

THIS TEST REPORT VALID UP TO : 30th September, 2027



**CAM, CAM-BT 18
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

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

Applicant has not recommended running-in of sprayer.

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

1. Date of test : 24.08.2022
2. Atmospheric conditions
 - a) Temperature : 31.9 °C
 - b) Relative humidity : 60.6 %
 - c) Pressure : 97.8 kPa

3. Data recorded

Avg. Speed of Pump (rpm)	Working pressure (kg/cm ²)	Test No.	Delivery from the discharge line (ml/min)	Overflow (ml/min)	Average discharge from the discharge line (ml/min)	Discharge rate of pump (ml/min)
3856	1.0	1	3000	NIL	3002.5	3002.5
		2	3020			
		3	2990			
		4	3000			
3703	2.0	1	2400	NIL	2375.0	2375.0
		2	2350			
		3	2380			
		4	2370			
3682	3.0	1	2000	NIL	2002.5	2002.5
		2	2020			
		3	1990			
		4	2000			
3670	4.0	1	1600	NIL	1600.0	1600.0
		2	1610			
		3	1600			
		4	1590			

Minimum discharge rate = 1600.0 ml/min at 4 kg/cm²

Maximum discharge rate = 3002.5 ml/min at 1 kg/cm²

Discharge at rated pressure = 2002.5 ml/min at 3 kg/cm²

6. TEST FOR VOLUMETRIC EFFICIENCY

(Vide Clause 8.4 of IS: 11313 -2007)

Date of Test	: 24.08.2022
Rated pressure, kg/cm ²	: 3.0
Avg. discharge of water at rated pressure, ml/min	: 2002.5
Avg. discharge of water at no-load, ml/min	: 3425.0
Avg. pump speed at no-load, rev/min	: 3994
Avg. pump speed at rated pressure, rev/min	: 3682
Volumetric efficiency of pump, %	: 63.42

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	: 24.08.2022
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	: 2.69 A
4. Avg. motor operating voltage	: 12.61 V
5. Avg. observed motor power requirement	: 33.90 watt
6. Avg. motor speed at no load	: 3994 rpm

7. Avg. motor speed at load : 3682 rpm
 8. Avg. time required for fully discharge of battery : 6.0 to 7.0 hours
 9. Avg. no load rpm of motor after 6 hours of operation : 3285 rpm
 10. Time required to full charge the battery with AC charger was observed as : 5.8 to 6.8 hours
 11. The spraying operation time after fully charging the battery was observed as : 5.9 to 6.9 hours

8. PRESSURE ADJUSTMENT TEST

1. Date of test : 24.08.2022
 2. Atmospheric conditions
 a. Temperature : 31.9 °C
 b. Relative humidity : 60.6 %
 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.	1.0	NIL	NIL	--
2.	2.0	NIL	NIL	--
3.	3.0	NIL	NIL	--
4.	4.0	NIL	NIL	--

4. Resistance to different pressure: Yes

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

- Date of test : 24.08.2022
 Type : Gooseneck Type (Type-B₂)

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 : **Not marked**
 Batch or code number : **Not marked**

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

Date of test : 24.08.2022
Type : Trigger type (Type-A)

10.1 MAXIMUM TRIGGER ACTIVATION TORQUE

Required torque	:	35 kgf-cm
Observed torque	:	29.5 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 : 24.08.2022		
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 : **Not marked**
c) Type of cut off device : **Not marked**

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

Date of test : 22.08.2022
Type of Nozzle : Fixed type, solid cone type

11.1 TEST FOR DISCHARGE RATE OF NOZZLE

The discharge rate for fine cone spray pattern as 1500 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 : 1455.0 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 60 degree. The spray angle corresponding to 300 kPa pressure was observed as 59.3 degree.

11.3 ENDURANCE TEST OF NOZZLE

- i) Date : 02.08.2022 to 22.08.2022
 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	1445.0	58.5
b)	Second collection	1450.0	57.7
c)	Third collection	1450.0	59.3
d)	Fourth collection	1427.5	57.7
e)	Fifth collection	1425.0	60.1
f)	Sixth collection	1422.5	59.3
g)	Seventh collection	1455.0	58.5
h)	Eighth collection	1457.5	60.1

Remark: i) Percentage variation in discharge rate at fine cone spray pattern from first to last collection is 0.86%.

ii) The variation in spray angle for fine cone spray pattern from first to last collection is 1.6 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** : **Not marked**
 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 : **Not marked**

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

- Date of test :- 25.07.2022 to 01.08.2022
- Total running time (h)-50
- Quantity of liquid collected during endurance:-
Avg. Discharge (ml/min)
 - First Collection - 2020.0
 - Second Collection - 2037.5
 - Third Collection - 2007.5
 - Fourth collection - 1982.5
 - Fifth Collection - 1987.5
 - Sixth Collection - 1997.5
 - Seventh Collection - 1992.5
- Percentage variation of discharge from first to last collection is 1.36 %.

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

Date of test : 23.08.2022

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 7.5 kg/cm ²
	-Pneumatic pressure	: 4.5 kg/cm ²
3	Duration	: 1 minutes each
4	Result	: No leakage, crack deformation or breakage 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 7.5 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	6	5	4	3	2	1	Centre	1	2	3	4	5	6
Discharge in ml.	03	09	32	70	103	145	215	195	102	62	28	12	05

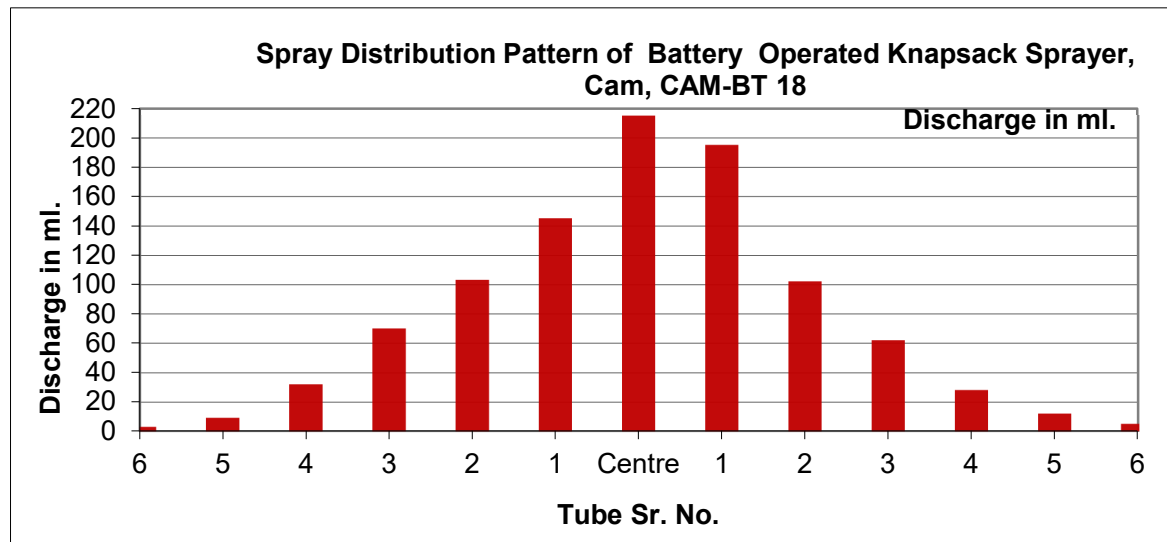


FIG. 1 : SPRAY DISTRIBUTION PATTERN

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 Make - Cam Model - CAM-BT 18 Sl. No. – CS20220315156 Delhi Saharanpur Road, Near P.N. Sharma Park, Baraut, Distt.- Baghpat-250611 (U.P.)	Conforms
17.	Literature	Operator manual, service manual & parts catalogue should be provided.	Provided	Conforms

Note: - The implementation of the critical technical specification has been deferred till 30.09.2022 vide Ministry's O.M. No. 13-1/2021 M&T (I&P) dated 03.02.2022

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 manufacturer's name or recognized trade mark, nominal length and batch or code number of lance is not marked. It **MUST** be looked into.
- 19.2 The strainer in nozzle is not provided. It may be provided.
- 19.3 The manufacturer's name or recognized trade mark, type of cut off device and batch or code number is not marked. It **MUST** be looked into.
- 19.4 The manufacturer's name or recognized trade mark, batch or code number and designation of nozzle is not marked. It **MUST** be looked into.
- 19.5 Agitator is not provided. It may be provided.
- 19.6 The safety wear is not provided. It **MUST** be provided.
- 19.7 Necessary tools are not provided with sprayer. It **MUST** be provided.
- 19.8 The volumetric efficiency of pump does not meet the requirement of Indian Standard. It **MUST** be improved.

- 19.9 During the hydraulic test of pump chamber, the motor stopped beyond 6.2 kg/cm² pressure against the pressure requirement of 7.5 kg/cm² and test could not be conducted. It **MUST** be looked into and improved.
- 19.10 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.
- 19.11 The strap cushion is not provided. It **MUST** be looked into.
- 19.12 The discharge outlet nipple length does not meet the requirement of Indian Standard. It **MUST** be improved.
- 19.13 The strainer area of cut off device does not meet the requirement of Indian Standard. It **MUST** be looked into.
- 19.14 The average aperture size of cut off device strainer does not meet the requirement of Indian Standard. It **MUST** be looked into.
- 19.15 The tank capacity does not meet the requirement of Indian Standard. It should be improved.
- 19.16 A suitable labeling plate (not sticker) needs to be provided with “Interlia” following information.
- (i) Manufacturer’s name
 - (ii) Make
 - (iii) Model
 - (iv) Month & year of manufacturer
 - (v) Rated speed
 - (vi) Rated pressure
 - (vii) Discharge rate
 - (viii) Power rating
 - (ix) Country of origin
- 19.17 **Safety provision/Safety wear**
- i) The safety instructions regarding handling poisonous agrochemical before, during and after spraying operation should be provided on sprayer.


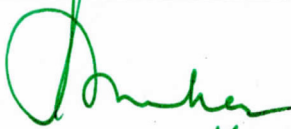
20. TECHNICAL LITERATURE

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	 16.09.2022

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

21. APPLICANT'S COMMENTS

We will update our product as per the comments.