

Application Reference No. 28/2022-23/120

(यह परीक्षण रिपोर्ट 30/09/2028 तक वैध है / THIS TEST REPORT IS VALID UPTO 30/09/2028)



Make of Agricultural Tractor : Mahindra
Model : NOVO 655 DI PP V1
Manufactured by : Mahindra & Mahindra Limited,
(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)

T-1776/2307/2023	MAHINDRA, NOVO 655 DI PP V1 - 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: September	Test Report No.: T-1776/2307/2023	Year: 2023
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There is apparently a “**Multi Drive Mode Switch (MDM)**” in the tractor. The applicant has christened the different modes as “Diesel Saver, Normal and Power Mode”. However, institute was requested to conduct the test only on so called Power mode. Therefore, this report contains the observation on the so called “**Power Mode**” only.

[C]	Tractor manufacturer’s name and address	:	M/s. Mahindra & Mahindra Limited (Farm Equipment Sector) Mahindra Research Valley, Mahindra World City, Plot no. 41/1, Anjur P.O., District Chengalpattu – 603004.
[D]	Location of tractor assembly	:	Mahindra & Mahindra Limited (Farm Equipment Sector) (i) Akurli Road, Kandivli (E), MUMBAI – 400 101 (ii) MIDC Hingna Road, Nagpur– 440 028 (iii) Khatima Panipat Highway, Rudrapur, Udhamsingh Nagar – 263 153. (iv) Jaipur Ajmer Road, Jaipur– 303 007 (v) Near Bidar “T” Junction, Mahindra Nagar, Zaheerabad- 502 220 (vi) Mahindra Research Valley, Mahindra World City, Plot no. 41/1, Anjur P.O., District Chengalpattu – 603 004
[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	:	32
[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 (trade name)	:	NOVO 655 DI PP V1
[C]	Type	:	Two Wheel Driven, Standard Agricultural Tractor.
[C]	Month & year of manufacture	:	02/23
[D]	Country of origin	:	India

1.1.2 Numbers:

[D]	1 st Serial No. of prototype	:	MBNWHBF9VPNL00001
[C]	Serial No.	:	MBNWHBF9VPNL00001

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: 12207-2019	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.	44.0 (D)	43.7	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	44.0 (D)	43.7	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% max.	264 (D)	277	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non-Evaluative	$\pm 8\%$	277 (D)	265.6	Yes
e)	Back-up torque, percent	Evaluative	12 percent	25 (D) 12 (R)	33.7	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 high ambient condition should not exceed the declaration.	135 (D)	134	Yes
	2) Coolant	Evaluative	The declared value should not exceed the boiling temperature of coolant under the pressurized or otherwise and the observed value under high ambient condition should not exceed the declaration.	110(D)	106	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. Power under High ambient conditions.	2.77 Maximum (R)	0.296	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 Maximum (R)	0.07	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.	Ballast not recommended		Not applicable
b)	Max. drawbar pull 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.	21.1 (D) 21.2 (R) Minimum	23.5	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.	35.2 (D) 35.0 (R) Minimum	38.2	Yes
d)	Maximum transmission oil temperature, (°C)	Evaluative	The declared value should not exceed the maximum value specified by oil company	120 (D)	89	Yes
6.1.3	Power lift and hydraulic pump performance:					
a)	Maximum lifting capacity throughout the range of lift, (kN):					
	1) At hitch points	Evaluative	Tolerance of ± 10%	26.5 (D)	26.38	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.	19.1 (D) 10.3(R) Minimum	19.08	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	NIL	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)	7.67	Yes
	2) Hot brake	Evaluative	10	10 (R)	7.97	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (R) Maximum	157	Yes

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1	2	3	4	5	6	7
c)	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.					
6.1.6	Safety features:					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulleys, silencer, hydraulic pipes [As per IS 12239 (Part2)]	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	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: 4468 (Part-I) (As amended from time to time)	Does not meet the requirement	No	
f)	Specifications of linkage drawbar	Evaluative	Should meet the requirements of IS: 12953 (As amended from time to time)	Meets the requirement	Yes	
g)	Swinging drawbar (wherever fitted)	Evaluative	Should meet the requirement of IS: 12362 (Part 3) (As amended from time to time)	Not provided	Not applicable	
h)	1)	Maximum travelling speed at rated engine speed in reverse gears, Km/h	Evaluative	Should not exceed 20 Km/h	Provided(The audible warning signal on tractor is activated when the speed in reverse gear reaches to 20 km/h)	Yes
	2)	Audible warning signal on tractor	Evaluative	As soon as the travelling speed in reverse gear reaches to 20 km/h, an audible warning signal on tractor shall be activated. The safety aspects about the operation of shuttle technology shall be brought in operation and manufacturer /dealer shall ensure the training on this aspect to operator before the delivery of tractor.	Fitted	Yes

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6.1.7	Labelling of tractors (Provision of labelling plate):							
	1)	Make	Evaluative	Should conform to the requirements of CMVR along with maximum PTO Power in kW and year of manufacture in numerical form. <table border="1" style="margin-left: 20px;"><tr><td>MM</td><td>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		NOVO 655 DI PP V1	Yes		
	3)	Month & Year of manufacture	Evaluative		02/23	Yes		
	4)	Engine number	Evaluative		NPL5SEE0021	Yes		
	5)	Chassis number	Evaluative		MBNWHBF9VPN L00001	Yes		
	6)	Maximum PTO power, (kW)	Evaluative		44(59.0)	Yes		
7)	Specific fuel consumption, (g/kWh)	Evaluative	264(197)		Yes			
6.1.8 Literature (Submission to test agency):								
(a)	Operator manual	Evaluative	Provided /Not Provided	Provided	Provided	Yes		
(b)	Parts Catalogue	Evaluative	Provided /Not Provided	Provided	Provided	Yes		
(c)	Workshop/ Service manual	Evaluative	Provided /Not Provided	Provided	Provided	Yes		
6.1.9	Fitment of Roll Over Protective Structures (ROPS):							
		For tractor having more than 1150 mm rear track width	Evaluative	ROPS should meet the requirement of IS:11821 or OECD code or equivalent International Standard	ROPS fitted [Meets the requirement of IS:11821(Part-2) as per clause 1.13 of this test report	Yes		
	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:12207-2019):								
S. No.	Category of break-downs	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	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 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			

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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 1 Categories 1, 2, 3 & 4 (fourth revision) [IS:4468(Part-I) – 1997 (Reaffirmed in 2022)] | : | 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 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 |

6.4 Salient Observations:

6.4.1 Laboratory tests:

6.4.1.1 PTO performance test:

Applicant vide letter no. FD/BVH/ICT/NOVO655DIPPV1/23-24/05 dated 11.08.2023 has recommended that tractor operating range is from 1000 rpm to rated engine rpm under full load condition. Hence during PTO performance test, varying speed test was conducted upto 1000 rpm of engine only under natural and high ambient condition.

6.4.1.2 Drawbar performance test:

- (i) Applicant vide letter no. FD/BVH/ICT/NOVO655DIV1/23-24/08 dated 21.08.2023 has requested not to conduct the ballasted drawbar performance test & ten-hour drawbar test which is allowed as per the additional guideline for testing of tractors as per new regime of testing of tractors vide an 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.
- (ii) The applicant also requested to restrict the drawbar performance test to 1000 engine rpm as per minimum operating range of tractor under full load condition. Hence, drawbar performance test was conducted upto 1000 rpm of engine only.

6.4.1.3 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 130 kg against the requirement of 40 to 100 kg.

- ii) Position of silencer outlet (upward) with respect to SIP has been measured as 710 mm against the minimum requirement of 800 mm.

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

6.4.1.4 Operator's work place:

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

- i) Vertical retainers on inner side of clutch pedal are 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.

6.4.1.5 Three-point linkage:

The dimensions viz. diameter of hitch pin hole & width of ball of upper & lower points and Lateral distance from lower hitch point to centre line of tractor do not meet the requirements of IS: 4468 (Part-I) – 1997. This should be looked into for necessary corrective action.

6.4.1.6 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 Recommendation with regard to safety on tractor:

- i) Identification of Fuel shut off by symbol has not been provided as per the requirement of IS: 6283(Part-1)-2006 (Reaffirmed January,2019).
- ii) Identification of Engine revolution gauge by colour code has not been provided as per the requirement of IS: 6283(Part-2)-2007 (Reaffirmed January,2019).
- ii) Identification of hand controls by colour coding has not been provided as per the requirement as laid down in Table – 5 of IS: 8133-2021.
- iv) 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.
- v) The working clearance between draft control lever and RHS mudguard has been measured as 30 mm, against the minimum requirement of 70 mm as per the requirement of IS: 12239 (Part II) - 2019.

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 Manual for "Mahindra NOVO 655 DI PP V1" tractor models.
- b) Parts catalogue for "Mahindra NOVO 655 DI PP V1" tractor model.
- c) Service manual for "Mahindra NOVO 655 DI PP V1" tractor 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) Recommended safe hitch height for trailer

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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	
C. V. CHIMOTE TEST ENGINEER	
A.K. UPADHYAY DIRECTOR(I/C)	

Draft test report compiled by B.N. Dixit, Agricultural Engineer.

7. APPLICANT'S COMMENTS

Para no.	Our reference	Applicants comments
7.1	6.7.2	Parameters in Product literature will be studied & 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	12.57
3.	Power lift and hydraulic pump performance test	4.75
4.	Drawbar performance test	5.30
5.	Brake performance test	2.25
6.	Nominal speed test	3.37
B.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	0.45
	TOTAL:	28.69