GUR纳米 SINGH & SONS, (TRACTOR MOUNTED) 
MANJIT-5' ROTAVATOR

Government of India
Ministry of Agriculture and Farmers Welfare

Department of Agriculture, Cooperation and Farmers Welfare

Northern Region Farm Machinery Training and Testing Institute

Tractor Nagar, Sirsa Road, HISAR (Haryana)-125 001

[ISO 9001:2015 CERTIFIED]

Website: http://nrfmmti.gov.in/
4.11 Lubricants:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Particulars</th>
<th>As recommended by the manufacturer</th>
<th>As used during test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Primary Gear box</td>
<td>Not specified</td>
<td>Oil originally filled in the machine was not changed</td>
</tr>
<tr>
<td>2</td>
<td>Secondary Gear box</td>
<td>Not specified</td>
<td>Servo M.P grease</td>
</tr>
<tr>
<td>3</td>
<td>Rotor Hub</td>
<td>Not specified</td>
<td>Servo M.P grease</td>
</tr>
<tr>
<td>4</td>
<td>Propeller Shaft</td>
<td>Not specified</td>
<td>Servo M.P grease</td>
</tr>
</tbody>
</table>

5. RUNNING – IN

Run-in was not recommended by the applicant.

6. LABORATORY TEST

6.1 Hardness: - The surface hardness of blade was recorded as under:

<table>
<thead>
<tr>
<th>Description</th>
<th>As per IS: 6690:1981 (HRC)</th>
<th>Hardness as observed (HRC)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edge portion</td>
<td>53 to 59</td>
<td>48.5 to 49.3</td>
<td>Does not conform</td>
</tr>
<tr>
<td>On shank portion</td>
<td>37 to 45</td>
<td>48.5 to 49.3</td>
<td>Does not conform</td>
</tr>
</tbody>
</table>

6.2 Chemical composition

The chemical composition of blades is tabulated as under:

<table>
<thead>
<tr>
<th>Constituents</th>
<th>As per IS: 6690-1981</th>
<th>Composition as observed (% of weight)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon (C)</td>
<td>0.70 - 0.85</td>
<td>0.3368</td>
<td>Does not conform</td>
</tr>
<tr>
<td>Silicon (Si)</td>
<td>0.10 - 0.40</td>
<td>0.3568</td>
<td>Conforms</td>
</tr>
<tr>
<td>Manganese (Mn)</td>
<td>0.50 - 1.0</td>
<td>1.0014</td>
<td>Conforms</td>
</tr>
<tr>
<td>Sulphur (S)</td>
<td>0.05(max)</td>
<td>0.0087</td>
<td>Conforms</td>
</tr>
<tr>
<td>Phosphorous (P)</td>
<td>0.05(max)</td>
<td>0.0454</td>
<td>Conforms</td>
</tr>
</tbody>
</table>

7. FIELD PERFORMANCE TEST

The field tests of the implement comprising of wet land and dry land operation were conducted for 15.82 and 27.19 hours respectively to assess the performance of the implement. The performance of implement is reported in Annexure-I & II for wet land and dry land operations respectively.

Observations of field performance test are summarized in the ensuing table:
## Summary of Field Performance Test

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Parameters/operations</th>
<th>Wet land operation (Puddling)</th>
<th>Dry land operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Tractor used</td>
<td>Jhon Deere 5204</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Gear used</td>
<td>A-1</td>
<td>A-2</td>
</tr>
<tr>
<td>3.</td>
<td>Type of soil (Refer IS:7926-1975)</td>
<td>Sandy loam</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Average soil moisture (%)</td>
<td>-</td>
<td>2.6 to 7.2</td>
</tr>
<tr>
<td>5.</td>
<td>Average depth of standing water (cm)</td>
<td>8.8 to 9.7</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Bulk density of soil (g/cc)</td>
<td>-</td>
<td>1.45 to 1.84</td>
</tr>
<tr>
<td>7.</td>
<td>Average speed of operation (kmph)</td>
<td>2.22 to 2.40</td>
<td>3.90 to 4.12</td>
</tr>
<tr>
<td>8.</td>
<td>Avg. travel reduction /Avg. wheel slip (%)</td>
<td>-0.28 to -0.52</td>
<td>1.34 to 3.43</td>
</tr>
<tr>
<td>9.</td>
<td>Average depth of puddle/ Average depth of cut (cm)</td>
<td>7.7 to 8.1</td>
<td>6.5 to 10.2</td>
</tr>
<tr>
<td>10.</td>
<td>Avg. working width (cm)</td>
<td>-</td>
<td>171 to 177</td>
</tr>
<tr>
<td>11.</td>
<td>Area covered (ha/h)</td>
<td>-</td>
<td>0.516 to 0.636</td>
</tr>
<tr>
<td>12.</td>
<td>Time required for one ha (h)</td>
<td>-</td>
<td>1.57 to 1.94</td>
</tr>
<tr>
<td>13.</td>
<td>Field efficiency (%)</td>
<td>-</td>
<td>79.0 to 92.0</td>
</tr>
<tr>
<td>14.</td>
<td>Puddling index (%)</td>
<td>82 to 91</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Fuel consumption</td>
<td>l/h</td>
<td>3.27 to 3.81</td>
</tr>
<tr>
<td></td>
<td></td>
<td>l/ha</td>
<td>-</td>
</tr>
<tr>
<td>16.</td>
<td>Average PTO power utilized (kW)</td>
<td>-</td>
<td>14.92</td>
</tr>
</tbody>
</table>

### 7.1 Quality of work
- **i)** The depth of puddle was recorded as 7.7 to 8.1 cm.
- **ii)** The puddling index was recorded as 82 to 91%.

### 7.2 Dry land operation

#### 7.2.1 Rate of work
- **i)** The rate of work was recorded as 0.516 to 0.636 ha/h, and the speed of operation varies from 3.90 to 4.12 kmph.
- **ii)** The time required to cover one hectare was recorded as 1.57 to 1.94 h.

#### 7.2.2 Quality of work
- **i)** The depth of operation was recorded as 6.5 to 10.2 cm.
- **ii)** Average working width was observed as 171 to 177 cm.
- **iii)** Field efficiency was observed as 79.0 to 92.0%.

### 7.3 Labour requirement

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

### 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:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Initial mass of blade (g)</th>
<th>Mass of blade after 43.01 hr. of operation (g)</th>
<th>Difference of weight (g)</th>
<th>Percentage of wear (%) after 43.01 hr.</th>
<th>Percentage of wear on hour basis (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1061.1</td>
<td>1045.8</td>
<td>15.3</td>
<td>1.44</td>
<td>0.03</td>
</tr>
<tr>
<td>2.</td>
<td>1029.4</td>
<td>1016.8</td>
<td>12.6</td>
<td>1.22</td>
<td>0.03</td>
</tr>
<tr>
<td>3.</td>
<td>1019.1</td>
<td>1004.7</td>
<td>14.4</td>
<td>1.41</td>
<td>0.03</td>
</tr>
<tr>
<td>4.</td>
<td>1016.3</td>
<td>994.4</td>
<td>21.9</td>
<td>2.15</td>
<td>0.05</td>
</tr>
<tr>
<td>5.</td>
<td>1015.9</td>
<td>986.4</td>
<td>29.5</td>
<td>2.90</td>
<td>0.07</td>
</tr>
<tr>
<td>6.</td>
<td>1026.6</td>
<td>981.0</td>
<td>45.6</td>
<td>4.44</td>
<td>0.10</td>
</tr>
</tbody>
</table>

8. EFFECTIVENESS OF SEALINGS

After completion of wet land operation for 15.82 hours, the implement 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:-

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Location</th>
<th>Whether ingress of mud and/or water was observed (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Primary reduction gear box</td>
<td>No</td>
</tr>
<tr>
<td>2.</td>
<td>Secondary reduction gear box</td>
<td>No</td>
</tr>
<tr>
<td>3.</td>
<td>Rotor assembly (hub)</td>
<td>No</td>
</tr>
</tbody>
</table>

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 43.01 hours of field operation.

11. COMMENTS AND RECOMMENDATIONS

11.1 No labeling plate is provided on machine. The labeling plate MUST be provided on machine with following information:-
- Make
- Model
- Year of manufacturer
- Working width
- Recommended tractor power (KW)
- Manufacturer’s address.

11.2 The specifications of implement hitch, does not conform in toto to the IS: 4468 (Part-1)-1997. Hence, it is recommended that implement should be provided with the hitch conforming to relevant Indian Standards.

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11.3 Dimensions of PIC of implement does not conform in toto to IS: 4931-1995 and therefore, it should be looked into for corrective action.

11.4 Hardness of the blade does not conform to IS: 6690:1981. This needs to be looked into for corrective action at production level.

11.5 The chemical composition of blades does not conform in toto to the IS: 6690-1981. This needs to be looked into for corrective action at production level.

11.6 The safety device should be provided in propeller shaft against overload.

11.7 The recommended grade of lubrication for primary and secondary gear box MUST be specified on rotavator.

11.8 Technical literature:
   No literature was supplied with the rotavator for reference during testing. The applicant MUST have to provide the following literature with machine.
   (i) Operator's manual
   (ii) Spare parts catalogue
   (iii) Service manual

TESTING AUTHORITY

R. K. NEMA
SENIOR AGRICULTURAL ENGINEER

P. K. PANDEY
DIRECTOR

12. APPLICANT'S COMMENTS

<table>
<thead>
<tr>
<th>Para No</th>
<th>Our reference</th>
<th>Applicant's comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1</td>
<td>11.1</td>
<td>We will provide labeling plate in future production.</td>
</tr>
<tr>
<td>12.2</td>
<td>11.7</td>
<td>In response to draft test report, the applicant has specified the following for gear box.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>i) Oil capacity 3.5 liters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) Oil grade SAE 140</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iii) Oil change period 250 hrs.</td>
</tr>
</tbody>
</table>