EN 13790 as a basic for inspection of pesticide application equipment (PAE) functioning similar to field crop and air-assisted sprayers.

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The standard EN 13790 – Inspection of sprayers in use – is available since the year 2003. EN 13790 specifies requirements and inspection procedures for field crop (part 1) and air-assisted sprayers (part 2). The article 8 of the Frame Work Directive obliged the Member States to ensure that PAE shall be subject to inspections at regular intervals. Except for the above called sprayers in the moment there is no EN standard available for inspection of all other types of PAE. From the SPISE Working Group point of view the EN standard can also applied to PAE which work similarly to field crop and air-assisted sprayers.

The working group developed in 2007 a guideline for testing of the followed listed PAE:

- Spray gun equipment,
- Mixing stations for aircrafts,
- Aircrafts,
- Interline sprayers,
- watering booms.

These PAE complies with the EN 13790 part 1 and 2. Also the inspection of spray trains is possible, but not yet integrated into the guideline. The table shows the available standard at the moment for the inspection of PAE and the possibilities with an enlargement of EN standard 13790.

Tab. 1 Available EN-Standards for the inspection of sprayers

EN-Standards / Inspection (February 2008)

| Kind of sprayer | EN Standard EN Standard necessary | | EN Standard to be developed | |
|-------------------------------------|-----------------------------------|-----|--------------------------------|--|
| 1) Field sprayer | Yes, EN 13790 | yes | no | |
| 2) Air assisted sprayer | Yes, EN 13790 | yes | no | |
| 3) Interline sprayer | Yes, EN 13790 (1) | Yes | no (1) | |
| 4) Airplane / helicopter | yes, EN 13790 (1) | yes | no (1) | |
| 5) Wheelbarrow sprayer | yes, EN 13790 (1) | Yes | no (1) | |
| 6) Spray gun equipment | yes, EN 13790 (1) | Yes | no (1) | |
| 7) Watering carriage | yes, EN 13790 (1) | yes | no (1) | |
| 8) Spray train | yes, EN 13790 (1) | yes | no (1) | |
| 9) Pedestrian motor-powered sprayer | no | yes | 1 | |
| 10) Fogging machines | no | yes | 1 | |
| 11) Granules distributor | no | yes | 1 | |
| 12) Knapsack sprayer | no | yes | 1 | |
| 13) Wiper | no | yes | 2 | |
| 14) Seed treatment equipment | no | yes | 3 | |
| 15) Injection system for nematodes | no | yes | 4 | |

⁽¹⁾ If the inspection method of EN 13790 will be extended to those equipment whose functioning is based on the same principle

The guideline takes the EN 13790 as a basic and includes special test features and hints and is also introduced with the help of some examples. The features are arranged by design groups of PAE and are numbered correspondingly. Following each feature the assignation to the type of equipment and the

applied test method is given. The features are completed, partly depending on the type of equipment with explanations, notes and examples for minor defects. Also features for equipment, which is not compulsory are given and are shown to a better differentiation in italic. The results of the test shall described in one test report which contains all information for all possible PAE. The assignation of the features are listed in figure 1.

| F | R | s | М | L | U | G | Inspection | Function test | Measurement | Additional equipment |
|----------------------------|---|---|---|------|----|---|------------|---------------|-------------|----------------------|
| R: Air assisted sprayers U | | | | ayer | rs | L: Aircraft U: Interline spraye G: Watering booms | | | | |

Fig. 1 Assignation of the features to the types of equipment and test methods

The concepts

- "Inspection" = investigation by eye,
- "Function test" = running the machine to simulate the usage,
- "Measurement" = measure some items by using special equipment and
- "Additional equipment" = additional design groups

should give an assistance for the inspection staff what is to be done with the respective design group. Some examples should make clear the sense and construction of the guideline:

Figure 2 shows the design group "Power transmission" with the feature "Function" and the original text of EN 13790. The feature is valid for the device groups "F"-field crop sprayers, "R"-air assisted sprayers, "S"- Spray gun equipment, "M"- Mixing stations, "L"-Aircraft and "U"-Interline sprayers, not for "G"- Watering booms. The procedures "Inspection" and "Function test" are emphasised, that means that the procedures must be carried out by the controlling staff. The explanations and notes helps in it.

1. Power transmission

K.1.1 Function

The power take-off drive shaft guard and the guard of the power input connection (PIC) shall be fitted and in good condition.

The different parts of the shaft, the universal joints and locking systems shall not show any mark of excessive wear and shall operate correctly.

The function of the guard shall be obvious and the guard shall not show any wear marks, holes, deformations or tears.

The restraining device that prevents the rotation of the power take-off shaft guard shall be present and shall work reliably.

The protective devices and any moving or rotating power transmission parts shall not be affected in their function.



| F R S M L U | Inspection | Function test | Measurement | Additional equipment | | |
|----------------|--|-----------------------------|----------------------------|---------------------------|--|--|
| Explanation: | Transmission parts like | PTO drive shaft, chain, cha | ain wheels, belt, and gear | box have to be inspected. | | |
| Minor defects: | Minor wear of the transmission parts, poor greasing of the chain, moderately damaged belt, lo | | | | | |
| | tension. | | | | | |
| Notes: | Take safety regulations into consideration! Instead of a PTO drive shaft also other transmission | | | | | |
| | parts may be present. | | | | | |

Fig. 2 Function of the power transmission

Another example shows the requirement for the group "Pump" with the feature "Capacity" with the original text of EN 13790 (Figure 3). In this example the procedures "Function test" and "Measurement" are emphasised. The pump capacity is to measured if the pump capacity is known. If the nominal pump

capacity is unknown, the sufficient flow rate capacity can be taken from the maximum nozzle output plus an additional flow rate for the hydraulic agitator.

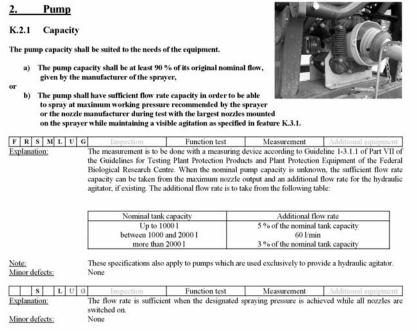
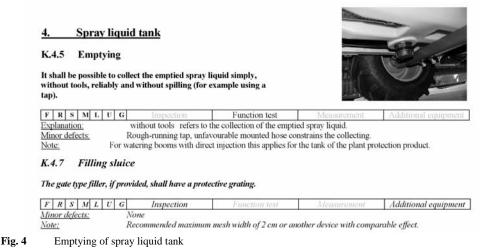


Fig. 3 Pump capacity

The figure 4 shows some requirements from the group "Spray liquid tank" with the features "Emptying" and "Filling sluice". The Emptying of the tank must be possible without tools and shout be inspected with a function test. This requirement is valid of course for all possible PAE, because everyone disposes of a tank for spray liquid. A "Filling sluice" is an additional equipment and is shown in italic. The state of the equipment can be examined without functional tests or measurements and are valid for all PAE.



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The test report brings all information of the inspected PAE in one document together and is subdivided into three parts:

The <u>head</u> of the report contains information about the PAE and the test station e.g. machine type, year of manufacture and equipment of the machine like spray tank volume, pump, agitator, controls, spray boom and nozzles with results of the cross distribution measurements.

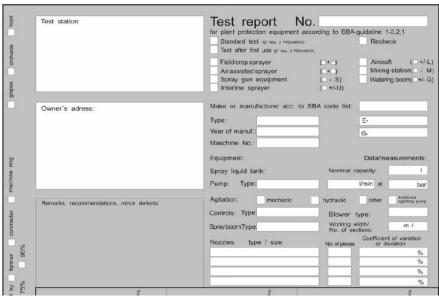


Fig. 5 Head of the test report

All results of the inspection procedure are summarised into the middle part of the report in detail and weak points are marked.

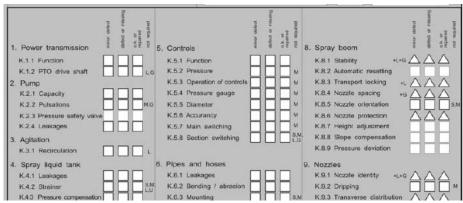


Fig. 6 Middle part of the test report

On the bottom of the report we will find the signature of the inspection staff and the information about the inspection result, e. g. label "yes" or "no". Several additional information over the PAE is summarised on the left side of the report, e. g. whether it concerns a mounted, trailed or self propelled sprayer or whether it is equipped with drift reducing equipment.

| The minor defects will be repaired immediately. | 11. Other equipment | | | 10. Blower K.10.1 Blower condition K.10.2 Switching off | | |
|---|---------------------|--------------------------|--|---|-----------|--|
| Signature of owner | | Description | | K.10.3 Guide plat K.10.4 Rotational | tes | |
| Result of the inspection: | abel: | yes no | | Next inspect | tion: | |
| Land / administrative authority | | Location of test station | | Date | Signature | |

Fig. 7 Bottom of the test report

Summary

The standard EN 13790 is usable not only for the inspection of field sprayers and air assisted sprayers, but also usable for the inspection of other PAE which functioning similar. The guideline of SPISE working group could be harmonized and later on a basic for the inspection process in the European Member States. Therefore the scope of EN 13790 should be extended so that other types of PAE should be included, because this is much more less time consuming than working out a complete new standard.