व्यावसायिक परीक्षण रिपोर्ट संख्या/ **No.: ROTAVATOR-335/2716/2021**

COMMERCIAL TEST REPORT माह/**Month: July, 2021**

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

DEEPAK AGRO, DA860, 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

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 Tele./FAX: 01662-276984

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**	M.P. Grease
4	Propeller Shaft	**Not Specified**	

4. RUNNING – IN

Rotavator was run in for 1.0 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	46.1 (Average)	**Does not conform**
On shank portion	37 to 45	48.1 (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	0.263	**Does not conform**
Silicon (Si)	0.10 -0.40	1.50-2.00	0.289	Conforms
Manganese (Mn)	0.50 -1.0	0.50-1.00	1.037	**Does not conform**
Sulphur (S)	0.05(max)	0.05(max)	0.039	Conforms
Phosphorous (P)	0.05(max)	0.05(max)	0.034	Conforms

6. FIELD PERFORMANCE TEST

The field tests of the rotavator comprising of dry land and wet land operation were conducted for 25.84 and 10.98 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 Ultra 605 DI	
2.	Gear used	L-1	L-1
3.	Type of soil	Sandy loam	
4.	Average soil moisture (%)	16.03 to 16.90	--
5.	Average depth of standing water (cm)	--	6.50 to 6.72
6.	Bulk density of soil (g/cc)	1.590 to 1.690	--
7.	Average speed of operation (kmph)	2.55 to 2.76	2.51 to 2.76
8.	Avg. travel reduction (%)	--	-5.83 to -4.71
9.	Avg. wheel slip (%)	-2.87 to -0.66	--
10.	Avg. depth of puddle (cm)	--	15.60 to 17.00
11.	Avg. depth of cut	11.00 to 11.46	--
12.	Avg. effective width (cm)	212 to 214	--
13.	Area covered (ha/h)	0.448 to 0.469	--
14.	Time required for one ha (h)	2.13 to 2.23	--
15.	Field efficiency (%)	79.36 to 85.08	--
16.	Puddling index (%)	--	82.14 to 85.05
17.	Fuel consumption		
	l/h	6.00 to 6.29	4.26 to 4.50
	l/ha	12.80 to 14.03	--
18.	Avg. PTO power consumption (kW)	24.65	--

6.1 Dry land operation

6.1.1 Rate of work

i) The rate of work was recorded 0.448 to 0.469 ha/h, and the speed of operation varied from 2.55 to 2.76 kmph.

ii) The time required to cover one hectare was recorded as 2.13 to 2.23 h

6.1.2 Quality of work

i) The depth of operation was recorded as 11.00 to 11.46 cm.

ii) Average effective width was observed as 212 to 214 cm.

iii) Field efficiency was observed as 79.36 to 85.08 %.

6.2 Wet Land operation

6.2.1 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

6.2.2 Quality of work

i) The depth of puddle was recorded as 15.60 to 17.0 cm.

ii) The puddling index was recorded as 82.14 to 85.05 %.

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 37.82 hr. of operation (g)	Difference of weight (g)	Percentage of wear (%) after 37.82 hr.	Percentage of wear on hour basis (%)
1.	1088.7	1065.7	23.00	2.11	0.06
2.	1056.9	1038.2	18.70	1.78	0.05
3.	1070.0	1055.2	14.80	1.38	0.04
4.	1078.0	1060.1	17.90	1.66	0.04
5.	1076.1	1062.3	13.81	1.28	0.03
6.	1060.5	1045.7	14.80	1.40	0.04
7.	1068.9	1058.2	10.70	1.00	0.03
8.	1054.4	1034.8	19.60	1.86	0.05
9.	1052.4	1035.4	17.00	1.62	0.04
10.	1081.0	1064.1	16.90	1.56	0.04

7. EFFECTIVENESS OF SEALINGS

After completion of wet land operation for 10.98 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)

Si. No	Parameters	Specification	Observed	Remarks
1.	Working width (mm)	1200 (Min.)	2230	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.)	10	Conforms
6.	Number of blades per flanges	6 (Max.)	6	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.)	450	Conforms
9.	Side Drive	Gear Drive /Chain Drive (Optional)	Gear 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	Boron	Conforms
12.	Hardness of blade Material, HRC	38 (min)	46.1 (Average)	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	**Not specified**	**Does not conform**
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.		Conforms

12. COMMENTS AND RECOMMENDATIONS

12.1 The Dimensions 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.

12.2 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.

12.3 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.

12.4 The dimension of three point linkage of implement does not conform, in toto, to the requirement of IS:4468 (Part-1)-1997 and therefore, it may be looked into for corrective action.

12.5 The sheet metal specifications not specified by applicant it **MUST** be specified.

13. TECHNICAL LITERATURE

The following literature are provided with rotavator for guidance to the user

i) Operator's manual
ii) Service manual
iii) Part's catalogue

However, the manual of rotavator should be updated as per IS:8132-1999.

TESTING AUTHORITY

Er. G.R. AMBALKAR AGRICULTURAL ENGINEER	Ambalkar
Dr. MUKESH JAIN **DIRECTOR**	Mukesh 31.07.2021

Test report compiled by Er. Maan Singh, Senior Technical Assistant

14. APPLICANT'S COMMENTS

"We will follow all Indian Standard"