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Federal Research Centre for Cultivated Plants

ENTAM

ENTAM - Test Report

Sprayer type: Self propelled Field Crop Sprayer
Trade mark: Amazone
Model: Pantera 4504

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

Test report: D - 2246
January 2021

Assessment table

Table 1: Assessment table

Number	Contents	Assessment
1	spray tank surface roughness	+++
2	spray tank over volume	+
3	volume of total residual	+
4	spray tank contents gauge from 10% to 20% filling	++
5	spray tank contents gauge from 20% filling	++
6	effectivity of 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	size of rinsing water tank	+
14	deviation of volume/hectare adjustment device from desired value	not measurable while stepless
15	repeatability of volume/hectare adjustment device	++
16	pressure drop between manometer and nozzle	+++
17	deviation of single nozzle output from table	++

Assessment keys are listed at the end of the report.

Note:
The layout of German ENTAM reports has changed because German federal authorities are directed to publish only documents accessible for people with a disability on their internet pages.

Technical data of sprayer

Tanks + pumps:
- 4500 liter tank
- Electronic contents indicator
- 523 liter rinsing water tank
- 20.9 liter hand wash tank
- 2 pumps AR 280 BP with 251 liter per minute at 5 bar for agitation and spraying
- 1 pump AR 185 for cleaning

Spray boom:
- 36 meter working width, 7 mechanical segments
- Single nozzle switching
- Infinitely variable from 400 mm to 2600 mm
- 10 ° pendulum device
- Pressure recirculation system for spray liquid

Frame + chassis + drive:
- 1.8 m to 2.4 m adjustable rack width
- Ground clearance 990 mm with tyres 380/90R50
- Hydraulic suspension
- Stepless hydraulic drive

Dimensions + weights:
- Total length 9200 mm
- Height 3900 mm
- Width 2700 mm
- Empty weight 11000 kg

Description of sprayer

The framework of the sprayer is made of steel profiles with the tank situated on the top. The axles have an adjustable track width of 1.8 m to 2.4 m. The sprayer is designed for a road speed of 50 km/h. It is propelled by a 160 Kilowatt Diesel engine.
The spray tank with a nominal volume of 4500 l is made of fiber-reinforced plastic. It keeps an over volume of 6.1 % to hold back foam. The sprayer is equipped with three pumps, two pumps for spraying and agitating and one for tank cleaning. For tank filling pumps can be used in combination. For the inner tank cleaning four rotating nozzles are placed in the center section of the tank. The tank is equipped with two agitation systems.
In the tested version the sprayer is equipped with 2 pumps AR 280 for spraying and agitation and one pump AR 185 for cleaning.
The intensity of the agitation can be adjusted in four steps or can be controlled automatically (depending on the amount of remaining spray liquid). Because of the recirculation system all the liquid in the spraying system can be diluted (up to the nozzles) it also facilitates to have the full concentration at the nozzles instantly in the first moment of spraying.

The wash water tank with a capacity of 522 liters is also made of fiber-reinforced plastic and is placed at the rear of the sprayer. The contents is shown on the display in the drivers cabin. The wash water tank can be filled via the suction line of the cleaning pump or directly.

The boom persists of 5 mechanical sections made of steel and the two outer sections made of aluminium. The outer sections contain an obstacle give away function. The boom is hydraulically folded lateral at the sprayer. The left and right boom side can be twisted independently for 10 degrees each. The slope compensation can compensate in a range of up to 15 %. The height of the boom can be controlled automatically by four supersonic sensors at the boom. This automatic function also includes the lifting and lowering of the boom at the beginning and end of a track. The range of height is between 400mm and 2600 mm.
Via the Amazone terminal “TouchPad2” and the multi function lever at the right arm rest all sprayer functions can be reached, selected and adjusted. Including the driving functions. All relevant data for the driving and movement of the sprayer are shown on a second terminal (with touch functions) below the “TouchPad2” Terminal. Additionally the sprayer is equipped with several cameras to show the surrounding of the sprayer to make ranking movements more safe. The cabine fulfils the category 4 requirements.

Result table

Table 2: Result table

Requirement	Result
spray tank over volume	6.1 %
spray tank contents gauge graduation marks	electronical display
spray tank contents gauge deviation between 10 - 20 % tank filling	3.85 %
spray tank contents gauge deviation over 20 % tank filling	3.48 %
spray tank surface roughness	0.009 mm
rinsing tank volume	523 liter
rinsing and dilution possible?	yes
cleaning performance of tank (cleaning effectivity)	97.79 %
rinsing efficiency of can rinsing equipment	0.0023 %
manometer graduation marks	0.1 bar
manometer deviation	0.13 bar
agitation system performance (deviation from even concentration)	6.4 %
dilutable residual in spray tank	69.32 liter
non dilutable residual in spray tank	non
spray boom height adjustment range from - to	400 - 2600 mm
spray boom nozzle ground contact protection?	yes
spray boom pressure loss between manometer and nozzle at 5.0 bar	2.4 %
spray nozzles dripping after switch off	non
maximum deviation of single nozzle flow rate from table	- 6.4 %
maximum deviation of single nozzle flow rate from mean	4.3 %
spray boom transverse distribution with nozzle: Lechler ID 120 04	
transverse distribution at 50 cm and 2 bar	6.5 % CV
transverse distribution at 40 cm and 3 bar	4.8 % CV
transverse distribution at 50 cm and 5 bar	6,0 % CV
volume/hectare adjustment device - spray computer	
spray computer repeatability of adjustment deviation, ascending maximum	- 2.6 %
spray computer repeatability of adjustment deviation, descending maximum	- 1.5 %
spray computer regulation speed, switching on/off single sections	6.2 seconds
spray computer regulation speed, switching on/off complete sprayer	5.6 seconds
spray computer reaching steady state in varing conditions, changing gear	stepless drive

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.

Pictures of sprayer

Pictures of sprayer

Assessment keys for assessment table

Table 3: Assessment keys for table 1 Assessment table

assessment point	unit	+	++	+++
1	mm	> 0.070 - 0.1	0.030 - 0.070	< 0.030
2	%	5 - 8	> 8 - 12	> 12
3	of allowed value	> 2/3	1/3 - 2/3	< 1/3
4	%	7.5 - 5.0	< 5.0 - 2.5	< 2.5
5	%	5.0 - 4.0	< 4.0 - 2.0	< 2.0
6	%	> 10 - 15	5 - 10	< 5
7	m	4.5 - 6	> 3 - 4.5	3 or less
8	m	1 - 1.5	> 1.5 - 2.0	> 2.0
9	bar	> 0.10 - 0.20	> 0.05 - 0.10	0.00 - 0.05
10	%	4 - 5	2 - 4	0 - < 2
11	% or seconds	> 7 - 7.5	> 3 - 7	0 - 3
12	CV	> 7 - 9	4 - 7	< 4
13	% of nominal tank volume	10 - 12	> 12 - 15	> 15
14	s	> 4 - 7	2 - 4	< 2
15	deviation %	> 4 - 6	2 - 4	< 2
16	%	> 7 - 10	3 - 7	< 3
17	%	> 7 - 10	3 - 7	< 3

Pictures:
Page 6, top: Right side of the sprayer.
Page 6, middle: Unfolded boom, outer aluminium segments with obstacle give away function.
Page 6, bottom: Compartment for product canisters and other equipment in the sprayer front.

Page 7, top: Control center and induction bowl at the left sprayer side.
Page 7, middle: Induction bowl.
Page 7, bottom: Multifunction lever and terminal in the right corner of the cabin.

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Responsibility and recognition

Performing competent authority
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This test is recognized by the ENTAM members

HBLFA Francisco Josephinum BLT Wieselburg (Austria). Recognition number BLT ProtNr 002/21

CMA-Administració de la Generalitat de Catalunya, Centre de Mecanització Agrària (Spain). Recognition number EPH 02/21

ENAMA Ente Nazionale per la Meccanizzazione (Italy). Recognition number ENTAM „Rapporto di prova prestazionale" 02/2021

INRAE - Institut National De Recherche en Agriculture, Alimentation et Environnement (France). Recognition number INRAE/CEMAGREF/21/014

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