

व्यावसायिक परीक्षण रिपोर्ट

संख्या/ No.: ROTAVATOR- 346/2727/2021

COMMERCIAL TEST REPORT (FIRST BATCH)

माह/ Month: August, 2021

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



**KUBOTA, KRMU181D, ROTARY TILLER
(ROTAVATOR) TRACTOR MOUNTED**



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

ट्रेक्टर 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

3.11 Lubricants:

Sl. No.	Particulars	As recommended by the manufacturer	As used during test
1	Primary Gear box	SAE 90	Oil originally filled in the rotavator was not changed
2	Secondary Gear box	SAE 90	
3	Rotor Hub	Not specified	M.P. Grease
4	Propeller Shaft	Not specified	

4. RUNNING – IN

Rotavator was run in for 1.02 hour before field performance test.

5. LABORATORY TEST

5.1 Hardness: - The surface hardness of blade was recorded as under: -

Description	As per IS: 6690:1981 (HRC)	Hardness as observed (HRC)	Remarks
Edge portion	53 to 59	50.43 (Average)	Does not conform
On shank portion	37 to 45	42.87 (Average)	Conforms

5.2 Chemical composition

The chemical composition of blades is tabulated as under:-

Constituents	As per IS: 6690-1981		Composition as observed (% of weight)	Remarks
	Carbon Steel	Silicon Manganese steel		
Carbon (C)	0.70 -0.85	0.50-0.60	0.562	Conforms to silicon manganese steel
Silicon (Si)	0.10 -0.40	1.50-2.00	1.903	
Manganese (Mn)	0.50 -1.0	0.50-1.00	0.747	
Sulphur (S)	0.05 (max)	0.05 (max)	0.049	
Phosphorous (P)	0.05 (max)	0.05 (max)	0.017	
Boron	--	--	0.001	--

6. FIELD PERFORMANCE TEST

The field tests of the Rotary tiller (rotavator) comprising of dry land and wet land operation were conducted for 25.66 and 11.41 hours respectively to assess the performance test which is reported in **Annexure-I & II** for dry land and wet land operation respectively.

Observations of field performance test is summarized in the ensuing table:-



Summary of Field Performance Test

Sl. No.	Parameters/operations	Dry land operation	Wet land operation (Puddling)
I	II	III	IV
1.	Tractor used	Kubota MU5501	
2.	Gear used	L-1	L-1
3.	Type of soil	Sandy loam	
4.	Average soil moisture (%)	17.5 to 18.50	--
5.	Average depth of standing water (cm)	--	7.22 to 9.44
6.	Bulk density of soil (g/cc)	1.630 to 1.740	--
7.	Average speed of operation (kmph)	2.59 to 2.62	2.55 to 2.56
8.	Avg. travel reduction (%)	--	-1.52 to -0.42
9.	Avg. wheel slip (%)	-1.26 to -0.57	--
10.	Average depth of puddle (cm)	--	17.78 to 19.89
11.	Average depth of cut (cm)	11.11 to 12.67	--
12.	Avg. effective width (cm)	179 to 181	--
13.	Area covered (ha/h)	0.394 to 0.433	--
14.	Time required for one ha (h)	2.31 to 2.54	--
15.	Field efficiency (%)	84.55 to 92.32	--
16.	Puddling index (%)	--	74.67 to 85.14
17.	Fuel consumption		
		l/h	4.92 to 5.24
		l/ha	12.06 to 13.17

6.1 Dry land operation

6.1.1 Rate of work

- i) The rate of work was recorded 0.394 to 0.433 ha/h, and the speed of operation varies from 2.59 to 2.62 kmph.
- ii) The time required to cover one hectare was recorded as 2.31 to 2.54 h

6.1.2 Quality of work

- i) The depth of operation was recorded as 11.11 to 12.67 cm.
- ii) Average effective width was observed as 179 to 181 cm.
- iii) Field efficiency was observed as 84.55 to 92.32 %.

6.2 Wet Land operation

Quality of work

- i) The depth of puddle was recorded as 17.78 to 19.89 cm.
- ii) The puddling index was recorded as 74.67 to 85.14 %.

6.3 Labour requirement

In all, two skilled operators are needed to ensure continuous operation of Rotary tiller (rotavator) for day long period.



6.4 Wear analysis (on mass basis)

Wear of hatchet blades (on mass basis) was measured and recorded in ensuing table:

Percentage wear of rotavator blades on mass basis

Sl. No.	Initial mass of blade (g)	Mass of blade after 38.09 hr. of operation (g)	Difference of weight (g)	Percentage of wear (%) after 38.09 hr.	Percentage of wear on hour basis (%)
1.	965.2	924.0	41.2	4.27	0.11
2.	968.5	926.0	42.5	4.39	0.12
3.	961.0	930.90	30.1	3.13	0.08
4.	957.1	921.0	36.1	3.77	0.10
5.	962.4	930.90	31.5	3.27	0.09
6.	965.9	930.20	35.7	3.70	0.10
7.	948.3	915.20	33.1	3.49	0.09
8.	968.2	927.80	40.4	4.17	0.11

7. EFFECTIVENESS OF SEALINGS

After completion of wet land operation for 11.41 hours, the rotavator was dismantled for checking the effectiveness of sealing provided against ingress of dust, and water/mud in various sub-assemblies/components. The observations are given in ensuing table:-

Sl. No.	Location	Whether ingress of mud and/or water was observed (Yes/No)
1.	Primary reduction gear box	No
2.	Secondary reduction gear box	No
3.	Rotor assembly (hub)	No

8. EASE OF OPERATION & ADJUSTMENTS

No noticeable difficulty was observed during the operation and adjustment of rotavator

9. DEFECTS, BREAKDOWN AND REPAIRS

No noticeable defect or breakdown was observed during the test.



II. CRITICAL TECHNICAL SPECIFICATION

(Vide Ministry's communication No 13-9/2019 M & T (I&P) dated 26.04.2019)

Sl. No	Parameters	Specification	Observed	Remarks
1.	Working width (mm)	1200 (Min.)	1800	Conforms
2.	Type of blade	C/L/J shape as per demand Hatch blade	L shape Hatcher blade	Conforms
3.	Thickness of blade (mm)	7-8 (Min.)	7.0	Conforms
4.	No. of blades	30 (Min.)	42	Conforms
5.	Total Number of flanges	5 (Min.)	08	Conforms
6.	Number of blades per flanges	6 (Max.)	06 and 03 nos. LHS & RHS of flange	Conforms
7.	Outer diameter of rotor shaft mm	75-90	90	Conforms
8.	Rotor diameter, including flange and blade mounted on flange, mm	425 (Min.)	490	Conforms
9.	Side Drive	Gear Drive /Chain Drive (Optional)	Chain drive	Conforms
10.	Depth control mechanism	Arc shaped skid on both side of rotavator	Provided	Conforms
11.	Material of blades	Boron 27/28/30 Mn (28MnCrB5) / High Carbon steel of grade EN42/EN45/EN47	Silicon manganese steel / EN45	Conforms
12.	Hardness of blade Material, HRC	38 (min)	42.87	Conforms
13.	Safety clutch/Device (Shear bolt) in PTO drive shaft	Must be provided	Provided	Conforms
14.	Rotavator stand	Must be provided	Provided	Conforms
15.	Guard over propeller shaft	Must be provided	Provided	Conforms
16.	Sheet Metal	ASTM A36 / IS 2062	ASTM A36	Conforms
17.	Marking/labeling of machine	The labeling plate should be riveted on the body of machine having Name and address of manufacturer, Country of Origin, Make, Model, Year of manufacturer, Serial Number, Type, size, required of prime mover (kW)	Provided	Conforms
18.	Literature	Operator manual, Service manual and Parts catalogue should be provided.	Provided	Conforms



12. COMMENTS AND RECOMMENDATIONS

- 12.1 The Dimension of three point linkage of implement does not conform, in toto, to the requirements of IS: 4468(Part-1)-1997 and therefore, it may be looked into for corrective action.
- 12.2 The grade of grease is not specified. It **MUST** be specified.
- 12.3 The hardness of blades does not conform, in toto, to the requirements of IS: 6690-1981. This needs to be looked into for corrective action.
- 12.4 **Technical Literature:**
Following literature was supplied with the Rotavator for reference during the test.
- Workshop manual rotary tiller (for KRMU151D, KRMU181D, KRMU211D)
 - Illustrated parts list rotary tiller (for KRMU151D, KRMU181D, KRMU211D)
 - Operator's manual rotary tiller (for KRMU151D, KRMU181D, KRMU211D)


13. COMPARISON WITH SPECIFICATION AND PERFORMANCE CHARACTERISTICS OF PREVIOUS SAMPLE (Test Report No. IMP-762/1798/2015 of NRFMT&TI, Hisar) AND PRESENT SAMPLE.

Sr. No.	Parameter	Previous Sample	Present Sample
1	2	3	4
13.1	Name and address of manufacturer	: SIAM KUBOTA Corporation Co., Ltd. 700/867, Moo 3, Amata Nakorn Industrial Estate, Nonggkha, Panthong, Chonburi, 20160, Thailand	No change
	Name and address of applicant	: Kubota Corporation Chennai Liaison Office No. 15, Medavakkam Road, Sholinganallur Chennai 600119, Tamil Nadu, India	Kubota Agricultural Machinery India Pvt. Ltd. 18/4, Mathura Road, Faridabad, Haryana-121007, India
	Country of origin	: Thailand	Thailand
	Name of machine	: Rotavator	Rotary Tiller (Rotavator), Tractor driven
	Type	: Tractor PTO powered, mounted type	Centrally mounted, Chain drive, Single speed.
	Make (apa)	: Kubota	Kubota

ROTAVATOR-346/2727/2021	KUBOTA, KRMU181D, ROTARY TILLER, (ROTAVATOR) TRACTOR MOUNTED, COMMERCIAL (1 ST Batch)
-------------------------	--

13.22 Chemical composition of blades			
Carbon (C)	:	0.250 to 0.454	0.562 (Average)
Silicon (Si)	:	1.419 to 1.718	1.903 (Average)
Manganese (Mn)	:	0.597 to 0.624	0.747 (Average)
Sulphur (S)	:	Nil	0.049 (Average)
Phosphorous (P)	:	0.0117 to 0.015	0.017 (Average)
Boron	:	--	0.001 (Average)

TESTING AUTHORITY

Er. G.R. AMBALKAR AGRICULTURAL ENGINEER	
Dr. MUKESH JAIN DIRECTOR	 10.08.2021

14. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comment
14.1	Chapter 10, 4 (i)	Chemical composition our declared material match with Silicon Manganese steel under IS 6690 : 1981, MPS may be consider as meeting the requirement.
14.2	Chapter 11, 11	Our provided material SUP6- Silicon manganese steel is equivalent to EN45 grade so it should be mentioned as conformed.
14.3	Chapter 11, 14	Sheet Metal – KRMU181D adopts the mild steel of SS400 which has equivalent strength with A36/ASTM. So it should be mention as conform.

