



MAHINDRA, 605 DI i TRACTOR
(Brand Name : Arjun Novo)



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 12207-2014, the following tests were considered to be carried out:

- Specification checking
- Nominal speed test
- PTO power performance test
- Hydraulic performance 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	20W 40	As recommended
2.	Transmission	Track Elf MM	Oil originally filled in the tractor was not changed
3.	Hydraulic system	Track Elf MM	--do--
4.	Steering housing	Track Elf MM	--do--
5.	Grease	MP3 Lithium base	MP Grease

3. ESSENTIAL TESTS

3.1. SPECIFICATIONS

	<u>Base Model</u>	<u>Variant Model</u>
3.1.1 Tractor:		
Make	: Mahindra	Mahindra
Model	: 605DI R	605 DI i
Brand name	: Arjun Novo	Arjun Novo
Type	: Four wheel, Rear-wheel drive, Agricultural Tractor	drive, General Purpose,
Year of manufacture	: 2013	2013 November
Serial number	: NAMB 00001	Not specified
Chassis number	: NAMB 00001	NAMB00046
Country of Origin	: INDIA	INDIA
3.1.2 Engine:		
Make	: Mahindra	Mahindra
Model	: MS457 3A	MSI457 3A
Serial number	: NAMB 00001	NAMB 00046
Engine speed (Manufacturer's recommended production setting)(rpm) :		
- Maximum speed at no load	: 2150 to 2250	2400 to 2500
- Low idle speed	: 800 to 900	750 to 850
- Speed at maximum torque	: 1100 to 1300	1100 to 1300
Rated speed, (rpm):		
- For PTO use	: 2000	2100
- For drawbar use	: 2000	2100


6. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

- 6.1** 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: 2014** 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- 2014	Values declared by the applicant/ requirement		As observed		Whet her Varia nt model meets the requir em- ents (Yes/ No.)
				Base model	Variant Model	Base model	Variant model	
1	2	3	4	5 a	5 b	6 a	6 b	7
6.1.1	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	37.51	37.51	37.3	36.5	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	37.51	37.51	37.3	36.4	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	251	251	244	248	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	241.3 (D)	199.8 (D)	236.9	202.3	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	18 (D)	18(D)	32.9	24.7	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	130	120	124	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.	112	112	101	102	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.44 (R)	2.48 (R)	0.13	0.39	Yes

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h)	Smoke level	Evaluative	Maximum light absorption coefficient of 3.25 per metre or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	3.25 per metre (R) 0.20 (D)	3.25 per metre (R) 0.20 (D)	0.45	0.29	Yes
6.1.2 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%]	21.5(D)	22 (D)	19.3	22.4	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	8.79 (R) (Minimum) 17.6 (D)	8.59(R) (Minimum) 18 (D)	14.5	13.5	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	Observed value should not exceed 50 mm.	50 max (R) 250 (D)	50 max (R) 250 (D)	50	06	Yes
6.1.3 Safety features :								
a)	Guards against moving and hot parts	Evaluative	Belt drives, pully, 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 meets the requirement		No
d)	Technical requirements for PTO shaft	Non-Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--		Does not meets the requirement		No
e)	Dimension of three point linkage	Non-Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	--		Does not meets the requirement		No
f)	Specification of linkage and swinging drawbars	Non-Evaluative	Should meet the requirements of IS 12953 and IS 12362 (part 3) (as amended from time to time)	--		Linkage drawbar meets the requirement, however swinging drawbars is not provided		Yes

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1	2	3	4	5 a	5 b	6 a	6 b	7
6.1.4	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		--		605 DI i	Yes
	3)	Year of manufacture	Evaluative		--		2013 (HD)	Yes
	4)	Engine number	Evaluative		--		NAMB00046	Yes
	5)	Chassis number	Evaluative		--		NAMB00046	Yes
	6)	Declaration of PTO power, kW	Evaluative		--		37.51	Yes
# The engine and chassis serial number of the tractor were embossed/ punched same (NAMB00046) at engine housing & labeling plate. For appropriate identification of engine and chassis (Transmission) the serial number of these assemblies should be different.								
6.1.5	Literature (Submission to test agency)							
(a)	Operator manual	Evaluative	Provided/ Not Provided	As relevant Code 8132)	per IS (IS	Provided	Yes	
(b)	Parts Catalogue	Evaluative	Provided/Not Provided	As relevant Code 8132)	per IS (IS	Provided	Yes	
(c)	Workshop/Service manual	Evaluative	Provided/Not Provided	As relevant Code 8132)	per IS (IS	Provided	Yes	

6.2 Salient Observations:

6.2.1 Laboratory tests:

6.2.1.1 PTO Performance:

- i) The maximum backup torque was observed as 24.7 %.
- ii) The specific fuel consumption in case of base and variant models corresponding to maximum power were observed as 244 & 248 g/kWh respectively against the declaration of 251 g/kWh. Which is within the tolerance limit.
- iii) The maximum PTO power in case of base and variant models were observed as 37.3 & 36.5 kW respectively against the declaration of 37.5 kW which is within the specified limit.

6.2.1.2 Hydraulic Performance:

The moment about rear axle with standard frame was calculated as 20.93 kN-m. Whereas, the moment about front axle was calculated as 20.03 kN-m under unballasted condition. The moment about rear axle is on higher side as compared to the moment about front axle even under unballasted condition. It is, therefore, recommended that the lifting capacity of the hydraulic system may be reduced suitably or ballast recommendation may be reviewed to avoid the front lifting of the tractor.

6.2.1.3 Operator's seat (Conformity with IS: 12343-1998):

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

- i) Width of seat
- ii) Vertical & longitudinal distance of from SIP to the centre of clutch pedal



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- 6.2.1.4 Location and operation of operator's control:**
Operations of some of the operator's control do not meet the requirements of IS: 8133-1983. This may be looked into for necessary corrective action.
- 6.2.1.5 Three point linkage:**
Some of the parameters of three point linkage conforms to Cat.I and some of them conforms to Cat.II. Keeping in view the spirit of standardization, necessary improvement may be incorporated.
- 6.2.1.6 Labeling of tractor: -**
The engine and chassis serial number of the tractor were embossed/ punched same (NAMB00046) at engine housing & labeling plate. For noteworthy identification of engine and chassis (Transmission) the serial number of these assemblies should be different.
The engine and chassis serial number of the tractor should be given separately for its noteworthy identification.
- 6.3 Maintenance / Service Problems:**
No noticeable maintenance or service problem was observed during the test.
- 6.4 Recommendation with regard to safety on tractor:**
The following requirements, inter alia, may be considered for incorporation on the tractor:
- 6.5 Adequacy of Literature supplied with machine:**
- 6.5.1** The following literatures supplied by the manufacturer for reference during the test.
- 6.5.2** It is therefore, recommended that following literature may be brought out as per IS: 8132-1999 (Reaffirmed in March, 2009) for the guidance of users and service personnel in national as well as regional languages for this model of tractor.

The results of the tests carried out on variant model "Mahindra 605DI I Tractor (Brand Name: Arjun Novo)" have been compared with those on base model "Mahindra 605 DI R Tractor (Brand Name: Arjun Novo)" and found within the limit, as specified in Indian Standard: **12207-2014**.

7. CITIZEN CHARTER

Duration of Test	Time frame for Testing & Evaluation as per Citizen Charter	Whether the Test Report is released within the time frame given in Citizen Charter	Remarks
3 Month (July, 2014 to September, 2014)	10 Months	No	None

TESTING AUTHORITY:

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