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व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT

संख्या/ No.: PS-273/1997/2017

माह/Month : April, 2017



**SHAKTI SBS-600
BATTERY OPERATED KNAPSACK SPRAYER
(FITTED WITH SOLAR PANEL)**



सत्यमेव जयते

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

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	-Gland seal	PVC	PVC	Conforms
	-Gland packing	Asbestos rope	Not applicable	--
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	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 in the specification sheet.	Conforms

3. TEST FOR DISCHARGE RATE OF PUMP

(Vide Clause 8.3 of IS – 11313 : 2007)

1. Date of test : 10.02.2017
2. Atmospheric conditions :
 - a) Temperature : 22°C
 - b) Relative humidity : 40 %
 - c) Pressure : 99.0 kPa
3. Data recorded

Speed of Pump (rpm)	Working pressure (kPa)	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)
2789	100	1	2470	Nil	2480.0	2480.0
		2	2490			
		3	2460			
		4	2500			
2608	200	1	2050	Nil	1997.5	1997.5
		2	2000			
		3	1960			
		4	1980			
2489	300	1	1580	Nil	1572.5	1572.5
		2	1570			
		3	1540			
		4	1600			
2449	400	1	1370	Nil	1402.0	1402.0
		2	1400			
		3	1440			
		4	1400			
2388	450	1	1280	Nil	1252.5	1252.5
		2	1260			
		3	1210			
		4	1260			

Minimum discharge rate = 1252.5 ml/min at 450 kPa
Maximum discharge rate = 2480 ml/min at 100 kPa
Discharge at rated pressure = 1402 ml/min at 400 kPa

4. TEST FOR VOLUMETRIC EFFICIENCY

(Vide Clause 8.4 of IS – 11313 : 2007)

Rated pressure, kPa	:	400
Discharge of water at rated pressure, l/min	:	1.402
Discharge of water at no-load, l/min	:	2.930
Pump speed at no-load, rev/min	:	2818
Pump speed at rated pressure, rev/min	:	2449
Volumetric efficiency of pump, %	:	55.06
Remarks : The volumetric efficiency does not conform to the requirement of IS: 11313:2007.		

5. POWER REQUIREMENT

(Vide Clause 8.5 of IS – 11313 : 2007)

Power requirement of DC motor fitted on sprayer was observed as following:-

Motor operating voltage	:	12 V
Avg. current drawn by motor at no load	:	0.4 A
Avg. current drawn by motor at load, rated pressure	:	1.4 A
Avg. observed motor power requirement at rated pressure	:	17.83 watt
Avg. motor speed at no load	:	2822 rpm
Avg. motor speed at on load, rated pressure	:	2447 rpm
Time required for fully discharge of battery	:	7 to 8 h
No load rpm of motor after 6 hours of operation	:	2128 rpm

6. PRESSURE ADJUSTMENT TEST

1. Date of test : 12.02.2017
2. Atmospheric conditions :
 - a. Temperature : 22°C
 - b. Relative humidity : 40 %
 - c. Pressure : 99.0 kPa
3. Data recorded

S. No.	Working pressure(kPa))	Fluctuation range (kPa)	Pressure drop (kPa)	Ratio
1.	100	NIL	NIL	--
2.	200	NIL	NIL	--
3.	300	NIL	NIL	--
4.	400	NIL	NIL	--
5.	450	NIL	NIL	--

4. Resistance of pressure: Yes

Cl. 8.2	The exposed mild steel parts shall have a protective coating to prevent surface deterioration. The steel used for hose ferrule/clip shall be plated with cadmium, zinc or nickel exposed brass parts may be given a suitable protective finish with clear transparent lacquer.	Metallic part are coated with enamel paint.	Conforms
Cl. 9 Marking & Packing Cl. 9.1 Marking	Each sprayer shall be marked with the following particulars		
	a) Manufacturer's name or recognized trade mark	Shakti Agro Industries, 2153/1, Radha Swami Road, St. No. 6, Arjun Nagar, Gill Road, Ludhiana-141003 (Pb) India	Conforms
	b) Batch or Serial No.	BS16/51	Conforms
	c) Tank nominal capacity	16 ltr.	Conforms
Cl.9.3 IS:3906-1995 Packing	Each sprayer shall be packed as agreed to between the purchase and the supplier for safe handling in transit.		

15. 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:3652-1995 : **Does not conform in toto**
(Reaffirmed 2011)
- iv) IS: 2643-2005-Pipe threads where pressure-tight : **Does not conform in toto**
joint are not made on the threads-dimensions,
tolerance and designation

16. COMMENTS & RECOMMENDATIONS

- 16.1 Serial number of battery is not marked. It should be marked.
- 16.2 Battery charger country of origin is not marked. It should be marked.
- 16.3 The model and serial number of Solar panel for battery charging is not specified. It should be specified.
- 16.4 The serial number of motor is not specified. It should be specified.
- 16.5 Pump serial number and country of origin is not marked. It should be marked.
- 16.6 The delivery hose length does not conform to the requirement of Indian Standard. It should be improved.
- 16.7 The strainer in cut-off device is not provided. It should be provided.

- 16.8 During the strap drop test the buckle/bracket of strap assembly found failed to hold the strap in its position. It should be improved.
- 16.9 The cut-off device and spray lance batch or code number is not marked. It should be marked.
- 16.10 The volumetric efficiency of pump does not meet the requirement of Indian Standard. It should be improved.
- 16.11 The maximum trigger actuation torque is 61.56 kgf-cm. This exceeds the limit specified by Indian Standard. It should be improved.
- 16.12 Agitator is not provided. It may be provided.
- 16.13 Metallic threaded connection provided on sprayer does not meet the requirements of Indian Standard. It should be looked into.
- 16.14 The strap width and strap cushion thickness does not meet the requirement of Indian Standard.
- 16.15 The current drawn by motor at no load and on load was observed as 0.4 and 1.4 A respectively which does not conform to requirement of IS- 14459: 1997.
- 16.16 Time required to full charge the battery with AC charger is observed as 8 to 9 1/2 hours.
- 16.17 Time required to full charge the battery with solar plate was observed as 12 to 14 hours.
- 16.18 The spraying operation time after fully charging the battery was observed as 7 to 8 hours.
- 16.19 During the pump chamber hydraulic test the motor stopped at 6.0 kg/cm² pressure against the pressure requirement of 10 kg/cm² and the test could not be conducted. This should be looked into and improved.
- 16.20 The discharge rate of nozzle for jet spray pattern does not meet the requirement of Indian Standard. It should be looked into.
- 16.21 The nozzle designation does not meet the requirement of Indian Standard. It should be improved.
- 16.22 The nozzle batch or code number is not marked. It should be marked.

16.23 A suitable labelling plate (not sticker) needs to be provided with ,inter alia ,following information;-

- i. Manufacturer's name
- ii. Make
- iii. Model
- iv. Month & year of manufacture
- v. Rated speed
- vi. Rated pressure
- vii. Discharge rate
- viii. Power rating
- ix. Country of origin

16.24 **Safety provisions/safety wear**

- i) The accessories viz, hand gloves and safety goggles for operator's safety are not provided with sprayer. It may be provided.
- ii) The safety instructions regarding handling of poisonous chemicals & first aid should be provided in operator's manual.

17. **TECHNICAL LITERATURE**

Operator cum service manual, specification sheet and material construction of different component of sprayer was provided during the test. However, the literature should be updated as per IS : 8132-1999,

TESTING AUTHORITY

R. K. NEMA SENIOR AGRICULTURAL ENGINEER	<i>Ren</i>
P. K. PANDEY DIRECTOR	<i>U3u - mugh</i>

18. **APPLICANT'S COMMENTS**

Para No.	Our Reference	Applicant's Comments
18.1	16.1 to 16.24	We will follow comments and recommendations at production level.