Julius Kühn-Institut
Federal Research Centre for Cultivated Plants

ENTAM

ENTAM - Test Report

Sprayer type: Trailed field crop sprayer
Trade mark: Amazone
Model: UX 4201 Super

Manufacturer:
Amazonen-Werke H. Dreyer
Am Amazonenwerk 9 -13
49205 Hasbergen-Gaste
Germany

Test report: D - 2083

September 2017

Assessment table

No.	Contents	Assessment
1	Spray tank surface roughness ***	++
2	Spray tank over volume	+++
3	Volume of total residual (here max. allowed 75 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 important test results.

*) changed requirement
**) alternative requirement: > 10 % of main tank = „+"
***) outside surface

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	%	>7-7.5	>3-7	0-3
3	of allow.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	times amount of dilutable residual **)	10-12	>12-14	>14
5	%	5.0-4.0	<4.0-2.0	<2.0	14	s	>4-7	2-4	<2
6	%	>10-15	5-10	<5	15	deviation %	>4-6	2-4	<2
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					

**) alternative requirement: > 10 % of main tank = „+"

Free download of the test under: *www.ENTAM.net*
or *www.julius-kuehn.de*

Technical data of sprayer

- 27 m working width.
- Pendulum range up to 10 °.
- Slope compensation up to 15 %.
- Infinitely lifting range 250 mm - 2600 mm.

- 4200 l tank.
- Terminal „AMATRON 3“ (ISOBUS).
- 571 l rinsing water tank.
- 27 l hand wash tank.

Fig.1: Overview.

- 1.8 m track width.
- 650 mm (drawbar) and 770 mm (axle) ground clearance (with 520/85R38 wheels).

- 2 Pumps „AR 280 bp“ with together 518 l/min at 6 bar (spraying and agitation).
- 1 pump „AR 180 bp“ for inner tank cleaning.

Dimensions and weights :

total length:	7500 mm
height:	3600 mm
width:	2600 mm
unloaded weight:	4610 kg

Description of sprayer

Fig.2: Right sprayer side.

The framework of the sprayer is made of steel profiles with the tank situated on the top. The axle with pivot steering has a track width of 1.8 m. It is designed for a road speed of 40 km/h. The rigid drawbar is equipped with PU dampers to reduce the jolts from towing. The pumps are placed on the drawbar profiles. The spray tank is designed without splash walls and only a small part of its base is flat due to its slim shape and sloping sides. This shall help to reduce deposits and improve the efficiency of the agitation system and the cleaning device. The tank keeps an over volume of 15.8 % to hold back foam. The clean water tank for rinsing and diluting holds a volume of 571 l. It is also made of polyethylene and is placed on the right side of the sprayer. It can also be used for the cleaning of the outer surfaces of the sprayer. Therefore a special cleaning set is available, consisting of a hose drum and a spray gun. The hose drum is situated on the boom support.

Fig.3: Lift and central section of the boom, with spray gun for cleaning and lights for visual spray control at night.

Description of sprayer

Fig.4: Left sprayer side: induction bowl, filling connections and control center with display.

The hand wash tank for the operator has a volume of 27 l.

For agitating the sprayer comes with a pressurised agitation system with an automatic steering to control the agitation intensity depending on the amount of liquid in the tank. It lowers the intensity down to zero if the contents falls below 200 l. This automatic function is a new feature in comparison with tested older versions of this sprayer. The sprayer is also equipped with a pressurized fluid circulation system which assures that the full spray concentration is available for all nozzles right at the beginning of the spray. It also allows to rinse the liquid in the boom up to the nozzles. The circulation system works with a fixed liquid pressure in the pipes but it can also be completely switched off. Thanks to this (overpressure) recirculation system the amount of non delutable residual can be reduced to about 1.5 l.

The lateral folded 27 m boom is a framework construction made of steel profiles (outer sections aluminium) whose height can be adjusted hydraulically and infinitely by a parallelogram. The vertical lift system can lift and adjust the boom within a range of 2350 mm. The pendulum range of the boom is +/- 10 ° and the slope compensation can compensate between +/- 15 %.

Fig.5: Display of the left side control centre.

Description of sprayer

Fig.6: „AMATRON 3" terminal with push buttons for displaying and contolling the spray and hydraulic functions.

On the left side of the sprayer a control centre and the filling connection is placed. With this control centre the functions for filling and agitation can be controlled. Next to that contol centre an induction bowl for bringing the plant protection product into the tank and for rinsing plant protection cans is mounted.

During the application all necessary functions can be displayed and controlled with the „AMATRON 3" terminal in the cabin. Also the automatic inner tank cleaning program, which works in individual steps can be activated via this terminal. The inner cleaning of the induction bowl is also integrated in that automatic cleaning program.

Result table

tested assembly				result (measured)	
spray tank	over volume			15.9 %	* min. 5 %
	contents gauge		graduation marks	electronical display	* max. 100 l
			deviation	3.6 % 4.8 %	* max. 7.5 % between 420l and 840 l. * max. 5 % between 840 l and 4200 l
	surface roughness		Inner surface	0.011 mm	* max 0.1 mm
rinsing tank	volume			571 l	*10 % of nominal volume
	rinsing and dilution possible?			yes	
	Cleaning performance (main tank) (concentration after cleaning)			1898	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			-0.2 bar	* max. 0.2 bar
agitation system	deviation from even concentration			6.0 %	*max. 15 %
residual in l			dilutable	69.7 l	* max. 75 l
			non dilutable	1.5, recirculation system	
spray boom	height adjustment range			250 mm - 2600 mm	
	nozzle ground contact protection			yes	
	pressure loss between manometer and nozzle at 2.5 bar pressure			4.4 %	* max. 10 %
	nozzle dripping after switch off			0 ml	* max. 2 ml
	single nozzle flow rate				
		pressure (bar)	flow rate (l/min)	max. deviation from table in % *(max. 10 %)	max. deviation from mean in % *(max. 5 %)
		4.0	1.41	8.0	4.8
	transverse distribution				
	pressure (bar)		distance (cm)	coefficient of variation (%) *(max. 9 %)	
		2.0	50	5.7	
		4.0	60	4.4	
		6.0	50	3.9	
	Measured with :			Lechler ID 120-03	

Tab.3: Result table * limit

Result table

volume/hectare adjustment device			
repeatability of adjustment			
	adjusted flow rate in l/ha	deviation from desired value % ** ascending application rate	deviation from desired value % ** descending application rate
	147	-3.7	0.8
	210	0	0.7
	273	0.4	-0.2
procedure		regulation speed: deviation to adjusted value after 7 s	
	switching on / off	4.2 s***	after 7 s
	switching of single sections	2.7 s***	after 7 s
procedure		reaching steady state after varing conditions (s)	
	change of driving speed by changing gears		steady state mean deviation
	1.5 m/s to 2.0 m/s	3.6 s	*
	2.0 m/s to 2.5 m/s	2.8 s	*
	2.5 m/s to 2.0 m/s	2.6 s	*
	2.0 m/s to 1.5 m/s	3.0 s	*

Tab.4: Result table 2.

* limit: < 10 % after 7 s
** limit: max. 6 %
***steady state reached

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 **BLT** Wieselburg (Austria)	044/17
CMA Generalitat de Catalunya Centre de Mecanització Agrària (CMA) (Spain)	EPH 14/17
ENAMA Ente Nazionale per la Meccanizzazione (Italy)	ENTAM „Rapporto di Agricola prova prestazionale" 14/2017
HIAE (MGI) Hungarian Institute of Agricultural Engineering (Hungary)	D-163/2017
IRSTEA - National Research Institute of Sience and Technology for Enviroment and Agriculture (France) (formerly CEMAGREF)	IRSTEA/CEMAGREF/ENTAM/ 17/032
PIMR - Przemyslowy Instytut Maszyn Rolniczych Industrial Institute of Agricultural Engineering (Poland)	PIMR-178/ENTAM/17

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