

ENTAM - Test Report



Sprayer type:
Trade mark:
Model:

Built on field crop sprayer
John Deere
5430 on carrier vehicle
5430i

Manufacturer:
John Deere Fabriek Horst BV
Energistraat 16
5961 PT Horst
Netherlands
July 2009

Test report: D - 1823

Assessment table		
No.	Contents	Assessment
1	Spray tank surface roughness	+++
2	Spray tank over volume	++
3	Volume of total residual (max. allowed 92 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	+
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	+

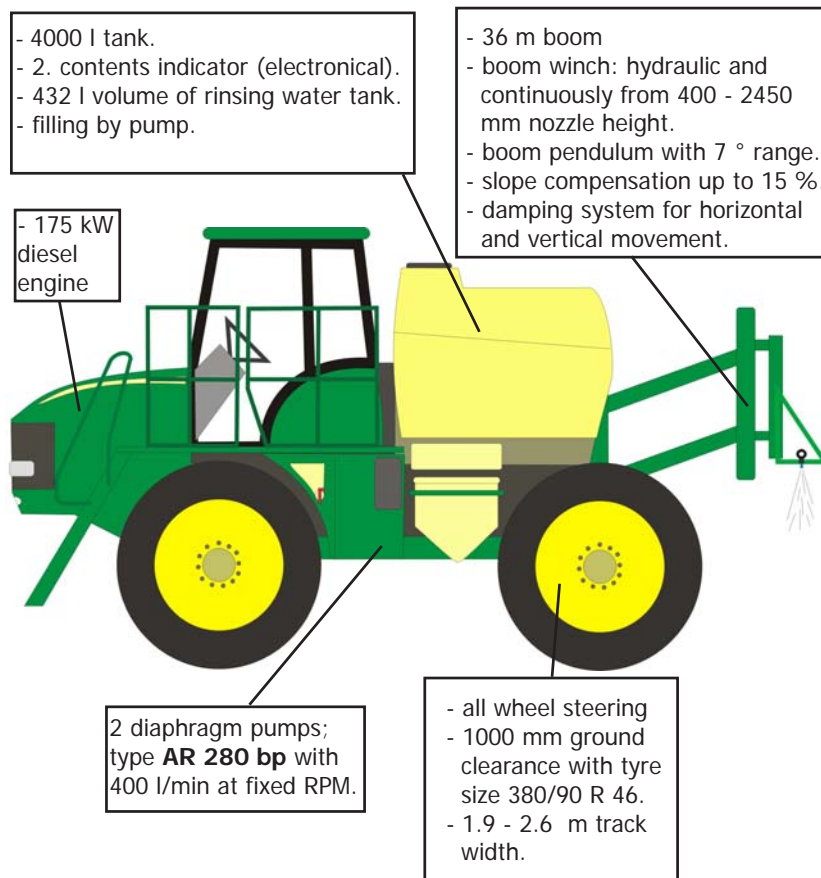
Fig.1+2: Assessment table and assessment keys of important test results.

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

Technical data of sprayer



Dimensions and weights (sprayer mounted on carrier vehicle):

total length:	9040 mm
height:	3750 mm
width:	3000 mm
unloaded weight:	10480 kg
total weight:	16170 kg

Fig.3: Diagram of sprayer.

Description of sprayer

The John Deere 5430i has an all-wheel-drive and pneumatic spring mounted axles. The tread of the chassis can be adjusted hydraulically between 1.9 and 2.6 m. The adjustment is made whilst moving at a low speed. It is driven by a 175 kW diesel engine with a hydrostatic 40 km/h gearbox. The operator can vary the speed infinitely using the throttle and one of the four speed settings. The undercarriage is covered entirely with a steel plate to provide a smooth surface which is kind to plants. The equipment has been designed as a built-on sprayer for the John Deere 5430i and is connected to the carrier vehicle at four support points. The built-on sprayer is removed by lifting it from the carrier vehicle. External hoisting gear is required to do this.



Fig.4: Left sprayer side with lateral folded boom and ascent to the drivers cabin.



Fig.5: Wheel suspension.

This equipment has been designed as a built-on sprayer for the John Deere 5430i and is connected to the carrier vehicle at four support points. The sprayer is secured with screws.

Description of sprayer

The tank which is made of polyethylene has no splash walls. The special shape of the tank sump is designed to avoid large quantities



Fig.6: Smooth covered under side. In the front you see the front axle.

of spray residues. The tank, with an oversize of 8.6 %, has sufficient reserves to accommodate any foam which may result. The sprayer is equipped with a separate clean water tank which holds 432 l and a hand wash tank which holds 20 l. In addition to filling via the tank opening, it can also be filled using the tank filling

connection with the pump. The liquid is prevented from running back by using a reflux valve. In the main tank there is a pressurised agitator (injector nozzles directly above the floor of the tank) and also a return agitator (two lateral rebound plates). The pressurised agitator can be switched on and off from the driver's seat and also during filling from the left side of the sprayer. The agitator switches itself off automatically when the tank contents fall to the 300 l level in order to reduce the amount of technical residues. In addition it is possible to switch off the agitator manually or at a specified tank level automatically. The most important functions for filling and agitating are centralised at the operator controls on the left of the sprayer. The tank can also be emptied here via an electric valve. The draining hole is protected from external impact by a metal cap.



Fig.7: Left sprayer side with control panel and induction hopper

Description of sprayer

The induction hopper with the container rinsing nozzle and circular pipe can be lowered to 880 mm when in use. All functions are performed electromechanically via valves. The spray level reading is directly above the side gauge (float attached to wire) and can be read whilst filling. The tank contents can also be read on the display in the driver's cab during spraying. 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 7° and hydraulic incline adjustment up to an incline of 15 %. As an option, the boom control with the „BoomTrac“ spacing system, using ultrasonic sensors on the boom ends, can also be activated. The spray system works with end-to-end stainless steel nozzle tubes with pneumatically controlled fivefold nozzles and bayonet cap – Tee Jet system, „John Deere Spray Master“ nozzles. The nozzles are selected manually. The inspected sprayer had IDK 120 03 and TeeJet XR 110 05 VK nozzles. The electronic pressure sensor is positioned on the boom support next to the flow meter (Polmac 1½“). The pressure in the boom is consistent thanks to the generous hose diameters. In addition, the boom is rinsed constantly when the nozzles are switched off by the pressure circulation system. The inspected 36 m boom can also be used partly folded as an 18 m boom. The tyres used on the inspected version allow a minimum nozzle height of 40 cm. The boom is equipped with a fluid circulation system which assures that the full spray concentration is available for all nozzles right at the beginning of the spray operation, and on the other hand that the fluid conducting parts of the boom can be rinsed independently.

Description of sprayer

It is controlled either via the valves in the cab or if preferred via the operation controls on the left of the sprayer (filling, cleaning, emptying). The operation controls include switches for the following functions: engine speed selection, agitator on/off, container rinsing



Fig.8: drivers place with „Greenstar 2“.

nozzle, induction bowl mode, tank rinsing system, emptying spray tank. The decentralised control valves (standard design) consist of 9 spray sections (pneumatic individual nozzle control), the main valve, the control valve (electromotive), Greenstar 2 display with 10" touch screen, and a lever on the right hand armrest which also integrates all the important hydraulic and spray functions.

Alternative equipment

Apart from the inspected sprayer version, John Deere also offers the sprayer with working widths of 24, 27, 28, 30, 32 and 33. Furthermore, pump equipment with one or two six-chamber diaphragm pumps or alternatively also a 700 l filling pump is available. Additional extras also include a washing brush with a hose reel, a high pressure cleaner, BoomTrac and boom end nozzles.

Result table				
tested assembly		result (measured)		
spray tank	over volume	8.58 %	* min. 5 %	
	contents gauge graduation marks	100 l	* max. 100 l	
	deviation	5.0 %	* max. 7.5 % up to 800 l filling	
		-1.9 %	* max. 5 % between 800 and 4000 l	
surface roughness	0.028 mm	* max 0.1 mm		
rinsing tank	volume	432 l corresponding to 10.8 % of nominal volume	* min. 10 % of nominal contents	
	rinsing and dilution possible?	yes		
can rinsing equipment	rinsing efficiency	yes	* max. 0.01 % of can contents	
manometer	graduation marks	0.1 bar	* max. 0.2 bar	
	deviation	0.0 bar	* max. 0.2 bar	
agitation system	deviation from even concentration	-12.7 %	* max. 15 %	
residual in l	dilutable	31 l	* max. 92 l	
	non dilutable	59 l		
spray boom	height adjustment range from - to	400 mm - 2450 mm		
	nozzle ground contact protection	yes		
	pressure loss between manometer and nozzle at 3 bar pressure	8.67 % (with XR 110 05)	* max. 10 %	
	nozzle dripping after switch off	0 ml	* max. 2 ml	
	single nozzle flow rate			
	type of nozzles: *) TeeJet XR 110 05 and **) Lechler IDK 120 03 POM			
	pressure (bar)	flow rate (l/min)	max. deviation from table in % *(max. 10 %)	max. deviation from mean in % *(max. 5 %)
	3*	1.847	9.5	4.6
	3**	1.198	4.3	2.9
	transverse distribution			
type of nozzle: TeeJet XR 110 05				
pressure (bar)	distance (cm)	coefficient of variation (%) *(max. 9 %)		
1.5	50	6.1		
3	50	5.8		
5	50	4.8		

Fig.9: 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 %)
200	2.9	0.62
275	1.9	0.52
350	2.1	0.20
procedure	regulation time (s) with deviation > 10 % to adjusted value	
switching on / off	4.1	* max. 7 s
switching of single sections	1.8	* max. 7 s
change of driving speed by changing gears		
1.5 m/s to 2.0 m/s	4.5	* max. 7 s
2.0 m/s to 2.5 m/s	2.4	* max. 7 s
2.5 m/s to 2.0 m/s	1.8	* max. 7 s
2.0 m/s to 1.5 m/s	2.7	* max. 7 s

Fig.10: 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.2 an 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)	040/09
	AU/DAE - University of Aarhus - Department of Agricultural Engineering Sciences (Denmark)	AU/DAE/ENTAM 2009-12
	Cemagref - Institut de recherche pour l'ingénierie de l'agriculture et de l'environnement (France)	CEMAGREF/ENT/09/024
	I.A.M.C. Institute of Agricultural Machinery and Constructions (Greece)	AE/121/01/ZZ
	HIAE Hungarian Institute of Agricultural Engineering (Hungary)	D-22/2009
	ENAMA Ente Nazionale per la Meccanizzazione Agricola (Italy)	ENTAM „Rapporto di prova prestazionale“ 15/2009
	PIMR - Przemyslowy Instytut Maszyn Rolniczych Industrial Institute of Agricultural Engineering (Poland)	PIMR - 41/ENTAM/09
	CMA Generalitat de Catalunya Centre de Mecanització Agrària (CMA) (Spain)	EPH 002/09
	ART - Agroscope Reckenholz-Taenikon (Switzerland)	D-28.09