

व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT

संख्या/ No.: ROTAVATOR-309/2578/2020
माह/Month: November, 2020

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



**CEPPL, STD 6 FT + 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

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[ISO 9001:2015 CERTIFIED]

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4.11 Lubricants:

Sl. No.	Particulars	As recommended by the manufacturer	As used during test
1	Primary Gear box	SAE 85W 140	Oil originally filled in the rotavator was not changed
2	Secondary Gear box	SAE 85W 140	
3	Rotor Hub	Not specified	M.P. Grease
4	Propeller Shaft	Not specified	

5. RUNNING – IN

Rotavator was run in for 1.72 hour before field performance test.

6. LABORATORY TEST**6.1 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	52	Does not conform
On shank portion	37 to 45	52	Does not conform

6.2 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	0.4252	Does not conform
Silicon (Si)	0.10 -0.40	1.50-2.00	1.9504	Conforms to Silicon manganese steel
Manganese (Mn)	0.50 -1.0	0.50-1.00	1.0831	Does not conform
Sulphur (S)	0.05(max)	0.05(max)	0.0390	Conforms
Phosphorous (P)	0.05(max)	0.05(max)	0.0155	Conforms

7. FIELD PERFORMANCE TEST

The field tests of the rotavator comprising of Dry land and Wet land operation were conducted for 25 and 10 hours respectively to assess the performance test 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, 265 DI MKM Power Plus	
2.	Gear used	L-1	L-1
3.	Type of soil	Sandy loam	
4.	Average soil moisture (%)	2.43 to 3.13	--
5.	Average depth of standing water (cm)	--	11.11 to 11.33
6.	Bulk density of soil (g/cc)	1.586 to 1.710	--
7.	Average speed of operation (kmph)	2.85 to 2.97	2.61 to 2.71
8.	Avg. travel reduction (%)	--	-1.79 to 0.39
9.	Avg. wheel slip (%)	-5.68 to -2.51	--
10.	Average depth of puddle (cm)	--	25.78 to 26.11
11.	Average depth of cut (cm)	11.06 to 11.17	--
12.	Avg. effective width (cm)	162 to 165	--
13.	Area covered (ha/h)	0.380 to 0.403	--
14.	Time required for one ha (h)	2.48 to 2.63	--
15.	Field efficiency (%)	79 to 86	--
16.	Puddling index (%)	--	81 to 83
17.	Fuel consumption		
		l/h	2.74 to 4.2
		l/ha	7.15 to 11.00
			1.63 to 2.56
			--

7.1 Dry land operation**7.1.1 Rate of work**

- i) The rate of work was recorded as 0.380 to 0.403 ha/h, and the speed of operation varies from 2.85 to 2.97 kmph.
- ii) The time required to cover one hectare was recorded as 2.48 to 2.63 h

7.1.2 Quality of work

- i) The depth of operation was recorded as 11.06 to 11.17 cm.
- ii) Average effective width was observed as 162 to 165 cm.
- iii) Field efficiency was observed as 79 to 86 %.

7.2 Wet Land operation

7.2.1 The tractor was fitted with half cage wheel on rear pneumatic traction wheel for conducting the puddling operation. The brief specification of half cage wheel is given in Annexure-III

7.2.2 Quality of work

- i) The depth of puddle was recorded as 25.78 to 26.11 cm.
- ii) The puddling index was recorded as 81 to 83 %.

7.3 Labour requirement

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

7.4 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 36.97 hr. of operation (g)	Difference of weight (g)	Percentage of wear (%) after 36.97 hr.	Percentage of wear on hour basis (%)
1.	936.4	863.5	72.9	7.79	0.21
2.	944.0	872.8	71.2	7.54	0.20
3.	937.3	864.2	73.1	7.80	0.21
4.	957.9	881.5	76.4	7.80	0.21
5.	941.9	865.9	76.0	8.07	0.22
6.	939.9	859.5	80.4	8.55	0.23
7.	941	862.3	78.7	8.36	0.23

8. EFFECTIVENESS OF SEALINGS

After completion of wet land operation for 10 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

9. EASE OF OPERATION & ADJUSTMENTS

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

10. DEFECTS, BREAKDOWN AND REPAIRS

No noticeable defect or breakdown was observed during the test.



11. CRITICAL TECHNICAL SPECIFICATION

Deferred till 31.12.2020 vide Ministry O.M. No 13-13/2020 M&T, (I&P) dated 24.04.2020

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 provision against overload on P.T.O. drive shaft is not provided. It **MUST** be provided.
- 12.3 The grade of grease is not specified. It **MUST** be specified.
- 12.4 The hardness of blades does not conform, to 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 **Technical literature:-**
One technical booklet "without any title on it", was provided with the rotavator during testing. The same needs to be revised, upgraded and updated as per IS: 8132-1999.

TESTING AUTHORITY

SANJAY KUMAR AGRICULTURAL ENGINEER	
P. K. PANDEY DIRECTOR	

13. APPLICANT'S COMMENTS

Para No.	Our Ref.	Applicant Comments
13.1	12.1	Corrective action has already been initiated at design end to meet all the dimensions of three point linkage of implement to conform IS: 4468 (Part-1) -1997. This will definitely introduce in further production.
13.2	12.2	Action has initiated to make sure that the future supply of PTO shafts will have the provision of shear bolt to avoid any effect of overload on tractor.
13.3	12.3	Grade of grease is NLGI Grade-3
13.4	12.4	Action initiated at manufacturer end for conformance to the raw material standard and inspect the process to maintain the hardness of the blade to conform IS:6690-1981
13.5	12.5	Corrective action initiated at manufacture end by inspect raw material to maintain the chemical composition of material as per IS: 6690-1981. This will be incorporated for next lot.
13.6	12.6	Updation of technical booklet has been initiated. The book will be revised and updated to conform IS: 8132:1999. All the recommendations will be taken seriously and improvements will be done at war footing level.