



**Foundation of Quality Control of
Agricultural Machinery (SKL)**

Features for testing Field Crop Sprayers Already in Use.

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*Foundation for Quality Control of Agricultural Machinery (SKL)
PoO Box 407
NL-6700 AK Wageningen
The Netherlands*

Preliminary remarks

The base for these features for testing field crop sprayers is in the "Regulation HPA Use Application Equipment for Plant Protection Products 2003" and the "Regulation PT Use Application Equipment for Plant Protection Products 2004". In these regulations is the base for the obligation for testing field crop sprayers. This Features for testing field crop sprayers is used by the test operators of the SKL certified testing stations to test the field crop sprayers in a uniform way with using of the testing equipment as prescript in the "TECHNICAL REQUIREMENTS for the installation of a KL testing station for testing field crop sprayers". Only SKL approved testing stations are permitted to perform the tests. All tests have to be done by test-operators who are in the possession of a certificate "SKL test-operator of field crop sprayers".

The result of the tests has to written down on the SKL testing form for Field crop sprayers.

2.1 Preparatory activities

The testing of field crop sprayers only takes place after it is noted that:

- A. The field crop sprayer is clean (outside and inside);
- B. All in use nozzle sets, what are used for application of plant protection products, are present;
- C. During standing there is no leakages (water and/or oil);
- D. The power unit (tractor) is present;
- E. The to be tested sprayer is safe (PTO, etc) ;
- F. SKL –Commission Form signed by the owner of the sprayer is present.

If any of these cases applies, this has to be solved first before the test will start.

During the testing the standardised testing pressures must be used in accordance with table 1 . Before the test is started, the test operator must be calculating what the minimum agitation capacity must be (to see m.1.).

2.2 Testing requirements:

Approval and disapproval

The sprayer is disapproved as one or more mentioned items of in the groups a till q (to see testing form field crop sprayers) is assessed badly .

Presence components:

Absence of components of which can be shown that they were already not present when the machine was new, is no reason for disapproval. Exceptions on this are the presence of a sieve the tank opening and the requirements of the pressure gauge.

a. Spray boom in- and out folding, locking

- a1. Folding in or out by hand shall be possible by one person without using tools or excessive force
- a2. The mechanical or hydraulic in or out folding has to take place with a rather even speed and without intervene by hand;
- a3. The locks on the spray boom, including the automatic resetting, in working and/or transport position has to function properly;
- a4. Hoses may not become bended during in or out folding.

b. Height adjustment of the spray boom (if present)

- b1. If the height adjustment takes place with a cable, when using a mechanical or hydraulic system of height adjustment, this cable may show no failures;
- b2. The height adjustment has to be possible in the original manner or the current manner may not be dangerous for the operator;
- b3. The height of the spray boom may not change during operation with more than 2 cm.

c. Boom tilt, pendulum (if present)

- c1. The boom tilt/correction (if provided) has to function properly;
- c2. The boom must be moved smooth back and forth in the vertical area, this may not be prevented by declined, clasping or harsh sliding respectively twisting components of the pendulum construction (swing).

d. Obstacle-avoiding device with automatic resetting of the spray boom

- d1. The automatic resetting has to function when activated;
- d2. The obstacle-avoiding device has to return in rest position when activated.

e. Quality of the construction

- e1. When measuring on a level surface, the distance between the lower edges of the nozzles and the surface varies not more than 10 cm.;
- e2. The traction is in such state that well the functioning of spraying equipment is guaranteed;
- e3. The spray boom has to be stable in all directions, i.e. not loose in any joints and not be bent.

f. Spraying line

- f1. No leakages during standing;
- f2. Hoses shall not be noddled;
- f3. The spraying line, the nozzles bodies and nozzles are motionlessly confirmed; the mutual unevenness of the nozzles is not more than 10 cm in the vertical direction;
- f4. Hose clamps shall be tightened properly, it shall not be possible to remove a hose without using a tool or without having removed a security measure firstly;
- f5. Hoses shall not be cut into by hose clamps;
- f6. There shall be no damage of the reinforcement of the hoses, which among other things comes to expression in swollen hoses.

g. Spray liquid tank

- g1. The liquid level indicator shall be clearly readable;
- g2. The tank cover shall be appropriate with regard to size and form of the tank opening and cannot be motionlessly fixed or been detached by hand;
- g3. The pressure compensation of the tank shall work;
- g4. The emptying point of the tank is useful;
- g5. In the tank opening is a filler sieve;
- g6. There shall be a non-return device on the water-filling device of the tank.

h. Filters

- h1. On both the suction and the pressure side of the pump is a filter;
- h2. The present filters shall be complete and in good condition.

i. Pressure gauge

- i1. The house of the pressure gauge has a diameter, which is not smaller than 63 mm;
- i2. Scale marking:
 - At least 0,2 bar for working pressures less than 5 bar;
 - At least 1,0 bar for working pressures between 5 and 20 bar
 - The scale marking for pressure gauges for measuring the air-pressure in case of the use of air/liquid nozzles shall be at least 0,1 bar in the range from 0,5 to 2 bar
- i3. Accuracy:
 - The accuracy of the pressure gauge shall be +/- 0,4 bar for working pressures from 1 to 8 bar.
 - The accuracy of the pressure gauge for measuring the air-pressure in case of the use of air/liquid nozzles shall be +/- 0,2 bar in the range from 0,5 to 2 bar

j. Flowmeter (if present)

- j1. The flowmeter, if present on the sprayer, shall not deviate more than 5% from the measured value within the customary measuring range.

k. Pump test.

- k1. At a working pressure of 10 bar or maximum pressure by the manufacturer permitted, no leakages shall occur;
- k2. The pressure safety valve shall work reliably;
- k3. During spraying with highest pressure, belonging to the pressure area of the at the sprayer used nozzles, no leakages shall occur;
- k4. During this test no hoses shall be swollen;
- k5. After being switched off, the nozzles shall not drip 5 s. after the spray jet has collapsed;
- k6. Regardless of the distance of the boom above the ground, no liquid shall be sprayed on the sprayer itself or on and part of the sprayer.

l. Pressure adjusting device

- l1. The established spraying pressure shall be maintained, at constant reversions of the pump, with an exactitude of plus or minus 0.2 bar;
- l2. After some times open and closing the main valve, the established pressure shall obtained (plus or minus 0.2 bar).

m. Agitation capacity

- m1. The pump shall have sufficient flow rate capacity in order to be able to spray at maximum working pressure as recommended by the sprayer or nozzle manufacturer with the largest nozzles mounted on the while maintaining a sufficient agitation capacity
 - If only hydraulic agitation, the agitation capacity shall be at least 5% of the nominal spray tank volume;
 - If hydraulic agitation plus an additional agitation device (i.e. an injector to increase the hydraulic agitation flow of a mechanical agitation device), the agitation capacity shall be at least 2,5% of the nominal spray tank volume
 - If only a mechanical agitation device is present, on basis of by the constituent supplied documentation can be determined that the water displacement (l/min) of the mechanical agitation device is more than 5% of the nominal tank volume;

- m2. A clearly visible agitation shall be achieved when spraying to the nominal p.t.o. speed, with the tank filled to the half of its nominal volume.

n. Distribution pattern of the sprayed fluid

- n1. The by 10 cm measured quantity of the sprayed fluid yield more than plus or minus 15% of the average
Of all on or at the sprayer present nozzles the distribution pattern must be checked over the complete work width. This test is carried out at in the table 2 mentioned test heights (the distance between the nozzle tip and top of the groove of the test stand) and at the standard test pressure according to table 1. The assessment area is from the middle between the last and the second last nozzle at one side, to the middle between the last and second last nozzle at the other side.
(Disapproved nozzles are removed of the machine.)
- n2. Border nozzles have to be, if present, assembled according to the instructions of the manufacturer of the nozzles and have to spray in the right direction.

o. Pressure accumulator (if present)

- o1. There shall no leakage of air from the air chamber of the accumulator;
- o2. The pressure in the air chamber of the accumulator shall be adjusted to the spraying pressure of the at the sprayer present nozzles. If the accumulator was initially not adjustable, this blame reason expires;
- o3. The indicator of the pressure gauge shall stand quiet.

p. Filler (if present)

- p1. The filler must not been damaged or not complete (pocket reel frame);
- p2. The reel head shall no be blocked.

q. Controls

- q1. All controls shall function smoothly.
- q2. All controls shall function well.

Tabel 1

	Spraying area (bar)	standard test pressure (bar) for test cross distribution	Highest test pressure (bar) (during leaking test and testing agitation capacity)
Flat-fan nozzles	1 t/m 5	3	5
Hollow cone nozzles	2 t/m 5	3	5
LP-flat fan nozzles	1 t/m 2,5	2	2,5
Air-induction flat fan nozzles (Venturi nozzles)	2 t/m 6-8*	3-5*	6-8*
Air/water flood jet nozzles (Airtec/Airjet, etc)	1 t/m 4 (water) 0,75 t/m 1,5 (air)	2,5 - 3 (water) 1,0 (air)	4 (water) 1,5 (air)
Other nozzle type according to the prescription of the manufacturer			

* test pressure and maximum pressure are depended of the prescriptions of th manufacturer for use of applications in agricultural crops. The standard test pressure is the average of the lowest and highest spraying pressure as given by the manufacturer. The highest testing pressure is the pressure given by the manufacturer.

Tabel 2

Spray angel nozzle	Testing height in cm at nozzle spacing of 50 cm
60°	85 - 95
80°	70 - 80
90°	70 - 80
110°	50 - 60
120°	45 - 55
Air/water flood jet nozzle	65 - 75