HYMARK HK-55
BATTERY CUM HAND 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

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

1. Date of test : 03.07.2017
2. Atmospheric conditions :
   a) Temperature : 32.2 °C
   b) Relative humidity : 66.4 %
   c) Pressure : 97.3 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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</tbody>
</table>

Minimum discharge rate = 862.5 ml/min at 6.0 kg/cm²
Maximum discharge rate = 2125.0 ml/min at 2.0 kg/cm²
Discharge at rated pressure = 1450.0 ml/min at 3.5 kg/cm²
4. TEST FOR VOLUMETRIC EFFICIENCY
(Vide Clause 8.4 of IS : 11313 - 2007)

Date of test : 03.07.2017
Rated pressure, kg/cm² : 3.5
Discharge of water at rated pressure, l/min : 1.450
Discharge of water at no load, l/min : 2.658
Pump speed at no load, rev/min : 3138
Pump speed at rated pressure, rev/min : 2811
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. Avg. motor operating voltage : 12 V
2. Avg. current drawn by motor at no load : 0.85 A
3. Avg. current drawn by motor at load : 2.49 A
4. Avg. motor operating voltage : 12.26 V
5. Avg. observed motor max. power requirement : 30.50 Watt
6. Motor speed at no load : 3140 rpm
7. Motor speed at on load : 2259 rpm
8. Time required for fully discharge of battery : 7.8 to 8.4 hr.
9. No load rpm of motor after 6 hours of operation : 2346 rpm

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

1. Date of test : 03.07.2017
2. Atmospheric conditions :
   a. Temperature : 32.6 °C
   b. Relative humidity : 65.8 %
   c. Pressure : 97.3 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>
<tr>
<td>1.</td>
<td>2.0</td>
<td>NIL</td>
<td>NIL</td>
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</tr>
<tr>
<td>2.</td>
<td>3.5</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
<tr>
<td>3.</td>
<td>4.5</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
<tr>
<td>4.</td>
<td>6.0</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
</tbody>
</table>

4. Resistance of pressure: Yes

7. TEST FOR SPRAY LANCE

Date of test : 02.07.2017
Type : Straight type (Type-A)
24. CONFORMITY TO INDIAN STANDARDS

i) IS: 11313:2007 Hydraulic power sprayers—specification
ii) IS: 10134-1994-Method of test for manually operated sprayer
iii) Spray nozzle and spray gun as per IS:3652-1995 (Reaffirmed 2011)
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 battery model and country of origin is not specified. It should be specified.

25.4 Country of origin of battery charger is not marked. It should be marked.

25.5 The model, rated speed and country of origin 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 is not marked. It **MUST** be looked into.

25.9 The strap cushion is not provided. It **MUST** be looked into.

25.10 The spray angle of nozzle at 300 kPa pressure does not conform to the requirement of IS:3652-1995. It **MUST** be looked into.

25.11 The lance is not marked. It **MUST** be marked.
25.12 The discharge rate of nozzle for fine cone spray pattern does not conform to the requirement of IS: 3652-1995. It **MUST** be looked into.

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 material of pump inlet port end fitting does not meet the requirement of Indian Standard. It should be looked into.

25.17 The cut-off device is not marked. It should be marked.

25.18 Time required to full charge battery with AC charger is observed as 9 to 10.3 hours.

25.19 The spraying operation time after fully charging the battery was observed as 7.8 to 8.4 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 0.85 A and 2.49 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 **MUST** be looked into.

25.23 The nozzle designation is not marked. It **MUST** be looked into.

25.24 During the pump chamber hydraulic test the motor stopped beyond 6.0 kg/cm² pressure against the pressure requirement of 8.75 kg/cm². Thus the sprayer does not meet the requirement of Indian Standard.

25.25 The pump discharge outlet nipple length does not meet the requirement of Indian Standard. It should be looked into.

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

25.27 The cut-off device strainer aperture opening is less than the requirement of Indian Standard. It should be improved.
25.28 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, specification sheet and material construction of different components was provided during the test which found adequate, however, the literature should be updated as per IS: 8132:1999, with the inclusion of safety instructions regarding handling poisonous agrochemicals 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 mark 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</td>
</tr>
<tr>
<td></td>
<td>production batches.</td>
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<tr>
<td>3.</td>
<td>We will mention the battery charger model and also the country of origin in future.</td>
</tr>
<tr>
<td>4.</td>
<td>We will mark the country of origin of battery charger in future.</td>
</tr>
<tr>
<td>5.</td>
<td>We will mention the pump model, country of origin and rated speed of pump in</td>
</tr>
<tr>
<td></td>
<td>future.</td>
</tr>
<tr>
<td>6.</td>
<td>We will amend the dimension of straps to meet the requirement of IS.</td>
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</tbody>
</table>