ASPEE ADT001/12AHBR
BATTERY OPERATED KNAPSACK SPRAYER

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
[ISO 9001:2015 CERTIFIED]

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### Material of construction of various components as per IS: 3906-1995

<table>
<thead>
<tr>
<th>Component</th>
<th>Material Details</th>
<th>Reference Material</th>
<th>Conforms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strap</td>
<td>Woven web cotton/synthetic yarn</td>
<td>Synthetic yarn</td>
<td>Conforms</td>
</tr>
<tr>
<td>Skirt/Stand</td>
<td>Steel, plastic</td>
<td>Plastic</td>
<td>Conforms</td>
</tr>
<tr>
<td>Strap buckle</td>
<td>Steel, Engg. Plastic</td>
<td>Plastic</td>
<td>Conforms</td>
</tr>
<tr>
<td>Cushion</td>
<td>Foam, rubber, foam plastic</td>
<td>Foam plastic</td>
<td>Conforms</td>
</tr>
</tbody>
</table>

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.

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### 3. TEST FOR DISCHARGE RATE OF PUMP

(Vide Clause 8.3 of IS – 11313: 2007)

1. **Date of test**: 18.01.2019
2. **Atmospheric conditions**
   - Temperature: 18.4 °C
   - Relative humidity: 55.5%
   - Pressure: 99.1 kPa
3. **Data recorded**

<table>
<thead>
<tr>
<th>Speed of Pump (rpm)</th>
<th>Pressure (kg/cm²)</th>
<th>Test No.</th>
<th>Delivery from the discharge line (ml/min)</th>
<th>Overflow</th>
<th>Average discharge from the discharge line (ml/min)</th>
<th>Discharge rate of pump (ml/min)</th>
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</tbody>
</table>

**Minimum discharge rate** = 1690 ml/min at 4 kg/cm²  
**Maximum discharge rate** = 2845 ml/min at 1 kg/cm²  
**Discharge at rated pressure** = 2125 ml/min at 3 kg/cm²
4. TEST FOR VOLUMETRIC EFFICIENCY
   (Vide Clause 8.4 of IS – 11313: 2007)

   Rated pressure, kg/cm² : 3
   Avg. discharge of water at rated pressure, l/min : 2.125
   Avg. discharge of water at no-load, l/min : 3.550
   Avg. pump speed at no-load, rev/min : 3741
   Avg. pump speed at rated pressure, rev/min : 3242
   Volumetric efficiency of pump, % : 69


5. POWER REQUIREMENT
   (Vide Clause 8.5 of IS – 11313 : 2007)

   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 : 0.88 A
   3. Avg. current drawn by motor at load : 1.97 A
   4. Avg. motor operating voltage : 12.57 V
   5. Avg. observed motor power requirement : 24.71 watt
   6. Avg. motor speed at no load : 3742 rpm
   7. Avg. motor speed at load : 3240 rpm
   8. Avg. time required for fully discharge of battery : 8 to 8.5 h
   9. Avg. No load rpm of motor after 6 hours of operation : 2460 rpm

6. PRESSURE ADJUSTMENT TEST

   1. Date of test : 18.01.2019
   2. Atmospheric conditions:-
      a. Temperature : 18.4 °C
      b. Relative humidity : 55.5 %
      c. Pressure : 99.1 kPa
   3. Data recorded

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Working pressure (kg/cm²)</th>
<th>Fluctuation range (kg/cm²)</th>
<th>Pressure drop (kg/cm²)</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
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<td>NIL</td>
<td>NIL</td>
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</tr>
<tr>
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<td>NIL</td>
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</tr>
<tr>
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<td>NIL</td>
<td>--</td>
</tr>
<tr>
<td>4.</td>
<td>4</td>
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<td>NIL</td>
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</tr>
</tbody>
</table>

   4. Resistance of pressure: Yes

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

   Date of test : 16.01.2019
   Type : Gooseneck (Type-B2)
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 joint are not made on the
   threads-dimensions, tolerance and designation: Does not conform in toto

16. COMMENTS & RECOMMENDATIONS

16.1 Battery Serial No. is not specified. It should be specified.
16.2 The speed of motor is not specified. It should be specified.
16.3 The model of battery charger is not specified. It should be specified.
16.4 The rated speed of pump is not specified. It should be specified.
16.5 The strainer in nozzle is not provided. It may be considering for providing.
16.6 The volumetric efficiency of pump does not meet the requirement of Indian Standard. It MUST be improved.
16.7 Agitator is not provided. It may be provided.
16.8 The strap cushion thickness does not meet the requirement of Indian Standard. It may be looked into.
16.9 The current drawn by motor at no load and on load was observes as 0.88A and 1.97A respectively which does not conform to requirement of IS- 14459: 1997.
16.10 Time required to full charge the battery with AC charger is observed as 8.0 to 8.5 hours.
16.11 The spraying operation time after fully charging the battery was observed as 7.5 to 8.0 hours.
16.12 During the pump chamber hydraulic test the motor stopped beyond 6 kg/cm² pressure against the pressure requirement of 7.5 kg/cm² and the test could not be conducted. This MUST be looked into and improved.
16.13 During the test of leakage and reliability test for cut off device the leakage through the valve was observed. It MUST be looked into for necessary action.
16.14 The discharge rate of nozzle for fine cone spray pattern does not meet the requirement of Indian Standard. It MUST be looked into.
16.15 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.
16.16 The variation of discharge rate of pump does not meet the requirement of IS: 11313:2007. It MUST be looked into.
16.17 The dimension of metallic threaded connection does not conform to the requirement of relevant code Standard.
16.18 During the strap drop test the buckle/bracket of strap assembly found failed to hold the strap in it’s position. It should be improved.
16.19 The material of pump inlet port end fitting does not meet the requirement of Indian Standard. It should be improved.
16.20 The average size of strainer of cut off device does not meet the requirement of Indian Standard. It MUST be looked into.
16.21 No necessary tools are provided with sprayer. It MUST be provided.
16.22 A suitable labeling plate (not sticker) needs to be provided with \textit{inter alia}, following information:
\begin{itemize}
  \item Manufacturer's name
  \item Make
  \item Model
  \item Month & year of manufacture
  \item Rated speed
  \item Rated pressure
  \item Discharge rate
  \item Power rating
  \item Country of origin
\end{itemize}

16.23 \textbf{Safety provision/Safety wear}
\begin{itemize}
  \item Safety instruction regarding handling poisonous agro-chemical before, during and after spraying operation should be provided on sprayer.
\end{itemize}

17. \textbf{TECHNICAL LITERATURE}

The following literature provided with sprayer for guidance to the user.
\begin{itemize}
  \item Operator's manual with parts catalogue.
\end{itemize}

The operator instruction manual of sprayer needs to be updated as per IS : 8132-1999.

\textbf{TESTING AUTHORITY}

\begin{center}
\begin{tabular}{|c|c|}
\hline
R. K. NEMA & \text{\underline{\text{Senior Agricultural Engineer}}} \\
\hline
P. K. PANDEY & \text{\underline{\text{Director}}} \\
\hline
\end{tabular}
\end{center}

18. \textbf{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>16.2,16.3,16.4</td>
<td>Noted, will specify.</td>
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<td>18.2</td>
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<td>16.9</td>
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<td>18.4</td>
<td>16.22</td>
<td>We will provide stickers providing complete information.</td>
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</table>

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