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व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT (ICT)

संख्या/No. : IMP-773/1813/2015
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ROTAVATOR
ACE, ART-754

सत्यमेव जयते

भारत सरकार
कृषि एवं किसान कल्याण मंत्रालय
(कृषि,सहकारिता एवं किसान कल्याण विभाग)

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MINISTRY OF AGRICULTURE & FARMERS WELFARE
(DEPARTMENT OF AGRICULTURE, COOPERATION & FARMERS WELFARE)

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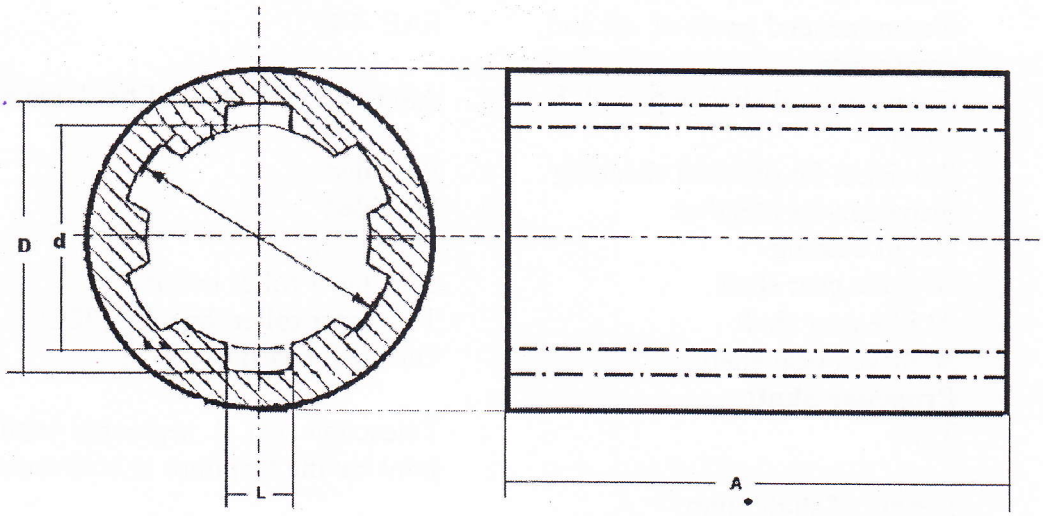

FIG.4 PROPELLER SHAFT HUB DIMENISONS

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

Description	As per IS:6690:1981 (HRC)	Hardness as observed (HRC)	Remarks
Edge portion	53 to 59	49.2 to 51.7	**Does not conform**
On shank portion	37 to 45	49.2 to 51.7	**Does not conform**

5.2 Chemical composition

The chemical composition of blades is tabulated in Table-2

TABLE-2

Sl. No.	Material	Requirement as per IS:6690:1981 (% by weight)	As observed (% by weight)	Remark
1.	Carbon (C)	0.50 to 0.60	0.2791	**Does not conform**
2.	Silicon(Si)	1.50 to 2.00	0.3121	**Does not conform**
3.	Manganese (Mn)	0.50 to 1.00	0.7439	Conforms
4.	Sulphur (S)	0.05 (max)	0.0069	Conforms
5.	Phosphorous (P)	0.05 (max)	0.0158	Conforms

6. FIELD TEST

The field tests of the implement comprising of dry and wet land operations were conducted for 20.35 & 15.40 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 annexure-I.

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

TABLE-3

Summary of field performance

Sl. No.	Parameters	Dry land operation	Wet land operation (puddling)
i)	Tractor used	Mahindra-555 DI, Arjun	Mahindra-605 DI, Arjun
ii)	Type of soil	Sandy loam	Sandy loam
iii)	Av. Soil moisture, %	11.0 to 20.0	--
iv)	Depth of standing water, cm	--	4.7 to 5.5
v)	Field efficiency, %	81.21 to 89.21	--
vi)	Puddling Index, %	--	71.74 to 74.8
vii)	Av. Speed of operation, kmph	2.79 to 2.96	2.36 to 2.38
viii)	Av. Depth of cut, cm	7.20 to 8.60	--
ix)	Av. depth of puddle, cm	--	11.23 to 11.50
x)	Av. Working width, m	2.006 to 2.129	--
xi)	Area covered, ha/h	0.493 to 0.522	--
xii)	Time required for one hectare, h	1.91 to 2.03	--
xiii)	Fuel consumption		
	- l/h	6.096 to 6.800	4.17 to 4.27
	- l/ha	11.842 to 13.444	--

6.1 Rate of work

6.1.1 Dry land operation

The rate of work in sandy loam soil was recorded as 0.493 to 0.522 ha/h and the forward speed as 2.79 to 2.96 kmph.

The time required to cover one hectare area was recorded as 1.91 to 2.03 h.

6.1.2 Wet land operation

Speed of operation varied from 2.36 to 2.38 kmph.

6.2 Quality of work

6.2.1 Dry land operation

The depth of operation was recorded as 7.20 to 8.60 cm.

The field efficiency was recorded as 81.21 to 89.21 %.

6.2.2 Wet land operation

Depth of puddle was recorded as 11.23 to 11.50 cm.

Puddling index was recorded as 71.74 to 74.8 %.

6.3 Wear of blades

6.3.1 On mass basis

Wear of hatchet blades (mass basis) after 35.75 hrs. of field operation is tabulated in Table-4

8. EASE OF OPERATION, ADJUSTMENTS & SAFETY

8.1 Propeller shaft is provided with safety bolt as its safety device.

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.

8.5 Operator has to get down from tractor to make adjustments in rotavator.

9. SOUNDNESS OF CONSTRUCTION

No breakdown occurred during 35.75 hrs of operation in the field.

10. COMMENTS & RECOMMENDATIONS

10.1 The dimensions of three point linkage of the implement does not conform to IS:4468 (Part-I):1997. Standard three point linkage system should be used at regular production level.

10.2 It is recommended to have provision for change in rotor speed to suit wider range of soil and soil moisture conditions.

10.3 Maneuverability of tractor with rotavator and quality of work were observed to be satisfactory.

10.4 Dimensions of power input shaft of rotavator does not conform to IS: 4931:1995. The shaft with specification comply with BIS standard under reference should be used at regular production level.

10.5 The hardness of hatchet blades in the edge portion and in the shank portion was 49.2 to 51.7 HRC against the requirement of 53 to 59 HRC (edge portion) and 37 to 45 HRC (on shank portion) as per IS:6690:1981. This calls for improvement at production level for hardness of rotor blade at its shank portion.

10.6 The percentage wear of hatchet blades on mass basis during field operation 35.75 hrs, ranged from 1.06 to 2.17 % which is normal.

10.7 The percentage wear of hatchet blades on dimensional basis after field operation 35.75 hrs, ranged from 2.14 to 8.00 % and 0.78 to 2.63 % respectively at edge and at 65 mm from edge.

10.8 The PTO power requirement of rotavator during field test was observed from 13.73 to 26.60 kW in dry land operation. Which is 44.86 to 86.92 percent of maximum PTO power at standard PTO speed (30.6 kW) of the tractor used.

10.9 An identification plate is provided on trailing board of rotavator. Mass of the implement and approx power requirement may also be added.

10.10 The safety bolt is provided in propeller shaft to protect from overloading.

10.11 Carbon & silicon content of rotar blade are lower that the limit as specified in IS:6690:1981 and therefore this should be taken care in future at regular production level.

10.12 The safety warnings and hazard decals are not provided on the machine. It should be provided. The labels of maintenance instruction and oil/lubricant grade, capacity, level etc. may also be provided.

11. LITERATURE :-

Manufacturer has provided a booklet containing operator manual, part catalogue and service manual for reference during test in English. However, it should be updated as per IS:8132:1983 in Hindi & other regional languages and provides with machine for guidance of users & technical personnel.

TESTING AUTHORITY

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12. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's Comments
12.1	--	We will make improvements in the components which does not conform to Indian Standard.