ENGINE OPERATED KNAPSACK SPRAYER
CHUAN DAO (KAWASHIMA) F-769
WITH ZENOAH G26LS ENGINE

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

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

1. Date of test : 16.01.2018
2. Atmospheric conditions:
   a) Temperature : 19° C
   b) Relative humidity : 45%
   c) Pressure : 99.2 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>
</tr>
</thead>
<tbody>
<tr>
<td>7602</td>
<td>7.0</td>
<td>1</td>
<td>7350</td>
<td>Nil</td>
<td>7347.5</td>
<td>7347.5</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>7370</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>7400</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>7270</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7290</td>
<td>13.0</td>
<td>1</td>
<td>7000</td>
<td>Nil</td>
<td>6965.0</td>
<td>6965.0</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>6950</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>7010</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>6900</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6892</td>
<td>20.0</td>
<td>1</td>
<td>5870</td>
<td>400.0</td>
<td>5960.0</td>
<td>6360.0</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>6000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>5970</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>6000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6485</td>
<td>25.0</td>
<td>1</td>
<td>3100</td>
<td>2332.5</td>
<td>3480</td>
<td>5812.5</td>
<td>0.24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>3640</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>3450</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>3730</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Minimum discharge rate = 5812.5 ml/min at 25 kg/cm²
Maximum discharge rate = 7347.5 ml/min at 7 kg/cm²
Discharge at rated pressure = 6360.0 ml/min at 20 kg/cm²
4. TEST FOR VOLUMETRIC EFFICIENCY OF PUMP
[vide clause 8.4 of IS: 11313-2007]

Rated pressure, kg/cm² : 20
Engine speed corresponding to rated pressure (rpm) : 6892
Theoretical cubic capacity of pump, ml : 7319
Actual volume at rated pressure, ml : 6360
Volumetric efficiency, % : 87

5. POWER REQUIREMENT

During the pump operation from minimum to maximum pressure range, the max. hydraulic power was observed as 0.24 kW against the declared net power output of engine as 1.10 Ps.

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>34</td>
</tr>
<tr>
<td>iii</td>
<td>Stroke (mm)</td>
<td>28</td>
</tr>
<tr>
<td>iv</td>
<td>Displacement,(cc)</td>
<td>25.4</td>
</tr>
<tr>
<td>v</td>
<td>Net power out put</td>
<td>0.82 kW @ 7500 rpm</td>
</tr>
<tr>
<td>vi</td>
<td>Net Torque</td>
<td>0.8 Nm @ 6500 rpm</td>
</tr>
</tbody>
</table>

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

1. Date of test : 16.01.2018
2. Atmospheric conditions :
   a. Temperature : 19 °C
   b. Relative humidity : 45 %
   c. Pressure : 99.2 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>7.0</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
<tr>
<td>2.</td>
<td>13.0</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
<tr>
<td>3.</td>
<td>20.0</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
<tr>
<td>4.</td>
<td>25.0</td>
<td>NIL</td>
<td>NIL</td>
<td>--</td>
</tr>
</tbody>
</table>
4. Resistance of pressure: Yes

NORTHERN REGION FARM MACHINERY TRAINING & TESTING INSTITUTE, HISAR
MARKING AND PACKING (CL10 IS:11313-2007)

Cl.10.1 Marking
Each sprayer shall be marked with the following particulars:

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Manufacturer’s name &amp; his registered trade mark, Sl. No. and batch or code No.</th>
<th>Powered by ZENOAH CHUAN DAO FOR SWARNA AGRITECH-INDIA MARKET GENUINE PRODUCT F-769</th>
<th>Does not conform in spirit and also in toto</th>
</tr>
</thead>
</table>

15. CONFORMITY TO INDIAN STANDARDS

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

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 serial number is not specified. It MUST be specified.

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

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

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

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

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

16.7 The strainer in pump is not provided. It may be considered for providing

16.8 The manufacture’s name or recognized trade mark and batch or code number on nozzle is not provided. It MUST be provided.
16.9 The spray gun manufacturer’s name or recognized trade mark & batch or code number is not marked on gun. It MUST be marked.

16.10 The discharge rate for fine cone spray pattern and 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.

16.11 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.

16.12 The spray angle for fine cone spray pattern of gun at a pressure of 600 kPa does not conform to the requirement of IS: 3652-1995. It MUST be looked into for further improvement.

16.13 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.

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

16.15 A suitable pressure gauge MUST be provided on sprayer as per the specifications specified by Indian standard.

16.16 At rated pressure of 20Kg/cm² the pump discharge was observed as 6360 ml/min. against the minimum requirement of 8000 ml/min. This must be examined.

16.17 At the rated pressure of 20kg/cm², the engine speed dropped up to 6892 rpm against the rated engine speed of 7500 rpm. This MUST be looked into for necessary action.

16.18 Percentage variation of discharge during endurance test of gun at cone spray pattern does not meet the requirement of Indian Standard. This MUST be looked into for necessary action.

16.19 Percentage variation of discharge during endurance test of sprayer does not meet the requirement of Indian Standard. This MUST be looked into for necessary action.

16.20 The pump inlet port and fitting material does not meet the requirement of Indian Standard. It MUST be looked into.

16.21 During the endurance test of sprayer the breakage of delivery spout was observed. The delivery spout was replaced with new one. This MUST be looked into.

16.22 During the endurance test of gun the breakage of delivery valve was observed. The delivery valve was replaced with new one. This MUST be looked into.

16.23 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
ENGINE OPERATED KNAPSACK SPRAYER
CHUAN DAO (KAWASHIMA) F 769 WITH ZENOAH G26LS
ENGINE (COMMERCIAL)

vi. Rated pressure
vii. Discharge rate
viii. Power rating of engine
ix. SFC of engine

16.24 Safety provision/safety wear
i) Safety wear for operator’s safety during operation was not provided. It MUST be provided.

17. TECHNICAL LITERATURE

The following literatures are provided with sprayer for guidance to the user.
   i) Operator’s instruction book of sprayer
   iii) Part’s catalogue for sprayer
The operator’s instruction book of sprayer needs to be updated as per IS: 8132-1999

TESTING AUTHORITY

R. K. NEMA
SENIOR AGRICULTURAL ENGINEER

P. K. PANDEY
DIRECTOR

18. APPLICANT’S COMMENTS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Cl. No. of Report</th>
<th>Applicant’s comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.1</td>
<td>16.1</td>
<td>In response to the observations on the Draft test report, the applicant has chosen to declare “708152” as the serial no. of the equipment. The requirement of the standard, however, is that each sprayer shall be marked with, inter alia, serial number.</td>
</tr>
<tr>
<td>18.2</td>
<td>16.2</td>
<td>In response to the observations on the Draft test report, the applicant has chosen to declare “2017” as the year of manufacture of the equipment</td>
</tr>
<tr>
<td>18.3</td>
<td>16.3</td>
<td>In response to the observations on the Draft test report, the applicant has chosen to declare that the lance provided is YC – 101 (Straight), But the requirement of the standard is “marking” of the designation on the gun. The applicant has declared that the suggestion will be communicated to manufacturer.</td>
</tr>
</tbody>
</table>