BCS GURU NANAK 622 VCR
SELF PROPELLED WHEAT REAPER (RIDE ON)

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 9001:2008 COMPLIANT INSTITUTION]

Website: http://nrfmtti.gov.in/
E-mail: fmti-nr@nic.in
Tele./FAX: 01662-276984
11. AIR CLEANER OIL PULL OVER TEST

Date : 03.12.2016

Range of atmospheric conditions:
- Temperature (°C) : 24 to 37
- Pressure (mm of Hg) : 744.2 to 745.9
- Relative humidity (%) : 16 to 41

Mass of oil in the air cleaner assemblies when filled with recommended grade of oil 5% in excess than marked level (g) : 175.7

<table>
<thead>
<tr>
<th>Position</th>
<th>Slope (degree)</th>
<th>Loss of oil (g)</th>
<th>Oil pull over (%)</th>
<th>Remarks if any</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Horizontal</td>
<td>Nil</td>
<td>1.6</td>
<td>0.91</td>
<td>Oil pull over is on higher side</td>
</tr>
<tr>
<td>ii) Tilted longitudinally with front end up</td>
<td>15</td>
<td>1.6</td>
<td>0.91</td>
<td></td>
</tr>
<tr>
<td>iii) Tilted longitudinally with rear end up</td>
<td>15</td>
<td>1.3</td>
<td>0.74</td>
<td></td>
</tr>
<tr>
<td>iv) Tilted laterally with right side up</td>
<td>15</td>
<td>0.4</td>
<td>0.23</td>
<td></td>
</tr>
<tr>
<td>v) Tilted laterally with left side up</td>
<td>15</td>
<td>0.6</td>
<td>0.34</td>
<td></td>
</tr>
</tbody>
</table>

12. FIELD TEST

The reaper was operated in field for 27.48 hours (including running in 1.13 hours) only in wheat harvesting.

The crop parameters recorded during the test with wheat crop are as given in Annexure-I and summarized.

**Table-2 : Crop parameter**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variety</td>
<td>Wheat HB 2967</td>
</tr>
<tr>
<td>Plant height (cm)</td>
<td>65 to 110</td>
</tr>
<tr>
<td>Plant population (No of tillers per m²)</td>
<td>220 to 352</td>
</tr>
<tr>
<td>Straw grain ratio</td>
<td>1.40:1 to 1.97:1</td>
</tr>
<tr>
<td>Moisture (%)</td>
<td>Grant 8.6 to 10.4</td>
</tr>
<tr>
<td>Straw</td>
<td>NR</td>
</tr>
</tbody>
</table>

The results of field performance test are given in Annexure – II and are summarized in Table-3.
Table 3: Summary of field Test:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Observation</th>
<th>Wheat harvesting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Speed of operation, kmph</td>
<td>4.07 to 4.26</td>
</tr>
<tr>
<td>2</td>
<td>Area covered, ha/h</td>
<td>0.497 to 0.560</td>
</tr>
<tr>
<td>3</td>
<td>Width of cut, m</td>
<td>1.66 to 1.71</td>
</tr>
<tr>
<td>4.</td>
<td>Fuel consumption l/h</td>
<td>0.85 to 0.94</td>
</tr>
<tr>
<td></td>
<td>Fuel consumption l/ha</td>
<td>1.60 to 1.87</td>
</tr>
<tr>
<td>5</td>
<td>Losses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pre harvest losses (kg/ha)</td>
<td>3.00 to 37.00</td>
</tr>
<tr>
<td></td>
<td>Cutter bar losses (kg/ha)</td>
<td>1.67 to 34.33</td>
</tr>
<tr>
<td>6</td>
<td>Stubble height after harvesting,(cm)</td>
<td>5.0 to 10.0</td>
</tr>
<tr>
<td>7</td>
<td>Time required to cover 1 ha. area (h)</td>
<td>1.76 to 2.01</td>
</tr>
<tr>
<td>8</td>
<td>Field efficiency (%)</td>
<td>69.50 to 81.29</td>
</tr>
</tbody>
</table>

12.1 Rate of work:
   i) During the tests the rate of work varied from 0.497 to 0.560 ha/h in wheat harvesting.
   ii) The fuel consumption varied from 0.85 to 0.94 l/h & 1.60 to 1.87 l/ha in wheat harvesting.
   iii) Field efficiency observed as 69.50 to 81.29 percent.

12.2 Quality of work:
   i) During wheat harvesting, cutter bar losses varied from 1.67 to 34.33 kg/ha.
   ii) Stubble height after harvesting was observed from 5.0 to 10.0 cm.

12.3 Time required for daily maintenance:
   About 15 minutes are required for daily servicing and maintenance of reaper binder with one man only.

12.4 Labour requirement:
   Two person including driver are required for smooth operation of the machine in the field. Additional labour are required for collection of the harvested crop.

12.5 Ease of operation and adjustment
   No noticeable difficulty was observed during test.

12.6 Harvesting any other crop:
   The harvesting of wheat crop was done by the reaper.

13. DEFECTS, ADJUSTMENT, BREAKDOWN & REPAIRS

   No noticeable defect or breakdown was observed during test.
14.7 Valve guides and valve springs:
Valve and valve guide clearance, mm
Inlet valve : 0.045
Exhaust valve : 0.042
Valve spring rate, kg/mm
Inlet valve : 1.35
Exhaust valve : 1.36

No noticeable defect was observed for valve guide and valve spring.

14.8 Timing gear:
No noticeable defect was observed.

14.9 Clutch:
Overall thickness of clutch plate, mm : 4.17 to 4.21
No noticeable defect was observed

14.10 Brake:
Thickness of brake shoe/ring, mm
LHS : 5.42 to 7.24
RHS : 5.65 to 7.28
No noticeable defect was observed

15. SUMMARY OF OBSERVATION, COMMENTS AND RECOMMENDATION

15.1 Engine performance test
i) The maximum power of the engine was observed as 6.4 kW against declared value of 7.35 kW which is just 87.1%. The variation between observed value and declared value is too much, and therefore, MUST be looked into for corrective measure.
ii) The specific fuel consumption during two hour maximum power test was observed as 271 g/kWh.
iii) During test, the maximum engine oil temperature was recorded as 146 degree C against the declaration of 140 degree C, which is not just on higher side but has serious repercussion as well. This MUST be looked into for improvement.

15.2 Field test
i) The area covered varied from 0.497 to 0.560 ha/h.
ii) The fuel consumption varied from 0.85 to 0.94 l/h and 1.60 to 1.87 l/ha.
iii) The cutter bar losses were observed as 1.67 to 34.33 kg/ha.

15.3 Ease of operation & adjustment
i) Safety guard MUST be provided for PTO pulley and belts.
ii) The exhaust MUST be provided with spark arresting device.
iii) Safety notice and hazard warning labels MUST be provided on machine
iv) The decals regarding operator's control MUST be provided on machine

15.4 Assessment of wear:
No noticeable defect was observed in engine and machine components.
15.5 Hardness and chemical composition:
   i) The hardness of knife blade does not conform to the requirement of IS: 6025-1982.
   ii) The hardness of knife guard does not conform the requirement of IS: 6024-1983.
   iii) Carbon content of knife back is not within the requirement specified in IS:10378-1982. Use of materials for knife blade and knife back meeting BIS requirement is recommended.

15.6 Dimensional requirement of cutter bar assembly:
   i) The specifications of knife section, knife back and knife guard does not conform to IS: 6025-1982, IS: 10378-1982 and IS: 6024-1983 respectively. This should be looked into for corrective action.

15.7 Noise measurement:
   Maximum noise level at bystander’s position and at operator’s ear level was observed as 86.8 dB(A) and 101.2 dB(A) respectively. The noise level at bystander’s lever is higher than the warning limit of 85 dB(A). The noise level at operator’s ear level is higher than warning and danger limit of 85 dB(A) and 90 dB(A) respectively for continuous exposers of 8 hours per day. This calls for reduction in noise level to improve operator’s comfort and safety.

15.8 Mechanical vibration:
   The amplitude of mechanical vibration of components marked as (*) in chapter 10 of this report may be consider on higher side. This calls for providing suitable remedial measures to dampen the vibration in order to improve the operational comfort and service life of various components & sub assemblies.

15.9 Air cleaner oil pull over test
   The oil pull over was observed as 0.91 to 0.23 percent, which is on higher side and calls for necessary corrective action.

15.10 Labeling plate
   Labeling plate is not provided on machine. A metallic labeling plate of permanent nature should be provided on machine with following information:-
   i) Make
   ii) Model
   iii) Serial No.
   iv) Year of manufacturer
   v) Manufacturer’s address
   vi) Engine make and model
   vii) Engine serial No.
   viii) Maximum power (kW)
   ix) Specific fuel consumption (g/kwh)

15.11 There is discrepancy in engine maintenance schedule specifically for air cleaner and lubrication oil change period in literatures provided for reference during test, which is confusing for the users, and therefore urgent corrective action is warranted.

15.13 The accelerator lever and stop lever does not meet the requirement of IS: 8133-1983. It should be looked into for corrective action.

16. TECHNICAL LITERATURE

The following literature was supplied with the machine during the course of test.

1. Operator’s manual- Reaper binder (Multilingual)
2. Workshop manual of Geaves 1451 engine (English)
3. Parts catalogue- BCS Vertical Conveyor Reaper

The operator’s manual of vertical conveyor reaper as per IS: 8132-1999 should be brought out. The service manual of machine should also be made available.

TESTING AUTHORITY

<table>
<thead>
<tr>
<th>G. R. AMBALKAR</th>
<th>AGRICULTURAL ENGINEER</th>
</tr>
</thead>
<tbody>
<tr>
<td>R. K. NEMA</td>
<td>SENIOR AGRICULTURAL ENGINEER</td>
</tr>
<tr>
<td>P. K. PANDEY</td>
<td>DIRECTOR</td>
</tr>
</tbody>
</table>

17. APPLICANT’S COMMENTS

<table>
<thead>
<tr>
<th>Para No.</th>
<th>Our Reference</th>
<th>Applicant’s Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.1</td>
<td>15.1 (i), (iii)</td>
<td>These points have been taken up with our engine manufacturer.</td>
</tr>
<tr>
<td>17.2</td>
<td>15.3, 15.5 to 15.13</td>
<td>Corrective actions are being taken.</td>
</tr>
</tbody>
</table>