

व्यावसायिक परीक्षण रिपोर्ट  
COMMERCIAL TEST REPORT

संख्या/ No.: PS-384/2292/2019  
माह/Month : March, 2019

**THIS TEST REPORT VALID UP TO : 31<sup>st</sup> MARCH, 2026**



**KHANDERWAL KTMS-500  
TRACTOR OPERATED SPRAYER**



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

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](mailto:fmti-nr@nic.in)

Tele./FAX: 01662-276984

vii)	Roller pump shaft	Stainless steel	Not applicable	---
viii)	Pump rollers	Nylon filled with lead	Not applicable	---
ix)	Pressure regulators	Brass, stainless steel	Stainless steel	Conforms
x)	Suction strainer	Brass, stainless steel, plastics	Stainless steel	Conforms
xi)	Strainer body	Brass, plastics	Plastic	Conforms
xii)	Gasket	Rubber, PVC, Leather, fiber	PVC	Conforms
xiii)	Spray nozzles	Brass, stainless steel	Brass	Conforms
xiv)	Spray boom	Mild steel, Galvanized, iron Braided rubber	Not applicable	--
xv)	Hose	Synthetic rubber, P.V.C	PVC	Conforms
xvi)	Tank	Galvanized iron, Brass, Fiber glass reinforced plastics.	Plastics	Conforms
xvii)	Pipe for agitator	Galvanized iron, Brass, PVC	PVC	Conforms
xviii)	Piston (bucket) screw	Brass, stainless steel	Not applicable	--
xix)	Crank case	Aluminum alloy	Aluminum alloy	Conforms
xx)	Roller pump body	Nickel resistant cast iron	Not applicable	---
xxi)	Roller pump and plate	Nickel resistant cast iron	Not applicable	---
xxii)	Roller pump rotor	Nickel resistant cast iron	Not applicable	---
xxiii)	Piston pump crank shaft	Carbon steel	Carbon steel	Conforms
xxiv)	Pump inlet port end fitting	Brass	Brass	Conforms
xxv)	Piston rod guide	Brass, Aluminum alloy, Gunmetal, Nylon	Not applicable	---
xxvi)	Connecting rod	Carbon steel	Aluminum alloy	<b>Does not conform</b>
xxvii)	Gudgeon pin	Carbon steel	Carbon steel	Conforms
xxviii)	Big end bearing	Steel coated with tin base white metal	Steel coated with tin base white metal	Conforms
xxix)	Small end bush	Gunmetal	Gunmetal	Conforms
xxx)	The material used for different components shall be declared by the manufacturer all the components mentioned in the table-I may not be present in a particular sprayer.		Not declared	<b>Does not conform</b>

**3. TEST FOR DISCHARGE RATE OF PUMP**  
**[vide Clause 8.3 of IS- 11313: 2007]**

1. Date of test : 12.02.2019
2. Atmospheric conditions :
  - a) Temperature : 21°C
  - b) Relative humidity : 51%
  - c) Pressure : 99.4 kPa

3. Data recorded



Speed of Pump (rpm)	Working pressure (kg/cm <sup>2</sup> )	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)	Hydraulic power (Kw)
909	15	1	38750	3720	38662.5	42382.5	2.34
		2	38650				
		3	38750				
		4	38500				
906	20	1	40600	1545	40612.5	42157.5	2.60
		2	40650				
		3	40550				
		4	40650				
900	25	1	41450	Nil	41482.5	41482.5	3.01
		2	41350				
		3	41500				
		4	41630				
896	30	1	41720	Nil	40627.5	40627.5	3.26
		2	40560				
		3	40600				
		4	40630				

Minimum discharge rate = 40627.5 ml/min at 30 kg/cm<sup>2</sup>

Maximum discharge rate = 42382.5 ml/min at 15 kg/cm<sup>2</sup>

Discharge at Rated pressure = 41482.5 ml/min at 25 kg/cm<sup>2</sup>

#### 4 TEST FOR VOLUMETRIC EFFICIENCY OF PUMP (Vide clause 8.4 of IS-11313 : 2007)

Rated pressure, kg/cm<sup>2</sup> : 25  
 Rated rpm of pump : 900  
 Theoretical Volume, ml : 53.01  
 Actual volume at rated rpm & rated pressure, ml : 46.09  
 Volumetric efficiency % : 87 %

#### 5. POWER REQUIREMENT (Vide Clause 6.3 of IS – 11313 : 2007)

The pump power requirement of the sprayer has been given as 3 to 5 hp (2.24 to 3.73 kW). The test for power required for operating the sprayer was conducted as per clause 8.5 of IS: 11313-2007 and data recorded is reported herewith.

Test No.	Pressure (kg/cm <sup>2</sup> )	Dynamometer reading		Pump speed (rpm)	Required power (kW)	Discharge (litre/min)
		Speed (rpm)	Torque (Nm)			
1	15	380	58.14	909	2.34	42.38
2	20	379	64.83	906	2.60	42.16
3	25	377	75.66	900	3.01	41.48
4	30	375	82.17	896	3.26	40.63

- Remark:**
- i) The power requirement was observed from 2.34 to 3.26 kW throughout the range of pressure against the declaration of 3 to 5 hp ( 2.24 to 3.73 kW)
  - ii) At rated speed and pressure of pump the power requirement is observed as 3.01 kW.

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

- 1. Date of test : 12.02.2019
- 2. Atmospheric conditions :
  - a. Temperature : 21 °C
  - b. Relative humidity : 51%
  - c. Pressure : 99.4 kPa

3. Data recorded

S. No.	Working pressure(kg/cm <sup>2</sup> )	Fluctuation range (kg/cm <sup>2</sup> )	Pressure drop (kg/cm <sup>2</sup> )	Ratio
1.	15	NIL	NIL	--
2.	20	NIL	NIL	--
3.	25	NIL	NIL	--
4.	30	NIL	NIL	--

4. Resistance of pressure: Yes

**7. TEST FOR HYDRAULIC SPRAY GUN  
[Vide Clause 7.3(b) of IS- 11313: 2007 & Annex E of IS- 3652; 1995]**

- Date of test : 09.02.2019
- Type of gun : Screw type

**7.1 TEST FOR DISCHARGE RATE OF SPRAY GUN**

The discharge rate for fine cone spray & jet spray pattern as 4500 ml/min & 5000 ml/min at the pressure of 600 kPa was declared by the applicant. The discharge rate corresponding to 600 kPa pressure was observed as under

- For fine cone spray pattern : 3630 ml/min
- For jet spray pattern : 4332.5 ml/min

**Remarks :-** Discharge Rate for fine cone spray pattern and jet spray pattern was observed not within the limit specified by the relevant code/standard.



Cl.9			
Cl. 9.1	All the components of the sprayer shall be free from burrs, pits and other visual defects which may be detrimental for their use.	Nothing that may be detrimental for use was noticed	Conforms
Cl. 9.2	The exposed metallic parts shall have a protective coating to prevent surface deterioration.	Exposed metallic parts have the protective coating.	Conforms

Cl.10. <b>MARKING AND PACKING</b> (Cl.10 IS:11313-2007)			
Cl.10.1 Marking	Each sprayer shall be marked with the following particulars :-		
a)	Manufacturer's name and his registered trade mark, Sl. No. and batch or code No.	NAME - KHANDERWAL AGRO. IND. TYPE - HYDRAULIC TYPE SIZE - 500 LTR IMP NAME - T.M.S MAKE - KHANDERWAL MODEL - KTMS-500 YEAR OF MFG. - 2018 BATCH - DEC 18 SR. No. - 2846 TRACTOR H.P - 24 & above COUNTRY - INDIA.	Conforms

#### 14. CONFORMITY TO INDIAN STANDARDS

- i) IS:11313-2007 (Reaffirmed 2012)-Hydraulic : **Does not conform in toto**  
power sprayer-specification
- ii) Spray nozzle and spray gun as per IS:3652-1995 : **Does not conform in toto**  
(Reaffirmed 2011)
- iii) Hose and hose connection as per IS:10134-1994 : **Conforms**
- iv) IS: 2643-2005-Pipe threads where pressure-tight : **Conforms**  
joint are not made on the threads-dimensions, tolerance and designation.
- v) Three point linkage hitch as per IS: 4468 : **Does not conform in toto**  
(Part:1): 1997(Reaffirmed 2012)
- vi) Dimensions of PIC yoke as per IS: 4931:1995 : **Does not conform in toto**  
(Reaffirmed 2009)

#### 15. COMMENTS AND RECOMMENDATIONS

- 15.1 The three point linkage and power input connection dimensions does not meet the requirement of Indian Standard. It **MUST** be improved.
- 15.2 The material used for different component are not declared. It **MUST** be provided.

- 15.3 The discharge rate for fine cone spray pattern and jet spray pattern spray gun at the pressure of 600 kPa does not conform the requirement of IS: 3652: 1955. It **MUST** be looked into for appropriate improvement.
- 15.4 Maximum achievable pressure does not meet the requirement of relevant Indian Standard. It **MUST** be looked into.
- 15.5 The spray gun provided with sprayer is not designated as specified by relevant Indian Standard, needs to be provided.
- 15.6 The material used for connecting rod does not meet the requirement of Indian Standard. It **MUST** be looked into.
- 15.7 A suitable pressure gauge/pressure indicator needs to be provided on sprayer as per the specifications specified by Indian Standard.
- 15.8 The discharge rate for fine cone spray of nozzle at a pressure of 300 kPa does not conform to the requirement of IS: 3652-1995. It **MUST** be looked into.
- 15.9 The spray nozzle is not designated as specified by relevant Indian Standard, needs to be provided.
- 15.10 The spray angle for fine cone spray pattern of spray nozzle at the pressure of  $300 \pm 30$  kPa does not conform to the requirement of IS : 3652-1995. It **MUST** be looked for further improvement.
- 15.11 The engaged threaded length of outlet port does not meet the requirement of relevant Indian Standard. It **MUST** be looked into.
- 15.12 As an important thing as pressure regulator was found not working properly. It **MUST** be looked into.
- 15.13 Safety provision and safety guard not provided on power transmission shaft. It **MUST** be provided.
- 15.14 A suitable labeling plate 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. Recommended tractor horse power
- 15.15 **Safety provision/safety wear**
- i) Safety instructions regarding handling poisonous agro chemical before, during and after spraying operations should be provided on sprayer.



### 16. TECHNICAL LITERATURE

Operator manual for sprayer and operator manual cum parts catalogue for pump is provided with the sprayer.

It is recommended to provide service manual for guidance of user.

The operator manual should be updated as per IS 8132-1997.

The operator manual should contain safety instructions regarding handling poisonous agrochemical before, during and after spraying operation.

### TESTING AUTHORITY

<p>R.K. NEMA SENIOR AGRICULTURAL ENGINEER</p>	<p style="text-align: center;"><i>Ren</i></p>
<p>P. K.PANDEY DIRECTOR</p>	<p style="text-align: center;"><i>U3n-mv84</i></p>

### 17. APPLICANT'S COMMENTS

No comments received from the applicant.

