



ESCORTS LIMITED, POWERTRAC 439 TRACTOR



सत्यमेव जयते

भारत सरकार

कृषि एवं किसान कल्याण मंत्रालय
कृषि, सहकारिता एवं किसान कल्याण विभाग
मशीनीकरण एवं प्रौद्योगिकी प्रभाग

GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS WELFARE

(DEPARTMENT OF AGRICULTURE, CO-OPERATION & FARMERS WELFARE, MECHANIZATION & TECHNOLOGY DIVISION)

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

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO : 9001 - 2015 Certified Institute)

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3. ESSENTIAL TESTS

3.1 SPECIFICATIONS

	<u>Previous Sample</u>	<u>Present Sample</u>
3.1.1 Tractor:		
Make	Escorts limited	Escorts limited
Model		POWERTRAC 439
Brand		POWERTRAC
Type		Four wheeled, rear wheel driven, unit construction, general purpose, agricultural tractor.
Month & year of manufacture		09 & 19
Chassis number		T053454B57FH
Country of Origin		India
3.1.2 Engine:		
Make		Escorts Limited
Model		E3.215 D-3A
Type		Four stroke, naturally aspirated, water cooled, direct injection, diesel engine
Serial number		E3512496
Engine speed (Manufacturer's recommended production setting), (rpm):		
- Maximum speed at no load,		2475 to 2525
- Low idle speed		600 to 650
- Speed at maximum torque		600 to 700
Rated speed, (rpm):		1200 to 1300
- For PTO use		2200
- For drawbar use		2200
3.1.3 Cylinder & Cylinder Head:		
Number		Three
Disposition		Vertical, Inline
Bore/stroke, (mm)		91.0/110.0
Capacity as specified by the applicant, (cc)		2146
Compression ratio		18.0 ± 5% : 1
Type of cylinder head		Mono block
Type of cylinder liners		Wet, replaceable
Type of combustion chamber		Direct injection, open chamber in piston crown.
Arrangement of valves		Overhead, inline
Valve clearance (cold/hot):		
- Inlet valve, (mm)		0.3
- Exhaust valve, (mm)		0.4
3.1.4 Fuel System:		
Type of fuel feed system		Gravity and forced feed
3.1.4.1 Fuel tank:		
Capacity, (l)	45.6	47.0
Location		Above clutch housing
Provision for draining of sediments / water		Not provided
Material of fuel tank	Steel sheet	Metallic



5. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

5.1 On the basis of tests conducted the performance results have been summarized as Evaluative (mandatory) / Non-evaluative (Non-mandatory) parameters applicable for qualifying Minimum Performance criteria as per Clause-4 (Table-1) of IS: 12207-2019 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- 2019	Values declared by the applicant/ (D) Requirement (R)		As observed		Whether meets the require- ments (Yes/No)
				Previous model	Current model	Previous model	Current model	
1	2	3	4	5 (a)	5 (b)	6 (a)	6 (b)	7
5.1.1	PTO Performance							
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: $\pm 5\%$ for PTO power and or engine power > 25 kW, $\pm 10\%$ for PTO power and or engine < 25 kW.	25.0 (D)	25.0 (D)	26.2	24.9	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	25.0 (D)	25.0 (D)	26.2	24.5	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% max.	238 (D)	238 (D)	232	245	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	+ 8%	137 (D)	137 (D)	140.3	130.0	Yes
e)	Back-up torque, percent	Evaluative	12 percent	12 (D)	12 (D)	27.2	22.3	Yes
f)	Maximum operating temperature, ($^{\circ}$C)							
	1) Engine oil	Evaluative	The declared value should not exceed the max. value specified by the manufacturer and the observed value under high ambient condition should not exceed the declaration.	125 (D)	125 (D)	105	99	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.	110 (D)	110 (D)	104	104	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions.	2.36 (D)	2.38 (D) 2.46 (R)	0.20	0.50	Yes
h)	Smoke level, m^{-1}	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No 52 or 75 Hartridge value (As per CMVR).	3.25 Max. (R)	3.25 Max. (R)	0.07	0.18	Yes



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1	2	3	4	5	6
5.1.3 Safety features :					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulley, sfencer, hydraulic pipes (As per IS 12239 (part 2)	Meets the requirement	Yes
b)	Lighting arrangement	Evaluative	As per CMVR	Meets the requirement	Yes
c)	Sealing 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)	Meets the requirement	Yes
d)	Technical requirements for PTO shaft	Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	Meets the requirement	Yes
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 drawbar	Evaluative	Should meet the requirements of IS 12953 (as amended from time to time)	Meets the requirement	Yes
g)	Swinging drawbars (wherever fitted)	Evaluative	Should meet the requirement of IS 12162 (part 3) (as amended from time to time)	Not provided	Not applicable
h)	1) Maximum travelling speed at rated engine speed in reverse gear, kmph	Evaluative	Should not exceed 20 kmph	10.11 kmph (Meets the requirement)	Yes
	2) Audible warning signal on tractor	Evaluative	As soon as the travelling speed in reverse gear reaches to 20 kmph, an audible warning signal on tractor be achieved. the safety aspects about the operation of shuttle technology shall be brought in operation and manufacturer/ dealer shall ensure the training on this aspects to operator before the delivery of tractor	Not applicable	Not applicable
5.1.4 Labelling of tractors (Provision of labelling plate): Present Sample					
i)	Make	Evaluative	Should conform to the requirements of CMVR along with maximum PTO power in kW and year of manufacture in numerical form MM YY Digit 01-12 in box no.1 for MM will represent the months & next two digits in box no. 2 for YY will represent the year of manufacturing	ESCORTS LIMITED	Yes
ii)	Model	Evaluative		POWERTRAC 439	Yes
iii)	Month & Year of manufacture	Evaluative		09 , 19	Yes
iv)	Engine serial number	Evaluative		E3512496	Yes
v)	Chassis serial number	Evaluative		T053454857FH	Yes
vi)	Maximum PTO power, kW	Evaluative		25.0	Yes



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1	2	3	4	5	6	7
5.1.5	Literature (Submission to test agency)					
	a) Operator manual	Evaluative	The printed literature in booklet form should be provided as per IS 8132 & should submit along with the test sample	Provided	Provided	Yes
	b) Parts Catalogue					
	c) Workshop/ Service manual					
5.1.6	Filament of roll over protective structures (ROPS) for tractor having more than 1150 mm rear track width	Evaluative	ROPS should meet the requirement of IS 11821 or OECD code or equivalent international standard	-	Not fitted	Not applicable
5.1.7	Standard Accessories	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with the tractor.	-	Provided	Yes
5.1.8	Accessories (optional)	Non Evaluative	Ballast weights, if fitted, should meet the requirement of CMVR	--	Provided	Yes

5.1.5 Salient Observations:

5.1.5.1 Laboratory tests:

5.1.5.1.1 PTO Performance:

- i) The maximum power was located at 2300 rpm of engine, which is 4.5% higher side than rated engine speed i.e. 2200 rpm, which indicates that the fuel injection pump setting is not proper. This should be looked into for necessary corrective action.
- ii) The maximum PTO power was recorded as **24.9 kW** against the declaration of **25.0 kW**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
- iii) The specific fuel consumption corresponding to maximum power was recorded as **245 g/kWh** against the declaration of **238 g/kWh**, which is within the tolerance limit of IS: 12207-2019.
- iv) The maximum equivalent crankshaft torque was recorded as **130.0 Nm** against the declaration of **137 Nm**, which is within the tolerance limit of IS: 12207-2019.
- v) The backup torque is 22.3 % and meets the evaluative requirement of IS: 12207-2019

5.1.5.1.2 Three Point Linkage:

The dimensions of lateral distance from lower hitch point to centre line of tractor and distance from end of power take-off shaft to centre of lower hitch point (lower link in horizontal position) does not meet the non evaluative requirement of IS:4468 (Part-I) - 1997. This should be looked into for necessary corrective action.

5.1.5.1.3 Operator's work place:

Operator's work place meets the requirements of IS: 12239 (Part-1 & Part-2) 1996, except the following:

- i) Provision of spark arresting device in the exhaust system.
- ii) Width of foot step.
- iii) Vertical retainness is not provided on both sides of clutch and brake pedals.
- iv) The working clearance around control lever is not provided as per minimum requirement.



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Yes
Not applicable
Yes
Yes

- 5.1.5.1.4 Symbols of operator's controls and other displays:**
All controls are identifiable with the symbols as per IS: 6283 (Part 1&2)-1998, except the provision of Oil lubricant, type and its frequency chart.
- 5.1.5.2 Maintenance / Service problems:**
No noticeable maintenance and service problems was observed during the test.
- 5.1.5.3 Recommendation with regard to safety on tractor:**
The following requirements, inter-alia, may be considered for incorporation on the tractor as per relevant Indian Standards:
- i) Provision of spark arresting device in exhaust system.
 - ii) The working clearance around position and draft control lever is less than the minimum requirement
 - iii) Oil lubricant type and its frequency chart should be provided on the tractor.
 - iv) There should be provision against accidental start of tractor.
 - v) Differential lock has not been provided.
 - vi) PTO master shield may be provided.
- 5.1.5.4 Adequacy of Literature:**
Literature was supplied with the tractor for reference during the test.
- a) Operator's Manual for Powertrac 439, 434 DS PLUS ALT 3500, 439 DS PLUS 4000 & 437 tractor models.
 - b) Spare Parts Catalogue for Powertrac 439 tractor model.
 - c) Repair manual for Powertrac 439, 434 DS PLUS ALT 3500, 439 DS PLUS 4000 & 437 tractor models.

6. CITIZEN CHARTER

Duration of Test	Test duration under citizen charter	Whether the report released within time frame given in the citizen charter	Remark
1 Months (November, 2019 to May,2020)	07 Months	Yes	None

TESTING AUTHORITY:


SHWETABH SINGH
AGRICULTURAL ENGINEER


C.V. CHIMOTE
TEST ENGINEER


J.J.R. NARWARE
DIRECTOR

The report compiled by: **Shri Shivkumar Sharma**, Senior Technical Assistant.



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7. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
7.1	5.1.5.1.1 (i)	These being studied & corrective action would be taken in near future.
7.2	5.1.5.1.2, 5.1.5.1.3 & 5.1.5.3	Your valuable comments & suggestion for improvements are well taken. Under our policy of continuous product improvement these aspect are further being looked into & will try to eliminate these deviation soon whenever necessary.

ANNEXURE - I

TRACTOR RUN HOURS DURING TEST

		HOURS
A.	LABORATORY AND TRACK TESTS:	50.0
1.	Running-in	12.5
2.	PTO performance test	0.5
3.	Nominal speed test	1.7
B	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	64.7
TOTAL:		