ICS HKS-25
ENGINE 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
[ISO 9001:2015 CERTIFIED]

Website: http://nrfmtti.gov.in/
Tele./FAX: 01662-276984
### 3. TEST FOR DISCHARGE RATE OF PUMP
[vide Clause 8.3 of IS-11313: 2007]

1. Date of test: 17.05.2019
2. Atmospheric conditions:
   a) Temperature: 33°C
   b) Relative humidity: 47%
   c) Pressure: 98.8 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</th>
<th>Average delivery from the discharge line (ml/min)</th>
<th>Discharge rate of pump (ml/min)</th>
<th>Hydraulic Power (kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6583</td>
<td>7</td>
<td>1.</td>
<td>7200</td>
<td>NIL</td>
<td>7115.0</td>
<td>7115.0</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.</td>
<td>7000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.</td>
<td>7210</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.</td>
<td>7050</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6470</td>
<td>8</td>
<td>1.</td>
<td>6860</td>
<td>NIL</td>
<td>6917.5</td>
<td>6917.5</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.</td>
<td>6900</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.</td>
<td>6950</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.</td>
<td>6960</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6408</td>
<td>9</td>
<td>1.</td>
<td>6800</td>
<td>NIL</td>
<td>6807.5</td>
<td>6807.5</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.</td>
<td>6800</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.</td>
<td>6850</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.</td>
<td>6780</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6310</td>
<td>10</td>
<td>1.</td>
<td>6700</td>
<td>NIL</td>
<td>6720.0</td>
<td>6720.0</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.</td>
<td>6750</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.</td>
<td>6720</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.</td>
<td>6710</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Minimum discharge rate** = 6720 ml/min at 10 kg/cm²
- **Maximum discharge rate** = 7115.0 ml/min at 7 kg/cm²
- **Discharge at rated pressure** = 7115.0 ml/min at 7 kg/cm²

### 4. TEST FOR VOLUMETRIC EFFICIENCY OF PUMP
[vide clause 8.4 of IS: 11313-2007]

Date: 02.06.2019
Rated pressure, kg/cm²: 7
Engine speed corresponding to rated pressure (rpm): 6583
Theoretical cubic capacity of pump, ml: 7720.39
Actual volume at rated pressure, ml: 7115.0
Volumetric efficiency, % : 92

5. POWER REQUIREMENT

During the pump operation from minimum to maximum pressure range, the max. hydraulic power was observed as 0.11 kW against the declared net power output of engine as 0.72 kW.

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 4 stroke air cooled spark ignition engine.</td>
</tr>
<tr>
<td>ii</td>
<td>Bore,(mm)</td>
<td>35</td>
</tr>
<tr>
<td>iii</td>
<td>Stroke (mm)</td>
<td>26</td>
</tr>
<tr>
<td>iv</td>
<td>Displacement,(cc)²</td>
<td>25</td>
</tr>
<tr>
<td>v</td>
<td>Net power output</td>
<td>0.72 kW@7000 rpm</td>
</tr>
<tr>
<td>vi</td>
<td>Max Torque</td>
<td>1.0 Nm at 5000 rpm</td>
</tr>
</tbody>
</table>

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

1. Date of test : 17.05.2019
2. Atmospheric conditions :
   a. Temperature : 33 °C
   b. Relative humidity : 47 %
   c. Pressure : 98.8 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>7</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
<tr>
<td>2.</td>
<td>8</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
<tr>
<td>3.</td>
<td>9</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
<tr>
<td>4.</td>
<td>10</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
</tbody>
</table>

4. Resistance of pressure: Yes

8. TEST FOR HYDRAULIC SPRAY GUN
[vide Clause 7.3(b) of IS- 11313: 2007 & Annex E of IS- 3652; 1995]

Date of test : 30.05.2019
Type of gun : Screw type

8.1 TEST FOR DISCHARGE RATE OF SPRAY GUN

The discharge rate for fine cone spray & jet spray pattern as 1700 ml/min & 5000 ml/min at the pressure of 600 kPa was declared by the applicant. The discharge rate corresponding to 600 kPa pressure was observed as under
- For fine cone spray pattern : 1905 ml/min
- For jet spray pattern : 6325 ml/min
17. COMMENTS AND RECOMMENDATIONS

17.1 The manufacturing year and serial number of sprayer is not marked. It MUST be looked into.

17.2 The manufacturing year and serial number of pump is not specified. It MUST be looked into.

17.3 The thickness of barrel does not meet the requirement of relevant code/standard. It MUST be looked into.

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

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

17.6 The spray gun is not designated and marked by its identification mark. The identification mark as specified by relevant Indian Standard. It MUST to be provided.

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

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

17.9 Though a pressure regulator provided but that was not in the working condition therefore its conformity IS:11313-2007 could not be ascertained. It MUST be looked into for creative action.

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

17.11 At rated pressure of 7 Kg/cm² the engine speed dropped up to 6583 rpm against the rated engine speed of 7000 rpm. This MUST be looked into for necessary action.

17.12 The pressure gauge full scale reading of 100 bar is provided, thus it does not conform to requirement of IS:11313-2007. It MUST be looked into.

17.13 The rated pressure of 7 kg/cm² the pump discharge was observed as 7115.5 ml/min against the minimum requirement of 8000 ml/min. This MUST be examined.

17.14 The percentage variation in discharge rate of pump does not meet the requirement of relevant code/standard. It MUST be looked into.

17.15 The engaged length of outlet port is not meet the requirement of relevant code/standard. It MUST be looked into.
17.16 The maximum achievable pressure does not meet the requirement of relevant code/standard. It MUST be looked into.

17.17 During the endurance test of pump the pressure gauge was found damaged and was replace with new one. It MUST be looked into.

17.18 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

17.19 Safety provision/safety wear
   i) Hand gloves, apron and gum boots MUST be added in safety wear.
   ii) Safety instructions regarding handling poisonous agro-chemical before, during and after spraying operations should be provided on sprayer.

18. TECHNICAL LITERATURE

The following literatures are provided with sprayer for guidance to the user.
   i) Operator’s manual of sprayer with parts catalogue.
   ii) Operator’s manual of engine.

The following literature MUST be provided with the sprayer :-
   i) Service manual of sprayer.

The operator instruction manual of sprayer needs to be updated as per IS 8132-1999.

TESTING AUTHORITY

| R. K. NEMA  |
| SENIOR AGRICULTURAL ENGINEER |  

| P. K. PANDEY  |
| DIRECTOR |  

19. APPLICANT'S COMMENTS

No comments received from applicant