

व्यावसायिक - वैरिएंट- (प्रथम बैच)

संख्या / No. : T- 1636/2167/2022

COMMERCIAL -VARIANT (First Batch Test)

माह / Month : April, 2022

[ONLINE TESTING]

(यह परीक्षण रिपोर्ट 30/04/2027 तक वैध है | / THIS TEST REPORT IS VALID UPTO: 30/04/2027)



MAHINDRA, 585 DI POWER + TRACTOR



भारत सरकार

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

GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS WELFARE
(DEPARTMENT OF AGRICULTURE, CO-OPERATION AND FARMERS WELFARE)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान
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(An ISO 9001: 2015 Certified Institute)

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T-1636/2167/2022	MAHINDRA, 585 DI POWER + TRACTOR – Commercial Variant (1st Batch)
	THIS TEST REPORT IS VALID UPTO: 30/04/2027

2. FUEL AND LUBRICANTS

2.1 Fuel : The High-speed diesel oil supplied by M/s Indian Oil Corporation Limited having density of 0.826 g/cc at 15°C was used.

2.2 Lubricants:

S. No.	Particulars	As recommended by the manufacturer	As used during the test
1.	Engine & air cleaner oil	SAE 15W40	As recommended
2.	Gear box, differential, rear axle, final drive, hydraulic brake & steering system oil	Servo MTRAC 30	Oil originally filled in the tractor was not changed
3.	Grease	MP3 Lithium base	MP grease

3. SPECIFICATIONS

3.1 Tractor:

Make : Mahindra
 Model : 585 DI POWER +
 Type : Rear Wheel Drive, Standard Agricultural Tractor
 Month & Year of manufacture : 11/21
 Chassis number : MBNAAANUBMNH02549
 Country of origin : India

3.2 Engine:

Manufacturer's Address : M/s. Mahindra & Mahindra Limited (Farm Equipment Sector), Akurli Road, Kandivli (E), Mumbai – 400 101
 Make : Mahindra
 Model : MDI3050ENA3A
 Type : Four stroke, liquid cooled, naturally aspirated, direct injection, diesel engine.
 Serial number : NMG6CBJ0026
 Year of manufacture : 2021
 Country of origin : India

3.2.1 Engine speed (rpm), (Manufacturer's recommended production settings):

- Maximum speed at no load : 2225 to 2425
 - Low idle speed : 750 to 850
 - Speed at maximum torque : 1200 to 1500

Rated speed, (rpm):

- For PTO use : 2100
 - For drawbar use : 2100

3.3 Cylinder & Cylinder Head:

Number : Four
 Disposition : Vertical, Inline
 Bore/stroke, (mm) : 88.9/120 (apa)
 Capacity as specified by the applicant, (cc) : 2979
 Compression ratio : 20.0 (± 1): 1
 Type of cylinder head : Monoblock
 Type of cylinder liners : Wet, replaceable
 Type of combustion chamber : Direct injection, Re-entrant bowl cavity on piston crown
 Arrangement of valves : Overhead, inline

Valve clearance (cold/hot):

- Inlet valve, (mm) : 0.4 / 0.3
 - Exhaust valve, (mm) : 0.5 / 0.4

T-1636/2167/2022	MAHINDRA, 585 DI POWER + TRACTOR – Commercial Variant (1st Batch)
	THIS TEST REPORT IS VALID UPTO: 30/04/2027

9. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

9.1 On the basis of tests conducted the performance results have been summarized as evaluative (mandatory) and non-evaluative (not-mandatory) parameter applicable for qualifying Minimum Performance Criteria as per Clause-4 (Table-1) of **IS: 12207-2019** for acceptance of the tractor for the purpose of subsidies/NABARD financing are summarized as under:-

S. 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
9.1.1	PTO Performance :					
a)	Max. power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: $\pm 5\%$ for PTO power or engine power >26 kW, $\pm 10\%$ for PTO power or Engine power ≤ 26 kW.	33.5 (D)	33.1	Yes
b)	Power at rated engine speed, (kW)	Non-Evaluative	-do-	33.5 (D)	33.1	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% Max.	255 (D)	252	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non-Evaluative	$\pm 8\%$	197 (D)	181.3	Yes
e)	Back-up torque, percent	Evaluative	12 percent, min.	12 (R)	20.5	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)	113	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)	94	Yes
g)	Smoke level, (m-1)	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hat ridge value (As per CMVR)	3.25 (R)	0.37	Yes

T-1636/2167/2022	MAHINDRA, 585 DI POWER + TRACTOR – Commercial Variant (1st Batch)					
	THIS TEST REPORT IS VALID UPTO: 30/04/2027					

1	2	3	4	5	6	7	
9.1.2	Brake performance at 25 kmph:						
a)	1)	Cold brake	Evaluative	10	10 (R)	6.72	Yes
	2)	Hot brake	Evaluative	10	10 (R)	6.87	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	203 to 234	Yes
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
9.1.3	Safety features :						
a)	Guards against moving and hot parts		Evaluative	Belt drives, pulleys, silencer, hydraulics 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		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)	Specifications of Swinging drawbar (wherever fitted)		Evaluative	Should meet the requirements 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, kmph	Evaluative	Should not exceed 20 kmph	Meets the requirement		Yes
	2)	Audible warning signal on tractor.	Evaluative	As soon as the travelling speed in reverse gear reaches to 20 kmph, an audible warning signal on tractor shall be activated.	Not fitted		Not applicable

T-1636/2167/2022	MAHINDRA, 585 DI POWER + TRACTOR – Commercial Variant (1st Batch)
	THIS TEST REPORT IS VALID UPTO: 30/04/2027

1	2	3	4	5	6	7
9.1.4	Labelling of tractors (Provision of labelling plate):					
1)	Make	Evaluative	Should conform to the requirements of CMVR along with maximum declared value of PTO power in kW and for month & year of manufacture in numerical MM YY Digit 01-12 in box No.1 for MM will represent the month and next two digit in the box No.2 for YY will represent the year of manufacturing	Mahindra	Yes	
2)	Model	Evaluative		585 DI Power +	Yes	
3)	Month & Year of manufacture	Evaluative		11/21	Yes	
4)	Engine number	Evaluative		NMG6CBJ0026	Yes	
5)	Chassis number	Evaluative		MBNAAANUBMNH02549	Yes	
6)	Declaration of PTO power, kW	Evaluative		33.5	Yes	
9.1.5	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	Provided	Yes
(b)	Parts Catalogue	Evaluative		Provided	Provided	Yes
(c)	Workshop/ Service manual	Evaluative		Provided	Provided	Yes
9.1.6	Fitment of Roll Over Protective Structure (ROPS): for tractors having more than 1150 mm rear track width	Evaluative	ROPS should meet the requirement of IS:11821 or OECD code or equivalent International Standard	Not Provided	Not Fitted	Not applicable
9.1.7	Standard accessories	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with tractor	Provided	Provided	Yes
9.1.8	Accessories (Optional)	Non Evaluative	Ballast weights if fitted should meet the requirement of CMVR.	Not Provided	Not Provided	Not applicable

9.2 CATEGORY OF BREAKDOWNS / DEFECTS (As per clause 5.0 of IS:12207- 2019) :					
S. No.	Category of Breakdown	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	As observed	Whether meets the requirement (Yes/No)
1.	Critical breakdown	Evaluative	There is no 'critical breakdown' during the course of testing	None	Yes
2.	Major breakdowns	Evaluative	There are not more than 1 major breakdowns and neither of them is of repetitive nature	None	Yes
3.	Minor breakdowns	Evaluative	There are not more than 3 minor defects during the test and the frequency of each is not be more than two	None	Yes
4.	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed four that is, (1 major + 3 minor) or 4 minor breakdowns	None	Yes

T-1636/2167/2022	MAHINDRA, 585 DI POWER + TRACTOR – Commercial Variant (1st Batch)
	THIS TEST REPORT IS VALID UPTO: 30/04/2027

9.3 Salient Observations:

9.3.1 Laboratory tests:

9.3.1.1 Three Point Linkage:

The following parameters does not meet the requirement of IS: 4468- 1997 (Part-I) (Reaffirmed in October, 2017).

- i) The dimension of width of ball of lower hitch point
- ii) Lateral distance from lower hitch point to centre line of tractor
- iii) Some of the parameters conform to Cat. I and some of them conform to Cat. II. Keeping in view the spirit of standardization, necessary improvements may be incorporated.

These observations were also made in the previous test report No. T-1191/1718/2018 (November, 2018) and no improvement have been made as regards to its conformity so far. This should be looked into for necessary corrective action at production level.

9.3.1.2 Specifications of Power Take-off Shaft:

In addition to clockwise rotation of PTO shaft, anticlockwise rotation has also been provided in contrast of “clockwise rotation” recommended in Clause No.4 of IS: 4931-1995. The provision of anticlockwise rotation has the potential of rendering the tractor not conforming to IS: 4931- 1995. In this case, it may lead to non-inclusion of tractor in the subsidy list. This should be looked into for necessary corrective action.

In response thereto, the applicant vide letter No. FD/BVH/BT/585PP/21-22/07 dated 08.04.2022 has submitted that “to meet the IS:4931 requirement, we have decided to eliminate the anticlockwise PTO option by removing “Gear Idler Driven RCRPTO (Part No. 006500829C2)” and thereby there would be only one direction of rotation i.e. clockwise, and which conforms to IS: 4931-1995 was allowed. Thus tractor now became IS:4931-1995 conformant.

9.3.1.3 Operator’s Manual:

- i) The model of tractor has been specified as “585 DI Power +” vide specification sheet. Whereas, the same has been specified as “585 PP” & “585 DI PP” vide P. No. 3-1 & 3-5 of Operator’s manual.
- ii) The maximum PTO power has been specified as “33.5 kW” vide specification sheet and 33.5 kW (45 hp) vide labeling plate of tractor. Whereas, the same has been specified as “44.39 hp” vide P. No. 3-1 of Operator’s manual.
- iii) The specific fuel consumption corresponding to maximum PTO power has been specified as “255 g/kWh” vide specification sheet and 225 g/kWh (190 g/hph) vide labeling plate of tractor. Whereas, the same has been specified as “187.55 g/hph” vide P. No. 3-1 of Operator’s manual.
- iv) The oil change period of air cleaner has been specified as “after every 50 hours or earlier if required in arduous condition” vide specification sheet. Whereas, the same has been specified as “at every 250 hours or earlier” vide P. No. 21-1 of Operator’s manual.

9.3.1.4 Maintenance / Service Problems:

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

9.3.1.5 Recommendation with regard to safety on tractor:

The following requirements, inter alia, may be considered for incorporation on the tractor:

- i) Longitudinal distance from seat index point to centre of steering control wheel has been measured as 580 mm against the requirement of 425 to 525 mm as per IS: 12343-1998 (Re-affirmed in January, 2019).

T-1636/2167/2022	MAHINDRA, 585 DI POWER + TRACTOR – Commercial Variant (1st Batch)
	THIS TEST REPORT IS VALID UPTO: 30/04/2027

- ii) Vertical distance from SIP to center line of centre of steering control wheel has been measured as 135 mm against the requirement of 175 to 385 mm as per IS: 12343-1998 (Re-affirmed in January, 2019).
- iii) Longitudinal distance from seat index point to differential lock pedal wheel has been measured as 250 mm against the requirement of 355 to 770 mm as per IS: 12343-1998 (Re-affirmed in January, 2019).
- iv) Fuel shut-off knob does not remain in "STOP" position as per requirement of IS: 8133-1983 (Re-affirmed in 2019).
- v) Width of foot step was measured as 155 mm against the minimum requirement of 200 mm as per IS: 12239 (Part-1)-2018.
- vi) Provision for spark arrester in exhaust system should be provided as per IS-12239 (Part-I) 2018.
- vii) Working clearance between the draft control lever and fender was measured as 15 mm against the minimum requirement 70 mm as per IS: 12239 (Part-2)-1999 (Re-affirmed in January, 2019).
- viii) Master shield of PTO shaft should be provided as per the requirement of IS: 4931-1995 (Re-affirmed in January, 2019).
- ix) Vertical retainers at both sides of clutch pedal should be provided as per IS: 12239 (Part-1) – 2018.
- x) Colour code of engine revolution gauge & water temperature gauge should be provided as per IS: 6283 (Part-1) – 2006 (Re-affirmed in January, 2019) & IS: 6283 (Part-2) – 2007 (Re-affirmed in January, 2019).

The recommendations at S. No. (i), (iii), (v), (vi), (vii) & (ix) were also made in the previous Test Report No. T-1191/1718/2018 (November, 2018), but no improvements have been made in this regard so far.

9.4 Adequacy of Literature:

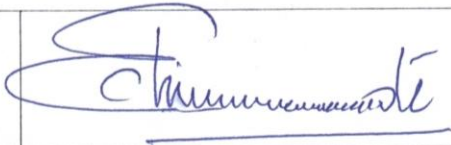
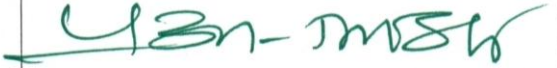
9.4.1 The following literatures of "Mahindra, 585 DI Power+" were supplied with the test tractor for reference during the test:-

- a) Operator's Manual for DI tractors.
- b) Part's Catalogue
- c) Service Manual

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) Coolant water ratio
- ii) Safe hitch height for 4 wheel trailer.

TESTING AUTHORITY:

C.V. CHIMOTE TEST ENGINEER	
P.K. PANDEY DIRECTOR	

Draft test report is compiled by: **Poonam Khurasia**, Senior Technical Assistant

T-1636/2167/2022	MAHINDRA, 585 DI POWER + TRACTOR – Commercial Variant (1st Batch)
	THIS TEST REPORT IS VALID UPTO: 30/04/2027

10. APPLICANT'S COMMENTS

Para No.	Our reference	Applicant's comments
10.1	3.14 & 9.3.1.2	The applicant vide letter No. FD/BVH/BT/585PP/21-22/07 dated 08.04.2022 has submitted that "to meet the IS:4931 requirement, we have decided to eliminate the anticlockwise PTO option by removing "Gear Idler Driven RCRPTO (Part No. 006500829C2)" which was allowed.
10.2	9.3.1.3	Observations will be studied and necessary corrective actions for improvement in the manuals will be ensured.
10.3	9.3.1.5 [(i) to (x)]	Parameters will be studied and necessary action will be initiated.
10.4	9.4.1 [(i) & (ii)]	Necessary suggestions will be studied and incorporated in manuals accordingly.

ANNEXURE – I

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS	HOURS
1.	Running-in	45.00
2.	PTO performance test	12.1
3.	Brake Test	0.75
4.	Nominal speed test	0.75
B.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	0.78
TOTAL:		59.38