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ENTAM
European Network for Testing of Agricultural Machines

ENTAM - Test Report

Sprayer type:	mounted boom sprayer
Trade mark:	Kverneland RAU
Model:	iXter B18 (with HC 24 boom)

Manufacturer:
Kverneland Group Nieuw-Vennep B.V.
Hoofdweg 1278
2153 Nieuw-Vennep
the Netherlands

Test report: D - 1871

Dec 2010

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	s	4.8 - 7	2.4 - 4.7	0 - 2.3
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

- 1800 l tank.
- 2. contents indicator (electronical).
- 189 l volume of rinsing water tank.
- 1 rigid nozzle for inner tank cleaning.

- 24 m working width.
- boom with 7 segments.
- vertical folding.
- boom winch: hydraulic and continuously, range 1310 mm.
- boom pendulum with 15° range.
- slope compensation up to 25 %.
- damping system for horizontal and vertical movement.

Induction bowle with can rinsing nozzle.

diaphragm pump type Altek P260 with 260 l/min at 10 bar.

Dimensions and weights:

total length:	1650 mm
height:	3220 mm
width:	2560 mm
unloaded weight:	1495 kg

Fig.3: Diagram of sprayer.

Description of sprayer

Fig.4: Sprayer rear view with folded boom.

Chassis and boom are framework constructions made of steel profiles. The connection is realized by a quick coupling frame. That is how the sprayers centre of gravity can be close to the tractor and concurrent the PTO and hydraulic connectors are easily accessible. For parking the sprayer extendible rests are existing.

Fig.5: Contents indicator.

The spray tank with a nominal volume of 1800 l is made from PE. The design shows slim shape and sloping sides. This shall help to reduce residuals so that also on inclined surface the tank can be emptied without residual. By using the tank filling connection the tank can be filled with up to 260 l/min. For this the user has to use a device with check valve. Alternative it can also be filled via a connection for hydrants, that is equipped with a check valve. The tank, with an oversize of 11.7 %, has sufficient reserves to accommodate any foam which may result. To empty the tank, an electric valve at the left sprayer side can be used. The agitator performed very well (< 5 % deviation) only after spraying the concentration on the bottom shows a deviation of 14 % .

Description of sprayer

The HC 24 boom is a framework construction made of steel profiles whose height can be adjusted hydraulically and infinitely with a lift frame. It comprises a central pendulum with a pendulum range of up to 15° and hydraulic incline adjustment up to an incline of 25 %. It is equipped with a damping and suspension system to reduce hits to the boom as well as vertical and horizontal movements of the boom. The working width of 24 m is splitted in 7 sections. Thanks to the design of the boom framework the nozzles are very well protected from ground and obstacle contact. For road transportation the boom can be vertical folded to a width of 2.56 m. Also working with one-sided folded boom or partly folded boom is possible. The liquid tubes in the boom are made from stainless steel and are equipped with multi nozzle holders. Also available is a „ENVO Inside“ system. Such a system will open the different sections valves for a short time (depending of the dead volume of that section) to spray out the washing liquid (at the beginning of spraying) with low PPP concentration before the real spray mixture will reach the nozzle. So the real spray mixture is available at all nozzles from the beginning of spraying. At the end of spraying (after washing) it can work in the opposit direction to spray out the real spray mixture concentration until the washing liquid reaches the nozzles. At the right sprayer side integrated is the rinsing water tank that holds 189 l.

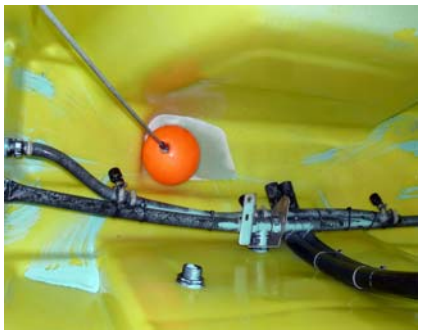

Fig.6: Tank bottom with float gauge for contents gauge, agitation system and residuals of copper oxychloride from testing.

Description of sprayer

Fig.7: Left sprayer side with control centre and rectracted induction bowle.

For loading the plant protection product, a retractable induction bowl can be used. This bowl is equipped with a circular pipe for flushing the plant protection product into the tank and for rinsing the induction bowle. For product container rinsing a rotating nozzle is mounted in the bowl. Next to the induction bowl a 15 l clean water tank for hand washing is installed.
The liquid level in the tank can be displayed on the indicator at the sprayer front side (Fig.5) or on the spray computer „Flow-mate Control“ (FMC) and on the operators control board.
Functions like the pressurised agitation system can be switched off via the computer „Flow-matic Control“ (FMC) to keep the residues in the tank to a minimum. The FMC contains also the steering of all hydraulic and spray functions and is able to save the data like area and sprayed volume for up to 20 plots. The FMC records the driving speed, application rate, remaining distance or remaining liquid volume in the tank.

Fig.8: „Flowmatic Control“ (FMC).

Result table

tested assembly			result (measured)	
spray tank	over volume		11.5	* min. 5 %
	contents gauge	graduation marks	1 (FMC screen)	* max. 100 l
		deviation	-4.0 % 4.3 %	* max. 7.5 % up to 360 l filling * max. 5 % between 360 and 1800 l
	surface roughness		0.058 mm	* max 0.1 mm
rinsing tank	volume		189 l corresponding to 10.5 % of nominal volume	* min. 10 % of nominal contents
	rinsing and dilution possible?		yes	
can rinsing equipment	rinsing efficiency			* max. 0.01 % of can contents
manometer	graduation marks		0.2 bar	* max. 0.2 bar
	deviation		0.05 bar	* max. 0.2 bar
agitation system	deviation from even concentration		13.9 %	*max. 15 %
residual in l		dilutable	8.9 l	* max. 138 l
		non delutable	16.6 l	
spray boom	height adjustment range		1310 mm	
	nozzle ground contact protection		yes	
	pressure loss between manometer and nozzle at 3 bar pressure		8.7 % (with Lechler ID 120 04)	* max. 10 %
	nozzle dripping after switch off		0 ml	* max. 2 ml
	transverse distribution			
	type of nozzle: Lechler ID 120 04			
	pressure (bar)	distance (cm)	coefficient of variation (%)	*(max. 9 %)
	1	50	6.62	
	5	50	3.04	
	8	50	3.95	

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	2.10	0.0
300	1.10	0.34
400	0.45	0.23
procedure	regulation time (s) with deviation > 10 % to adjusted value	
switching on / off	4.5	* max. 7 s
switching of single sections	3.0	* max. 7 s
change of driving speed by changing gears		
1.5 m/s to 2.0 m/s	2.1	* max. 7 s
2.0 m/s to 2.5 m/s	1.4	* max. 7 s
2.5 m/s to 2.0 m/s	2.0	* max. 7 s
2.0 m/s to 1.5 m/s	2.1	* max. 7 s

Fig.10: 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 (Austria)	006/11
AU/DAE - University of Aarhus - Department of Agricultural Engineering Sciences (Denmark)	AU/DAE/ENTAM 2011-14
Cemagref - Institut de recherche pour l'ingénierie de l'agriculture et de l'environnement (France)	CEMAGREF/ENT/11/022
HIAE Hungarian Institute of Agricultural Engineering (Hungary)	D-41/2011
ENAMA Ente Nazionale per la Meccanizzazione Agricola (Italy)	ENTAM „Rapporto di prova prestazionale“ 04/2011
PIMR - Przemyslowy Instytut Maszyn Rolniczych Industrial Institute of Agricultural Engineering (Poland)	PIMR - 58/ENTAM/11
CMA Generalitat de Catalunya Centre de Mecanització Agrària (CMA) (Spain)	EPH 001/11