

व्यावसायिक परीक्षण रिपोर्ट  
COMMERCIAL TEST REPORT

संख्या/No. : T-668/1174/2009  
माह/Month : April, 2009



**TAFE, MF 5245 DI MAHAMAHAN TRACTOR**



सत्यमेव जयते

भारत सरकार

कृषि मंत्रालय

(कृषि एवं सहकारिता विभाग)

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### 17. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

17.1 Evaluative (mandatory) / Non-evaluation (Non-mandatory) parameter 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/ requirement	As observed	Whether meets the requirements (Yes/No.)
1	2	3	4	5	6	7
<b>17.1.1 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 >35 hp. -7.5/+10% for PTO power ≤ 35 hp	35.7	34.5	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	35.7	34.5	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	265	236	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	177	174.9	Yes
e)	Back-up torque, percent	Non Evaluative	7 percent, min.	-	19.6	Yes
f)	<b>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.	132	109	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	102	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.35	0.23	Yes

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1	2	3	4	5	6	7
h)	Smoke level	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Haltridge value (As per CMVR)	-	0.69 (per meter)	Yes
<b>17.1.2 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	21.61	25.56	Yes
b)	Max. drawbar pull standard ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	13.32	15.30	Yes
c)	Maximum drawbar power standard ballast (kW).	Evaluative	Min. 80% of PTO power as referred in A1(a) of PTO performance	27.6	29.9	Yes
d)	Max. transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	120	105	Yes
<b>17.1.3 Power lift and hydraulic pump performance :</b>						
a)	Maximum lifting capacity throughout the range of lift, (kN):					
	1) At hitch points	Non Evaluative	[Tolerance of minus 10%]	15.0	14.8	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	8.28	13.7	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	[Tolerance of plus 5 mm]	50	10	Yes
<b>17.1.4 Brake performance at 25 kmph:-</b>						
a)	Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with ballast, (m):					
	1) Cold brake	Evaluative	10	10	7.80/6.70	Yes
	2) Hot brake	Evaluative	10	10	6.30	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s <sup>2</sup> (N)	Evaluative	600	600	250 to 400	Yes

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1	2	3	4	5	6	7		
c)	Whether parking brake is effective at a force of 600 N at foot pedal(s) or 400 N at hand lever	Evaluative	Yes	Yes	Yes	Yes		
<b>17.1.5 Noise measurement :</b>								
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	88	85	Yes		
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	98	94	Yes		
<b>17.1.6 Amplitude of mechanical vibrations at :</b>								
1)	Left foot rest	Non Evaluative	100 microns (max)	100	240	No		
	Right foot rest			100	270	No		
2)	Seat (with driver seated)			100	70	Yes		
	Steering wheel			100	90	Yes		
<b>17.1.7 Haulage requirements :</b>								
a) Gross mass of the trailers, (tonnes):								
1)	Two wheel	Non	--	5.0	5.0	Yes		
	Four wheel	Evaluative	--	5.0	5.0	Yes		
b) Distance travelled / litre of fuel consumption, (km/l):								
1)	Two wheel	Non Evaluative	--	5.20 to 5.60	5.52 to 5.61	Yes		
	2)			Four wheel	5.35 to 5.75	5.02 to 5.05	No	
c) Fuel consumption (ml/km/tonne):								
1)	Two wheel			Non Evaluative	--	35.96 to 39.20	35.7 to 36.3	Yes
	2)	Four wheel	36.10 to 40.00			31.9 to 32.0	Yes	
<b>17.1.8 Wetland cultivation :</b>								
Sealing for the following assemblies:		Evaluative	The identified assemblies should essentially meet the requirement of IS: 11062. 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	Yes
1)	Clutch assembly	-do-						
2)	Brake housings	-do-						
3)	Front axle hubs	-do-						
<b>17.1.9 Safety features :</b>								
a)	Guards against moving and hot parts	Evaluative	As per CMVR	At present no requirements	---	--		
b)	Lighting arrangement	Evaluative	As per CMVR	--	Provided	Yes		

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1	2	3	4	5	6	7
17.1.10	Labelling of tractors (Provision of labelling plate):					
1)	Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	--	TAFE	Yes
2)	Model	Evaluative		--	MF 5245 DI Mahama-haan	Yes
3)	Year of manufacture	Evaluative		--	KFZW(2007)	Yes
4)	Engine number	Evaluative		--	T III SJ 327 02637	Yes
5)	Chassis number	Evaluative		--	402321	Yes
6)	Declaration of PTO power, (kW)	Evaluative		--	35.7	Yes
17.1.11	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	-do-	95.202	95.00 to 95.03	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative	-do-	When piston ring groove clearance exceeds 0.25 mm	0.115 to 0.126	Yes
(c)	Ring end gap, (mm):					
	- Top comp. ring.	Evaluative	-do-	1.5	0.43 to 0.45	Yes
	- 2 <sup>nd</sup> comp. ring.		-do-	1.5	0.90 to 0.92	Yes
	- Oil ring.		-do-	1.5	0.48	Yes
(d)	Ring groove clearance, (mm):					
	- Top comp. ring.	Evaluative	-do-	--	Tapered ring	--
	- 2 <sup>nd</sup> comp. ring.		-do-	0.25	0.055 to 0.062	Yes
	- Oil ring.		-do-	0.25	0.043 to 0.049	Yes
(e)	Clearance of main bearings, (mm):					
	- Diametrical clearance	Evaluative	-do-	0.50	0.100 to 0.126	Yes
	- Crankshaft end float	Evaluative	-do-	0.50	0.08	Yes
(g)	Clearance of big end bearings, (mm):					
(h)	- Diametrical	Evaluative	-do-	0.50	0.047 to 0.093	Yes
	- Axial	Evaluative	-do-	0.25	0.18 to 0.23	Yes
(i)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.35	0.098 to 0.155	Yes
(j)	Clearance between center pin and bush, (mm)	Non Evaluative	-- do--	1.25	0.031 to 0.101	Yes

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17.1.12 CATEGORY OF BREAKDOWNS / DEFECTS :					
S. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2008	As observed	Whether meets the requirements (Yes/No.)
1.	2.	3.	4.	5.	6.
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:12207-2008:				
S. No.	Characteristic	Requirements as per IS: 12207-2008	AS observed	Whether meets the requirements (Yes/No.)
1	2	3	4	5
1	Air cleaner oil pull over, max. oil pull over, (%)	0.25% (max.)	0.24	Yes
2.	Seating requirements	Should meet the requirements of IS: 12343-1996	Does not conform	No
3.	Filment of ROPS	With a provision for fitment of ROPS. If ROPS fitted it should meet the requirement of IS: 11521-1992	ROPS is not fitted	-
4.	Technical requirements for PTO shaft	Should meet the requirements of IS: 4931 -1995	Does not meet the requirement	No
5.	Dimensions of three point linkage	Should meet the requirements of IS: 4468 (Part-I)-1997	Does not meet the requirement	Yes
6.	Specifications of linkage drawbar	Should meet the requirements of IS: 12953-1990.	Conforms	Yes
7.	Specifications of swinging drawbar	Should meet the requirements of IS:12362 Part 3 -1994.	Not provided	--
8.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Provided	Yes

**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 Oct. 2004)] : **Does not conform**
- ii) Agricultural tractors – Rear mounted power take-off - Types 1, 2 and 3(third revision)[IS: 4931-1995 (Reaffirmed in Oct. 2004)] : **Does not 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, 2007)/ISO730-1:1994] : **Does not conform**

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- iv) Drawbar for agricultural tractors – Link type : Conforms  
[IS 12953:1990 (Reaffirmed in March, 2007)]
- v) Agricultural tractors - Operator's seat technical : Does not conform  
requirement [IS 12343 –1998 (First revision) (Re-  
affirmed in Dec, 2004)]
- vi) Guide for safety & comfort of operator of agricultural : Does not conform  
tractors: Part 1 General requirements (first revision) :  
[IS 12239(PT-1) 1996 (Reaffirmed in March, 2007)/ISO  
4254-1:1989]
- vii) Tractors and machinery for agriculture and forestry, : Does not conform  
powered lawn and garden equipment – Symbols for  
operator controls and other displays [IS: 6283 (Part-1  
& Part-2) –1998(Re-affirmed in Dec, 2003)/ ISO 3767-  
2:1991)]
- viii) Tractors and machinery for agriculture and forestry – : Does not conform  
Technical means for ensuring safety Part 2: Tractors  
(first revision) [(IS 12239 (PT-2) 1999) (Re-affirmed in  
Oct. 2004)]
- xi) Guide lines for location and operation of operator : Conforms  
controls on agricultural tractors and machinery (first  
revision) (IS: 8133 – 1983) (Re-affirmed in Oct. 2004)
- x) Agricultural Tractor & Machinery Lighting device for : Conforms  
travel on public roads (IS: 14683-1999) (Re-affirmed in  
Oct. 2004)

#### 17.4 Salient Observations:

##### 17.4.1 Laboratory tests:

##### 17.4.1.1 PTO Performance:

- i) The backup torque is 19.6%.
- ii) The specific fuel consumption corresponding to maximum power was measured as 236 g/kWh, against the declaration of 265 g/kWh.

##### 17.4.1.2 Drawbar Performance Test:

Due to excessive creeping of tyres over the rim the LHS & RHS drive wheel tube damaged and were replaced with new ones. This should be examined and suitable improvements should be incorporated.

##### 17.4.1.3 Mechanical Vibration:

The amplitude of mechanical vibration on various assemblies marked as (\*) in chapter-9 of this test report are on higher side especially at foot rest. This calls for reduction of vibration to improve the operational comfort and service life of components.

##### 17.4.1.4 Power take-off Shaft: -

- i) The dimensions "dΦ" and "AΦ" does not meet the requirements of IS: 4931-1995. This should be looked into for improvement.
- ii) The master shield for PTO has been not provided.

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**17.4.1.5 Operator's seat:**

- i) The width of seat does meet the requirement of IS: 12343- 1998. This should be looked into for necessary corrective action.
- ii) Longitudinal adjustment provided on operator's seat i.e. forward and rearward from the mid position was observed as  $\pm 25$  mm against the optimum requirements of  $\pm 25$  mm and  $\pm 100$  mm respectively. In view of enhancing comfort level of operator, this may be looked into for increasing.

**17.4.1.6 Labelling Plate:**

- i) On the labelling plate the year of manufacture has been declared in coded form. It should be declared in numeric form on labelling plate.
- ii) The size of letters embossed/punched on labelling plate is observed as 2 mm, only which is not easily readable. This should be improved.

**17.4.2 Field performance:**

**17.4.2.1 Wet land cultivation (Puddling Operation):**

The tractor meets the requirements for wet land cultivation as per IS:11082-1984 and is suitable for wet land cultivation.

**17.4.2.2 Haulage Performance:**

- i) The distance travelled per litre of fuel consumption in case of four wheel trailer was observed as 5.02 to 5.05 Km/litre against the declaration of 5.35 to 5.75 km/litre. This should be looked into.
- ii) Water ballasting in drive wheels has been recommended by the manufacturer for haulage test. Due to liquid ballasting in drive wheels, it was observed that excessive jerks were generated at high speed and operator felt fatigue due to these jerks during operation. Therefore, it is recommended that liquid / water ballasting of wheels for road application may be reviewed.

**17.4.3 Component/Assembly inspection:**

- i) The valve spring index was recorded as 13.53 to 13.83 N/mm against the discard limit of 19.61 N/mm. The valve spring has crossed the discard limit only after 111.1 hours of operation. This should be looked into for necessary corrective action.
- ii) The discard limit for clearance between centre pin and bush has been specified as 1.25 mm, which seems to be very high and calls for necessary corrective action.

**17.5 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 for differential lock.
- iii) Transport lock in the hydraulic system.
- iv) Provision of power take-off master shield.
- v) The drive wheels of the tractor should be fully guarded



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**17.6 Maintenance/Service Problems:**

The oil change period for air cleaner has been illustrated in the operator's manual as "when the oil level rises by more than 9 mm due to dust deposit". This does not give clear indication for maintenance of air cleaner. This should be re-examined for necessary corrective action.

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


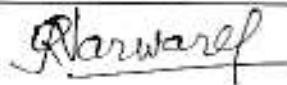
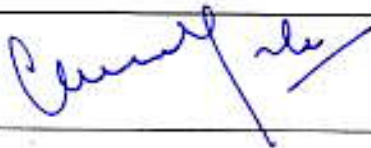
The following literature has been supplied by the applicant:-

- a) Owner's service manual
- b) Owner's service manual book II

The above literature should be improved with regard to illustration on fuel saving tips and information on matching implements.

The supplied literature was not found adequate. It is therefore recommended that the workshop manual and parts catalogue should be brought out for the guidance of service persons and users.

**TESTING AUTHORITY:**

R. K. NEMA ASSISTANT ENGINEER (T)	
J. J. R. NARWARE SENIOR TEST ENGINEER	
V. N. KALE DIRECTOR	

It is confirmed reports 09/MF5245 Di maha mahaan checked