

व्यावसायिक परीक्षण रिपोर्ट  
COMMERCIAL TEST REPORT

संख्या/ No.: PS-524/2977/2023  
माह/Month: April, 2023

**THIS TEST REPORT VALID UP TO : 30<sup>th</sup> April, 2030**



**SHAKTI, SPS-P768F  
ENGINE OPERATED PORTABLE SPRAYER,  
4-STROKE**



भारत सरकार  
Government of India  
कृषि एवं किसान कल्याण मंत्रालय  
Ministry of Agriculture and Farmers Welfare  
कृषि एवं किसान कल्याण विभाग  
Department of Agriculture and Farmers Welfare  
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xvii)	Pipe for agitator	Galvanized iron, Brass, PVC	PVC	Conforms
xviii)	Piston (bucket) screw	Brass, stainless steel	Not applicable for this design	--
xix)	Crank case	Aluminum alloy	Not applicable for this design	--
xx)	Roller pump body	Nickel resistant cast iron	Not applicable for this design	--
xxi)	Roller pump and plate	Nickel resistant cast iron	Not applicable for this design	--
xxii)	Roller pump rotor	Nickel resistant cast iron	Not applicable for this design	--
xxiii)	Piston pump crank shaft	Carbon steel	A quadrant gear driven by drive shaft of gear box mounted on plunger rod.	--
xxiv)	Pump inlet port end fitting	Brass	Brass	Conforms
xxv)	Piston rod guide	Brass, Aluminum alloy, Gunmetal, Nylon	Not applicable for this design	--
xxvi)	Connecting rod	Carbon steel	Not applicable for this design	--
xxvii)	Gudgeon pin	Carbon steel	Not applicable for this design	--
xxviii)	Big end bearing	Steel coated with tin base white metal	Not applicable for this design	--
xxix)	Small end bush	Gunmetal	Not applicable for this design	--
xxx)	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 by the manufacturer	Conforms

#### 4. RUNNING-IN

Applicant has not recommended running-in of sprayer.

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

1. Date of test : 22.03.2023
2. Atmospheric conditions
  - a) Temperature : 24.0° C
  - b) Relative humidity : 65.2 %
  - c) Pressure : 99.4 kPa

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### 3. Data recorded

Avg. Speed of engine (rpm)	Working pressure (kg/cm <sup>2</sup> )	Test No.	Delivery from the discharge line (ml/min)	Overflow (ml/min)	Average delivery from the discharge line (ml/min)	Discharge rate of pump (ml/min)	Hydraulic Power (kW)
7115	10.0	1.	8240	NIL	8192.5	8192.5	0.13
		2.	8190				
		3.	8160				
		4.	8180				
7065	12.0	1.	8000	NIL	8002.5	8002.5	0.16
		2.	8040				
		3.	7950				
		4.	8020				
6925	14.0	1.	7850	NIL	7827.5	7827.5	0.18
		2.	7800				
		3.	7840				
		4.	7820				
6785	16.0	1.	7610	NIL	7622.5	7622.5	0.20
		2.	7650				
		3.	7600				
		4.	7630				

**Minimum discharge rate** = 7622.5 ml/min at 16 kg/cm<sup>2</sup>  
**Maximum discharge rate** = 8192.5 ml/min at 10 kg/cm<sup>2</sup>  
**Discharge at rated pressure** = 8192.5 ml/min at 10 kg/cm<sup>2</sup>

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

Date : 22.03.2023  
 Rated pressure, kg/cm<sup>2</sup> : 10  
 Engine speed corresponding to rated pressure (rpm) : 7120  
 Theoretical cubic capacity of pump, ml : 8328.96  
 Actual volume at rated pressure, ml : 8187.50  
 Volumetric efficiency, % : 98.3 %

### 7. POWER REQUIREMENT

During the pump operation from minimum to maximum pressure range. the max. hydraulic power was observed as 0.20 kW against the declared net power output of engine as 0.74 kW.

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

1. Date of test : 22.03.2023
2. Atmospheric conditions
  - a. Temperature : 24.0 °C
  - b. Relative humidity : 65.2 %
  - c. Pressure : 99.4 kPa

## 3. Data recorded

Sr. No.	Working pressure (kg/cm <sup>2</sup> )	Fluctuation range (kg/cm <sup>2</sup> )	Pressure drop (kg/cm <sup>2</sup> )	Ratio
1.	10.0	NIL	NIL	--
2.	12.0	NIL	NIL	--
3.	14.0	NIL	NIL	--
4.	16.0	NIL	NIL	--

4. Resistance of different pressure: Yes

**10. TEST FOR HYDRAULIC SPRAY GUN**

[Vide clause 7.3(b) of IS: 11313-2007 &amp; Annex E of IS: 3652-1995]

Date of test : 17.03.2023  
Type of gun : Screw type

**10.1 TEST FOR DISCHARGE RATE OF SPRAY GUN**

The discharge rate for fine cone spray & jet spray pattern as 3282 ml/min & 4860 ml/min at the pressure of 600 kPa was declared by the applicant. However, the discharge rate corresponding to 600 kPa pressure was observed as under

- For fine cone spray pattern : 3532.5 ml/min
- For jet spray pattern : 5157.5 ml/min

**10.2 TEST FOR SPRAY ANGLE OF SPRAY GUN**

The spray angle for fine cone spray pattern at a pressure of 600 kPa was declared as 70 degree by the applicant. However, the spray angle corresponding to 600 kPa pressure was observed as 74.6 degree.

**10.3 STRENGTH OF GUN**

Sr. No	Details	Condition
1	Condition of nozzle tip	Closed
2	Hydraulic pressure	1500 kPa
3	Duration of pressure	5 Minutes
4	Result	No leak, crack or bursting of gun was observed during test.

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**10.4 SPRAY GUN DESIGNATION** : Marked as AG-C 70 3282 J-4860

**10.5 MARKING**

Manufacturer's name or recognized trade mark : Marked as Shakti

Batch or code number : Marked as SAG-A

**10.6 ENDURANCE TEST OF GUN (Vide clause E 3.6 of IS:3652-1995)**

1. Date : 06.03.2023 to 16.03.2023
2. Total running time (h) : 48
3. Quantity of liquid collected and spray angle observed during endurance test.

Sr. no.	Collection	Discharge rate ml/min		Spray angle, degree
		Fine cone spray pattern	Jet spray pattern	
a	First collection	3487.5	5050.0	73.2
b	Second collection	3555.0	5012.5	74.6
c	Third collection	3452.5	4960.0	73.9
d	fourth collection	3452.5	5132.5	72.6
e	Fifth collection	3285.0	5065.0	73.2
f	Sixth collection	3357.5	4940.0	74.6
g	Seventh collection	3585.0	5067.5	73.9
h	Eighth collection	3327.5	4957.5	72.6

- Remarks-**
- (i) Percentage variation of discharge at fine cone spray pattern from first to last collection, 4.59 %.
  - (ii) Percentage variation of discharge at jet spray pattern from first to last collection, 1.83 %.
  - (iii) Percentage variation in spray angle of gun at cone spray pattern from first to last collection, 0.6 degree.

**11. TEST FOR NOZZLE**

[Vide clause 5.15 of IS- 11313-2007 & Annex F of IS- 3652-1995]

Date of test : 17.03.2022

Type of nozzle : Solid cone type, Adjustable

**11.1 TEST FOR DISCHARGE RATE OF NOZZLE**

The discharge rate for fine cone spray & jet spray pattern as 3240 ml/min & 4300 ml/min at a pressure of 300 kPa was declared by the applicant. However, the discharge rate corresponding to 300 kPa pressure was observed as under:-

- For fine cone spray pattern : 3170.0 ml/min
- For jet spray pattern : 4617.5 ml/min

**11.2 TEST FOR SPRAY ANGLE OF NOZZLE**

The spray angle for fine cone spray pattern at the pressure of 300 kPa was 60 degree declared by the applicant. However, the spray angle corresponding to 300 kPa pressure was observed as 63.9 degree.

**11.3 SPRAY DISTRIBUTION PATTERN OF NOZZLE**

The liquid discharge from nozzle at 300 kPa pressure was collected in glass tube of patternator. The spray pattern as per the quantity of liquid collected is represented in tabular form and in Fig. 1.

**11.4 NOZZLE DESIGNATION** : Marked as AN-C 60 3240 J-4300

Provision of strainer in nozzle : **Not provided**

**11.5 MARKING**

Manufacturer's name or recognized trade mark : Marked as Shakti

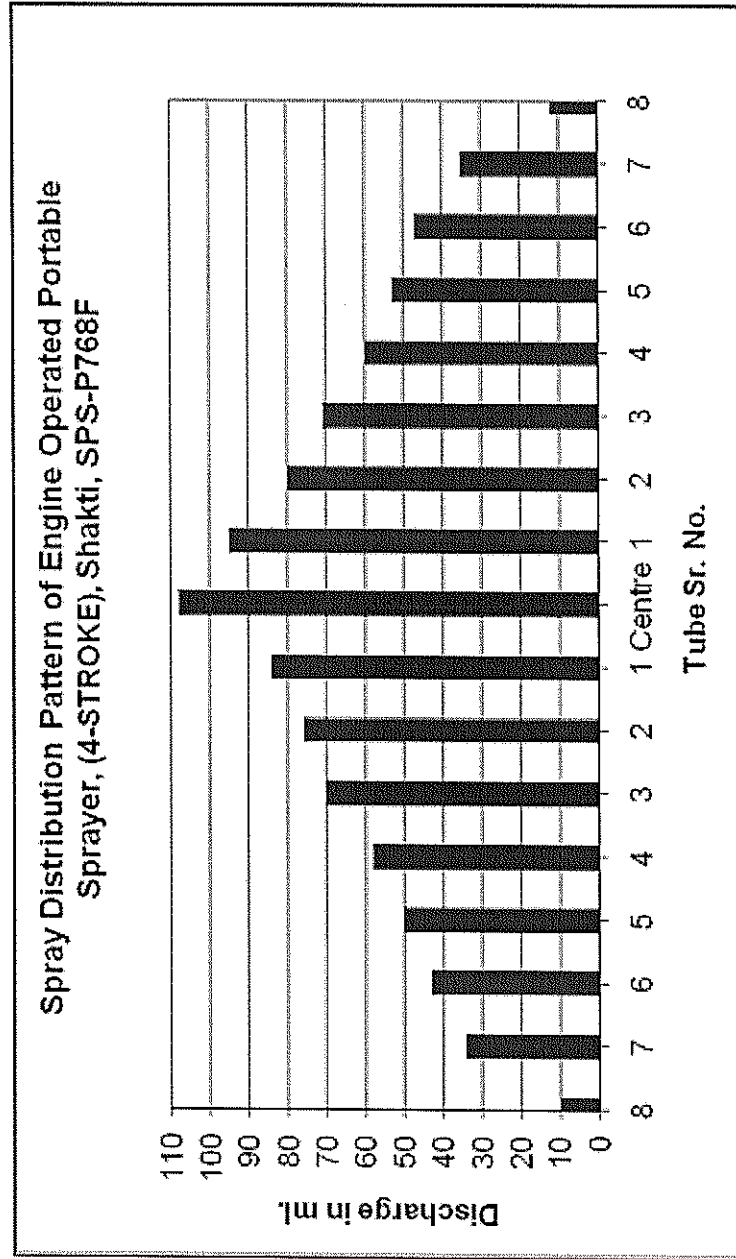
Batch or code number : Marked as SA-NDA

**12. AIR PRESSURE CHAMBER TEST**

**As the air pressure chamber is not provided, this test was not conducted.**

**DATA OF SPRAY DISTRIBUTION PATTERNATOR TEST OF NOZZLE**

No. of tube	8	7	6	5	4	3	2	1	Centre	1	2	3	4	5	6	7	8
Discharge in ml.	10	34	43	50	58	70	76	84	108	95	80	71	60	53	47	35	12

**FIG. 1 : SPRAY DISTRIBUTION PATTERN**

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**13. ENDURANCE TEST OF SPRAYER**  
[vide Clause 8.8 of IS- 11313: 2007]

1. Date(s) of Test: 23.02.2023 to 03.03.2023
2. Total running hours: - 50
3. Quantity of liquid Collected (ml/min.):-
  - a) First Collection - 8145.0
  - b) Second Collection - 8117.5
  - c) Third Collection - 8117.5
  - d) Fourth Collection - 8185.0
  - e) Fifth Collection - 8120.0
  - f) Sixth Collection - 8107.5
  - g) Seventh Collection - 8090.0

4. Percentage variation of discharge rate from first to last collection was observed as 0.68 %.

**14. TEST FOR HOSE AND HOSE CONNECTION**  
[vide Clause 5.14.3 of IS 11313: 2007 & Clause 7.2 of IS- 10134: 1994]

Date of test- 17.03.2023		
Sr. No	Details	Condition
1	Test Condition	Hose outlet end closed
2	Hydraulic pressure applied	1.5 MPa
3	Duration of pressure	1 Minute
4	Result	No leak, crack or breakage observed in hose and hose connection during the test.

**15. ASSESMENT OF CONSTRUCTIONAL REQUIREMENTS**

Ref. Cl. No.	Specified requirements as per Indian Standard IS: 11313-2007	Observation	Remarks
Cl.5.1	The tank, if provided, its capacity shall be not less than 100 liters. The tank capacity shall be declared by the manufacturer.	Not applicable for portable power sprayer.	--
Cl. 5.1.1	The tank when filled up to its total capacity, the tank shall not show any sign of leakage and shall not buckle.	Not applicable for this design.	--
Cl.5.2 Filling hole	A filling hole of suitable diameter shall be provided on top of the tank.	Not applicable for this design.	--
Cl. 5.2.1	The hole shall be covered with a tightly fitted cap.	Not applicable for this design.	--
Cl. 5.2.2	The suitable drain plug shall be provided at the bottom of the tank for cleaning.	Not applicable for this design.	--
Cl. 5.3 Lubrication Cl. 5.3.1	A suitable arrangement shall be provided for lubricating the moving parts and shall be indicated by the manufacturer in the manual.	Two grease cups are provided and indicated in the manual.	Conforms



## 21. COMMENTS AND RECOMMENDATIONS

- 21.1 The serial number & year of manufacture of sprayer is not specified. It **MUST** be looked into.
- 21.2 The ignition timing of engine is not specified. It **MUST** be looked into.
- 21.3 The pressure gauge with full scale reading of 120 bar is provided. Thus, it does not conform to requirement of IS:11313-2007. It **MUST** be looked into.
- 21.4 The strainer in nozzle is not provided. It may be provided.
- 21.5 The diameter of connecting rod of spray gun does not meet the requirement of relevant code/standards. It **MUST** be looked into.
- 21.6 The necessary tools are not provided. It **MUST** be provided.
- 21.7 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 pressure
  - vi) Rated speed
  - vii) Discharge rate
  - viii) Power rating of engine
  - ix) Specific fuel consumption (SFC) of engine
- 21.8 **Safety provision /safety wear.**
- (i) Safety instructions regarding handling poisonous agro-chemical before, during and after spraying operators should be provided on sprayer.

## 22. TECHNICAL LITERATURE


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

- i) Operator’s manual
- ii) Service manual
- iii) Part’s catalogue

However, the manuals of sprayer need to be updated as per IS: 8132-1999

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**TESTING AUTHORITY**

Er. SANJAY KUMAR AGRICULTURAL ENGINEER	
Dr. MUKESH JAIN DIRECTOR	 03.04. 2023

The draft test report is compiled by Sh. Abhishek Chourey, MTS (Technical)

**23. APPLICANT'S COMMENTS**

We will follow recommendation and comments mention of test report  
in our manufacturing and packing process.

