व्यावसायिक परीक्षण रिपोर्ट
**COMMERCIAL TEST REPORT**

संख्या/ **No.: PS-390/2308/2019**
माह/**Month : April, 2019**

**THIS TEST REPORT VALID UP TO : 30th APRIL, 2024**


# YAD AGROMA WONDER-WTRB1 BATTERY CUM HAND OPERATED KNAPSACK SPRAYER

सत्यमेव जयते

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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## 3. RUNNING - IN

Though the applicant has not recommended running-in, with the consent of the applicant the running-in of the sprayer was conducted for one hour in order to overcome variation in initial performance. Lubrication and the adjustment of the components were done as per applicants' recommendation.

## 4. TEST FOR DISCHARGE RATE OF PUMP
**(Vide Clause 8.3 of IS: 11313 - 2007)**

1. Date of test : 02.04.2019
2. Atmospheric conditions :
   a) Temperature : 28 °C
   b) Relative humidity : 52 %
   c) Pressure : 99.1 kPa
3. Data recorded

| 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) |
|---|---|---|---|---|---|---|
| 3082 | 1 | 1 | 2230 | NIL | 2237.5 | 2237.5 |
| | | 2 | 2200 | | | |
| | | 3 | 2250 | | | |
| | | 4 | 2270 | | | |
| 2875 | 2 | 1 | 1860 | NIL | 1820.0 | 1820.0 |
| | | 2 | 1820 | | | |
| | | 3 | 1800 | | | |
| | | 4 | 1800 | | | |
| 2863 | 3 | 1 | 1450 | NIL | 1462.5 | 1462.5 |
| | | 2 | 1520 | | | |
| | | 3 | 1500 | | | |
| | | 4 | 1380 | | | |
| 2849 | 4 | 1 | 1200 | NIL | 1202.5 | 1202.5 |
| | | 2 | 1220 | | | |
| | | 3 | 1190 | | | |
| | | 4 | 1200 | | | |

**Minimum discharge rate = 1202.5 ml/min at 4 $kg/cm^2$**
**Maximum discharge rate = 2237.5 ml/min at 1 $kg/cm^2$**
**Discharge at rated pressure = 1202.5 ml/min at 4.0 $kg/cm^2$**

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

Date of test : 23.04.2019
Rated pressure, $kg/cm^2$ : 4.0
Avg. discharge of water at rated pressure, l/min : 1202.5

Avg. discharge of water at no load, l/min : 2692.5
Avg. pump speed at no load, rev/min : 3203
Avg. pump speed at rated pressure, rev/min : 2849
Volumetric efficiency of pump, % : 50 %

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

## 6. POWER REQUIREMENT
**(Vide Clause 8.5 of IS – 11313 : 2007)**

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 : 0.90 A
3. Avg. current drawn by motor at load : 1.63 A
4. Avg. motor operating voltage : 13.15 V
5. Avg. observed motor power requirement : 20.57 Watt
6. Avg. motor speed at no load : 3205 rpm
7. Avg. motor speed at load : 2848 rpm
8. Avg. Time required for fully discharge of battery : 7.5 to 8 hr
9. Avg. No load rpm of motor after 6 hours of Operation : 2114 rpm

## 7. PRESSURE ADJUSTMENT TEST
**(Vide Clause 8.7.1 of IS – 11313 : 2007)**

1. Date of test : 02.04.2019
2. Atmospheric conditions :
   a. Temperature : 28 °C
   b. Relative humidity : 52 %
   c. Pressure : 99.1 kPa
3. Data recorded

| S. No. | Working pressure ($kg/cm^2$) | Fluctuation range ($kg/cm^2$) | Pressure drop ($kg/cm^2$) | Ratio |
|---|---|---|---|---|
| 1. | 1 | NIL | NIL | -- |
| 2. | 2 | NIL | NIL | -- |
| 3. | 3 | NIL | NIL | -- |
| 4. | 4 | NIL | NIL | -- |

4. Resistance of pressure: Yes

## 8. TEST FOR SPRAY LANCE
**(Vide Annex. D of IS: 3652-1995)**

Date of test : 23.04.2019
Type : Straight type (Type-A)

### 8.1 STRENGTH OF SPRAY LANCE

| Sr. No. | Details | Condition |
|---|---|---|
| 1 | Test Condition | Outlet closed |
| 2 | Hydraulic pressure applied | 1 MPa |

| | | | | |
|---|---|---|---|---|
| xxi) | Gasket | Synthetic rubber, PVC, fibre | PVC | Conforms |
| xxii) | Valve seat | Brass, stainless steel, engg. plastic | Engg. Plastic | Conforms |
| xxiii) | valve | Brass, stainless steel, engg. plastic | Engg. Plastic | Conforms |
| xxiv) | Skirt/ stand | Steel, plastic | Plastic | Conforms |
| xxv) | Strap buckle | Steel, Engg. Plastic | Steel | Conforms |
| xxvi) | Cushion | Foam rubber, foam plastic | NA | -- |
| **Materials of components of spray lance, nozzle, cut of device (as per IS 3652-1995): Refer chapter No. 2 of this test report.** | | | | |

| Clause No. | Specified requirement | Observations | Remarks |
|---|---|---|---|
| Cl. 4.4 IS 3906:1995 | The material used for different components shall be declared by the manufacturer in the manual. | Declared | Conforms |

## 16. RUNNING - IN

Though the applicant has not recommended running-in, with the consent of the applicant the running-in of the sprayer was conducted for one hour in order to overcome variation in initial performance. Lubrication and the adjustment of the components was done as per applicants recommendation.

## 17. TEST FOR DISCHARGE RATE
**(Vide Clause 6.1.3 of IS 10134-1994)**

1. Date of test : 19.03.2019
2. Atmospheric conditions
   a) Temperature : 26°C
   b) Relative humidity : 47%
   c) Pressure : 98.7 kPa
3. Data recorded

| No. of hand strokes per minute | Working pressure (kPa) | Test No. | Delivery from the discharge line (ml/min) | Overflow (ml/min) | Average delivery from the discharge line (ml/min) | Discharge rate of pump (ml/min) |
|---|---|---|---|---|---|---|
| 16 | 300 | 1 | 760 | Nil | 772.5 | 772.5 |
| 16 | 300 | 2 | 780 | Nil | | |
| 16 | 300 | 3 | 770 | Nil | | |
| 16 | 300 | 4 | 780 | Nil | | |

**Average discharge rate : 772.5 ml/min at 300 kPa pressure**

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

| | Date of test | : | 24.04.2019 |
|---|---|---|---|
| Sl. No. | Details | | Observation |
| 1. | Discharge of water in 10 successive stroke | : | 470.0 ml |
| 2. | No of cycle | : | 10 |
| 3. | Actual volume of water in one cycle | : | 47.0 ml |
| 4. | Inner diameter of pump cylinder | : | 45.0 mm |
| 5. | Stroke length at 300 kPa pressure | : | 34.0 mm |
| 6. | Piston displacement | : | 54.08 cc |
| 7. | Theoretical volume of water in one cycle | : | 54.08 ml |
| 8. | Volumetric efficiency, % | : | 87% |

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

Date of test : 24.04.2019

| Sr. No | Details | Condition |
|---|---|---|
| 1 | Test Condition | Outlet end closed |
| 2 | Pressure applied<br>-Hydraulic pressure<br><br><br>-Pneumatic pressure | **(The operating handle found distorted at 6.0 kg/cm$^2$ pressure against the pressure requirement 10 kg/cm$^2$ the test)**<br>6 kg/cm$^2$ |
| 3 | Duration | 1 minutes each |
| 4 | Result | **The operating handle found distorted at 6.0 kg/ cm$^2$ pressure during the test.** |

**Remark: The operating handle found distorted at 6.0 kg/cm$^2$ pressure and therefore sprayer does not conform to the requirement laid down in clause 7.1 of IS : 10134:1994.**

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

Date of test : 19.03.2019

| Sr. No | Details | Condition |
|---|---|---|
| 1 | Test Condition | Discharge outlet closed |
| 2 | Preassure applied | 7.5 kg/cm$^2$ |
| 3 | Result | **The operating handle found distorted at 6.0 kg/cm$^2$ pressure during the test.** |

## 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 13 of this report.**

## 25. CONFORMITY TO INDIAN STANDARDS

| | | | |
|---|---|---|---|
| i) | IS: 11313:2007 Hydraulic power sprayers-specification | : | **Does not conform in toto** |
| ii) | IS: 10134-1994-Method of test for manually operated sprayer | : | **Does not conform in toto** |
| iii) | Spray nozzle and spray gun as per IS:3652-1995 (Reaffirmed 2011) | : | **Does not conform in toto** |
| iv) | IS: 2643-2005-Pipe threads where pressure-tight joint are not made on the threads-dimensions, tolerance and designation | : | **Does not conform in toto** |

## 26. COMMENTS & RECOMMENDATIONS

**26.1** The sprayer year of manufacture and serial number is not marked. It should be marked.

**26.2** The batch or serial number of sprayer is not specified. It **MUST** be specified.

**26.3** The motor max current and rated speed is not specified. It should be specified.

**26.4** The country of origin of battery is not specified. It should be specified.

**26.5** The make and model and country of origin of battery charger is not specified. It should be specified.

**26.6** The model and country of origin of pump is not specified. It should be specified.

**26.7** The dimension of straps does not meet the requirements of Indian Standard. It **MUST** be looked into.

**26.8** During the strap drop test the buckle/bracket of strap assembly found failed to hold the strap in its position. It should be provided.

**26.9** The strap cushion thickness does not meet the requirement of Indian standard. It **MUST** be looked into.

**26.10** The average size of strainer of filling hole does not meet the requirement of Indian Standard. It **MUST** be looked into.

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

**26.12** Material used for pump inlet port end fitting does not meet the requirement of IS:11313-2007. It **MUST** be looked into.

**26.13** The spray nozzle is not designated and marked by its identification mark. The identification mark as specified by relevant Indian Standard. It **MUST** be provided.

**26.14** The batch or code number on nozzle is not provided. It **MUST** be looked into.

**26.15** Manufacturer's name or recognized trade mark and nominal length on spray lance is not marked. It **MUST** be looked into.

**26.16** The cut off device manufacturer's name or recognized trade mark and batch or code number is not provided. It **MUST** be provided.

**26.17** 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.

**26.18** The spray angle for fine cone spray pattern of nozzle at a pressure of 300 kPa does not conform to the requirement of IS : 3562-1995. It **MUST** be looked into.

**26.19** The strainer in nozzle is not provided. It should be provided.

**26.20** Agitator is not provided in sprayer. It may be provided.

**26.21** Time required to full charge battery with AC charger is observed as 7.5 to 8.0 hours.

**26.22** The spraying operation time after fully charging the battery was observed as 6.5 to 7.0 hours.

**26.23** The current drawn by motor at no load and on load was observed 0.90 to 1.63 Amp. respectively which does not conform to requirement of IS: 14459:1997.

**26.24** **The volumetric efficiency of sprayer on battery operated mode was observed as 50%, which is not within the requirement of the relevant Indian Standard.**

**26.25** The back rest cushions are not provided with sprayer. It may be provided.

**26.26** No necessary tools are provided with sprayer. It **MUST** be provided.

**26.27** During the pump chamber hydraulic test the motor stopped beyond 6.0 kg/cm$^2$ pressure against the pressure requirement of 10 kg/cm$^2$. Thus the sprayer does not meet the requirement of Indian Standard.

**26.28** The length of operating trigger does not meet the requirement of relevant code/Standard. It **MUST** be looked into.

**26.29** The operating lever of sprayer found distorted during test. It should be examined & improved.

**26.30** A suitable labelling 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 speed
vi. Rated pressure
vii. Discharge rate
viii. Power rating
ix. Country of origin

**26.31 Safety provision/safety wear**

i) The safety instructions regarding handling poisonous agro chemical before, during and after spraying operation should be provided on sprayer.

## 27. TECHNICAL LITERATURE

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

i) Operator's instruction service manual with parts catalogue

The operator instruction manual of sprayer needs to be updated as per IS : 8132-1999.

## TESTING AUTHORITY

| | |
|---|---|
| R. K. NEMA<br>SENIOR AGRICULTURAL ENGINEER | |
| **P. K. PANDEY**<br>**DIRECTOR** | |

## 28. APPLICANT'S COMMENTS

| Para No | Our reference | Applicant's comments |
|---|---|---|
| 28.1 | 26.1,26.3,26.4,26.5,26.6, 26.25,26.26 | We will provide. |
| 28.2 | 26.8,26.23,26.24,26.27, 26.29 | We will improve. |
| 28.3 | 26.7,26.9,26.10 | We will maintain as per Indian Standard |
| 28.4 | 26.11 | We will improve as per Indian Standard |
| 28.5 | 26.12 | We will make corrective changes as per Indian Standard. |
| 28.6 | 26.13 | We will mark in future. |
| 28.7 | 26.14,26.15,26.16 | Will be provided. |
| 28.8 | 26.17 | We will maintain. |
| 28.9 | 26.18,26.28 | We will make corrective changes |
| 28.10 | 26.20 | Agitator will be provided |