Julius Kühn-Institut
Bundesforschungsinstitut für Kulturpflanzen

ENTAM
European Network for Testing of Agricultural Machines

ENTAM - Test Report

Sprayer type:	Trailed field crop sprayer
Trade mark:	Amazone
Model:	UX 4200 Special

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

Test report: D - 1864

June 2009

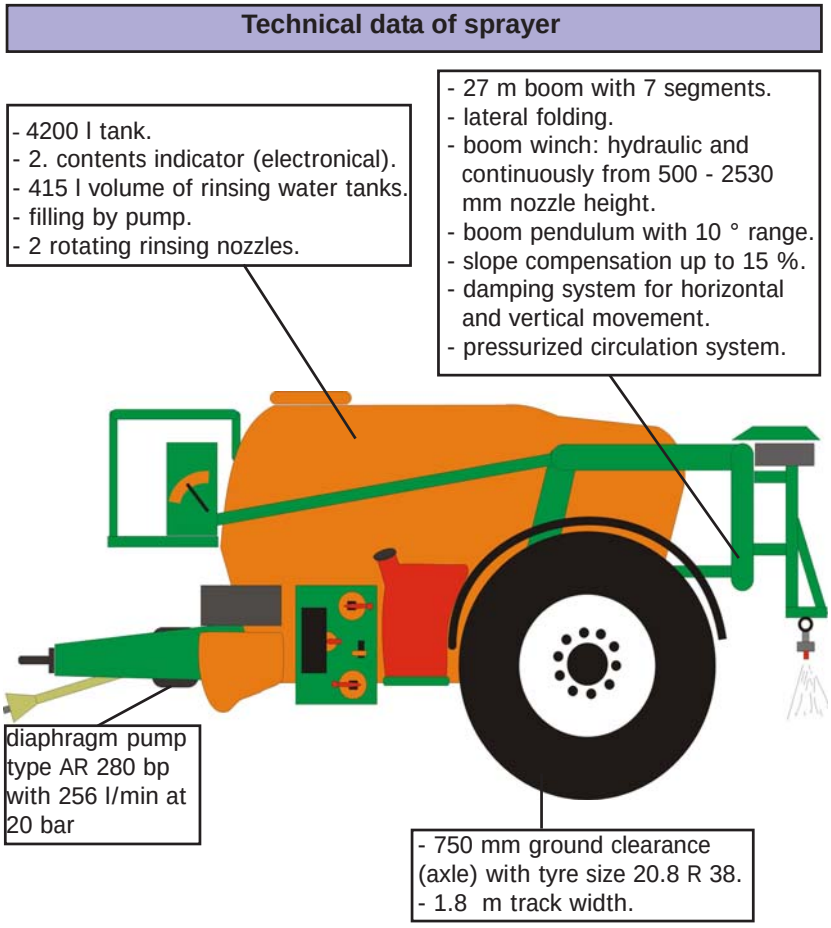
Assessment table		
No.	**Contents**	**Assessment**
1	Spray tank surface roughness	++
2	Spray tank over volume	++
3	Volume of total residual	++
4	Spray tank contents gauge up to 20% Filling	+
5	Spray tank contents gauge from 20% Filling	+
6	Agitation system	++
7	Width of nozzle bar section	++
8	Boom height adjustment range	+++
9	Accuracy of pressure gauge	+
10	Accuracy of flow meter	++
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.

Note: The assessment keys are listed below. The detailed results are in the following test report.

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 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	% 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	%	>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.jki.bund.de*



Dimensions and weights:

total length:	6850 mm
height:	3250 mm
width:	2380 mm
unloaded weight:	3500 kg
total weight:	8000 kg

Fig.3: Diagram of sprayer.

Description of sprayer

The chassis is a framework construction made of steel profiles with the pump placed between the two drawbar profiles. The track width of the sprayer is 1.8 m. The chassis is designed for a maximum speed of 40 km/h.

Fig.4: Right sprayer side with lateral folded boom.

The rigid drawbar is equipped with PU dampers to reduce the jolts from towing. The tested sprayer had a drawbar eye which complies with DIN 11026, but also other couplings, steering drawbar or steering axle (Trail-Tron) for follow-up track trailing are available.

The spray tank is not designed with splash walls and only a small part of its base is flat due to its slim shape and sloping sides. This all helps to reduce deposits and improve the efficiency of the agitation system and the cleaning device. The tank, with an oversize of 11.1 %, has sufficient reserves to accommodate any foam which may result. Two clean water tanks with a volume of together 515 l are mounted at the sprayer, for inner tank cleaning or for rinsing of the

Fig.5: Drawbar dampers.

liquid system. The seperate hand wash tank holds 22.5 l. The pressurised agitation system can be switched off to keep the residues in the tank to a minimum. The speed of the agitation system can also be infinitely adjusted by a valve. The sprayer is equipped with a pressurized fluid circulation system (DUS) which assures that the full spray concentration is available for all nozzles right at the beginning of the spray. Also the fluid conducting parts of the boom can be rinsed independently. 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. By using the tank filling connection the tank can easily be filled with the pump. The spray level reading is possible manually (at the left sprayer side) or on the display. Both level indicators fulfill the accuracy requirements entirely.

Fig.6: Contents indicator for filling.

Fig.7: Block with section valves and pressure adjustment device of the recirculation system „DUS“ (big tube at the right side).

Description of sprayer

The boom is a framework construction made of steel profiles whose height can be adjusted hydraulically and infinitely by a parallelogram. It comprises a central pendulum with a pendulum range of up to 10° and hydraulic incline adjustment up to an incline of 15 %. The inclination is displayed by LED on the „Amaspray+“ terminal. It is also possible to work with the outer boom sections stay folded. Thanks to a nozzle protection bar at the outer boom sections the nozzles there are very well protected from ground and obstacle contact. The induction bowl is equipped with a circular pipe and 3 fixed nozzles for flushing the plant protection product into the tank and for rinsing the induction bowle. For plant protection container rinsing a rotating nozzle is mounted in the bowl. For using the bowle he has to be tilt out. The most important functions for filling and agitating are centralised at the operator controls board on the left side of the sprayer.

Fig.8: Nozzle protection bar at the outer boom segments.

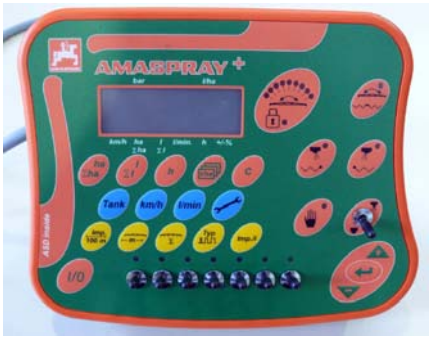


Fig.9: „Amaspray+“ terminal.

In normal spraying mode the speed and current application rate or the liquid flow in l/min are shown on the display. Also other information like sprayed amount of liquid or sprayed area can be displayed.

Result table

tested assembly			result (measured)	
spray tank	over volume		11.2	* min. 5 %
	contents gauge graduation marks		100	* max. 100 l
		deviation	-6.9 % 4.5 %	* max. 7.5 % up to 840 l filling * max. 5 % between 800 and 4200 l
	surface roughness		0.052 mm	* max 0.1 mm
rinsing tank	volume		515 l corresponding to 12.3 % of nominal volume	* min. 10 % of nominal contents
	rinsing and dilution possible?		yes	
can rinsing equipment	rinsing efficiency			* 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		8.8 %	*max. 15 %
residual in l		dilutable	50.5 l	
		non delutable	1.5 l	
spray boom	height adjustment range from - to		500 mm - 2530 mm	
	nozzle ground contact protection		yes	
	pressure loss between manometer and nozzle at 3 bar pressure		5.6 % (with AirMix 110 04)	* max. 10 %
	nozzle dripping after switch off		0 ml	* max. 2 ml
	single nozzle flow rate			
	type of nozzle: Agrotop AirMix 110 04			
	pressure (bar)	flow rate (l/min)	max. deviation from table in % *(max. 10 %)	max. deviation from mean in % *(max. 5 %)
	1	0.971	8.76	-3.65
	3	1.624	4.94	-3.94
	5	2.093	7.55	-2.14
	transverse distribution			
	type of nozzle: Agrotop AirMix 110 04			
	pressure (bar)	distance (cm)	coefficient of variation (%) *(max. 9 %)	
	1	50	4.44	
	3	50	4.84	
	5	50	4.17	

Fig.10: Result table 1.

Result table

volume/hectare adjustment device		
repeatability of adjustment		
adjusted flow rate in l/ha	deviation from adjusted value % *(max. 6 %)	CV *(< 3 %)
180	-3.25	0.26
250	-0.97	0.36
320	-0.98	0.36
procedure	regulation time (s) with deviation > 10 % to adjusted value	
switching on / off	3.6	* max. 7 s
switching of single sections	3.6	* max. 7 s
change of driving speed by changing gears		
1.5 m/s to 2.0 m/s	1.8	* max. 7 s
2.0 m/s to 2.5 m/s	1.7	* max. 7 s
2.5 m/s to 2.0 m/s	5.1	* max. 7 s
2.0 m/s to 1.5 m/s	5.0	* max. 7 s

Fig.11: Result table 2.

Safety Tests

The sprayer is equipped with safety pictograms (stickers) and operating instructions in the native language, which include further safety information. The sprayer carries a CE-mark and a vehicle identification plate.

The CE-mark shows that a product fulfills the requirements defined for the respective EC directives and that the supplier has carried out the appropriate procedures to achieve conformity. The CE-mark is placed on the equipment by the manufacturer. The manufacturer confirms by doing so that the sprayer was designed and built in accordance with harmonised EC Directive 98/37/EEC and that standard EN 907 has been complied with.

Explanation on testing:

Testing takes place according to the Technical Instructions for ENTAM-Tests of Field Crop Sprayers (Rel. 3). 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:

BLT- Francisco Josephinum, Wieselburg (Austria)	046/09
AU/DAE - University of Aarhus - Department of Agricultural Engineering Sciences (Denmark)	AU/DAE/ENTAM 2009-14
Cemagref - Institut de recherche pour l'ingénierie de l'agriculture et de l'environnement (France)	CEMAGREF/ENT/09/023
I.A.M.C. Institute of Agricultural Machinery and Constructions (Greece)	ΛΕ/120/01/ZZ
HIAE Hungarian Institute of Agricultural Engineering (Hungary)	D-21/2009
ENAMA Ente Nazionale per la Meccanizzazione Agricola (Italy)	ENTAM „Rapporto di prova prestazionale“ 16/2009
PIMR - Przemyslowy Instytut Maszyn Rolniczych Industrial Institute of Agricultural Engineering (Poland)	PIMR - 43/ENTAM/09
CMA Generalitat de Catalunya Centre de Mecanització Agrària (CMA) (Spain)	EPH 003/09
ART - Agroscope Reckenholz-Taenikon (Switzerland)	D-29.09