

प्रारंभिक व्यावसायिक परीक्षण रिपोर्ट
INITIAL COMMERCIAL TEST REPORT

संख्या/No. : T- 1813/2344/2024
माह/Month : January, 2024

Application Reference No. 28/2023-24/32

(यह परीक्षण रिपोर्ट 31.01.2029 तक वैध है / THIS TEST REPORT IS VALID UPTO 31.01.2029)



Make of Agricultural Tractor : MAHINDRA
Model : 2121 OJA
Manufactured by : Mahindra & Mahindra Ltd.
(Farm Equipment Sector)
Mahindra Research Valley, Mahindra
World City, Plot No. 41/1, Anjur P.O,
District Chengalpattu – 603004,



भारत सरकार

कृषि एवं किसान कल्याण मंत्रालय
(कृषि एवं किसान कल्याण विभाग)

GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS' WELFARE
(DEPARTMENT OF AGRICULTURE & FARMERS' WELFARE)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान
ट्रैक्टर नगर, बुदनी (म.प्र.) 466 445

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE
TRACTOR NAGAR, BUDNI (M.P.) 466 445
(An ISO 9001:2015 Certified Institute)

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| T-1813/2344/2024 | MAHINDRA, 2121 OJA - INITIAL COMMERCIAL TEST |
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IMPORTANT INFORMATION

The Government of India, Ministry of Agriculture and Farmers' Welfare has directed, vide a OM No. 13-17/2021-M&T(I&P) dated 28.07.2022, that since 15th August, 2022, only mandatory tests will be carried out on a tractor unless applicant has expressly requested for optional tests as well, mentioned in the above captioned OM.

In the instant case, there is no request from the applicant to carry out the optional tests hence only Mandatory Tests, as given below, have been conducted and reported in this report:-

1. PTO performance
2. Hydraulic performance
3. Drawbar performance
4. Brake performance

| | | |
|----------------|-----------------------------------|------------|
| Month: January | Test Report No.: T-1813/2344/2024 | Year: 2024 |
|----------------|-----------------------------------|------------|



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| T-1813/2344/2024 | MAHINDRA, 2121 OJA - INITIAL COMMERCIAL TEST |
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| | | | |
|-----|--|---|--|
| [C] | Tractor manufacturer's name and address | : | Mahindra & Mahindra Ltd. (Farm Equipment Sector) Mahindra Research Valley, Mahindra World City, Plot No.41/1, Anjur P.O, District Chengalpattu - 603004 |
| [D] | Location of manufacturing plants | : | (i) Akurli road, Kandivali (E), Mumbai-400101 (ii) MIDC, Hingna Road, Nagpur - 440028 (iii) Khatima Panipat Highway, Rudrapur, Udhamasinghnagar - 263153 (iv) Jaipur Ajmer Road, Jaipur - 303007 (v) Near Bidar "T" Junction, Mahindra Nagar, Zaheerabad - 502220 (vi) Mahindra Research Valley, Mahindra World City, Plot No.41/1, Anjur P.O, District Chengalpattu - 603004 |
| [C] | Submitted for test by (Applicant) | : | The Manufacturer |
| [C] | Selected for test by | : | The Ministry vide OM No. 13-17/2021 - M&T (I&P) dated 28.07.2022, has allowed the applicant to submit the test sample directly to the Institute without requiring any random selection for Initial Commercial Testing. Thus, the applicant directly submitted the test sample to the Institute for test. |
| [D] | Place of running-in | : | At manufacturer's works |
| [D] | Duration of running-in, (h): | : | |
| | -Engine | : | 30 |
| | -Transmission | : | 16 |
| [C] | Location of test | : | Government of India, Central Farm Machinery Training and Testing Institute, P.O. - Tractor Nagar, BUDNI - 466445 (M.P.), INDIA |

1. SPECIFICATIONS OF TRACTOR

1.1 Identification:

1.1.1 Denomination

| | | | |
|-----|-----------------------------|---|--|
| [C] | Make of tractor | : | Mahindra |
| [C] | Model | : | 2121 OJA |
| [C] | Type | : | Four Wheel Driven, Standard Agricultural Tractor |
| [C] | Month & year of manufacture | : | 07 / 23 |
| [D] | Country of origin | : | India |

1.1.2 Numbers:

| | | | |
|-----|---|---|--------------------|
| [D] | 1 st Serial No. or prototype | : | MBNM9HAPENZM00013 |
| [C] | Serial No. | : | MBNMEL 4KKPZD00109 |

1.2 Engine:

| | | | |
|-----|------------------------|---|--|
| [D] | Manufacturer's address | : | Yanmar Power Technology Co. Ltd Plot No I -5, 2nd Avenue Road, ORIGINS By Mahindra World City, North Chennai, Eliambedu Village, Ponneri Taluk, Tiruvallur District, Tamilnadu, PIN 601206, India |
| [C] | Make | : | Yanmar Power Technology Co. Ltd. |
| [C] | Model | : | 3TN82S-B5XPMH21 |
| [C] | Type | : | Four stroke, naturally aspirated, liquid cooled direct injection, diesel engine. |
| [C] | Serial No. | : | 02326M |

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| T-1813/2344/2024 | MAHINDRA, 2121 OJA - INITIAL COMMERCIAL TEST |
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6. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

6.1 On the basis of test conducted the performance results have been summarized as evaluative (mandatory) / Non-evaluative (Non-mandatory) parameters applicable for Qualifying Minimum Performance criteria as per Clause-4 (Table-1) of **IS: 12207-2022** for acceptance of the tractor for the purpose of subsidies/NABARD financing are summarized as under:

| Sl. No. | Characteristic | Category (Evaluative / Non Evaluative) | Requirements as per IS: 12207-2022 | Values declared by the applicant/ (D) Requirement (R) | As observed | Whether meets the requirements (Yes/No) |
|---|---|--|--|---|-------------|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| MANDATORY TESTS: (As per Ministry's Office Memorandum No. 13-17/2021-M&T (I&P) dated 28th of July, 2022). | | | | | | |
| 6.1.1 | PTO Performance: | | | | | |
| a) | Maximum power under 2 h test, (kW) (Natural ambient condition) | Evaluative | Declared value to be achieved with a tolerance of: $\pm 5\%$ for PTO power and or engine power > 26 kW. $\pm 10\%$ for PTO power and or engine ≤ 26 kW. | 13.42 (D) | 13.8 | Yes |
| b) | Power at rated engine speed, (kW) | Non Evaluative | -do- | 13.42 (D) | 13.8 | Yes |
| c) | Specific fuel consumption corresponding to maximum power, (g/kWh) | Evaluative | + 10% max. | 284 (D) | 262 | Yes |
| d) | Maximum equivalent crankshaft torque, (Nm) | Non Evaluative | $\pm 8\%$ | 73.5 (D) | 67.5 | No |
| e) | Back-up torque, percent | Evaluative | 12% min. | 12 (D) 12 (R) | 22.7 | Yes |
| f) | Maximum operating temperature, ($^{\circ}$ C): | | | | | |
| | 1) Engine oil | Evaluative | The declared value should not exceed the max. value specified by the oil company and the observed value under natural ambient/high ambient condition should not exceed the declaration. | 125 (D) | 109 | Yes |
| | 2) Coolant | Evaluative | Observed value should not exceed the declared value or boiling point of the coolant at radiator cap pressure whichever is lower. The boiling point of the coolant at radiator pressure shall be provided by the applicant. | 105 (D) | 94 | Yes |
| g) | Engine oil consumption, (g/kWh) | Evaluative | Not exceeding 1% of SFC at max. Power under natural ambient conditions. | 2.62 (R) Maximum | 1.55 | Yes |
| h) | Smoke level, m^{-1} | Evaluative | Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR). | 3.25 per meter (R) Maximum | 0.25 | Yes |
| 6.1.2 | Drawbar performance: | | | | | |
| a) | Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN) | Non Evaluative | Minimum 70% of static mass of tractor with ballast. | * | * | * |

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| T-1813/2344/2024 | MAHINDRA, 2121 OJA - INITIAL COMMERCIAL TEST |
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| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|--|----------------|--|---------------------------------|------|-----|
| b) | Max. drawbar pull without ballasted corresponding to 15 percent wheel slip, (kN) | Evaluative | Minimum 70% of static mass of tractor without ballast or with standard ballast, as the case may be. In case of light weight tractors having ≤1500 kg total static mass of tractor, Min. 65 % of static mass of tractor without ballast or with standard ballast, as the case may be. | 5.1 (D) 5.16 (R) Minimum | 7.07 | Yes |
| c) | Maximum drawbar power without ballast/ with standard ballast, (kW). | Evaluative | Minimum 80 % of PTO power as referred in SI No. i) a) of PTO performance in case of tractors having total static mass > 1500 kg Minimum 75 % of PTO power as referred in SI No. i) a) of PTO performance in case of light weight tractors having ≤1500 kg total static mass of tractor Minimum 75 % of the engine power as referred in SI No. i) a) of engine performance in case of tractors which do not have a PTO shaft. | 10.1 (D) 10.4 (R) Minimum | 12.0 | Yes |
| d) | Maximum transmission oil temperature, (°C) | Evaluative | The declared value should not exceed the maximum value specified by oil company. | 105 (D) | 89 | Yes |
| *Applicant vide letter No. FD/BVH/ICT/21HP/2121OJA/23-24/03 dated 08.11.2023 has requested not to conduct the ballasted drawbar performance and ten hour test which was allowed as per the additional guidelines for testing of tractor as per new regime of testing of tractor vide OM no. 13-32/2023-M&T (I&P) (FTS-125476) dated 16.05.2023. Accordingly, only unballasted drawbar performance test was conducted. | | | | | | |
| 6.1.3 Power lift and hydraulic pump performance: | | | | | | |
| a) | Maximum lifting capacity throughout the range of lift, (kN): | | | | | |
| 1) | At hitch points | Evaluative | Should not be less than 90% of declared value. | 9.26 (D) 8.33 (R) Minimum | 9.82 | Yes |
| 2) | With the standard frame | Evaluative | The lift capacity should at least be 24 kg/PTO kW and it should be 21.5 kg/engine kW where the tractor is not provided with a PTO shaft. | 7.15 (D) 3.25 (R) Minimum | 7.95 | Yes |
| b) | Maximum drop in the height of the point of application of the force after each 5 minutes interval for a total duration of 30 Minutes, (mm) | Non Evaluative | The observed value should not exceed 50 mm. | 50 (D) Maximum | 00 | Yes |
| 6.1.4 Brake performance at 25 kmph: | | | | | | |
| a) | Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with road ballast, (m): | | | | | |
| 1) | Cold brake | Evaluative | 10 | 10 (R) | 3.52 | Yes |
| 2) | Hot brake | Evaluative | 10 | 10 (R) | 3.96 | Yes |
| b) | Whether parking brake is effective at a force of 600 N at foot pedal (s) or 400 N at hand lever | Evaluative | Yes / No | Yes | Yes | Yes |
| 6.1.5 OPTIONAL TESTS: As the applicant has not applied for any optional tests, therefore no optional tests was conducted. | | | | | | |

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| T-1813/2344/2024 | MAHINDRA, 2121 OJA - INITIAL COMMERCIAL TEST |
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| 6.1.6 | Safety features : | | | | |
| a) | Guards against moving and hot parts | Evaluative | Belt drives, pulleys, silencer, hydraulic pipes [As per IS 12239 (Part 2)] | Meets the requirement | Yes |
| b) | Lighting arrangement | Evaluative | As per CMVR | Meets the requirement | Yes |
| c) | Seating requirements (Tractors having more than 1150 mm rear track width) | Non Evaluative | Should meet the requirements of IS: 12343 (As amended from time to time) | (Tractor rear track width is less than 1150 mm) | Not applicable |
| d) | Technical requirements for PTO shaft | Non Evaluative | Should meet the requirements of IS: 4931 (As amended from time to time) | Meets the requirement | Yes |
| e) | Dimensions of three point linkage | Non Evaluative | Should meet the requirements of IS: 17231-2019 (As amended from time to time) | Does not meet the requirement | No |
| f) | Specifications of linkage drawbar | Non Evaluative | Should meet the requirements of IS: 12953 (As amended from time to time) | Meets the requirement | Yes |
| g) | Specifications of swinging drawbar (wherever fitted) | Non Evaluative | Should meet the requirement of IS: 12362 (Part 3) (As amended from time to time) | Not provided | Not applicable |
| h) | Audible warning signal on tractor | Evaluative | If tractor travel speed in reverse gear exceeds 20 kmph, an audible warning signal on tractor shall get activated. A sticker to the effect that "operating the tractor beyond 20 kmph speed in reverse gear is not safe" should be prominently displayed. | Provided (The audible warning signal on tractor is activated when the speed in reverse gear reaches to 20 kmph) | Yes |
| 6.1.7 | Labelling of tractors (Provision of labeling plate): | | | | |
| 1) | Make | Evaluative | Should conform to the requirements of CMVR along with maximum PTO Power in kW, specific fuel consumption (SFC) corresponding to maximum power in g/kWh and year of manufacture in numerical form. MM YY | Mahindra | Yes |
| 2) | Model | Evaluative | | 2121 OJA | Yes |
| 3) | Month & Year of manufacture | Evaluative | | 07/23 | Yes |
| 4) | Engine number | Evaluative | | 02326M | Yes |
| 5) | Chassis number | Evaluative | | MBNMEL4KKPZ D00109 | Yes |
| 6) | Maximum PTO power, (kW) | Evaluative | | 13.42 (17.99) | Yes |
| 7) | Specific fuel consumption, g/kWh | Evaluative | | 284 (211.78) | Yes |
| 6.1.8 | Literature (Submission to test agency): | | | | |
| (a) | Operator manual | Evaluative | The printed literature in booklet form should be provided as per IS 8132 and should submit along with the test sample. | Provided | Yes |
| (b) | Parts Catalogue | Evaluative | | Provided | Yes |
| (c) | Workshop/ Service manual | Evaluative | | Provided | Yes |

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| T-1813/2344/2024 | MAHINDRA, 2121 OJA - INITIAL COMMERCIAL TEST |
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|---------------|---|----------------------|---|--|----------------|
| 6.1.9 | Fitment of Roll Over Protective Structures (ROPS): | | | | |
| | For tractor having more than 1150 mm rear track width | Evaluative if fitted | ROPS should meet the requirement of IS:1182 or OECD code or equivalent International Standard | Not fitted (Tractor rear track width is less than 1150 mm) | Not applicable |
| 6.1.10 | Standard Accessories | Evaluative | Trailer hitch, front tow hook, linkage drawbar should be provided with tractor | Provided | Yes |
| 6.1.11 | Accessories (optional) | Non Evaluative | Ballast weight, if fitted, should meet the requirement of CMVR | Not fitted | Not applicable |

| 6.2 CATEGORY OF BREAKDOWNS / DEFECTS (As per clause 5.0 of IS:12207-2022): | | | | | |
|--|-------------------------|--|---|-------------|---|
| S. No. | Category of break-downs | Category (Evaluative / Non Evaluative) | Requirements as per IS: 12207-2022 | 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 neither of them should be repetitive in nature. | None | Yes |
| 4. | Total breakdowns | Evaluative | In no case, the total number of breakdowns should exceed five, that is, (2 major + 3 minor) or (1 major + 4 minor) or 5 minor breakdowns. | None | Yes |

6.3 Conformity with following IS:

- i) Guidelines for declaration of power and specific fuel consumption and labeling of agricultural tractors (First revision) [IS:10273 -1987 (Reaffirmed Year 2019)] : **Conforms**
- ii) Agricultural tractors - Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS:4931-1995 (Reaffirmed Year 2019)] : **Conforms**
- iii) Agricultural wheeled tractors – Rear mounted three-point linkage: Part 2 Categories 1, 2, 3 & 4 (fourth revision) [IS:17231-2019] : **Does not conform**
- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed Year 2022)] : **Conforms**
- v) Agricultural tractors- Operator’s seat technical requirement [IS12343 - 2021] : **Not applicable**
(Tractor rear track width is less than 1150 mm)
- vi) Guide for safety & comfort of operator of agricultural tractors:Part 1 General requirements (first revision):[IS 12239 (Part 1) - 2018] : **Does not conform**
- vii) Tractors and machinery for agriculture and forestry – Technical means for ensuring safety Part 2: Tractors (first revision) (IS 12239 (Part 2) 1999) (Reaffirmed Year 2019)] : **Does not conform**
- viii) Guide lines for location and operation of operator controls on agricultural tractors and machinery [IS: 8133 - 2021] : **Does not conform**
- ix) Tractors and machinery for agriculture and forestry, powered lawn and garden equipment - Symbols for operator controls and other displays Part2 Symbols for agricultural tractors and machinery [IS: 6283(Part-1) - 2006 (Reaffirmed Year 2019) and IS: 6283 (Part-2) – 2007 (Reaffirmed Year 2019)] : **Does not conform**
- x) Agricultural Tractors and Machinery-Lighting device for travel on public roads (IS:14683-1999) (Reaffirmed Year 2019)] : **Conforms**

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| T-1813/2344/2024 | MAHINDRA, 2121 OJA - INITIAL COMMERCIAL TEST |
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6.4 Salient Observations:

6.4.1 Laboratory tests:

6.4.1.1 PTO Performance Test:

- i) The maximum equivalent crankshaft torque was recorded as 67.5 N-m against the declaration of 73.5 N-m, which does not meet the non-evaluative requirement of IS 12207: 2022. This should be looked into for necessary corrective action.

6.4.1.2 Operator's work place:

The following parameters does not meet the requirement of IS: 12239 (Part-I) 2018.

- i) Vertical retainer on inner side of clutch pedal was not provided
- ii) Spark arresting device has not been provided in the exhaust system
- iii) Master shield has not been provided.

Therefore, all of the above should be looked into for necessary corrective action.

6.4.1.3 Three point linkage:

The dimension viz. lateral moment of lower hitch point, distance from end of power take-off to center of lower hitch point, transport height, leveling adjustment & transport height & power range does not meet the requirements of IS:17231–2019. This should be looked into for corrective action.

6.4.1.4 PTO master shield:

PTO master shield has not been provided on tractor. This should be looked into for necessary corrective action.

6.5 Maintenance / Service Problems:

No noticeable maintenance or service problem was observed during the test.

6.6 Recommendation with regard to safety on tractor:

- i) The hand accelerator lever, when moved away from the operator (i.e. forward) decreases the engine speed, which does not meet the requirement as laid down in Table - 1 of IS: 8133-2021.
- ii) Color code on illuminated display has not been provided as per the requirement as laid down in IS: 6283 (Part 2): 2007.
- iii) Differential lock has not been provided.
- iv) The distance between parking brake lever and dash board was measured 25 mm against the maximum requirement of 150 mm.

Above parameters should be looked into for necessary corrective action.

6.7 Adequacy of Literature supplied with machine:

6.7.1 The following literatures were supplied with the test tractor for reference during the test: -

- a) Operator's Manual for "Mahindra 2121 OJA, Mahindra 2124 OJA, Mahindra 2127 & Mahindra 2130" tractor's model.
- b) Parts catalogue for "Mahindra 2121 OJA, Mahindra 2124 OJA, Mahindra 2127 & Mahindra 2130" tractor's model.
- c) Service manual for "Mahindra 2121 OJA, Mahindra 2124 OJA, Mahindra 2127 & Mahindra 2130" tractor's model.




6.7.2 The operator manual may be brought out for the guidance of users and service personnel as per IS: 8132-1999 incorporating, inter alia, the following:

- i) Safe hitch height for trailer operation.

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| T-1813/2344/2024 | MAHINDRA, 2121 OJA - INITIAL COMMERCIAL TEST |
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TEST CARRIED OUT AT C.F.M.T. & T.I., BUDNI (M.P.), INDIA

TESTING AUTHORITY

| | |
|--|--|
| B. N. DIXIT AGRICULTURAL ENGINEER |  |
| R.P. PANDEY SENIOR INSTRUMENTATION ENGINEER |  |
| A. K. UPADHYAY DIRECTOR (I/C) |  |

Draft Test Report compiled by **Shivkumar Sharma**, Senior Technical Assistant.

7. APPLICANT'S COMMENTS

| Para no. | Our reference | Applicant's comments |
|----------|---------------|--|
| 7.1 | 6.7.2 | Parameters will be studied and necessary action will be initiated. |

ANNEXURE- I

TRACTOR RUN HOURS DURING TEST

| A. | LABORATORY AND TRACK TESTS: | HOURS |
|---------------|---|--|
| 1. | Running-in | Applicant has declared it to be conducted on their work place. |
| 2. | PTO performance test | 11.6 |
| 3. | Power lift and hydraulic pump performance test | 0.8 |
| 4. | Drawbar performance test | 3.4 |
| 5. | Brake performance test | 1.0 |
| 6. | Nominal speed test | 2.5 |
| B. | Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test. | 5.4 |
| TOTAL: | | 24.7 |