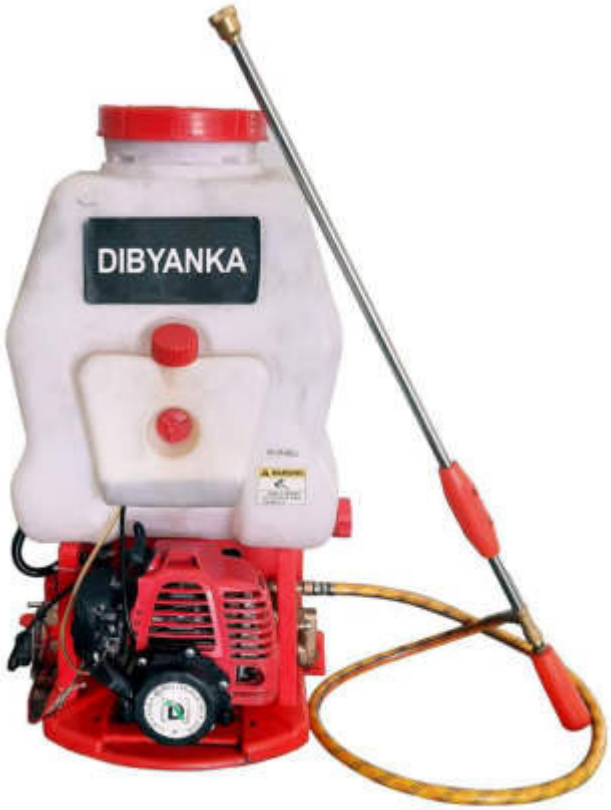
व्यावसायिक परीक्षण रिपोर्ट

COMMERCIAL TEST REPORT

संख्या/ **No.: PS-541/3102/2023**

माह/**Month: November, 2023**



DIBYANKA, DAIPL-DPS
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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8. ENGINE RATING TEST AND FUEL CONSUMPTION TEST

Date of test : 11.10.2023

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)	Specific (g/kWh)	
	9.25	Test started							
1.	10.26	100	0.74	6488	0.50	0.304	0.409	411	1.2
2.	11.28	100	0.74	6490	0.50	0.295	0.397	587	1.3
3.	12.25	100	0.73	6522	0.50	0.296	0.399	594	1.3
4.	13.25	100	0.74	6514	0.50	0.289	0.390	573	1.3
5.	14.27	100	0.74	6513	0.50	0.289	0.390	573	1.3
6.	15.23	100	0.74	6486	0.50	0.297	0.400	591	1.3
7.	16.26	100	0.74	6467	0.50	0.289	0.389	577	1.3
8.	16.55	100	0.74	6526	0.51	0.294	0.396	581	1.3
	Avg.	**100**	**0.74**	**6501**	**0.50**	**0.294**	**0.396**	**561**	**1.3**
9.	17.24	110	0.80	6402	0.54	0.286	0.386	533	1.4
10.	17.36	75	0.55	6966	0.40	0.318	0.428	793	0.9
11.	17.44	50	0.37	7632	0.30	0.318	0.428	1076	0.7
12.	17.57	25	0.18	8415	0.16	0.330	0.445	2081	0.4
13.	18.16	Unloaded	0.09	8761	0.08	0.584	0.787	7078	0.1

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

1. Date of test : 29.09.2023
2. Atmospheric conditions
   a. Temperature : 35.5 °C
   b. Relative humidity : 36.3 %
   c. Pressure : 97.8 kPa
3. Data recorded

Sr. No.	Working pressure(kg/cm^2)	Fluctuation range (kg/cm^2)	Pressure drop (kg/cm^2)	Ratio
1.	5.0	NIL	NIL	--
2.	10.0	NIL	NIL	--
3.	15.0	NIL	NIL	--
4.	20.0	NIL	NIL	--

4. Resistance of different pressure: Yes

10. TEST FOR HYDRAULIC SPRAY GUN
[Vide clause 7.3(b) of IS: 11313-2007 & Annex E of IS: 3652-1995]

Date of test : 29.09.2023
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 3000 ml/min & 3200 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 : 2902.5 ml/min
  For jet spray pattern : 3100.0 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 75 degree by the applicant. However, the spray angle corresponding to 600 kPa pressure was observed as 76.5 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.

10.4 SPRAY GUN DESIGNATION : **Not marked**

10.5 MARKING
Manufacturer's name or recognized trade mark : **Not marked**
Batch or code number : **Not marked**

10.6 ENDURANCE TEST OF GUN (Vide clause E 3.6 of IS:3652-1995)
1. Date : 19.09.2023 to 27.09.2023
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	2950.0	3015.0	76.5
b	Second collection	2892.5	3005.0	75.2
c	Third collection	2910.0	2937.5	76.2
d	fourth collection	3010.0	3135.0	75.3
e	Fifth collection	2962.5	3102.5	75.3
f	Sixth collection	2970.0	3082.5	77.2
g	Seventh collection	2925.0	3017.5	77.5
h	Eighth collection	2992.5	3055.0	75.9

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

1. Date(s) of Test : 08.09.2023 to 15.09.2023
2. Total running hours: - 50
3. Quantity of liquid Collected (ml/min.):-
   a) First Collection - 6212.5
   b) Second Collection - 6017.5
   c) Third Collection - 5980.0
   d) Fourth Collection - 6105.0
   e) Fifth Collection - 5842.5
   f) Sixth Collection - 5830.0
   g) Seventh Collection - 6250.0
4. Percentage variation of discharge rate from first to last collection was observed as 0.60 %.

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- 29.09.2023		
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 knapsack 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 knapsack sprayer	--
Cl.5.2 Filling hole	A filling hole of suitable diameter shall be provided on top of the tank.	Not applicable for knapsack sprayer	--
Cl. 5.2.1	The hole shall be covered with a tightly fitted cap.	Not applicable for knapsack sprayer	--
Cl. 5.2.2	The suitable drain plug shall be provided at the bottom of the tank for cleaning.	Not applicable for knapsack sprayer	--
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

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
1st compression ring	0.02	0.3
2nd compression ring	0.04	0.3
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 : **Not applicable**

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 5952.5 ml/min.	Does not conform
3.	Pressure regulator	Must be provided	Provided	Conforms
4.	Horizontal thrown up jet spray, m	6 (min)	7.9 meter	Conforms
5.	Mass of spray gun, kg	1.6 (max.)	0.283 kg	Conforms
6.	Spray gun marking	Manufacturer name or recognized trademark & batch or code number as per BIS code	**Not marked**	**Does not conform**
7.	Marking of nozzle	Manufacturer name or recognized trademark & batch or code number as per BIS code	**Not marked**	**Does not conform**

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, 3 hole lance, gasket set, 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.	Instruction manual provided	**Partially conform**

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) : **Partially conform**

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 70 kg/cm^2 is provided. Thus, it does not conform to requirement of IS:11313-2007. It **MUST** be looked into.

21.3 At rated pressure of 15 kg/cm^2, the pump discharge was observed as 5952.5 ml/min. against the minimum requirement of 8000.0 ml/min. This **MUST** be examined.

21.4 The strainer in nozzle is not provided. It may be provided.

21.5 The spray gun is not designated and marked by identification mark. The identification mark as per specified by Indian Standard. It **MUST** be looked into.

21.6 The spray nozzle is not designated and marked by identification mark. The identification mark as per specified by Indian Standard. It **MUST** be looked into.

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

Instruction manual provided by the applicant.
However, the following literature **MUST** be provided with sprayer as per IS: 8132-1999 for guidance to the users.

i) Operator's manual
ii) Service manual
iii) Part's catalogue

TESTING AUTHORITY

Er. SANJAY KUMAR **AGRICULTURAL ENGINEER**	
Dr. MUKESH JAIN **DIRECTOR**	20.11.2023

The test report is compiled by Sh. C. Veeranjaneyulu, Sr. Tech.

23. APPLICANT'S COMMENTS

We will update the recommendations made by you in the production level.