

व्यावसायिक परीक्षण रिपोर्ट
INITIAL COMMERCIAL TEST REPORT

संख्या/No. : T- 1825/2356/2024
माह/Month : February, 2024

Application Reference No. 28/2023-24/37

(यह परीक्षण रिपोर्ट 28/02/2029 तक वैध है / THIS TEST REPORT IS VALID UPTO 28/02/2029)



Make of Agricultural Tractor : MAHINDRA
Model : 2127 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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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

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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	:	2127 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	:	MBNM9HAPENZM00008
[C]	Serial No.	:	MBNMEJJKPZD00031
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-B5LMH27
[C]	Type	:	Four stroke, naturally aspirated, liquid cooled direct injection, diesel engine.
[C]	Serial No.	:	00909M

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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.	17.001 (D)	16.9	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	17.001 (D)	16.9	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% max.	285 (D)	280	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	$\pm 8\%$	83.1 (D)	74.5	No
e)	Back-up torque, percent	Evaluative	12% min.	12 (D) 12 (R)	24.8	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)	116	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)	102	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. Power under natural ambient conditions.	2.80 (R) Maximum	0.13	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	0.42	Yes

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1	2	3	4	5	6	7
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.	*	*	*
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 tractor having total static mass ≤1500 kg, Min. 70 % of static mass of tractor without ballast or with standard ballast, as the case may be.	5.32 (D) 5.35 (R) Minimum	7.30	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.	12.8 (D) 12.7 (R) Minimum	13.2	Yes
d)	Maximum transmission oil temperature, (°C)	Evaluative	The declared value should not exceed the maximum value specified by oil company.	120 (D)	100	Yes

* Applicant vide letter no. FD/BVH/ICT/27HP/21700JA/23-24/03 dated 08.11.2023 has requested to conduct the testing as per the additional guideline for testing of tractors vide OM No. 13-32/2023-M&T (I&P) (FTS-125476) dated 16.05.2023. Accordingly, drawbar performance test under unballasted condition was conducted only.

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	9.85 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) 3.98 (R) Minimum	7.37 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	05 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)	4.04 Yes
	2)	Hot brake	Evaluative	10	10 (R)	4.65 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

*Brake performance test has been conducted at maximum attainable speed of 21.19 kmph.

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1	2	3	4	5	6	7	
6.1.5	OPTIONAL TESTS: As the applicant has not applied for any optional tests, therefore no optional tests was conducted.						
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. Digit 01 – 12 in box No.1 for MM will represent the months and next two digits in box No.2 for YY YY will represent the year of Manufacturing.	Mahindra	Yes		
2)	Model	Evaluative		2127 OJA	Yes		
3)	Month & Year of manufacture	Evaluative		07/23	Yes		
4)	Engine number	Evaluative		00909M	Yes		
5)	Chassis number	Evaluative		MM YY	MBNMELJKKPZ D00031	Yes	
6)	Maximum PTO power, (kW)	Evaluative		17.001 (22.79)	Yes		
7)	Specific fuel consumption, g/kWh	Evaluative		285 (212.52)	Yes		

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1	2	3	4	5	6	7
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	
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.	One* (Mj-16)	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.	One (Mj-16)	Yes

* During Load maintenance test, hydraulic lift does not hold on transport position, Upon this, the applicant vide letter No. FD/BVH/ICT/27HP/2127OJA/23-24/06 dated: 01.01.2024 has requested to inspect the malfunctioning of sensor / Electronic control V/V, which was allowed. During inspection, Lift Safety Valve malfunction was observed. Upon this, the applicant has requested to replace Lift Safety Relief Valve vide letter No. FD/BVH/ICT/27HP/2127OJA/23-24/07 dated: 03.01.2024, which was allowed. Therefore, "Lift Safety Relief Valve" (Part No. 007219712J91, Quantity – 1 No.) was replaced with new one having same specification. This defect is categorized as **Major defect (Mj-16)** as per IS: 12207-2022.

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**

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- 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)] : **Conforms**
- x) Agricultural Tractors and Machinery-Lighting device for travel on public roads (IS:14683-1999) (Reaffirmed Year 2019)] : **Conforms**

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 74.5 N-m against the declaration of 83.1 N-m, which does not meet the non-evaluative requirement of IS 12207: 2022. This should be looked into for necessary corrective action.
- ii) Applicant vide letter no. FD/BVH/ICT/27HP/2127OJA/23-24/03 dated 08.11.2023 has recommended that tractor operating range is from 1500 rpm to rated engine rpm under full load condition. Hence during PTO performance test, varying speed test was conducted upto 1500 rpm of engine only under natural and high ambient condition.

6.4.1.2 Power lift and hydraulic pump performance:

During Load maintenance test, hydraulic lift does not hold on transport position, Upon this, the applicant vide letter No. FD/BVH/ICT/27HP/2127OJA/23-24/06 dated: 01.01.2024 has requested to inspect the malfunctioning of sensor / Electronic control V/V, which was allowed. During inspection, Lift Safety Valve malfunction was observed. Upon this, the applicant has requested to replace Lift Safety Relief Valve vide letter No. FD/BVH/ICT/27HP/2127OJA/23-24/07 dated: 03.01.2024, which was allowed. Therefore, "Lift Safety Relief Valve" (Part No. 007219712J91, Quantity – 1 No.) was replaced with new one having same specification. This defect is categorized as **Major defect (Mj-16)** as per IS: 12207-2022.

6.4.1.3 Drawbar Performance Test:

The applicant also requested to restrict the drawbar performance test to 1500 engine rpm as per minimum operating range of tractor under full load condition. Hence drawbar performance test was conducted upto 1500 rpm of engine only.

6.4.1.4 Operator's seat:

The following parameters does not meet the requirement of IS: 12343-2021:

- i) Length of seat from SIP was measured as 165 mm against requirement of 260 ± 50 mm.
- ii) Width of seat was measured as 420 mm against minimum requirement of 450 mm
- iii) Vertical distance from SIP from centre of steering control wheel has been measured as 140 mm against the requirement of 265 to 385 mm.

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

6.4.1.5 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.

6.4.1.6 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 does not meet the requirements of IS:17231–2019. This should be looked into for corrective action.

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6.4.1.7 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) The working clearance between position control lever and draft control lever was measured 15 mm against the minimum requirement of 70 mm.
 - iii) The working clearance between parking lever and dashboard was measured 20 mm against the minimum requirement of 70 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: -


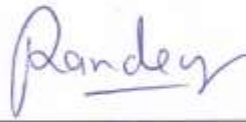

- a) Operator's Manual for "Mahindra 2121 OJA, Mahindra 2124 OJA, Mahindra 2127 OJA & Mahindra 2130 OJA" tractor's model.
- b) Parts catalogue for "Mahindra 2121 OJA, Mahindra 2124 OJA, Mahindra 2127 OJA & Mahindra 2130 OJA" tractor's model.
- c) Service manual for "Mahindra 2121 OJA, Mahindra 2124 OJA,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

TEST CARRIED OUT AT C.F.M.T. & T.I., BUDNI (M.P.), INDIA

TESTING AUTHORITY

SHIVKUMAR SHARMA AGRICULTURAL ENGINEER	
R.P. PANDEY SENIOR INSTRUMENTATION ENGINEER	
A. K. UPADHYAY DIRECTOR (I/C)	

Draft Test Report compiled by **Pratyush Satya**, Senior Technical Assistant.

7. APPLICANT'S COMMENTS

Para no.	Our reference	Comments
7.1	6.4.1.2	As per point no. 6.4.1.2 we have already taken up with supplier for corrective action and we will regularise as continuous improvement.
7.2	6.7.2	Parameters will be studied & necessary action will be initiated.

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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	11.4
3.	Power lift and hydraulic pump performance test	3.1
4.	Drawbar performance test	3.1
5.	Brake performance test	1.0
6.	Nominal speed test	2.6
B.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test.	5.9
TOTAL:		27.1