SHAKTI SPS-708
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

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

1. Date of test: 27.08.2016
2. Atmospheric conditions:
   a) Temperature: 32.8°C  
   b) Relative humidity: 48.3%  
   c) Pressure: 729.7 mm of Hg
3. Data recorded

<table>
<thead>
<tr>
<th>Specified 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>
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</table>

Minimum discharge rate = 5956 ml/min at 25 kg/cm²  
Maximum discharge rate = 6755 ml/min at 13 kg/cm²

4 TEST FOR VOLUMETRIC EFFICIENCY OF PUMP

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 93.75% & 88.19% at 13 kg/cm² and at 25 kg/cm² pressure respectively. Hence the Volumetric Efficiency was not found as much as required by the code throughout the range of working pressure declared by the applicant.
14. 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 (Reaffirmed 2011)
    Does not conform in toto

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

15. COMMENTS AND RECOMMENDATIONS

15.1 The material of piston or plunger is not as per Indian Standard. It needs to be improved.

15.2 The pressure gauge marking exceeds 2.5 times the declared value of pressure. Suitable pressure gauge may be provided to ensure the compliance of the relevant Indian Standard.

15.3 The thickness of the wall of the barrel is less than the value specified in the relevant Indian Standard. It must be improved.

15.4 The diameter of connecting rod is less than the value specified in the relevant Indian Standard. It may be looked into.

15.5 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.

15.6 Relevant Indian Standard must be followed with regard to marking on spray gun.

15.7 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.

15.8 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.

15.9 As the discharge rate for fine cone spray & jet spray pattern of spray gun at the pressure of 600 ± 60kPa was not declared by the applicant, the conformity of spray angle of spray gun to Cl E 3.1 of Annexure E 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.

15.10 As the spray angle for fine cone spray pattern at a pressure of 600 ± 60kPa was not declared by the applicant, the conformity of discharge to Cl. E 3.2 of Annexure E 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.

15.11 As the discharge rate for fine cone spray & jet spray pattern at a pressure of 300 kPa was not declared by the applicant, the conformity of discharge of nozzle 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.
15.12 As the spray angle for fine cone spray pattern at a pressure of 300 kPa was not declared by the applicant, the conformity of spray angle of nozzle 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.

15.13 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

15.14 Safety provision/safety wear
   i) The accessories viz. mask, hand gloves and safety goggles for operator’s safety has not been provided with sprayer. It needs to be provided for safety of user.
   ii) Safety instructions regarding handling poisonous agro-chemical and first aid may also be added in operator’s manual.

16. TECHNICAL LITERATURE

Though an user manual was provided, the same was, however, found inadequate; as all necessary information required was not there. It needs to be updated as per IS:8132-1999.

TESTING AUTHORITY

R. K. NEMA
SENIOR AGRICULTURAL ENGINEER

P. K. PANDEY
DIRECTOR

17. APPLICANT’S COMMENTS

Editorial comments received from applicant incorporated in the test report.