

व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT

संख्या/ No.: PS-484/2713/2021
माह/Month: July, 2021

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



**HYMARK, HK-59 BATTERY CUM HAND 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

Northern Region Farm Machinery Training and Testing Institute

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

Date of test	:	07.07.2021
Rated pressure, kg/cm ²	:	3.5
Avg. discharge of water at rated pressure, ml/min	:	1747.5
Avg. discharge of water at no load, ml/min	:	3830.0
Avg. pump speed at no load, rev/min	:	3988
Avg. pump speed at rated pressure, rev/min	:	3557
Volumetric efficiency of pump, %	:	51.10 %

Remarks: - 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	:	08.07.2021
The 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	:	1.30 A
3. Avg. current drawn by motor at load	:	1.78 A
4. Avg. motor operating voltage	:	12.86 V
5. Avg. observed motor power requirement	:	23.07 Watt
6. Avg. motor speed at no load	:	3988 rpm
7. Avg. motor speed at load	:	3557 rpm
8. Avg. Time required for full discharge of battery	:	7.5 to 8.0 hour
9. Avg. No load rpm of motor after 6 hours of Operation	:	3126 rpm
10. Time required to fully charge the battery with AC charger was observed as	:	7.5 to 8.7 hours
11. The spraying operation time after full charging the battery was observed as	:	7.2 to 8.0 hours

8. PRESSURE ADJUSTMENT TEST (Vide Clause 8.7.1 of IS : 11313-2007)

1. Date of test : 07.07.2021
2. Atmospheric conditions :
 - a. Temperature : 33.5 °C
 - b. Relative humidity : 50.8 %
 - c. Pressure : 98 kPa



10.3

LEAKAGE AND RELIABILITY TEST FOR CUT-OFF DEVICE

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 : A-1/15
 c) Type of cut-off device : Not marked

11. TEST FOR NOZZLE

(Vide Annex F of IS: 3652-1995)

Date of test : 05.07.2021

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 : 1370.0 ml/min

Remarks: 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 88.4 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.



Sr. No.	No. of collection	Avg. Discharge rate at fine cone spray pattern, ml/min	Spray angle, degree
a)	First collection	1397.5	89.5
b)	Second collection	1350.0	88.4
c)	Third collection	1372.5	88.7
d)	Fourth collection	1350.0	89.2
e)	Fifth collection	1365.0	88.9
f)	Sixth collection	1355.0	88.1
g)	Seventh collection	1332.5	88.4
h)	Eighth collection	1367.5	88.9

Remark: i) Percentage variation in discharge rate for fine cone spray pattern from first to last collection, 2.15 %.

ii) The variation in spray angle for fine cone spray pattern from first to last collection, 0.6 degree.

11.4 SPRAY DISTRIBUTION PATTERN OF NOZZLE

The liquid discharge from nozzle at 300 kPa pressure was collected in glass tubes 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 : A-1/15

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

- Date of test :- 07.06.2021 to 14.06.2021
- Total running time (h)-50
- Quantity of liquid collected during endurance:-
Avg. discharge (ml/min)

a)	First Collection	-	1815.0
b)	Second Collection	-	1807.5
c)	Third Collection	-	1775.0
d)	Fourth collection	-	1770.0
e)	Fifth Collection	-	1705.0
f)	Sixth Collection	-	1750.0
g)	Seventh Collection	-	1765.0

- Percentage variation of discharge from first to last collection, 2.75 %



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**HYMARK, HK-59 BATTERY CUM HAND OPERATED KNAPSACK
SPRAYER WITH SOLAR PANEL (COMMERCIAL)****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 : 05.07.2021

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

15. ASSESSMENT OF CONSTRUCTIONAL REQUIREMENTS

15.1 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 litres	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 $0.63 \text{ mm} \pm 0.03 \text{ mm}$.	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/Stand	The tank shall be provided with a skirt/stand which shall project a minimum of 6mm beyond the lowest portion of the bottom of the tank.	The tank is provided with a stand which is projected 6 mm beyond the lowest portion of the bottom of the tank.	Conforms
Cl.6.3 Strap	Two straps of not less than 800 mm when adjusted to maximum possible length and 38 mm in width shall be provided in order to help carriage of sprayer Provision for adjustment of the length of each strap shall also be provided.	Two straps provided of 1200 mm length and 38 mm width. Provision made for adjustment of the strap length.	Conforms
Cl.6.3.1	The straps and their assembly shall withstand the test prescribed in 7.3 of IS: 10134-1994.	Does not withstand the test (Refer Chapter No. 23 of this test report)	Does not conform
Cl.6.4 Filling hole	A filling hole of 90 mm minimum diameter if circular or in minor axis if oval, shall be provided on the top of the tank.	Circular filling hole of 112 mm diameter is provided on the top of tank.	Conforms
Cl.6.4.1	The hole shall be covered with a tightly fitted cap or lid it shall withstand the test given under 6.4.1.1.	Hole is covered with threaded lid.	Conforms

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18. TEST FOR VOLUMETRIC EFFICIENCY
(Vide Clause 6.2 of IS: 10134-1994)

Sl. No.	Date of test	:	03.07.2021
	Details		Observation
1.	Discharge of water in 10 successive stroke	:	332.5 ml
2.	No of cycle	:	10
3.	Actual volume of water in one cycle	:	33.25 ml
4.	Inner diameter of pump cylinder	:	45.0 mm
5.	Stroke length at 300 kPa pressure	:	30.0 mm
6.	Piston displacement	:	47.69 cc
7.	Theoretical volume of water in one cycle	:	47.69 ml
8.	Volumetric efficiency, %	:	69.70 %

Remark:- The volumetric efficiency does not conform to the requirement of IS: 10134-1994

19. TEST FOR PRESSURE CHAMBER
(Vide Clause 7.1 of IS: 10134-1994)

Date of test : 03.07.2021

Sr. No	Details	Condition
1	Test Condition	Outlet end closed
2	Pressure applied -Hydraulic pressure -Pneumatic pressure	8.75 kg/cm ² 5.25 kg/cm ²
3	Duration	1 minute each
4	Result	No leakage, crack, deformation or breakage observed in pressure chamber during the test.

20. TEST FOR OPERATING LEVER, HANDLE & PISTON ROD
(Vide clause 7.6 of IS: 10134-1994)

Date of test : 05.07.2021

Sr. No	Details	Condition
1	Test Condition	Discharge outlet closed
2	Preasure applied	8.75 kg/cm ²
3	Result	No distort, crack or break observed in handle, operating lever and piston.

21. TEST FOR HOSE AND HOSE CONNECTION
(Vide Clause 5.14.3 of IS:11313-2007 & Clause 7.2 of IS: 10134-1994)

Refer Chapter 14 of this report.



22. ENDURANCE TEST OF SPRAYER (Vide clause 8.1 of IS:10134-1994)

1. Date: 24.06.2021 to 02.07.2021
2. Total running time (h) - 48
3. Quantity of liquid collected during endurance:-

	Avg. discharge (ml/min)
a) First Collection	- 542.5
b) Second Collection	- 515.0
c) Third Collection	- 510.0
d) Fourth collection	- 537.5
e) Fifth Collection	- 512.5
f) Sixth Collection	- 502.5
g) Seventh Collection	- 522.5
h) Eighth Collection	- 527.5

Remark: Percentage variation of discharge from first to last collection, 2.76 %.

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

Date of test : 05.07.2021

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 2nd drop the buckle of strap assembly failed to hold the strap in its position.

24. ASSESSMENT OF CONSTRUCTIONAL REQUIREMENTS APPLICABLE FOR HAND OPERATED KNAPSACK SPRAYER

Ref. Cl. No.	Specified requirements as per Indian Standard IS: 3906-1995	Observation	Remarks
Cl.5.1 Discharge rate	When tested in accordance with the method given in 6.1.3 of IS:10134- 1994, the pump shall be capable of discharge a minimum of 500 ml of water per minute.	530.0 ml/min	Conforms
Cl.5.2 Volumetric efficiency	When tested in accordance with the method given in 6.2 of IS 10134 : 1994, the volumetric efficiency shall be not less than 85 percent.	69.7 %	Does not conform
Cl. 6.1 Tank	The tank capacity shall be 10, 13 or 16 liters with a tolerance of ± 0.5 litres.	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 $0.63 \text{ mm} \pm 0.03 \text{ mm}$.	Not applicable, as the tank is made of plastic.	--

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16.	Making/labeling of sprayer	The labeling 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 cum hand operated knapsack sprayer (fitted with solar panel). B.no./s.no.- A-1/15 model no. HK-59 F-21, sector-11, noida-201301 (U.P.)	Partially conform
17.	Literature	Operator manual, service manual & parts catalogue should be provided.	Provided	Conform

26. 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- : **Partially conform**
1995 (Reaffirmed 2011)

27. COMMENTS & RECOMMENDATIONS

- 27.1 During the strap drop test, the buckle/bracket of strap assembly failed to hold the strap in it's position. It should be improved.
- 27.2 The strap cushion is not provided. It should be provided.
- 27.3 The aperture size of cut-off device strainer does not meet the requirement of Indian Standard. It **MUST** be looked into.
- 27.4 The type of cut-off device is not marked. It **MUST** be looked into.
- 27.5 The discharge rate of nozzle at a pressure of 300 kPa for fine cone spray pattern does not conform to the requirement of IS: 3652-1995. It **MUST** be looked into.
- 27.6 The strainer in nozzle is not provided. It may be provided.
- 27.7 Agitator is not provided in sprayer. It may be provided.
- 27.8 During the hydraulic test of pump, the motor stopped beyond 5.8 kg/cm² pressure against the pressure requirement of 8.75 kg/cm² and the test could not be conducted. This **MUST** be looked into and improved.



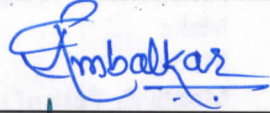
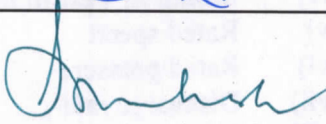
28. TECHNICAL LITERATURE

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 should be updated as per IS:8132-1999.

TESTING AUTHORITY

Er. G.R. AMBALKAR AGRICULTURAL ENGINEER	
Dr. MUKESH JAIN DIRECTOR	 27.07.2021

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

29. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant Comment's
29.1	27.1	Will be improved to hold the strap in its position.
29.2	27.2 & 27.6	Will be provided.
29.3	27.3 & 27.9	Will be looked into to meet the requirement of Indian Standard
29.4	27.4	Will be marked.
29.5	27.5	Will be looked into to meet the requirement of IS:3652-1995
29.6	27.7	Will also be provided
29.7	27.8	We will check and improve.
29.8	27.10	Will be improved as per the requirement of the relevant Indian Standard.
29.9	27.11	Will be provided with the required information.
29.10	27.12	Will be provide on sprayer.
29.11	28	Will be updated as per IS:8132-1999.

