



**MAHINDRA, 255 DI POWER + TRACTOR
(Brand Name : Bhoomiputra)**



भारत सरकार

GOVERNMENT OF INDIA

कृषि मंत्रालय (कृषि एवं सहकारिता विभाग, मशीनीकरण एवं प्रौद्योगिकी 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)

ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५ TRACTOR NAGAR, BUDNI (M.P.) 466445

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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), Farm Division Near Bidar 'T' Junction, Mahindra Nagar, Zaheerabad, Medak district- (A.P.)- 502 220
Test requested by (applicant)	: M/s Mahindra & Mahindra Limited (Farm Equipment Sector), Akurli Road, Kandivli (E), MUMBAI – 400 101
Selected for test by	: Applicant
Place of running-in	: At applicant's works
Duration of said running-in (h):	
- Engine	: 15
- Transmission	: 30
Method of Selection	: The tractor was submitted directly by the applicant for test. Hence method of selection is not known.

1. SPECIFICATION

1.1 Tractor:	
Make	: Mahindra
Model	: 255 DI Power +
Brand name	: Bhoomiputra
Type	: Four wheel, Rear-wheel drive, General Purpose, Agricultural Tractor
Year of manufacture	: 2012
Chassis number	: BLMC3238
Country of Origin	: INDIA

17. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

17.1 Evaluative (mandatory) / Non-evaluation (Non-mandatory) parameters applicable for qualifying Minimum Performance criteria as per Clause-4 (Table-1) of IS: 12207-2014 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- 2014	Values declared by the applicant (D)/ Require- ment (R)	As observe d	Whether meets the require- ments (Yes/No.)
1	2	3	4	5	6	7
17.1.1	PTO Performance :					
a)	- Max. power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: -5 / +10% for PTO power >26 kW. -7.5/+10% for PTO power ≤ 26 kW or -5 / +10% for Engine power >26 kW. -7.5/+10% for Engine power ≤ 26 kW	15.8(D)	16.04	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	15.8(D)	16.04	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+ 5%	252	253	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	100	93.8	Yes
e)	Back-up torque, percent	Non Evaluative	10 %, min.	Min.11%	28.7	Yes
f)	Maximum operating temperature (°C):					
	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.	130(D)	116	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.	112(D)	110	Yes

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1	2	3	4	5	6	7
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions.	2.57 (max.) (R)	0.532	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)	3.25 per meter (R)	0.24	Yes
17.1.2	Drawbar performance :					
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	15.20 (D) 15.04 (R)	18.51	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 or with standard ballast, as the case may be.	11.3(D) 11.38(R)	15.09	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.	12.64(D) 12.83(R)	14.0	Yes
d)	Max. transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	110	78	Yes
17.1.3	Power lift and hydraulic pump performance :					
a)	Maximum lifting capacity throughout the range of lift, (kN):					
	1) At hitch points	Non Evaluative	[Tolerance of minus 10%]	11.7(D)	13.45	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	7.8(D) 3.8(R)	9.87	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 minute, (mm)	Non Evaluative	Observed value should not exceed 50 mm.	250(D)	20	Yes
17.1.4	Brake performance at 25 kmph:					
a)	Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with Unballasted* tractor, (m):					
	1) Cold brake	Evaluative	10	10 (R)	7.6	Yes
	2) Hot brake	Evaluative	10	10 (R)	8.1	Yes

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1	2	3	4	5	6	7
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (R)	433	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
*Road ballast not recommended by manufacturer.						
17.1.5	Noise measurement :					
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	88 (R)	81	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	98 (R)	93	Yes
17.1.6	Amplitude of mechanical vibrations at :					
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R)	160	No
	2) Right foot rest			100 (R)	460	No
	3) Seat (with driver seated)			100 (R)	120	Yes
	4) Steering wheel			100 (R)	180	Yes
17.1.7	Air Cleaner oil pull over:					
	Max. percentage of oil pull over	Non Evaluative	0.25% Maximum	0.25%(D)	0.02%	Yes
17.1.8	Haulage requirements :					
a)	Gross mass of the trailers, (tones):					
	1) Two wheel	Non Evaluative	As Specified by the manufacturer	3.5 (D)	3.5	Yes
	2) Four wheel		-do-	3.75 (D)	3.75	Yes
b)	Distance travelled / liter of fuel consumption, (km/l):					
	1) Two wheel	Non Evaluative	-do-	6 to 7 (D)	8.99	No
	2) Four wheel		-do-	6 to 7 (D)	8.11 to 8.43	No
c)	Fuel consumption (ml/km/tonne):					
	1) Two wheel	Non Evaluative	-do-	35 to 45 (D)	31.78	No
	2) Four wheel		-do-	35 to 45 (D)	31.65 to 32.88	No
17.1.9	Wetland cultivation :					
	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 mud (R)	No ingress of water and/or mud was observed	Yes
	1) Clutch assembly	-do-				
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
	4) Engine oil	-do-				
	5) Transmission oil	-do-				

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1	2	3	4	5	6	7
17.1.10	Safety features :					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes (As per IS 12239 (part 2))	At present no requirements	Provided	--
b)	Lighting arrangement (Tractor having more than 1150 mm rear track width)	Evaluative	As per CMVR	--	Provided	Yes
c)	Seating requirement (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)	--	Conforms	Yes
e)	Dimension of three point linkage	Non-Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	--	Conforms	Yes
f)	Specification of linkage	Non-Evaluative	Should meet the requirements of IS 12953 and IS 12362 (part 3) (as amended from time to time)	--	Conforms	Yes
	Swinging drawbars				Not provided	--
17.1.11	Labelling of tractors (Provision of labelling plate):					
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	--	Mahindra	Yes
	2) Model	Evaluative		--	255 DI Power +	Yes
	3) Year of manufacture	Evaluative		--	2012 CC	Yes
	4) Engine number	Evaluative		--	BLMC3238	Yes
	5) Chassis number	Evaluative		--	BLMC3238	Yes
	6) Declaration of PTO power, (kW)(hp)	Evaluative		--	15.8(21.2)	Yes
17.1.12	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	89.13	88.95	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non-Evaluative		0.20	0.117 to 0.124	Yes
(c)	Ring end gap (mm):					
	- Top comp. ring.	Evaluative	To be specified by the manufacturer	2.5	0.35	Yes
	- 2 nd comp. ring.			2.5	0.60	Yes
	- Oil ring.			2.0	0.35	Yes

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(d)	Ring groove clearance (mm):					
	- Top comp. ring.	Evaluative	To be specified by the manufacturer	-TAPERED-		Yes
	- 2 nd comp. ring.			0.30	0.127 to 0.130	Yes
	- Oil ring.			0.20	0.097 to 0.102	Yes
(e)	Clearance of main bearings (mm):					
	- Diametrical clearance	Evaluative	-do-	0.20	0.092 to 0.116	Yes
	- Crankshaft end float	Evaluative		0.60	0.20	Yes
(f)	Clearance of big end bearings, (mm):					
	- Diametrical	Evaluative	-do-	0.20	0.084 to 0.123	Yes
	- Axial	Evaluative	-do-	0.75	0.25	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.30	0.12 to 0.16	Yes
(h)	Clearance between center pin and bush, (mm)	Non Evaluative	-do-	0.30	0.13 to 0.15	Yes

17.1.13 CATEGORY OF BREAKDOWNS / DEFECTS :					
Sl. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	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

17.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2014:				
S. No.	Characteristic	Requirements as per IS: 12207-2014	AS observed	Remarks
1	2	3	4	5
1.	Fitment of ROPS	With a provision for fitment of ROPS.	Not provided	Not applicable
		If ROPS fitted it should meet the requirement of IS: 11821-1992	Not provided	Not applicable
2.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Front tow hook not provided	No

17.3 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)] : Conform
- 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 March, 2012)] : **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] : Conform
- 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)] : **Does not 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

17.4 Salient Observations:

17.4.1 Laboratory tests:

17.4.1.1 PTO Performance:

The specific fuel consumption corresponding to maximum power was measured as **253 g/kWh** against the declaration of 252 g/kWh, which is within the tolerance limit of IS: 12207-2014.

17.4.1.2 Drawbar performance:

During drawbar performance creeping of tyre over rim was observed as 55 mm & 60 mm for LHS and RHS tyres respectively, which is on higher side and calls for necessary corrective action.

17.4.1.3 Mechanical Vibration:

The amplitude of mechanical vibration on various assemblies marked as (*) in Chapter-9 of this test report is on higher side, especially at the steering control wheel and foot rest. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

17.4.1.4 Three point linkage:

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

17.4.1.5 Operator's Seat:

Length and Width of Operator's seat does not meet the requirements of IS: 12343:1998 (Re-affirmed in March, 2009) and calls for necessary corrective action.

17.4.1.6 Location and operation of operator's control:

Operations of some of the operator's control do not meet the requirements of IS: 8133-1983(Re-affirmed in March, 2009) as given below. This may be looked into.

- i) Safety switch against accidental start of the engine has not been provided.
- ii) Fuel shut-off lever does not remain in "STOP" position.
- iii) Safety switch against accidental start of the engine has not been provided.

17.4.1.7 Operators work place:

The some parameters of constructional requirements with regard to safety do not meet the IS: 12239(part I)-1996(Re-affirmed in March, 2012) & IS: 12239(part II)-1999(Re-affirmed in March, 2009) respectively as given below. This may be looked into.

- i) The spark arrester has not been provided in the exhaust system.
- ii) Vertical retainers have not been provided on both sides of clutch & brake pedals.
- iii) Width of foot step.
- iv) The insulation to hydraulic pipeline hot part has not been provided.

17.4.1.8 Haulage test:

During haulage test the distance travelled /liter of fuel consumption (km/l) was observed as 8.99(two wheel trailer) and 8.11to 8.43 (four wheel trailer) against the declaration of 6 to 7 km/l for both. The fuel consumption (ml/km/tonne) was observed as 31.78(two wheel trailer) and 31.65 to 32.88(four wheel trailer) against the declaration of 35 to 45 ml/km/tonne for both. This should be looked into.

17.4.2 Field performance test:**17.4.2.1 Wet land cultivation (Puddling operation):**

Ingress of mud/or water was noticed in King pin assembly during puddling operation of the tractor. Hence, It does not meets the requirements of IS: 11082-1984 (Technical requirements of agricultural tractors for wetland operation). Therefore, the tractor is not recommended or suitable for wetland operation but meets the selected performance characteristics (IS: 12207-2014).

17.5 Maintenance / Service Problems:

No noticeable maintenance or service problem was observed during the test. However, suitable provision for separating water may be provided in the line after the fuel tank.

17.6 Adequacy of Literature supplied with machine:

17.6.1 The following modified literatures have been supplied by the manufacturer.

- a) Operator's manual for DI Tractors
- b) Part's catalogue MKM/ DLX tractors
- c) Service manual for Mahindra tractors

17.6.2 The literature submitted by the firm was found adequate. However, the following points may be re-examined & suitably incorporated in the operator's manual:

- a) All variants model of tractor along with their features at a glance may be provided.
- b) The preventive maintenance schedule chart showing the activity to be done by customer at 10hr/daily and/or every 50 hr and the respective page no. referred thereon for particular activity is not clear.
- c) The steering box oil level change period is mentioned in application whereas only check is indicated in manual.

17.6.3 These literatures may also be brought out in national as well as other regional languages.

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18. Citizen charter

Duration of Test	Test duration under citizen charter	Whether the report released within time frame given in the citizen charter	Remark
January 2014 to August 2014 8 Months	10 Months	Yes	--

TESTING AUTHORITY:

Rakesh Paliwal
AGRICULTURAL ENGINEER

H.L.Yadav
SENIOR AGRICULTURAL ENGINEER

C.R.LOHI
DIRECTOR

19. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
19.1	17.4.1.2,17.4.1.3,17.4.1.4,17.4.1.5, 17.4.1.7,17.4.1.8,17.4.1.9,17.6.2, 17.4.2.1	Observation will be studied and necessary action will be incorporated.

ANNEXURE-I**BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST**

S. No.	Item	Disc Plough	Rotavator	Puddler
1.	Make	Mahindra & Mahindra	Shaktiman	Tafe
2.	Type	Mounted	Mounted	Mounted
3.	No. of bottoms/blades	Two	24	12 (6 in each gang)
4.	Type of bottoms/blades	Plane concave	Hatchet	Notched
5.	Size of bottoms/blades, (mm)	635	245 x 75 x 6	460
6.	Spacing of bottoms/flanges, (mm)	510	225	164
7.	Lower hitch point span, (mm)	635	635	680
8.	Mast height, (mm)	470	640	450
9.	Overall dimensions, (mm):			
	- Length	1520	550	1190
	- Width	1190	1310	1810
	- Height	1005	950	1330
10.	Gross mass, (kg)	310	245	210

ANNEXURE-II**BRIEF SPECIFICATION OF HALF CAGE WHEEL**

S. No.	Items	Specification
1.	Type	Half cage wheel
2.	Dia, (mm)	1085
3.	Width, (mm)	355
4.	No. and types of lugs	12, straight lugs made of M.S. angle section welded to angle iron frame
5.	Size of angle section, (mm)	50 x 50 x 5
6.	Length of lugs, (mm)	350
7.	Spacing of lugs, (mm)	285
8.	Weight of each cage wheels (kg)	60

TRACTOR RUN HOURS DURING TEST

Annexure – III

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	PTO performance test	11.4
3.	Power lift and hydraulic pump performance test	4.0
4.	Drawbar performance test	17.13
5.	Turning ability	0.2
6.	Location of centre of gravity	0.2
7.	Operator's field of vision	0.1
8.	Brake test	2.0
9.	Noise measurement	1.42
10.	Air cleaner oil pull over test	3.80
11.	Mechanical vibration test	1.0
12.	Theoretical speed test	0.67
B.	FIELD TEST:	
1.	Disc ploughing	11.2
2.	Rotavation	10.95
3.	Puddling (including 5.0 hours water proof test)	15.17
C.	HAULAGE TEST:	5.76
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	6.41
	TOTAL:	91.41