

व्यावसायिक वैरिएंट परीक्षण रिपोर्ट (प्रथम बैच)

संख्या/No. : T-1566/2094/2021

COMMERCIAL VARIANT TEST REPORT (1st Batch)

माह/Month : July, 2021

[ONLINE TESTING]

(यह परीक्षण रिपोर्ट 31/07/2026 तक वैध है ||THIS TEST REPORT IS VALID UPTO: 31/07/2026)



**ESCORTS LIMITED, 439 E1
(BRAND NAME- POWERTRAC) TRACTOR**



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

ट्रैक्टर नगर, बुदनी (म.प्र.)-466 445

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO 9001: 2015 Certified Institute)

TRACTOR NAGAR, BUDNI (M.P.) - 466 445

E-mail: fmti-mp@nic.in, Web site: fnttibudni.gov.in Telephone: 07564-234729, 234743

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2. FUEL AND LUBRICANTS

2.1 Fuel : The High-speed diesel oil supplied by M/s Indian Oil Corporation Limited having density of 0.836 g/cc at 15°C was used.

2.2 Lubricants:

S. No.	Particulars	As recommended by the manufacturer	As used during the test
1.	Air cleaner	SAE 15W40(API 4)/ SAE 20W40(API CD/SF- IS:13656-EP-DL-2)	As recommended
2.	Engine oil	20W40(API CD/SF- IS:13656-EP-DL-2)	As recommended
3.	Steering oil	SAE 90 (API GL-4, IS:1118-EP,Type GL-4)	Oil originally filled in the tractor systems were not changed
4.	Gearbox, differential, rear axle, rear final drive brake and hydraulic system oil	UTTO (Tract ELFSF-3I)	Oil originally filled in the tractor systems were not changed
5.	Grease	Servo grease MP	MP Grease

3. ESSENTIAL TESTS

3.1 SPECIFICATIONS

3.1.1 Tractor:

Make : Escorts limited
 Model : 439 E1
 Brand name : Powertrac
 Type : Four wheel, Rear wheel driven, Unit construction, General Purpose, Agricultural Tractor
 Month & Year of manufacture : 02 / 21
 Chassis number : T053535493LK
 Country of origin : India

3.1.2 Engine:

Make : Escorts Limited
 Model : E3.234-3A
 Type : Four stroke, Liquid cooled, Naturally aspirated, Direct injection, Diesel engine.
 Serial number : E3580759
 Country of origin : India

3.1.2.1 Engine speed (rpm), (Manufacturer's recommended production settings):

- Maximum speed at no load : 2475 to 2525
 - Low idle speed : 600 to 700
 - Speed at maximum torque : 1200 to 1300
Rated speed, (rpm):
 - For PTO use : 2200
 - For drawbar use : 2200

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7. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

7.1 On the basis of tests conducted the performance results have been summarized as evaluative (mandatory) and non-evaluation (not-mandatory) parameter 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:-

S. 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 requirements (Yes / No)
1	2	3	4	5	6	7
7.1.1	PTO Performance :					
a)	Max. power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: $\pm 5\%$ for PTO power or engine power >26 kW, $\pm 10\%$ for PTO power or Engine power ≤ 26 kW.	27.8 (D)	27.3	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	27.8 (D)	26.7	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% Max.	234 (D)	252	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	$\pm 8\%$	146 (D)	147.3	Yes
e)	Back-up torque, percent	Evaluative	12 % (Minimum)	12 (D) 12 (R)	27.8	Yes
f)	Maximum operating temperature($^{\circ}$ C)					
	1) Engine oil	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.	125 (D)	104	Yes
	2) Coolant (liquid)	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)	105	Yes
g)	Engine oil consumption,(g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.55 (R) Maximum	0.24	Yes
h)	Smoke level, (m^{-1})	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hat ridge value (As per CMVR)	3.25 (R)	0.10	Yes

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1	2	3	4	5	6	7
7.1.2	Wetland cultivation :					
	Sealing for the following assemblies:					
	1) Clutch assembly	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 (R)	The major breakdowns were not observed in the field test during Commercial Variant Test of this tractor model having test report No. T-1084/1609/2017 released in April, 2017. So, as per the provision as laid down in clause 7.2 of IS: 12207- 2019, the field test during the batch testing of this tractor model was not conducted.	--
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
	4) Engine Oil	-do-				
	5) Transmission Oil	-do-				
7.1.3	Safety features :					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pullies, silencer, hydraulics pipes(as per IS-12239 Part 2)	Meet the requirements	Yes	
b)	Lighting arrangement	Evaluative	As per CMVR	Meet the requirements	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)	Meet the requirements	Yes	
d)	Technical requirements for PTO shaft	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-I) (As amended from time to time)	Does not meet the requirements	No	
f)	Specifications of linkage drawbar	Evaluative	Should meet the requirements of IS 12953 (As amended from time to time)	Meet the requirements	Yes	
g)	Specifications of Swinging drawbar (wherever fitted)	Evaluative	Should meet the requirements of IS 12362 (Part 3) (As amended from time to time)	Not provided	Not applicable	
h)	1) Maximum travelling speed at rated engine speed in reverse gears, kmph	Evaluative	Should not exceed 20 kmph	10.18 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 shall be activated.	Not fitted	Not applicable	

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1	2	3	4	5	6	7	
7.1.4	Labelling of tractors (Provision of labelling plate):						
	1) Make	Evaluative	Should conform to the requirements of CMVR along with maximum declared value of PTO power in kW and for month & year of manufacture in numerical <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>MM</td><td>YY</td></tr></table> Digit 01-12 in box No.1 for MM will represent the month and next two digit in the box No.2 for YY will represent the year of manufacturing	MM	YY	ESCORTS LIMITED	Yes
MM	YY						
	2) Model	Evaluative		439 E1	Yes		
	3) Month & Year of manufacture	Evaluative		02 / 21	Yes		
	4) Engine number	Evaluative		E3580759	Yes		
	5) Chassis number	Evaluative		T053535493LK	Yes		
	6) Declaration of PTO power, kW	Evaluative	27.8	Yes			
7.1.5	Literature (Submission to test agency)						
(a)	Operator manual	Evaluative	Provided / Not Provided	Provided	Provided	Yes	
(b)	Parts Catalogue	Evaluative	Provided / Not Provided	Provided	Provided	Yes	
(c)	Workshop/ Service manual	Evaluative	Provided / Not Provided	Provided	Provided	Yes	
7.1.6	Fitment of Roll Over Protective Structure (ROPS): for tractors 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 Provided	Not Fitted	Not Applicable	
7.1.7	Standard accessories	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with tractor	Provided	Provided	Yes	
7.1.8	Accessories (Optional)	Non Evaluative	Ballast weights if fitted should meet the requirement of CMVR.	Provided	Provided	Yes	

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7.2 CATEGORY OF BREAKDOWNS / DEFECTS (As per clause 5.0 of IS:12207-2019) :					
S. No.	Category of Breakdown	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	As observed	Whether meets the requirement (Yes/No.)
1.	Critical breakdown	Evaluative	There is no 'critical breakdown' during the course of testing	None	Yes
2.	Major breakdowns	Evaluative	There are not more than 1 major breakdowns and neither of them is of repetitive nature	None	Yes
3.	Minor breakdowns	Evaluative	There are not more than 3 minor defects during the test and the frequency of each is not be more than two	None	Yes
4.	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed four that is, (1 major + 3 minor) or 4 minor breakdowns	None	Yes

7.3 Salient Observations:

7.3.1 Laboratory tests:

7.3.1.1 PTO Performance:

- i) The maximum PTO power was recorded as **27.3 kW** against the declaration of **27.8 kW**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
- ii) The specific fuel consumption corresponding to maximum power was recorded as **252 g/kWh** against the declaration of **234 g/kWh**, which is within the tolerance limit of IS: 12207-2019.
- iii) The maximum equivalent crankshaft torque was recorded as **147.3 N-m** against the declaration of **146.0 N-m**, which is within the permissible limit as specified in IS: 12207-2019.
- iv) The backup torque is **27.8 %** and meets the requirement of IS: 12207-2019
- v) During PTO performance test under natural ambient condition, maximum PTO power and corresponding specific fuel consumption was recorded as **25.1 kW & 258 g/kWh** against the declaration of **27.8 kW & 234 g/kWh** respectively. The maximum PTO power and specific fuel consumption corresponding to maximum power does not meet the evaluative requirement of IS: 12207-2019 with regard to tolerance limit. Upon the request of applicant following checking/adjustment/setting were carried out on the tractor:
 - i) Fuel filter was changed with new one.
 - ii) Fuel supply lines were checked and cleaned.
 - iii) Air cleaner was inspected & air cleaner hose were cleaned.
 - iv) Fuel injector pressure was checked and found within the declared values, Hence no adjustment was done.
 - v) Tappet clearance of 2nd cylinder Intake valve was measured as 0.40 mm against the declared value of 0.30 mm. Therefore, 2nd cylinder intake valve tappet clearance was adjusted to 0.30 mm. The tappet clearance of other intake & exhaust valves was found within the declared value.

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7.3.1.2 Three point linkage:

Distance from end of power take-off shaft to centre of lower hitch point (lower links in horizontal position) does not meet the requirement of IS:4468-1997(Part-I) (Reaffirmed in 2017). This should be looked into for necessary corrective action.

7.4 Maintenance / Service Problems:

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

7.5 Recommendation with regard to safety on tractor:

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

- i) Oil lubricant frequency chart should be provided on tractor as per the requirement of IS: 6283 (Part-1) – 2006 (Re-affirmed in January, 2019) (Part I & Part II)-1998 (Re-affirmed in January, 2019).
- ii) Provision of safety against accidental start of engine should be provided as per the requirement of IS:8133-1983 (Re-affirmed in January, 2019).
- iii) Spark arrester should be provided in the exhaust system as per the requirement of IS:12239 (Part-2)-1999 (Re-affirmed in January, 2019).
- iv) Fuel shut-off knob should remain in “STOP” position as per the requirement of IS:8133-1983 (Re-affirmed in 2014).
- v) Master shield around the PTO shaft should be provided as per the requirement of IS:4931-1995 (Re-affirmed in January, 2019).
- vi) Differential lock should be provided as per the requirement of IS:12239 (Part-2)-1999 (Re-affirmed in January, 2019).
- vi) The working clearance between position and draft control lever of hydraulic system was observed as 30 mm it should be provided as per IS:12239 (Part-2)-1999 (Re-affirmed in January, 2019).
- vii) The working clearance between position control lever of hydraulic system and mudguard was observed as 55 mm against the minimum requirement 70 mm as per IS:12239 (Part-2)-1999 (Re-affirmed in January, 2019).

7.6 Adequacy of Literature:


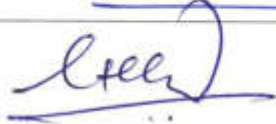

7.6.1 Following literature of following tractor models were supplied with the test sample for reference during the test.

- a) Operator’s Manual for Powertrac 439, 434 DS PLUS ALT 3500, 439 DS PLUS ALT 4000, 437 & 439 E1 tractor models.
- b) Operator’s Manual for Powertrac 439, 434 DS PLUS ALT 3500, 439 DS PLUS ALT 4000, 437 & 439 E1 tractor models.
- c) Spare Parts Catalogue for Powertrac 439 E1 tractor model.

7.6.3 The literature should be brought out in national as well as other regional languages of India for guidance of users.

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TESTING AUTHORITY:

C.V. CHIMOTE TEST ENGINEER	
Y. K. RAO SENIOR AGRICULTURAL ENGINEER	
P. K. PANDEY DIRECTOR	

Draft Test Report is compiled by: **Pratyush Satya**, Senior Technical Assistant

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8.0 APPLICANT COMMENT'S

Para No.	Our Reference	Applicant's comments
8.1	7.3.1.2, 7.5 & 7.6.2	Your valuable comments & suggestions for improvements are well taken. Under our policy of continuous product improvement these aspects are further being looked into and will try to eliminate these deviations soon wherever necessary.

ANNEXURE – I

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS	HOURS
1.	Running-in (at manufacturer's work place)	50.00
2.	PTO performance test	12.52
3.	Nominal speed test	1.32
B.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	1.55
TOTAL		65.4