COMMERCIAL TEST REPORT

No. Imp-691/1680/2014

Month: November, 2014

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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-1.

<table>
<thead>
<tr>
<th>Description</th>
<th>As per IS:6690-Jan. 2007 (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>47</td>
<td>Does not conform</td>
</tr>
<tr>
<td>On shank portion</td>
<td>37 to 45</td>
<td>47</td>
<td>Does not conform</td>
</tr>
</tbody>
</table>

5.2 Chemical composition
The chemical composition of blades is tabulated in Table-2.

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Material</th>
<th>Requirement as per IS:6690-Jan. 2007 (% by weight)</th>
<th>As observed (% by weight)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Carbon I</td>
<td>0.50 to 0.60</td>
<td>0.8808</td>
<td>Does not conform</td>
</tr>
<tr>
<td>2.</td>
<td>Silicon(Si)</td>
<td>1.50 to 2.00</td>
<td>0.4480</td>
<td>Does not conform</td>
</tr>
<tr>
<td>3.</td>
<td>Manganese (Mn)</td>
<td>0.50 to 1.00</td>
<td>1.0495</td>
<td>Does not conform</td>
</tr>
<tr>
<td>4.</td>
<td>Sulphur (S)</td>
<td>0.05 (max)</td>
<td>Nil</td>
<td>Conforms</td>
</tr>
<tr>
<td>5.</td>
<td>Phosphorous (P)</td>
<td>0.05 (max)</td>
<td>0.0181</td>
<td>Conforms</td>
</tr>
</tbody>
</table>

6. FIELD TEST

The field tests of the implement comprising of dry and wet land operations were conducted for 21.36 & 15.41 hours respectively to assess the performance of the implement. The details of tractor used for field operations are given in annexure-1.

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

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Parameters</th>
<th>Dry land operation</th>
<th>Wet land operation (puddling)</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>Tractor used</td>
<td>New Holland-5500 (4WD)</td>
<td></td>
</tr>
<tr>
<td>ii)</td>
<td>Type of soil</td>
<td>Sandy loam</td>
<td>Clay loam</td>
</tr>
<tr>
<td>iii)</td>
<td>Av. Soil moisture, %</td>
<td>9.0 to 13.0</td>
<td>-</td>
</tr>
<tr>
<td>iv)</td>
<td>Depth of standing water, cm</td>
<td>-</td>
<td>5.80 to 7.25</td>
</tr>
<tr>
<td>v)</td>
<td>Field efficiency, %</td>
<td>75.04 to 81.80</td>
<td>-</td>
</tr>
</tbody>
</table>
6.1 Rate of Work

6.1.1 Dry land operation
- The rate of work in sandy loam soil was recorded as 0.453 to 0.517 ha/h and the forward speed as 3.03 to 3.13 kmph.
- The time required to cover one hectare area was recorded as 1.93 to 2.21 h.

6.1.2 Wet land operation
- Speed of operation varied from 2.61 to 2.67 kmph.

6.2 Quality of work

6.2.1 Dry land operation
- The depth of operation was recorded as 8.11 to 10.0 cm.
- The field efficiency was recorded as 75.04 to 81.80 %.

6.2.2 Wet land operation
- Depth of puddle was recorded as 13.1 to 14.3 cm.
- Puddling index was recorded as 66.8 to 78.1 %.

6.3 WEAR OF BLADES

6.3.1 On Mass basis
Wear of hatchet blades (mass basis) after 36.77 hrs. of field operation is tabulated in Table-4.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Initial mass of blade (g)</th>
<th>Mass after 36.08 hrs. of operation (g)</th>
<th>Wear (%)</th>
<th>(% Wear per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1040.8</td>
<td>997.7</td>
<td>4.14</td>
<td>0.113</td>
</tr>
<tr>
<td>2.</td>
<td>1027.6</td>
<td>1001.4</td>
<td>2.55</td>
<td>0.069</td>
</tr>
<tr>
<td>3.</td>
<td>1020.2</td>
<td>995.0</td>
<td>2.47</td>
<td>0.067</td>
</tr>
<tr>
<td>4.</td>
<td>1058.0</td>
<td>1032.1</td>
<td>2.45</td>
<td>0.067</td>
</tr>
<tr>
<td>5.</td>
<td>1085.1</td>
<td>1058.9</td>
<td>2.41</td>
<td>0.066</td>
</tr>
<tr>
<td>6.</td>
<td>1061.6</td>
<td>1040.8</td>
<td>1.96</td>
<td>0.053</td>
</tr>
<tr>
<td>7.</td>
<td>1078.5</td>
<td>1049.6</td>
<td>2.68</td>
<td>0.073</td>
</tr>
<tr>
<td>8.</td>
<td>1012.9</td>
<td>990.5</td>
<td>2.21</td>
<td>0.060</td>
</tr>
</tbody>
</table>
After completion of field test in wet land operation for 15.91 hrs., the implement was dismantled for checking effectiveness of sealing provided against ingress of dust and water/mud in various sub-assemblies and also to check the condition of components of the rotavator.

### EFFECTIVENESS OF SEALINGS

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Location</th>
<th>Whether ingress of mud and/or water was observed</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 chain; drive</td>
<td>No</td>
</tr>
<tr>
<td>3.</td>
<td>Hub of rotor assembly</td>
<td>No</td>
</tr>
</tbody>
</table>

### 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.

### SOUNDNESS OF CONSTRUCTION

No breakdown occurred during 36.77 hrs of operation in the field.

### COMMENTS & RECOMMENDATIONS

10.1 The dimensions of three point linkage of the implement partly conform to IS: 4468-March 2007 (Part-I). 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-Oct. 2004. 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 47 HRC and 47 HRC respectively against the requirement of 53 to 59 HRC (edge portion) and 37 to 45 HRC (on shank portion) as per IS:6690-Jan. 2007. This calls for improvement at production level.
10.6 The percentage wear of hatchet blades on mass basis during field operation 36.77 hrs, ranged from 1.96 to 4.14% which is normal.
10.7 The percentage wear of hatchet blades on dimensional basis after field operation 36.77 hrs, ranged from 8.34 to 13.02 % and 2.77 to 6.02 % respectively at edge and at 65 mm from edge.
10.8 The PTO power requirement of rotavator was observed from 15.14 to 15.72 kW in dry land operation; however tractor of pto power as 37.0 kW (corresponding to 540 rpm) was used during field test. Hence, 40.9 to 42.5 % of pto power was utilized.
10.9 An identification plate is provided on chassis of rotavator.
10.10 Chemical composition of rotar blade are not within limit as specified limit as in IS: 6690-2007 hence these should be looked into in future at regular production level.

11. LITERATURE The manufacturer has not developed the literature of machine there. Therefore, the manufacturer should develop the literature in Hindi or English & other regional languages as per IS: 8132-1983 for the guidance of users & technical personnel.

TESTING AUTHORITY

<table>
<thead>
<tr>
<th>G.R. AMBALKAR</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Engineer</td>
<td></td>
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</table>

<table>
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<tr>
<th>R.K. NEMA</th>
<th></th>
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<tbody>
<tr>
<td>Senior Agricultural Engineer</td>
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<tr>
<th>HIMAT SINGH</th>
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<tr>
<td>Director</td>
<td></td>
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</tbody>
</table>

Test report compiled by: Sh. B. N. Dixit, Sr. Tech. Assistant

12. APPLICANT’S COMMENTS

Editorial comments incorporated in test report.