



ESCORTS LIMITED, POWERTRAC 4455 BT TRACTOR



सत्यमेव जयते

भारत सरकार

GOVERNMENT OF INDIA

कृषि मंत्रालय (कृषि एवं सहकारिता विभाग, मशीनीकरण एवं प्रौद्योगिकी प्रभाग)
Ministry of Agriculture (Deptt. of Agri. & Co-op, Mechanization & Technology Division)

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO : 9001 - 2008 Certified Institute)

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Manufacturer : M/s. Escorts Limited,
Plot No 2 & 3, Sector-13,
Faridabad – 121 007 (Haryana)

Test requested by : M/s. Escorts R & D Centre,
15/5, Mathura Road,
Faridabad – 121 003 (Haryana)

Place of running-in : At applicant's works.

Duration of said running-in, (h):

- Engine : 20
- Transmission : 30

Method of Selection : The tractor was submitted directly by the applicant for test. Hence, method of selection is not known.

1. SPECIFICATIONS

1.1 Tractor:

- Make : Escorts Limited
- Model : Powertrac 4455 BT
- Brand name : Powertrac
- Type : Four wheeled, rear-wheel driven, Standard Agricultural Tractor.
- Year of manufacture : 2014 (February 2014)
- Chassis number : B-3227482
- Country of origin : India
- Variants, if any * : None

1.2 Engine:

- Make : Escorts Limited
- Model : AE4.312A-3A
- Type : Four stroke, naturally aspirated, water cooled, direct injection, diesel engine.
- Serial number : E-3251191

1.2.1 Engine speed(Manufacturer's recommended production setting), (rpm):

- Maximum speed at no load : 2300 to 2400
- Low idle speed : 600 to 700
- Speed at maximum torque : 1200 to 1300

Rated speed, (rpm):

- For PTO use : 2200
- For drawbar use : 2200

1.3 Cylinder & Cylinder Head:

- Number : Four
- Disposition : Vertical, Inline
- Bore/stroke, (mm) : 95/110
- Capacity as specified by the applicant, (cc) : 3120
- Compression ratio : 18.0 ± 5% : 1
- Type of cylinder head : Monoblock
- Type of cylinder liners : Wet, replaceable



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Condition of seals for stub axles and king pins : Normal
Clearance between centre pin and bushes, (mm) : 0.014 to 0.393 | Against the discard limit of 0.50 mm

14.6 Steering system:
Visual condition of the components of complete steering assembly : Normal

14.7 Starter motor & Alternator:
Presence of soil/oil in housing : None
Condition of bearings and other components : Normal

15. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

Sl. No.	Adjustments/Defects/Breakdowns and Repairs	Tractor run hours
	Nil	

16. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

16.1 Evaluative (mandatory) / Non-evaluative (Non-mandatory) parameters 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	32.8 (D)	33.8	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	32.8 (D)	32.8	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	256 (D)	261	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	181.3 (D)	188.8	Yes



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1	2	3	4	5	6	7
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10 percent, min (R)	28.7	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 (D)	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.	110 (D)	98	Yes
g)	Engine oil consumption, (g/kWh) Smoke level	Evaluative Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	2.56 (D) 2.64 (R)	0.70	Yes
h)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	3.25 per meter (R)	0.47	Yes
16.1.2	Drawbar performance :					
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	21.8 (D) 21.8 (R) Minimum	26.54	Yes
b)	Max. drawbar pull with standard ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	14.90 (D) 14.95 (R) Minimum	17.16	Yes
c)	Maximum drawbar power with standard 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.	26.6 (D) 27.0 (R) Minimum	29.9	Yes

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1	2	3	4	5	6	7
d)	Max. transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	130 (D)	109	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%]	14.70 (D)	14.87	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	9.80 (D) 7.96 (R) (Minimum)	13.07	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	The observed value not exceed 50 mm	50	66	No
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 ballast* (m):						
1)	Cold brake	Evaluative	10	10 (R)	6.67	Yes
2)	Hot brake	Evaluative	10	10 (R)	6.98	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (R)	186 to 198	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
*The manufacturer has not recommended ballasting for road test. Therefore, the brake test was conducted under unballasted condition only.						
16.1.5 Noise measurement:						
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	88 (R)	84	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	98 (R)	95	Yes
16.1.6 Amplitude of mechanical vibrations at :						
1)	Left foot rest	Non Evaluative	100 microns (max)	100 (R)	170	No
2)	Right foot rest				210	No
3)	Seat (with driver seated)				150	No
4)	Steering Wheel				130	No



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16.1.8	Haulage requirements :						
a)	Gross mass of the trailers, (tones):						
	1)	Two wheel	Non Evaluative	--	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 Evaluative	--	4.0 to 6.5 (D)	5.44 to 5.66	Yes
	2)	Four wheel	Evaluative	--	4.0 to 6.5 (D)	4.81 to 510	Yes
c)	Fuel consumption (ml/km/tonne):						
	1)	Two wheel	Non Evaluative	--	25 to 35 (D)	35.29 to 36.75	No
	2)	Four wheel	Evaluative	--	25 to 35 (D)	32.64 to 34.65	Yes
*The manufacturer has not recommended ballasting for road test. Therefore, the brake test was conducted under unballasted condition only.							
16.1.9	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.	There should be no ingress of water and/or mud	No ingress of water and/or mud was observed	Yes	
	1) Clutch assembly	-do-					
	2) Brake housings	-do-					
	3) Front axle hubs	-do-					
	4) Engine oil	-do-					
	5) Transmissi on oil	-do-					
16.1.10	Safety features :						
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes (As per IS 12239 part 2)	--	*Not applicable	--	
	*The guard against moving and hot part is not fully guarded as per code requirement. The year of manufacture of the test sample is before the date of implementation of relevant IS: 12207-2014. Therefore for prospective effects of implementation of code this conforms to IS: 12239 (Part-2)-1999 (Re-affirmed in March, 2009).						
b)	Lighting arrangement (Tractor having more than 1150 mm rear track width)	Evaluative	As per CMVR	--	Provided	Yes	
		Non-Evaluative	Should meet the requirements of IS 12343 (as amended from time to time)	--	Does not meet the requirement	No	
c)	Seating requirement (Tractors having more than 1150 mm rear track width)	Non-Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--	Provided	Yes	
		Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--	Does not meet the requirement	No	
d)	Technical requirements for PTO shaft	Non-Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--	Provided	Yes	



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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 meet 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)	--	Conforms	Yes	
16.1.11	Labelling of tractors (Provision of labelling plate):						
			Should conform to the requirements of CMVR along-with declared value of PTO HP	--	Escorts limited	Yes	
	1) Make	Evaluative		--	Powertrac 4455 BT	Yes	
	2) Model	Evaluative		--	2014	Yes	
	3) Year of manufacture	Evaluative		--	E 3251191	Yes	
	4) Engine number	Evaluative		--	B 3227482	Yes	
	5) Chassis number	Evaluative		--	32.8 (43.9)	Yes	
	6) Declaration of PTO power, (kW)	Evaluative					
16.1.12	Discard limit for:						
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	95.30 (D)	95.00 to 95.01	Yes	
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.50 (D)	0.152 to 0.163	Yes	
(c)	Ring end gap (mm):			-do-	2.00	0.40 to 0.50	Yes
	- Top comp. ring	Evaluative	-do-	2.00	1.00 to 1.05	Yes	
	- 2 nd comp. ring		-do-	2.00	0.45 to 0.50	Yes	
	- Oil ring						
(d)	Ring groove clearance (mm):			-do-	0.50	Tapper	--
	- Top comp. ring	Evaluative	-do-	0.40	0.074 to 0.083	Yes	
	- 2 nd comp. ring		-do-	0.30	0.040 to 0.061	Yes	
	- Oil ring						
(e)	Clearance of main bearings (mm):			0.40	0.042 to 0.111	Yes	
	- Diametrical clearance	Evaluative	To be specified by the manufacturer	0.75	0.20	Yes	
	- Crankshaft end float	Evaluative					
(f)	Clearance of big end bearings, (mm):			-do-	0.40	0.057 to 0.100	Yes
	- Diametrical	Evaluative	-do-	0.75	0.35	Yes	
	- Axial	Evaluative	-do-	0.50	0.303 to 0.424	Yes	
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.50	0.014 to 0.393	Yes	
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.50			



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1	2	3	4	5	6	7
16.1.13 Literature (Submission to test agency)						
(a)	Operator manual	Evaluative	Provided/Not Provided	As relevant Code (IS 8132)	per IS	Provided Yes
(b)	Parts Catalogue	Evaluative	Provided/Not Provided	As relevant Code (IS 8132)	per IS	Provided Yes
(c)	Workshop/ Service manual	Evaluative	Provided/Not Provided	As relevant Code (IS 8132)	per IS	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.	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
16.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2014:						
S. No.	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		Not provided		Not applicable
2.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.		Provided		Yes



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- 16.3 Conformity with following IS:**
- i) Guide lines for declaration of power and specific fuel consumption and labelling of agricultural tractors (First revision) [IS10273: 1987 (Reaffirmed 2009)] : Conforms
 - ii) Agricultural tractors - Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS:4931-1995 (Reaffirmed 2009)] : Conforms
 - 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 2007)] : Conforms
 - v) Agricultural tractors - Operator's seat technical requirement [IS 12343 -1998 (First revision) (Reaffirmed 2009)] : **Does not conform**
 - vi) Guide for safety & comport of operator of agricultural tractors: Part 1 General requirements (first revision): [IS 12239 (PT-1) 1996/ISO 4254-1:1989 (Reaffirmed 2009)] : **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 2009)] : **Does not conform**
 - viii) Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) IS: 8133-1983 (Reaffirmed 2009)] : **Does not conform**
 - ix) Tractors and machinery for agriculture and forestry, powered lawn and garden equipment - Symbols for operator controls and other displays Part 2 Symbols for agricultural tractors and machinery [IS:6283 (Part-1)-2006 and IS: 6283 (Part-2)-2007 (Reaffirmed 2009)] : Conforms
 - x) Agricultural Tractors and Machinery - Lighting device for travel on public roads (IS: 14683-1999) (Reaffirmed 2009)] : Conforms

16.4 Salient Observations:

16.4.1 Laboratory tests:

16.4.1.1 PTO Performance:

- i) The backup torque is 28.7 %.
- ii) The specific fuel consumption corresponding to maximum power was measured as **261 g/kWh** against the declaration of 256 g/kWh, which is within the tolerance limit of IS: 12207-2014.

16.4.1.2 Drawbar performance:

During 10 hour drawbar test, creeping of LHS & RHS rear tyre over the rims was observed as 50 mm & 55 mm respectively, which was considered on higher side. This should be looked into for necessary corrective action.



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- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed 2007)] : Conforms
- v) Agricultural tractors - Operator's seat technical requirement [IS 12343 -1998 (First revision) (Reaffirmed 2009)] : Does not conform
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16.4.1.3 Hydraulic Performance:

The maximum Cumulative drop in height of lift during load maintenance test was observed was 66 mm which does not meet the required limit of 50 mm, this should be looked into for necessary corrective action.

16.4.1.4 Mechanical Vibration:

The amplitude of mechanical vibration on various assemblies marked as (*) in Chapter-8 of this test report is on higher side, especially at the foot rest, seat (with driver seated) and steering control wheel. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

16.4.1.5 Three point linkage:

The lateral distance from lower hitch point to center line of tractor does not meet the requirements of IS-4468-(Part I)-1997. This should be looked into for necessary corrective action.

16.4.1.6 Operator's seat:

- i) The length and width of operator's seat was observed as 200 & 440 mm against the requirement of '260 ± 50' & '450' mm as per IS: 12343-1998. This should be looked into for necessary corrective action.
- ii) The longitudinal distance of SIP from steering control wheel does not meet the requirements of IS: 12343-1998. This should be looked into for necessary corrective action.

16.4.2 Field performance test:

16.4.2.1 Wetland cultivation (Puddling operation):

No ingress of mud and / or water was noticed during puddling operation of the tractor and meet the requirements of IS: 11082-1984 (Technical requirements of agricultural tractors for wetland operation). Therefore, the tractor is recommended as suitable for wetland operation (Puddling).

16.4.2.2 Haulage performance:

The Specific Fuel consumption (ml/km/tonne) with two wheel trailers were observed as 35.29 to 36.75 respectively against the declaration 25 to 35 ml/km/tonne. This does not meet the requirement of IS: 12207-2014 and therefore, should be looked into for necessary corrective action.

16.5 Maintenance / Service Problems:

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

16.6 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) The working clearance around the hydraulic position control lever and mudguard may be provided as per IS: 12239 (Part-2) – 1999.
- iii) Fuel shut-off knob does not remain in "STOP" position.
- iv) Provision for master shield for PTO shaft.
- v) The guard for alternator, silencer, belt drives, pulley and hydraulic pipes should be as per IS: 12239 (Part-2)-1999.

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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) Tractor operator's Manual (For Powertrac 4455 BT tractor model)
 ii) Tractor part's catalogue (For Powertrac 4455 BT tractor model)
 iii) Tractor repair Manual (For Powertrac 4455 BT tractor model)
 16.7.2 The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.

17. Citizen charter

Duration of Test	Test duration under citizen charter	Whether the report released within time frame given citizen charter	Remark, if any
10 Months	10 Months (June, 2014 to March, 2015)	Yes	None

TESTING AUTHORITY:

H.L.YADAV
SENIOR AGRICULTURAL ENGINEER

C.R.LOHI
DIRECTOR

Test Report compiled by: **Shri. Pramod Yadav**, Senior Technical Assistant.

18. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
18.1	16.3 (iii),(v),(vi), (vii) & (viii), 16.4.1.5, & 16.4.1.6	Under our policy of continuous product improvement this aspect is further being looked into and improved design will be incorporated in product very soon.
18.2	16.4.1.2, 16.4.1.3, 16.4.1.4, 16.4.2.2, 16.6 & 16.7.3	These are being studied & corrective action will be taken in near future wherever required.