16.2.3 Track system
Visual condition of the components of complete assembly: The track tension adjustment bolts of both the track found bend

16.3 Starter motor & alternator
Presence of oil in housing: None
Condition of bearings and other components: No noticeable defect observed

16.4 Chains, sprockets and belts
No noticeable defect observed

16.5 Bearings
No noticeable defect observed

16.6 Wear of the peg teeth bar of threshing cylinder
The wear of the peg/spike teeth bar of the separating cylinder was measured. The percentage wear on mass basis was computed and the results are given below:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Original mass before test (g)</th>
<th>Mass after 54.69 hrs. of test (g)</th>
<th>Percent wear by weight (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1679.8</td>
<td>1622.4</td>
<td>3.42</td>
</tr>
<tr>
<td>2</td>
<td>1724.2</td>
<td>1685.0</td>
<td>2.27</td>
</tr>
<tr>
<td>3</td>
<td>1782.6</td>
<td>1746.1</td>
<td>2.05</td>
</tr>
<tr>
<td>4</td>
<td>1707.0</td>
<td>1675.9</td>
<td>1.82</td>
</tr>
</tbody>
</table>

16.7 Wear of the peg/spike bar of separating cylinder
The wear of the peg teeth bar of the threshing cylinder was measured. The percentage wear on mass basis was computed and the results are given below:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Original mass before test (g)</th>
<th>Mass after 54.69 hrs. of test (g)</th>
<th>Percent wear by weight (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1192.6</td>
<td>1184.9</td>
<td>0.65</td>
</tr>
<tr>
<td>2</td>
<td>1210.9</td>
<td>1201.4</td>
<td>0.78</td>
</tr>
<tr>
<td>3</td>
<td>1220.0</td>
<td>1206.2</td>
<td>1.13</td>
</tr>
<tr>
<td>4</td>
<td>1218.6</td>
<td>1205.7</td>
<td>1.06</td>
</tr>
</tbody>
</table>

17 SUMMARY OF OBSERVATIONS, COMMENTS AND RECOMMENDATIONS

17.1 Engine Performance Test:

<table>
<thead>
<tr>
<th>Brake Power KW</th>
<th>Engine speed (rpm)</th>
<th>Fuel consumption</th>
<th>Specific energy, kWh/l</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>l/h</td>
<td>kg/h</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

i) Maximum power – Two hour test:
49.5 2250 13.84 11.68 0.236 3.577

ii) Power at rated engine speed: (2200 rpm)
49.2 2200 13.46 11.36 0.231 3.655
ENGINE TEST (HIGH AMBIENT)

<table>
<thead>
<tr>
<th>Brake Power (kW)</th>
<th>Engine speed (rpm)</th>
<th>Fuel consumption</th>
<th>Specific energy kWh/l</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>a) Maximum power-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47.7</td>
<td>2250</td>
<td>13.50</td>
<td>11.39</td>
</tr>
<tr>
<td>b) Power at rated engine speed: (2200 rpm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47.2</td>
<td>2200</td>
<td>13.07</td>
<td>11.03</td>
</tr>
</tbody>
</table>

**Remarks:**

i) The maximum power output of the engine was reported to be 49.5 kW at 2250 rpm at full throttle setting against the declared value of 56 kW. **The maximum power at full throttle setting is 11.6 percent lower than the declared value and does not conform to the requirement of IS: 15806:2008. It should be looked into for necessary corrective action.**

ii) The power at rated engine speed was reported to be 49.2 kW against the declared value of 56.0 kW. **The rated power is 12.1 percent lower than the declared value and does not conform to the requirement of IS: 15806:2008. It should be looked into for corrective action.**

17.2 Mechanical vibration

The amplitude of mechanical vibration of components marked as (*) in chapter 12 of this report are observed 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.

17.3 Noise measurement:

The ambient noise emitted by the machine at bystander’s position and operator’s ear level was measured as 86.1 & 95.4 dB (A) respectively when tested according to IS 8122 (Part 2)-2000. Noise level is on higher side against warning & danger limit of 85 dB(A) and 90 dB(A) respectively as specified by ILO for continuous exposure of 8 hours per day. This calls for reduction in noise level to improve the operational comfort.

17.4 Field Test:

17.4.1 Summary of field tests:

The results of the field test are summarized below:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameters</th>
<th>Observed Range (Paddy Harvesting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Average speed of operation (kmph)</td>
<td>1.70 to 2.76</td>
</tr>
<tr>
<td>2.</td>
<td>Average area covered (ha/h)</td>
<td>0.204 to 0.420</td>
</tr>
<tr>
<td>3.</td>
<td>Average fuel consumption:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- (l/h)</td>
<td>7.56 to 8.89</td>
</tr>
<tr>
<td></td>
<td>- (l/ha)</td>
<td>20.46 to 40.19</td>
</tr>
<tr>
<td>4.</td>
<td>Average crop throughput (tonne/h)</td>
<td>4.72 to 6.35</td>
</tr>
<tr>
<td>5.</td>
<td>Average grain breakage in main grain outlet (%)</td>
<td>0.303 to 1.401</td>
</tr>
<tr>
<td>6.</td>
<td>Average header losses (%)</td>
<td>0.242 to 1.583</td>
</tr>
</tbody>
</table>
17.4.1.1 Paddy harvesting
i) The average threshing efficiency ranged from 97.40 to 99.39 percent, which is on lower side and does not conform to the requirement of IS 15806-2008. It MUST be improved.

ii) The average cleaning efficiency ranged from 95.50 to 98.47 percent, which is on lower side and does not conform to the requirement of IS: 15806:2008. It MUST be improved.

17.4.2 Harvesting of any other crops : Not done, as not recommended

17.4.3 Ease of operation and safety provision
i) The loosening of idler pulley of unloading drive engaging system was observed during operation of combine harvester. It should be looked into for corrective action.

ii) The controls provided around the operator are within easy reach, but the controls listed at 2.9.1 of this test report are not labelled with symbols as per IS 6283 (Part 2) 2007. Therefore it is recommended that the symbols as per the requirement of IS-6283 (Part 2)-2007 may be provided.

iii) Safety against accidental start of engine is not provided. It should be provided as per IS: 8133-1983.

iv) Spark arrester in engine exhaust is not provided. It should be provided.

v) Drive safety arrangement (slip clutch) is not provided at cutting platform auger, under shout conveyor, grain and tailing elevator. It is recommended to provide drive safety as it is essential requirement as per IS:15806-2008.

vi) First aid box and fire extinguisher are not provided on machine. It may be provided for safety.

17.5 The air cleaner element schedule/replacement interval is not specified. It MUST be provided for maintenance of machine.

17.6 The hydraulic oil change period is not specified. It MUST be specified for proper maintenance machine.

17.7 Arrangement for locking the header assembly in raised position is not provided. It should be provided.

17.8 Provision for indication of grain tank filling and grain tank cover is not provided. It should be provided.
17.9 Hardness and chemical composition

17.9.1 Hardness & chemical composition of knife blade does not conform to the limits as specified in IS: 6025-1982. It should be looked into at regular production level.

17.9.2 Hardness of knife guard is not within the limit as specified in IS: 6024-1983. It should be looked into for improvement.

17.9.3 The carbon content of the knife back does not conform to the requirement of relevant IS code. It should be looked into for improvement.

17.10 Wear Assessment

i) The track tension adjustment bolts of both the track found bend. It should be looked into for necessary corrective action.

ii) The scratch mark was observed on engine second main bearing shell. It should be looked into.

17.11 Literature supplied with the Machine:

Following literatures are provided by the applicant for reference during test with test sample

1. Operator’s manual & service maintenance manual
2. Spare parts catalogue

The operator’s manual needs to be updated as per IS: 8132:1999. The repair service manual may also be brought out for guidance of service personal.

17.12 Conformity to Indian Standard

(i) IS: 6025-1982 (Reaffirmed 2014)-Specification for : Does not conform
knife section for harvesting machine.

(ii) IS: 6024-1983 (Reaffirmed 2014)-Specification for : Does not conform
guards for harvesting machines.

(iii) IS: 10378-1982 (Reaffirmed 2016)-Specification of : Does not conform
knife back for harvesting machine.

(iv) IS: 15806-2008(Reaffirmed 2013)-Combine harvester : Does not conform
thresher selected performance and other characteristics recommendations.

(v) IS: 6283 (Part II)-2007(Reaffirmed 2014)-Tractors and : Does not conform
machinery for agriculture and forestry-symbol for operator controls and other displays.

(vi) IS: 8133-1983 (Reaffirmed 2014)-Guidelines for : Does not conform
location & operation of operator controls on agricultural tractors and machinery.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Characteristics</th>
<th>Requirement</th>
<th>Declared</th>
<th>Observed</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Prime mover performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i)</td>
<td>Max. power (absolute) Average max. power observed during 2 hrs. max. power test in natural ambient condition, kW</td>
<td>It should not be less than 5% of the declared value.</td>
<td>56.0</td>
<td>49.5</td>
<td>Does not conform</td>
</tr>
<tr>
<td>ii)</td>
<td>Max. power observed during test after adjusting the no load engine speed as per recommendation of the manufacturer for field work, kW</td>
<td>Max. power observed must not be less than 5% of declared value.</td>
<td>56.0</td>
<td>49.5</td>
<td>Does not conform</td>
</tr>
<tr>
<td>iii)</td>
<td>Power at rated engine speed, kW</td>
<td>The observed value must not be less than 5% of the declared value by the applicant.</td>
<td>56.0</td>
<td>49.2</td>
<td>Does not conform</td>
</tr>
<tr>
<td>iv)</td>
<td>Specific fuel consumption g/kWh.</td>
<td>The average observed value during 2 hr. max. power test must be within ±5% of the declared value by applicant/manufacturer.</td>
<td>231</td>
<td>236</td>
<td>Conforms</td>
</tr>
<tr>
<td>v)</td>
<td>Max. smoke density (bosch no.) at 80% load between the speed at max. power &amp; 55% of speed at max. or 1000 rpm whichever is higher, should be observed as per CMVR rule</td>
<td>For tractor :- 5.2 bosch no. or 75 hartridge For engine :- Free deceleration or natural aspirated or turbo charged - 65 hartridge</td>
<td>--</td>
<td>2.9</td>
<td>Conforms</td>
</tr>
<tr>
<td>vi)</td>
<td>Max. crank shaft torque, (N–m) observed during the test after no load engine speed is adjusted as per manufacture's recommendation for field work</td>
<td>It must not be less than 8% of declare value by manufacturer.</td>
<td>250</td>
<td>237.5</td>
<td>Conforms</td>
</tr>
<tr>
<td>vii)</td>
<td>Back up torque, %</td>
<td>7% min.</td>
<td>--</td>
<td>13.1</td>
<td>Conforms</td>
</tr>
<tr>
<td></td>
<td>VISHAL TAF (GRAIN CARE), SELF PROPELLED COMBINE HARVESTER (TRACK TYPE) COMMERCIAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COMB–168/2007/2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### viii) Max. operating temp.
- **To be declared by manufacturer.** °C
- **i) Engine oil**
  - 120
  - **ii) Coolant**
  - 95
  - NA
- ** ix) Lubrication oil consumption, g/kWh**
  - 1% of SFC at 5hr. max. power test during high ambient condition
  - 0.542
  - Conforms

### 2. Brake performance
- **i) Whether parking brake is effective at a force of 600 N at foot pedal or 400 N at Hand and lever**
  - Yes or No
  - NA
  - NA

### 3. Mechanical vibration
- **Operator’s platform**
  - 120 µm max.
  - 2500
- **ii) Steering lever**
  - 150 µm max.
  - 4300
- **iii) Seat with driver seated**
  - 120 µm max.
  - 2500

### 4. Air cleaner oil pull over
- **Max. oil pull over in % age when tested in accordance with IS: 8122 pt. (II)-2000**
  - 0.25% max.
  - NA
  - NA

### 5. Noise measurement
- **Max. ambient noise emitted by combine dB (A)**
  - 88 dB (A) as per CMVR
  - 86.1
    - As per IS: 8122 (Part-2)
  - CMVR not applicable
- **Max. noise at operator’s ear level dB (A)**
  - 98 dB (A) as per CMVR
  - 95.4
    - As per IS: 8122 (Part-2)
  - CMVR not applicable

### 6. Discard limit
- **Cylinder bore diameter, mm**
  - Should not exceed the values declared by the manufacture
  - 104.15
  - 104.04
  - Conforms
- **Piston diameter, mm**
  - Not specified
  - 103.85
  - Could not be ascertained
- **Clearance between piston and cylinder liner at skirt, mm**
  - 0.5
  - 0.18
  - Conforms
- **Ring end gap, mm**
  - 1. Top compression ring
  - 1.2
  - 0.70
  - Conforms
  - 2. 5th compression ring
  - 1.2
  - 0.90
  - Conforms
  - 3. Oil ring
  - 1.2
  - 0.70
  - Conforms
### 7. Field performance

<table>
<thead>
<tr>
<th>i)</th>
<th>Suitability for crops</th>
<th>Wheat &amp; paddy essential</th>
<th>Paddy</th>
<th>Recommended for paddy only</th>
</tr>
</thead>
<tbody>
<tr>
<td>ii)</td>
<td>Grain breakage in grain tank</td>
<td>≤ 2.5 %</td>
<td>0.303 to 1.401</td>
<td>Conforms</td>
</tr>
<tr>
<td>iii)</td>
<td>Non collectable losses</td>
<td>≤ 2.5% for wheat, paddy &amp; gram, ≤ 4.0% for soya bean</td>
<td>0.467 to 1.906</td>
<td>Conforms</td>
</tr>
<tr>
<td>iv)</td>
<td>Threshing efficiency</td>
<td>≥ 98% wheat &amp; paddy</td>
<td>97.40 to 99.39</td>
<td>Does not conform</td>
</tr>
<tr>
<td>v)</td>
<td>Cleaning efficiency</td>
<td>≥ 96% wheat &amp; paddy</td>
<td>95.50 to 98.47</td>
<td>Does not conform</td>
</tr>
</tbody>
</table>

### 8. Safety requirement

<table>
<thead>
<tr>
<th>i)</th>
<th>Guards against all moving parts</th>
<th>Essential</th>
<th>Provided</th>
<th>Provided</th>
<th>Conforms</th>
</tr>
</thead>
<tbody>
<tr>
<td>ii)</td>
<td>Lighting arrangement a) Head light b) Parking light c) Indication d) Reverse gear e) Brake f) Number plate</td>
<td>Essential as per CMVR</td>
<td>NA</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>iii)</td>
<td>Grain tank cover</td>
<td>Essential</td>
<td>Not provided</td>
<td>Does not conform</td>
<td></td>
</tr>
<tr>
<td>iv)</td>
<td>Spark arrester in engine’s exhaust</td>
<td>Essential</td>
<td>Not provided</td>
<td>Does not conform</td>
<td></td>
</tr>
<tr>
<td>v) Stone trap before concave</td>
<td>Essential</td>
<td>Provided</td>
<td>Conforms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>vi) Rear view mirror</td>
<td>Essential</td>
<td>Provided</td>
<td>Conforms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>vii) Slip clutch at following drives – a) Cutting platform auger b) Under shot conveyor drive c) Grain &amp; tailing elevator</td>
<td>Essential</td>
<td>Not provided</td>
<td>Does not conform</td>
<td></td>
<td></td>
</tr>
<tr>
<td>viii) Anti slip surfaces at operator platform &amp; ladder &amp; proper gripping for the control levers.</td>
<td>Essential</td>
<td>Provided</td>
<td>Conforms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ix) Working clearance around the controls</td>
<td>Essential 70 mm, min.</td>
<td>Provided</td>
<td>Conforms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x) Labelling of control and gauges</td>
<td>Essential</td>
<td>Not provided</td>
<td>Does not conform</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Material of construction

i) Knife guard should conforms to IS: 6024 - 2004

The guard (except ledger plate) shall be manufactured from malleable iron casting (IS: 2108-1977), steel casting (IS: 1030-1974) or steel forging (IS: 2004-1978) Hardness 163HB max. -- Not declared by the applicant Unascertainable

ii) Knife blade As per IS :6025 -2004

It must have Chemical composition as C=0.70-0.95 % Mn=0.30-0.50% -- C= 0.6411% Mn= 0.4560% Does not conform Conforms

iii) Knife back should meet the requirement of IS:10378-2006

The knife back shall be manufactured from Carbon Steel having minimum carbon content of 0.35 % -- C= 0.1892% Does not conform