

ENTAM - Test Report



Sprayer type: Trailed field crop sprayer
Trade mark: HARDI
Model: AEON 5200

Manufacturer:
Hardi GmbH
Schaumburger Straße 17
DE - 30900 Wedemark

Test report: D - 2256
September 2022

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 up to 10% filling	++
5	spray tank contents gauge from 10% to 20% filling	+++
6	spray tank contents gauge from 20% filling	+++
7	effectivity of agitation system	+
8	width of nozzle bar section	+++
9	boom height adjustment range	+++
10	accuracy of pressure gauge	++
11	accuracy of flow meter	+++
12	regulation speed	++
13	even transverse distribution	++
14	size of rinsing water tank	+
15	deviation of volume/hectare adjustment device from desired value	+
16	repeatability of volume/hectare adjustment device	+++
17	pressure drop between manometer and nozzle	++
18	deviation of single nozzle output from table	++

Assessment keys are listed at the end of the report.

Note:

This ENTAM report is prepared as an accessible document.

Technical data of sprayer

Tanks + pumps:

- 5200 liter tank
- electronic level indicator
- 2x rotating nozzles für inner tank cleaning
- 540 liter rinsing water tank
- 46,1 liter hand wash tank
- Hardi piston diaphragm pump type 464/12 as spraying and agitating pump

Spray boom:

- 30 meter working width, 9 mechanical segments
- Lateral folding
- Lifting mast with stepless adjustment from 500 - 2850 mm
- 7,8 ° pendulum device
- Slope compensation up to 14,5 %
- Pressure circulation system
- single nozzle circuit with 3 compartment nozzle carriers
- Sprayer operation via ISOBUS (delivery primarily with AG Leader or Topcon terminals)

Frame + chassis + drive:

- 820 mm ground clearance axle and 480 mm drawbar with 520/85 R46 tyres
- track width 2250 mm

Dimensions + weights:

- Total length 8300 mm
- Height 3900 mm
- Width 2920 mm
- Unloaded weight 7227 kg
- Total weight 13500 kg

Description of sprayer

In this test, the Hardi AEON 5200 field sprayer was tested with a Hardi Type 464/12 piston diaphragm pump. The pump produces a volume flow of 334 l/min at 0 bar and 310 l/min at 15 bar. The pump is used for sprayer operation, agitation, tank filling and cleaning.

The chassis consists of a load-bearing steel profile, which is supported by a hydraulically sprung axle and a drawbar with bottom hitch. The field sprayer is steered to follow the tractor's track by means of Ackermann steering. The steering commands are recorded with a potentiometer on the drawbar of the sprayer.

The spray liquid tank, made of polyurethane, is specified with a nominal volume of 5200 l and can be overfilled by up to 7.3 %. The level is recorded electronically and displayed in the terminals, in the tractor and in the sprayer control centre. The tank is emptied via a ball valve located in the tank sump. Furthermore, the tank can also be pumped empty via the pressure outlet.

The tank is filled via the 2" Hardi suction connection on the left side of the unit using the injection pump with injector support. For cleaning the tank, two rotating cleaning nozzles are centrally located in the tank. The tank has a central agitator which can be switched on and off and adjusted in intensity from the operating terminals. A level-dependent control is also possible.

The spray boom is a spatial fan construction made of steel profiles and is guided in a parallelogram. The field sprayer is equipped with a 30 m boom, electric individual nozzle control and with a stainless steel nozzle line. The 5-fold nozzle bodies are mounted at a distance of 500 mm. The electric single nozzle switching valves simultaneously prevent the nozzles from dripping. The boom is hydraulically folded to the side. The height adjustment is infinitely variable hydraulically via the parallelogram from 500 to 2850 mm. The pendulum range is up to 7.8° against the horizontal. The tested unit was also equipped with a slope compensation system that can compensate for slopes of up to 14.5 %. Furthermore, the half-sided booms can be adjusted horizontally in inclination independently of each other. Five ultrasonic distance sensors take over the boom height and contour control on request, whereby the boom is automatically raised and lowered when unloading and reloading at the headland and the half-side booms follow the field contour. The boom is mechanically divided into a total of 9 segments. The last segment is equipped with an obstacle deflector that can avoid obstacles to the front and rear. The nozzles are protected from contact with the ground or branches in the outer segment by a circumferential tube and perforated plate.

The spring-loaded swing-out induction hopper made of polyethylene with a hinged lid. Further features of the induction hopper are a spring-loaded rotary nozzle for rinsing containers, a rotary nozzle for rinsing/wetting the container wall (when the container is closed), a "propeller nozzle" for rinsing in powder and a rinsing lance attached to the outside of the container. The height of the filling opening is approx. 840 mm. The functions of the induction hopper are operated via three spring-loaded toggle levers on the induction hopper.

The graphic display for operating the syringe from the control centre is located in the area of the induction air lock. The soft keys are located around the display, where the current function is indicated via changing symbols.

Result table

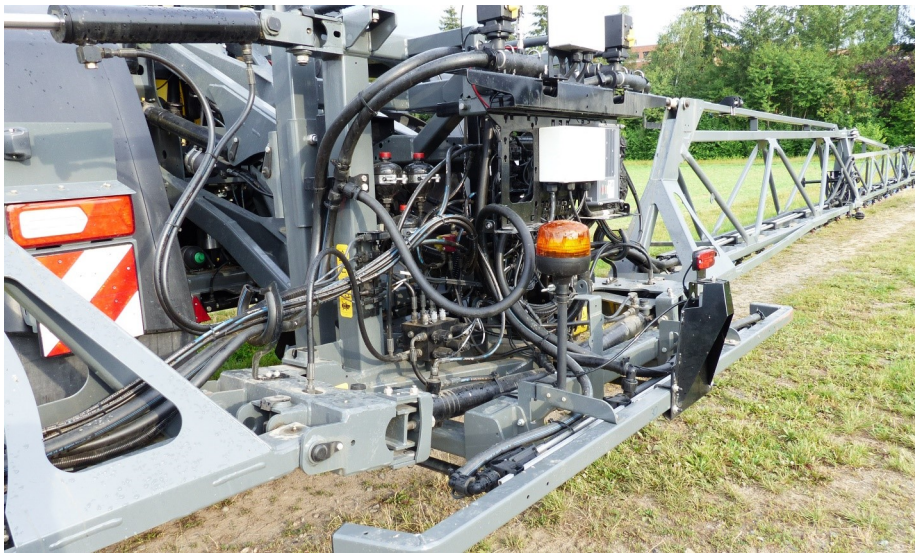
Table 2: Result table

Requirement	Result
1 spray tank over volume	7.31 %
2 spray tank contents gauge graduation marks	electronical display
3 spray tank contents gauge deviation between 10 - 20 % tank filling	-1.91 %
4 spray tank contents gauge deviation over 20 % tank filling	-1.81 %
5 spray tank surface roughness	0.0039 mm
6 rinsing tank volume	540 liter
7 rinsing and dilution possible?	yes
8 cleaning performance of tank (cleaning effectivity)	88.34 %
9 rinsing efficiency of can rinsing equipment	0.0010 %
10 manometer graduation marks	0.10 bar
11 manometer deviation	0.06 bar
12 agitation system performance (deviation from even concentration)	-10.89 %
13 dilutable residual in spray tank	58.89 liter
14 non dilutable residual in spray tank	non
15 spray boom height adjustment range from - to	500 - 2850 mm
16 spray boom nozzle ground contact protection?	yes
17 spray boom pressure loss between manometer and nozzle at 5.0 bar	2.00 %
18 spray nozzles dripping after switch off	non
19 maximum deviation of single nozzle flow rate from table	- 4.812 %
20 maximum deviation of single nozzle flow rate from mean	- 3.946 %
21 spray boom transverse distribution with nozzle	HAR MD 03
22 transverse distribution at 50 cm and 2 bar	5.70 % CV
23 transverse distribution at 60 cm and 3 bar	3.72 % CV
24 transverse distribution at 50 cm and 5 bar	5.17 % CV
25 volume/hectare adjustment device - spray computer	4.20 seconds
26 spray computer repeatability of adjustment deviation, ascending maximum	1.63 %
27 spray computer repeatability of adjustment deviation, descending maximum	0.68 %
28 spray computer regulation speed, switching on/off single sections	2.10 seconds
29 spray computer regulation speed, switching on/off complete sprayer	4.50 seconds
30 spray computer reaching steady state in varing conditions, changing gear	3.00 seconds

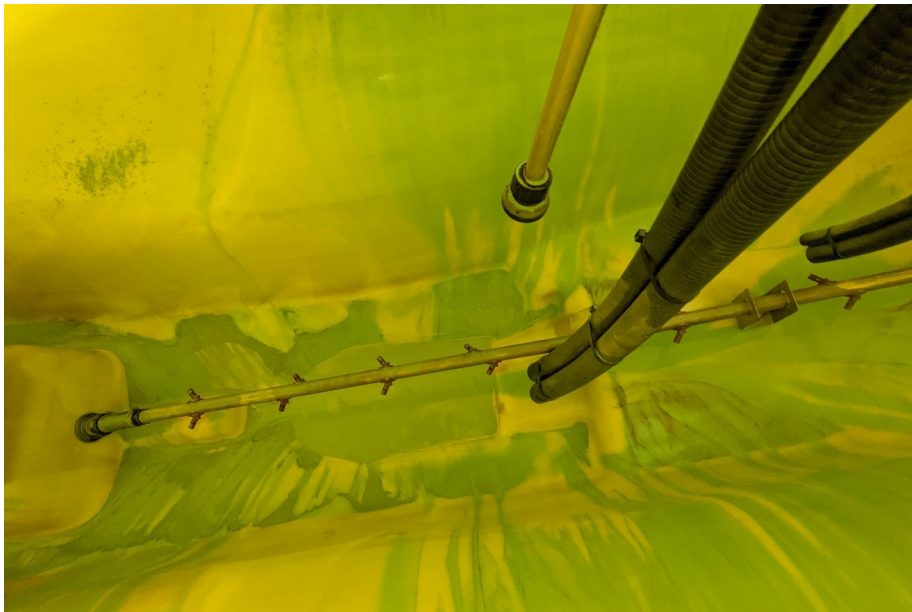
Explanation on testing:

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	%	15.0 - 10.0	10.0 - 5.0	< 5.0
5	%	7.5 - 5.0	< 5.0 - 2.5	< 2.5
6	%	5.0 - 4.0	< 4.0 - 2.0	< 2.0
7	%	> 10 - 15	5 - 10	< 5
8	m	4.5 - 6	> 3 - 4.5	3 or less
9	m	1 - 1.5	> 1.5 - 2.0	> 2.0
10	bar	> 0.10 - 0.20	> 0.05 - 0.10	0.00 - 0.05
11	%	4 - 5	2 - 4	0 - < 2
12	% or seconds	> 7 - 7.5	> 3 - 7	0 - 3
13	CV	> 7 - 9	4 - 7	< 4
14	% of nominal tank volume	10 - 12	> 12 - 15	> 15
15	s	> 4 - 7	2 - 4	< 2
16	deviation %	> 4 - 6	2 - 4	< 2
17	%	> 7 - 10	3 - 7	< 3
18	%	> 7 - 10	3 - 7	< 3

Pictures:

Page 6, top: Right side of the sprayer.

Page 6, middle: Unfolded boom.

Page 6, bottom: Control centre and filling connections on the left side of the sprayer.

Page 7, top: Control center and induction bowl at the left sprayer side.

Page 7, middle: Central machine control on the right side

Page 7, bottom: Field sprayer tank after agitator test

Free download of reports:

Complete test report under: www.ENTAM.net or www.openagrar.de

Responsibility and recognition



Performing competent authority

Julius Kühn-Institute (Germany)
Institute for Application Technique in Plant Protection
Messeweg 11-12
D-38104 Braunschweig

This test is recognized by the ENTAM members



CMA-Administració de la Generalitat de Catalunya, Centre de Mecanització Agrària (Spain).

Recognition number EPH05/22



ENAMA Ente Nazionale per la Meccanizzazione (Italy). Recognition number ENTAM

Recognition number Rif. ENTAM: 04/22



INRAE - Institut National De Recherche en Agriculture, Alimentation et Environnement (France).

Recognition number INRAE/CEMAGREF/ENTAM/22/012



ŁUKASIEWICZ-PIT – Sieć Badawcza Łukasiewicz – Poznański Instytut Technologiczny – POLAND

Recognition number Ł-PIT-333/ENTAM/22

10.5073/20220706-153315

<https://doi.org/10.5073/20220706-153315>