व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT

संख्या/ **No.: PS-483/2712/2021**
माह/**Month: July, 2021**

THIS TEST REPORT VALID UP TO : 31st July, 2026

HYMARK, HK-58 BATTERY OPERATED KNAPSACK SPRAYER WITH SOLAR PANEL

भारत सरकार
Government of India
कृषि एवं किसान कल्याण मंत्रालय
Ministry of Agriculture and Farmers Welfare
कृषि, सहकारिता एवं किसान कल्याण विभाग
Department of Agriculture, Cooperation and Farmers Welfare
उत्तरी क्षेत्र कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान
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6. TEST FOR VOLUMETRIC EFFICIENCY
(Vide Clause 8.4 of IS : 11313 -2007)

Date of Test	:	30.06.2021
Rated pressure, kg/cm^2	:	3.5
Avg. discharge of water at rated pressure, ml/min	:	1537.5
Avg. discharge of water at no-load, ml/min	:	3517.5
Avg. pump speed at no-load, rev/min	:	4210
Avg. pump speed at rated pressure, rev/min	:	3630
Volumetric efficiency of pump, %	:	50.7

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 : 06.07.2021

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	:	1.0 A
3. Avg. current drawn by motor at load	:	2.24 A
4. Avg. motor operating voltage	:	12.80 V
5. Avg. observed motor power requirement	:	28.62 watt
6. Avg. motor speed at no load	:	4165 rpm
7. Avg. motor speed at load	:	3630 rpm
8. Avg. time required for fully discharge of battery	:	7.5 to 8.0
9. Avg. No load rpm of motor after 6 hours of operation	:	3210 rpm
10. Time required to full charge the battery with AC charger was observed as	:	7.6 to 8.5 hours
11. The spraying operation time after fully charging the battery was observed as	:	7.0 to 7.5 hours

8. PRESSURE ADJUSTMENT TEST

1. Date of test : 29.06.2021
2. Atmospheric conditions:-
   a. Temperature : 34.1 °C
   b. Relative humidity : 51.3 %
   c. Pressure : 97 kPa

3. Data recorded

S. 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 : 28.06.2021
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 : Hymark
Nominal length : 525 mm
Batch or code number : C-1/12

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

Date : 28.06.2021
Type : Trigger type (Type – A)

10.1 MAXIMUM TRIGGER ACTIVATION TORQUE

Required torque	:	Observed torque
Less than 35 kgf-cm	:	30.2 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 Minute
4	Observation	No leak, crack or bursting of cut-off device was observed during test.

10.3 LEAKAGE AND RELIABILITY TEST FOR CUT-OFF DEVICE

	Date of test	26.06.2021
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 : Hymark
b) Batch or code number : C-1/12
c) Type of cut off device : **Not Marked**

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

Date of test : 24.06.2021
Type of Nozzle **(apa)** : 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 under:-

- For fine cone spray pattern : 1435.0 ml/min

Remark: The discharge rate for fine cone spray pattern does not conform to the requirement of IS: 3652 -1995.

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 degree.

11.3 ENDURANCE TEST OF NOZZLE

i) Date : 15.06.2021 to 23.06.2021
ii) Total running time (h) : 48
iii) Quantity of liquid collected and spray angle observed during endurance test

S. No.	No. of collection	Avg. Discharge rate, ml/min for fine cone spray pattern	Spray angle, Degree.
a)	First collection	1460.0	90.0
b)	Second collection	1457.5	88.9
c)	Third collection	1447.5	89.7
d)	Fourth collection	1447.5	88.4
e)	Fifth collection	1445.0	89.5
f)	Sixth collection	1447.5	88.9
g)	Seventh collection	1430.0	88.4
h)	Eighth collection	1435.0	89.5

Remark: i) Percentage variation in discharge rate at fine cone spray pattern from first to last collection, 1.71%.

ii) The variation in spray angle for fine cone spray pattern from first to last collection, 0.5 degree.

11.4 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 : AN-C90 1200

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

11.6 MARKING OF NOZZLE

Manufacturer's name or recognized trade mark : Hymark

Batch or code number : C-1/12

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

1. Date of test :- 07.06.2021 to 14.06.2021
2. Total running time (h)-50
3. Quantity of liquid collected during endurance:-

Avg. Discharge (ml/min)

a) First Collection - 1550.0
b) Second Collection - 1470.0
c) Third Collection - 1550.0
d) Fourth collection - 1502.5
e) Fifth Collection - 1495.0
f) Sixth Collection - 1505.0
g) Seventh Collection - 1507.5

4. Percentage variation of discharge from first to last collection 2.74 %.

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 : 24.06.2021

Sr. No	Details	Condition
1	Test Condition	Outlet end closed
2	Hydraulic pressure applied	1.5 MPa
3	Duration	1 minutes
4	Result	No leakage, crack or breakage observed in hose and hose connection during the test.

15. TEST FOR STRAP AND ITS ASSEMBLY
(Vide Clause 7.3 of IS : 10134-1994)

Date of test : 25.06.2021

The sprayer was filled with clean water to its specified capacity. The sprayer was hung from a solid support by its straps simulating its carriage on the shoulder of an operator. The tank was vertically raised to height of 300 mm and was allowed to drop freely and hung by straps.

Observation : : At 6th drop the buckle of strap assembly failed to hold the strap in its position.

16. ASSESSMENT OF CONSTRUCTIONAL REQUIREMENTS

16.1	GENERAL REQUIREMENTS		
Ref. Cl. No.	**Specified requirements as per Indian Standard IS: 3906-1995**	**Observation**	**Remarks**
Cl. 6.1 Tank	The tank capacity shall be 10,13 or 16 litres with a tolerance of ± 0.5 litre.	The tank capacity is 16 litres	Conforms
Cl.6.1.1	The thickness of sheet used in manufacture of brass tank shall be minimum of 0.63 mm ± 0.03 mm.	Not applicable, as the tank is made of plastic.	--
Cl. 6.1.2	The tank, when filled up to its neck level with water, shall not show any sign of leakage and shall not buckle.	No sign of leakage & buckling in tank is noticed, when filled up to the neck level with water.	Conforms
Cl.6.2 Skirt/Stands	The tank shall be provided with a skirt/stand which shall project a minimum of 6 mm beyond the lowest portion of the bottom of the tank.	The tank is provided with a stand which is projected 6.0 mm beyond the lowest portion of the bottom of the tank.	Conforms

18. COMMENTS & RECOMMENDATIONS

18.1 The model of motor is not specified. It **MUST** be looked into.

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

18.3 Make & Model of Solar Panel are not specified. It **MUST** be looked into.

18.4 Agitator is not provided. It may be provided.

18.5 The discharge rate of nozzle for fine cone spray pattern does not meet the requirement of Indian Standard. It **MUST** be looked into.

18.6 During the strap drop test the buckle/bracket of strap assembly failed to hold the strap in it's position. It should be improved.

18.7 The volumetric efficiency of pump does not meet the requirement of Indian standard. It **MUST** be improved.

18.8 During the hydraulic test of pump chamber, the motor stopped beyond 5.4 kg/cm^2 pressure against the pressure required of 8.75 kg/cm^2 and the test could not be conducted. This **MUST** be looked into and improved.

18.9 The type of cut-off device is not marked. It **MUST** be looked into.

18.10 The strainer area of cut-off device does not meet the requirement of Indian Standard. It **MUST** be looked into.

18.11 The average aperture size of cut-off device strainer does not meet the requirement of Indian standard. It **MUST** be looked into.

18.12 The strap cushion is not provided. It should be provided.

18.13 A suitable labeling plate (**Not sticker**) needs to be provided with "interalia" following information.

i. Manufacture'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

18.14 **Safety provision/Safety wear**

The safety instructions regarding handling poisonous agrochemical before, during and after spraying operation should be provide on sprayer.

19. TECHNICAL LITERATURE

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

i. Operator Manual
ii. Part's catalogue
iii. Service manual

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

TESTING AUTHORITY

Er. G.R. AMBALKAR AGRICULTURAL ENGINEER	Ambalkar
Dr. MUKESH JAIN **DIRECTOR**	22.07.2021

Test report compiled by Er. Maan Singh, Senior Technical Assistant

20. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant Comment's
20.1	18.1	Will be specified.
20.2	18.2, 18.3, 18.4 & 18.12	Will be provided.
20.3	18.5, 18.7, 18.10, & 18.11	Will be looked into meet the requirement of Indian Standard
20.4	18.6	Will be improved to hold the strap in its position.
20.5	18.8	We will check and improve.
20.6	18.9	Will be marked.
20.7	18.13	Will be provided with required information.
20.8	18.14	Will be provide on sprayer.
20.9	19	Will be updated as per IS:8132-1999.