

## *ENTAM - Test Report*



**Sprayer type:**  
**Trade mark:**  
**Model:**

**Mounted field crop sprayer**  
**LEMKEN**  
**Sirius 10/1900**

**Manufacturer:**  
LEMKEN GmbH & Co KG  
Weseler Straße 5  
46519 Alpen  
Germany

**Test report: D - 1940**

March 2013

<b>Assessment table</b>
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No.	Contents	Assessment
1	Spray tank surface roughness	++
2	Spray tank over volume	++
3	Volume of total residual (here max. allowed 63,5 l)	++
4	Spray tank contents gauge up to 20% Filling	++
5	Spray tank contents gauge from 20% Filling	++
6	Agitation system	+++
7	Width of nozzle bar section	+++
8	Boom height adjustment range	+
9	Accuracy of pressure gauge	+
10	Accuracy of flow meter	see no.14
11	Regulation speed	+++
12	Even transverse distribution	++
13	Rinsing water tank	+
14	Deviation of volume/hectare adjustment device (spray computer) from desired value	++
15	Repeatability of volume/hectare adjustment device (spray computer)	+++
16	Pressure drop between manometer and nozzle	++
17	Deviation of single nozzle output from table	++

Fig.1+2: Assessment table and assessment keys of important test results.

No.	unit	+	++	+++	No.	unit	+	++	+++
1	µm	>70-100	30-70	<30	10	%	4-5	2-4	0-<2
2	%	5-8	>8-12	>12	11	%	>7-10	>3-7	0-3
3	of al-low.value	>2/3-3/3	1/3-2/3	<1/3	12	CV	>7-9	4-7	<4
4	%	7.5-5.0	5.0-2.5	<2.5	13	% of tank vol.	10-12	>12-14	>14
5	%	5.0-4.0	<4.0-2.0	<2.0	14	%	>4-6	2-4	<2
6	%	>10-15	5-10	<5	15	CV	>2-3	1-2	<1
7	m	4.5-6	>3-4.5	3 or less	16	%	>7-10	3-7	<3
8	m	1-1.5	>1.5-2.0	>2.0	17	%	>7-10	3-7	<3
9	bar	>0.10-0.20	>0.05-0.10	0.00-0.05					

Free download of the test under: [www.ENTAM.net](http://www.ENTAM.net)  
or [www.jki.bund.de](http://www.jki.bund.de)

## Technical data of sprayer

- 1900 l tank.
- Electrical contents indicator.
- 2 agitation systems.
- 196 l rinsing water tank.

- 27m boom.
- 9 hydraulic sections.
- Boom lift continuously from 270 mm-1750 mm.
- Pressurized recirculation system.



- 20.8 L washhand tank.

- P.T.O. driven 4 chamber diaphragm pump, type Altek 260 with 259 l/min at 10 bar.

### Dimensions and weights:

total length:	2300 mm
height:	2950 mm
width:	2450 mm
unloaded weight:	1646 kg

Fig.3: Diagram of sprayer.

## Description of sprayer



Fig.4: Left sprayer side with folded boom.

The base frame is made of angular steel panels and profiles. It is attached to the tractor using a patented quick coupling element. A special feature of the quick coupling element is that the p.t.o. drive shaft, the upper link and the hydraulic connections can be connected to the tractor before the equipment itself is positioned directly behind the tractor to then be attached. This means that it is no longer necessary to negotiate the small amount of

space between the tractor and the attached equipment. The equipment can be parked using swivelling supports.



The spray boom ('SEH') is a composite structure made of a steel grid frame (blue boom parts) and stabilising aluminium tubes. The aluminium tubing also serves to protect the multiple nozzle with electro-magnetic single nozzle control situated inside the framework.

Fig.5: Nozzle in the aluminium frame tube.

The lateral boom extensions can be angled separately and hydraulically. The boom has 5 segments on each side and one middle part. The boom suspension comprises a pendulum frame with an incline-adjustment feature. The boom halves are separated in the middle of the boom and are damped horizontally by rubber stops.



Fig.6: Unfolded boom and boom lift.

## Description of sprayer

The boom is damped vertically in the middle by gas-assisted shock absorbers. The hydraulic incline-adjustment feature assures compensation of slopes with inclines of up to 15 %. The pendulum has a maximum range of up to 8° versus the horizontal.

The tank has a nominal volume of 1900 l and is made of polyethylene. The volume in the tank is measured by an electronic level indicator (TankPilot) with a display to the left of the framework and also at the Ecospray terminal. The tank can be filled either by a filling connection with a KAM-LOCK coupling on the left, a hydrant filling connection with a reflux valve or a suction injector. The clean water tank is made of polyethylene with a volume of 196 l (underneath the main tank on the right) for diluting the remaining technical fluid, and for cleaning the inside and outside of the tank and rinsing equipment parts which transport fluid.



Fig.7: Sprayer with folded boom and quick coupling frame.

The sprayer is equipped with a power agitation system and a standard agitation system for mixing the plant protection product and distributing it evenly into the spray fluid. The power agitation system is built by an agitating rod with a total of 11 injector nozzles (Lechler mixing nozzle 4 mm) at the bottom of the tank for agitating products which have left deposits. The standard agitation system comprises two injector nozzles (1 x left side, 1 x right side). The system's output can be adjusted indefinitely using a valve. Both agitation systems can be switched off.



Fig.8: Left sprayer side with control centre, hand wash tank (left of control panel).

The main operating controls are on the left of the equipment and are covered to protect them from dirt; also, there is a swivelling induction bowl with a lid and a separate hand wash tank which has a capacity of 20.8 l. The induction bowl made of polyethylene is equipped with a rotating nozzle with a spring-loaded valve for cleaning containers, and a circular flushing pipe.

## Description of sprayer



Fig.9: Induction bowl underneath the control panel.

The control valves comprise electromagnetically controlled individual nozzle valves, pressure regulation valve, flow meter (ARAG DN 25), pressure sensor on the nozzle tube and the terminal, LEMKEN Ecospray. The sprayer is controlled entirely at the terminal; in addition the hydraulics can be operated either by Ecospray or if preferred by EcoControl. The boom is folded in automatic mode by EcoControl; first of all it is lifted and then folded section for section via sensors. The driver can take

control in automatic mode at any time so that individual boom sections can also be folded separately. Up to nine sections can be controlled. When in operation, the terminal shows the application rate (l/ha), pressure (bar), driving speed, level of fluid in the tank and relative boom height (%). Moreover, there is an integrated angle display for adjustment to slope inclination. Function menus also contain information on the remaining area, entire area and flow rate.



Fig.10: Control terminal LEMKEN Ecospray and EcoControl in the drivers cabin.

<b>Result table</b>
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tested assembly		result (measured)		
spray tank	over volume	9.2 %	* min. 5 %	
	contents gauge	graduation marks electronical display	* max. 100 l	
	deviation		* max. 7.5 % up to 380 l filling * max. 5 % between 380 l and 1900 l	
surface roughness	0.040 mm	* max 0.1 mm		
rinsing tank	volume	196 l corresponding to 10.3 % of nom. volume	* min. 10 % of main tank	
	rinsing and dilution possible?	yes		
can rinsing equipment	rinsing efficiency	0.002 %	* max. 0.01 % of can contents	
manometer	graduation marks	0.1 bar	* max. 0.2 bar	
	deviation	0.2 bar	* max. 0.2 bar	
agitation system	deviation from even concentration	4.07 %	*max. 15 %	
residual in l	dilutable	21.97 l	* max. 63.5 l	
	non dilutable	-		
spray boom	height adjustment range from - to nozzle ground contact protection	270 mm - 1750 mm	sprayer not mounted	
	pressure loss between manometer and nozzle at 5 bar pressure	5.7 % (with ID 120 06 POM)	* max. 10 %	
	nozzle dripping after switch off	0 ml	* max. 2 ml	
	single nozzle flow rate	type of nozzle: Agrotop AirMix 110-04 / Lechler ID 120 06 POM		
		pres- sure (bar)	flow rate (l/ min)	max. deviation from table in % *(max. 10 %)
				max. deviation from mean in % *(max. 5 %)
		1.0 3.0 5.0	1.64 2.9	6.9 6.9 4.7 4.2
transverse distribution				
	type of nozzle: Agrotop AirMix 110-04			
	pres- sure (bar)	distance (cm)	coefficient of variation (%) *(max. 9 %)	
	1.5 3.0 6.0	50 50 50	6.0 4.2 4.4	

Fig.11: Result table 1.

Result table		
volume/hectare adjustment device		
repeatability of adjustment		
adjusted flow rate in l/ha	deviation from desired value % CV (max. 3 % CV)	deviation from desired value % CV (max. 3 % CV)
	ascending application rate	Descending application rate
200	0,8	0,17
250	0,49	0,14
300	0,48	0,43
<u>procedure</u>	regulation speed: deviation to adjusted value after 7 s	
switching on / off	2.0 %	after 7 s
switching of single sections	2.0 %	after 7 s
<u>procedure</u>	reaching stady state after varying conditions (s)	
change of driving speed by changing gears		stady state means deviation
1.5 m/s to 2.0 m/s	5.1 s	< 10 %
2.0 m/s to 2.5 m/s	4.8 s	< 10 %
2.5 m/s to 2.0 m/s	5.1 s	< 10 %
2.0 m/s to 1.5 m/s	5.1 s	< 10 %

Fig.12: Result table 2.

Explanation on testing:

Testing takes place according to the Technical Instructions for ENTAM-Tests of Field Crop Sprayers (Rel. 4). This procedure was developed by the competent testing authorities of the European countries participating in ENTAM and is based on the CEN standard EN 12761 „Agricultural and forestry machinery – Plant protection equipment for the application of plant protection products and liquid fertilisers“. This test is only a technical performance test which takes place without an accompanying field test. The test results apply only to the tested appurtenances of the sprayer. Statements on the behaviour of the sprayer with different appurtenances cannot be derived from these results.

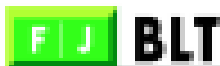


## Responsibility and recognition



Performing competent authority:  
 Julius Kühn-Institute (Germany)  
 Institute for Application Techniques in Plant Protection  
 Messeweg 11-12  
 D-38104 Braunschweig

### **This test is recognized by the ENTAM members of the ENTAM technical working group -Plant Protection-:**



**BLT**- Francisco Josephinum, Wieselburg -  
 Biomass, Logistics, Technology (Austria)

BLT-Prot.Nr.051/13



**CMA** Generalitat de Catalunya  
 Centre de Mecanització Agrària (CMA) (Spain)

EPH 001/13



**ENAMA** Ente Nazionale per la Meccanizzazione  
 Agricola (Italy)

ENTAM „Rapporto di prova  
 prestazionale“ 01/2013



**HIAE** Hungarian Institute of Agricultural  
 Engineering (Hungary)

D-67/2013



**IRSTEA** - National Research Institute of Science  
 and Technology for Environment and Agriculture  
 (France) (formerly CEMAGREF)

IRSTEA/CEMAGREF/  
 ENTAM/ 13/001



**PIMR** - Przemysłowy Instytut Maszyn  
 Rolniczych Industrial Institute of Agricultural  
 Engineering (Poland)

PIMR-87/ENTAM/13