



**ROTAVATOR
'NEW BHARAT - 30'**



सत्यमेव जयते

भारत सरकार
कृषि मंत्रालय
(कृषि एवं सहकारिता विभाग)

GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE
(DEPARTMENT OF AGRICULTURE & COOPERATION)

उत्तरी क्षेत्र कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान
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NORTHERN REGION FARM MACHINERY TRAINING AND TESTING INSTITUTE TRACTOR NAGAR, SIRSA
ROAD, HISAR-125001 (HARYANA)

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5. LABORATORY TEST

5.1 The hardness of blades was determined at edge and shank portion. The results of hardness test are tabulated in Table-I.

TABLE-1

Hardness as observed (HRC)		As per IS:6690-Jan. 2007 (HRC)		Remark
Edge portion	Shank portion	On Edge portion	On shank portion	Conforms for shank portion
44 to 49	37 to 38	53 to 59	37 to 45	

5.2 Chemical composition

The chemical composition of blades is tabulated in Table-2

TABLE-2 The chemical analysis of blade

Sl. No.	Material	Requirement as per IS:6690-Jan. 2007 (% by weight)	As observed (% by weight)	Remark
1.	Carbon	0.50 to 0.60	0.29	Does not conform
2.	Silicon	1.50 to 2.00	0.20	Does not conform
3.	Manganese (Mn)	0.50 to 1.00	1.27	Does not conform
4.	Sulphur (s)	0.05 (max)	0.022	Conforms
5.	Phosphorous (p)	0.05 (max)	0.016	Conforms



:: Chemical Composition of elements of Rotavator blade conforms to Indian Standard.

6. FIELD TEST

The field tests of the implement comprising of dry and wet land operation were conducted for 21.5 & 17.2 hours respectively in different soil moisture conditions to assess the performance of the implement. The details of tractor used for field operations are given in 4.2

The tractor PTO speed was maintained at 540rpm. The performance of implement is reported in Annexure-II and summarized in Table-3.

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TABLE-3: Summary of field performance

Sl.No.	Parameters	Dry land operation	Wet land operation (puddling)
i)	Tractor used	Swaraj – 855	
ii)	Type of soil	Sandy Loam	
iii)	Av. Soil moisture, %	11 to 13.2	--
iv)	Av. depth of standing water, cm	--	12.0 to 13.4
v)	Bulk density of soil, g/cc	1.73 to 1.84	--
vi)	Field efficiency	82.2 to 89.7	
vii)	Puddling index, %	--	80 to 85.0
viii)	Av. Speed of operation, kmph	2.93 to 3.19	2.76 to 2.94
ix)	Av. Depth of cut	11.0 to 11.7	--
x)	Depth of puddle, cm	--	13.6 to 15.6
xi)	Av. Working width, m	2.01 to 2.03	--
xii)	Area covered, ha/h	0.485 to 0.574	--
xiii)	Time required for one hectare, hr.	1.75 to 2.05	
xiv)	Fuel consumption		
	- l/h	5.58 to 6.68	5.77 to 6.47
	- l/ha	11.20 to 12.33	--
xv)	Wheel slippage %	-1.05 to -3.03	-4.71 to -7.54
xvi)	Power requirement, kW (PS)	24 to 27 (32.6 to 36.7)	

6.1 Rate of Work

6.1.1 Dry land operation

-The rate of work in sandy loam soil was recorded as 0.485 to 0.574 ha/h and the forward speed as 2.93 to 3.19 kmph.

-The time required to cover one hectare area was recorded as 1.75 to 2.05 h.

6.1.2 Wet land operation

-Speed of operation varied from 2.76 to 2.94 kmph.

6.2 Quality of work

6.2.1 Dry land operation

-The depth of operation was recorded as 11.0 to 11.7 cm.

-The field efficiency was recorded as 82.2 to 89.7%.

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Sl.No.	Location	Whether ingress of mud and/or water was observed
1.	Primary reduction gear box.	No
2.	Secondary reduction chain; drive	No
3.	Hub of rotor assembly	No

8. EASE OF OPERATION, ADJUSTMENTS & SAFETY

- 8.1 The drive shaft (universal coupling shaft) is provided with shear bolt for safety.
- 8.2 The propeller shaft has telescopic sections with universal joints, to adjust the length of drive shaft, which is adequate.
- 8.3 Depth adjustment can be made by raising or lowering the skids.
- 8.4 Implement does not have provision to vary rotor shaft speed to cater to different soil and moisture conditions.

9. DEFECTS, BREAKDOWNS AND REPAIRS

No breakdown occurred during 38.7 hrs operation in the field.

10. COMMENTS & RECOMMENDATIONS

- 10.1 The dimension of three point linkage of the implement does not conform to IS:4468-March 2007(Part-I). Therefore, the standard 3 point linkage system complying with test code under reference should be used on Rotavator at regular production level.
- 10.2 It is recommended to have more provision for change in rotor speed to suit wider range of soil and soil moisture conditions.
- 10.3 Maneuverability of tractor with Rotavator was found to be satisfactory. The quality of work was observed to be satisfactory.
- 10.4 Dimensions of splined end of pinion shaft do not conform to IS : 4931 –Oct. 2004. This should be incorporated at production level.
- 10.5 Hardness of blade at edge & shank portion are 44 to 49 HRC and 37 to 38 HRC as against 53 to 59 and 37 to 45 HRC at edge and shank portion as per IS :6690-Jan. 2007. The blades with standard hardness should be used on regular production.
- 10.7 The percentage wear of hatchet blades on mass basis during field operation per hour ranged from 0.08 to 0.15% , and it is considered to be normal.
- 10.8 The percentage wear of hatchet blades on dimensional basis during field operation (38.7 hrs.) ranged from 10.25 to 15.80 % and 2.87 to 6.12 % at edge and at 65 mm from edge respectively

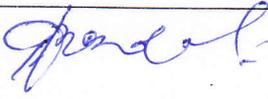
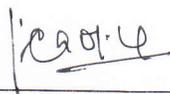
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- 10.9 Tractor used was 34.3 kW pto power. Hence, only 69.9% to 78.7% of tractor pto power was utilized during dry land operation.
- 10.10 The Identification plate need to be provided in respect of machine at regular production level.
- 10.11 Chemical composition of hatchet blade for carbon, silicon & manganese does not comply with IS:6690-2002.

11. LITERATURE

The manufacturer has developed operating manual in bilingual (i.e. in Hindi and English) which contains the specification of the implement, operating, maintenance and the safety instructions and also the spare parts list. The literature a developed is found to be adequate for the guidance of users and service personnel. However, it needs to developed in other regional languages.

TESTING AUTHORITY

(J.P. MANDAL) ASSISTANT ENGINEER	
(P. K. CHOPRA) SENIOR AGRICULTURAL ENGINEER	
(HIMAT SINGH) - DIRECTOR -	



APPLICANT'S COMMENTS

1. We shall manufacture the 3 point linkage of the implements according to IS:4468-March2007 (Part-I) in our regular production in future.
2. We shall provide multi speed gear box for change in rotor speed to suit wider rang of soil moisture conditions.
3. We shall provide the splined end of pinion shaft according to IS:4931- Oct.2004 in our regular production.
4. We shall undertake to use the blades with standard hardness in our regular production.
5. We shall provide identification plate in our regular production.
6. We shall also provide the Literature in different languages.

We again stated that all the observations/comments suggested by you will be incorporated at regular production level.