

ENTAM - Test Report



Sprayer type: Trailed Field Crop Sprayer
Trade mark: John Deere
Model: R975i

Manufacturer:
John Deere Fabriek Horst B.V.
Energiestraat 16
NL-5961 Horst
Netherlands

Test report: D - 2278
February 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, see no.14	
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:

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:

- 7500 liter tank
- 2 contents indicator (float with rope and electrical)
- 3 rotating nozzles für inner tank cleaning
- 695 liter rinsing water tank
- 18,2 liter hand wash tank
- Hydraulic driven centrifugal pump Hypro Pentair 9306 C with nominal 850l/min at 3 bar

Spray boom:

- 36 meter working width, 7 mechanical segments
- Lateral folding
- Boom lift: hydraulic with a height range auf 2010 mm
- 10 ° pendulum device
- Slope compensation up to 13%
- Damping system für horizontal and vertical boom movement
- Pressure recirculation system for spray liquid

Frame + chassis + drive:

- Ground clearance 480 mm (drawbar) and 840 mm (axle) with tyres 520/85R46

Dimensions + weights:

- Total length 7550 mm
- Height 3320 mm
- Width 3000 mm
- Unloaded weight 5910 kg
- Total weight 13000 kg

Description of sprayer

In this test, the John Deere R975i sprayer was tested with a hydraulically driven Hypro centrifugal pump.

The sprayer is equipped with a sprung axle (polyurethane shock absorbers). The track width of this machine is 2.0 m. The chassis is designed for speeds up to 40 km/h (with full tank). For track guidance, the drawbar is equipped with a steering sensor connected to the steering axle. The steering function can be operated via the joystick in the tractor cab.

The tank is designed without baffles and has a round shape. This has reduced the amount of deposits and increased the effectiveness of the agitation system and cleaning device.

The pressure circulation system is equipped with a pneumatic nozzle control. When the pump is running and the main valve is off, fluid is pumped through the spray lines and returns to the tank. In this way, the system charges the spray line up to the nozzles. When application begins, the return line turns into a supply line, which ensures a quick pressure build-up in the boom.

Both the flow sensor and the pressure sensor are mounted directly on the spray boom. The fluid system on the boom shows a uniform pressure build-up with a very low pressure drop in the spray lines. With the aid of a hydraulic lifting system, the height of the boom is continuously adjustable via a parallelogram lifting system with boom damping and hydraulic slope compensation. The automatic slope compensation functions via two ultrasonic distance sensors on the boom, but can also be controlled manually on the operating terminal in the driver's cab. The slope compensation can compensate for slopes of up to 13 % and the boom pendulum operates in a range of up to 10 degrees.

On the centrifugal pump version, correct fluid flow is ensured by the hydraulically controlled speed of the pump. This includes functions such as flushing, agitation and filling the tank. All hydraulic functions are controlled electronically, i.e. the tractor only needs a double-acting control valve or a pressure connection with free return flow.

For filling or flushing 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 equipped with: 3 rinsing nozzles, 1 "anti-bridging" nozzle for better insertion into the suction line, 1 lid rinsing nozzle and 1 can rinsing nozzle with spring-operated valve for internal cleaning of the containers.

Result table

Table 2: Result table

Requirement	Result
spray tank over volume	6.82 %
spray tank contents gauge graduation marks	electronical display
spray tank contents gauge deviation between 10 - 20 % tank filling	0.81 %
spray tank contents gauge deviation over 20 % tank filling	1.41 %
spray tank surface roughness	0.047 mm
rinsing tank volume	695 liter
rinsing and dilution possible?	yes
cleaning performance of tank (cleaning effectivity)	97.83 %
rinsing efficiency of can rinsing equipment	0.0091 %
manometer graduation marks	0.10 bar
manometer deviation	0.10 bar
agitation system performance (deviation from even concentration)	14.35 %
dilutable residual in spray tank	49.11 liter
non dilutable residual in spray tank	non
spray boom height adjustment range from - to	390 - 2400 mm
spray boom nozzle ground contact protection?	yes
spray boom pressure loss between manometer and nozzle at 5.0 bar	3.3 %
spray nozzles dripping after switch off	non
maximum deviation of single nozzle flow rate from table	3.6 %
maximum deviation of single nozzle flow rate from mean	3.3 %
spray boom transverse distribution with nozzle: Teejet DG 110 05 VS	
transverse distribution at 50 cm and 1 bar	5.91 % CV
transverse distribution at 40 cm and 3 bar	5.36 % CV
transverse distribution at 50 cm and 5 bar	5.45 % CV
volume/hectare adjustment device - spray computer	
spray computer repeatability of adjustment deviation, ascending maximum	1.61 %
spray computer repeatability of adjustment deviation, descending maximum	1.37 %
spray computer regulation speed, switching on/off single sections	3.17 seconds
spray computer regulation speed, switching on/off complete sprayer	1.68 seconds
spray computer reaching steady state in varying conditions, changing gear	1.1 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, Left boom side with ultrasonic sensors.

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: Hydraulic driven centrifugal pump.

Page 7, bottom: Terminal with multifunction lever in the cabin.

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Responsibility and recognition



Performing competent authority
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This test is recognized by the ENTAM members



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