HYMATIC H-808
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
[ISO 9001:2008 COMPLIANT INSTITUTION]
BATTERY OPERATED KNAPSACK SPRAYER  
(FITTED WITH SOLAR PANEL)  
HYMATIC H-808, COMMERCIAL

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cushion</td>
<td>Foam, rubber, foam plastic</td>
<td>Not provided</td>
<td>Does not conform</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.

Declared in the specification sheet.  
Conforms

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

1. Date of test: 18.10.2016
2. Atmospheric conditions:
   a) Temperature: 32° C
   b) Relative humidity: 29 %
   c) Pressure: 738.5 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

1. 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>
<td>3210</td>
<td>50</td>
<td>1</td>
<td>2230</td>
<td>NIL</td>
<td>2226</td>
<td>2226</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>2220</td>
<td></td>
<td>2226</td>
<td>2226</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>2225</td>
<td></td>
<td>2226</td>
<td>2226</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>2230</td>
<td></td>
<td>2226</td>
<td>2226</td>
</tr>
<tr>
<td>3116</td>
<td>200</td>
<td>1</td>
<td>1520</td>
<td>NIL</td>
<td>1510</td>
<td>1510</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>1510</td>
<td></td>
<td>1510</td>
<td>1510</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>1500</td>
<td></td>
<td>1510</td>
<td>1510</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>1510</td>
<td></td>
<td>1510</td>
<td>1510</td>
</tr>
<tr>
<td>3061</td>
<td>350</td>
<td>1</td>
<td>900</td>
<td>NIL</td>
<td>909</td>
<td>909</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>910</td>
<td></td>
<td>909</td>
<td>909</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>915</td>
<td></td>
<td>909</td>
<td>909</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>910</td>
<td></td>
<td>909</td>
<td>909</td>
</tr>
<tr>
<td>3012</td>
<td>500</td>
<td>1</td>
<td>290</td>
<td>NIL</td>
<td>286</td>
<td>286</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>280</td>
<td></td>
<td>286</td>
<td>286</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>285</td>
<td></td>
<td>286</td>
<td>286</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>290</td>
<td></td>
<td>286</td>
<td>286</td>
</tr>
</tbody>
</table>

Minimum discharge rate  = 286 ml/min at 500 kPa
Maximum discharge rate  = 2226 ml/min at 50kPa

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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 85.6 % & 11.1 % at 50kPa and at 500 kPa pressure respectively. Hence the Volumetric Efficiency was not found as much as required by the code, throughout the range.

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

As the applicant has not specified the specific speed for sprayer operation, the power requirement cannot be ascertained. However the power requirement of DC motor fitted on sprayer was observed as following.

1. Motor operating voltage : 12 V
2. Current drawn by motor at no load : 0.4 A
3. Current drawn by motor at load : 1.2 A
4. Observed motor power requirement : 14.4 Watt
5. Motor speed at no load : 3480 rpm
6. Motor speed at on load : 2989 rpm
7. Time required for fully discharge of battery : 6.5 to 7.5 h
8. No load rpm of motor after 6 hours of operation : 1947 rpm

6. PRESSURE ADJUSTMENT TEST

1. Date of test : 18.10.2016
2. Atmospheric conditions :
   a. Temperature : 32 °C
   b. Relative humidity : 29 %
   c. Pressure : 738.5 mm of Hg
3. Data recorded

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Working pressure(kPa)</th>
<th>Fluctuation range (kg/cm²)</th>
<th>Pressure drop (kg/cm²)</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>50</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>350</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
<tr>
<td>4.</td>
<td>500</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
</tbody>
</table>

4. Resistant of pressure: Yes
Each sprayer shall be marked with the following particulars

<table>
<thead>
<tr>
<th>Cl. 9 Marking &amp; Packing</th>
<th>a) Manufacturer’s name or recognized trade mark</th>
<th>Marked as Hymatic Agro Equipment</th>
<th>Conforms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cl. 9.1 Marking</td>
<td>b) Batch or Serial No.</td>
<td>S-1/8</td>
<td>Conforms</td>
</tr>
<tr>
<td>IS:3906-1995 Packing</td>
<td>c) Tank nominal capacity</td>
<td>16 ltr.</td>
<td>Conforms</td>
</tr>
<tr>
<td></td>
<td>Each sprayer shall be packed as agreed to between the purchase and the supplier for safe handling in transit.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 model and country of origin is not marked. It should be marked.

16.3 Motor serial number and speed is not specified. It should be specified.

16.4 Pump model, serial number, working pressure, rated pressure, rated speed and country of origin is not marked. It should be marked.

16.5 The pump discharge outlet nipple length does not meet the requirement of Indian Standard.

16.6 Spray lance batch or code number is not marked. It should be marked.

16.7 Cut-off device strainer area is less than the requirement of Indian Standard. It should be improved.

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

16.9 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.

16.10 The cut off device and spray lance not marked. It should be marked.

16.11 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.
16.12 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.

16.13 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.

16.14 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.

16.15 The maximum trigger actuation torque is 43.9 kgf-cm. This exceeds the limit specified by Indian Standard. It should be improved.

16.16 Agitator is not provided. It may be provided.

16.17 Battery charger country of origin is not specified by applicant. It should be specified on charger.

16.18 Motor serial number and speed is not specified. It should be specified.

16.19 Pump serial number is not specified by applicant. It should be specified on sprayer.

16.20 The strap cushion is not provided. It may be provided.

16.21 The back rest cushion is not provided on sprayer. It may be provided.

16.22 The current drawn by motor at no load and on load was observes as 0.4 and 1.2A respectively which does not conform to requirement of IS- 14459: 1997.

16.23 The volumetric efficiency of sprayer, though truly unascertainable for the want of required declaration, was observed less than 80%, which needs to be examined.

16.24 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
16.25 Safety provisions/safety wear

i) The accessories viz. mask, hand gloves and safety goggles for operator’s safety are provided with sprayer.

ii) The safety instructions regarding handling of poisonous chemicals & first aid should be provided in operator’s manual.

17. TECHNICAL LITERATURE

A single page leaflet named operator’s manual is provided with the sprayer during test, which is not found adequate. It is recommended to develop the operator’s manual as per IS:8132-1999. Service manual and spare part catalogue should also be brought out for guidance of user.

TESTING AUTHORITY

G.R. AMBALKAR
AGRICULTURAL ENGINEER

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>Cl. No. 16.1-16.14, 16.15, 16.17, 16.19, 16.23</td>
<td>We will incorporate in the machine.</td>
</tr>
<tr>
<td>18.2</td>
<td>16.24</td>
<td>In future, all sprayers will be marked with labeling plate with all the necessary information</td>
</tr>
<tr>
<td>18.3</td>
<td>16.25 (ii), 17</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>