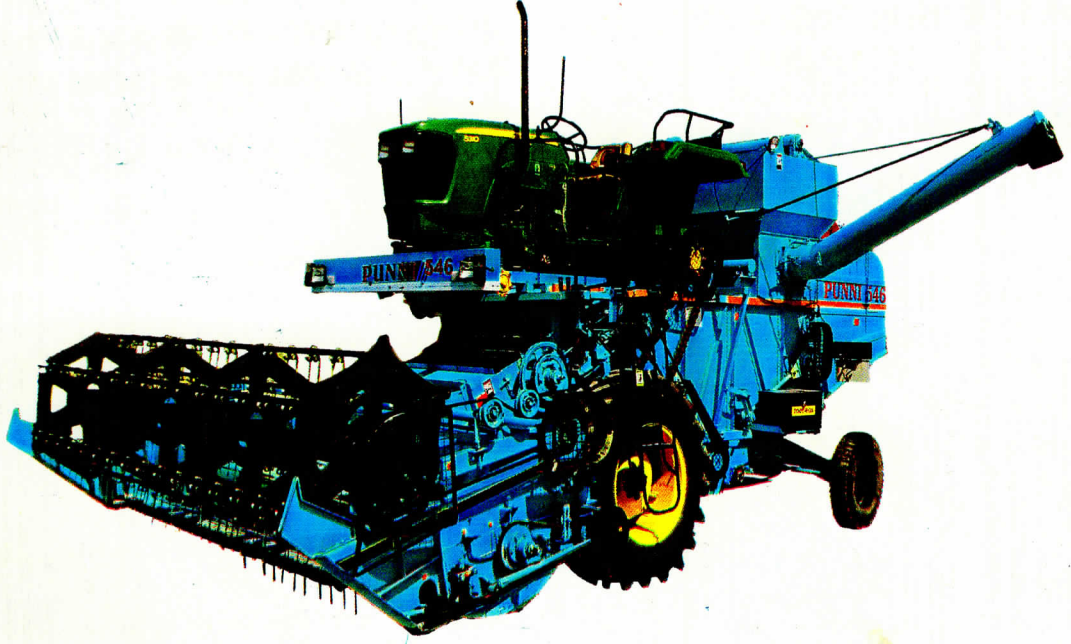


व्यावसायिक परीक्षण रिपोर्ट  
COMMERCIAL TEST REPORT

संख्या/ No.: COMB-209/2474/2020  
माह/Month: May, 2020

**THIS TEST REPORT VALID UP TO : 31<sup>st</sup> MAY, 2027**



**PUNNI-546  
TRACTOR MOUNTED COMBINE HARVESTER**



भारत सरकार

Government of India

कृषि एवं किसान कल्याण मंत्रालय

Ministry of Agriculture and Farmers Welfare

कृषि, सहकारिता एवं किसान कल्याण विभाग

Department of Agriculture, Cooperation and Farmers Welfare

उत्तरी क्षेत्र कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

Northern Region Farm Machinery Training and Testing Institute

ट्रैक्टर नगर, सिरसा रोड, हिसार, (हरियाणा) - 125 001

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[ISO 9001:2015 CERTIFIED]

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**13. NOISE LEVEL MEASUREMENT****13.1 Noise at bystander's position**

Date of test : 29.11.2019

Type of track : Concrete

Background noise level, dB (A) : 52.3

**Location of microphone:**

Height of microphone above ground level, m : 1.2

Distance of microphone from line of travel, m : 7.5

**Atmospheric conditions:**

Temperature, (°C) : 25.1

Pressure, (kPa) : 99.5

Relative humidity, (%) : 61.5

Wind velocity, (m/s) : 0.8 to 2.2

**TEST DATA:**

| S. No. | Gear Used | Travelling Speed before acceleration (kmph) | Noise level, dB (A)        |                                      |
|--------|-----------|---|----------------------------|--------------------------------------|
|        |           |   | Silencer facing microphone | Silencer facing away from microphone |
| 1.     | A1        | 1.56  | 84                         | 83                                   |
| 2.     | A2        | 2.79  | 83                         | 82                                   |
| 3.     | A3        | 3.42  | 83                         | 82                                   |
| 4.     | B1        | 3.71  | 83                         | 81                                   |
| 5.     | B2        | 6.83  | 83                         | 81                                   |
| 6.     | B3        | 8.03  | 83                         | 81                                   |
| 7.     | C1        | 10.37                                       | 83                         | 82                                   |
| 8.     | C2        | 16.90                                       | 83                         | 81                                   |
| 9.     | C3        | 21.18                                       | 83                         | 83                                   |

**13.2 Noise at operator's ear level**

Date of test : 29.11.2019

Type of track : Concrete

Background noise level, dB(A) : 51.8

Height of microphone from the foot board, mm : 1170

**Atmospheric conditions:**

Temperature, (°C) : 24.9

Pressure, (kPa) : 99.5

Relative humidity, (%) : 59.9

Wind velocity, (m/s) : 1.2 to 2.8

**TEST DATA:**

Maximum noise level observed dB(A) : 93

**14. FIELD TEST**

**14.1** Combine harvester was operated in field for 28.03 and 26.73 hours for wheat and paddy harvesting respectively. During the test, available varieties of crop were harvested to assess the field performance of combine with regard to quality of work, rate of work, fuel consumption, safety and soundness of construction etc. The crop and atmospheric conditions during field test are given in Appendix - II & IV respectively.



The crop parameters recorded during the test for all crops are as under:-

**Crop Parameters**

| Sl. No. | Parameters                               |   | Observations |              |
|---------|--|---|--------------|--------------|
|         |  |   | Wheat        | Paddy        |
| 1.      | Average plant height, cm                 | : | 61 to 98     | 98 to 132    |
| 2.      | Average number of tillers/m <sup>2</sup> | : | 48 to 82     | 198 to 298   |
| 3.      | Average length of ear head, cm           | : | 7.2 to 11    | 22 to 32     |
| 4.      | Average straw/grain ratio                | : | 0.8 to 2.4   | 1.3 to 1.7   |
| 5.      | Average moisture, %                      |   |              |              |
|         | - Grain                                  | : | 9.7 to 10.2  | 13.4 to 16.5 |
|         | - Straw                                  | : | 9.6 to 10.2  | 68.2 to 70.1 |

The results of field performance test of wheat and paddy crops harvesting are summarised in Table - 5 and presented in detail in **Appendix - II to V.**

**Table- 5 : SUMMARY OF LOSSES & EFFICIENCIES OBSERVED DURING FIELD PERFORMANCE TEST.**

| Crop variety | Collectable losses (%) (Max.) | Non-collectable losses (%) (Max.) | Total processing losses (%) (Max.) | Threshing efficiency (%) (Min.) | Cleaning efficiency (%) (Min.) | Grain breakage in main tank (%) | Forward speed (kmp/h) | Area covered (ha/h) | Fuel consumption |                | Grain output (kg/h) | Crop throughput (t/h) |
|--------------|-------------------------------|-----------------------------------|------------------------------------|---------------------------------|--------------------------------|---------------------------------|-----------------------|---------------------|------------------|----------------|---------------------|-----------------------|
|              |                               |                                   |                                    |                                 |                                |                                 |                       |                     | (l/h)            | (l/ha)         |                     |                       |
| 1            | 2                             | 3                                 | 4                                  | 5                               | 6                              | 7                               | 8                     | 9                   | 10               | 11             | 12                  | 13                    |
| <b>WHEAT</b> |                               |                                   |                                    |                                 |                                |                                 |                       |                     |                  |                |                     |                       |
| HD 2967      | 2.2                           | 2.5                               | 2.3                                | 99.8                            | 96.5                           | 1.93                            | 3.18                  | 1.032               | 6.72             | 6.51           | 2250.13             | 7.71                  |
| HD 3086      | 1.8                           | 0.4                               | 2.0                                | 99.3                            | 97.8                           | 0.67 to 1.07                    | 2.95 To 3.15          | 0.868 to 1.016      | 4.69 to 6.87     | 5.40 to 6.77   | 2226.80 to 2694.58  | 5.92 to 5.94          |
| PBW 723      | 0.9                           | 0.2                               | 1.0                                | 99.8                            | 98.2                           | 0.43 to 0.73                    | 3.2 to 3.30           | 0.843 to 0.998      | 5.43 to 5.51     | 5.52 to 6.44   | 4538.18 to 4643.38  | 8.29 to 10.08         |
| <b>PADDY</b> |                               |                                   |                                    |                                 |                                |                                 |                       |                     |                  |                |                     |                       |
| PUSA -44     | 1.6                           | 1.3                               | 2.4                                | 99.7                            | 98.1                           | 0.23 to 1.01                    | 1.48 to 1.50          | 0.326 to 0.390      | 5.43 to 7.67     | 13.91 to 23.55 | 2763.73 to 3936.81  | 6.61 to 9.73          |
| PR-53        | 2.1                           | 0.5                               | 2.3                                | 98.0                            | 96.9                           | 0.10                            | 1039                  | 0.319               | 6.64             | 20.81          | 2880.77             | 6.57                  |
| PR-2lack 12  | 1.2                           | 0.2                               | 1.3                                | 99.4                            | 97.6                           | 0.60                            | 1.48                  | 0.353               | 6.17             | 17.50          | 3079.11             | 7.47                  |
| PUSA 121     | 2.0                           | 1.2                               | 2.6                                | 98.7                            | 97.4                           | 0.71                            | 1.51                  | 0.359               | 5.95             | 16.57          | 2158.20             | 5.88                  |



|           |                             |       |      |
|-----------|-----------------------------|-------|------|
| 10.       | 215.9                       | 214.2 | 0.79 |
| 11.       | 210.1                       | 208.0 | 1.00 |
| 12.       | 217.0                       | 215.7 | 0.60 |
| 13.       | 218.6                       | 217.2 | 0.64 |
| 14.       | 219.0                       | 218.0 | 0.46 |
| 15.       | 219.9                       | 218.9 | 0.46 |
| 16.       | 223.0                       | 221.5 | 0.67 |
| <b>b)</b> | <b>Peg teeth of concave</b> |       |      |
| 1         | 209.8                       | 208.4 | 0.86 |
| 2         | 211.6                       | 210.2 | 0.66 |
| 3         | 207.2                       | 206.6 | 0.29 |
| 4         | 219.3                       | 217.8 | 0.68 |
| 5         | 209.8                       | 208.8 | 0.48 |
| 6         | 214.2                       | 212.8 | 0.65 |

### 17. SUMMARY OF OBSERVATIONS

**17.1 Tractor P.T.O. Performance Test: (Refer tractor test report No T-1082/1607/2017, April 2017 issued by C.F.M.T & T.I Budni)**

**17.2 Field test**

**17.2.1 Summary of field tests**

The results of the field test are summarized below:-

| S. No | Parameters  | Observed range               |                                |
|-------|---|------------------------------|--------------------------------|
|       |   | Wheat harvesting             | Paddy harvesting               |
| 1.    | Range of average speed of operation (kmph)  | 2.95 to 3.30                 | 1.39 to 1.51                   |
| 2.    | Range of average area covered (ha/h)  | 0.843 to 1.032               | 0.319 to 0.390                 |
| 3.    | Maximum average fuel consumption:<br>- (l/h)<br>- (l/ha)                              | 4.69 to 6.87<br>5.40 to 6.77 | 5.43 to 7.67<br>13.91 to 23.55 |
| 4.    | Range of average crop throughput (tonne/h)  | 5.92 to 10.08                | 5.88 to 9.73                   |
| 5.    | Reported average grain breakage in main grain outlet (%)                              | 0.43 to 1.93                 | 0.10 to 1.01                   |
| 6.    | Reported average header losses (%)  | 0.07 to 2.29                 | 0.08 to 0.57                   |
| 7.    | Reported average total non-collectable losses (%)                                     | 0.1 to 2.5                   | 0.2 to 1.3                     |
| 8.    | Reported average total collectable losses (%) (un threshed + broken from main outlet) | 0.5 to 2.2                   | 1.1 to 2.1                     |
| 9.    | Reported average total processing losses (%)  | 0.6 to 2.3                   | 1.3 to 2.6                     |
| 10.   | Reported average threshing efficiency (%)   | 99.3 to 99.9                 | 98.0 to 99.7                   |
| 11.   | Reported average cleaning efficiency (%)  | 96.5 to 98.2                 | 96.8 to 98.1                   |





|    |   |            |  |                                       |            |          |
|----|---|------------|--|---------------------------------------|------------|----------|
| d) | Max. Smoke density (Bosch no.) at 80% load between the speed at max. Power and 55% of speed at max. or 1000 rpm whichever is higher | Evaluative | As per Central Motor Vehicles (CMV) Rules.             | Nil                                   | 0.54       | Conforms |
| e) | Back up torque, %   | Evaluative | 10 % min.  | Nil                                   | 34.3       | Conforms |
| f) | Max. Operating temperature, °C<br>i) Engine oil<br>ii) Coolant  | Evaluative | 135<br>118   | Should not exceeds the declared value | 117<br>100 | Conforms |
| g) | Lubrication oil consumption, g/kWh  | Evaluative | Not exceeding 1 % of SFC at maximum power high ambient | Nil                                   | 0.61       | Conforms |

**II. Brake performance at 24 km/h or maximum speed whichever is less**

|    |  |            |                            |    |                     |          |
|----|--|------------|----------------------------|----|---------------------|----------|
| a) | Max. Stopping distance at a force equal to or less than 600 N on brake pedal (m)- (cold brake and hot brake) | Evaluative | As per requirement of CMVR | -- | Cold 6.3<br>Hot 7.0 | Conforms |
| b) | Max. Force exert on brake pedal to achieve declaration of 2.5 m/sec <sup>2</sup>                             | Evaluative | ≤ 600 N                    | -- | Cold 250<br>Hot 265 | Conforms |
| c) | Effectiveness of parking brake at a force of 600 N at foot pedal or 400 N at hand lever                      | Evaluative | As per requirement of CMVR | -- | Effective           | Conforms |

**III. Mechanical vibration**

|    |                         |                |             |     |  |                         |
|----|-------------------------|----------------|-------------|-----|--|-------------------------|
| a) | Operator's platform     | Non evaluative | 120 μm max. | Nil | 1500, which is the maximum value, the instrument was capable of measuring. | <b>Does not conform</b> |
| b) | Steering control wheel  | Non evaluative | 150 μm max. | Nil | 637  | <b>Does not conform</b> |
| c) | Seat with driver seated | Non evaluative | 120 μm max. | Nil | 797  | <b>Does not conform</b> |



| IV. Air cleaner oil pull over   |  |            |                         |     |  |                |
|---|--|------------|-------------------------|-----|--|----------------|
| a)  | Air cleaner oil pull over in % when tested in accordance with IS 8122 (part 2)                             | Evaluative | 0.20 percent max.       | Nil | Dry type air cleaner provided hence test is not applicable | Not Applicable |
| V. Noise measurement  |  |            |                         |     |  |                |
| a)  | Max. ambient noise emitted by combine at bystanders position dB (A)  | Evaluative | As per CMV Rules        | Nil | 84   | Conforms       |
| b)  | Max. noise at operator's ear level dB (A)  | Evaluative | As per CMV Rules        | Nil | 93   | Conforms       |
| VI. Header lifting Test   |  |            |                         |     |  |                |
| a)  | Satisfactory completion of header lifting test   | Evaluative | -                       | Nil | Satisfactory completed                                     | Conforms       |
| VII. Relevant discard limit of John Deere 5310 V3 tractor as reported in the Budni test report No. T- 1082/1607/2017, April, 2017 is reproduced hereunder |  |            |                         |     |  |                |
| a)  | Cylinder bore diameter, mm   | Evaluative | 106.77                  | Nil | 106.48 to 106.50   | Conforms       |
| b)  | Piston diameter, mm  | Evaluative | 106.30                  | Nil | 106.38 to 106.39   | Conforms       |
| c)  | Piston to cylinder liner clearance at skirt  | Evaluative | 0.32                    | Nil | 0.10 to 0.11   | Conforms       |
| d)  | Ring end gap, mm<br>i) Top compression ring<br>ii) 2 <sup>nd</sup> compression ring<br>iii) Oil ring       | Evaluative | 0.75<br>2.00<br>0.75    | Nil | 0.45<br>0.65 to 0.74<br>0.40                               | Conforms       |
| e)  | Ring groove clearance, mm<br>1. Top compression ring<br>2. 2 <sup>nd</sup> compression ring<br>3. Oil ring | Evaluative | Tapered<br>0.25<br>0.92 | Nil | Tapered<br>0.038 to 0.046<br>0.041 to 0.057                | Conforms       |
| f)  | Diametrical and axial clearance of big end bearing, mm<br>Diametrical<br>Axial                             | Evaluative | 0.65<br>0.85            | Nil | 0.069 to 0.179<br>0.35                                     | Conforms       |
| g)  | Diametrical and axial clearance of main bearings, mm<br>Diametrical<br>Axial/crank shaft end float         | Evaluative | 0.65<br>0.85            | Nil | 0.087 to 0.121<br>0.20                                     | Conforms       |



|    |                               |            |                             |     |  |          |
|----|-------------------------------|------------|-----------------------------|-----|--|----------|
| h) | Thickness of brake lining, mm | Evaluative | Wear up to oil groove depth | Nil | Left: 1.15 to 1.43<br>Right: 1.24 to 1.52        | Conforms |
| i) | Thickness of clutch plate, mm | Evaluative | Wear up to rivet head       | Nil | Transmission: 1.09 to 1.40,<br>PTO: 0.52 to 1.16 | Conforms |

## VIII. Field performance

|    |                                   |            |   |     |                                     |          |
|----|-----------------------------------|------------|---|-----|-------------------------------------|----------|
| a) | Suitability for crops             | Evaluative | Wheat & paddy (Wheel type)<br>Paddy (Track type)                            | Nil | Wheat and paddy                     | Conforms |
| b) | Average processing losses (%)     | Evaluative | Wheat : Max. (of average) 3%  | Nil | Wheat Max. (of average) 2.3 %       | Conforms |
|    |                                   |            | Rice : Max. (of average) 4%   |     | Rice Max. (of average) 2.6 %        | Conforms |
| c) | Threshing efficiency              | Evaluative | ≥98 percent for wheat & Paddy   | Nil | 99.3% for Wheat<br>98.0% for Paddy  | Conforms |
| d) | Cleaning efficiency               | Evaluative | ≥96 percent for wheat & Paddy   | Nil | 96.5% for Wheat<br>96.8% for Paddy  | Conforms |
| e) | Grain breakage in main grain tank | Evaluative | ≤ 2.5 percent   | Nil | 1.93% for Wheat<br>1.01 % for Paddy | Conforms |
| f) | Non collectable losses            | Evaluative | i) ≤ 2.5 percent for wheat & Paddy & grain<br>ii) ≤ 4.0 percent for Soybean | Nil | 2.5% For Wheat<br>1.3 % For Paddy   | Conforms |





**IX. Safety requirement**

|    |  |                |  |    |                               |                |
|----|--|----------------|--|----|-------------------------------|----------------|
| a) | Guards against all moving parts  | Evaluative     | Belt and chain drives, pulleys hydraulic pipes around operators work place | -- | Provided                      | Conforms       |
| b) | Lighting arrangement   | Evaluative     | As per CMVR  | -  | Provided                      | Conforms       |
| c) | Grain tank cover   | Evaluative     | Essential  | -  | Provided                      | Conforms       |
| d) | Spark arrester in engine's exhaust in case naturally aspirated engine                      | Evaluative     | Essential  |    | Turbo charger Provided system | Not Applicable |
| e) | Stone trap before concave bars   | Evaluative     | Essential  | -  | Provided                      | Conforms       |
| f) | Rear view mirror   | Evaluative     | Essential  | -  | Provided                      | Conforms       |
| g) | Fire extinguisher  | Evaluative     | Essential  | -  | Provided                      | Conforms       |
| h) | Slip clutch at following drives –  |                |  |    |                               |                |
|    | i) Cutting platform auger  | Evaluative     | Essential  | -  | Provided                      | Conforms       |
|    | ii) Undershot conveyor drive   | Non-Evaluative | Optional   |    | Provided                      | Conforms       |
|    | iii) Grain & tailing elevator  | Non-Evaluative | Optional   |    | Provided                      | Conforms       |
| i) | Anti slip surfaces at operator platform & ladder & proper gripping for the control levers. | Evaluative     | Essential  | -  | Provided                      | Conforms       |
| j) | Working clearance around the controls  | Non evaluative | Essential 70mm,min   | -  | Provided                      | Conforms       |
| k) | Labelling of control and gauges  | Evaluative     | Essential  | -  | Provided                      | Conforms       |





| XI Material of construction : |   |                |  |    |                         |                                      |
|-------------------------------|---|----------------|--|----|-------------------------|--------------------------------------|
| i)                            | Knife guard should conform to IS: 6024 - 1983           | Non evaluative | Should have maximum hardness 163 HB  | -  | Hardness 367 HB         | Does not conform                     |
| ii)                           | Knife blade As per IS :6025 -1982                       | Non evaluative | It must have Chemical composition as<br>C=0.70-0.95 %<br>Mn= 0.30-0.50%                        | -  | C= 2.2427<br>Mn= 0.2653 | Does not conform<br>Does not conform |
| iii)                          | Knife back should meet the requirement of IS:10378-1982 | Non evaluative | The knife back shall be manufactured from Carbon Steel having minimum carbon content of 0.35 % | -- | C=0.2102                | Does not conform                     |

## X. Break down (critical, major &amp; minor)

| Sr. No. | Category of breakdowns | Category (Evaluative/ Non evaluative) | Requirements as per OM   | As observed | Whether meets the requirements (Yes/No) |
|---------|------------------------|---------------------------------------|--|-------------|---|
| 1.      | Critical               | Evaluative                            | No critical breakdown  | None        | Yes                                     |
| 2.      | Major                  | Evaluative                            | Not more than two and neither of them should be repetitive in nature | None        | Yes                                     |
| 3.      | Minor                  | Evaluative                            | Not more than five and frequency of each should not be more than two | None        | Yes                                     |
| 4.      | Total breakdown        | Evaluative                            | In no case total no of (major + minor) breakdowns exceed five        | None        | Yes                                     |





**19. COMMENTS AND RECOMMENDATIONS****19.1 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.

**19.2 Field performance test**

One knife blade was broke during paddy harvesting.

**19.3 Ease of operation and safety provision**

- i) No noticeable difficulties observed during operation of combine harvester.
- ii) The first aid box is not provided on machine. It may be provided.

**19.4** Cutter bar knife drive safety arrangement is not provided. It should be provided.

**19.5** There is no provision for varying oscillation of sieve. It should be looked into.

**19.6** One knife blade was broke during paddy harvesting. It should be looked into.

**19.7 Hardness and chemical composition**

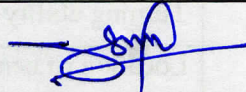
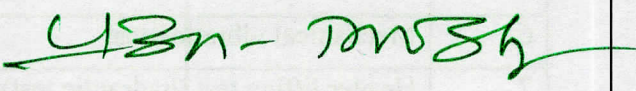
- i) **Hardness & chemical composition of knife blade, knife guard and knife back is not within the limits specified in their respective IS: 6025-1982. It should be looked into for corrective action at regular production level.**



**19.8 Literature supplied with the machine**

Operator cum service manual cum parts catalogue supplied with the machine  
However the same need be updated as per IS: 8132 – 1999.

**TESTING AUTHORITY**

|   |   |
|---|---|
| ANSHUL PANDEY<br>AGRICULTURE ENGINEER (I) |  |
| P. K. PANDEY<br>DIRECTOR                  |   |

The Test Report compiled by C.Veeranjaneyulu, Senior Technician

**20. APPLICANT'S COMMENTS**

| Para No | Our reference  | Applicants comment's                                  |
|---------|----------------|---|
| 20.1    | 19.1           | We will take corrective action in regular production. |
| 20.2    | 19.3<br>ii)    | First aid will be provided with machine               |
| 20.3    | 19.4           | We will take corrective action in regular production. |
| 20.4    | 19.5           | We will provide stepped pulley.                       |
| 20.5    | 19.2,19.6,19.7 | We will take necessary action for improvement.        |

