COMMERCIAL TEST REPORT

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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>
<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>44</td>
<td>Does not conform</td>
</tr>
<tr>
<td>On shank portion</td>
<td>37 to 45</td>
<td>39</td>
<td>Conforms</td>
</tr>
</tbody>
</table>

:: Values of hardness are not conforming to Indian Standard.

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>0.57</td>
<td>Conforms</td>
</tr>
<tr>
<td>2.</td>
<td>Silicon(Si)</td>
<td>1.50 to 2.00</td>
<td>1.98</td>
<td>Conforms</td>
</tr>
<tr>
<td>3.</td>
<td>Manganese (Mn)</td>
<td>0.50 to 1.00</td>
<td>0.79</td>
<td>Conforms</td>
</tr>
<tr>
<td>4.</td>
<td>Sulphur (S)</td>
<td>0.05 (max)</td>
<td>0.008</td>
<td>Conforms</td>
</tr>
<tr>
<td>5.</td>
<td>Phosphorous (P)</td>
<td>0.05 (max)</td>
<td>0.023</td>
<td>Conforms</td>
</tr>
</tbody>
</table>

6. FIELD TEST

The field tests of the implement comprising of dry and wet land operation were conducted for 20.92 & 15.13 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.
### Summary of field performance

<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>Sonalika -75 DI</td>
<td>-</td>
</tr>
<tr>
<td>ii)</td>
<td>Type of soil</td>
<td>Sandy Loam</td>
<td>-</td>
</tr>
<tr>
<td>iii)</td>
<td>Av. Soil moisture, %</td>
<td>12.1 to 13.4</td>
<td>-</td>
</tr>
<tr>
<td>iv)</td>
<td>Depth of standing water, cm</td>
<td>-</td>
<td>8.5 to 12.8</td>
</tr>
<tr>
<td>v)</td>
<td>Field efficiency, %</td>
<td>58.3 to 91.7</td>
<td>-</td>
</tr>
<tr>
<td>vi)</td>
<td>Puddling Index, %</td>
<td>-</td>
<td>79.6 to 82.4</td>
</tr>
<tr>
<td>vii)</td>
<td>Av. Speed of operation, kmph</td>
<td>3.17 to 3.49</td>
<td>2.89 to 3.05</td>
</tr>
<tr>
<td>viii)</td>
<td>Av. Depth of cut, cm</td>
<td>8.7 to 11.5</td>
<td>-</td>
</tr>
<tr>
<td>ix)</td>
<td>Av. depth of puddle, cm</td>
<td>-</td>
<td>12.7 to 16.0</td>
</tr>
<tr>
<td>x)</td>
<td>Av. Working width, m</td>
<td>2.07 to 2.32</td>
<td>-</td>
</tr>
<tr>
<td>xi)</td>
<td>Area covered, ha/h</td>
<td>0.42 to 0.66</td>
<td>-</td>
</tr>
<tr>
<td>xii)</td>
<td>Time required for one hectare, h</td>
<td>1.52 to 2.38</td>
<td>-</td>
</tr>
<tr>
<td>xiii)</td>
<td>Fuel consumption</td>
<td>-  l/h</td>
<td>8.00 to 8.58</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.11 to 5.50</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 0.42 to 0.66 ha/h and the forward speed as 3.17 to 3.49 kmph.
- The time required to cover one hectare area was recorded as 1.52 to 2.38 h.

**6.1.2 Wet land operation**

- Speed of operation varied from 2.89 to 3.05 kmph.

#### 6.2 Quality of work

**6.2.1 Dry land operation**

- The depth of operation was recorded as 8.7 to 11.5 cm.
- The field efficiency was recorded as 58.3 to 91.7 %.

**6.2.2 Wet land operation**

- Depth of puddle was recorded as 12.7 to 16.0 cm.
- Puddling index was recorded as 79.6 to 82.4 %.

#### 6.3 WEAR OF BLADES

**1.3.1 On Mass basis**

Wear of hatchet blades (mass basis) after 36.05 hrs. of field operation is Tabulated in Table-4.
8.5 Operator has to get down from tractor to make adjustments in rotavator.

9.0 SOUNDNESS OF CONSTRUCTION
No breakdown occurred during 36.05 hrs. of operation in the field.

10.0 COMMENTS & RECOMMENDATIONS

10.1 The dimensions of three point linkages of the implement partly conform to IS: 4468-March 2007(Part-I). The standard three point linkage system should be incorporated at 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 input shaft of rotavator and corresponding pto shaft hub do not conform to IS: 4931-Oct. 2004. Therefore, standard power input shaft with corresponding pto shaft hub complies with BIS code 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 HRC and 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 36.05 hrs, ranged from 1.63 to 2.77 % which is normal.

10.7 The percentage wear of hatchet blades on dimensional basis after field operation 36.05 hrs, ranged from 4.42 to 11.04 % and 2.85 to 5.01 % respectively at edge and at 65 mm from edge.

10.8 The PTO power requirement of rotavator was observed from 33.0 to 35.3 kW in dry land operation; however tractor of pto power as 39.8 kW (corresponding to 540 rpm) was used during field test. Hence the power utilization was from 82.9 to 88.7 %

10.9 An identification plate should be provided on each rotavator at regular production level.

10.10 A suitable safety device should be provided in propeller shaft.

10.11 The chemical composition of primary elements of rotavator blade are well within specified limit in IS 6690-Jan. 2007.