

व्यावसायिक परीक्षण रिपोर्ट

संख्या/ No.: ROTAVATOR-363/2744/2021

COMMERCIAL TEST REPORT

माह/Month: August, 2021

THIS TEST REPORT VALID UP TO : 31st August, 2028



**SONALIKA, SLSUPSMSR-7, 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

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3.11 Lubricants:

Sl. No.	Particulars	As recommended by the manufacturer	As used during test
1	Primary Gear box	EP-140	Oil originally filled in the rotavator was not changed.
2	Secondary Gear box	EP-140	
3	Rotor Hub	Not Specified	EP-140
4	Propeller Shaft	Not Specified	Lithium base grease

4. RUNNING - IN

Rotavator was run in for 1.03 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	46.07 (Average)	Does not conform
On shank portion	37 to 45	45.60 (Average)	Does not conform

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	0.145	Does not conform
Silicon (Si)	0.10 -0.40	1.50-2.00	1.752	Conforms to manganese steel
Manganese (Mn)	0.50 -1.0	0.50-1.00	0.873	Conforms
Sulphur (S)	0.05(max)	0.05(max)	0.061	Does not conform
Phosphorous (P)	0.05(max)	0.05(max)	0.000	Conforms

6. FIELD PERFORMANCE TEST

The field tests of the rotavator comprising of dry land and wet land operation were conducted for 25.93 and 12.04 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	Mahindra Arjun 555 DI	
2.	Gear used	L-2	L-1
3.	Type of soil	Sandy loam	
4.	Average soil moisture (%)	17.83 to 18.57	--
5.	Average depth of standing water (cm)	--	7.60 to 8.00
6.	Bulk density of soil (g/cc)	1.72 to 1.78	--
7.	Average speed of operation (kmph)	2.62 to 2.66	2.37 to 2.38
8.	Avg. travel reduction (%)	--	-2.49 to -2.03
9.	Avg. wheel slip (%)	-2.56 to -1.19	--
10.	Average depth of puddle (cm)	--	14.50 to 16.0
11.	Average depth of cut (cm)	10.17 to 10.43	--
12.	Avg. effective width (cm)	194 to 196	--
13.	Area covered (ha/h)	0.392 to 0.448	--
14.	Time required for one ha (h)	2.23 to 2.55	--
15.	Field efficiency (%)	76.12 to 87.16	--
16.	Puddling index (%)	--	73.94 to 79.62
17.	Fuel consumption		
		l/h	5.37 to 6.02
		l/ha	13.00 to 15.22
18.	Avg. PTO power consumption, kW	21.27	--

6.1 Dry land operation**6.1.1****Rate of work**

- The rate of work was recorded 0.392 to 0.448 ha/h, and the speed of operation varied from 2.62 to 2.66 kmph.
- The time required to cover one hectare was recorded as 2.23 to 2.55 h

6.1.2**Quality of work**

- The depth of operation was recorded as 10.17 to 10.43 cm.
- Average effective width was observed as 194 to 196 cm.
- Field efficiency was observed as 76.12 to 87.16 %.

6.2**Wet Land operation****6.2.1****Quality of work**

- The depth of puddle was recorded as 14.50 to 16.00 cm.
- The puddling index was recorded as 73.94 to 79.62 %.

6.3**Labour requirement**

In all, two skilled operators are needed to ensure continuous operation of 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 39.00 hr. of operation (g)	Difference of weight (g)	Percentage of wear (%) after 39.00 hr.	Percentage of wear on hour basis (%)
1.	970.8	933.9	36.9	3.80	0.10
2.	997.9	961.4	36.5	3.65	0.09
3.	1008.5	972.0	36.5	3.61	0.09
4.	1013.4	978.3	35.1	3.46	0.09
5.	975.7	945.5	32.2	3.30	0.08
6.	1019.1	984.8	34.3	3.36	0.09
7.	1012.9	977.3	35.6	3.51	0.09
8.	1005.9	965.1	40.8	4.05	0.10
9.	1013.0	971.2	41.8	4.12	0.11
10.	1007.1	967.9	39.2	3.89	0.10
11.	994.2	951.7	42.5	4.27	0.11

7. EFFECTIVENESS OF SEALINGS

After completion of wet land operation for 12.04 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 defect observed during the test.



11. CRITICAL TECHNICAL SPECIFICATION

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

Sr. No	Parameters	Specification	Observed	Remarks
1.	Working width (mm)	1200 (Min.)	2000	Conforms
2.	Type of blade	C/L/J shape as per demand Hatchet blade	L-shape	Conforms
3.	Thickness of blade (mm)	7-8 (Min.)	7.0	Conforms
4.	No. of blades	30(Min.)	60	Conforms
5.	Total Number of flanges	5 (Min.)	11	Conforms
6.	Number of blades per flanges	6 (Max.)	06	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.)	456	Conforms
9.	Side Drive	Gear Drive /Chain Drive (Optional)	Gear drive	Conforms
10.	Depth control mechanism	Arc shaped skid on both side of rotavator	Skid on both Side of rotavator	Conforms
11.	Material of blades	Boron 27/28/30 Mn (28MnCrB5) / High Carbon steel of grade EN42/EN45/EN47	Boron	Conforms
12.	Hardness of blade Material, HRC	38 (min)	46.07	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	AS36 / IS 2062	IS:2862	Conforms

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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)	Partially meet the requirement	Partially Conform
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 Dimension of PIC of Implement does not conform, in toto, to the requirements of IS: 4931-1995 and therefore, it may be looked into for corrective action.
- 12.3 The grade of grease is not specified. It **MUST** be specified.
- 12.4 The hardness of blades does not conform, the requirements of IS: 6690-1981. This needs to be looked into for corrective action.
- 12.5 The chemical composition of blades does not conform, in toto, to the requirements of IS: 6690-1981. This needs to be looked into for corrective action.
- 12.6 The recommended PTO speed of prime mover is not specified on the labeling plate. It **MUST** be looked into.
- 12.7 The country of origin is not specified on the labeling plate. It **MUST** be looked into.



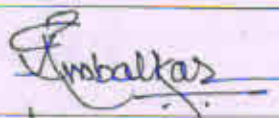
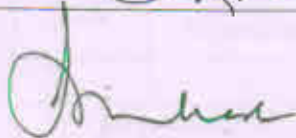
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12.8 Technical Literature:

One booklet entitled "Owner's manual" was provided for reference during test. The same, however, needs to be updated as per IS:8132-1999.

TESTING AUTHORITY

Er. G.R. AMBALKAR AGRICULTURAL ENGINEER	
Dr. MUKESH JAIN DIRECTOR	 28.08.2021

Test report compiled by Girdhari Lal, Technician

13. APPLICANT'S COMMENTS

Para No.	Our reference	Applicant Comments
13.1	12.1	The dimension of three point linkage will be improve / take care in our regular production as per IS: 4468 (Part-1): 1997, also change the correct dimension in our drawing.
13.2	12.2	The dimension of PIC will be improves in our regular production as per IS: 4931-1995.
13.3	12.3	It is lithium based grease will update the same in our Owner manual.
13.4	12.4	Same EP-140 oil grade use in the rotor hub, will update the same in our Owner manual.
13.5	12.5	The hardness of the blades will be take care in our regular production as per IS: 6690-1981.
13.6	12.6	The chemical composition of blades will be take care in our regular production as per PS: 6690-1981.
13.7	12.7 & 12.8	Will update the labeling p'ate
13.8	12.9	Will provide the owner manual with our each & every machine.

