

व्यावसायिक परीक्षण रिपोर्ट

COMMERCIAL TEST REPORT (FIRST BATCH)

संख्या/ No.: PS-514/2872/2022

माह/Month: July, 2022

THIS TEST REPORT VALID UP TO : 31st July, 2027



**SHAKTI, SBS-500e,
BATTERY OPERATED KNAPSACK SPRAYER**



भारत सरकार

Government of India

कृषि एवं किसान कल्याण मंत्रालय

Ministry of Agriculture and Farmers Welfare

कृषि एवं किसान कल्याण विभाग

Department of Agriculture and Farmers Welfare

उत्तरी क्षेत्र कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

Northern Region Farm Machinery Training and Testing Institute

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[ISO 9001:2015 CERTIFIED]

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xxxiii)	Material of construction of various components as per IS: 3906-1995			
	Strap	Woven web cotton/synthetic yarn	Synthetic yarn	Conforms
	Skirt/Stand	Steel, plastic	Plastic	Conforms
	Strap buckle	Steel, Engg. Plastic	Steel	Conforms
	Cushion	Foam, rubber, foam plastic	Not available	Does not conform
xxxiv)	The material used for different components shall be declared by the manufacturer. All the components mentioned in the Table No.-I of IS:11313-2007 may not be present in a particular sprayer.		Declared by the manufacturer	Conforms

4. RUNNING-IN

The sprayer was run-in 1.0 hour as recommended by the applicant before starting of test.

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

1. Date of test : 04.07.2022
2. Atmospheric conditions
 - a) Temperature : 35.4 °C
 - b) Relative humidity : 61.6 %
 - c) Pressure : 97.5 kPa
3. Data recorded

Avg. 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)
3175	1.0	1	2100	NIL	2122.5	2122.5
		2	2140			
		3	2100			
		4	2150			
3040	2.0	1	1620	NIL	1615.0	1615.0
		2	1610			
		3	1630			
		4	1600			
2985	3.0	1	1460	NIL	1475.0	1475.0
		2	1480			
		3	1470			
		4	1490			
2854	4.5	1	1070	NIL	1070.0	1070.0
		2	1080			
		3	1070			
		4	1060			

Minimum discharge rate = 1070.0 ml/min at 4.5 kg/cm²
Maximum discharge rate = 2122.5 ml/min at 1 kg/cm²
Discharge at rated pressure = 1475.0 ml/min at 3 kg/cm²

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

Date of Test	: 04.07.2022
Rated pressure, kg/cm ²	: 3.0
Avg. discharge of water at rated pressure, ml/min	: 1475.0
Avg. discharge of water at no-load, ml/min	: 2900.0
Avg. pump speed at no-load, rev/min	: 3579
Avg. pump speed at rated pressure, rev/min	: 2985
Volumetric efficiency of pump, %	: 60.97%

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

7. POWER REQUIREMENT (Vide Clause 8.5 of IS : 11313-2007)

Date of test	: 05.07.2022
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	: 1.65 A
3. Avg. current drawn by motor at load	: 2.73 A
4. Avg. motor operating voltage	: 12.63 V
5. Avg. observed motor power requirement	: 34.50 watt
6. Avg. motor speed at no load	: 3579 rpm
7. Avg. motor speed at load	: 2985 rpm
8. Avg. time required for fully discharge of battery	: 5.0 to 6.0 hours
9. Avg. no load rpm of motor after 6 hours of operation	: 2665 rpm
10. Time required to full charge the battery with AC charger was observed as	: 4.7 to 5.8 hours
11. The spraying operation time after fully charging the battery was observed as	: 4.9 to 5.9 hours

8. PRESSURE ADJUSTMENT TEST

- Date of test : 04.07.2022
- Atmospheric conditions
 - Temperature : 35.4 °C
 - Relative humidity : 61.6 %
 - Pressure : 97.5 kPa
- Data recorded

S. No.	Working pressure (kg/cm ²)	Fluctuation range (kg/cm ²)	Pressure drop (kg/cm ²)	Ratio
1.	1.0	NIL	NIL	--
2.	2.0	NIL	NIL	--
3.	3.0	NIL	NIL	--
4.	4.5	NIL	NIL	--

- Resistance to different pressure: Yes

9. TEST FOR SPRAY LANCE
(Vide Annex D of IS : 3652 –1995)

Date of test : 02.07.2022
Type : Gooseneck Type (Type-B₁)

9.1 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 bursting of lance was observed during test

9.2 MARKING ON SPRAY LANCE

Manufacturer's name or recognized trade mark : Marked as Shakti
Nominal length : Marked as 600 mm
Batch or code number : Marked as SALG-B₁

10. TEST FOR CUT-OFF DEVICE
(Vide Annex C Clause 6.8.3 of IS: 3652–1995)

Date of test : 02.07.2022
Type : Trigger type (Type-A)

10.1 MAXIMUM TRIGGER ACTIVATION TORQUE

Required torque	:	35 kgf-cm
Observed torque	:	29.8 kgf-cm

10.2 STRENGTH TEST FOR CUT-OFF DEVICE

Sr. No	Details	Condition
1	Condition of outlet	Closed
2	Hydraulic pressure	750 kPa
3	Duration of pressure retained	5 Minutes
4	Observation	No leakage, crack or bursting of cut-off device was observed during test.

10.3 LEAKAGE AND RELIABILITY TEST FOR CUT-OFF DEVICE

Date of test : 02.07.2022		
Sr. No.	Details	Condition
1	Test Condition	Mounted on test setup
2	Hydraulic pressure retained	300 kPa
3	Operating cycles	5000 cycles at pressure 300 kPa and repeated for 500 cycles at a pressure of 600 kPa @ 15 cycles per minutes
4	Observation	No drip or leak of cut off device through valve was observed during the test

10.4 MARKING ON CUT-OFF DEVICE

- a) Manufacturer's name or recognized trade mark : Marked as Shakti
 b) Batch or code number : Marked as SACTV-A
 c) Type of cut off device : **Not marked**

**11. TEST FOR NOZZLE
 (Vide Annex F of IS : 3652-1995)**

Date of test : 29.06.2022
 Type of Nozzle : Adjustable, solid cone type

11.1 TEST FOR DISCHARGE RATE OF NOZZLE

The discharge rate for fine cone spray pattern & jet spray pattern as 1100 ml/min & 1900 ml/min at a pressure of 300 kPa was declared by the applicant. The discharge rate corresponding to 300 kPa pressure was observed as below:-

- For fine cone spray pattern : 1150.0 ml/min
- For jet spray pattern : 1515.0 ml/min

Remark:- The discharge rate for jet spray pattern does not conform to the requirement of IS:3652-1995

11.2 TEST FOR SPRAY ANGLE OF NOZZLE

The spray angle of nozzle at a pressure of 300 kPa was declared by the applicant as 75 degree. The spray angle corresponding to 300 kPa pressure was observed as 79.7 degree.

11.3 ENDURANCE TEST OF NOZZLE

- i) Date : 21.06.2022 to 29.06.2022
 ii) Total running time (h) : 48
 iii) Quantity of liquid collected and spray angle observed during endurance test

Sr. No.	No. of collection	Avg. Discharge rate, ml/min		Spray angle, Degree.
		Fine cone spray pattern	Jet spray pattern	
a)	First collection	1187.5	1522.5	79.0
b)	Second collection	1197.5	1490.0	78.5
c)	Third collection	1227.5	1467.5	79.7
d)	Fourth collection	1235.0	1457.5	79.0
e)	Fifth collection	1142.5	1542.5	77.8
f)	Sixth collection	1167.5	1527.5	79.7
g)	Seventh collection	1180.0	1520.0	79.0
h)	Eighth collection	1197.5	1557.5	77.8

Remark: i) Percentage variation in discharge rate at fine cone spray pattern from first to last collection is 0.8%.

ii) Percentage variation of discharge at jet spray pattern from first to last collection is 2.29%.

iii) The variation in spray angle for fine cone spray pattern from first to last collection is 1.2 degree.

11.4 SPRAY DISTRIBUTION PATTERN OF NOZZLE

The liquid discharge from nozzle at 300 kPa pressure was collected in glass tube of patternator. The spray pattern as per the quantity of liquid collected is represented in tabular form and in fig. 1.

11.5 NOZZLE DESIGNATION : Marked as 75 1100 1900

Provision for strainer in nozzle : **Not provided**

11.6 MARKING OF NOZZLE

Manufacturer's name or recognized trade mark : Marked as Shakti

Batch or code number : Marked as SA-NDA

12. ENDURANCE TEST OF SPRAYER

(Vide clause 8.8 of IS: 11313-2007)

1. Date of test :- 13.06.2022 to 20.06.2022
2. Total running time (h)-50
3. Quantity of liquid collected during endurance:-
Avg. Discharge (ml/min)
 - a) First Collection - 1485.0
 - b) Second Collection - 1475.0
 - c) Third Collection - 1467.5
 - d) Fourth collection - 1465.0
 - e) Fifth Collection - 1460.0
 - f) Sixth Collection - 1465.0
 - g) Seventh Collection - 1457.5
4. Percentage variation of discharge from first to last collection is 1.85 %.

13. TEST FOR PUMP CHAMBER

(Vide Clause 7.1 of IS: 10134-1994)

Date of test : 29.04.2022

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

DATA FOR SPRAY DISTRIBUTION OF NOZZLE

No. of tube	10	9	8	7	6	5	4	3	2	1	Centre	1	2	3	4	5	6	7	8	9	10
Discharge in ml.	05	10	21	31	54	56	60	54	54	56	70	71	57	49	46	58	77	67	45	25	12

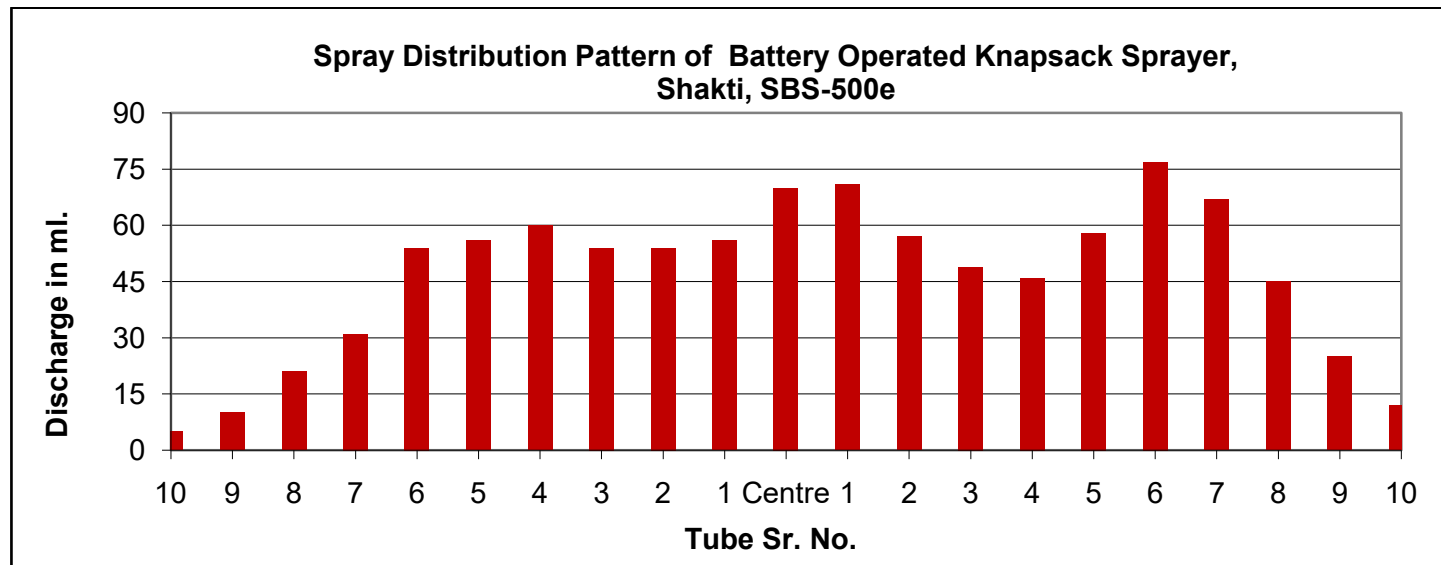


FIG. 1 : SPRAY DISTRIBUTION PATTERN

18. CONFORMITY TO INDIAN STANDARDS

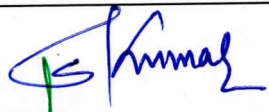
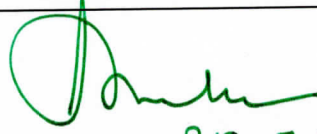
- i) IS: 11313:2007 Hydraulic power sprayers- : **Partially conform**
specification
- ii) IS: 10134-1994-Method of test for manually : **Partially conform**
operated sprayer
- iii) Spray nozzle and spray gun as per IS:3652-1995 : **Partially conform**
(Reaffirmed 2011)

19. COMMENTS & RECOMMENDATIONS

- 19.1** The discharge rate of nozzle at a pressure of 300 kPa for jet spray pattern does not conform to the requirement of IS:3652-1995. It **MUST** be looked into.
- 19.2** The strainer in nozzle is not provided. It may be provided.
- 19.3** The strainer in cut-off device is not provided. It **MUST** be looked into.
- 19.4** Agitator is not provided. It may be provided.
- 19.5** The type of cut-off device is not marked. It **MUST** be looked into.
- 19.6** Necessary tools are not provided with sprayer. It **MUST** be provided.
- 19.7** The volumetric efficiency of pump does not meet the requirement of Indian Standard. It **MUST** be improved.
- 19.8** The strap cushion is not provided. It **MUST** be looked into.
- 19.9** The dimension of straps do not meet the requirement of Indian Standard. It **MUST** be looked into.
- 19.10** The discharge outlet nipple length does not meet the requirement of Indian Standard. It **MUST** be improved.
- 19.11** A suitable labeling plate (not sticker) needs to be provided with “Interlia” following information.
- (i) Manufacturer’s name
 - (ii) Make
 - (iii) Model
 - (iv) Month & year of manufacturer
 - (v) Rated speed
 - (vi) Rated pressure
 - (vii) Discharge rate
 - (viii) Power rating
 - (ix) Country of origin
- 19.12 Safety provision/Safety wear**
- i) The safety instructions regarding handling poisonous agrochemical before, during and after spraying operation should be provided on sprayer.

21.1.11	Overall Dimensions, mm				
	Height	:	470	470	
	Width	:	370	200	
	Length	:	180	370	
21.1.12	Total mass, kg	:	5.500	4.640	
	Mass with full chemical tank, (kg)	:	21.200	20.640	
21.1.13	Technical literature	:	Operator cum service manual, specification sheet and detail if material of construction.	Operator manual, service manual and parts list.	

TESTING AUTHORITY

Er. SANJAY KUMAR AGRICULTURAL ENGINEER	
Dr. MUKESH JAIN DIRECTOR	 25.07.2022

The draft test report compiled by Abhishek Chourey, MTS (Technical)

22. APPLICANT'S COMMENTS

We will follow all points under comment and recommendations of test report in our production and testing process.