inspection of the workshops

The aim of this activity is to establish and maintain only workshops who full fill the defined requirements, have the correct, calibrated and maintained testing equipment. The process includes an initial and periodical audits of the workshop.

#### d. Registration of the performed inspections

The activity of registration of the results of the inspections includes the issuing of the test reports. In article 8.6 of 2009/128/EC is stated that the national organisation issues the certificates of approved sprayers. But this registration system is also needed to create an overview of the issued certificates to inform the European Commission. The statistical information gathered from the test reports can also be used to both improve the inspection scheme and inform the users of sprayers.

#### e. Inspection of the sprayers

This activity is the end process of the other activity. A trained test operator at a recognized workshop (which includes well calibrated testing equipment) inspect the sprayer following the guidelines and register the results of the inspection in the right manner.

#### f. Quality control of the inspected sprayers

The keep the quality uniform, audits of the result of the inspections (i.e. inspected sprayers) are needed. The results of this audits can used both for improvement of the system and for the recognition of the workshop.

### **c. QMS: documents**

As input for the other activities in the first activity some basic documents have to developed. But not only developed, they have to be maintained, following the Continuous Improvement circle. Input can come from different sources: from participants in the inspections scheme, from audits, from owners of sprayers or from developments in national or international legislation or standardisation.

The different documents are:

## 1. Inspection of sprayers

### a. Testing protocols for all types of sprayers

For all relevant types of sprayer specific testing protocols have to be developed. This protocol can be based on harmonized standards (like EN-ISO 16122) or Annex 2 of 2009/128/EC combined with elements from harmonized standards for types of sprayers no harmonized standard is available.

### b. Test –report (content / layout)

Based on EN-ISO 16122:1 the test report shall contain at minimum the following information:

- Recognized workshop / test team what executed the inspection;
- Reference to EN ISO 16122 and deviations, if any;
- Owner's identity;
- Owner's address;
- Sprayer manufacturer;
- Type of sprayer;
- Serial number or other unique identification;
- Year of construction;
- Drive (i.e. Mounted/trailed /self-propelled);
- Name and contact details of the inspector and where different the testing organization and Signature;
- Date of inspection;
- Any malfunction of the sprayer. If the malfunction is a result of sprayer design this should be noted;
- Any information on malfunctions of the sprayer useful to identify the corrective work required;
- Results of measurements.

### c. Sticker (content / layout)

By means of the content of the sticker it shall be clear for the owner of the sprayer:

- Reference to national body
- Date of expiring
- Preferably a unique number

## 2. Training of the inspectors

### Content and length of the training

Central in the course shall be how to implement the testing protocols for the different types of sprayers and how to use the testing equipment and interpreting the measuring results. Extended by knowledge about the testing scheme and legislation. Dependent on the entrance level it can be extended by knowledge of sprayers/spraying technique or it can be extended with knowledge about calibration/adjustment of sprayers.

Definition of the entrance level and the end level the trainees have to reach.

Important is that there are entrance levels for the participants of the courses. General knowledge about and practical skills with sprayers, spraying technique and nozzle should be known.

The end level to trainees shall reach shall be clear defined and tested by means of a clear theoretical and practical examination.

Refreshing courses (frequency / content)

To keep the level of the test operators up to date, refreshing courses with a reasonable interval are important. The content should focus on new developments and new techniques but also a rehearsal of the testing protocols.

### **3. Requirements workshops**

#### **a. Requirements workshops**

The requirements the workshops have to meet shall be clear defined:

- Type, size and focus of the enterprise
- Number of test operators
- Test location (safe and environmentally friendly testing)

#### **b. Requirements testing equipment**

The requirements for the testing equipment are mostly defined in relevant parts of the standard EN-ISO 16122. Important to define is if a type approval is needed, how to deal with testing equipment what is already certified in another Member State, how to deal with homemade testing equipment.

#### **c. Calibration/check testing equipment**

Important for good inspections is accurate testing equipment, therefore periodical calibration/check of the testing equipment is needed.

In EN-ISO 16122 for some testing equipment the minimum intervals are defined, for the other testing equipment the interval shall be defined.

This calibration can be done by independent organizations / laboratories following the calibration procedure.

#### **d. QMS: procedures**

The following procedures are needed:

##### **1. Development of documents**

Input of this procedure are the requirements as defined in 4.1 General. The output are the documents. This is a continuous process fed by input from sources like results from audits workshops and inspected sprayers, developments in legislation, standardisation, spraying technique and testing equipment.

##### **2. Training of test operators**

Input of this procedure are the documents with the demands for the content and end-levels of the training. Result shall be certified test operators.

##### **3. Registration of certified test operator**



The certified test operators shall be registered in a central database in a uniform way. This information is used both for the recognition of workshops and for the registration of results of the inspections.

#### 4. Recognition of a workshop

Workshops shall be recognized following the demands for the workshops, the testing equipment and the outcome of the audit procedure.

#### 5. Workshop audit procedure

Workshops shall be initial and periodical audited following the demands for the workshops and testing equipment.

#### 6. Calibration of testing equipment

Testing equipment shall be periodical calibrated or checked on correct and accurate operation. This calibration can be done by independent laboratories, the official organisation or other to be defined organisation. Important is to describe the asked accuracy of reference methods / instruments used to the calibration.

#### 7. Registration of recognized workshops

The recognized workshops shall be registered in a central database, this list of workshops shall be visible for the owners of sprayers.

#### 8. Inspection of sprayers

Sprayers shall be inspected by recognized workshops by certified test operators following the relevant testing protocol. The results of the inspection shall put on a test report. Only sprayers what meet all requirements shall be approved.

#### 9. Registration of the results of an inspection

The results of an inspection shall be registered in a uniform way on the defined test report. This test reports shall be stored in a database where the results can be analysed.

#### 10. Administrative process how to distribute stickers

Only recognized workshops can use the stickers. It has to clear that no misuse is possible and what workshop used what sticker on what sprayer.

#### 11. Inspection audit procedure

Periodical audits of the process the test operator is following when testing a sprayer or the result of this inspection (the tested and approved (or disapproved) sprayer) are needed in order the keep the quality uniform. The output of this procedure will be used in the procedure of recognition of the workshops.

### **4. Conclusion.**

The requirements for the sprayers in Annex 2 of the EU directive 2009/128/ec and the harmonized standards of the EN-ISO 16122 series are a good base for testing sprayers in the EU. But to have within a member state and between member states uniform inspections of a high level of quality, which is needed to reach enough support among the owners of sprayers and for an effective mutual recognition, a system of Quality Assurance is needed. This paper gives an outline and base of a future SPISE Advice on this topic. It is based on the harmonized EN-ISO standards and includes other SPISE advises on the different topics.