

व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT

संख्या/ No.: PS-440/2536/2020
माह/Month : September, 2020

THIS TEST REPORT VALID UP TO : 30th SEPTEMBER, 2025



**FORTUNEAGRO, FAI-16 DLX, BATTERY CUM HAND
OPERATED KNAPSACK SPRAYER**



भारत सरकार

Government of India

कृषि एवं किसान कल्याण मंत्रालय

Ministry of Agriculture and Farmers Welfare

कृषि, सहकारिता एवं किसान कल्याण विभाग

Department of Agriculture, Cooperation and Farmers Welfare

उत्तरी क्षेत्र कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

Northern Region Farm Machinery Training and Testing Institute

ट्रैक्टर नगर, सिरसा रोड, हिसार, (हरियाणा) - 125 001

Tractor Nagar, Sirsa Road, HISAR (Haryana)-125 001

[ISO 9001:2015 CERTIFIED]

Website: <http://nrfmtti.gov.in/>

Tele./FAX: 01662-276984

E-mail: fmti-nr@nic.in

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	- Swirl core	Brass, stainless steel, Engg. Plastics,	Brass	Conforms
	-Disc, tip,	Brass, ceramic, stainless steel,	Brass	Conforms
	-Spindle, coupling nut & gland nut	Brass, Engg. Plastics, Stainless steel	Not applicable	--
xxxii)	Material of construction of cut-off device			
	-Body, valve seat, gland nut, cap & collar, Valve stem	Brass, Engineering plastic, stainless steel	Engineering plastic	Conforms
	Nipple	Brass, Engineering plastic, stainless steel	Not applicable	--
	-Valve	Brass, synthetic rubber, stainless steel, plastic	Plastic	Conforms
	-Strainer	Brass, , stainless steel, plastic	Plastic	Conforms
	-Operating knob	Brass, Engineering plastic,	Not applicable	---
	- Operating trigger	Steel, Engineering plastic	Engineering plastic	Conforms
	-Spring	Stainless steel,	Stainless steel	Conforms
	-Gasket	Synthetic rubber, fibre, PVC	PVC	Conforms
	-Gland seal	PVC	PVC	Conforms
	-Gland packing	Asbestos rope	Not applicable	--
xxxiii)	Material of construction of other components as per IS: 3906-1995			
	Lid or cap	Brass, Plastic, Stainless steel	Plastic	Conforms
	Strap	Woven web cotton/ synthetic yarn	Woven web cotton	Conforms
	Skirt/ stand	Steel, plastic	Plastic	Conforms
	Strap buckle	Steel, Engg. Plastic	Engg. plastic	Conforms
	Cushion	Foam rubber, foam plastic	Rubber	Conforms
xxxiv)	The material used for different components shall be declared by the manufacturer, all the components mentioned in the table-I may not be present in a particular sprayer.		Declared by the applicant	Conforms

3. RUNNING - IN

Though the applicant has not recommended running-in, with the consent of the applicant the running-in of the sprayer was conducted for one hour in order to overcome variation in initial performance. Lubrication and the adjustment of the components were done as per applicants' recommendation.



4. TEST FOR DISCHARGE RATE OF PUMP (Vide Clause 8.3 of IS: 11313 - 2007)

1. Date of test : 10.02.2020
2. Atmospheric conditions :
 - a) Temperature : 20.4 °C
 - b) Relative humidity : 54.4 %
 - c) Pressure : 99.5 kPa

3. Data recorded

Speed of Pump (rpm)	Working pressure (kg/cm ²)	Test No.	Delivery from the discharge line (ml/min)	Overflow (ml/min)	Average discharge from the discharge line (ml/min)	Discharge rate of pump (ml/min)
3181	1	1	2560	NIL	2570.0	2570.0
		2	2570			
		3	2570			
		4	2580			
3035	2	1	2120	NIL	2147.5	2147.5
		2	2160			
		3	2160			
		4	2150			
2930	3	1	1850	NIL	1840.0	1840.0
		2	1830			
		3	1830			
		4	1850			
2852	4	1	1670	NIL	1617.5	1617.5
		2	1600			
		3	1610			
		4	1590			

Minimum discharge rate = 1617.5 ml/min at 4 kg/cm²
Maximum discharge rate = 2570.0 ml/min at 1 kg/cm²
Discharge at rated pressure = 1840.0 ml/min at 3.0 kg/cm²

5. TEST FOR VOLUMETRIC EFFICIENCY (Vide Clause 8.4 of IS: 11313 - 2007)

Date of test : 11.02.2020
 Rated pressure, kg/cm² : 3.0
 Avg. discharge of water at rated pressure, ml/min : 1840
 Avg. discharge of water at no load, ml/min : 2975.5
 Avg. pump speed at no load, rev/min : 3351
 Avg. pump speed at rated pressure, rev/min : 2930
 Volumetric efficiency of pump, % : 71 %

Remark: - The volumetric efficiency does not conform to the requirement of IS: 11313-2007.



6. POWER REQUIREMENT

(Vide Clause 8.5 of IS – 11313 : 2007)

The power requirement of DC motor fitted on sprayer was observed as following.

1. Motor operating voltage : 12 V
2. Avg. current drawn by motor at no load : 1.07 A
3. Avg. current drawn by motor at load : 2.03 A
4. Avg. motor operating voltage : 13.40 V
5. Avg. observed motor power requirement : 26.47 Watt
6. Avg. motor speed at no load : 3353 rpm
7. Avg. motor speed at load : 2930 rpm
8. Avg. Time required for fully discharge of battery : 7.0 to 7.5 hr
9. Avg. No load rpm of motor after 6 hours of Operation : 2470 rpm

7. PRESSURE ADJUSTMENT TEST

(Vide Clause 8.7.1 of IS – 11313 : 2007)

1. Date of test : 10.02.2020
2. Atmospheric conditions :
 - a. Temperature : 20.4 °C
 - b. Relative humidity : 54.4 %
 - c. Pressure : 99.5 kPa
3. Data recorded

S. No.	Working pressure (kg/cm ²)	Fluctuation range (kg/cm ²)	Pressure drop (kg/cm ²)	Ratio
1.	1	NIL	NIL	--
2.	2	NIL	NIL	--
3.	3	NIL	NIL	--
4.	4	NIL	NIL	--

4. Resistance of pressure: Yes

8. TEST FOR SPRAY LANCE

(Vide Annex. D of IS: 3652-1995)

- Date of test : 14.02.2020
Type : Straight type (Type-A)

8.1 STRENGTH OF SPRAY LANCE

Sr. No.	Details	Condition
1	Test Condition	Outlet closed
2	Hydraulic pressure applied	1 MPa
3	Duration of pressure retained	5 minutes
4	Result	No leak, crack, or burst of lance was observed during test

8.2 MARKING ON SPRAY LANCE

- Manufacturer's name or recognized trade mark : Fortuneagro
Nominal length, mm : 2 FT

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xxi)	Gasket	Synthetic rubber, PVC, fibre	PVC	Conforms
xxii)	Valve seat	Brass, stainless steel, engg. plastic	Engg. Plastic	Conforms
xxiii)	valve	Brass, stainless steel, engg. plastic	Engg. Plastic	Conforms
xxiv)	Skirt/ stand	Steel, plastic	Plastic	Conforms
xxv)	Strap buckle	Steel, Engg. Plastic	Engg. Plastic	Conforms
xxvi)	Cushion	Foam rubber, foam plastic	Foam	Conforms

Materials of components of spray lance, nozzle, cut of device (as per IS 3652-1995):
Refer chapter No. 2 of this test report.

Clause No.	Specified requirement	Observations	Remarks
Cl. 4.4 IS 3906:1995	The material used for different components shall be declared by the manufacturer in the manual.	Declared by the applicant	Conforms

16. RUNNING - IN

Though the applicant has not recommended running-in, with the consent of the applicant the running-in of the sprayer was conducted for one hour in order to overcome variation in initial performance. Lubrication and the adjustment of the components was done as per applicants recommendation.

17. TEST FOR DISCHARGE RATE (Vide Clause 6.1.3 of IS 10134-1994)

1. Date of test : 22.02.2020
2. Atmospheric conditions
 - a) Temperature : 22.6°C
 - b) Relative humidity : 46.2%
 - c) Pressure : 99.4 kPa
3. Data recorded

No. of hand strokes per minute	Working pressure (kPa)	Test No.	Delivery from the discharge line (ml/min)	Overflow (ml/min)	Average delivery from the discharge line (ml/min)	Discharge rate of pump (ml/min)
16	300	1	740	Nil	737.5	737.5
16	300	2	730	Nil		
16	300	3	750	Nil		
16	300	4	730	Nil		

Average discharge rate : 737.5 ml/min at 300 kPa pressure

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18. TEST FOR VOLUMETRIC EFFICIENCY
(Vide Clause 6.2 of IS 10134-1994)

	Date of test	:	22.02.2020
Sl. No.	Details		Observation
1.	Discharge of water in 10 successive stroke	:	452.5 ml
2.	No of cycle	:	10
3.	Actual volume of water in one cycle	:	45.25 ml
4.	Inner diameter of pump cylinder	:	45.0 mm
5.	Stroke length at 300 kPa pressure	:	36.0 mm
6.	Piston displacement	:	57.22 cc
7.	Theoretical volume of water in one cycle	:	57.22 ml
8.	Volumetric efficiency, %	:	79.1 %

19. TEST FOR PRESSURE CHAMBER
(Vide Clause 7.1 of IS 10134-1994)

Date of test : 23.02.2020

Sr. No	Details	Condition
1	Test Condition	Outlet end closed
2	Pressure applied -Hydraulic pressure -Pneumatic pressure	7.5 kg/cm ² 4.5 kg/cm ²
3	Duration	1 minutes each
4	Result	No leakage, crack, deformation or breakage observed in pressure chamber during the test.

20. TEST FOR OPERATING LEVER, HANDLE & PISTON ROD
(Vide clause 7.6 of IS-10134:1994)

Date of test : 14.09.2020

Sr. No	Details	Condition
1	Test Condition	Discharge outlet closed
2	Preassure applied	7.5 kg/cm ²
3	Result	No distort, crack or break observed in handle, operating lever and piston.

21. TEST FOR HOSE AND HOSE CONNECTION
(Vide Clause 5.14.3 of IS 11313:2007 & Clause 7.2 of IS 10134-1994)

Refer Chapter 13 of this report.



25. CRITICAL TECHNICAL SPECIFICATIONS

Deferred till 31.12.2020 vide Ministry's O.M.No.13-13/2020-M&T(I&P) dated 24.04.2020

26. CONFORMITY TO INDIAN STANDARDS

- i) IS: 11313:2007 Hydraulic power sprayers- : **Does not conform in toto**
specification
- ii) IS: 10134-1994-Method of test for manually : **Does not conform in toto**
operated sprayer
- iii) Spray nozzle and spray gun as per IS:3652- : **Does not conform in toto**
1995 (Reaffirmed 2011)
- iv) IS: 2643-2005-Pipe threads where pressure- : **Does not conform in toto**
tight joint are not made on the threads-
dimensions, tolerance and designation

27. COMMENTS & RECOMMENDATIONS

- 26.1 The motor serial number and rated speed is not specified. It should be specified.
- 26.2 The model of battery charger is not specified. It should be specified.
- 26.3 The model serial number and country of origin of pump is not specified. It should be specified.
- 26.4 The dimension of straps does not meet the requirements of Indian Standard. It **MUST** be looked into.
- 26.5 During the strap drop test the buckle/bracket of strap assembly found failed to hold the strap in its position. It should be provided.
- 26.6 The strap cushion thickness does not meet the requirement of Indian standard. It **MUST** be looked into.
- 26.7 The average size of strainer of cut-off device does not meet the requirement of Indian Standard. It **MUST** be looked into.
- 26.8 Material used for pump inlet port end fitting does not meet the requirement of IS:11313-2007. It **MUST** be looked into.
- 26.9 The cut off device manufacturer's name or recognized trade mark and batch or code number is not provided. It **MUST** be provided.
- 26.10 The discharge rate of nozzle at a pressure of 300 kPa for fine cone spray pattern and jet spray pattern does not conform to the requirement of IS: 3652-1995. It **MUST** be looked into.


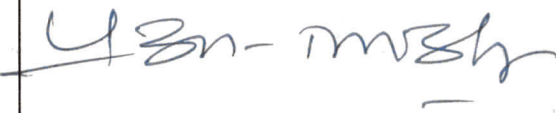
- 26.11 The spray angle for fine cone spray pattern of nozzle at a pressure of 300 kPa does not conform to the requirement of IS : 3562-1995. It **MUST** be looked into.
- 26.12 The percentage variation in discharge rate of endurance test of nozzle for fine cone spray pattern from first to last collection does not conform to the requirement of Indian Standard. It **MUST** be looked into.
- 26.13 The strainer in nozzle is not provided. It should be provided.
- 26.14 Agitator is not provided in sprayer. It may be provided.
- 26.15 The tank nominal capacity on tank is not marked. It **MUST** be looked into.
- 26.16 The nominal length of spray lance does not meet the requirement of Indian Standard. It **MUST** be looked into.
- 26.17 Time required to full charge battery with AC charger is observed as 8.5 to 9.0 hours.
- 26.18 The spraying operation time after fully charging the battery was observed as 7.0 to 7.5 hours.
- 26.19 The current drawn by motor at no load and on load was observed 1.07 to 2.03 Amp. respectively which does not conform to requirement of IS: 14459:1997.
- 26.20 The volumetric efficiency of sprayer on battery operated and hand operated mode was observed as 71 % and 79.1 % respectively, which is not within the requirement of the relevant Indian Standard.
- 26.21 No necessary tools are provided with sprayer. It **MUST** be provided.
- 26.22 During the pump chamber hydraulic test the motor stopped beyond 5.8 kg/cm² pressure against the pressure requirement of 7.5 kg/cm². Thus the sprayer does not meet the requirement of Indian Standard. This **MUST** be looked into and improved.
- 26.23 **Safety provision/safety wear**
- i) The safety instructions regarding handling poisonous agro chemical before, during and after spraying operation should be provided on sprayer.



28. TECHNICAL LITERATURE

One leaflet entitled “ Knapsack Battery Power Sprayer Operation And Service Manual with part List” has been provided. The same, however, does not indicate the make and model of the sprayer it is related to. It amounts to not providing the relevant literature. It is therefore recommended that the literature be brought out as per IS:8132-1999.

TESTING AUTHORITY

MAAN SINGH SENIOR TECHNICAL ASSISTANT	
P. K. PANDEY DIRECTOR	

29. APPLICANT'S COMMENTS

Para No.	Our reference	Applicant's Comments
29.1	26.1 to 26.23	We inform to take care the corrective actions, and in future supply, above points will be considered before dispatch of material.

