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

Government of India
Ministry of Agriculture and Farmers Welfare
Department of Agriculture, Cooperation and Farmers Welfare
Northern Region Farm Machinery Training and Testing Institute

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

Website: http://nrfmtti.gov.in/
<table>
<thead>
<tr>
<th>Speed of Pump (rpm)</th>
<th>Working pressure (kPa)</th>
<th>Test No.</th>
<th>Delivery from the discharge line (ml/min)</th>
<th>Overflow (ml/min)</th>
<th>Average discharge from the discharge line (ml/min)</th>
<th>Discharge rate of pump (ml/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2789</td>
<td>100</td>
<td>1</td>
<td>2470</td>
<td>Nil</td>
<td>2480.0</td>
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<tr>
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<td>2449</td>
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<tr>
<td>2388</td>
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<td>1</td>
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<td>4</td>
<td>1260</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

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)

<table>
<thead>
<tr>
<th>Rated pressure, kPa</th>
<th>400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharge of water at rated pressure, l/min</td>
<td>1.402</td>
</tr>
<tr>
<td>Discharge of water at no-load, l/min</td>
<td>2.930</td>
</tr>
<tr>
<td>Pump speed at no-load, rev/min</td>
<td>2818</td>
</tr>
<tr>
<td>Pump speed at rated pressure, rev/min</td>
<td>2449</td>
</tr>
<tr>
<td>Volumetric efficiency of pump, %</td>
<td>55.06</td>
</tr>
</tbody>
</table>


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
- 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

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Working pressure(kPa)</th>
<th>Fluctuation range (kPa)</th>
<th>Pressure drop (kPa)</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>100</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
<tr>
<td>2.</td>
<td>200</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
<tr>
<td>3.</td>
<td>300</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
<tr>
<td>4.</td>
<td>400</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
<tr>
<td>5.</td>
<td>450</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Cl. 9.1 Marking</th>
<th>Each sprayer shall be marked with the following particulars</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Manufacturer’s name or recognized trade mark</td>
<td></td>
</tr>
<tr>
<td>Shakti Agro Industries, 2153/1, Radha Swami Road, St. No. 6, Arjun Nagar, Gill Road, Ludhiana-141003 (Pb) India</td>
<td></td>
</tr>
</tbody>
</table>

**b) Batch or Serial No.**  
BS16/51  
Conforms

**c) Tank nominal capacity**  
16 ltr.  
Conforms

**Cl.9.3 IS:3906-1995**  
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 - specification:  
Does not conform in toto

**ii)** IS: 10134-1994-Method of test for manually operated sprayer  
Does not conform in toto

**iii)** Spray nozzle and spray gun as per IS:3652-1995 (Reaffirmed 2011):  
Does not conform in toto

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

### 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 observes 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

P. K. PANDEY
DIRECTOR

18. APPLICANT’S COMMENTS

<table>
<thead>
<tr>
<th>Para No.</th>
<th>Our Reference</th>
<th>Applicant’s Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.1</td>
<td>16.1 to 16.24</td>
<td>We will follow comments and recommendations at production level.</td>
</tr>
</tbody>
</table>