HYMATIC H-809
BATTERY OPERATED KNAPSACK SPRAYER
(FITTED WITH SOLAR PANEL & OPERATING HANDLE)

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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[ISO 9001:2008 COMPLIANT INSTITUTION]
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3. TEST FOR DISCHARGE RATE OF PUMP  
(Vide Clause 8.3 of IS: 11313 - 2007)

1. Date of test: 19.10.2016  
2. Atmospheric conditions:  
   a) Temperature: 35°C  
   b) Relative humidity: 24%  
   c) Pressure: 737.2 mm of Hg

As there is no pressure regulator provided on a sprayer, the discharge rate of the pump could not be ascertained as per clause 8.3 of IS: 11313: 2007 however, the discharge rate of pump was measured between minimum pressure of 50 kPa & maximum pressure of 500 kPa as per clause 8.3 of IS: 11313-2007 on the test bench.

3. Data recorded

<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>
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<td>50</td>
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<td>2440</td>
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<td></td>
<td>4</td>
<td>920</td>
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</tr>
</tbody>
</table>

Minimum discharge rate = 912 ml/min at 500 kPa  
Maximum discharge rate = 2440 ml/min at 50kPa

4. TEST FOR VOLUMETRIC EFFICIENCY  
(Vide Clause 8.4 of IS: 11313 - 2007)

As applicant has not specified the rated pressure and rated speed of pump, hence volumetric efficiency could not be ascertained, as per the requirement of relevant code.  
However, volumetric efficiency, so to speak, was found to be 84.24% & 31.20% at 50kPa and at 500 kPa pressure respectively. Hence the Volumetric Efficiency was not found as much as required by the code, throughout the whole range of pressure.
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 As applicant has not specified the rated pressure and rated speed of pump, hence volumetric efficiency could not be ascertained. As per the requirement of relevant code. In order to facilitate the testing in the true letter and spirit, this needs to be declared.

25.2 As the applicant has not specified the specific speed for sprayer operation, the power requirement cannot be ascertained. In order to facilitate the testing in the true letter and spirit, this needs to be declared.

25.3 As the discharge rate of nozzle at a pressure of 300 kPa was not declared by the applicant, the conformity of discharge to Cl F 3.1 of Annexure F of IS 3652-1995 could not be ascertained. In order to facilitate the testing in the true letter and spirit, this needs to be declared.

25.4 As the spray angle of nozzle at a pressure of 300 kPa was not declared by the applicant, the conformity of discharge to Cl F 3.2 of Annexure F of IS 3652-1995 could not be ascertained. In order to facilitate the testing in the true letter and spirit, this needs to be declared.

25.5 The spray nozzle is not designated and marked by its identification mark. The identification mark as specified by relevant Indian Standard, needs to be provided.

25.6 The pump make, model and serial number is not specified. It should be specified.

25.7 The lance is not marked as per Indian standard. Printed or engraved marking may be provided.

25.8 The cushion for strap and back rest is not provided. It may be provided as per Indian Standard.

25.9 The lance is not marked as per requirements of Indian Standard. It should be marked.

25.10 The strainer area and aperture diameter of cut off device does not meet the requirement of relevant Indian standard. It should be looked into.
25.11 The trigger actuation force is observed more than as defined in Indian Standard. It should be examined & improved.

25.12 The material used for different component is not declared by applicant. It should be declared.

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

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

25.15 The cut-off device is not marked as per Indian standard. Printed or engraved marking may be provided.

25.16 Time require to full charge battery with AC charger is observed as 8 to 9 hours and voltage is observed as 12.30 to 13 V.

25.17 The spraying operation time after fully charging with electric charger was observed as 6 to 7 hours.

25.18 Though volumetric efficiency of sprayer on battery operated mode was not possible to ascertain for the want of rated speed and rated pressure declared by the applicant. All the same the volumetric efficiency, so to speak, was not up to the required value throughout the range of pressure. In contrast volumetric efficiency was observed as 75.7% which is not within the requirement of relevant Indian Standard.

25.19 The operating lever got bent during the test. It should not distort crack or break. It should be looked into for improvement.

25.20 The current drawn by motor at no load and on load was observed as 0.5 A and 1.5 A respectively which does not conform to requirement of IS: 14459-1997.

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

25.22 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
25.23 Safety provision/safety wear
   i) The accessories viz mask, hand gloves and safety goggles for operator’s safety are provided with sprayer.

   ii) Safety instructions regarding handling poisonous agrochemical and first aid may be added in operator’s manual.

26. TECHNICAL LITERATURE

Only a leaflet is provided with the machine during test. The operator’s manual should be brought out as per IS:8132:1999. Service manual and spare part catalogue should be brought out for the customer guidance.

TESTING AUTHORITY

<table>
<thead>
<tr>
<th>G. R. AMBALKA R</th>
<th>AGRICULTURAL ENGINEER</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R. K. NEMA</td>
<td>SENIOR AGRICULTURAL ENGINEER</td>
<td></td>
</tr>
<tr>
<td>P. K. PANDEY</td>
<td>DIRECTOR</td>
<td></td>
</tr>
</tbody>
</table>

27. APPLICANT’S COMMENTS

<table>
<thead>
<tr>
<th>Para No.</th>
<th>Our Reference</th>
<th>Applicant’s Comments</th>
</tr>
</thead>
<tbody>
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<td>27.1</td>
<td>25.1-25.7, 25.9-25.12, 25.15, 25.16, 25.19</td>
<td>We will incorporate in the machine.</td>
</tr>
<tr>
<td>27.2</td>
<td>25.23</td>
<td>In future, all sprayers will be marked with labelling plate with all the necessary information.</td>
</tr>
<tr>
<td>27.3</td>
<td>25.24 (ii), 26</td>
<td>In future, we will mention all the safety signs and hazard pictorials and other required details on operator’s manual.</td>
</tr>
</tbody>
</table>