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ब्यावसायिक परीक्षण रिपोर्ट (प्रारंभिक)
COMMERCIAL TEST REPORT (Initial)

संख्या / No. : T-1112/1638/2017
माह / Month : October, 2017



MAHINDRA, JIVO 245 DI TRACTOR



सत्यमेव जयते

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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16. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

16.1 Evaluative (mandatory) / Non-evaluation (Non-mandatory) parameter 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:

Sl. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	Values declared by the applicant (D) / Requirement (R)	As observed	Whether meets the requirements (Yes/No)
1	2	3	4	5	6	7
16.1.1 PTO Performance :						
a)	Maximum 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	16.5 (D)	15.7	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	16.5 (D)	15.7	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+ 5%	275 (D)	262	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	81(D)	79.4	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	18 (D)	22.2	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)	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.	112 (D)	100	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	1% (D) 2.69 (R)	0.66	Yes
h)	Smoke level	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hairidge value (As per CMVR)	5.2 FSN meter (D) 3.25 per meter (R)	0.16	Yes



1	2	3	4	5	6	7	
16.1.2 Drawbar performance :							
a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip. (kN)	Non Evaluative	Minimum 65% of static mass with ballast	Not applicable			
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip. (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	6.70 (D)	9.52	Yes	
				6.88 (R)			
c)	Maximum drawbar power without 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.	13.2 (D)	14.9	Yes	
				11.8 (R)			
d)	Maximum transmission oil temperature ($^{\circ}$ C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	120 (D)	77	Yes	
16.1.3 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%]	7.35 (D)	7.81	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	4.41 (D)	4.54	Yes
3.70 (R)							
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 (D)	09	Yes	
16.1.4 Brake performance at 25 kmph:							
a)	Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with road ballast, (m):						
	1)	Cold brake	Evaluative	10	10 (R)	8.28	Yes
	2)	Hot brake	Evaluative	10	10 (R)	8.38	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s^2 (N)	Evaluative	600	600 (R)	489 to 500	Yes	
16.1.5 Noise measurement :							
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	85 (R)	79	Yes	
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96 (R)	94	Yes	
16.1.6 Amplitude of mechanical vibrations at :							
1)	Left foot rest	Non Evaluative	100 microns (max)	100 (R)	160	No	
	Right foot rest				160	No	
	Seat (with driver seated)				90	Yes	
	Steering Wheel				160	No	

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1	2	3	4	5	6	7
16.1.7	Haulage requirements :					
a)	Gross mass of the trailers, (tones):					
1)	Two wheel	Non Evaluative	--	2.5	2.5	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
1)	Two wheel	Non Evaluative	--	7.79	8.03 to 8.44	Yes
c)	Fuel consumption (ml/km/tonne):					
1)	Two wheel	Non Evaluative	--	42.8	47.4 to 49.8	Yes
16.1.8	Wetland cultivation :					
	Sealing for the following assemblies:		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	No ingress of mud and / or water was observed after repeat test	Yes
1)	Clutch assembly	Evaluative				
2)	Brake housings	Evaluative				
3)	Front axle hubs	Evaluative				
4)	Engine oil	Evaluative				
5)	Transmission oil	Evaluative				
16.1.9	Safety features :					
a)	Guards against moving and hot parts	Evaluative	As per CMVR	---	Meet the requirements	Yes
b)	Lighting arrangement	Evaluative	---do---	---	-do-	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)	---	Not applicable as the rear track width of tractor is less than 1150 mm.	Not applicable
d)	Technical requirements for PTO shaft	Non Evaluative	Should meet the requirements of IS: 4931 (As amended from time to time)	---	Meet the requirements	Yes
e)	Dimensions of three point linkage	Non Evaluative	Should meet the requirements of IS: 4468 (Part-2) 1993 (Cat.1N Narrow Hitch)	---	-do-	Yes
f)	Specifications of linkage drawbar	Non Evaluative	Should meet the requirements of IS 12953-1990 & IS:4468 (Part-2)-1993	---	Meet the requirements	Yes
	Swinging drawbar		Should meet the requirements of IS 12362-(Part 3)-1994.	---	Not Provided	Not applicable
16.1.10	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		--	JIVO 245 DI	Yes
3)	Year of manufacture	Evaluative		--	FG (i.e September,2016)	Yes
4)	Engine number	Evaluative		--	CGF4WKA0001	Yes
5)	Chassis number	Evaluative		--	MBNZKGBBFGC F00001	Yes
6)	Declaration of PTO power, kW (hp)	Evaluative		--	16.5	Yes

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16.1.1	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	89.1(D)	88.951 to 88.957	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.20 (D)	0.136 to 0.138	Yes
(c)	Ring end gap (mm):					
	- Top comp. ring.	Evaluative	-do-	2.5	0.20	Yes
	- 2 nd comp. ring.		-do-	2.5	0.55	Yes
	- Oil ring.		-do-	2.0	0.35	Yes
(d)	Ring groove clearance (mm):					
	- Top comp. ring.	Evaluative	-do-	Taper Rings		--
	- 2 nd comp. ring.		-do-	0.30	0.058 to 0.065	Yes
	- Oil ring.		-do-	0.20	0.030 to 0.031	Yes
(e)	Clearance of main bearings (mm):					
	- Diametrical clearance	Evaluative	To be specified by the manufacturer	0.20	0.108 to 0.112	Yes
	- Crankshaft end float	Evaluative		0.60	0.13	Yes
(f)	Clearance of big end bearings, (mm):					
	- Diametrical	Evaluative	-do-	0.20	0.064 to 0.073	Yes
	- Axial	Evaluative	-do-	0.75	0.20	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	Not applicable		
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.30	0.064 to 0.090	Yes
16.1.13	Literature (Submission to test agency)					
(a)	Operator manual	Evaluative	Provided/ Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
(b)	Parts Catalogue	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
(c)	Workshop/ Service manual	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
16.1.14	CATEGORY OF BREAKDOWNS / DEFECTS :					
S. No.	Category of breakdowns	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.	One (Mn-13)	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.	One	Yes	



1	2	3	4	5	6	7
16.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2014:						
	Characteristic	Requirements as per IS: 12207-2014	As observed	Whether meets the requirements (Yes/No.)		
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	ROPS not fitted	Not applicable		
2.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Front tow hook not provided	No		

16.3 Conformity with following IS:

- i) Guidelines 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-2):1993 (Reaffirmed in March, 2007)/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)] Tractors having more than 1150 mm rear track width. : Not applicable as the rear track width of tractor is less than 1150 mm.
- vi) Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision) : [IS 12239 (PT-1)-1996 (Reaffirmed in March, 2009)/ISO 4254-1:1989] : **Does not conform**
- vii) 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 conform**
- viii) 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
- 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

16.4 Salient Observations:**16.4.1 Laboratory tests:****16.4.1.1 PTO Performance:**

- i) The maximum PTO power was recorded as 15.7 kW against the declaration of 16.5 kW, which meets the requirement of **IS: 12207-2014** with regard to tolerance limit.
- ii) The backup torque was observed as 22.2 %.



- iii) The specific fuel consumption corresponding to maximum power was measured as 262 g/kWh against the declaration of 275 g/kWh, which is within the tolerance limit of IS: 12207-2014.

16.4.1.2 Mechanical Vibration:

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

16.4.1.3 Location and operation of operator's control:

Working clearance PTO engaged hand lever is 25 mm clearance, which does not meet the requirement of the IS: 12239 (Part-2)-1999. This should be looked into for necessary corrective action.

16.4.1.4 Symbols for operator controls and displays:

Colour codes for engine revolution gauge are not identifiable with the symbols as per IS: 6283 (Part-1 & 2) -1998. This should be pay attention for improvement as per IS.

16.4.2.1 Wetland Cultivation (Puddling Operation):

- i) During the initial test on wet land cultivation (Puddling operation) ingress of water and mud in RHS swivel housing (stub axle assembly) was observed and the tractor does not meeting the evaluative requirement of IS: 12207-2014 in respect to wet land cultivation (Puddling operation). Consequent upon the request received from the applicant vide letter No. Nil dated 21.08.2017 for changing the RHS stub axle assembly (swivel housing) parts of front axle & replacement of the following parts having the same specification under "Repeat test" as per the provision of clause 3.2.3 of IS 12207-2014.

S. No.	Part Name	Existing parts	Quantity	Replaced Parts	Quantity
i)	'O' ring swivel housing	006513336Y1	02	006513336Y1	02
ii)	'O' ring beam to side housing	006513337Y1	02	006513337Y1	02
iii)	Swivel housing seal	007609741C1	02	007609741C1	02
iv)	Hub seal	008003896B1	02	008003896B1	02
v)	Shim end reduction	006513355Y1	04	006513355Y1	04
vi)	Shim end reduction	006513357Y1	04	006513357Y1	04
vii)	Front axle oil	25.143	5 litre	25.143	5 litre
viii)	Sealant 515	For sealing used			

The repeat wetland cultivation (Puddling operation) test was conducted and no ingress of water and/or mud was observed in various assemblies / components. The tractor was found suitable for wetland cultivation (Puddling operation) and meets the requirements of IS: 11082-1984.(Technical requirements of agricultural tractors for wetland operations).

- ii) During wet land cultivation (puddling test) seepage of oil was observed from rear PTO shaft. On close inspection cassette seal PTO (Part no. 006511674V1) were found in damaged condition. The damaged cassette seal PTO (Part no. 006511674V1) were replaced with new ones This breakdown has been categorized as Mn-13 as per IS: 12207-2014 and calls for stringent quality control measures at production level.

16.5 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.

16.6 Recommendation with regard to safety on tractor:

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

- Provision for spark arresting device in exhaust system.
- Provision of master shield for PTO shaft.
- Front tow hook should be provided.



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- 16.7 Adequacy of Literature supplied with machine:**
- 16.7.1** The following literature has been supplied with the tractor
- i) Operator's Manual for Mahindra, JIVO 245 DI Tractor.
 - ii) Part's catalogue Mahindra, JIVO 245 DI Tractor.
 - iii) Service Manual Mahindra, JIVO 245 DI Tractor.
- 16.7.2** The literature supplied was found adequate. However, The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.

17.0 Citizen charter

Duration of Test (Including Repeat Test)	Time frame for Testing evaluation as per citizen charter	Whether the report released within time frame given citizen charter	Remark, if any
06 Months (May ,2017 to October , 2017)	10 Months	Yes	---

TESTING AUTHORITY:


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18. Applicant's Comment

Para No.	Our Reference	Applicant's Comment
18.1	16.4.1.2,16.1.4.3,16.1.4.4,16.1.2.1(i & ii) & 16.6 (i, ii & iii)	Observation will be studied & necessary action will be incorporated.