

ENTAM - Test Report



Sprayer type:
Trade mark:
Model:

Trailed field crop sprayer
LEMKEN
Albatros 9/4000

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

Test report: D - 2056

July 2016

Assessment table

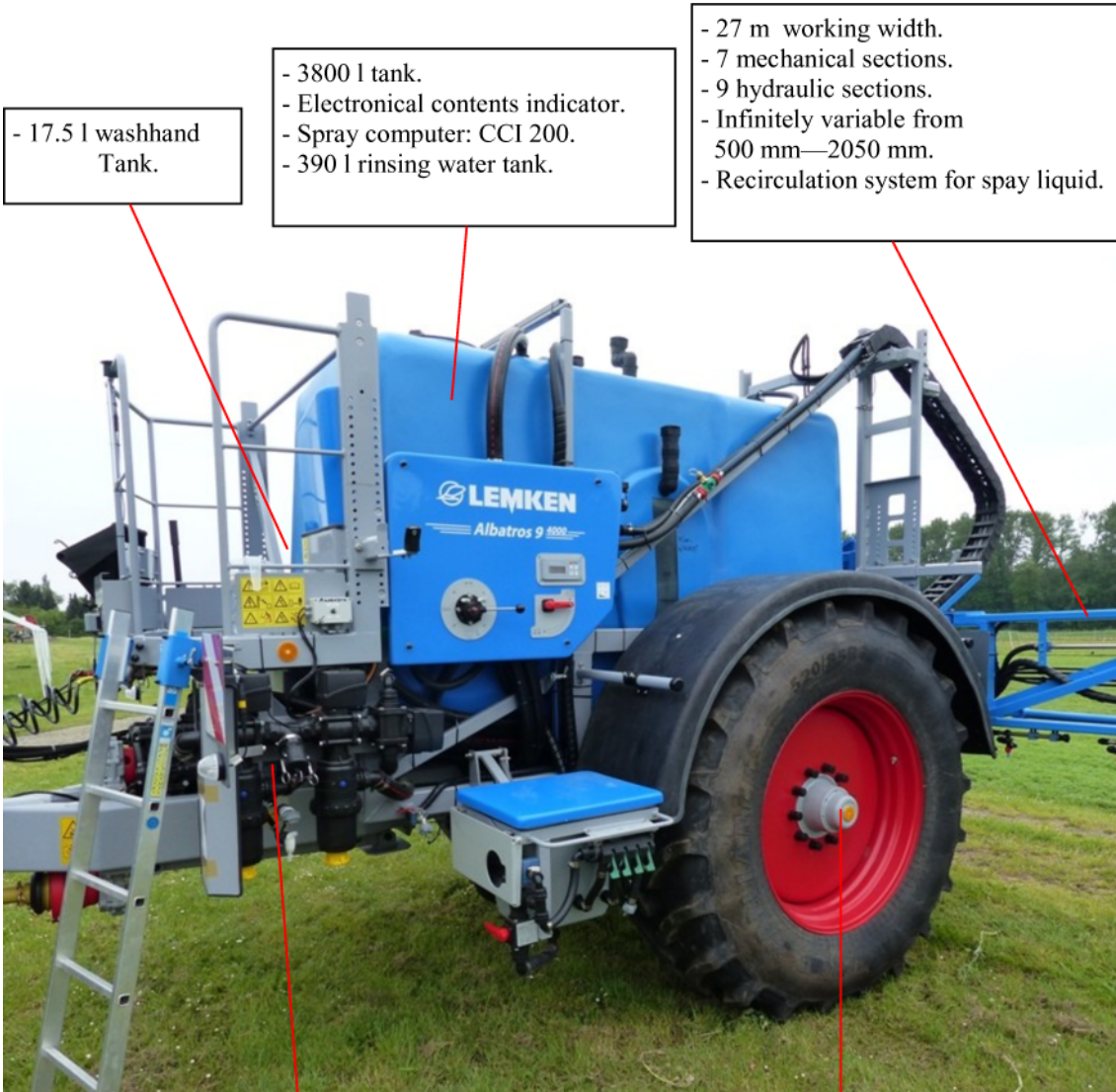
No.	Contents	Assessment
1	Spray tank surface roughness	+++
2	Spray tank over volume	++
3	Volume of total residual (here max. allowed 73 l)	+
4	Spray tank contents gauge up to 20% Filling	++
5	Spray tank contents gauge from 20% Filling	+++
6	Agitation system	+
7	Width of nozzle bar section	+++
8	Boom 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	++

Tab.1+2: Assessment table and assessment keys of 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 nom. tank volume	10-12	>12-14	>14
5	%	5.0-4.0	<4.0-2.0	<2.0	14	s	>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
or www.julius-kuehn.de

Technical data of sprayer



- 17.5 l washhand Tank.

- 3800 l tank.
- Electronical contents indicator.
- Spray computer: CCI 200.
- 390 l rinsing water tank.

- 27 m working width.
- 7 mechanical sections.
- 9 hydraulic sections.
- Infinitely variable from 500 mm—2050 mm.
- Recirculation system for spay liquid.

Fig.1: Overview.

- 2 pumps (spraying, mixing), PTO driven.
- type „AR 250 bp“ with 230 l/min at 20 bar and 540 l/min.

- Rigid axle.
- 2.0 m track width.
- Ground clearance 580 mm (frame) / 720 mm (axle) with tyre size 520/85-R38.
- Drawbar steering.

Dimensions and weights :

total length:	6100 mm
height:	3460 mm
width:	2700 mm
unloaded weight:	4617 kg

Description of sprayer



Fig.2: Frame with steering drawbar and parking support with hydraulic pump.

The framework is made of steel profiles, with the tank situated on the top. The framework is designed for a maximum speed of 40 km/h. It is equipped with a rigid axle with track width of 2.0 m and a steering drawbar with tracking function. The two 6 chamber diaphragm pumps (type: Annovi Reverberi AR 250 bp) are situated on top of the drawbar and driven by power take-off

shaft.

The spray boom is a framework construction made of welded steel profiles. It is horizontally folded at the sides of the sprayer. The outer section of the boom is provided with a steel bar to protect the nozzles in case of obstacle contact. The height of the boom can be adjusted hydraulically and infinitely between 500 mm and 2050 mm. The spacing between the nozzles is 500 mm. The pendulum device has a pendulum range of up to 10 ° relative to horizontal. The inspected equipment was also equipped with a slope compensation feature which can compensate gradients of up to 15 %. Two ultrasonic distance sensors can regulate the height at which the boom is carried if required; the boom is raised and lowered automatically when it is taken from the track / placed back on the track on reaching the headland. The operator can determine the distance between the nozzles and the target. The boom is divided mechanically into seven segments. For switching the nozzles, they are grouped together in nine hydraulic sections.



Fig.3: Boom with ultrasonic sensor, nozzle protection bar and obstacle give away device.

Description of sprayer



Fig.4: Sprayer with folded boom and steering drawbar with suspension (yellow plate).

The main tank is made of plastic (GRP) and has a nominal volume of 3800 l. The spray level can be read using an electronic level indicator at the terminal in the driver's cab or at the main operating controls (scale graduation of 1 l) to the left side of the sprayer.

There is also a filling connection (KAM-LOCK) on the left of the sprayer for filling the tank. This allows a filling capacity of up to 500 l/min.

Apart from emptying by spraying, the tank can also be emptied using a drain valve on the right of the sprayer or using the pump and a pressure connection (KAM-LOCK) on the left side of the sprayer.

The tank is cleaned by 2 rotating nozzles (plastic) in the tank. The sprayer comprises a pressurised agitation system for mixing the products.

The agitator can be switched on and off from the driver's cab and its speed can be adjusted infinitely from zero to full power. According to the requirements the sprayer has a separate 390 l water tank for cleaning and diluting. This separate water tank is placed in the main tank for an additional function as wash plate.

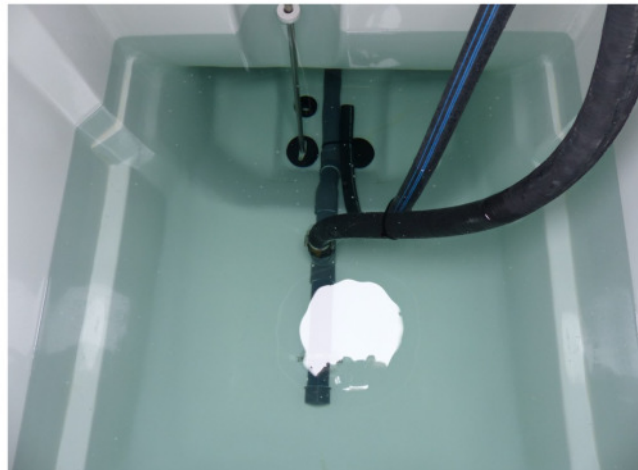


Fig.5: Bottom section of tank.

Description of sprayer

The swivelling induction bowl made of plastic is equipped with a rotating nozzle for cleaning containers and four rinsing nozzles fixed to the side as well as one nozzle in the area of the vent. A closed circular pipeline is supporting the cleaning of the inner walls of the induction bowl in case of adhesive powders.

The control unit including job calculator type CCI 200 are meant for regulating spray application depending on the speed of the sprayer, for tracking assistance and automatic spray section control (DGPS sensor). The central spray sections, pressure adjustment, lifting and lowering of the boom, slope compensation feature and manual drawbar steering can be controlled by the terminal. All the necessary parameters can be entered by using the terminals touch-



Fig.6: Foldable induction bowl with foldable work surface.

screen, the function keys and a rotary knob with press button. The 21.5 inch touch-screen liquid crystal graphic display can still be read adequately in direct sunlight. During operation the display shows: application in l/ha, driving speed, active spray sections, spray pressure, sprayed area, manual or automatic mode, for example. It can also show the liquid level in the tank or information about the spray boom like: height, automatic or manual mode and angel of pendulum devise.



Fig.7: LEMKEN CCI 200 terminal in the driver's cab.

Result table

tested assembly			result (measured)		
spray tank	over volume		8.9 %	* min. 5 %	
	contents gauge	graduation marks	electronical display, 1l	* max. 100 l	
		deviation	1.8%	* max. 7.5 % between 380l and 760 l	
	1.9%		* max. 5 % between 760 l and 3800 l		
surface roughness		0.007 mm	* max 0.1 mm		
rinsing tank	volume		390 l	> 10 % nom. tank volume	
	rinsing and dilution possible?		yes		
	Cleaning performance (main tank) (concentration after cleaning)		11301	Min.factor 400 of concentration before cleaning	
can rinsing equipment		rinsing efficiency	< 0.01 %	* max. 0.01 % of can contents	
manometer	graduation marks		0.1 bar	* max. 0.2 bar	
	deviation		0.12 bar	* max. 0.2 bar	
agitation system	deviation from even concentration		10 %	*max. 15 %	
residual in l		dilutable	67 l	* max. 73 l	
		non dilutable	6		
spray boom	height adjustment range from - to		500 mm - 2050 mm		
	nozzle ground contact protection		yes		
	pressure loss between manometer and nozzle at 5 bar pressure		1.20 % (with Lechler ID 120-03 POM)	* max. 10 %	
	nozzle dripping after switch off		0 ml	* max. 2 ml	
	single nozzle flow rate				
	type of nozzle: Lechler ID 120-03 POM				
		pres- sure (bar)	flow rate (l/ min)	max. deviation from table in % *(max. 10 %)	max. deviation from mean in % *(max. 5 %)
		5.0	1.54	5.9	-5.6
	transverse distribution				
	type of nozzle: Lechler ID 120-03 POM				
	pres- sure (bar)	distance (cm)	coefficient of variation (%) *(max. 9 %)		
	2.5	50	4.6		
	5.0	70	5.0		
	8.0	50	3.1		

Tab. 3: Result table 1.

*) allowed limit

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
140	1.69	2.71
200	1.43	1.11
260	0.46	0.44
procedure	regulation speed: deviation to adjusted value after 7 s	
switching on / off	1.2 %	after 7 s
switching of single sections	1.0 %	after 7 s
procedure	reaching steady state after varying conditions (s)	
change of driving speed by changing gears		steady state mean deviation
1.5 m/s to 2.0 m/s	5.3 s	< 10 %
2.0 m/s to 2.5 m/s	3.2 s	< 10 %
2.5 m/s to 2.0 m/s	1.4 s	< 10 %
2.0 m/s to 1.5 m/s	6.0 s	< 10 %

Tab.4: Result table 2.

Explanation on testing:

Testing takes place according to the Technical Instructions for ENTAM-Tests of Field Crop Sprayers (Rel.5). This procedure was developed by the competent testing authorities of the European countries participating in ENTAM and is based on the standard EN ISO 16119. 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:



HBLFA Francisco Josephinum 018/2016
BLT Wieselburg
 (Austria)



CMA Generalitat de Catalunya 018/2016
 Centre de Mecanització Agrària (CMA)
 (Spain)



ENAMA Ente Nazionale per la Meccanizzazione Agricola ENTAM „Rapporto di
 (Italy) prova prestazionale“:07/2016



HIAE Hungarian Institute of Agricultural Engineering D-125/2016
 (Hungary)



IRSTEA - National Research Institute of Science and Technology for Environment and Agriculture IRSTEA/CEMAGREF/ENTAM/
 (France) (formerly CEMAGREF) 16/010



PIMR - Przemysłowy Instytut Maszyn Rolniczych Industrial Institute of Agricultural Engineering (Poland) PIMR-140/ENTAM/16