



**MAHINDRA GUJRAT, SHAKTIMAAN 45 DLX
TRACTOR (Brand Name : SHAKTIMAAN)**



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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Subsequent to the examination of the case in light of Indian Standard IS 12207-2008, the following tests were considered to be carried out:

- Specification checking
- Nominal speed
- Two hour maximum PTO power performance test, under normal ambient condition
- Brake performance test
- Air cleaner oil pull over test
- Puddling Test

2. FUEL AND LUBRICANTS

2.1 Fuel : The High-speed diesel oil supplied by M/s Indian Oil Corporation Limited having density of **0.836 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	Servo Maxmile 6K	As recommended
2.	Transmission*	Track ELF	Oil originally filled in the tractor was not changed
3.	Steering housing	Servo gear Hp 90EP	--do--
4.	Grease	Servo gem EP	MP Grease
5.	Air cleaner bowl	SAE 20W40	SAE 20W40

*(includes gear box, differential housing, rear axle, final drive, Hydraulic system and brake housing)

3. ESSENTIAL TESTS

3.1. SPECIFICATIONS

	<u>Base Model</u>	<u>Variant Model</u>
3.1.1 Tractor:		
Make	: Mahindra Gujarat	Mahindra Gujarat
Model	: Shaktimaan – 45	Shaktimaan – 45 DLX
Brand name	: Shaktimaan	Shaktimaan
Type	: Four wheel, Rear-wheel drive, Agricultural Tractor	Four wheel, Rear-wheel drive, standard Agricultural Tractor
Year of manufacture	: 2006	2013
Chassis Serial number	: S 4560210001	S 45 KD 1839
Country of Origin	: India	India
3.1.2 Engine:		
Make	: Mahindra Gujarat	Mahindra Gujarat
Model	: MG 453	MG 453
Type	: Four stroke, water cooled, direct injection, diesel engine	
Serial number	: S 4560210001	S 45 KD 1839
Engine speed (Manufacturer's recommended production setting)(rpm):		
- Maximum speed at no load	: 2350 to 2450	2350 to 2450
- Low idle speed	: 750 to 850	750 to 850
- Speed at maximum torque	: 1200 to 1400	1200 to 1400

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7. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

7.1 On the basis of test conducted the performance results have been summarized as evaluative (mandatory) and non – evaluative (not mandatory) parameters applicable for qualifying Minimum Performance Criteria as per clause-4 table-1 of Indian Standard 12207: 2008 for acceptance of tractor for the purpose of subsidies/NABARD financing for the applicable features for this tractor model.

Sl. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207- 2008	Values declared by the applicant/ requirement		As observed		Whether Variant model meets the requirem ents (Yes/No.)
				Base model	Variant Model	Base model	Variant model	
1	2	3	4	5 a	5 b	6 a	6 b	7
7.1.1	PTO Performance :							
a)	- Max. Power under 2 hrs. 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	29.5	29.5	28.6	28.7	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	29.0	29.0	28.6	28.7	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	286	286	278	267	Yes
d)	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	130	114	99	Yes
	2) Coolant (water)	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.	115	115	100	82	Yes
7.1.2	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 (R)	10	10	7.20	7.28	Yes
	2) Hot brake	Evaluative	10 (R)	10	10	7.30	7.98	Yes

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1	2	3	4	5 a	5 b	6 a	6 b	7
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600 (R)	600	600	292 to 370	380 to 384	Yes
7.1.3	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.	The manufacturer has recommended that the tractor is not suitable for wetland cultivation (Puddling operation)	Variant model Recommended for wetland cultivation (puddling operation)	Base Model was Not recommended for wetland cultivation (Puddling operation)	In variant model No ingress of mud/or water was noticed	Yes
1)	Clutch assembly	-do-						
2)	Brake housings	-do-						
3)	Front axle hubs	-do-						
7.1.4	Safety features :							
a)	Guards against moving and hot parts	Evaluative	As per CMVR	At present no requirements	Provided	--		
b)	Lighting arrangement	Evaluative	As per CMVR	--	Provided	Yes		
7.1.5	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 GUJARAT	MAHINDRA GUJARAT	Yes		
2)	Model	Evaluative		SHAKTIMAAN 45	SHAKTIMAAN 45 DLX	Yes		
3)	Year of manufacture	Evaluative		2006	2013	Yes		
4)	Engine serial number	Evaluative		S 4560210001	S 45 KD 1839	Yes		
5)	Chassis serial number	Evaluative		S 4560210001	S 45 KD 1839	Yes		
6)	Declaration of PTO power, kW	Evaluative		29.5 (39.6)	29.5 (39.6)	Yes		

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7.2 Salient Observations:

7.2.1 Laboratory tests:

7.2.1.1 PTO Performance:

- i) The maximum PTO power in case of base and variant models were observed as 28.6 & 28.7 kW respectively against the declaration of 29.5 kW which is within the tolerance limit.
- ii) The specific fuel consumption in case of base and variant models corresponding to maximum power were observed as 278 & 267 g/kWh respectively against the declaration of 286 g/kWh. Which is within the tolerance limit.

7.2.1.2 Wetland Cultivation (Puddling Operation):

No ingress of mud/or water was noticed during puddling operation of the tractor. Hence, It meets the requirements of IS: 11082-1984 reaffirmed in 2000 (Technical requirements of agricultural tractors for wetland operation). **The tractor is suitable for wetland operation (Puddling).**

7.2.1.3 Provision for safety and comfort of operator, (Conformity with IS: 12343-1998):

The operator's seat provided on the tractor does not meet the following requirements and calls for necessary improvement in respect of following.

- i) Longitudinal distance from SIP to the center of differential lock

7.2.1.4 Operator's work place: IS :12239 (Part-I& II)

The operator's work place provided on the tractor does not meet the following requirements and calls for necessary improvement in respect of following.

- i) Width of footsteps is less.
- ii) Hydraulic pipe lines are not insulated properly.
- iii) The provision for the spark arrester on silencer is not provided.

7.2.1.5 Labelling of tractor: -

Labelling plate of tractor meets the requirements, however in labelling plate brand name: SHAKTIMAAN may be mentioned to avoid the confusion regarding the model name among customer.

7.3 Maintenance / Service Problems:

No noticeable maintenance or service problem was observed during the test. However, suitable provision for draining the sediments/water may be provided at the fuel tank.

7.4 Recommendation with regard to safety on tractor:

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

- i) Safety provisions against accidental start of engine.
- ii) Fuel shut-off knob shall remain in stop position without application of manual effort.
- iii) Proper insulation at hydraulic pipes may be provided.

7.5 Adequacy of Literature supplied with machine:

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

- i) Operator's manual for (Shaktimaan 31/312/30/35/40/45/45 DLX tractors models.
- ii) Spare parts catalogue for (Shaktimaan 31/312/30/35/40/45/45 DLX tractors models.
- iii) Service manual for (Shaktimaan 31/312/30/35/40/45/45 DLX/ 55/60/614 tractors models.

- 7.5.1 The literature submitted by the firm was found adequate. However, these literatures may also be brought out in national as well as other regional languages.

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8. CITIZEN CHARTER

Time frame for Testing & Evaluation as per Citizen Charter	Duration of Test	Whether the Test Report is released within the time frame given in Citizen Charter	Remarks
10 Months	7 Months (December , 2013 to June , 2014)	Yes	None

TESTING AUTHORITY:

H. L. YADAV
SENIOR AGRICULTURAL ENGINEER

C. R. LOHI
DIRECTOR

Test report compiled by **Shri. Chanchlesh Singh Raghuwanshi**, Assistant Agricultural Engineer

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9. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
9.1	7.2.1.3 (i), 7.2.1.4 (i, ii, iii), 7.2.1.5, 7.4 (i, ii, iii)	Observation will be studied and necessary action will be incorporated.
9.2	7.5.1	Updated literature of subject tractor model is enclosed herewith.

Annexure-I

BRIEF SPECIFICATION OF HALF CAGE WHEEL

S. No.	Items	Specification
1.	Type	Half cage wheel
2.	Diameter, (mm)	1060
3.	Width, (mm)	305
4.	No. and type of lugs	16, straight lugs made of MS angle section welded to angle iron frame
5.	Size of angle section, (mm)	50x50x5
6.	Length of lugs, (mm)	345
7.	Spacing of lugs, (mm)	210
8.	Weight of each cage wheel, (kg)	75

Annexure-II

TRACTOR RUN HOURS DURING TEST

A. LABORATORY AND TRACK TESTS	HOURS
1. PTO Performance Test	--
2. Nominal speed test	0.6
3. Brake Performance Test	2.0
4. Air cleaner oil pull over test	3.5
B. Field test	
1. Puddling and water proof test	15.8
C. Miscellaneous test and other run hours, including idle run transportation, trial and preparation for the tests.	1.3
Total	23.2