

व्यावसायिक परीक्षण रिपोर्ट (प्रथम बैच)

COMMERCIAL TEST REPORT (1st Batch)

संख्या/No. : T- 1626/2157/2022

माह/Month : February, 2022

[ONLINE TESTING]

(यह परीक्षण रिपोर्ट 28/02/2027 तक वैध है/THIS TEST REPORT IS VALID UPTO 28/02/2027)



**ESCORTS LIMITED, 425 N E1
(BRAND NAME: POWERTRAC) TRACTOR**



सत्यमेव जयते

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: fmttibudni.gov.in, Telephone: 07564-234729

T- 1626/2157/2022	ESCORTS LIMITED, 425 N E1 (BRAND NAME: POWERTRAC) – Commercial (1st Batch)
	THIS TEST REPORT IS VALID UPTO: 28/02/2027

3. SPECIFICATIONS

3.1	Tractor:	
	Make	: Escorts Limited
	Model	: 425 N E1
	Type	: Rear Wheel Drive, Standard Agricultural Tractor.
	Month & Year of manufacture	: 07/21
	Chassis number	: T053561166DK
	Country of Origin	: India
3.2	Engine:	
	Manufacturer's address	: M/s. Escorts Limited, Plot No. 2 & 3, Sector – 13, Faridabad – 121 007, Haryana
	Make	: Escorts Limited
	Model	: E2.156-3A
	Type	: Four stroke, naturally aspirated, liquid cooled, direct injection, diesel engine.
	Serial number	: E3629577
	Engine speed (Manufacturer's recommended production setting, (rpm) :	
	- Maximum speed at no load,(rpm)	: 2225 to 2325
	- Low idle speed, (rpm)	: 600 to 700
	- Speed at maximum torque, (rpm)	: 1200 to 1300
	Rated speed, (rpm):	
	- For PTO use	: 2000
	- For drawbar use	: 2000
3.3	Cylinder & Cylinder Head:	
	Number	: Two
	Disposition	: Vertical, inline
	Bore/stroke, (mm)	: 95/110 (apa)
	Capacity as specified by the applicant, (cc)	: 1560 (apa)
	Compression ratio, (apa)	: 18.0 ± 5% : 1
	Type of cylinder head	: Monoblock
	Type of cylinder liner	: Wet, replaceable
	Type of combustion chamber	: Open chamber in piston crown.
	Arrangement of valves	: Overhead, Inline
	Valve clearance (cold):	
	- Inlet valve, (mm)	: 0.30
	- Exhaust valve, (mm)	: 0.40
3.4	Fuel System:	
	Type of fuel system	: Gravity and force feed
3.4.1	Fuel tank:	
	Capacity, (l)	: 45.0
	Location	: Above clutch housing
	Provision for draining of sediments /water	: Not provided
	Type of fuel tank	: Metallic
3.4.2	Water separator:	
	Make	: DEC
	Type	: Inverted funnel, gravity separation
	Location	: On RHS of engine, in between fuel tank & fuel feed pump.
	Capacity (l)	: 0.50

T- 1626/2157/2022	ESCORTS LIMITED, 425 N E1 (BRAND NAME: POWERTRAC) – Commercial (1st Batch)
	THIS TEST REPORT IS VALID UPTO: 28/02/2027

16. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

16.1 On the basis of tests conducted the performance results have been summarized as evaluative (mandatory) and non-evaluative (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
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: $\pm 5\%$ for PTO power or engine power >26 kW, $\pm 10\%$ for PTO power or Engine power ≤ 26 kW.	17.0 (D)	17.1	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	17.0 (D)	17.0	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	$+ 10\%$ max.	234 (D)	235	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	$\pm 8\%$	96.4 (D)	96.4	Yes
e)	Back-up torque, percent	Evaluative	12% , min.	12% , (R) minimum	18.6	Yes
f)	Maximum operating temperature, ($^{\circ}\text{C}$)					
	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)	90	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)	83	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.35 (R) maximum 2.30 (D)	0.32	Yes
h)	Smoke level, (m^{-1})	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	3.25 per meter max.	0.08	Yes

T- 1626/2157/2022	ESCORTS LIMITED, 425 N E1 (BRAND NAME: POWERTRAC) – Commercial (1st Batch)
	THIS TEST REPORT IS VALID UPTO: 28/02/2027

1	2	3	4	5	6	7
16.1.2	Drawbar performance:					
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 70% of static mass with ballast	Not applicable	Not applicable	--
b)	Maximum drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 70% of static mass of tractor without ballast	10.95 (D) 11.19 (R) minimum	12.63	Yes
c)	Maximum drawbar power without 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.	13.9 (D) 13.7 (R) minimum	15.5	Yes
d)	Max. transmission oil temperature, (°C)	Evaluative	The declared value should not exceed the maximum value specified by oil company	125 (D)	64	Yes
16.1.3	Power lift and hydraulic pump performance :					
a)	Maximum lifting capacity throughout the range of lift, (kN):					
	1) At hitch points	Evaluative	±10%	14.00 (D)	14.83	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	7.84 (D) 4.02 (R) minimum	8.82	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	Observed value should not exceed 50 mm.	50 (D) 50 maximum	22	Yes
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 road ballast, (m):					
	1) Cold brake	Evaluative	10	10	6.65	Yes
	2) Hot brake	Evaluative	10	10	7.60	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 maximum	189 to 241	Yes

T- 1626/2157/2022	ESCORTS LIMITED, 425 N E1 (BRAND NAME: POWERTRAC) – Commercial (1st Batch)
	THIS TEST REPORT IS VALID UPTO: 28/02/2027

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, N	Evaluative	Yes / No	Yes (R)	Yes	Yes
16.1.5	Noise measurement:					
a)	Maximum ambient noise emitted by the tractor, dB(A)	Evaluative	88 dB (A) for >1.5 tonne GWV and 85 db (A) for <1.5 tonne GWV (as per CMVR)	88 maximum	82	Yes
b)	Maximum noise at operator's ear level, dB(A)	Evaluative	96 (as per CMVR)	96 maximum	91	Yes
16.1.6	Amplitude of mechanical vibrations at :					
	1) Left foot rest	Non Evaluative	100 microns (max.)	100 (max.)	201	No
	2) Right foot rest				199	No
	3) Seat (with driver seated)				194	No
	4) Steering Wheel				211	No
16.1.7	Air Cleaner:					
	Max. oil pull over, (%)	Evaluative	0.25% (max.)	Dry type air cleaner is fitted	Not applicable	--
16.1.8	Haulage requirements:					
a)	Gross mass of the trailers, (tonnes):					
	Two wheel	Non Evaluative	As specified by the manufacturer	2.5 (D)	2.5	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
	Two wheel	Non Evaluative	As specified by the manufacturer	8.0 to 9.0 (D)	8.99 to 10.35	No
c)	Fuel consumption (cc/km/tonne):					
	Two wheel	Non Evaluative	As specified by the manufacturer	30 to 35 (D)	38.68 to 44.49	No
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	The manufacturer has recommended that the tractor is not suitable for wet land cultivation	--
	1) Clutch assembly	-do-				
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
	4) Engine oil	-do-				
	5) Transmission oil	-do-				

T- 1626/2157/2022	ESCORTS LIMITED, 425 N E1 (BRAND NAME: POWERTRAC) – Commercial (1st Batch)
	THIS TEST REPORT IS VALID UPTO: 28/02/2027

1	2	3	4	5	6	7
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)	--	Meets the requirement	Yes
b)	Lighting arrangement	Evaluative	As per CMVR	--	Meets the requirement	Yes
c)	Seating 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 meet the requirement	No
f)	Specification of linkage drawbar	Evaluative	Should meet the requirements of IS 12953 and IS 12362 (part 3) (as amended from time to time)	--	Meets the requirement	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 fitted	--
h)	1) Maximum travelling speed at rated engine speed in reverse gears, (kmph)	Evaluative	Should not exceed 20 Kmph	--	8.50 (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 applicable	--	Not applicable	--
16.1.11	Labelling of tractors (Provision of labelling plate):					
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO in kW and year of manufacture in numerical MM YY 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	Escorts Limited		Yes
	2) Model	Evaluative		425 N E1		Yes
	3) Month & Year of manufacture	Evaluative		07/21		Yes
	4) Engine number	Evaluative		E3629577		Yes
	5) Chassis number	Evaluative		T053561166DK		Yes
	6) Declaration of maximum PTO power, (kW)	Evaluative		17.0		Yes
	7) Specific fuel consumption (g/kWh)	Evaluative		234		Yes

T- 1626/2157/2022	ESCORTS LIMITED, 425 N E1 (BRAND NAME: POWERTRAC) – Commercial (1st Batch)
	THIS TEST REPORT IS VALID UPTO: 28/02/2027

1	2	3	4	5	6	7
16.1.12	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	95.300 (D)	95.023 to 95.042	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.46	0.134 to 0.147	Yes
(c)	Piston diameter at skirt, (mm)	Non Evaluative		When ring groove clearance exceeds discard limit	94.865 to 94.898	Yes
(d)	Ring end gap (mm):					
	- Top comp. ring	Evaluative	-do-	2.00	0.45	Yes
	- 2 nd comp. ring		-do-	2.00	0.40 to 0.45	Yes
	- Oil ring		-do-	2.00	0.30 to 0.35	Yes
(e)	Ring groove clearance (mm):					
	- Top comp. ring	Evaluative	-do-	0.200	Tapered ring	--
	- 2 nd comp. ring		-do-	0.200	0.062 to 0.064	Yes
	- Oil ring		-do-	0.150	0.062	Yes
(f)	Clearance of main bearings (mm):					
	- Diametrical clearance	Evaluative	-do-	0.200	0.037 to 0.098	Yes
	- Crankshaft end float	Evaluative	-do-	0.20	0.17	Yes
(g)	Clearance of big end bearings, (mm):					
	- Diametrical	Evaluative	-do-	0.400	0.077 to 0.098	Yes
	- Axial	Evaluative	-do-	0.65	0.30 to 0.40	Yes
(h)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.50	0.12 to 0.18	Yes
(i)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.60	0.03 to 0.11	Yes
16.1.13	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
16.1.14	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	---
16.1.15	Standard accessories	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with tractor	Provided	Provided	Yes

T- 1626/2157/2022	ESCORTS LIMITED, 425 N E1 (BRAND NAME: POWERTRAC) – Commercial (1st Batch)
	THIS TEST REPORT IS VALID UPTO: 28/02/2027

1	2	3	4	5	6	7
16.1.16	Accessories (Optional)	Non Evaluative	Ballast weights if fitted should meet the requirement of CMVR.	Provided	Provided	Yes

16.2 CATEGORY OF BREAKDOWNS / DEFECTS:					
S. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	As observed	Whether meets the requirements (Yes/No.)
1.	Critical	Evaluative	There is no 'critical breakdown' during the course of testing	None	Yes
2.	Major	Evaluative	There are not more than 1 major breakdowns and neither of them is of repetitive nature	None	Yes
3.	Minor	Evaluative	There are not more than 3 minor defects during the test and the frequency of each is not be more than two	One (Mn17)	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

16.3 Salient Observations:

16.3.1 Laboratory tests:

16.3.1.1 Hydraulic Performance:

During hydraulic test, continuous jerks were observed in the hydraulic system. Upon this, the applicant vide letter no. ERC:BUDNI: 425NE1-B-151/21_R01 dated 25.11.2021 and 01.12.2021, had requested to replace the following which was allowed:

- i. Removal, cleaning and refitting of "Tube Assembly (Distributor to Cylinder)", Part no. D10285260.9.
- ii. Four numbers of "Seal - Benzo Bolt (Distributor to Cylinder Line)" of same specification having Part no. D10174950.9 were replaced during re-assembling. Two of them were fitted at the cylinder end and two seals were used at the distributor end of the tube assembly.

This should be looked into for necessary improvement.

16.3.1.2 Mechanical Vibration:

The amplitude of mechanical vibration on various assemblies marked as (*) in Chapter – 10 of this test report is on higher side. This calls for dampening down of vibrations especially on left and right foot rests, steering wheel and operator's seat to improve the operational comfort and service life of components.

The above observations were also made in the previous test report No. T-1155/1681/2018 (May, 2018) and no improvement have been made as regards to its conformity so far.

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE - BUDNI	Page 46 of 49
--	----------------------

T- 1626/2157/2022	ESCORTS LIMITED, 425 N E1
	(BRAND NAME: POWERTRAC) – Commercial (1st Batch)
THIS TEST REPORT IS VALID UPTO: 28/02/2027	

16.3.1.3 Three point linkage:

- i) The lateral distance from lower hitch point to centre line of tractor was observed 364 mm against the requirement of 435 mm, which does not meet the requirement of IS: 4468 -1997 (Part-1). This should be looked into for necessary corrective action.
- ii) The lateral movement of lower hitch point was measured as 78 mm against the requirement of minimum 125 mm as per IS: 4468-1997 (Part-1). This should be looked into for necessary corrective action.
- iii) Power range was observed 550 mm against the minimum requirement of 650 mm, which does not meet the requirement of IS: 4468 (Part-1) - 1997 (Reaffirmed in Oct., 2017) for Category II hitch. This should be looked into for necessary corrective action.
- iv) Lower hitch point clearance was observed as 55 mm against the minimum requirement of 100 mm as per IS: 4468 (Part-1), which needs necessary corrective actions.
- v) Some of the parameters conform to Cat. I and some of them conform to Cat. II. Keeping in view the spirit of standardization, necessary improvements may be incorporated.

The observations at (i) and (v) were also made in the previous test report No. T-1155/1681/2018 (May, 2018) and no improvement have been made as regards to its conformity so far.

16.3.1.4 Components/assembly inspection:

- i) The spring rate of inlet and exhaust valves were observed as 9.90 to 10.10 N/mm and 10.20 to 10.30 N/mm respectively against the discard limit of 12.26 N/mm. This should be looked into for necessary corrective action.
- ii) Discard limit for backlash between crown wheel and pinion of the differential unit was not declared by the applicant. It was only recommended to re-shim to obtain a backlash of 0.40 mm. Hence, a suitable discard limit for backlash between the crown wheel and pinion may also be specified.

16.4 Recommendation with regard to safety on tractor:

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

- i) Provision of safety against the accidental start of engine as per the requirement of IS: 8133-1983 (Reaffirmed in January, 2019)
- ii) Provision for spark arresting device in exhaust system as per the requirement of IS: 12239 (Part-1)-2018.
- iii) Width of footstep as per the requirement of IS: 12239 (Part-1)-2018.
- iv) Vertical retainers as per the requirement of IS: 12239 (Part-1)-2018.
- v) Differential lock should be provided as per the requirement of IS: 12239 (Part-2) – 1999 (Reaffirmed in January, 2019).
- vi) The Working clearance around the position control lever and RHS fender should be provided as per IS: 12239 (Part-2) – 1999 (Reaffirmed in January, 2019).
- vii) PTO master shield should be provided on tractor as per IS: 4931-1995 (Reaffirmed in January, 2019).
- viii) Provision for transport lock in the hydraulic system to prevent accidental dropping of lifted implements.

Observations at (i), (ii), (iii), (v), (vi) and (vii) were also made in the previous test report vide No. T-1155/1681/2018 (May, 2018) and no improvements have been made as regards to its conformity so far.

16.5 Maintenance / Service Problems:

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

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE - BUDNI	Page 47 of 49
--	----------------------

T- 1626/2157/2022	ESCORTS LIMITED, 425 N E1
	(BRAND NAME: POWERTRAC) – Commercial (1st Batch)
THIS TEST REPORT IS VALID UPTO: 28/02/2027	

16.6 Haulage test:

- i) Distance travelled per litre of fuel consumption with two wheel trailer was recorded as 8.99 to 10.35 litres against the declaration of 8.0 to 9.0 litres. This should be looked into for necessary corrective action.
- ii) The fuel consumption with two wheel trailer was recorded as 38.68 to 44.49 ml/km/tonne against the declaration of 30 to 35 ml/km/tonne. This should be looked into for necessary corrective action.
This observation was also made in the previous test report No. T-1155/1681/2018 (May, 2018) and no improvement have been made as regards to its conformity so far.

16.7 Adequacy of Literature supplied with machine:


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

- a) Operator's manual for Escorts Limited, 425 N E1 (Brand name: Powertrac) tractor model
- b) Service manual for Escorts Limited, 425 N E1 (Brand name: Powertrac) tractor model
- c) Parts catalogue for Escorts Limited, 425 N E1 (Brand name: Powertrac) tractor model

16.7.2 The operator manual may be brought out for the guidance of users and service personnel as per IS:8132-1999 incorporating, inter alia, the following:

- i) The tractor is not suitable for wetland cultivation (puddling operation).
- ii) "Puddling Care" should be removed from Chapter 10 of Operator's manual, as the tractor is recommended as 'Not suitable' for puddling operation.

TESTING AUTHORITY:

<p>C.V. CHIMOTE TEST ENGINEER</p>	
<p>P.K. PANDEY DIRECTOR</p>	

Draft Test Report compiled by: **Partha Lodh**, Senior Technical Assistant

17. APPLICANT'S COMMENTS

Para no.	Our reference	Applicant comments
17.1	--	We had observed no discrepancies in Test Report.

T- 1626/2157/2022	ESCORTS LIMITED, 425 N E1 (BRAND NAME: POWERTRAC) – Commercial (1 st Batch)
	THIS TEST REPORT IS VALID UPTO: 28/02/2027

ANNEXURE – I

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	52
2.	PTO performance test	12.6
3.	Power lift and hydraulic pump performance test	2.0
4.	Drawbar performance test	14.4
5.	Brake test	1.8
6.	Noise measurement	1.5
7.	Mechanical vibration test	1.0
8.	Nominal speed test	0.8
B.	HAULAGE TEST:	5.8
C.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	4.8
TOTAL:		96.7