HYMARK HK-59
BATTERY CUM HAND 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

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

1. **Date of test**: 11.07.2017  
   Atmospheric conditions:  
   a) **Temperature**: 32°C  
   b) **Relative humidity**: 65%  
   c) **Pressure**: 97.2 kPa

3. **Data recorded**

<table>
<thead>
<tr>
<th>Speed of pump (rpm)</th>
<th>Working pressure (kg/cm²)</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>
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<td>2050</td>
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<td></td>
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</tbody>
</table>

**Minimum discharge rate** = 980.0 ml/min at 5.0 kg/cm²  
**Maximum discharge rate** = 2062.5 ml/min at 2.0 kg/cm²  
**Discharge at rated pressure** = 1422.5 ml/min at 3.5 kg/cm²

**Remarks**: The tendency of stalling of motor was observed beyond 5 kg/cm² pressure against working pressure 2 to 6 kg/cm² declared by the applicant. Therefore, sprayer does not meet the requirement laid down in clause 8.3 of IS:11313-2007.
4. TEST FOR VOLUMETRIC EFFICIENCY
   (Vide Clause 8.4 of IS : 11313 - 2007)

   Rated pressure, kg/cm² : 3.5
   Avg. discharge of water at rated pressure l/min : 1.423
   Avg. discharge of water at no load, l/min : 2.630
   Avg. pump speed at no load, rev/min : 3243
   Avg. pump speed at rated pressure, rev/min : 2873
   Volumetric efficiency of pump, % : 61

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

5. 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 : 0.83 A
   3. Avg. current drawn by motor at load : 1.89 A
   4. Avg. motor operating voltage : 12.53 V
   5. Avg. observed motor power requirement : 23.73 Watt
   6. Avg. motor speed at no load : 3245 rpm
   7. Avg. motor speed on load : 2310 rpm
   8. Avg. time required for fully discharge of battery : 8 to 8.5 hr.
   9. Avg. No load rpm of motor after 6 hours of operation : 2322 rpm

6. PRESSURE ADJUSTMENT TEST
   (Vide Clause 8.7.1 of IS – 11313 : 2007)

   1. Date of test : 11.07.2017
   2. Atmospheric conditions :
      a. Temperature : 33 °C
      b. Relative humidity : 64 %
      c. Pressure : 97.2 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>
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</thead>
<tbody>
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<td>NIL</td>
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</tr>
<tr>
<td>2.</td>
<td>3.0</td>
<td>NIL</td>
<td>NIL</td>
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</tr>
<tr>
<td>3.</td>
<td>4.0</td>
<td>NIL</td>
<td>NIL</td>
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</tr>
<tr>
<td>4.</td>
<td>5.0</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
</tbody>
</table>

   4. Resistance of pressure: Yes

   Remarks : The tendency of stalling of motor was observed beyond 5 kg/cm² pressure against working pressure 2 to 6 kg/cm² declared by the applicant. Therefore, sprayer does not meet the requirement laid down in clause 8.7.1 of IS:11313-2007.

7. TEST FOR SPRAY LANCE

   Date of test : 06.07.2017
   Type : Straight type (Type-A)
24. **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 |
| vi) | IS: 2643-2005-Pipe threads where pressure-tight joint are not made on the threads-dimensions, tolerance and designation | Does not conform in toto |

25. **COMMENTS & RECOMMENDATIONS**

25.1 The year of manufacture of sprayer is not marked. It should be marked.

25.2 The motor serial number, motor power and rated speed is not specified. It should be specified.

25.3 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.

25.4 The battery model and country of origin is not specified. It should be specified.

25.5 The country of origin, model and rated speed of pump is not specified. It should be specified.

25.6 The dimension of straps does not meet the requirements of Indian Standard. It **MUST** be looked into.

25.7 During the strap drop test the buckle/bracket of strap assembly found failed to hold the strap in its position. It should be improved.

25.8 The nozzle manufacturer’s name/recognized trade mark, batch or code number and designation is not provided. It **MUST** be provided.

25.9 Strap cushion is not provided. It **MUST** be provided.

25.10 The model and serial number of solar panel for battery charging is not specified. It should be specified.
25.11 The spray angle of nozzle does not meet the requirements of Indian Standard. It MUST be looked into.

25.12 The lance is not marked with manufacturer’s name/recognized trade mark, batch or code number and nominal length. It MUST be marked.

25.13 The trigger actuation force is observed more than as defined in Indian Standard. It MUST be examined & improved.

25.14 The strainer in nozzle is not provided. It should be provided.

25.15 Agitator is not provided in sprayer. It may be provided.

25.16 The cut-off device is not marked. It MUST be marked.

25.17 Time required to full charge battery with AC charger is observed as 9.1 to 9.9 hours.

25.18 The spraying operation time after fully charging the battery was observed as 8.0 to 8.5 hours.

25.19 Time required to full charge the battery with solar plate was observed as 10.2 to 11.0 hours.

25.20 The volumetric efficiency of sprayer on battery operated mode was observed as 61%, which is not within the requirement of the relevant Indian Standard.

25.21 The current drawn by motor at no load and on load was observed as 0.83 A and 1.89 A respectively which does not conform to requirement of IS: 14459-1997.

25.22 The sprayer does not conform to the relevant standard in toto. It should be looked into.

25.23 During the pump chamber hydraulic test the motor stopped beyond 5.0 kg/cm² pressure against the pressure requirement of 8.75 kg/cm². Thus the sprayer does not meet the requirement of Indian Standard.

25.24 Pump discharge outlet nipple length does not meet the requirement of Indian Standard.

25.25 The cut-off device strainer area is less than the requirement of Indian Standard. It should be improved.

25.26 Cut-off device strainer aperture opening is less than the requirement of Indian Standard. It should be improved.
25.27 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

26. TECHNICAL LITERATURE

The operator manual was provided during the test which found adequate, however, it should be updated as per IS: 8132:1999, with the inclusion of safety instructions regarding handling poisonous agrochemical and first aid.

TESTING AUTHORITY

R. K. NEMA
SENIOR AGRICULTURAL ENGINEER

P. K. PANDEY
DIRECTOR

27. APPLICANT'S COMMENTS

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Applicant's Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>We will mention the year of manufacture of sprayer in future.</td>
</tr>
<tr>
<td>2</td>
<td>We will specify the motor serial number, motor power and rated speed in further production batches.</td>
</tr>
<tr>
<td>3</td>
<td>We will look into the discharge rate of nozzle for fine cone spray pattern in future.</td>
</tr>
<tr>
<td>4</td>
<td>We will specify the battery model and country of origin in future.</td>
</tr>
<tr>
<td>5</td>
<td>We will mention the pump model, country of origin and rated speed of pump in future.</td>
</tr>
<tr>
<td>6</td>
<td>We will increase the strap width to meet the requirement of Indian Standard.</td>
</tr>
<tr>
<td>7</td>
<td>We will improve the buckle quality of strap assembly in future.</td>
</tr>
<tr>
<td>8</td>
<td>We will provide nozzle manufacturers name, batch number and designation in future.</td>
</tr>
</tbody>
</table>