Julius Kühn-Institut
Federal Research Centre for Cultivated Plants

ENTAM

ENTAM - Test Report

Componenttype: Crop protection product input device
Trade mark: ARAG
Model: Niagara

Manufacturer:
ARAG srl
Via Palladio, 5
42048 Rubiera -RE-Italy

Test report: D - 2031

July 2015

Technical data

Nominal capacity (l)	30
Length (mm)	565
Width (mm)	541
Height (mm)	618
Weight — empty (kg)	11.1
Material of induction bowl	plastic
Diameter of filler opening (mm)	412
Lid anchoring	hinge
Lid lock	Turn lock
Lid sealing	yes
Internal cleaning system	yes
Type of cleaning system	rotating nozzle
Cleaning device for product cans	yes
Type of cleaning device	rotating nozzle
Over pressure valve	no

Description of device

The device allows the user to introduce the plant protection product into the sprayer tank from the ground and without access to the main tank openings or to the top of a sprayer main tank. The device works as a watergate. Plant protection product can be filled into the device. If water is pumped through the drainpipe below the outlet of the bowl, an underpressure is produced by a Venturi valve in the drainpipe. This underpressure sucks the content of the bowl via the drainpipe into the main tank of the sprayer. A lid with turn lock avoids that user or enviroment will be striked by the product during it is fushed and sucked out of the bowl.

Fig.1: Device as delivered, with mounting, drainpipe with ball valve, injectors, lever valves and manual.

Flushing is supported by a mixing nozzle in the bowle. For cleaning the inner surfaces the bowl is equipped with a rotating nozzle and pipe opening (under the upper rim of the bowl). The rotating nozzle can also be used to clean the inner surfaces of plant protection product cans.

Fig.2: View to the bottom of the bowl. Rotating nozzle (white), mixing nozzle (green), suction opening with screen (black).

The bowl has a round shape to support the flushing and cleaning. It is made from polyethylene while the mounting that was delivered as standard accessory is made from painted steel. The delivered kit also contains different injectors (8 mm, 11 mm, 16 mm) for the Venturi in the drainpipe to adjust the emptiyng flow rate to different pressures and pump flow rates. The Device can be used to flush in chemicals in powder, granules or liquid form. If it is used for granules than a minimal liquid pressure of 4 bar at the inlet connection should be used to provide a sufficient empting performance.

Description of device

Three lever valves with color code (black, yellow, red) are mounted at the side of the bowl, to control the single functions for mixing and cleaning in the device. The sucking will be enabled and disabled by a ball vale in the drainpipe (see fig. 1).

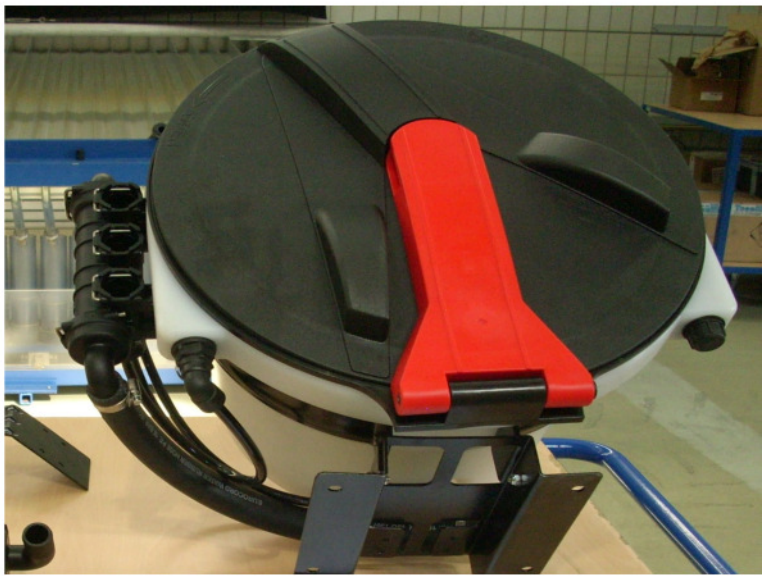

Fig.3: Rim with hinge and housings for 3 lever velves for controling (left, valves dismounted).

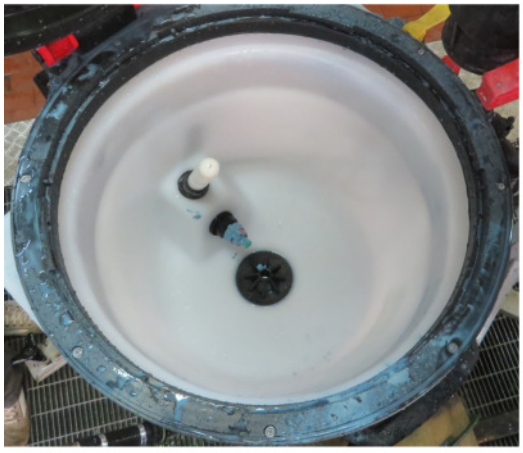

Fig.4: Bowl after introduction of powder.

Result table		
Requirement	Measured value	Limit
Precision of level indicator	No level indicator	Acc. ISO 9357 if indicator existing
Over volume of bowl	14 %	Min. 10 %
Guard grid at bowl outlet	fulfilled	No trespassing of 20 mm balls
Empting flow rate (water only)		
Black valve (8 mm), (2.0 bar—8.0 bar inlet pressure / 0.2 bar back pressure)	69 — 227 l/min	60 l / min
Black valve (8 mm), (4.0 bar—8.0 bar inlet pressure / 0.4 bar back pressure)	74 — 221 l/min	60 l / min
Yellow valve (11 mm), (2.0 bar—8.0 bar inlet pressure / 0.2 bar back pressure)	69 — 227 l / min	60 l / min
Yellow valve (11 mm), (4.0 bar—8.0 bar inlet pressure / 0.4 bar back pressure)	74 — 213 l / min	60 l / min
Green valve (16 mm), (2.0 bar—5.0 bar inlet pressure / 0.2 bar back pressure)	182 — 202 l / min	60 l / min
Green valve (16 mm), (2.0 bar—5.0 bar inlet pressure / 0.4 bar back pressure)	113 — 197 l / min	60 l / min
Emptying performance with powder, 8 mm valve, (2.0 bar—8.0 bar inlet pressure / 0.2 bar — 0.4 bar back pressure)	0.2 % – 0.3 % residual	Max. 2 % of filled in material
Emptying performance micro granules, 8 mm valve (4.0 bar—8.0 bar inlet pressure / 0.2 bar — 0.4 bar back pressure)	1.32 % – 0.5 % residual	Max. 2 % of filled in material
Efficiency of internal washing system, 8 mm valve (2.0 bar —8.0 bar inlet pressure / 0.2 bar — 0.4 bar back pressure)	0.09 % - 0.05 % residual	Max. 0.1 % residual of nominal bowl volume (30 l)
Possibility to clean 10 l (or bigger) product cans	fulfilled	
Efficiency of cleaning crop protection product cans at 2.0 bar	< 0.005 % residual	Max. 0.01 % residual of nominal can volume
Hydraulic tight	yes	No splashes outside the bowl

Fig.5: Result table.

Explanation on testing:

Testing takes place according to the Technical Instructions for ENTAM-Tests of Induction hoppers (Rel.1). This procedure was developed by the competent testing authorities of the European countries participating in ENTAM and is based on the ISO 21278—1/2 standards „Equipment for crop protection – Induction hoppers“. 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 equipment. Statements on the behaviour of the equipment 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 - Biomass, Logistics, Technology (Austria)	036/15
CMA Generalitat de Catalunya Centre de Mecanització Agrària (CMA) (Spain)	EIF 001/15
ENAMA Ente Nazionale per la Meccanizzazione Agricola (Italy)	ENTAM „Rapporto di prova prestazionale" 12/2015
HIAE Hungarian Institute of Agricultural Engineering (Hungary)	D-110/2015
IRSTEA - National Research Institute of Sience and Technology for Enviroment and Agriculture (France) (formerly CEMAGREF)	IRSTEA/CEMAGREF/ ENTAM/15/014
PIMR - Przemyslowy Instytut Maszyn Rolniczych Industrial Institute of Agricultural Engineering (Poland)	PIMR-125/ENTAM/15