

ENTAM - Test Report



Sprayer type:
Trade mark:
Model:

Trailed field crop sprayer
Agrio
NAPA 3800/24

Manufacturer:
AGRIO MZS s.r.o.
Mric 66
CZ-38203 Kremze

Test report: D - 2064

Assessment table

No.	Contents	Assessment
1	Spray tank surface roughness	+++
2	Spray tank over volume	++
3	Volume of total residual (here max. allowed 67 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	see 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	++

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

*) changed requirement
**) with horizontal sprayer

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	%	>7-7.5	>3-7	0-3
3	of al-low.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	times amount of dilutable	10-12	>12-14	>14
5	%	5.0-4.0	<4.0-2.0	<2.0	14	s	>4-7	2-4	<2
6	%	>10-15	5-10	<5	15	deviation %	>4-6	2-4	<2
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.julius-kuehn.de

Technical data of sprayer

- 24 m working width.
- 10 hydraulic sections.
- Pendulum range up to 11 °.
- Slope compensation up to 20 %.
- Infinitely variable from 500mm - 2220 mm.

- 3800 l tank.
- Electronic contents indicator.
- Müller Touch 800.
- 340 l rinsing water tank.

- 17.2 l handwash tank.



Fig.1: Overview.

- 6-chamber-diaphragm pump.
type „Annovi Reverberi AR 280 bp“ with
263 l/min at 6 bar.

- 2.25 m track width.
- 605 mm ground clearance
(axle) and 560 mm (drawbar)
with 520/85 R 38 tyres.
- Axle pivot steering.

Dimensions and weights :

total length:	6900 mm
height:	3150 mm
width:	2800 mm
unloaded weight:	3720 kg

Description of sprayer



Fig.2: View of the right sprayer side with equipment box.

The framework of the sprayer is made of steel profiles with the tank situated on the top. The pivot steering axle has a track width of 2.25 m. It is designed for a road speed of 40 km/h.

The spray tank with a nominal volume of 3800 l is made of polythene. He keeps an overvolume of 9 % to hold back foam. The pressure agitation system in the spray tank is indefinitely adjustable from 0 to maximum. The clean water tank for rinsing and diluting holds a volume of 340 l. The hand wash tank for the operator has a volume of 17 l.

The boom is made from welded steel tubes. It can be adjusted in height indefinitely between 500 mm and 2220 mm with a vertical lift system. The pendulum range of the boom is $\pm 11^\circ$ and the slope compensation can compensate between $\pm 20\%$. The outer 3 m segment of the boom works as obstacle give away.



Fig.3: Steel boom with outer hinges for the obstacle give away function.

Description of sprayer



Fig.4: Steel rope boom lift for the lateral folding boom.

The boom is equipped with two ultrasonic sensors for detecting and automatically keeping the adjusted boom height over ground.

Via pneumatic single nozzle switching can the nozzles be grouped together to individual spray sections, controlled by the spray computer. With the used spray computer (Müller Touch 800) it is possible to keep the spray volume constant also in case of changing speed. The unit is also equipped with track control and automatic spray section control functions. All important adjustments can be done from the driver's place. During work the following information can be shown on the display: current spray rate (l/ha), driving speed, active spray sections, flowrate, sprayed amount, sprayed area, remaining tank contents, remaining area or distance. All necessary controls and connections for filling, agitation and inner tank cleaning are centralized on the left sprayer side. In case of blockage, the central suction filter is easy to reach and to remove on the left sprayer side. The 2 central pressure filters have to be cleaned manually.



Fig.5: Left sprayer side: induction bowl, control center with filling connections.

Description of sprayer



Fig.6: Induction bowl with contents indicator and rotating nozzle for can cleaning.

The 60 l induction bowl (left sprayer side) offers 1 nozzle for flushing in. Additionally the induction bowl is equipped with a rotating nozzle for the cleaning of plant protection cans and an additional nozzle for the inner cleaning of the bowl. Therefore also a hand gun spray lance is mounted. Above all, the cap is equipped with the “easyFlow” system from Agrotop.

The flushing in can be done with a rate up to 120 l/min (with pump at 540 rpm).

Result table

tested assembly				result (measured)	
spray tank	over volume			9.45 %	* min. 5 %
	contents gauge		graduation marks	electronical display	* max. 100 l
			deviation	-2.8 %	* max. 7.5 % between 380l and 760 l.
				3.6 %	* max. 5 % between 760 l and 3800 l
surface roughness			0.012 mm	* max 0.1 mm	
rinsing tank	volume			340 l	** 10 times of diluable volume
	rinsing and dilution possible?			yes	
	Cleaning performance (main tank) (concentration after cleaning)			24072	Min.factor 400 of concentration before cleaning
can rinsing equipment		rinsing efficiency		<0.01 %	* max. 0.01 % of can contents
manometer	graduation marks			0.2 bar	* max. 0.2 bar
	deviation			-0.15 bar	* max. 0.2 bar
agitation system	deviation from even concentration			4.9 %	*max. 15 %
residual in l		dilutable		59.9 l	* max. 67 l
		non dilutable		Non, recirculation system	
spray boom	height adjustment range from - to			500 mm - 2220 mm	
	nozzle ground contact protection			yes	
	pressure loss between manometer and nozzle at 3 bar pressure			-7.3 %	* max. 10 %
	nozzle dripping after switch off			0 ml	* max. 2 ml
	single nozzle flow rate				
		pressure (bar)	flow rate (l/min)	max. deviation from table in % *(max. 10 %)	max. deviation from mean in % *(max. 5 %)
		3.0	1.194	-3.8	-3.3
	transverse distribution				
		pressure (bar)	distance (cm)	coefficient of variation (%) *(max. 9 %)	
		3.0	40	7.3	
	3.0	60	5.9		
	6.0	50	4.2		
Measured with :			Agrotop TurboDrop 03		

Tab.3: Result table

* limit

**sprayer in horizontal position

Result table		
volume/hectare adjustment device		
repeatability of adjustment		
adjusted flow rate in l/ha	deviation from desired value % **	deviation from desired value % **
	ascending application rate	descending application rate
140	-6	-1
200	-2	0
260	-3	1
<u>procedure</u>	regulation speed: deviation to adjusted value after 7 s	
<u>switching on / off</u>	1,5 s***	after 7 s
<u>switching of single sections</u>	1.2 s***	after 7 s
<u>procedure</u>	reaching steady state after varying conditions (s)	
change of driving speed by changing gears		steady state mean deviation
1.5 m/s to 2.0 m/s	3.9 s	*
2.0 m/s to 2.5 m/s	4.4 s	*
2.5 m/s to 2.0 m/s	5.7 s	*
2.0 m/s to 1.5 m/s	5.3 s	*

Tab.4: Result table 2.

* limit: < 10 % after 7 s

** limit: m,ax. 6 %

***steady state reached

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.

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:



HBLFA Francisco Josephinum 023/2017
BLT Wieselburg
 (Austria)



CMA Generalitat de Catalunya 01/17
 Centre de Mecanització Agrària (CMA)
 (Spain)



ENAMA Ente Nazionale per la Meccanizzazione ENTAM „Rapporto di Agricola
 (Italy) prova prestazionale“ 03/2017



HIAE (MGI) Hungarian Institute of Agricultural Engineering D-145/2017
 (Hungary)



IRSTEA - National Research Institute of Science and Technology for Environment and Agriculture IRSTEA/CEMAGREF/ENTAM/
 (France) (formerly CEMAGREF) 17/014



PIMR - Przemyslowy Instytut Maszyn Rolniczych Industrial Institute of Agricultural Engineering PIMR-160/ENTAM/17
 (Poland)