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COMMERCIAL TEST REPORT (Batch)

संख्या / No. : T-823/1332/2012
माह / Month : April, 2012

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ESCORTS LIMITED, FARMTRAC 60 TRACTOR



सत्यमेव जयते

भारत सरकार
कृषि मंत्रालय
(कृषि एवं सहकारिता विभाग)

GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE
(DEPARTMENT OF AGRICULTURE & CO-OPERATION)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान
ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE
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ESCORTS LTD. FARMTRAC 60 TRACTOR –
Commercial (Batch Test)

Manufacturer : M/s. Escorts Limited
Plot No 2 & 3,
Sector 13, Faridabad-121007
Haryana

Test requested by : M/s. Escorts Limited,
15/5, Mathura Road
Faridabad -121007, Haryana

Place of running-in : CFMT&TI, Budni

Duration of said running-in, (h):

- Engine : 20

- Transmission : 30

Method of Selection : The test sample was selected randomly out of five tractors from the production line by the representative of testing authority.

1. SPECIFICATIONS

1.1 Tractor:

Make : Escorts limited

Model : Farmtrac 60

Type : Four wheeled, rear-wheel driven, general purpose, agricultural tractor.

Year of manufacture : 2010

Chassis number : T-2193520

Country of origin : India

Variants, if any* :

S No.	Variant model	Variant Features
1.	Farmtrac 60 VM PS	With single clutch, Power Steering, 13.6x28 rear tyre
2.	Farmtrac 60 AM	With 32.3 Kw PTO power, 1850 Rated speed, Dual Clutch, Mechanical steering, 13.6 x 28 rear tyre.
3.	Farmtrac 60 LM	With 32.3 Kw power, 1850 Rated speed, Single Clutch, Mechanical steering, 14.9 x 28 rear tyre, Oil Immersed Brakes, 1500 Kg Lifting Capacity.
4.	Farmtrac 60 EPI AM	With 32.3 Kw PTO power, 1850 Rated speed, Dual Clutch, Mechanical steering, Oil Immersed Brakes, Epicyclic reduction, 13.6 x 28 rear tyre, 1500 Kg lifting Capacity.

*The variant models are yet to be tested at this Institute.

1.2 Engine:

Make : Escorts limited

Model : AF3.315A-3A

Type : Four stroke, naturally aspirated, water cooled, direct injection, diesel engine.

Serial number : E-2196424



14.4 Adequacy of literature:

- i) Operator's manual and repair manual was supplied with the test tractor for reference during the test. The spare parts catalogue was not provided.
The following information was not provided in the operator's manual.
- Recommended matching size of implements
 - Safe trailer hitching height and maximum gross load of the trailer.
 - Preparation and maintenance of tractor for wet land operation if any.
- Operator's manual repair manual and spare parts catalogue is supplied with the test tractor for reference during the test.

15. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

15.1 Evaluative (mandatory) / Non-evaluative (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:

Sl. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2008	Values declared by the applicant/ (D) Requirement (R)	As observed	Whether meets the requirements (Yes/No.)
1	2	3	4	5	6	7
15.1.1 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 >35hp. -7.5/+10% for PTO power ≤ 35 hp	31.3 (D)	31.7	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	31.3 (D)	31.7	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	254 (D)	249	Yes



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1	2	3	4	5	6	7
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	152.0 (D)	191.9	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10% (R)	26.8	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)	105	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.	110 (D)	93	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.52 (R)	0.18	Yes
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	Yes
15.1.	Drawbar performance :					
a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	19.60 (R)	22.65	Yes
				20.1 (D)		
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	12.56 (R)	15.24	Yes
				14.9 (D)		
c)	Maximum drawbar power without ballast, (kW).	Evaluative	Min. 80% of PTO power as referred in 15.1.1 (a) of PTO performance	25.4 (R)	25.8	Yes
				27.9 (D)		
d)	Maximum transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	125 (D)	88	Yes

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15.1.3

a)

b)

15.1.4

a)

b)

15.1.5

a)

b)

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1	2	3	4	5	6	7
15.1.3	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%]	10.3 (D)	9.46	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	7.61 (R) (Minimum)	8.26	Yes
				8.33 (D)		
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	[Tolerance of plus 5 mm]	50 (R)	18	Yes
15.1.4	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)	5.20	Yes
2)	Hot brake	Evaluative	10	10 (R)	7.00	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (R)	360 to 400	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 (R)	Yes	Yes
15.1.5	Noise measurement :					
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	88 (Maximum) (R)	86	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	98 (Maximum) (R)	96	Yes
15.1.6	Amplitude of mechanical vibrations at :					
1)	Left foot rest	Non Evaluative	100 microns (max)	100 (Maximum) (R)	70	Yes
2)	Right foot rest				90	Yes
3)	Seat (with driver seated)				100	Yes
4)	Steering control wheel				150	No



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1	2	3	4	5	6	7
15.1.7 Haulage requirements :						
a) Gross mass of the trailers, (tones):						
1)	Two wheel	Non	--	5.0 (D)	5.0	Yes
2)	Four wheel	Evaluative	--	6.0 (D)	6.0	Yes
b) Distance travelled / litre of fuel consumption, (km/l):						
1)	Two wheel	Non	--	4.5 to 5.5 (D)	5.73 to 5.96	Yes
2)	Four wheel	Evaluative	--	5.0 to 6.0 (D)	5.52 to 5.56	Yes
c) Fuel consumption (ml/km/tonne):						
1)	Two wheel	Non	--	30 to 35 (D)	33.6 to 34.9	Yes
2)	Four wheel	Evaluative	--	32 to 37(D)	30.0 to 30.2	Yes
15.1.8 Wetland cultivation :						
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-				
15.1.9 Safety features :						
a)	Guards against moving and hotparts	Evaluative	As per CMVR	At present no requirements	provided	Yes
b)	Lighting arrangement	Evaluative	As per CMVR	--	Provided	Yes
15.1.10 Labelling of tractors (Provision of labelling plate):						
1)	Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	--	Escorts limited	Yes
2)	Model	Evaluative		--	Farmtrac 60	Yes
3)	Year of manufacture	Evaluative		--	11B-11A (February, 2011)	Yes
4)	Engine number	Evaluative		--	E-2196424	Yes
5)	Chassis number	Evaluative		--	T-2193520	Yes
6)	Declaration of PTO power, (kW)	Evaluative		--	31.3 (42.5)	Yes
15.1.11 Discard limit for:						
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	112.071 for 1 st grading & 112.123 for 5 th grading	111.79 to 111.81	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.465 (D)	0.205 to 0.233	Yes

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(g)
(h)
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1	2	3	4	5	6	7
(c)	Ring end gap (mm):					
Yes	- Top comp. ring.	Evaluative	-do-	2.00	0.45 to 0.55	Yes
Yes	- 2 nd comp. ring.		-do-	2.00	0.55 to 0.60	Yes
Yes	- Oil ring.		-do-	2.00	0.65 to 0.70	Yes
(d)	Ring groove clearance (mm):					
Yes	- Top comp. ring.	Evaluative	-do-	0.20	Tapered	--
Yes	- 2 nd comp. ring.		-do-	0.20	0.080 to 0.090	Yes
Yes	- Oil ring.		-do-	0.30	0.037 to 0.041	Yes
(e)	Clearance of main bearings (mm):					
Yes	- Diametrical clearance	Evaluative	To be specified by the manufacturer	0.40	0.076 to 0.152	Yes
Yes	- Crankshaft end float	Evaluative		0.60	0.12	Yes
(f)	Clearance of big end bearings, (mm):					
Yes	- Diametrical	Evaluative	-do-	0.60	0.084 to 0.093	Yes
Yes	- Axial	Evaluative	-do-	0.80	0.25	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.40	0.11 to 0.19	Yes
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.40	0.15 to 0.21	Yes
15.1.12	CATEGORY OF BREAKDOWNS / DEFECTS :					
S. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2008	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	

15.2 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	Maximum oil pull over, (%)	0.25% (max.)	0.15	Yes
2.	Seating requirements	Should meet the requirements of IS: 12343-1998	Does not meet the requirements	No



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1	2	3	4	5
3.	Fitment of ROPS	With a provision for fitment of ROPS.	Not provided	No
		If ROPS fitted it should meet the requirement of IS: 11821-1992	ROPS not fitted	Not applicable
4.	Technical requirements for PTO shaft	Should meet the requirements of IS: 4931 -1995	Does not meet the requirements	No
5.	Dimensions of three point linkage	Should meet the requirements of IS: 4468 (Part-I)-1997	Does not meets the requirements	No
6.	Specifications of linkage drawbar	Should meet the requirements of IS: 12953-1990.	Meets the requirements	Yes
	Specification of swinging drawbar	Should meet the requirements of IS: 12362 Part 3-1994.	Not provided	Not applicable
7.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Provided	Yes

15.3 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)] : **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)/ISO 730-1:1994] : **Does not conform**
- 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 (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**

**15.4 Salient Observations:****15.4.1 Laboratory tests:****15.4.1.1 PTO Performance:**

- i) The backup torque is 26.8%.
- ii) The maximum power was recorded as **33.3 & 31.7 kW** in case of previously tested and present test sample respectively against the declaration of **31.3 kW**, which is 4.80 % less in case of present test sample.
- iii) The specific fuel consumption corresponding to maximum power was recorded as **253 & 249 g/kWh** in case of previously tested and present test sample respectively against the declaration of **254 g/kWh**, which meets the requirement of IS: 12207-2008 with regard to tolerance.
- iv) The power drop under high ambient condition in compare to the natural ambient condition was recorded as **4.4 %**.

15.4.1.2 Drawbar performance:

- i) The maximum drawbar power with unballasted tractor was recorded as **29.2 kW & 25.8 kW** in case of previously tested and present test sample against the minimum requirement of **26.6 & 25.4 kW** respectively.
- ii) The maximum drawbar pull corresponding to 15% wheel slip with unballasted tractor was recorded as **14.9 kN & 15.24 kN** in case of previously tested and present test sample against the minimum requirement of **12.59 & 12.56 kN** respectively.
- iii) During drawbar performance the tyre creeping over rim of LHS & RHS tyre were observed **80 & 90 mm** respectively, it is on higher side and should be looked into.

15.4.1.3 Hydraulic performance:

- i) During lift load maintenance test maximum drop was observed as 365 mm. the cleaning of valve assembly hydraulic safety (part No. D 10059570) was done by air pressure. Thereafter the maximum drop was observed as 18mm. This should be looked into.

15.4.1.4 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 steering control wheel. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

15.4.1.5 Three point linkage:

- i) Lateral distance from lower hitch point to centre line of tractor does not meets the requirement of IS: 4468 (Part-1)-1997. This should be looked into for necessary corrective action.
- ii) Some of the parameters of the three point linkage conform to Cat.-I and some of them conform to Cat.-II. Keeping in view of the spirit of standardization, the necessary improvements may be incorporated.

15.4.1.6 Linkage drawbar:

- i) Some of the parameters of linkage drawbar conforms to Cat.I and same of them conform to Cat.II. In view of the spirit of standardization, necessary improvements may be incorporated.



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15.4.1.7 **Power take-off shaft:**

- i) The dimensions 'dø' of the Power take-off shaft does not meet the requirement of IS: 4931-1995. This should be looked into for necessary corrective action.
- ii) All the dimensions of master shield of the Power take-off shaft do not meet the requirement of IS: 4931-1995. This should be looked into for necessary corrective action.

15.4.1.8 **Operator's Seat:**

Longitudinal distance from seat index point to the center of steering control wheel does not meet the requirements of IS: 12343:1998 and calls for necessary corrective action.

15.4.2 **Field performance test:**

15.4.2.1 **Wetland cultivation (Puddling operation):**

No ingress of mud or water was observed during wetland cultivation. Hence the tractor meets the requirements for wet land cultivation (Puddling operation) as per IS: 11082-1984 and found suitable for wetland cultivation.

15.4.3 **Components/ assessment of wear:**

Scratch marks were observed on the LHS king pin lower bush. This should be looked into.

15.5 **Maintenance / Service Problems:**

No noticeable maintenance or service problem was observed during the test.

15.6 **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 remain the Fuel shut-off knob in "STOP" position without application of sustainable manual effort.
- iii) The minimum cautionary notice as per clause 11.2 of IS: 12239 (Part-2)-1999 has not been provided.
- iv) The working clearance between the hydraulic position & draft control levers should be provided as per the requirement of relevant Indian Standard.
- v) Provision of transport lock.

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

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

- a) Operator's manual
- b) Repair manual
- c) Spare part's catalogue

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- 15.7.2 The modified operator's manual submitted by the applicant was found adequate.
- 15.7.3 The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.

TESTING AUTHORITY:

R.K.NEMA
AGRICULTURAL ENGINEER

J. J. R. NARWARE
SENIOR AGRICULTURAL ENGINEER

V.N. KALE
DIRECTOR

16. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
16.1	Clause No. 1.13.2(III), 1.14.1(dØ), 1.14.2 1.20.1, 1.20.3, 1.20.4, 1.20.5, 15.3(ii)(iii)(v)(vi), (vii) (ix), 15.4.1.1(iv), 15.4.1.5(i)(ii) 15.4.1.6, 15.4.1.8, 15.6(i) to (v)	Under our policy of continuous product improvement these aspects are further being looked into & will try to eliminate these deviations soon wherever necessary.
16.2	Clause No 13.0(1 to 3) 14.3.1.6(vi) (viii) (xi) 15.4.1.2 (iii) 15.4.1.3(i), 15.4.1.7, 15.4.3	These being studied and corrective action would be taken in near future.
16.3	Clause No. 14.3.1(ix), (x) 15.4.1.4	We would be looking into possibility to reduce noise and vibration levels further.



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

Sr. No.	Item	M.B. Plough	Rotavator
1	Make	Field King	Maschio Itali
2	Type	Mounted	Mounted
3	No. of Bottoms/Blades	Three	42, in 8 flanges
4	Type of Bottom/Blades	General purpose	Hatchet
5	Size of Bottoms/Blades (mm)	385	245 x 75 x 6
6	Spacing of bottoms/Flanges, (mm)	280	245
7	Lower hitch point span, (mm)	785	735
8	Mast height, (mm)	510	470 & 610
9	Overall Dimensions (mm)		
	- Length	1920	1020
	- Width	1040	1985
	- Height	1180	1045
10	Gross Mass, (Kg)	345	440

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

Sr. No.	Items	Specification
1	Type	Full cage wheel
2	Outer dia. (mm)	1250
3	Width (mm)	1010
4	No. & Type of Lugs	32, straight lugs made up of M.S. angle section welded to angle iron frame
5	Size of angle section, (mm)	40x40x6
6	Length of lug, (mm)	500
7	Spacing of lug, (mm)	180
8	Weight of each cage wheel (kg)	170

ANNEXURE - IIITRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	50.0
2.	PTO performance test	12.1
3.	Drawbar performance test	14.7
4.	Power lift and hydraulic pump performance test	3.5
5.	Brake test	2.1
6.	Air cleaner oil pull-over test	3.5
7.	Noise measurement	1.7
8.	Mechanical vibration test	1.0
9.	Theoretical speed test	1.0
B.	FIELD TEST:	
1.	M.B. ploughing	10.2
2.	Rotavation	11.0
3.	Puddling (including 5.0 hours water proof test)	15.0
C.	HAULAGE TEST:	8.8
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	8.4
	TOTAL:	143.0