

Application Reference No. 28/2023-24/119

(यह परीक्षण रिपोर्ट 31/10/2029 वैध है / THIS TEST REPORT IS VALID UPTO 31/10/2029)



Make of Agricultural Tractor : MAHINDRA
Model : Arjun 555 DI L1
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)

IMPORTANT INFORMATION

The Government of India, Ministry of Agriculture and Farmers Welfare has directed, vide an 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: October	Test Report No.: T-1889/2420/2024	Year: 2024
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GOVERNMENT OF INDIA
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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 – 440016
(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 : 30
- [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 : Arjun 555 DI L1
- [C] Type : Rear Wheel Driven, Standard Agricultural Tractor
- [C] Month & year of manufacture : 04 / 23
- [D] Country of origin : India

1.1.2 Numbers:

- [D] 1st Serial No. or prototype : MBNBEBBBAPNA28376
- [C] Serial No. : MBNBEBBBAPNA28376

1.2 Engine:

- [D] Manufacturer's address : Mahindra & Mahindra Ltd.,
(Farm Equipment Sector)
(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] Make : Mahindra
- [C] Model : MTDHI30NA049B3A
- [C] Type : Four stroke, naturally aspirated, liquid cooled, direct injection, diesel engine
- [C] Serial No. : NPM6C3E0001

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). (In the ensuing table, 'D' stands for applicant's declaration, whereas 'R' stands for requirement as per BIS test code)					
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.	33.50 (D)	32.7	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	33.50 (D)	32.7	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% max.	254.8 (D)	259	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	$\pm 8\%$	197 (D)	180.8	No
e)	Back-up torque, percent	Evaluative	12% min.	21 (D) 12 (R)	21.7	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.	130 (D)	127	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.	112 (D)	107	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. Power under natural ambient conditions.	2.59 (R) Maximum	0.21	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	0.58	Yes

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 / with standard ballast 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. 65 % of static mass of tractor without ballast or with standard ballast, as the case may be.	15.3 (D) 15.34 (R) Minimum	19.07	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.	26.8 (D) 26.2 (R) Minimum	28.9	Yes
d)	Maximum transmission oil temperature, (°C)	Evaluative	The declared value should not exceed the maximum value specified by oil company.	110 (D)	88	Yes
* Applicant vide letter no. FD/BVH/ICT/ARJUN555DIL1/23-24/02 dated 02.05.2024 has requested to conduct the testing as per the consolidated 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 standard ballasted 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.	17.65 (D) 15.89 (R) Minimum	17.53	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.	13.23 (D) 7.70 (R) Minimum	13.30	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	105	No
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 standard ballast, (m):					
1)	Cold brake	Evaluative	10	10 (R)	6.78	Yes
2)	Hot brake	Evaluative	10	10 (R)	7.07	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

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)	Does not meet the requirement		No		
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.	Not fitted		Not applicable		
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. <table border="1" style="margin: 5px 0;"><tr><td style="width: 40px;">MM</td><td style="width: 40px;">YY</td></tr></table> Digit 01 – 12 in box No.1 for MM will represent the months and next two digits in box No.2 for YY will represent the year of Manufacturing.	MM	YY	Mahindra		Yes
MM	YY							
	2) Model	Evaluative		ARJUN 555 DI L1		Yes		
	3) Month & Year of manufacture	Evaluative		04 / 23		Yes		
	4) Engine number	Evaluative		NPM6C3E0001		Yes		
	5) Chassis number	Evaluative		MBNBEBBBAPNA2 8376		Yes		
	6) Maximum PTO power, (kW)	Evaluative		33.5		Yes		
	7) Specific fuel consumption, g/kWh	Evaluative	254.8		Yes			

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	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] : **Does not conform**
- 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 : **Does not conform**
 Symbols for agricultural tractors and machinery [IS: 6283(Part-1) - 2006 (Reaffirmed Year 2019) and IS: 6283 (Part-2) – 2007 (Reaffirmed Year 2019)]
- 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 PTO Performance Test:

Maximum equivalent crankshaft torque has been observed as 180.8 N-m against the declaration of 197.0 N-m which does not meet the non-evaluative requirement of IS: 12207-2022 in with regard to tolerance limit. **This should be looked into for necessary corrective action.**

6.4.2 Hydraulic Performance Test:

During maintenance of lift load test, cumulative drop in the height of lower links was measured as 105 mm against the maximum permissible limit of 50 mm which does not meet the non evaluative requirement of IS: 12207-2022. **This should be looked into for necessary correction.**

6.4.3 Three-point linkage:

The following parameters does not meet the requirements of IS: 17231-2019 and needs to be looked into for necessary corrective actions:

- i) The dimensions viz. diameter of hitch pin hole & width of ball of upper hitch points, diameter of hitch pin hole & width of ball of lower hitch points and lateral distance from lower hitch point to centre line of tractor does not meet the requirements of IS:4468 (Part-I) – 1997.This should be looked into for corrective action.
- ii) The distance from end of power take-off to centre of lower hitch point has been measured as 470 mm against the requirement of 500 to 575 mm.

6.4.4 Operator's seat:

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

- i) Provision for adjustment of driver's mass has been specified as 50 to 120 kg against the requirement of 40 to 100 kg.
- ii) Longitudinal distance from SIP to centre of differential lock pedal has been measured as 240 mm against the requirement of 410 to 720 mm.
- iii) Vertical distance from SIP to centre of clutch pedal & brake pedal has been measured as 495 mm against the requirement of 230 to 460 mm.
- iv) Vertical distance from SIP to centre of accelerator pedal & differential lock pedal has been measured as 535 mm & 505 mm respectively against the requirement of 230 to 460 mm.
- v) Longitudinal distance from SIP to centre of steering control wheel has been measured as 560 mm against the requirement of 425 to 525 mm.
- vi) Vertical distance from SIP to centre of steering control wheel has been measures as 135 mm against the requirement of 265 to 385 mm.
- vii) Vertical distance from SIP to foot rest has been measured as 635 mm against the requirement of 450 to 520 mm.

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

6.4.5 Operator's work place:

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

- i) Vertical retainness on inner side of clutch and brake pedals was not provided
- ii) Spark arresting device has not been provided in the exhaust system

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

6.4.6 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 Specification of Tractor

Discrepancies in the specification between the Specification sheet and Operator's manual are as under:

S. No.	Description	As per Specification Sheet	As per Operator's manual
i.	Transmission oil change period	First change after 1300 hours and subsequently after every 1400 hours of operation.	First change after 1300 hours and subsequently after every 1200 hours of operation. (P. No. 16-5)
ii.	Transmission oil filter change period	First change after 50 hours, second at 600 hours & then after every 700 hours of operation.	First change after 100 hours & then after every 400 hours of operation.
iii.	Steering oil change period	First change after 1200 hrs	Not specified

All of the above should be looked into for necessary corrective action.

6.7 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) Identification of hand controls by colour has not been provided as per the requirement as laid down in Table – 5 of IS: 8133-2021.
- iii) Color code on illuminated display has not been provided as per the requirement as laid down in IS: 6283 (Part 2): 2007.
- iv) The distance of engine stop control has been measured as 140 mm from engine start control, which should be within 150 mm as per the requirement of IS: 8133-2021.

Above parameters should be looked into for necessary corrective action.

6.8 Adequacy of Literature supplied with machine:**6.8.1** The following literatures were supplied with the test tractor for reference during the test: -




- a) Operator Manual for "Mahindra, Arjun 555 DI L1" tractor model.
- b) Parts catalogue for "Mahindra, Arjun 555 DI L1" tractor model.
- c) Service manual for "Mahindra, Arjun 555 DI L1" tractor model.

6.8.2 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) Recommended 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	
V. S. SHINDE SENIOR AGRICULTURAL ENGINEER	
Dr. P. P. RAO DIRECTOR	

Draft Test Report compiled by **Poonam Khurasia**, Senior Technical Assistant.

7. APPLICANT'S COMMENTS

Para No.	Our reference	Comments
7.1	6.6 (i), (ii) & (iii)	Observations will be studied to take necessary corrective action may be initiated.

ANNEXURE-ITRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	Applicant has declared that it has already conducted on their work place
2.	PTO performance test	12.9
3.	Power lift and hydraulic pump performance test	5.2
4.	Drawbar performance test	3.9
5.	Brake performance test	2.3
6.	Nominal speed test	0.6
B.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test.	0.6
TOTAL:		25.5