

व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT

संख्या/ No.: PS-546/3115/2023
माह/Month: December, 2023

THIS TEST REPORT VALID UP TO : 31st December, 2030



**PADGILWAR, PAI-KPS-4S
ENGINE OPERATED KNAPSACK SPRAYER**



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

उत्तरी क्षेत्र कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

Northern Region Farm Machinery Training and Testing Institute

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[ISO 9001:2015 CERTIFIED]

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5. TEST FOR DISCHARGE RATE OF PUMP

[vide Clause 8.3 of IS- 11313: 2007]

1. Date of test : 21.09.2023
2. Atmospheric conditions
- a) Temperature : 34.1° C
- b) Relative humidity : 61.4 %
- c) Pressure : 97.7 kPa

3. Data recorded

Avg. Speed of engine (rpm)	Working pressure (kg/cm ²)	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)
6775	05	1.	8120	NIL	8115.00	8115.00	0.09
		2.	8100				
		3.	8130				
		4.	8110				
6530	08	1.	8020	NIL	8027.50	8027.50	0.10
		2.	8050				
		3.	8010				
		4.	8030				
6420	10	1.	7940	NIL	7945.00	7945.00	0.11
		2.	7950				
		3.	7930				
		4.	7960				
6263	12	1.	7815	NIL	7806.25	7806.25	0.13
		2.	7800				
		3.	7810				
		4.	7800				

Minimum discharge rate = 7806.25 ml/min at 12 kg/cm²

Maximum discharge rate = 8115.00 ml/min at 5 kg/cm²

Discharge at rated pressure = 8027.50 ml/min at 8 kg/cm²

6. TEST FOR VOLUMETRIC EFFICIENCY OF PUMP

[vide clause 8.4 of IS: 11313-2007]

Date : 21.09.2023

Rated pressure, kg/cm² : 8

Engine speed corresponding to rated pressure (rpm) : 6977.5

Theoretical cubic capacity of pump, ml : 8164.8

Actual volume at rated pressure, ml : 8047.5

Volumetric efficiency, % : 98.56%



7. POWER REQUIREMENT

During the pump operation from minimum to maximum pressure range, the max. hydraulic power was observed as 0.12 kW against the declared net power output of engine as 0.74 kW.

8. ENGINE RATING TEST AND FUEL CONSUMPTION TEST

Date of test : 22.09.2023
Type of dynamometer : Electrodyne
Model of dynamometer : 4 kW AA6-15
Dynamometer constant : 9950

Sr. No.	Hours of the day	Load (%)	Load (kg)	Engine speed (rpm)	Power (kW)	Fuel consumption			Specific energy (kWh/l)
						(kg/h)	(l/h)	(g/kWh)	
	09:05	Test started							
1.	10:03	100	0.54	6526	0.37	0.240	0.325	651	1.1
2.	11:06	100	0.53	6528	0.36	0.237	0.321	654	1.1
3.	12:06	100	0.52	6451	0.35	0.231	0.313	659	1.1
4.	13:05	100	0.52	6549	0.36	0.241	0.326	674	1.1
5.	14:04	100	0.53	6555	0.36	0.241	0.327	662	1.1
6.	15:05	100	0.51	6498	0.35	0.228	0.309	658	1.1
7.	16:04	100	0.51	6522	0.35	0.229	0.310	658	1.1
8.	17:04	100	0.53	6506	0.36	0.224	0.303	620	1.2
	Avg.	100	0.52	6516	0.36	0.221	0.317	655	1.1
9.	17:03	110	0.57	6317	0.38	0.216	0.293	573	1.3
10.	17:14	75	0.39	7040	0.29	0.224	0.303	778	0.9
11.	17:25	50	0.26	7358	0.20	0.259	0.351	1291	0.6
12.	17:35	25	0.14	7673	0.11	0.289	0.391	2565	0.3
13.	17:50	Unloaded	0.09	7969	0.08	0.327	0.444	4362	0.2

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

1. Date of test : 21.09.2023
2. Atmospheric conditions
a. Temperature : 34.5 °C
b. Relative humidity : 60.4 %
c. Pressure : 97.7 kPa



3. Data recorded

Sr. No.	Working pressure(kg/cm ²)	Fluctuation range (kg/cm ²)	Pressure drop (kg/cm ²)	Ratio
1.	6.0	NIL	NIL	--
2.	8.0	NIL	NIL	--
3.	10.0	NIL	NIL	--
4.	12.0	NIL	NIL	--

4. Resistance of different pressure: Yes

18.1.4 Big end bearing

Dia. of crank pin (mm)	Dia. of bearing (mm)	Clearance (mm)		Max. permissible wear limit (mm)	
		Diametrical	Axial	Diametrical	Axial
Needle Bearing provided					

18.1.5 Main bearing of crank shaft:

Sr. No.	Dia. of main Journal (mm)	Dia. of main bearing (mm)	Diametrical Clearance of main bearing (mm)	End float of crank shaft (mm)	Max. permissible wear limit (mm)	
					Diametrical	End float of crank shaft
1.	Both side ball bearing provided					

18.1.6 Piston Rings groove clearance:

Ring no.	Ring groove clearance, mm	Max. permissible wear limit, mm
1 st compression ring	0.04	0.50
2 nd compression ring	0.03	0.50
Oil ring	Not applicable	

18.1.7 Valve guide clearance:

Valve guide diameter (mm)		Valve stem diameter (mm)		Valve guide clearance (mm)		Max. permissible wear limit (mm)	
Inlet	Exhaust	Inlet	Exhaust	Inlet	Exhaust	Inlet	Exhaust
Not applicable							

18.2 Valve guides and valve springs

Valve spring stiffness, kgf/mm : Inlet – 0.46
Exhaust – 0.45

19. CRITICAL TECHNICAL SPECIFICATIONS

[Vide Ministry Letter No. 13-9/2019-M & T (I&P)-Part dated 26.04.2019 and F. No. 9-1/2019 M&T (I&P) dated 20.8.2019]

Sr. No.	Parameters	Specification	Observed	Remarks
1.	Tank Capacity	--	Not applicable for knapsack sprayer	--
2.	Discharge, ml/min	8000 (min) at rated speed and rated pressure	The discharge rate at rated pressure is 8315.0 ml/min.	Conforms
3.	Pressure regulator	Must be provided	Provided	Conforms
4.	Horizontal thrown up jet spray, m	6 (min)	9.6 meter	Conforms
5.	Mass of spray gun, kg	1.6 (max.)	0.280 kg	Conforms
6.	Spray gun marking	Manufacturer name or recognized trademark & batch or code number as per BIS code	Marked	Conforms
7.	Marking of nozzle	Manufacturer name or recognized trademark & batch or code number as per BIS code	Marked	Conforms

8.	Pressure gauge	Must be provided	Liquid filled pressure gauge is provided	Conforms
9.	Safety accessories	Mask, hand gloves and safety goggles, apron, gum boots must be provided	Provided	Conforms
10.	Necessary tools & spares	Spanners, set of gasket, measuring jar should be provided	A set of necessary tools are provided with spark plug spanner, spray gun, gasket set, 2 no. open spanner, pump kit, measuring jar, suction strainer are provided.	Conforms
11.	Making/labeling of sprayer	Must be riveted on the body of sprayer having name & address of manufacture, month & year of manufacture, rated speed, rated pressure, discharge rate, power rating of engine, SFC of engine	Just a sticker and not proper labeling plate is provided on the sprayer with following information.	Partially conform
12.	Literature	Operator manual, service manual & parts catalogue should be provided.	Provided	Conforms

20. CONFORMITY TO INDIAN STANDARDS

- i) IS:11313-2007 (Reaffirmed 2012)-Hydraulic power sprayer-specification : **Partially conform**
- ii) Spray nozzle and spray gun as per IS:3652-1995 (Reaffirmed 2011) : **Conforms**
- 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 : **Conforms**



21. COMMENTS AND RECOMMENDATIONS

- 21.1 The ignition timing of engine is not specified. It **MUST** be looked into.
- 21.2 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.
- 21.3 The strainer in nozzle is not provided. It may be provided.
- 21.4 The diameter of connecting rod of spray gun does not meet the requirement of relevant code/standards. It **MUST** be looked into.

21.5 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

21.6 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 were 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

TESTING AUTHORITY

Er. SANJAY KUMAR AGRICULTURAL ENGINEER	
Dr. MUKESH JAIN DIRECTOR	 01.12.2023

The test report is compiled by Sh. Vikram, Sr. Tech.

23. APPLICANT’S COMMENTS

We will take necessary corrective action for meeting the specification for the next future production.

