

व्यावसायिक परीक्षण रिपोर्ट  
COMMERCIAL TEST REPORT

संख्या/ No.: PS-463/2633/2020  
माह/Month : December, 2020

**THIS TEST REPORT VALID UP TO : 31<sup>st</sup> December, 2025**



**BALWAAN, BS 2-1208, 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/>

E-mail: [fmti-nr@nic.in](mailto:fmti-nr@nic.in)

Tele./FAX: 01662-276984

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

1. Date of test : 13.11.2020
2. Atmospheric conditions :
  - a) Temperature : 20.8 °C
  - b) Relative humidity : 48 %
  - c) Pressure : 99.5 kPa

#### 3. Data recorded

Speed of Pump (rpm)	Working pressure (kg/cm <sup>2</sup> )	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)
3239	1.0	1	1820	NIL	1810	1810
		2	1800			
		3	1830			
		4	1790			
3059	2.0	1	1560	NIL	1545	1545
		2	1540			
		3	1530			
		4	1550			
3028	3.0	1	1320	NIL	1305	1305
		2	1290			
		3	1310			
		4	1300			
2980	4.0	1	1150	NIL	1165	1165
		2	1180			
		3	1170			
		4	1160			

Minimum discharge rate = 1165 ml/min at 4 kg/cm<sup>2</sup>  
 Maximum discharge rate = 1810 ml/min at 1 kg/cm<sup>2</sup>  
 Discharge at rated pressure = 1305 ml/min at 3.0 kg/cm<sup>2</sup>

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

Date of test : 14.11.2020  
 Rated pressure, kg/cm<sup>2</sup> : 3.0  
 Avg. discharge of water at rated pressure, ml/min : 1305  
 Avg. discharge of water at no load, ml/min : 2175  
 Avg. pump speed at no load, rev/min : 3686  
 Avg. pump speed at rated pressure, rev/min : 3028  
 Volumetric efficiency of pump, % : 73 %

**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 : 1.25 A
3. Avg. current drawn by motor at load : 2.08 A
4. Avg. motor operating voltage : 12.19 V
5. Avg. observed motor power requirement : 25.40 Watt
6. Avg. motor speed at no load : 3686 rpm
7. Avg. motor speed at load : 3028 rpm
8. Avg. Time required for fully discharge of battery : 8 to 9 hr
9. Avg. No load rpm of motor after 6 hours of Operation : 2963 rpm

**7. PRESSURE ADJUSTMENT TEST**

(Vide Clause 8.7.1 of IS – 11313 : 2007)

1. Date of test : 13.11.2020
2. Atmospheric conditions :
  - a. Temperature : 20.8 °C
  - b. Relative humidity : 48 %
  - c. Pressure : 99.5 kPa
3. Data recorded

S. No.	Working pressure (kg/cm <sup>2</sup> )	Fluctuation range (kg/cm <sup>2</sup> )	Pressure drop (kg/cm <sup>2</sup> )	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 : 13.11.2020  
Type : Gooseneck Type (Type – B<sub>2</sub>)

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 : Not Marked  
Nominal length, mm : Not Marked  
Batch or code number : Not Marked

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 : 26.11.2020
2. Atmospheric conditions
  - a) Temperature : 21°C
  - b) Relative humidity : 49.3%
  - c) Pressure : 99.1 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.	540	NIL	525.0	525.0
16	300	2.	520	NIL		
16	300	3.	530	NIL		
16	300	4.	510	NIL		

**Average discharge rate : 525.0 ml/min at 300 kPa pressure**

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

Sl. No.	Details	:	Observation
	Date of test	:	26.11.2020
1.	Discharge of water in 10 successive stroke	:	327.5 ml
2.	No of cycle	:	10
3.	Actual volume of water in one cycle	:	32.75 ml
4.	Inner diameter of pump cylinder	:	44 mm
5.	Stroke length at 300 kPa pressure	:	36.0 mm
6.	Piston displacement	:	54.71 cc
7.	Theoretical volume of water in one cycle	:	54.71 ml
8.	Volumetric efficiency, %	:	60 %

**Remarks:** The volumetric efficiency of pump does not conform to the requirement of IS: 10134-1994.

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

Date of test : 27.11.2020

Sr. No	Details	Condition
1	Test Condition	Outlet end closed
2	Pressure applied -Hydraulic pressure -Pneumatic pressure	7.5 kg/cm <sup>2</sup> 4.5 kg/cm <sup>2</sup>
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 : 27.11.2020

Sr. No	Details	Condition
1	Test Condition	Discharge outlet closed
2	Preassure applied	7.5 kg/cm <sup>2</sup>
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.

## 22. ENDURANCE TEST OF SPRAYER (Vide clause 8.1 of IS-10134:1994)

1. Date: 17.11.2020 to 25.11.2020.
2. Total running time (h) - 48
3. Quantity of liquid collected during endurance:-  
Avg. discharge (ml/min)
 

a)	First Collection	-	512.5
b)	Second Collection	-	525.0
c)	Third Collection	-	520.0
d)	Fourth collection	-	505.0
e)	Fifth Collection	-	525.0
f)	Sixth Collection	-	512.5
g)	Seventh Collection	-	525.0
h)	Eighth Collection	-	522.5

**Remark:** Percentage variation of discharge from first to last collection, 1.95 %.

## 23. TEST FOR STRAP AND ITS ASSEMBLY (Vide Clause 7.3 of IS 10134-1994)

Date of test : 12.11.2020

The sprayer was filled with clean water to its specified capacity. The sprayer was hung from a solid support by its straps simulating its carriage on the shoulder of an operator. The tank was vertically raised to height of 300 mm and was allowed to drop freely and hung by straps.

**Observation:** At 4<sup>th</sup> drop the buckle/bracket of strap assembly was found as failed to hold the strap in its position.

## 24. ASSESSMENT OF CONSTRUCTIONAL REQUIREMENTS APPLICABLE FOR HAND OPERATED KNAPSACK SPRAYER

Ref. Cl. No.	Specified requirements as per Indian Standard IS: 3906-1995	Observation	Remarks
Cl.5.1 Discharge rate	When tested in accordance with the method given in 6.13 of IS 10134 : 1994, the pump shall be capable of discharge a minimum of 500 ml of water per minute.	525 ml/min	Conforms
Cl.5.1 Volumetric efficiency	When tested in accordance with the method given in 6.2 of IS 10134 : 1994, the volumetric efficiency shall be not less than 85 percent.	60 %	Does not conform
Cl. 6.1 Tank	The tank capacity shall be 10, 13 or 16 liters with a tolerance of $\pm 0.5$ liter.	The tank capacity is 18 liters.	Does not conform as such
Cl.6.1.1	The thickness of sheet used in manufacture of brass tank shall be minimum of 0.63 mm $\pm$ 0.03 mm.	Not applicable, as the tank is made of plastic.	--

**25. CRITICAL TECHNICAL SPECIFICATIONS**

Deferred till 31.03.2021 vide Ministry's O.M.No.13-13/2020-M&T(I&P) dated 22.12.2020

**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**  
tight joint are not made on the threads-  
dimensions, tolerance and designation

**27. COMMENTS & RECOMMENDATIONS**

- 27.1 The make and serial number of motor is not specified. It **MUST** be specified.
- 27.2 The model, serial number and country of origin of battery is not specified. It should be specified.
- 27.3 The make, model, serial number, country of origin and rated speed of pump is not specified. It should be specified.
- 27.4 The country of origin of battery charger is not specified. It should be specified.
- 27.5 During the strap drop test the buckle/bracket of strap assembly found failed to hold the strap in its position. It should be provided.
- 27.6 The strap cushion thickness does not meet the requirement of Indian standard. It **MUST** be looked into.
- 27.7 The average size of strainer of cut-off device does not meet the requirement of Indian Standard. It **MUST** be looked into.
- 27.8 The cut off device manufacturer's name or recognized trade mark and batch or code number is not provided. It **MUST** be provided.
- 27.9 The discharge rate of nozzle at a pressure of 300 kPa for fine cone spray pattern does not conform to the requirement of IS: 3652-1995. It **MUST** be looked into.
- 27.10 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.
- 27.11 The tank capacity of sprayer does not meet the requirement of IS: 3906-1995. It **MUST** be looked into.

- 27.12 The strainer in nozzle is not provided. It should be provided.
- 27.13 Agitator is not provided in sprayer. It may be provided.
- 27.14 Leakage of water from pump chamber during the hydraulic pressure test of pump chamber on battery operated mode. It **MUST** be looked into.
- 27.15 The manufacturer's name & recognized trade mark and designation of spray nozzle is not marked. It **MUST** be marked.
- 27.16 Time required to full charge battery with AC charger is observed as 8.5 to 9.0 hours.
- 27.17 The spraying operation time after fully charging the battery was observed as 7 to 7.8 hours.
- 27.18 The volumetric efficiency of sprayer on battery operated and hand operated mode was observed as 73 % and 60 % respectively, which is not within the requirement of the relevant Indian Standard.
- 27.19 No necessary tools are provided with sprayer. It **MUST** be provided.
- 27.20 The manufacturer's name and recognized trade mark and nominal length of lance is not marked. It **MUST** be looked into.
- 27.21 A suitable labelling plate (Not sticker) needs to be provide with "inter alia", following information.
- i) Manufacturer's name
  - ii) Make
  - iii) Model
  - iv) Month & year of manufacturer
  - v) Rated speed
  - vi) Rate Pressure
  - vii) Discharge rate
  - viii) Power rating
  - ix) Country of origin


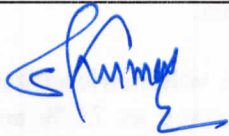
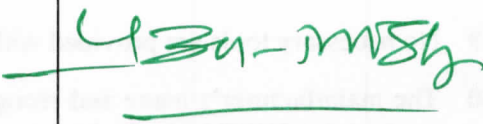


**28. TECHNICAL LITERATURE**

One leaflet entitled "Battery Sprayer user's manual and packing slip" has been provided. The same, however, does not indicate the model and proper name 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	
SANJAY KUMAR AGRICULTURAL ENGINEER	
P. K. PANDEY DIRECTOR	

**29. APPLICANT'S COMMENTS**

" No Specific Comments received from applicant "

