



**MAHINDRA, 295 DI SUPER TURBO TRACTOR**



**भारत सरकार**

**GOVERNMENT OF INDIA**

कृषि मंत्रालय (कृषि एवं सहकारिता विभाग, मशीनीकरण एवं प्रोद्योगिकी प्रभाग)

Ministry of Agriculture (Deptt. of Agri. & Co-op, Mechanization & Technology Division)

**केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान**

**CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE**

**(An ISO : 9001-2008 Certified Institute)**

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T-914/1430/2014

**MAHINDRA 295 DI SUPER TURBO TRACTOR –  
Commercial (Batch) Test**

- Manufacturer : M/s. Mahindra & Mahindra Limited  
(Farm Equipment Sector), Akurli Road,  
Kandivli (E), MUMBAI – 400 101
- Location of other manufacturing plants (apa) :
- : M/s. Mahindra & Mahindra Limited  
(Farm Equipment Sector)  
Hingna Road, Hingna MIDC  
**NAGPUR - 440016. (Maharashtra)**
  - : M/s. Mahindra & Mahindra Limited  
(Farm Equipment Sector)  
Agri Business Development Centre, Khatima  
Panipat Highway, Udham Singh Nagar,  
Vil. Lalpur, Tehsil-Kichha,  
**RUDRAPUR-263153, (Uttanchal)**
  - : M/s. Mahindra & Mahindra Limited  
(Farm Equipment Sector)  
Agri Development Centre, Vil-Mehla  
Tehsil-Dudu Jaipur- Ajmer Road,  
**JAIPUR-303007, (Rajasthan)**
  - M/s. Mahindra & Mahindra Limited**  
(Farm Equipment Sector)  
Near Bidar 'T' Junction,  
Mahindra Nagar, **Zaheerabad,**  
**Medak district- (A.P.)- 502 220**
  - : **M/s Mahindra & Mahindra Limited**  
(Farm Equipment Sector), Akurli Road,  
Kandivli (E), MUMBAI – 400 101
- Test requested by (applicant) :
- : The testing authority
  - : At C.F.M.T.T&I, Budni
  - : 15
  - : 30
  - : The test sample was selected randomly out of  
six tractors from the production line by the  
representative of testing authority.
- Selected for test by
- Place of running-in
- Duration of said running-in (h):**
- Engine
  - Transmission
- Method of Selection**

**1.1 Tractor:**  
Make  
Model  
Variants, if any(as declared)

**1. SPECIFICATION**

- : Mahindra
- : 295 DI Super Turbo

S.No.	Variant model*	Brand Name	Variant features
1	295 DI SUPER TURBO DLX (T-660/1166/2009), April 2009	SARPANCH MKM	Full Constant Mesh Gear Box, Side Shift Bull Horn Gear Lever , OIB & Hyd Oil In Common With Gear Box
2	395 DI SUPER TURBO (T-844/1399/2013) Aug-2013	BHOOMIPUTR A MKM	Combination Of Sliding Mesh & Constant Mesh, Centre Shift Gear Lever, OIB & Hyd Oil In Common With Gear Box, larger Tyre



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vii) The amplitude of mechanical vibration on various assemblies marked as (\*) in Chapter-8 of test report No T-632/1138/2008 were on higher side. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

The amplitude of mechanical vibration on various assemblies marked as (\*) in Chapter-8 of this test report are on higher side. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

**13.4 Adequacy of literature:**

i) The following literature was supplied with the tractor for reference during the test.

- i) Operator's Manual
- ii) Service Manual
- iii) Supplementary Parts Catalogue for 295 DI Super Turbo

The following literature was supplied with the tractor for reference during the test.

- i) Operator's Manual
- ii) Service Manual
- iii) Parts Catalogue

These literatures may also be brought out in National & other regional languages for guidance of user's.

**14. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS**

14.1 Evaluative (mandatory) / Non-evaluation (Non-mandatory) parameters applicable for qualifying Minimum Performance criteria as per Clause-4 (Table-1) of IS: 12207-2008 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: 12207-2008	Values declared by the applicant (D)/ Requirement (R)	As observed	Whether meets the requirements (Yes/No.)
1	2	3	4	5	6	7
<b>14.1.1 PTO Performance :</b>						
a)	- Max. power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: -5 / +10% for PTO power >35hp. - 7.5/+10% for PTO power ≤ 35 hp.	26.1 (D)	25.0	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	26.1 (D)	25.0	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+ 5%	230(D)	246	No



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1	2	3	4	5	6	7
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	141.5(D)	141.2	Yes
e)	Back-up torque, percent	Non Evaluative	7 %, min.	7-12 (D)	12.42	Yes
<b>f) Maximum operating temperature (°C):</b>						
1)	Engine oil	Non 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.	125 (D)	118	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)	103	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions.	0.15% of FC	0.38	Yes
h)	Smoke level	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	0.20 per meter	0.22	Yes
<b>14.1.2 Drawbar performance :</b>						
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	16.79 (D) 17.53 (R) Minimum	19.0	Yes
b)	Max. drawbar pull with standard ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor with standard ballast	11.36 (D) 11.79 (R) Minimum	13.86	Yes
c)	Maximum drawbar power without ballast/ with standard ballast, (kW).	Evaluative	Min. 80% of PTO power as referred in 17.1.1(a) of PTO performance	21.0 (D) 20.0 (R) Minimum	21.7	Yes
d)	Max. transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	110 (D)	107	Yes



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1	2	3	4	5	6	7
<b>14.1.3</b>	<b>Power lift and hydraulic pump performance :</b>					
<b>a)</b>	Maximum lifting capacity throughout the range of lift, (kN):					
1)	At hitch points	Non Evaluative	[Tolerance of minus 10%]	10.1(D)	11.65	Yes
2)	With the standard frame	Evaluative	The lift capacity should at least be 18 kg/PTO hp. and it should be 16 kg/engine hp where the tractor is not provided with a PTO shaft	6.9(D) 5.91 (R) Minimum	8.56	Yes
<b>b)</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 minute, (mm)	Non Evaluative	[Tolerance of plus 5 mm]	250 (D) 50 (R) Maximum	90	Yes
<b>14.1.4</b>	<b>Brake performance at 25 kmph:</b>					
<b>a)</b>	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)	9.65	Yes
2)	Hot brake	Evaluative	10	10 (R)	9.65	Yes
<b>b)</b>	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s <sup>2</sup> (N)	Evaluative	600	600 (R)	204 to 263	Yes
<b>c)</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
<b>14.1.5</b>	<b>Noise measurement :</b>					
<b>a)</b>	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	88 (R)	83	Yes
<b>b)</b>	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	98 (R)	93	Yes
<b>14.1.6</b>	<b>Amplitude of mechanical vibrations at :</b>					
1)	Left foot rest	Non Evaluative	100 microns (max)	100 (R)	180	No
2)	Right foot rest			100 (R)	50	Yes
3)	Seat (with driver seated)			100 (R)	160	No
4)	Steering wheel			100 (R)	70	Yes
<b>14.1.7</b>	<b>Haulage requirements :</b>					
<b>a)</b>	Gross mass of the trailers, (tonnes):					
1)	Two wheel	Non Evaluative	--	5.0 (D)	5.0	Yes
2)	Four wheel	Evaluative	--	6.0 (D)	6.0	Yes
<b>b)</b>	Distance travelled / liter of fuel consumption, (km/l):					
1)	Two wheel	Non Evaluative	--	4 to 5 (D)	6.18 to 6.24	No
2)	Four wheel	Evaluative	--	4 to 5 (D)	5.47 to 5.51	No
<b>c)</b>	Fuel consumption (ml/km/tonne):					
1)	Two wheel	Non Evaluative	--	25 to 30 (D)	32.04 to 32.34	No



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1	2	3	4	5	6	7	
	2)	Four wheel	--	25 to 30 (D)	30.22 to 30.47	No	
<b>14.1.8</b>	<b>Wetland cultivation :</b>						
	Sealing for the following assemblies:		Evaluative	The identified assemblies should essentially meet the requirement of IS: 11082. No water ingress in the identified assembly given in column-2. If tractor does not meet the requirements of wetland cultivation, it may be recommended for dry land operation only.	There should be no ingress of water and/or mud (R)	No ingress of mud and / or water was observed	Yes
1)	Clutch assembly		-do-				
2)	Brake housings		-do-				
3)	Front axle hubs		-do-				
<b>14.1.9</b>	<b>Safety features :</b>						
<b>a)</b>	Guards against moving and hot parts	Evaluative	As per CMVR	At present no requirements	Provided	Yes	
<b>b)</b>	Lighting arrangement	Evaluative	As per CMVR	--	Provided	Yes	
<b>14.1.10</b>	<b>Labelling of tractors (Provision of labelling plate):</b>						
1)	Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	--	MAHINDRA	Yes	
2)	Model	Evaluative		--	295 DI SUPER TURBO	Yes	
3)	Year of manufacture	Evaluative		--	2013 BD	Yes	
4)	Engine number	Evaluative		--	NGJY 00007	Yes	
5)	Chassis number	Evaluative		--	NGJY 00007	Yes	
6)	Declaration of PTO power, (kW)(hp)	Evaluative		--	26.1 (35)	Yes	
<b>14.1.11</b>	<b>Discard limit for:</b>						
<b>(a)</b>	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	89.03	88.90 to 88.91	Yes	
<b>(b)</b>	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.20	0.127 to 0.138	Yes	
<b>(c)</b>	<b>Ring end gap (mm):</b>		Evaluative	To be specified by the manufacturer	2.5	0.35 to 0.45	Yes
-	Top comp. ring.	2.5			0.25 to 0.70	Yes	
-	2 <sup>nd</sup> comp. ring.	2.0			0.25 to 0.70	Yes	
-	Oil ring.						
<b>(d)</b>	<b>Ring groove clearance (mm):</b>		Evaluative	To be specified by the manufacturer	-TAPERED-		Yes
-	Top comp. ring.	0.30			0.078 to 0.079	Yes	
-	2 <sup>nd</sup> comp. ring.	0.20			0.056 to 0.057	Yes	
-	Oil ring.						
<b>(e)</b>	<b>Clearance of main bearings (mm):</b>		-do-		0.40	0.106 to 0.126	Yes
-	Diametrical clearance	Evaluative			0.60	0.20	Yes
-	Crankshaft end float	Evaluative					



(f)	Clearance of big end bearings, (mm):						
	-	Diametrical	Evaluative	-do-	0.40	0.083 to 0.097	Yes
(g)	-	Axial	Evaluative	-do-	0.30	0.25	Yes
		Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.30	0.102 to 0.120	Yes
(h)		Clearance between center pin and bush, (mm)	Non Evaluative	-do-	0.30	0.084 to 0.10	Yes

14.1.12 CATEGORY OF BREAKDOWNS / DEFECTS :

Sl. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2008	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 5 minor breakdowns.	None	Yes

14.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2008:

S. No.	Characteristic	Requirements as per IS: 12207-2008	AS observed	Remarks
1	2	3	4	5
1	Maximum air cleaner oil pull over (%).	NA	NA	--
2.	Seating requirements	Should meet the requirements of IS: 12343-1998	Does not meet the requirement	No
3.	Fitment of ROPS	With a provision for fitment of ROPS. If ROPS fitted it should meet the requirement of IS: 11821-1992	Not provided	--
4.	Technical requirements for PTO shaft	Should meet the requirements of IS: 4931 -1995	Meets the requirements	Yes
5.	Dimensions of three point linkage	Should meet the requirements of IS: 4468 (Part-I)-1997	Meets the requirements	Yes
6.	Specifications of linkage drawbar	Should meet the requirements of IS: 12953-1990.	Meets the requirements	Yes
	Specifications of swinging drawbar	Should meet the requirements of IS:12362 Part 3-1994.	Not provided	--
7.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Front tow hook not provided	--

14.3 Conformity with following IS:  
 i) Guide lines for declaration of power and specific fuel consumption and labeling of agricultural tractors (First revision) [IS 10273:1987 (Reaffirmed in March, 2009)] : Conforms



- ii) Agricultural tractors – Rear mounted power take-off - Types 1, 2 and 3(third revision)[IS: 4931-1995 (Reaffirmed in March, 2009)] : 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 March, 2009)/ISO 730-1:1994] : Conforms
- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in March, 2007)] : Conforms
- v) Agricultural tractors - Operator's seat technical requirement [IS 12343 -1998 (First revision) (Reaffirmed in March, 2009)] : Does not conform
- vi) Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision) : [IS 12239 (PT-1) 1996/ISO 4254-1:1989 (Reaffirmed in (Reaffirmed in March, 2007))] : Does not conform
- vii) Tractors and machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays [IS: 6283 (Part-1 & Part-2) -2006 & 2007 (Reaffirmed in March, 2009)]/ ISO 3767-2:1991] : Conforms
- viii) Tractors and machinery for agriculture and forestry – Technical means for ensuring safety Part 2: Tractors (first revision) (IS 12239 (PT-2) 1999) (Reaffirmed in March, 2009)] : Conforms
- ix) Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) (IS: 8133 – 1983) (Reaffirmed in March, 2009)] : Does not conform
- x) Agricultural Tractor & Machinery Lighting device for travel on public roads (IS: 14683-1999) (Reaffirmed in March, 2009)] : Conforms

14.4 Salient Observations:  
 14.4.1 Laboratory tests:  
 14.4.1.1 PTO Performance:  
 i) The percentage of backup torque was recorded as 6.0 & 12.42 % in case of previous & present sample respectively.  
 ii) The maximum power was recorded as 26.7 & 25.0 kW in case of previous & present sample respectively against the declaration of 26.1 kW, which is 6.37 % less in case of present test sample.  
 iii) The specific fuel consumption corresponding to maximum power in case of previous and present sample was measured as 232 & 246 g/kWh respectively against the declaration of 237.8 & 230 g/kWh. Improvements were not recorded in the specific fuel consumption in the present sample.  
 iv) The power drop under high ambient condition in compare to the natural ambient condition was recorded as 9.2 %.  
 14.4.1.2 Drawbar Performance:  
 i) The maximum drawbar power with un-ballasted tractor was recorded as 22.4 kW & 21.7 kW in case of previously tested and present test sample against the minimum requirement of 20.9 & 20.0 kW respectively.



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- ii) The maximum drawbar pull corresponding to 15% wheel slip with un-ballasted tractor was recorded as **13.56 & 13.86 kN** in case of previously tested and present test sample against the minimum requirement of **11.36 & 11.79 kN** respectively.
- iii) During 10 hr drawbar performance the tyre creeping over rim of RHS tyre were observed as 32 mm in present test sample respectively, it is on higher side and should be looked into.

**14.4.1.3 Hydraulic performance:**

- i) The maximum lifting capacity at hitch points and at the standard frame was observed as **11.65 kN and 8.56 kN** against the declared value of 10.1 KN and 6.9 kN respectively.

**14.4.1.4 Mechanical Vibration:**

The amplitude of mechanical vibration on various assemblies marked as (\*) in Chapter-8 of this test report are on higher side especially at accelerator lever & brake pedals. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

**14.4.1.5 Three point linkage:**

Some of the parameters of the three point linkage conform to Cat.-I and some of them conform to Cat.-II. Keeping in view of the spirit of standardization, the necessary improvements may be incorporated.

**14.4.1.6 Operator's Seat:**

Longitudinal distance from seat index point to the center of steering control wheel does not meet the requirements of IS: 12343:1998 and calls for necessary corrective action.

**14.4.2 Field performance:**

The major breakdowns were not observed in the field test during Commercial Test (BT) of the tractor model "MAHINDRA 295 DI SUPER TURBO" (base MAHINDRA 295 DI SUPER TURBO) tested vide test report No. T-632/1138 (July, 2008). So, as per the provision laid down in clause 7.2 of IS: 12207- 2008, the field test on this tractor model was not conducted during the batch testing.

**14.5 Maintenance / Service Problems:**

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

**14.6 Recommendation with regard to safety on tractor:**

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

- i) Provision for spark arresting device in exhaust system.
- ii) Provision of vertical retainers at both sides of clutch pedal.
- iii) Width of foot step.

**14.7 Adequacy of Literature supplied with machine:**

**14.7.1** The following literature was supplied with the tractor for reference during the test.

- a) Operator's Manual
- b) Service Manual
- c) Parts Catalogue

**14.7.2** These literatures may also be brought out in National & other regional languages for guidance of user's.



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**15.0 Citizen charter**

Duration of Test	Test duration under citizen charter	Whether the report released within time frame given in the citizen charter	Remark
7 Months Jun 2013 to Dec 2013	10 Months	Yes	--

**TESTING AUTHORITY:**

  
**H.L. YADAV**  
SENIOR AGRICULTURAL ENGINEER

  
**C.R. LOHI**  
DIRECTOR

Test Report compiled by: **Shri. P RISHI PRAKASH**, Assistant Agricultural Engineer.

**16. Applicant's Comments**

Para No.	Our Reference	Applicant's comments
16.1	14.4.1.4, 14.4.1.5, 14.4.1.6, 14.6 (i, ii, iii)	Observations will be studied and necessary action will be incorporated.

**ANNEXURE-I**

**TRACTOR RUN HOURS DURING TEST**

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	45
2.	PTO performance test	13.49
3.	Power lift and hydraulic pump performance test	1.42
4.	Drawbar performance test	14.41
5.	Turning ability	0.2
6.	Brake test	2.7
7.	Noise measurement	1.5
8.	Mechanical vibration test	0.5
9.	Theoretical speed test	0.38
C.	<b>HAULAGE TEST:</b>	
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	10.9
	<b>TOTAL:</b>	5.96
		<b>96.46</b>