

व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT

संख्या/ No.: PS - 528/3042/2023
माह/Month: June, 2023

THIS TEST REPORT VALID UP TO : 30th June, 2028



**HYMARK, HK-51-12
BATTERY 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

ट्रैक्टर नगर, सिरसा रोड, हिसार, (हरियाणा) - 125 001

Tractor Nagar, Sirsa Road, HISAR (Haryana)-125 001

[ISO 9001:2015 CERTIFIED]

Website: <http://nrfmtti.gov.in/>

E-mail: fmti-nr@nic.in

Tele./FAX: 01662-276984

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xxxii)	Material of construction of cut off device components			
-Body, valve seat, gland nut, cap & collar, Valve stem	Brass, Engineering plastic, stainless steel	Engg. Plastic	Conforms	
-Nipple	Brass, Engineering plastic, stainless steel,	Engg. Plastic	Conforms	
-Valve	Brass, synthetic rubber, plastic, stainless steel	Plastic	Conforms	
-Strainer	Brass, stainless steel, plastic	Plastic	Conforms	
-Operating knob	Brass, Engineering plastic	Not applicable	--	
- Operating trigger	Steel, Engineering plastic	Engg. Plastic	Conforms	
-Spring	Stainless steel,	Stainless steel	Conforms	
-Gasket	Synthetic rubber, fiber, PVC	PVC	Conforms	
-Gland seal	PVC	PVC	Conforms	
-Gland packing	Asbestos rope	Not applicable	--	
xxxiii)	Material of construction of various components as per IS: 3906-1995			
Strap	Woven web cotton/synthetic yarn	Synthetic yarn	Conforms	
Skirt/Stand	Steel, plastic.	Plastic	Conforms	
Strap buckle	Steel, Engg. Plastic	Engg. Plastic	Conforms	
Cushion	Foam, rubber, foam plastic	Not available	Does not conform	
xxxiv)	The material used for different components shall be declared by the manufacturer. All the components mentioned in the Table No.-I of IS:11313-2007 may not be present in a particular sprayer.		Declared by the manufacturer	Conforms

4. RUNNING-IN

The sprayer was run in for 1.0 hours as recommended by applicant before starting of test.

5. TEST FOR DISCHARGE RATE OF PUMP (Vide Clause 8.3 of IS: 11313– 2007)

1. Date of test : 27.04.2023
2. Atmospheric conditions
 - a) Temperature : 35.8 °C
 - b) Relative humidity : 24.1 %
 - c) Pressure : 98.1 kPa
3. Data recorded

Avg. Speed of Pump (rpm)	Working pressure (kg/cm ²)	Test No.	Delivery from the discharge line (ml/min)	Over-flow (ml/min)	Average discharge from the discharge line (ml/min)	Discharge rate of pump (ml/min)
3482	2.0	1	2280	NIL	2275.0	2275.0
		2	2250			
		3	2300			
		4	2270			

3431	3.0	1	1800	NIL	1795.0	1795.0
		2	1780			
		3	1810			
		4	1790			
3396	3.5	1	1710	NIL	1715.0	1715.0
		2	1730			
		3	1700			
		4	1720			
3382	4.0	1	1500	NIL	1505.0	1505.0
		2	1520			
		3	1490			
		4	1510			
3343	5.0	1	1300	NIL	1285.0	1285.0
		2	1270			
		3	1290			
		4	1280			

Minimum discharge rate = 1285.0 ml/min at 5 kg/cm²
Maximum discharge rate = 2275.0 ml/min at 2 kg/cm²
Discharge at rated pressure = 1715.0 ml/min at 3.5 kg/cm²

6. TEST FOR VOLUMETRIC EFFICIENCY (Vide Clause 8.4 of IS: 11313 -2007)

Date of Test : 27.04.2023
 Rated pressure, kg/cm² : 3.5
 Avg. discharge of water at rated pressure, ml/min : 1715.0
 Avg. discharge of water at no-load, ml/min : 3615.0
 Avg. pump speed at no-load, rev/min : 3907
 Avg. pump speed at rated pressure, rev/min : 3396
 Volumetric efficiency of pump, % : 54.58

Remark:- The volumetric efficiency does not conform to the requirement of IS:11313-2007

7. POWER REQUIREMENT (Vide Clause 8.5 of IS : 11313-2007)

Date of test : 27.04.2023
 Power requirement of DC motor fitted on sprayer was observed as following:-
 1. Motor operating voltage : 12 V
 2. Avg. current drawn by motor at no load : 1.31 A
 3. Avg. current drawn by motor at load : 2.29 A
 4. Avg. motor operating voltage : 12.80 V
 5. Avg. observed motor power requirement : 29.41 watt
 6. Avg. motor speed at no load : 3907 rpm
 7. Avg. motor speed at load : 3396 rpm
 8. Avg. time required for full discharge of battery : 6.8 to 8.0 hours
 9. Avg. no load rpm of motor after 6 hours of operation : 3383 rpm



10. Time required to fully charge the battery : 6.5 to 7.8 hours
with AC charger was observed as

11. The spraying operation time after fully : 6.5 to 8.0 hours
charging the battery was observed as

8. PRESSURE ADJUSTMENT TEST

1. Date of test : 27.04.2023
2. Atmospheric conditions
 - a. Temperature : 35.8 °C
 - b. Relative humidity : 24.1 %
 - c. Pressure : 98.1 kPa
3. Data recorded

Sr. No.	Working pressure (kg/cm ²)	Fluctuation range (kg/cm ²)	Pressure drop (kg/cm ²)	Ratio
1.	2.0	NIL	NIL	--
2.	3.0	NIL	NIL	--
3.	3.5	NIL	NIL	--
4.	4.0	NIL	NIL	--
5.	5.0	NIL	NIL	--

4. Resistance to different pressure: Yes

9. TEST FOR SPRAY LANCE (Vide Annex D of IS: 3652 –1995)

Date of test : 26.04.2023
Type : Straight Type (Type-A)

9.1 STRENGTH OF SPRAY LANCE

Sr. No	Details	Condition
1	Test Condition	Outlet closed
2	Hydraulic pressure applied	1 MPa
3	Duration of pressure retained	5 minutes
4	Result	No leak, crack, or bursting of lance was observed during test

9.2 MARKING ON SPRAY LANCE

Manufacturer's name or recognized trade mark : **Not marked**
Nominal length : Marked as 525 mm
Batch or code number : Marked as A-1/26

10. TEST FOR CUT-OFF DEVICE (Vide Annex C Clause 6.8.3 of IS: 3652–1995)

Date of test : 26.04.2023
Type : Trigger type (Type-A)

10.1 MAXIMUM TRIGGER ACTIVATION TORQUE

Required torque	: 35 kgf-cm
Observed torque	: 30.4 kgf-cm



10.2 STRENGTH TEST FOR CUT-OFF DEVICE

Sr. No	Details	Condition
1	Condition of outlet	Closed
2	Hydraulic pressure	750 kPa
3	Duration of pressure retained	5 Minutes
4	Observation	No leakage, crack or bursting of cut-off device was observed during test.

10.3 LEAKAGE AND RELIABILITY TEST FOR CUT-OFF DEVICE

Date of test : 26.04.2023		
Sr. No.	Details	Condition
1	Test Condition	Mounted on test setup
2	Hydraulic pressure retained	300 kPa
3	Operating cycles	5000 cycles at pressure 300 kPa and repeated for 500 cycles at a pressure of 600 kPa @ 15 cycles per minutes
4	Observation	No drip or leak of cut off device through valve was observed during the test

10.4 MARKING ON CUT-OFF DEVICE

- a) Manufacturer's name or recognized trade mark : **Not marked**
 b) Batch or code number : Marked as A-1/26
 c) Type of cut off device : **Not marked**

**11. TEST FOR NOZZLE
(Vide Annex F of IS : 3652-1995)**

Date of test : 25.04.2023
 Type of Nozzle : Hollow cone type, Fixed type

11.1 TEST FOR DISCHARGE RATE OF NOZZLE

The discharge rate for fine cone spray pattern as 1200 ml/min at a pressure of 300 kPa was declared by the applicant. The discharge rate corresponding to 300 kPa pressure was observed as below:-

- For fine cone spray pattern : 1170.0 ml/min

11.2 TEST FOR SPRAY ANGLE OF NOZZLE

The spray angle of nozzle at a pressure of 300 kPa was declared by the applicant as 90 degree. The spray angle corresponding to 300 kPa pressure was observed as 90.5 degree.

11.3 ENDURANCE TEST OF NOZZLE

- i) Date : 17.04.2023 to 24.04 .2023
 ii) Total running time (h) : 48
 iii) Quantity of liquid collected and spray angle observed during endurance test

Sr. No.	No. of collection	Avg. Discharge rate, ml/min	Spray angle, Degree.
		Fine Cone Spray pattern	
a)	First collection	1155.0	92.0
b)	Second collection	1152.5	91.1
c)	Third collection	1150.0	90.5
d)	Fourth collection	1170.0	91.6
e)	Fifth collection	1172.5	90.5
f)	Sixth collection	1177.5	90.0
g)	Seventh collection	1155.0	92.0
h)	Eighth collection	1160.0	91.1

Remark: i) Percentage variation in discharge rate at fine cone spray pattern from first to last collection is 0.43 %.

ii) The variation in spray angle for fine cone spray pattern from first to last collection is 0.9 degree.

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.

- 11.5 NOZZLE DESIGNATION** : Marked as AN 90-1200
Provision for strainer in nozzle : **Not provided**
- 11.6 MARKING OF NOZZLE**
Manufacturer's name or recognized trade mark : **Not marked**
Batch or code number : Marked as A-1/26

12. ENDURANCE TEST OF SPRAYER (Vide clause 8.8 of IS: 11313-2007)

- Date of test :- 10.04.2023 to 16.04.2023
- Total running time (h)- 50
- Quantity of liquid collected during endurance:-
Avg. Discharge (ml/min)

a)	First Collection	-	1745.0
b)	Second Collection	-	1720.0
c)	Third Collection	-	1722.5
d)	Fourth collection	-	1745.0
e)	Fifth Collection	-	1725.0
f)	Sixth Collection	-	1715.0
g)	Seventh Collection	-	1715.0
- Percentage variation of discharge from first to last collection is 1.72 %.



13. TEST FOR PUMP CHAMBER
(Vide Clause 7.1 of IS: 10134-1994)

Date of test : 26.04.2023

Sr. No	Details	Condition
1	Test Condition	: Outlet end closed
2	Pressure applied -Hydraulic pressure	: Motor stopped beyond 6.2 kg/cm ² pressure against the pressure requirement of 8.75 kg/cm ²
	-Pneumatic pressure	: 5.25 kg/cm ²
3	Duration	: 1 minutes each
4	Result	: No leakage, crack deformation or breakage was observed in pump chamber during the test.

Remarks:- Tendency of stalling of motor was observed beyond 6.2 kg/cm² hydraulic pressure and therefore test could not be taken up to the required pressure of 8.75 kg/cm². Hence, sprayer does not conform to the requirement laid down in clause 7.1 of IS: 10134-1994.



DATA FOR SPRAY DISTRIBUTION OF NOZZLE

No. of tube	10	9	8	7	6	5	4	3	2	1	Centre	1	2	3	4	5	6	7	8	9	10
Discharge in ml.	10	26	41	75	80	86	65	54	48	48	40	39	46	50	62	71	58	42	26	15	05

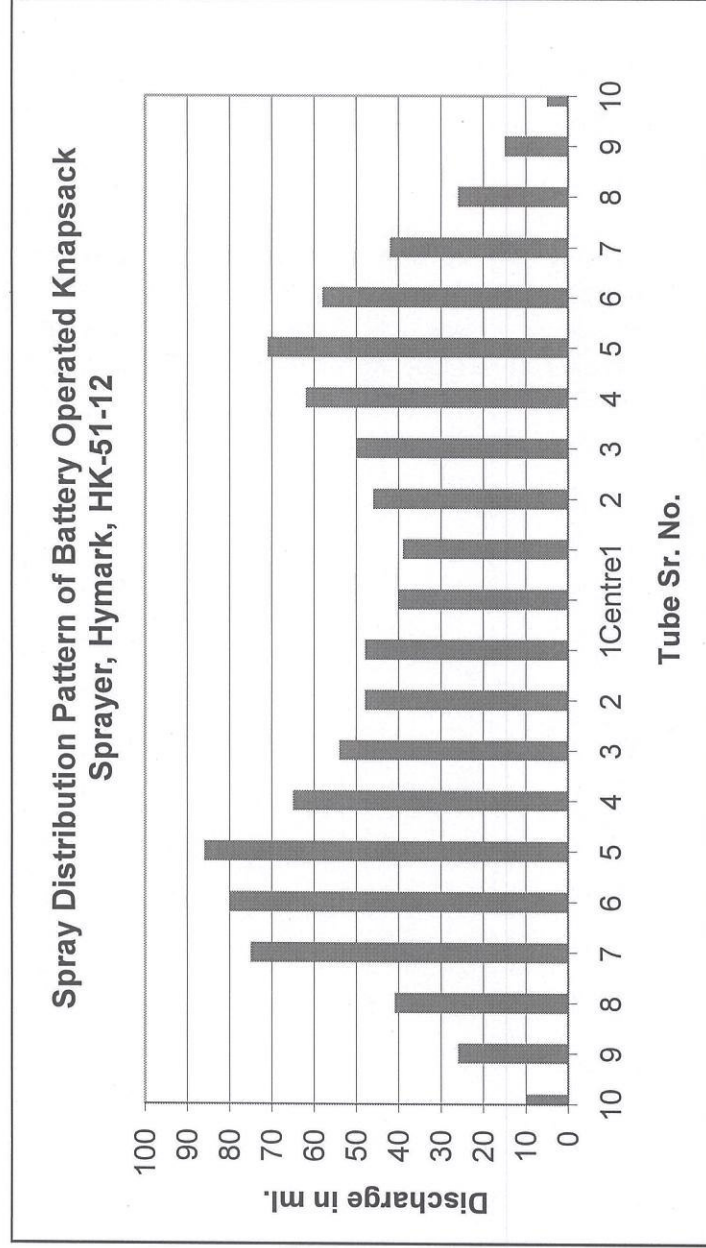


FIG. 1 : SPRAY DISTRIBUTION PATTERN

16.	Making/labelling of sprayer	The labelling plate should be provided on the body of sprayer having name & address of manufacturer, month & year of manufacture, rated pressure, discharge rate, country of origin.	Just a sticker and not proper labelling plate is provided on the sprayer with following information Hymark Battery operated knapsack sprayer B.No./S.No. A-1/26 Model No. HK-51-12 F-21, Sector-11, Noida (U.P)	Conforms
17.	Literature	Operator manual, service manual & parts catalogue should be provided.	Provided	Conforms

18. CONFORMITY TO INDIAN STANDARDS

- i) IS: 11313-2007 Hydraulic power sprayers- : **Partially conform**
specification
- ii) IS: 10134-1994-Method of test for manually : **Partially conform**
operated sprayer
- iii) Spray nozzle and spray gun as per IS:3652-1995 : **Partially conform**
(Reaffirmed 2011)

19. COMMENTS & RECOMMENDATIONS

- 19.1 The strainer in nozzle is not provided. It may be provided.
- 19.2 The manufacturer's name or recognized trade mark of nozzle is not marked. It **MUST** be looked into.
- 19.3 The manufacturer's name or recognized trade mark of lance is not marked. It **MUST** be looked into.
- 19.4 The volumetric efficiency of pump does not meet the requirement of Indian Standard. It **MUST** be improved.
- 19.5 The manufacturer's name or recognized trade mark and type of cut off device is not marked. It **MUST** be looked into.
- 19.6 During the hydraulic test of pump chamber, the motor stopped beyond 6.2 kg/cm² pressure against the pressure requirement of 8.75 kg/cm² and test could not be conducted. It **MUST** be looked into and improved.
- 19.7 During the strap drop test, the buckle/bracket of strap assembly failed to hold the strap in its position. It should be improved as per relevant standard.
- 19.8 The strainer area of cut-off device does not meet the requirement of Indian Standard. It **MUST** be looked into.

- 19.9 The average aperture size of cut off device strainer does not meet the requirement of Indian standard. It must be looked into.
- 19.10 The strap cushion is not provided. It **MUST** be looked into.
- 19.11 A suitable labeling plate (not sticker) needs to be provided with “Interlia” following information.
- i) Manufacturing’s name
 - ii) Make
 - iii) Model
 - iv) Month & year of manufacture
 - v) Rated Speed
 - vi) Rated pressure
 - vii) Discharge rate
 - viii) Power rating
 - ix) Country of origin
- 19.12 i) **Safety provision /safety wear.**
The safety instructions regarding handling poisonous agro-chemical before, during and after spraying operators should be provided on sprayer.





20. TECHNICAL LITERATURE

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

- i. Operator manual
- ii. Service manual
- iii. Parts catalogue

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

TESTING AUTHORITY

Er. SANJAY KUMAR AGRICULTURAL ENGINEER	
Dr. MUKESH JAIN DIRECTOR	 15.06.2023

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

21. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant Comments
21.1	19.1	Strainer in Nozzle will be provided.
21.2	19.2	We will mark the nozzle with the recognized Trademark.
21.3	19.3	We will mark the lance with the recognized Trademark.
21.4	19.4	We will improve the volumetric efficiency of the pump.
21.5	19.5	We will mark the type of Cut off Device and recognized Trademark.
21.6	19.6	We will look into and improve the quality and performance of motor.
21.7	19.7	We will improve the strap assembly.
21.8	19.8	We will make the strainer of Cut off Device as per Indian Standard.
21.9	19.9	We will modify and correct to make sure the average aperture size of cut off device strainer is as per Indian Standard.
21.10	19.10	We will provide Strap Cushion
21.11	19.11	We will provide a suitable labeling plate with the required information.
21.12	19.12	We will provide safety instructions regarding handling poisonous agro-chemical before, during and after spraying operations.

