ENGINE OPERATED KNAPSACK SPRAYER
HUSQVARNA, 321S15

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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Website: http://nrfmtti.gov.in/
Tele./FAX: 01662-276984
Conforms

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
Conforms

3. TEST FOR DISCHARGE RATE OF PUMP
[vide Clause 8.3 of IS-11313: 2007]

1. Date of test: 16.07.2018
2. Atmospheric conditions
   a) Temperature: 31°C
   b) Relative humidity: 77%
   c) Pressure: 97.1 kPa
3. Data recorded

<table>
<thead>
<tr>
<th>Speed of engine (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 delivery from the discharge line (ml/min)</th>
<th>Discharge rate of pump (ml/min)</th>
<th>Hydraulic Power (kW)</th>
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</thead>
<tbody>
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<td>6240</td>
<td>15.0</td>
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<td>6650</td>
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<tr>
<td>5908</td>
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<td>6200</td>
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<td>6342.5</td>
<td>6342.5</td>
<td>0.26</td>
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<td></td>
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<td>4</td>
<td>3700</td>
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</tr>
</tbody>
</table>

Minimum discharge rate = 3900.0 ml/min at 30 kg/cm²
Maximum discharge rate = 6650.0 ml/min at 15 kg/cm²
Discharge at rated pressure = 6342.5 ml/min at 25 kg/cm²
4. TEST FOR VOLUMETRIC EFFICIENCY OF PUMP
[vide clause 8.4 of IS: 11313-2007]

Rated pressure, kg/cm² : 25
Engine speed corresponding to rated pressure (rpm) : 5908
Theoretical cubic capacity of pump, ml : 6736
Actual volume at rated pressure, ml : 6342.5
Volumetric efficiency, % : 94

5. POWER REQUIREMENT

During the pump operation from minimum to maximum pressure range, the max. hydraulic power was observed as 0.26 kW against the declared net power output of engine as 0.95 HP

6. ENGINE PERFORMANCE TEST

In pursuance of Ministry's order No. 7-23/2011-M&T (I&P) dated 20.04.2011 the engine performance test has not been conducted and the specifications/performance as specified by the applicant/ declared in the manual have been endorsed.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Parameter</th>
<th>Declaration</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Engine Type</td>
<td>Single cylinder 2 stroke air cooled spark ignition engine.</td>
</tr>
<tr>
<td>ii</td>
<td>Bore,(mm)</td>
<td>33</td>
</tr>
<tr>
<td>iii</td>
<td>Stroke (mm)</td>
<td>30</td>
</tr>
<tr>
<td>iv</td>
<td>Displacement,(cc)</td>
<td>25.4</td>
</tr>
<tr>
<td>v</td>
<td>Net power output</td>
<td>0.70 kW @ 7000 rpm</td>
</tr>
<tr>
<td>vi</td>
<td>Max torque, Nm</td>
<td>1.2</td>
</tr>
</tbody>
</table>

7. PRESSURE ADJUSTMENT TEST
(Vide clause 8.7.1 of IS: 11313-2007)

1. Date of test : 16.07.2018
2. Atmospheric conditions
   a. Temperature : 31 °C
   b. Relative humidity : 77 %
   c. Pressure : 97.1 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>
<td>15</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
<tr>
<td>3</td>
<td>25</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
<tr>
<td>4</td>
<td>30</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
</tbody>
</table>

4. Resistance of pressure: Yes
15. CONFORMITY TO INDIAN STANDARDS

i) IS:11313-2007 (Reaffirmed 2012)-Hydraulic power sprayer specification : Does not conform in toto

ii) Spray nozzle and spray gun as per IS:3652-1995 : Does not conform in toto
(Reaffirmed 2011)

iii) Hose and hose connection as per IS:10134-1994 : Conforms

iv) IS: 2643-2005-Pipe threads where pressure-tight joint are not made on the threads-dimensions, tolerance and designation : Conforms

v) IS: 7347-1974 (Reaffirmed 2006)-Specification for performance of small size spark ignition engines for agricultural water pumps, sprayers, tillers, reapers and other similar applications : Could not be ascertained

16. COMMENTS AND RECOMMENDATIONS

16.1 The sprayer year of manufacture is not specified. It should be specified.

16.2 The spray gun is not designated and marked by identification mark. The identification mark as specified by relevant Indian Standard, MUST be provided.

16.3 The pump year of manufacture is not specified. It MUST be specified.

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

16.5 The strainer in nozzle is not provided. It may be considered for providing

16.6 The manufacture’s name or recognized trade mark and batch or code number on nozzle is not provided. It MUST be provided.

16.7 The spray gun manufacturer’s name or recognized trade mark & batch or code number is not marked on gun. It MUST be marked.

16.8 The discharge rate for jet spray pattern of spray gun at the pressure of 600 kPa does not conform to the requirement of IS: 3652:1995. It MUST be looked into for appropriate improvement

16.9 The discharge rate for fine cone spray & jet spray pattern of nozzle at a pressure of 300 kPa does not conform to the requirement of IS: 3652-1995. It MUST be looked into.

16.10 At rated pressure of 25 kg/cm², the pump discharge was observed as 6342.5 ml/min against the minimum requirement of 8000 ml/min. This MUST be examined.

16.11 The spray angle for fine cone spray pattern of nozzle at a pressure of 300 kPa does not conform to the requirement of IS: 3652-1995. It MUST be looked into.

16.12 As an important thing as pressure regulator was found “not working”. It MUST be looked into.

16.13 At rated pressure of 25 kg/cm². The engine speed dropped up to 5908 rpm against the rated engine speed of 7000 rpm. This MUST be looked into for necessary action.

16.14 A suitable pressure gauge MUST be provided on sprayer as per the specification specified by Indian Standard.

16.15 The diameter of connecting rod of spray gun does not conform to the requirement of Indian standard. It MUST be looked into.
16.16 A suitable labeling 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 of engine
ix. SFC of engine

16.17 Safety provision/safety wear

i) Safety wear for operators safety during operation was not provided. It MUST be provided.

ii) Safety instruction regarding handling poisonous agro chemicals before, during and after spraying operation should be provided on sprayer.

17. TECHNICAL LITERATURE

The following literatures are provided with sprayer for guidance to the user.

i) Operator’s manual of sprayer
ii) Operator’s manual of engine
iii) Parts catalogue

The operators instruction book of sprayer need to be updated as per IS : 8132 - 1999
The safety instructions regarding handling poisonous agro chemicals before, during and after spraying operation should be included in the operator’s manual.

TESTING AUTHORITY

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 comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.1</td>
<td>16.2, 16.4, 16.6, 16.7</td>
<td>We will insist that the supplier provide the product with the respective marking.</td>
</tr>
<tr>
<td>18.2</td>
<td>16.8, 16.9, 16.11, 16.13, 16.5</td>
<td>We will look into the same for production samples.</td>
</tr>
</tbody>
</table>