WHEAT STRAW REAPER 'DST-56'

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

NORTHERN REGION FARM MACHINERY TRAINING AND TESTING INSTITUTE
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A-2 Grease cups:
1. Grease cup of wheel bearings  2  After 8 – 15 hours
B. Oiling points:
1. Reel moving bushes  20  After 8 – 15 hours
2. Sieve drive mechanism pulley  2
Total  22

8. LABORATORY TESTS:

A  Hardness of knife blades (HRC)  As observed  As per IS:6025-Dec. 2004  Remarks
  a. Hardened Zone :  25  48 to 58  Does not conform
  b. Remainder Zone :  22  20 to 35  Conform
B  Hardness of chaffer drum blade (HRC)  As observed  As per IS:6025-Dec. 2004  Remarks
  Hardened Zone :  39  48 to 58  Does not conform
  Remainder Zone :  38  20 to 35  Does not conform
C. Chemical composition of Knife blades  

<table>
<thead>
<tr>
<th>Element</th>
<th>As observed</th>
<th>As per IS:6025-Dec. 2004</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon %</td>
<td>0.77</td>
<td>0.70 to 0.95</td>
<td>Conform</td>
</tr>
<tr>
<td>Manganese %</td>
<td>0.77</td>
<td>0.30 to 0.50</td>
<td>Does not conform</td>
</tr>
</tbody>
</table>
D. Chemical composition of chaffer Drum blades  

<table>
<thead>
<tr>
<th>Element</th>
<th>As observed</th>
<th>As per IS:6025-Dec. 2004</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon %</td>
<td>0.80</td>
<td>0.70 to 0.95</td>
<td>Conform</td>
</tr>
<tr>
<td>Manganese %</td>
<td>0.77</td>
<td>0.30 to 0.50</td>
<td>Does not conform</td>
</tr>
</tbody>
</table>

9. FIELD TEST

The straw reaper fitted with John Deere - 5310 tractor at engine throttle setting corresponding to 1850 rpm was tested in the field for 35.51 hours for reaping of left over straw stubbles after harvesting by grain combine. During tests field performance of straw reaper was assessed with regard to quality of work, rate of work, fuel consumption, safety and soundness of construction etc. The crop parameters and atmospheric conditions as observed during field tests are also given in Annexure-II.

9.1 Rate of work and fuel consumption

The "split straw percentage" is defined as the percentage of straw split to the total weight of straw sample collected after passing through the machine. The quantity of straw collected is expressed in terms of straw recovery percentage which is defined as the percentage of difference of straw weight before and after machine operation to the initial weight of straw in the randomly selected sample area of test field.

During straw harvesting tests, rate of work in wheat straw varied from 0.54 to 0.62 ha/h. The travel speed varied from 2.95 to 3.88 kmph in A-2 & A-3 in wheat harvested field. Fuel consumption varied from 4.23 to 5.81 l/h

The results of field performance tests are summarized in Table-1 and detail is given in Annexure-II.
TABLE -1 : SUMMARY OF FIELD PERFORMANCE TEST

<table>
<thead>
<tr>
<th>WheatCrop variety</th>
<th>Forward speed (kmph)</th>
<th>Rate of work (ha/h)</th>
<th>Rate of work (ha/ha)</th>
<th>Fuel consumption (l/h)</th>
<th>Av. Length of bhusa (mm)</th>
<th>Straw split (%)</th>
<th>Straw recovery (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP-1203</td>
<td>2.95 to 3.32</td>
<td>0.54</td>
<td>1.85</td>
<td>4.23 to 4.54</td>
<td>21.35 to 24.70</td>
<td>98.0 to 98.50</td>
<td>62.35 to 63.51</td>
</tr>
<tr>
<td>PBW-396</td>
<td>2.97 to 3.50</td>
<td>0.57 to 0.62</td>
<td>1.62 to 1.74</td>
<td>4.23 to 5.08</td>
<td>24.05 to 39.40</td>
<td>91.50 to 97.50</td>
<td>63.95 to 82.08</td>
</tr>
<tr>
<td>PBW-590</td>
<td>3.50 to 3.88</td>
<td>0.54 to 0.62</td>
<td>1.60 to 1.86</td>
<td>4.90 to 5.81</td>
<td>24.65 to 33.25</td>
<td>92.0 to 97.0</td>
<td>66.52 to 81.19</td>
</tr>
</tbody>
</table>

9.3 Quality of work:

9.3.1 Wheat straw harvesting:
During the field tests straw split ranged from 91.50 to 98.50% and straw recovery ranged from 63.51 to 82.08%.

The length of straw wheat varied from 21.35 to 39.40 mm. The straw recovery mainly depends upon the left over straw stubbles height in the field harvested by the combine harvester. The length and splitting of straw so formed is considered to be satisfactory as animal feed.

10 EASE OF HANDLING DURING OPERATION

No specific problem was observed in handling during operation of straw reaper.

11 LABOUR REQUIREMENTS.
Prior to each test, about 2 man hour were required for daily maintenance of tractor and straw reaper for operation. One skilled operator is enough to operate tractor with straw reaper. Extra labour is required for handling and transportation of bhusa.

12 WEAR OF CRITICAL COMPONENTS
The wear of serrated blades of chaffer cylinder and concave was measured after completion of 35.51 hours of wheat straw harvesting. Percentage wear on mass basis was computed and the results are given below:

12.1 Wear of Chaffer cylinder blades

<table>
<thead>
<tr>
<th>S.No</th>
<th>Initial mass (g)</th>
<th>Final mass (g)</th>
<th>Wear (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>69.3</td>
<td>69.0</td>
<td>0.43</td>
</tr>
<tr>
<td>2.</td>
<td>67.8</td>
<td>67.6</td>
<td>0.29</td>
</tr>
<tr>
<td>3.</td>
<td>68.6</td>
<td>68.4</td>
<td>0.29</td>
</tr>
<tr>
<td>4.</td>
<td>69.6</td>
<td>69.5</td>
<td>0.14</td>
</tr>
<tr>
<td>5.</td>
<td>68.5</td>
<td>68.3</td>
<td>0.29</td>
</tr>
</tbody>
</table>

NORTHERN REGION FARM MACHINERY TRAINING & TESTING INSTITUTE, HISSAR
The serrated blades of chaffer drum & concave after 35.51 hours of operation had wear in range of 0.14 to 0.58 % & concave from 0.14 to 1.45 % respectively which is normal.

13 SOUNDNESS OF CONSTRUCTION
No breakdown was observed during 35.51 hrs. of field tests.

14 SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS:

14.1 Rate of work and fuel consumption
On the basis of field test, output of machine varied from 0.54 to 0.62 ha/h. The forward speed of tractor John Deere -5310 varied from 2.95 to 3.50 kmph. Gear used was A-2 & A-3 both as per field condition. Fuel consumption of tractor varied from 4.23 to 5.81 l/h (7.15 to 10.36 l/ha).

14.1.2 Quality of work
Quality of straw is expressed in terms of percentage of split and recovery of straw and average length of straw. The split straw was observed as 91.50 to 98.50%. The average length of straw ranged from 21.35 to 39.40 mm. The straw recovery ranged from 63.51 to 82.08 %.
14.2 COMMENTS AND RECOMMENDATIONS

1. Quality of wheat straw was observed to be satisfactory and is considered to be satisfactory as animal feed.
2. Operator –cum-Service manual and spare parts list has not been supplied by the manufacturer. This should be brought out as per IS : 8132-1983 for guidance of users and service personnel.
3. It is recommended to incorporate the safety device in drive shaft and safety guards/covers need to be provided.
4. Chemical composition of cutter bar blade and chaffer drum blade is not comprising to relevant Indian Standard. Blades having chemical composition conforming to Indian Standard should be used at manufacturing level.

15. LITERATURE

The manufacturer has developed specification of machine, operator’s manual, part’s catalogue etc in a different booklet however, it needs to be modified in Hindi, English and other regional languages for guidance of users and service personals as per IS: 8132-1983.

TESTING AUTHORITY

(R. M. TIWARI)  
ASSISTANT ENGINEER (W/S)

(P. K. CHOPRA)  
(SENIOR AGRICULTURAL ENGINEER)

(A. N. MESHRAM)  
DIRECTOR

Test report compiled by: Shri S. A. Hinge (St.A.)

APPLICANT’S COMMENT

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Our reference</th>
<th>Applicant’s comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Para 14.2 Comments and recommendations S.No. 2</td>
<td>Operator cum service manual and spare parts list prepared and submitted to this Institute.</td>
</tr>
<tr>
<td>2.</td>
<td>Para 14.2 Comments and recommendations S.No. 3</td>
<td>We will incorporate the safety device in drive shaft and safety guards covers as required at manufacturing level.</td>
</tr>
<tr>
<td>3.</td>
<td>Para 14.2 Comments and recommendations S.No. 4</td>
<td>We will use blades having chemical composition conforming to Indian Standard at manufacturing level.</td>
</tr>
</tbody>
</table>