

ENTAM - Test Report



Sprayer type:
Trade mark:
Model:

Trailed field crop sprayer
John Deere
R962i

Manufacturer:
John Deere Fabriek Horst B.V.
Energistraat 16
NL - 5961 HORST
Netherlands
Jan 2012

Test report: D - 1918

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	valued under 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	+++

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					

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or www.jki.bund.de

Technical data of sprayer

- 6200 l nominal tank volume.
- 2 contents indicators (float with rope and electronical).
- 3 rotating nozzles for inner tank cleaning.

- 36 m working width.
- boom with 7 segments.
- lateral folding.
- recirculation system.
- boom lift: hydraulic with a height range of 2010 mm.
- boom pendulum with 10° range.
- slope compensation up to 13 %.
- damping system for horizontal and vertical boom movement.



2 diaphragm pumps
type AR 280 bp with
nominal 2*265 l/min
at 20 bar.

Induction hopper
with rotating can
rinse nozzle.

Ground clearances
425 mm (drawbar)
and 840mm (axle)
with 620/70 R 42
tires.

Dimensions and weights:

total length:	7550 mm
height:	3320 mm
width:	3000 mm
unloaded weight:	5910 kg

Fig.3: Diagram of sprayer.

Description of sprayer



Fig.4: Sprayer with lateral folded boom.

The chassis of the sprayer is equipped with a suspended axle (polyurethane shock absorber). The trackwidth of this machine is 2.0 m. The chassis is designed for speeds up to 40 km/h (with full tank). For track

following the drawbar is equipped with a steering sensor that is connected with the steering axle. The steering function can be operated via the joystick in the tractor cabin. The tank is designed without surge walls and with a round shape. Due to this the amount of depositions could be reduced and the effect of the agitation system and the cleaning device is increased. The pressure circulation system is with pneumatic nozzle control. When the pump is running and the main valve is off, liquid is pumped throughout the spray lines and returns to the tank. In this way the system charges the spray line up to the nozzles. When spraying starts, the return line changes into a supply line, which ensures a fast pressure build up within the boom.



Fig.5: Draw bar with steering sensor.

Description of sprayer



Fig.6: Mid section of the boom.

Both the flow sensor and the pressure sensor are fitted directly to the spray boom. The liquid system at the boom shows a uniform pressure build-up with a very low pressure drop in the spray lines. By means of a hydraulic lift system the

boom height is continuously adjustable via a parallelogram lifting system with boom dampening system and hydraulic slope compensation. The inspected 36 m spray boom can also be moved around half folded as a 24 m spray boom. The automatic slope compensation works by means of two ultrasonic distance sensors (BoomTrac) at the boom, but it can also be controlled manually at the control terminal (GreenStar) in the driver`s cabin. The boom slope compensation can level out slopes up to 13 % and the boom pendulum works in a range up to 10 °.

The boom is equipped with 12 spray liquid sections and the spray regulation is using both spray pressure and flow to calculate the correct output. In case of malfunction of one or both sensors the discrepancy of the input signals is monitored and a



Fig.7:Folded boom with BoomTrac sensor.

Description of sprayer

warning message will be displayed to the operator via the terminal. The spray liquid system has a primary pressure regulator which has been preset by the manufacturer and provides a constant pressure for the following sprayer operations: rinsing, agitation



Fig.8: Control centre and induction hopper on right sprayer side.

and induction of chemicals to the tank. The secondary pressure circuit is controlled by means of two spray rate regulators according to the required level of spraying pressure. The spray rate regulators are made of a ball valve operated by an electric servomotor. All hydraulic functions are controlled electronically, this means the tractor only needs a double-action control valve or a pressure connection with free return flow. In order to fill or rinse the sprayer all necessary valves and connections are located on the left side of the sprayer. Emptying is also possible by pump. The induction hopper is fitted with: 3 rinse nozzles, 1 „anti-bridge“

nozzle for a better introduction of the chemicals into the suction line, 1 lid rinse nozzle and 1 can rinse nozzle with a spring-operated valve for internal cleaning of cans.



Fig.9: Folded out induction hopper.

Result table			
tested assembly		result (measured)	
spray tank	over volume	9.2	* min. 5 %
	contents gauge	graduation marks	1 (screen)/50 l front indic.
		deviation	6.0 %
			-3.2 %
	surface roughness	0.047mm	* max. 7.5 % up to 1240 l filling * max. 5 % between 1240 and 6200 l
rinsing tank	volume	713 l (tested version) ¹⁾	* min. 10 % of nominal contents
	rinsing and dilution possible?	yes	
can rinsing equipment	rinsing efficiency	not tested	* max. 0.01 % of can contents
manometer	graduation marks	0.1 bar	* max. 0.2 bar
	deviation	0.1 bar	* max. 0.2 bar
agitation system	max. deviation from even concentration	15	* max. 15 %
residual in l	dilutable	68 l	* max. 103 l
	non dilutable	0 l	recirc. system
spray boom	height adjustment range	2010	
	nozzle ground contact protection	yes	
	nozzle at 3 bar pressure	3.5 % (with DG 110 05)	* max. 10 %
	nozzle dripping after switch off	0 ml	* max. 2 ml
transverse distribution			
type of nozzle: TeeJet DG 110 05VS			
	pressure (bar)	distance (cm)	coefficient of variation (%) * (max. 9 %)
	1	50	5.9
	3	50	5.4
	5	50	5.5

1) Acc. manufacturers information changed to 650 l.

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 %)
240	2.1	0.34
300	1.3	0.38
360	1.7	0.28
procedure	regulation speed for dynamic conditions (s)	
switching on / off	4.7	* 10 % after 7 s
switching of single sections	1.8	* 10 % after 7 s
changing gears		
1.5 m/s to 2.0 m/s	0.6 s	* max. 7 s
2.0 m/s to 2.5 m/s	0.3 s	* max. 7 s
2.5 m/s to 2.0 m/s	0.6 s	* max. 7 s
2.0 m/s to 1.5 m/s	1.1 s	* max. 7 s

Fig.11: Result table 2.

Explanation on testing:

Testing takes place according to the Technical Instructions for ENTAM-Tests of Field Crop Sprayers (Rel. 4). 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 - 020/12
Biomass, Logistics, Technology (Austria)



CMA Generalitat de Catalunya EPH 001/12
Centre de Mecanització Agrària (CMA) (Spain)



ENAMA Ente Nazionale per la Meccanizzazione ENTAM „Rapporto di
Agricola (Italy) prova prestazionale“
07/2012



HIAE Hungarian Institute of Agricultural D-64/2012
Engineering (Hungary)



IRSTEA - National Research Institute of Science IRSTEA/CEMAGREF/ENTAM/
and Technology for Environment and Agriculture 12/008
(France) (formerly CEMAGREF)



PIMR - Przemysłowy Instytut Maszyn PIMR-84/ENTAM/12
Rolniczych Industrial Institute of Agricultural
Engineering (Poland)