

व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT (Initial)

संख्या/No. : T- 1257/1784/2019
माह/Month : July, 2019

(यह परीक्षण रिपोर्ट 31/07/2022 तक वैध है / THIS TEST REPORT IS VALID UPTO 31/07/2022)



**ESCORTS LIMITED, EURO 45 E5 (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
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T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

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

Applicant : M/s. Escorts R & D Centre
15/5 Mathura Road
Faridabad – 121 003 ,
Haryana

Month: July	Test Report No. T- 1257/1784/2019	Year: 2019
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CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE - BUDNI	Page 2 of 47
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T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

Type of Test : **COMMERCIAL (Initial)**

Test code/Procedure : IS: 5994-1998 (Reaffirmed in 2014)
and IS: 12207-2014 IS: 9253-2001
(Reaffirmed in March 2012)

Period of Test : September, 2018 to May, 2019

Test Report No. : **T-1257/1784/2019**

Month/Year : **July, 2019**

-
- i) The results reported in this report are observed values and no corrections have been applied for atmospheric and site conditions.
- ii) The data given in this report pertain to the particular machine submitted by the applicant, for tests.
- iii) The results presented in this report do not in any way attribute to the durability of the machine.
- iv) This report should not be reproduced in part or full without prior permission of the Director, Central Farm Machinery Training and Testing Institute, Budni (M.P.)
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SELECTED CONVERSIONS

Sl. No	Units	Conversion Factor	A B B R E V I A T I O N S	
1.	Force:		Apa	As per applicant
	1 kgf	9.80665 N	TDC	Top Dead Centre
		2.20462 lbf	IS	Indian Standard
2.	Power:		LHS/RHS	Left Hand Side/ Right Hand Side
	1 mechanical horse power	1.01387 metric horse power	Hg	Mercury
		745.7 W	Temp.	Temperature
	1 metric horse power	735.5 W	N.R.	Not recorded
	1 kW	1.35962 metric horse power	Rpm	Revolutions per minute
3.	Pressure:		O.D/I.D	Outer diameter/ Inner diameter
	1 psi	6.895 kPa	N.A.	Not available/ Not applicable
	1 kgf/cm ²	98.067 kPa = 735.56 mm of Hg	PTO	Power take-off
	1 bar	100 kPa = 10 N/cm ²	R.H.	Relative Humidity
	1 mm of Hg	1.3332 m-bar		

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

C O N T E N T S

	<u>PAGE</u>
1. Specification	05
2. Fuel and Lubricants	19
3. PTO Performance test	20
4. Drawbar Performance Test	24
5. Power Lift and hydraulic pump performance test	29
6. Brake Test	30
7. Noise Measurement	31
8. Mechanical Vibration Measurement	32
9. Location of Centre of Gravity	32
10. Turning ability	32
11. Operator's field of vision	33
12. Field test	34
13. Haulage test	35
14. Components/Assembly Inspection	35
15. Adjustments, Defects, Breakdowns & Repairs	37
16. Summary of Observations, Comments & Recommendations	38
17. Citizen Charter	45
18. Applicant's Comments	46
ANNEXURE – I, II, & III	46 & 47

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
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Plot No. 2 & 3, Sector – 13
Faridabad – 121 007
Haryana

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

Selected for test by : Applicant
Place of running-in : At manufacturer'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 : EURO 45 E5
Variants, if any : None
Brand name : POWERTRAC
Type : Four wheeled, Four wheel driven, unit construction, general purpose, agricultural tractor.
- Year of manufacture : February, 2018 (LG)
Chassis number : T053372408LG
Country of Origin : India
- 1.2 Engine:**
- Make : Escorts Limited
Model : AE3.276C-3A
Type : Four stroke, naturally aspirated, liquid cooled, direct injection, diesel engine.
- Serial number : E3418236
- Engine speed (Manufacturer's recommended production setting, (rpm)) :**
- Maximum speed at no load, (rpm) : 2130 to 2230
- Low idle speed, (rpm) : 700 to 800
- Speed at maximum torque, (rpm) : 1200 to 1300
- Rated speed, (rpm):**
- For PTO use : 2000
- For drawbar use : 2000
- 1.3 Cylinder & Cylinder Head:**
- Number : Three
Disposition : Vertical, inline
Bore/stroke, (mm) : 98/122
Capacity as specified by the applicant, (cc) : 2761 (apa)
Compression ratio, (apa) : 17.5 (± 5%) : 1
Type of cylinder head : Monoblock
Type of cylinder liners : Wet, replaceable
Type of combustion chamber : Direct injection, open chamber in piston crown
Arrangement of valves : Over head, Inline

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

	Valve clearance (cold):	
	- Inlet valve, (mm)	: 0.30
	- Exhaust valve, (mm)	: 0.40
1.4	Fuel System:	
	Type of fuel system	: Gravity and force feed
1.4.1	Fuel tank:	
	Capacity, (l)	: 60.0
	Location	: Above clutch housing
	Provision for draining of sediments /water	: Provided
	Material of fuel tank	: XLPE Polyethylene (apa)
1.4.2	Water separator:	
	Make	: Hilux
	Type	: Sedimentation type with swirling motion
	Location	: In between fuel tank & fuel feed pump on RHS of engine.
	Capacity (l)	: 0.50
1.4.3	Fuel feed pump:	
	Make	: Bosch, India
	Type	: plunger
	Model/Group combination No.	: FP/KSG22AD105, F 002 A50 040
	Provision of sediment bowl	: Provided
	Method of drive	: Through cam shaft of fuel injection pump
1.4.4	Fuel filters:	
	Make	: Bosch, India
	Model/Group combination No.	: F002 H20 187
	Number	: One
	Type of elements:	: Spin-on, throw away
	Material of element	: Cellulose (apa)
	Capacity of final stage filter, (l)	: 0.40
1.4.5	Fuel Injection pump:	
	Make	: Bosch, India
	Model/Group combination No.	: F002 A3Z F30, PES4A90D410RS3500
	Type	: Inline, plunger
	Serial number	: 817116251
	Method of drive	: Through timing gears
1.4.6	Fuel injectors:	
	Make	: Bosch, India
	Nozzle Holder No.	: F 002 C70 023
	Nozzle No.	: DSL A 146P 5620
	Type	: Multi hole (Five holes)
	Manufacturer's production pressure setting, (MPa)	: 25.0 to 25.8
	Injection timing	: $8^\circ \pm 1$ before TDC (apa)
	Firing order	: 1-2-3
1.4.7	Governor:	
	Make	: Bosch, India
	Model/Group combination No.	: RSV375...1000A4C1855L
	Type	: Mechanical, centrifugal, variable speed.
	Rated engine speed, (rpm)	: 2000
	Governed range of engine speed, (rpm)	: 700 to 2230

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

1.5	Air Intake System:		
1.5.1	Pre-cleaner	:	Not provided
1.5.2	Air cleaner:		
	Make	:	Donaldson
	Type	:	Dry type
	Location	:	In front of radiator, under the bonnet
	Range of suction pressure at maximum power, (kPa)	:	3.0
	Details of elements:		
	- Size (OD/ID), (mm)	:	Primary element Secondary element 125 / 83 78 / 60
	- Length, (mm)	:	310 300
	- Type	:	Paper Felt
	Air flow restriction indicator	:	Provided
	Dust unloading valve	:	Provided
	Maintenance schedule	:	Clean the element everyday and replace after 500 working hours.
1.6	Exhaust system:		
	Type of silencer	:	Elliptical, under the Bonnet
	Position of silencer outlet with Respect to SIP, (mm):		
	- Vertical	:	1002
	- Longitudinal	:	1490
	- Lateral	:	390 (on LHS)
	Range of exhaust gas pressure at maximum power, (kPa)	:	9.1 to 9.9
	Provision of spark arresting device	:	None
	Provision against entry of rain water	:	A bend is provided on the outlet of silencer.
1.7	Lubricating system:		
	Type	:	Force feed cum splash
	Oil sump capacity, (l)	:	5.50
	Total lub oil capacity, (l)	:	6.55
	Oil change period	:	First change after 100 hours and subsequently after every 300 hours.
	Cooling device, (if any)	:	None
1.7.1	Filters:		
	Make	:	Powertrac
	Type	:	Full flow, spin-on, throw away paper element.
	Number	:	One
1.7.2	Pump:		
	Type	:	Gear
	Method of drive	:	Through timing gear
	Pressure release setting, (kPa)	:	300 ± 10 (apa)
	Minimum permissible pressure, (kPa)	:	98.07 (apa)
1.8	Cooling system:		
	Type	:	Forced circulation of liquid
	Brand name of coolant	:	Veedol (apa)
	Coolant water ratio	:	1 : 25 (apa)

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

Details of pump	: Centrifugal, semi-open impeller of 104 mm diameter, having 08 number of vanes and driven through crankshaft pulley by a cogged "V"-belt common to alternator.
Details of fan	: Suction type, 06 plastic blades of 382.5 mm diameter and mounted on water pump shaft.
Means of temperature control	: Thermostat
Bare radiator capacity, (l)	: 3.50
Capacity of expansion flask, (l)	: 0.70
Total coolant capacity, (l)	: 7.10
Radiator cap pressure, (kPa)	: 49
1.9 Starting System:	
Type	: 12V, DC, Electrical
Aid for cold starting	: None
Any other device provided for easy starting.	: None
1.10 Electrical System:	
1.10.1 Battery:	
Make & Model	: Amaron & TR550D31R
Type	: Lead acid
Capacity and rating	: 12V, 75 Ah at 20 hours discharge rate
Location	: In front of radiator under bonnet.
1.10.2 Starter:	
Make	: Autolek (apa)
Model	: Not Available
Type	: Pre-engaging, solenoid operated
Capacity and rating	: Not Available
Serial Number	: NA
1.10.3 Generator:	
Make	: Auto lek
Model	: AL1882D
Type	: Alternator
Output rating	: 12V, 35 Amp
Serial number	: Not Available
Method of drive	: Through crankshaft pulley by a cogged V-belt common to water pump.
1.10.4 Voltage regulator:	: In built with alternator

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

1.10.5 Details of lights:

Description	No. & capacity of bulbs (W)	Height of the centre of beam above ground level,(mm)	Size of beam, (mm)	Distance between centre of the beam and outside edge of tractor at standard rear track setting, (mm)
Front Lights:				
- Head lights	2, 12V, 35/35 W	1070	130 ϕ	517
- Working lights	2, 12V, 21 W	1280	60 ϕ	702
- Parking lights	2, 12V, 5 W	1380	85 x 85	235
- Turn-cum-hazard Indicator light	2, 12V, 21 W	1380	85 x 85	130
- Reflectors (white)	2	1380	45 x 75	180
Rear lights:				
- Parking-cum-brake light	2, 12V, 21/5 W	1370	85 x 85	230
- Turn-cum-hazard Indicator light	2, 12V, 21 W	1370	85 x 85	120
Reflectors (Red)	2	1370	45 x 75	175
Plough light (on RHS mudguard)	1, 12 V, 55 W	1440	125 ϕ	355
Registration plate light	1, 12 V, 5 W	1300	30 ϕ	175

1.10.6 Main switch : Key turn type having three positions viz.
i) OFF
ii) Circuit 'ON'
iii) Start

1.10.7 Light switch : Rotary type having four positions viz.
i) OFF
ii) Parking + dash board light
iii) Head light (short beam) + (ii)
iv) Head light (long beam) + (ii)

1.10.8 Horn:
Make : Addon
Type : 12V, 2B, electromagnetically vibrated diaphragm type
Location : In front of radiator, under the bonnet

1.10.9 Fuse box : Contains six number of fuses having following capacities:

10 A	15 A
01	05

1.10.10 Details of other electrical accessories:

1.10.10.1 Flasher Unit:
Make : Interface
Capacity:
-Turn signal : 21W x 2 + 2W x 1
-Hazard signal : 21W x 4 + 2W x 2
Flashes/Min. : 85

1.10.10.2 Seven pin socket for trailer lights : Provided

1.10.10.3 Safety against accidental start : Engine will not start unless the forward – reverse shift lever is in neutral position.

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

- 1.11 Instrument panel details:**
- i) Starting switch (key-turn-type)
 - ii) Light switch (rotary type)
 - iii) Engine rpm cum Cumulative digital run hour meter (0 to 25) x 100 rpm
 - iv) Lubricating oil pressure gauge (with coloured zones)
 - v) Water temperature gauge (with coloured zones)
 - vi) Battery volt meter gauge (with coloured zones)
 - vii) Fuel level gauge (with coloured zones).
 - viii) Battery charging warning indicator.
 - ix) Lubricating oil pressure indicator.
 - x) Head light long beam 'ON' indicator.
 - xi) Air cleaner clogged indicator.
 - xii) Turn/hazard signal indicator tell-tale
 - xiii) Parking brake light indicator.
 - xiv) Four wheel engaged indicator.
 - xv) Hazard light switch with indicator.
 - xvi) Left /right Turn indicator light switch.
 - xvii) Work lamp ON/OFF switch.
 - xviii) Horn push button
 - xix) Mobile charging socket
 - xx) Hand accelerator lever.
 - xxi) Steering control wheel.
 - xxii) Rear view mirror
 - xxiii) Fuel shut-off knob

1.12 Transmission System:


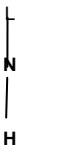
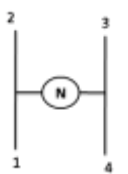
1.12.1 Clutch:

- Make : Luk, India
- Type : Dual, Dry friction pads and plate, Diaphragm
- Transmission** : Dry friction pads
- PTO** : Dry friction plate
- No. of friction plate, (s) : Two
- Material:**
- Main transmission clutch : Cerametallic (apa)
- PTO clutch : Organic (apa)
- Size, [OD/ID (mm)] :**
- Main transmission clutch : 280.5 / 168.2 Φ and 31.8 cm² contact area of each pad having five pads.
- PTO clutch : 279.7 / 165.9 Φ
- Method of operation:**
- Main transmission clutch : By pressing LHS foot pedal
- PTO clutch : By LHS hand operated lever

1.12.2 Gear box:

- Make : Carraro
- Type : Mechanical, combination of constant mesh & synchromesh gears
- No. of speeds:**
- Forward : 8
- Reverse : 8

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

- Gear shifting pattern :  :  : 
- Forward-reverse lever : Side shift arrangement
- Range selection lever : On RHS of operator's seat
- Main gear shift lever : On LHS of operator's seat.
- Location of gear shifting levers : On LHS of operator's seat.
- Main gear shift lever : On LHS of operator's seat.
- Range selector lever : On LHS of operator's seat.
- Forward reverse gear lever : On LHS of operator's seat.
- Oil capacity, (l) : 30.0 (common with common with rear differential, rear axle & rear final drive, hydraulic and brakes system).
- Oil changing period : First change after 150 hours and thereafter every 600 hours of operation.

1.12.3 Nominal Speeds:

1.12.3.1 Rear wheel

Movement	Gear No.	No of engine revolutions for one revolution of driving wheel	Nominal speed at rated engine speed when fitted with 14.9-28 size tyres of 640 mm radius index, (kmph)
Forward	L1	175.71	2.75
	L2	119.97	4.02
	L3	81.91	5.89
	L4	56.84	8.49
	H1	47.95	10.05
	H2	32.72	14.74
	H3	21.66	21.66
	H4	15.50	31.15
Reverse	RL1	176.09	2.74
	RL2	120.23	4.01
	RL3	81.99	5.89
	RL4	57.03	8.46
	RH1	48.06	10.03
	RH2	32.83	14.71
	RH3	22.34	21.59
	RH4	15.53	31.08

- Number of front wheel revolution for one revolution of rear wheel : 1.60

1.12.4 Differential unit:

- Type : Crown wheel and bevel pinion with differential unit accommodated inside the differential housing.
- Reduction through crown wheel & pinion : 4.09 : 1 (45/11 T)
- Oil capacity of differential housing, (l) : 30.0 (common with gear box, rear axle & rear final drive, hydraulic and brakes system).
- Oil changing period : First change after 150 hours and thereafter every 600 hours of operation.

1.12.4.1 Differential lock:

- Type : Pin type
- Location : On RHS of operator seat
- Method of operation : By pressing the pedal provided on RHS of operator's seat.

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

1.12.5 Rear axle & Final drive:	
Type	: Epicyclic reduction unit
Reduction through final drive	: 6.00 : 1 (ring-75T, sun-15T, planet-29T)
Oil capacity of final drive, (l)	: 30.0 (common with gear box, differential housing, hydraulic & brakes system).
Oil changing period	: First change after 150 hours and thereafter every 600 hours of operation.
1.12.6 Front differential unit:	
Type	: Crown wheel and bevel pinion with differential assembly accommodated inside the front axle housing.
Reduction through crown wheel & pinion	: 3.27 : 1 (36/11 T)
Oil capacity of differential housing,(l)	: 6.0(common with front axle & final drive)
Oil changing period	: First change after 150 hours and thereafter every 600 hours of operation.
Differential lock:	Not provided
1.12.7 Front axle & Front final drive:	
Type	: Bevel gear
Reduction through final drive	: 4.27:1
Oil capacity of final drive, (l)	: 6.0(common with front differential unit)
Oil changing period	: First change after 150 hours and thereafter every 600 hours of operation.
1.13 Power lift (Hydraulic system):	
Make	: Mita (apa)
Type	: Open centre, live, ADDC
No. and type of cylinder	: One, single acting
Type of linkage lock for transport	: Hydraulic shut off valve in closed position acts as transport lock.
1.13.1 Hydraulic pump :	
- Make	: EATON
- Type	: Gear
- Location & drive	: On LHS of engine and driven through timing gears.
No. & type of filters	: Two, one suction strainer and one spin-on throw away paper element.
Hydraulic oil capacity, (l)	: 30 (common with gear box, rear differential unit, rear axle & rear final drive and brakes system).
Oil change period	: First change after 150 hours and thereafter every 600 hours of operation.
Provision for external tapping	: Provided
Details of control levers	: i) Position control lever (Black) ii) Draft control lever (Red) iii) Transport lock knob iv) Pre-selector knob v) External circuit lever
Method of draft sensing	: Through top link

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

1.13.2 Three point linkage:

S. No.	Observations	As per IS: 4468- (Part-1) -1997 (Reaffirmed in Oct., 2017) (Cat.I / Cat.II), (mm)	As measured (mm)	Remarks
1	2	3	4	5
I.	Upper hitch points:			
a)	Dia of hitch pin hole	19.30 to 19.50 / 25.70 to 25.90	25.85	Conforms to Cat. II
b)	Width of ball	44.0 (max.) / 51.0 (max.)	51.0	Conforms to Cat. II
II.	Lower hitch points:			
a)	Dia of hitch pin hole	22.40 to 22.65 / 28.70 to 29.00	22.65/29.0	Conforms to Cat. I & II
b)	Width of ball	34.8 to 35.0 / 44.8 to 45.0	44.24/44.72	Does not conform
III.	Lateral distance from lower hitch point to centre line of tractor	359 / 435	364	Does not conform
IV.	Lateral movement of lower hitch points	100 (min) / 125 (min)	205	Conforms to Cat. I & II
V.	Distance from end of power take-off to centre of lower hitch point (lower links in horizontal position)	450 to 575 / 550 to 625	560	Conforms to Cat. I & II
VI.	Transport height	820 (min)/ 950 (min)	930	Conforms to Cat. I
VII.	Power range (without force)	560(min)/ 650 (min)	525	Does not conform
VIII.	Leveling adjustment	100 (min)/ 100 (min)	315	Conforms to Cat. I & II
IX.	Lower hitch point clearance	100 (min)/ 100 (min)	150	Conforms to Cat. I & II
X.	Lower hitch point height	200 (max)/ 200 (max)	200	Conforms to Cat. I & II

1.13.3 Linkage geometry dimensions {Refer Fig.-1(a)}:

The following are dimensions observed, corresponding to **640 mm** as tyre dynamic radius index:

S. No.	Parameter	Notation	Dimension or range, (mm)	Setting used during test, (mm)
1	2	3	4	5
1.	Length of lower link	A	785	785
2.	Length of lift arm	B	225	225
3.	Length of lift rods	C	375 to 560	467
4.	Length of top link	D	520 to 770	665
5.	Distance of lift rod connection point from pivot point of lower link	E	330,395 & 475	395
6.	Distance of lower link pivot point from rear wheel axis:			
	-Horizontally	F	140, behind	140, behind
	-Vertically	G	160, below	160, below

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

1	2	3	4	5
7.	Distance of upper link pivot point from rear wheel axis:			
	-Horizontally	H	295, 305 & 320, behind	295, behind
	-Vertically	J	250, 275 & 335, above	275, above
8.	Distance of lift arm pivot point from rear wheel axis:			
	-Horizontally	K	155, behind	155, behind
	-Vertically	L	265, above	265, above
9.	Height of lower hitch points relative to the rear wheel axis:			
	- In high position	M	-45 to 290	85
	- In low position	N	-555 to -90	440
10.	Height of lower link hitch points when locked in transport position	85, above		

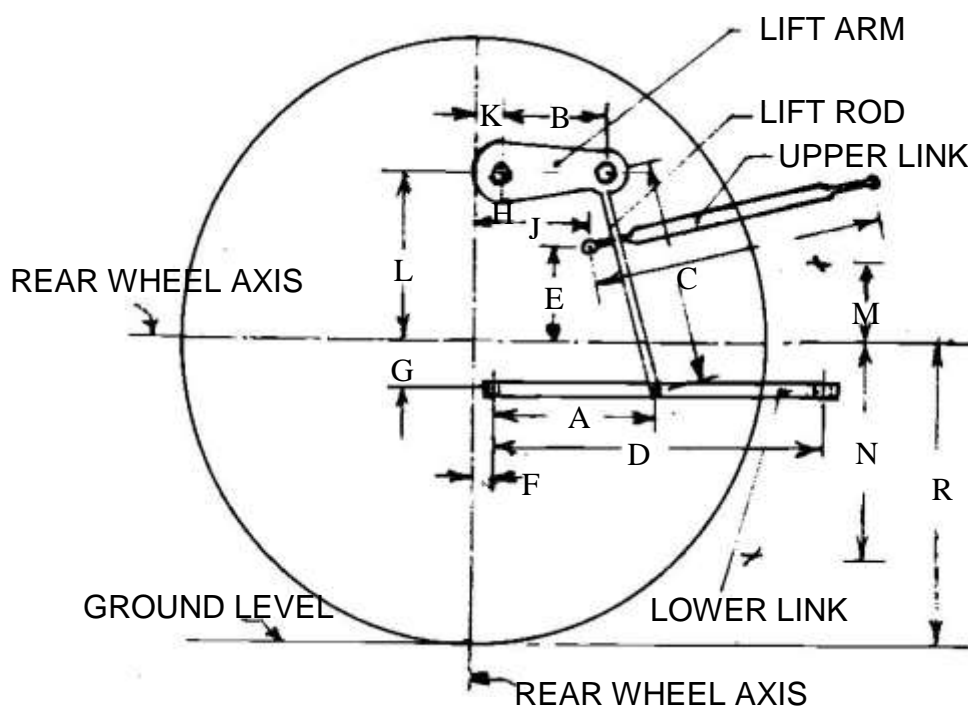


Fig. 1 (a): DIMENSIONAL NOTATIONS FOR TABLE OF LINKAGE GEOMETRY

1.13.4

Drawbar:

1.13.4.1

Linkage Drawbar [Refer Fig.1(b)] :

Notation	As per IS: 12953-1990 (Reaffirmed in Oct.,2017), (Cat.I) / (Cat.II), (mm)	As measured, (mm)	Remarks Lower link
A	683 ± 1.5 / 825 ± 1.5	683.00	Conforms to Cat.-I
B	75 (min) / 75 (min)	75.10	Conforms to Cat. I & II
C	30 (min) / 30 (min)	30.20	Conforms to Cat. I & II
D \varnothing	21.79 to 22.0 / 27.79 to 28.0	27.88	Conforms to Cat. II
E	39.0 (min) / 49.0 (min)	58.0	Conforms to Cat. I & II
F \varnothing	12.0 (min) / 12.0 (min)	12.0	Conforms to Cat. I & II
G	15.0 (min) / 15.0 (min)	15.60	Conforms to Cat. I & II
H \varnothing	25 ± 1 / 25 ± 1	24.90	Conforms to Cat. I & II
J	80 ± 1.5 / 80 ± 1.5	79.60	Conforms to Cat. I & II
No. of holes	7 / 9	7	Conforms to Cat. I

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

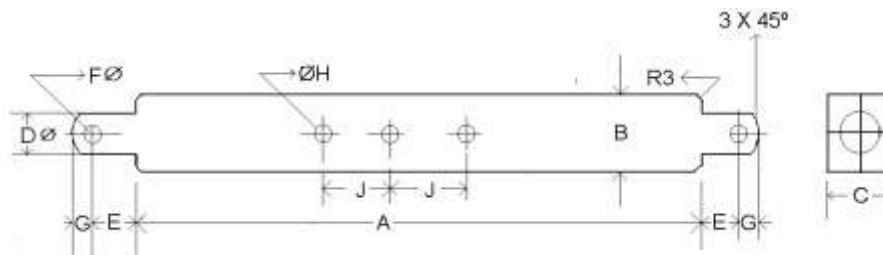


Fig. 1 (b): DIMENSIONAL NOTATIONS FOR LINKAGE DRAWBAR

1.13.4.2 Swinging drawbar: : Not provided

1.14 Power take-off shaft:

Type : Type-I, Independent
Method of engaging : By a hand lever provided on LHS of operator's seat
No. of shaft,(s) : One
PTO speed corresponding to rated engine speed, (rpm) : 625 (540) & 864 (540 E)
Distance behind rear axle, (mm) : 375
Engine to PTO speed ratio : 3.200 : 1 (540) & 2.316 : 1 (540 E)
Weather the PTO shaft is capable of transmitting full power of the engine. : Yes
Other speed corresponding to rated engine speed, if any : None

1.14.1 Specifications of Power Take-Off Shaft: -

Specification	As per IS: 4931-1995 (Reaffirmed in 2014), Type-1	As observed	Remarks
Nominal speed, (rpm)	540 ± 10	540 rpm of PTO shaft corresponds to 1728 rpm of engine	Conforms
No. of splines	6	6	Conforms
Direction of rotation	Clockwise	Clockwise	Conforms
Location	The position of the centre of the end of PTO shaft shall be within 50 mm to right or left of the centre line of the tractor.	In the centre line of the tractor	Conforms
Dimensions, (mm) {Refer Fig. 2(a)}:			
D∅	34.79 ± 0.06	34.75	Conforms
d∅	28.91 ± 0.05	28.06	Does not conform
B∅	29.40 ± 0.10	29.65	Does not conform
A∅ (Optional)	8.30 ± 0.10	8.31	Conforms
W	8.69 – 0.09 -0.16	8.62	Conforms
a	7	7	Conforms
b	25 ± 0.50	25.49	Conforms
c	38.0	38.0	Conforms
x	30°	30°	Conforms
B	76 (min)	81.89	Conforms
h	450 to 675	630	Conforms

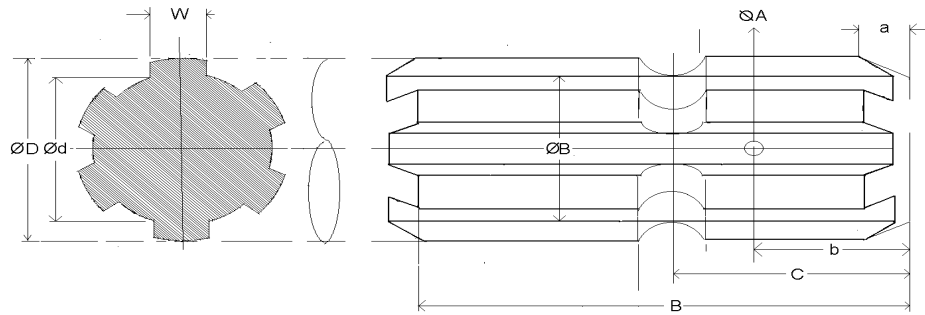


Fig. 2 (a): DIMENSIONAL NOTATIONS FOR TYPE-I POWER TAKE-OFF SHAFT

1.14.2	Power Take-off Master Shield	: Not provided
1.15	Towing hitch:	
1.15.1	Front:	
	Type	: Clevis
	Location	: At front of engine support bracket
	Height above ground level, (mm)	: 740
	Type of adjustment	: Fixed
	Width of clevis, (mm)	: 55.20
	Dia of pin hole, (mm)	: 33.50
1.15.2	Rear:	
	Type	: Clevis
	Location	: At the rear of differential housing
	Height above ground level, (mm):	
	- Maximum	: 710
	- Minimum	: 520
	Number of positions	: 05
	Type of adjustment	: By changing the position of hitch on its mounting bracket
	Distance of hitch point, (mm):	
	- From rear wheel centre	: 500
	- From power take-off shaft end	: 125
	Dia of pin hole,	: 32.90
	Width of clevis,	: 75.25
1.16	Steering:	
	Make	: EATON
	Type	: Hydrostatic, power steering
	Location	: Above the gearbox housing
	Method of operation	: Manual, through steering control wheel
	Diameter of steering control wheel, (mm)	: 400
	Make & type of pump	: EATON & Gear (Tendem)
	Location & drive	: LHS of engine and driven through timing gears.
	Make, type & number of hydraulic ram cylinder	: ETN, double acting and one
	Location of ram cylinder	: Below front axle support
	Steering oil capacity, (l)	: 2.0
	Lubricant change period	: First change after 150 hours. Subsequently change after every 850 hours.

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

1.17	Brakes:	
1.17.1	Service Brake:	
	Make	: Carrao (apa)
	Type	: Mechanical, oil immersed multi discs
	Location	: On rear half axle shaft, before final drive.
	No. of disc(s)	: 02 (on each wheel side)
	Area of liners, (cm ²)	: 465.25 (on each wheel side)
	Material of liners	: HDT 303(apa)
	Method of operation	: Individual or combined RHS foot pedal operated.
1.17.2	Parking Brake:	
	Type	: Pawl and ratchet arrangement
	Location and method of operation	: Service brake act as a parking brake when locked in position by a hand lever provided on RHS of operator's seat
1.18	Wheel Equipment:	
1.18.1	Steered Wheel(s):	
	Make	: MRF SHAKTI LIFE
	Number	: 2
	Type of tyre	: Pneumatic, traction
	Size	: 8.30-20
	Ply rating	: 6
	Maximum permissible loading capacity of each tyre at 190 kPa pressure, (kgf)	: 670
	Recommended inflation pressure, (kPa) :	
	- For field work	: 196
	- For transport	: 196
	Track width, (mm)	: 1200,1280,1320,1340,1380,1420,1440 & 1540 (std.)
	Method of changing track width	: By reversing the wheel disc
	Make & size of rim	: CWPL & W7 x 20
1.18.2	Drive wheel(s):	
	Make	: APOLLO KRISHAK GOLD
	Number	: 2
	Type of tyre	: Pneumatic, traction
	Size	: 14.9-28
	Ply rating	: 12
	Maximum permissible loading capacity of each tyre at 230 kPa pressure, (kgf)	: 2120
	Recommended inflation pressure, (kPa):	
	- For field work	: 100
	- For transport	: 108
	Track width, (mm)	: 1340, 1440 (std.), 1450, & 1540
	Method of changing track width	: By changing and reversing the wheel disc on off-set rim lugs.
	Make & size of rim	: CWPL & W12 x 28
1.18.3	Wheel base, (mm)	: 1890
	Method of changing wheel base, if any, and range	: None
1.19	Operator's seat:	
	Make	: SIETZ (apa)
	Type	: Cushioned seat with backrest

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

Type of suspension : Two helical coil springs
Type of damping : Hydraulic shock absorber
Range of adjustment, (mm):
Vertical : ± 35
Lateral : NIL
Longitudinal : ± 52

1.20 Provision for safety and comfort of operator:

1.20.1 Operator's Seat :

Conformity with IS: 12343-1998 (Reaffirmed in 2014):

All parameters meets the minimum requirements of IS: 12343-1998, (Re-affirmed in 2014), **except the following:**

- i) Longitudinal distance from seat index point to the centre of differential lock pedal
- ii) Vertical distance from seat index point to the centre of clutch pedal.
- ii) Vertical distance from seat index point to the centre of brake pedal.
- iv) Vertical distance from seat index point to the centre of accelerator pedal

1.20.2 Conformity with IS: 6283 (Part 1)-2006 (Re-affirmed in 2014):

All the controls are identifiable with symbols as per IS: 6283(Part 1) -2006

1.20.3 Conformity with IS: 6283 (Part 2)-2007 (Re-affirmed in 2014):

All the displays are identifiable with colour codes as per IS: 6283(Part 2) -2007

1.20.4 Conformity with IS:8133-1983 (Re-affirmed in 2014), except the following:

Location and movement of various controls meets the requirement of IS:8133-1983 (Re-affirmed in 2014), **except the following:**

The fuel shut-off knob does not remain in stop position.

1.20.5 Conformity with IS: 12239 (Part-1)-1996 (Re-affirmed in October, 2017):

Meets the requirements of IS: 12239 (Part-1)-1996 (Re-affirmed in October, 2017), **except the following:**

Provision of spark arresting device in the exhaust system.

1.20.6 Conformity with IS:12239 (Part-2)-1999 (Re-affirmed in 2014):

Meets the requirements of IS:12239 (Part-2)-1999 (Re-affirmed in 2014), **except the following:**

Working clearance around the PTO lever and fender on LHS , parking lever and hydraulic lever for external circuit and fender on RHS is less than the minimum requirement

1.20.7 Conformity with IS: 14683 – 1999 (Re-affirmed in 2014) :

Lighting requirements conform to IS: 14683-1999 (Re-affirmed in 2014).

1.20.8 Rear view mirror:

Rear view mirror has been provided.

1.20.9 Slow moving emblem:

Slow moving emblem has been provided.

1.21 Labelling of tractor as per IS: 10273-1987 (Reaffirmed in 2014):

Location of labelling plate: The labelling plate is riveted on LHS of fender and provides the following information:

Name of Manufacturer	ESCORTS LIMITED-AGRI MACHINERY FARIDABAD
Make	ESCORTS LIMITED
Brand name	POWERTRAC
Model	EURO 45 E5
Year of manufacturer	LG (February, 2018)
Engine Serial Number	E3418236
Chassis Serial Number	T053372408LG
Maximum P.T.O Power, kW	29.4
Specific fuel consumption, g/kWh	260

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

1.22 Ballast Conditions:

Particulars	As used during drawbar test	As used during field test		As used during Haulage test	
		Dry land	Wet land		
Front	C.I. weight	Nil	Nil	Deep lug tyre	Nil
	Water	Nil	Nil		Nil
Rear	C.I. weight	320	320	With Roto puddler	Nil
	Water	Nil	Nil		Nil

1.22.1 Standard ballast, if any : 208 at front

Particulars	Front	Rear
C.I. weight (Kg)	208 kg	Nil
Location	Below front axle & in front of radiator	--

1.23 Masses:

Particulars	Mass of the tractor without operator but with all the liquid reservoirs full, (kg)		
	Front	Rear	Total
i) With standard ballast	1080	1140	2220
ii) With ballast as used during drawbar performance test	1100	1440	2540
iii) With ballast as used during field test	1080	1410	2490
iv) As used during wet land operation (full cage wheel)	1080	1140	2220
v) As used during haulage test with trailer hitch and canopy	1080	1140	2220

1.24 Overall dimensions:

Condition	Length, (mm)	Width, (mm)	Height, (mm)		Ground clearance, (mm)
			With exhaust pipe	Without exhaust pipe	
Without ballast	3695	1835	2375	1760 (steering control wheel)	285 (below Front wheel Hub assembly)

1.25 Number of external lubricating Points:

- Oiling : Nil
- Greasing cups : Nil
- Greasing nipples : 08

1.26 Colour of tractor:

Chassis & engine : Black

Sheet metal:

Bonnet : Blue

Mudguard, Wheel rim & disc : Silver

1.27 Optional features, if any : None

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:

Sl. No.	Particulars	As recommended by the manufacturer	As used during the test
1.	Engine	SAE 20W40 (API 4)	As recommended
2.	Transmission, Brake & Hydraulic system	Oil Transmission Universal Tractor DS4018	As recommended
3.	Steering system	Transfluid III H	As recommended
4.	Grease	Servo grease MP	Servo grease MP

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

3. PTO PERFORMANCE TEST

Date(s) of test : 18.10.2018 & 22.10.2018

Tractor run at the Institute prior to start of : 5.6

PTO test (h)

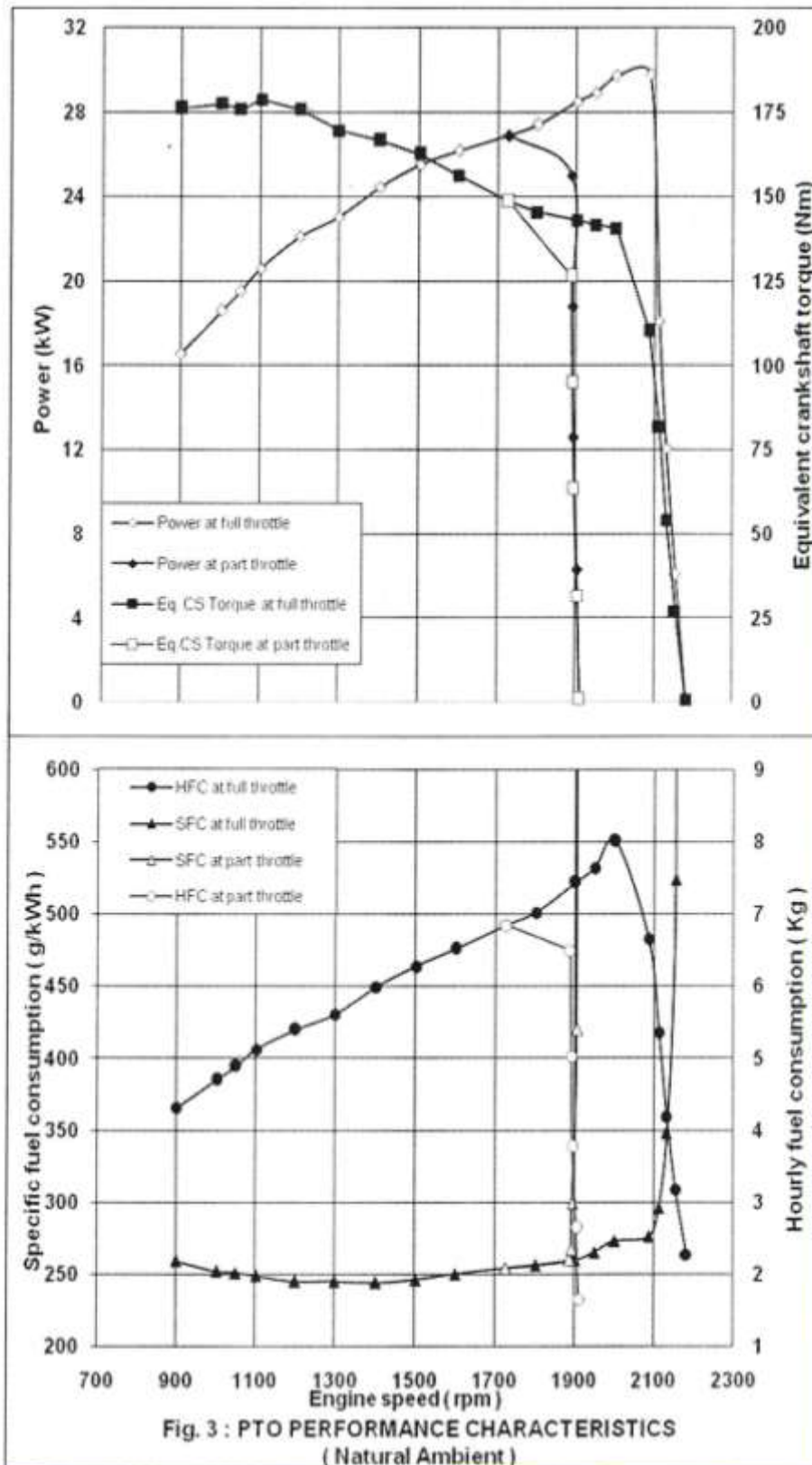
Type of dynamometer bench : ESF 1000 S , Eddy Current

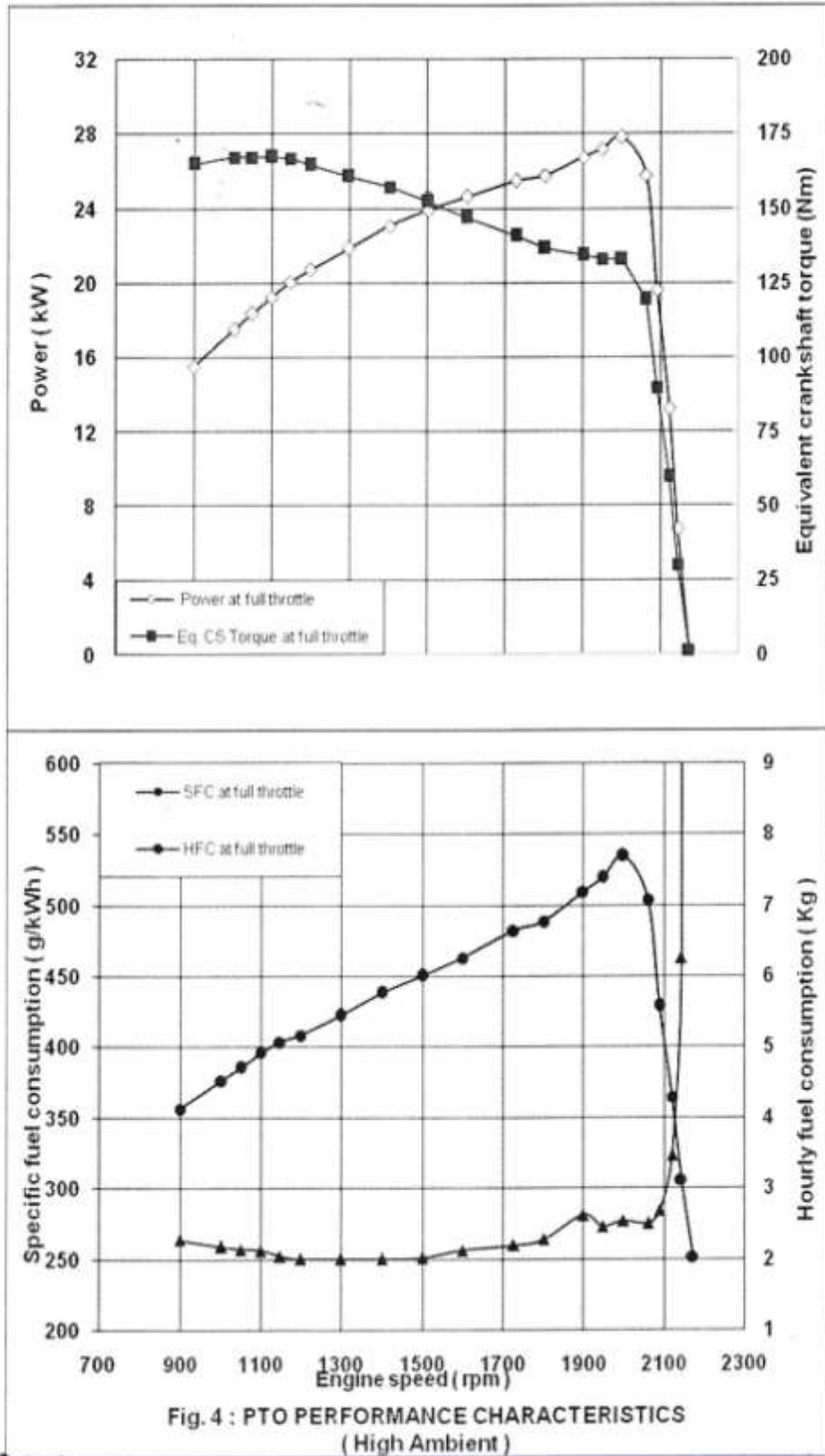
- 3.1 The results of power take-off performance are tabulated in Table-1 and graphically represented in Fig. 3, 4 and 5.

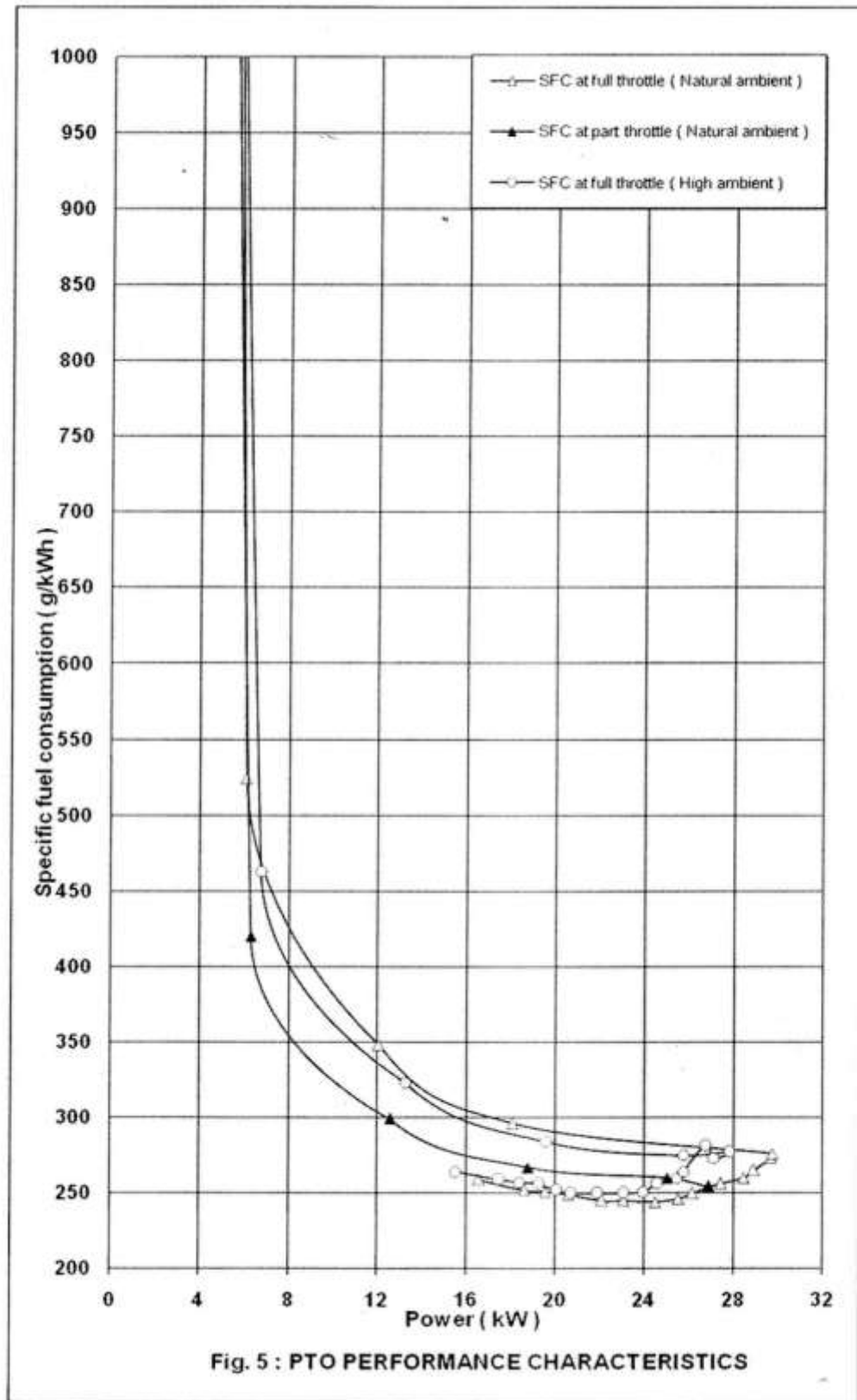
Table – 1

Power, (kW)	Speed (rpm)		Fuel consumption			Specific energy (kWh/l)
	PTO	Engine	(l/h)	(kg/h)	Specific, (kg/ kWh)	
a) Maximum power – 2 hours test:						
29.4	625	2000	9.40	7.86	0.267	3.13
27.4	625	2000	8.97	7.50	0.274	3.05*
b) Power at rated engine speed (2000 rpm):						
29.4	625	2000	9.40	7.86	0.267	3.13
27.4	625	2000	8.97	7.50	0.274	3.05*
c) Power at standard power take-off speed (540 ± 10 rpm):						
27.0	540	1728	8.19	6.85	0.254	3.30
25.5	540	1728	7.94	6.64	0.260	3.21*
d) Varying loads at rated engine speed:						
i) Torque corresponding to maximum power available at rated engine speed:						
29.4	625	2000	9.40	7.86	0.267	3.13
ii) 85% of the torque obtained in (i):						
25.8	646	2067	8.38	7.01	0.272	3.08
iii) 75% of the torque obtained in (ii):						
19.7	655	2096	6.62	5.54	0.281	3.00
iv) 50% of the torque obtained in (ii):						
13.2	662	2118	5.06	4.23	0.320	2.61
v) 25% of the torque obtained in (ii):						
6.7	670	2144	3.70	3.09	0.461	1.81
vi) Unloaded:						
0.2	680	2176	2.47	2.07	10.35	0.08
e) Varying loads at part throttle:						
i) Torque corresponding to maximum power available at standard PTO speed (540 ± 10 rpm):						
27.0	540	1728	8.19	6.85	0.254	3.30
ii) 85% of the torque obtained in (i):						
25.0	590	1888	7.77	6.50	0.260	3.23
iii) 75% of the torque defined in (ii):						
18.8	591	1891	6.02	5.03	0.267	3.12
iv) 50% of the torque defined in (ii):						
12.6	592	1894	4.50	3.77	0.299	2.80
v) 25% of the torque defined in (ii):						
6.3	595	1904	3.16	2.64	0.419	1.99
vi) Unloaded:						
0.20	597	1910	1.97	1.65	0.825	0.10

* Under high ambient conditions







T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

	<u>Natural ambient</u>	<u>High ambient</u>
-No load maximum engine speed, (rpm) :	2176	2173
-Equivalent crankshaft torque at maximum power, (Nm) :	140.3	130.8
- Maximum equivalent crankshaft torque, (Nm) :	178.7	167.2
-Engine speed at maximum equivalent crankshaft torque, (rpm) :	1101	1101
- Back-up torque, percent :	27.4	27.8
-Smoke level, maximum light absorption coefficient (per meter) :	0.18	--
- Range of atmospheric conditions:		
Temperature, (°C) :	26 to 28	41 to 44
Pressure, (kPa) :	98.8 to 99.2	99.9 to 100.5
Relative humidity, (%) :	54 to 62	26 to 33
- Maximum temperatures (degree):		
Engine oil :	107	112
Coolant (water) :	90	107
Fuel :	51	67
Air intake :	32	51
Exhaust gas :	379	396
- Pressure at maximum power:		
Intake air, (kPa) :	3.0	3.1
Exhaust gas,(kPa) :	9.1 to 9.9	9.5 to 10.1
- Consumptions:		
Lub. oil, (g/kWh) :	--	0.333
Coolant (water % of total coolant capacity) :	--	Nil

4. DRAWBAR PERFORMANCE TEST

Date(s) of test	:	13.02.2019,14.02.2019,15.02.2019 &18.02.2019
Tractor run at the Institute prior to start of drawbar performance test, (h)	:	27.0
Type of track	:	Concrete
Height of drawbar in (mm):		
- Without ballast	:	450
- With ballast	:	450

- 4.1 The results of drawbar performance test with 4WD engaged condition, consisting of maximum power and pull with standard ballast/with ballast and ten hours test are tabulated in **Table - 2**. The results of the tests with ballast are also represented graphically in **Fig. 6 & 7**.

Table - 2

DRAWBAR PERFORMANCE TEST

Gear	Travel Speed, (km/h)	Draw-bar power, (kW)	Draw-bar pull, (kN)	Engine Speed, (rpm)	Wheel Slip, (%)	Fuel consumption		Specific Energy, (kW/h/l)	Atmospheric conditions			Temperature (°C)			Max. sustained pull, (kN)	
						(kg/kWh)	(l/h)		Temp (°C)	Pressure (kPa)	R.H. (%)	Fuel	Trans. oil	Coolant (water)		Eng. line oil
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
i) Maximum power test (Tractor with standard ballast & 4WD in engaged condition) :																
L1	2.57	13.5	18.95	2086	14.9	0.400	6.48	2.09	29	99.6	34	42	88	85	109	20.02
L2	3.69	19.5	19.05	2048	14.9	0.380	8.87	2.20	28	99.7	32	41	88	86	112	19.78
L3	5.76	22.9	14.33	2001	7.2	0.340	9.32	2.46	26	99.8	32	39	81	86	110	18.84
L4	8.59	22.5	9.42	2001	4.0	0.349	9.39	2.40	25	99.9	32	37	78	88	108	13.07
H1	10.30	23.5	8.20	2000	2.7	0.337	9.47	2.48	25	99.9	33	37	64	89	107	10.99
ii) Maximum power test (Tractor with ballasted & 4WD in engaged condition) :																
L1	2.52	14.8	21.13	2077	15.2	0.395	6.99	2.12	27	99.2	42	40	86	86	109	22.54
L2	3.63	21.5	21.25	1999	13.3	0.363	9.34	2.30	26	99.3	46	38	83	88	111	22.52
L3	5.78	22.4	13.95	2004	6.0	0.349	9.35	2.40	25	99.4	41	37	77	86	110	18.94
L4	8.60	21.8	9.12	2004	3.0	0.361	9.41	2.32	23	99.4	44	35	63	86	108	13.07
H1	10.23	22.2	7.80	1997	2.0	0.361	9.59	2.31	23	99.4	45	34	53	88	101	11.18

Contd.. Table-2

G e a r	1	2	3	4	5	6	Fuel consumption		Specific Energy, (kW/h/l)	Atmospheric conditions			Temperature (°C)			Max. sust- ained pull, (kN)		
							(kg/ kW/h)	(l/h)		Temp (°C)	Pre- ssure (kPa)	R.H. (%)	Fuel	Trans. oil	Coolant (water)		Engi- ne oil	
								7	8	9	10	11	12	13	14	15	16	17
v) Five hours test at 75 percent of pull obtained at max. Power (ballasted wheeled tractor with 4 WD in engaged condition):																		
L2		4.04	17.92	15.94	2077	7.4	0.352	7.70	2.33	22	98.8	43	34	61	84	105		--
										27	10	58	39	89	87	110		
vi) Five hours test at pull corresponding to 15 percent wheel slip (ballasted wheeled tractor with 4 WD in engaged condition):																		
L1		2.56	15.05	21.13	2084	--	0.397	7.28	2.06	22	98.6	32	33	61	82	104		--
										27	10	41	40	83	88	109		

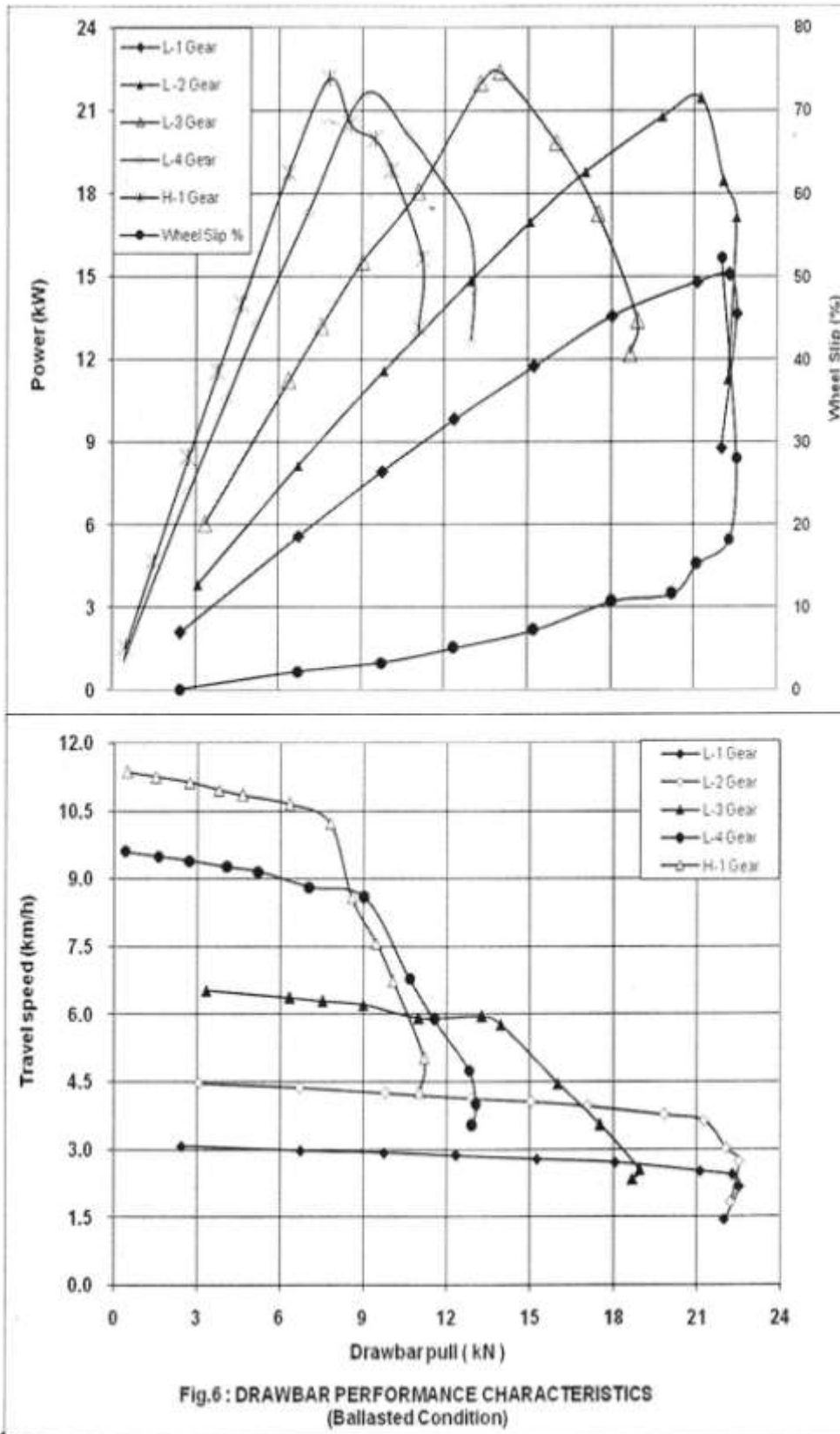
i) The coolant (water) and lubricating oil consumption for both during 10 hours test were recorded as Nil.

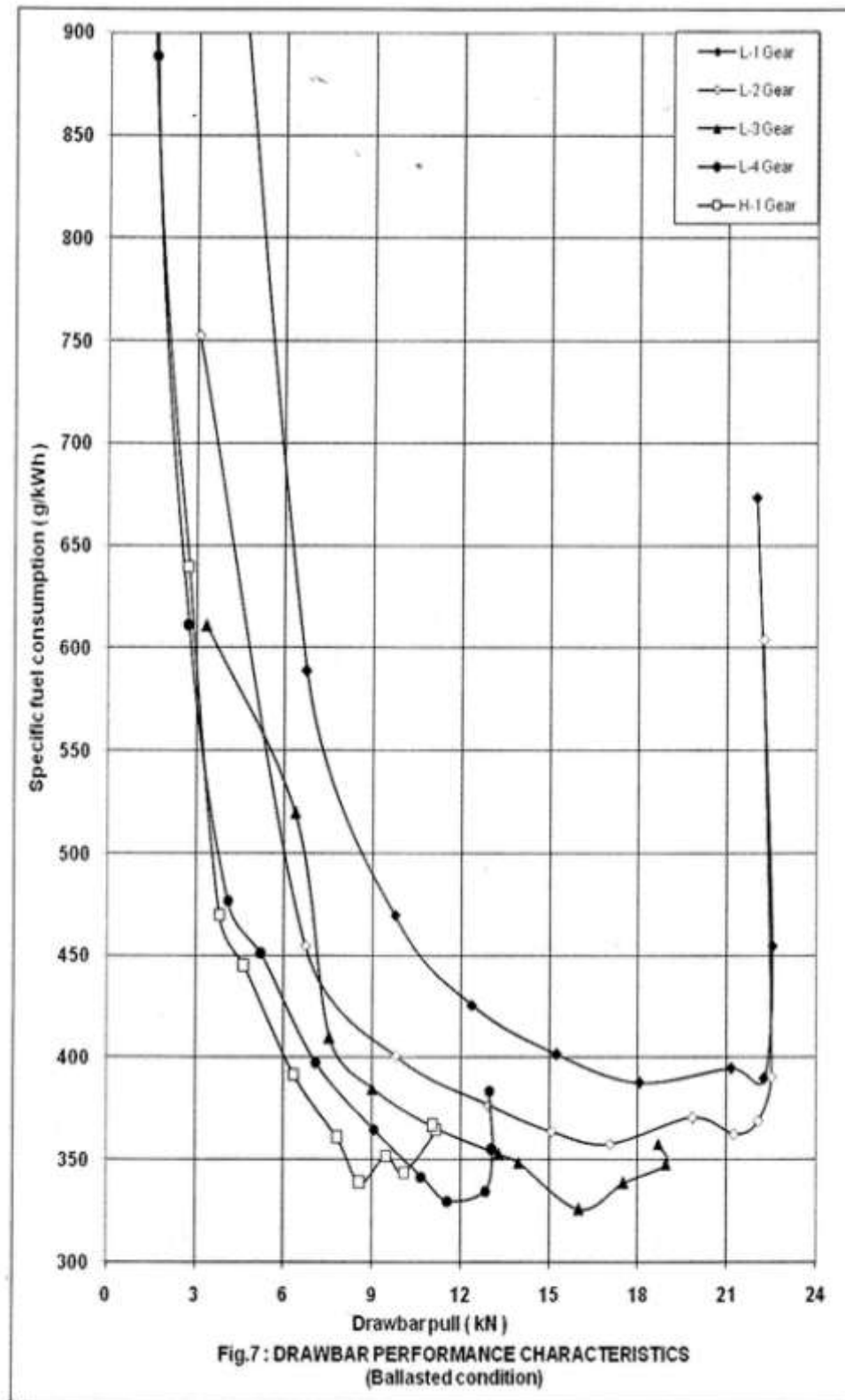
ii) Tyre Creeping, (mm):

- LHS : 28
- RHS : 25

iii) Maximum temperatures during entire drawbar test, (°C):

Engine oil : 112
Coolant (water) : 89
Transmission oil : 89
Fuel : 40





T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

5. POWER LIFT AND HYDRAULIC PUMP PERFORMANCE TEST

Date(s) of test : 01.11.2018
 Tractor run at the Institute prior to start of hydraulic test, (h) : 16.6
 Pump speed at rated engine speed, (rpm) : 2000

5.1 Hydraulic power test:

Pump delivery rate at min. pressure and rated engine speed, (l/min) : 33.83
 Maximum hydraulic power,(kW) : 9.9
 Pump delivery rate at maximum hydraulic power, (l/min) : 32.95
 Pressure at maximum hydraulic power, (MPa) : 18.0
 Sustained pressure of the open relief valve, (MPa) : 20.0

Tapping point:

a) Relief valve test : External circuit
 b) Pump performance test : Pump outlet
 Temperature of hydraulic fluid, (°C) : 60 to 65

5.2 Lifting capacity test:

Test	Height of lower hitch point above ground in down position, (mm)	Vertical Movement with lifting forces, (mm)	Maximum corrected force exerted through full range, (kN)	Corresponding pressure, (MPa)	Moment about rear axle, (kN-m)	Maximum tilt angle of mast from vertical, (degrees)
At hitch points	200	510	14.88	18.0	13.76	--
On the standard frame	200	505	11.08	18.0	17.01	15

5.3 Maintenance of lift load:

Force applied at the frame, (kN) : 9.97
 Temperature of hydraulic fluid at the start of test, (°C) : 60

Test data:

Elapsed Time, (minute)	5	10	15	20	25	30
Cumulative drop in height of lift, (mm)	5	12	15	17	19	20

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

6. BRAKE TEST

6.1 Service brake:

6.1.1 Cold brake test:

Date of test	: 15.11.2018
Type of track	: Concrete
Maximum attainable speed, (kmph):	
-Standard ballast	: 33.75
- With road ballasted	: N.A.

		At maximum attainable speed			
Std ballasted tractor	Braking device control force, (N)	545	511	477	442
	Mean deceleration, (m/sec ²)	3.14	2.96	2.70	2.50
	Stopping distance, (m)	13.93	14.84	16.27	17.58

		At 25 kmph travel speed			
Std ballasted tractor	Braking device control force, (N)	504	491	477	464
	Mean deceleration, (m/sec ²)	3.03	2.84	2.71	2.50
	Stopping distance, (m)	8.06	8.48	8.90	9.65

6.1.2 Brake fade test:

		At maximum attainable speed			
Std ballasted tractor	Braking device control force, (N)	582	539	496	453
	Mean deceleration, (m/sec ²)	2.90	2.84	2.69	2.50
	Stopping distance, (m)	14.66	15.49	16.31	17.58

		At 25 kmph travel speed			
Std ballasted tractor	Braking device control force, (N)	552	528	504	480
	Mean deceleration, (m/sec ²)	2.73	2.68	2.65	2.5
	Stopping distance, (m)	8.88	8.99	9.09	9.65

Maximum deviation of tractor from its original course, (m) : None

Abnormal vibration : None

The brakes were heated by : Self braking

Remark: The manufacturer has not recommended ballasting for road test, therefore the brake test was conducted under standard ballast condition only.

6.2 Parking brake test:

Particulars	Parked on 18 percent slope		Parked on 12 percent slope with trailer of 2.32 tonnes.	
	Facing Up	Facing Down	Facing Up	Facing Down
Braking device control force, (N)	227	249	255	283
Efficacy of parking brake	----- Effective -----			

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

7. NOISE MEASUREMENT

7.1 Noise at bystander's position:

Date of test	:	20.09.2018
Type of track	:	Concrete
Background noise level, dB (A)	:	54
Atmospheric conditions:		
Temperature, (°C)	:	31
Pressure, (kPa)	:	97.1
Relative humidity, (%)	:	45
Wind velocity, (m/s)	:	1.2

S. No.	G e a r	Travelling speed before acceleration, (kmph)	Noise level , dB (A)
1.	L1	2.19	79
2.	L2	3.14	79
3.	L3	4.65	79
4.	L4	6.75	79
5.	H1	7.91	80
6.	H2	11.51	80
7.	H3	16.93	81
8.	H4	24.60	82

7.2 Noise at operator's ear level:

Date of test	:	13.02.2019
Type of track	:	Concrete
Background noise level, dB (A)	:	54.1
Atmospheric conditions:		
Temperature, (°C)	:	29
Pressure, (kPa)	:	99.5
Relative humidity, (%)	:	34
Wind velocity, (m/s)	:	1.3

Gear	Drawbar pull at which the tractor develops the maximum noise level, (kN)	Corresponding travelling speed, (kmph)	Noise level dB (A)
L1	12.89 to 19.04	2.83 to 2.55	90
L2	17.89 to 19.05	3.84 to 3.69	91
L3	14.10 to 14.32	5.80 to 5.76	92
*L4	6.91 to 9.42	9.07 to 8.59	91
H1	7.91 to 8.20	10.53 to 10.30	93

* Gear corresponds to the nominal traveling speed nearest to 7.5 kmph.

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

8. MECHANICAL VIBRATION MEASUREMENT

Date of test : 26.10.2018
Type of test surface : Concrete

Sl. No.	Measuring points		Vibration, microns			
			At load corresponding to 85% of max. PTO power		At no load	
			HD	VD	HD	VD
i)	Foot rest	Left	60	50	10	10
		Right	40	60	10	10
ii)	Steering wheel		140*	130*	60	140*
iii)	Seat	Bottom	70	40	20	60
		Back	70	120*	50	110*
iv)	Mudguard	Left	50	40	20	30
		Right	120*	90	30	20
v)	Head light	Left	70	50	30	40
		Right	70	190*	50	70
vi)	Battery base, centre		80	160*	30	120*
vii)	Tail light	Left	90	40	60	30
		Right	40	60	30	40
viii)	Plough light		120*	190*	110*	30
ix)	Gear shifting lever		50	30	30	20
x)	Accelerator lever	Hand	130*	100	100	30
		Foot	100	120*	30	90
xi)	Brake pedal	Left	100	130*	50	90
		Right	210*	160*	70	150*
xii)	Clutch pedal		210*	360*	300*	340*
xiii)	Main hydraulic control lever		80	60	40	30
xiv)	PTO engaging lever		50	30	10	10
xv)	Differential lock lever		50	30	20	10

* The amplitude of mechanical vibration is on higher side.

9. LOCATION OF CENTRE OF GRAVITY

Condition	Particulars	Coordinates
Tractor under unballasted condition but with all the liquid reservoirs full & the operator replaced by a 75 kg mass on the seat	Height above ground, (mm)	681
	Distance forward from the vertical plane containing the axis of rear wheels, (mm)	878
	Distance from the median plane parallel to the longitudinal axis of tractor bisecting the track, (mm)	08 (towards LHS)

10. TURNING ABILITY

10.1: With 4WD condition:

Characteristics	Minimum turning diameter,(m)		Minimum clearance diameter,(m)	
	LHS	RHS	LHS	RHS
Brakes released	7.35	7.29	7.75	7.69
Brake applied	5.52	5.39	5.84	5.73

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)	
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)	

10.2: With 2WD condition:

Characteristics	Minimum turning diameter,(m)		Minimum clearance diameter,(m)	
	LHS	RHS	LHS	RHS
Brakes released	6.33	6.27	6.67	6.59
Brake applied	5.87	5.77	6.13	6.07

11. OPERATOR'S FIELD OF VISION

The operator's field of vision to the front and rear from the operator's seat is represented in **Fig. 10**. The observations are as under:

1. The non visible space in front is **7260 mm** which is **3.80** times of wheel base (i.e. 1890mm).
2. The non-visible space on LHS and RHS is **2680 mm** which is **1.86** times of standard rear track width (i.e. 1440 mm).
3. Silencer creates the masking effect.

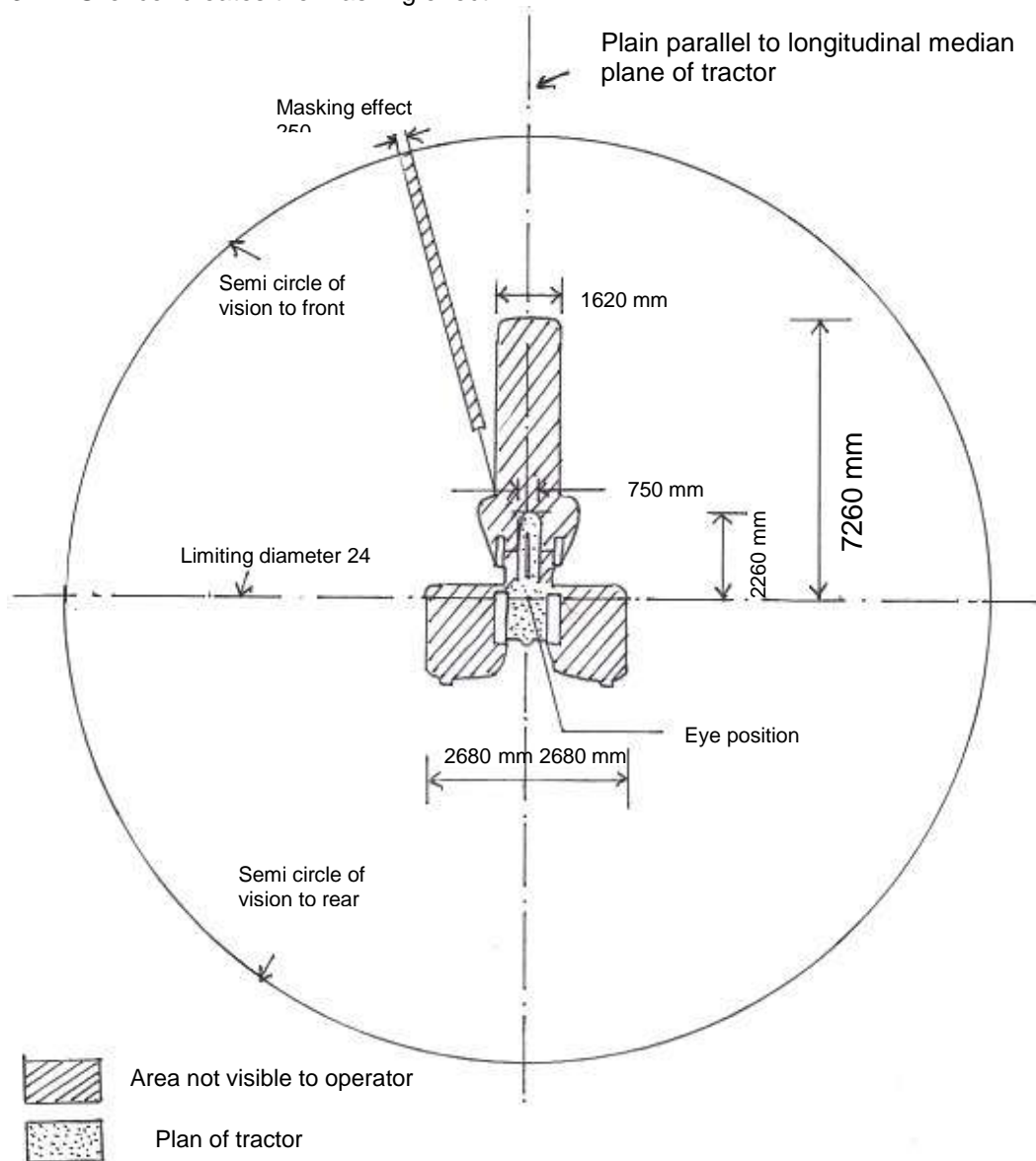


Fig. 10: OPERATOR'S FIELD OF VISION

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

12. FIELD TEST

- 12.1** The field tests comprising of Disc Ploughing, rotavation and puddling (including water proof test) were conducted for **11.7, 10.3** and **15.4** hours respectively.
All the field tests were conducted at the full accelerator settings, when the no load speed of the engine varied from **2150** to **2176 rpm**.
- 12.2** The brief specifications of the implements used during field tests are given in **Annexure – I & II**.
- 12.3** The summary of field test observation with Disc Plough, rotavator and puddling is given in **Table - 3**.

Table – 3

SUMMARY OF FIELD PERFORMANCE TEST

Sl. No.	Parameter/operation	Disc Ploughing	Rotavation	Puddling
i)	Type of soil	Heavy	Heavy	Heavy
ii)	Av. soil moisture, (%) / Av. depth of standing water, (cm)	7.8 to 15.7	9 to 15	15 to 16
iii)	Bulk density of soil, (g/cc)	1.55 to 1.60	1.6	-
iv)	Cone index, (kg/sq.cm) / Puddling index, (%)	8.17 to 9.36	6.30 to 8.17	85
v)	Gear used	L-1	L-1	L-2
vi)	Av. speed of operation, (kmph)	2.61	2.98	3.90 to 4.06
vii)	Av. wheel slip, (%) / Av. Travel reduction, (%)	13.0 to 15.2	- 4.5 to - 3.9	3.5 to 4.6
viii)	Av. depth of cut, (cm) / Av. Depth of puddles, (cm)	14 to 18	7 to 9	30.3 to 33.0
ix)	Av. working width, (cm)	63 to 64	151 to 167	--
x)	Area covered, (ha/h)	0.132 to 0.140	0.365 to 0.426	--
xi)	Fuel consumption:			
	- (l/h)	3.60 to 3.83	5.47 to 5.63	4.65 to 5.02
	- (l/ha)	25.70 to 29.05	12.83 to 15.39	--
xii)	Av. draft of implement, (kN)	7.20 to 7.42	--	--

Remarks: The average lub oil and coolant (water) consumptions during the entire field tests were observed as **Nil** and **1.92 ml/h** respectively.

12.4 Wet land cultivation (Puddling):

12.4.1 The tractor was fitted with roto puddler and puddling special tyre for carrying out the puddling operation. The brief specifications of roto puddler and puddling special tyre is given in **Annexure – I**

12.4.2 After completion of puddling and water proof test, the tractor was partially dismantled to check effectiveness of sealing provided against ingress of water and / or mud in various assemblies / components as per requirements of IS : 11082 – 1984 (Reaffirmed in October, 2017) [Technical requirement of Agriculture tractors for wet land cultivation]. The observations recorded were as under.

S. No.	Location	Whether ingress of mud/or water	Remarks
1.	Front axle assemblies	No	None
2.	Centre pin	No	
3.	Clutch assembly	No	
4.	Lubricating oil of engine sump, transmission, hydraulic housing, final drive housing & steering system	No	
5.	Brake assembly	No	
6.	Rear axle assembly	No	
7.	Starter motor	No	
8.	Alternator		

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

13. HAULAGE TEST

Type of trailer:		Two wheel (Single axle)	Four wheel (Double axle)
Gross mass of trailer, (tonnes)	:	3.5	4.5
Height of trailer hitch above ground level, (mm)	:	575	660
Gear used during the test for negotiating slopes upto 8%	:	H4	H4
Average travel speed, (kmph)	:	32.83	32.83 to 33.08
Average fuel consumption:			
- (l/h)	:	7.85 to 7.86	7.02 to 7.07
- (ml/km/tonne)	:	54.23 to 54.30	47.50 to 47.55
Average distance traveled per litre of fuel consumption, (km)	:	5.26 to 5.27	4.67 to 4.68
General observations:			
Effectiveness of brakes	:	Effective	Effective
Maneuverability of tractor-trailer Combination	:	Satisfactory	Satisfactory

14. COMPONENTS/ASSEMBLY INSPECTION

The engine and other assemblies were dismantled after **84.2** hours of tractor operation at this Institute.

14.1 Engine:

14.1.1 Cylinder bore:

Cylinder No.	Cylinder bore dia, (mm)						Max. permissible limit, (mm)
	Top position		Middle position		Bottom position		
	Thrust side	Non-thrust side	Thrust side	Non-thrust side	Thrust side	Non-thrust side	
1.	98.045	98.044	98.048	98.047	98.045	98.038	98.30
2.	98.039	98.038	98.043	98.039	98.041	98.039	
3.	98.038	98.038	98.039	98.040	98.042	98.040	

14.1.2 Piston:

Piston No.	Piston dia, (mm)					Piston to cylinder liner clearance at skirt (mm)	
	Top (above top compression ring)		At skirt		Max. permissible wear limit,	As observed	Max. permissible limit,
	Thrust Side	Non-thrust side	Thrust side	Non-thrust side			
1.	97.284	97.165	97.912	*	When the ring and groove clearance exceeds discard limit	0.136	0.45
2.	97.280	97.143	97.908	*		0.135	
3.	97.272	97.158	97.911	*		0.131	

* Not measured due to design features.

14.1.3 Ring end gap:

Rings	Ring end gap, (mm)									Max. Permissible end gap limit, (mm)
	Cylinder No.1			Cylinder No.2			Cylinder No.3			
	Top	Middle	Bottom	Top	Middle	Bottom	Top	Middle	Bottom	
1 st comp ring	0.45	0.45	0.45	0.45	0.45	0.45	0.40	0.40	0.40	2.00
2 nd comp ring	1.00	1.00	1.00	0.90	0.90	0.90	0.80	0.80	0.80	2.00
Oil ring	0.70	0.70	0.70	0.70	0.70	0.70	0.75	0.75	0.75	2.00

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

14.1.4 Ring side clearance:

Rings	Ring side clearance, (mm)			Max. Permissible clearance Limit, (mm)
	Piston-I	Piston-II	Piston-III	
1st Compression ring	--Tapped--			
2 nd Compression ring	0.054	0.055	0.059	0.20
Oil ring	0.047	0.048	0.045	0.15

14.1.5 Main bearings:

Bearing No.	Diametrical Clearance, (mm)	Crankshaft end float, (mm)	Max. permissible clearance limit, (mm)	
			Diametrical clearance	Crankshaft end float
1.	0.075 to 0.076	0.35	0.40	0.67
2.	0.068 to 0.080			
3.	0.073 to 0.081			
4.	0.066 to 0.089			

14.1.6 Big end bearings:

Bearing No.	Clearance, (mm)		Max. permissible clearance limit, (mm)	
	Diametrical	Axial	Diametrical	Axial
1.	0.047 to 0.086	0.25	0.40	0.60
2.	0.052 to 0.089	0.25		
3.	0.052 to 0.079	0.25		

14.1.7 Valve, guides and timing gears:

Any marked sign of overheating of valves : None
Pitting of seat/faces of valves : None
Any visual damage to the teeth of timing gears : None

Observation

Spring Rate, (N/mm):

Intake valve spring : 11.3 to 11.4
Exhaust valve spring : 11.2 to 11.3

Against the discard limit of 8.83 N/mm

Clearance between valve guide and valve stem, (mm):

Intake valve : 0.047 to 0.062
Exhaust valve : 0.080 to 0.085

Against discard limit of 0.25 mm

14.2 Clutch:

Any marked wear on clutch friction plate(s) : **None**
Condition of clutch release bearing : Normal
Condition of pilot bearing : Normal
Condition of diaphragm springs. : Normal
Presence of oil in clutch housing : None
Any marks on fly wheel/pressure plate : None

Overall thickness of clutch plate,(mm):

-Main transmission : 10.48 to 10.71 | 5.7 mm (Under a load of 7000N)
-PTO : 7.66 to 7.72 | 5.7 mm

Height of lining over rivet head, (mm):

-Main transmission : 2.69 to 2.80
-PTO : 1.20 to 1.29

Upto rivet head

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

14.3 Transmission gears:

Observation

Any visual damage, pitting & chipping of any transmission gear teeth : None

Backlash between crown wheel and Pinion, (mm) : 0.28

Re-shim when backlash exceeds 0.400 mm

14.4 Brakes:

Description	Initial specified thickness of brake disc, (mm)	Measured thickness of brake lining after test,(mm)	Measured depth of oil groove of brake lining, (mm)	Minimum permissible depth of oil groove of brake lining, (mm)
Left	4.6 to 4.7	4.60 to 4.65	0.43 to 0.60	0.25
Right	4.6 to 4.7	4.72 to 4.83	0.53 to 0.67	

14.5 Front axle

: Front axle final drive reduction unit case is located near front wheel hub in a separate case. The differential unit is accommodated inside centre of the front axle housing. Bearing pins and bushes are provided at end of front axle and final drive.

Condition of front axle seals, bushes & bearing pins : None

Any visual damage, pitting & chipping of front axle transmission gear teeth : None

Any marked wear of bearing pins and bushes : None

Clearance between bearing pins and bushes at top, mm : N.A

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Clearance between centre pin (journals) and bushes, mm : 0.25 to 0.36

Against discard limit of 0.60 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
	None	

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

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:

S. 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	29.4 (D)	29.4	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	29.4 (D)	29.4	Yes
c)	Specific fuel consumption corresponding to maximum power,(g/kWh)	Non Evaluative	+ 5%	260 (D)	267	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	190 (D)	178.7	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10 percent, min (R)	27.4	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.	125 (D)	112	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)	107	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.60 (D) 2.74 (R)	0.33	Yes
h)	Smoke level	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 (R)	0.18	Yes

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

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 65% of static mass with ballast	16.00 (D) 16.19 (R) Minimum	21.25	Yes
b)	Maximum drawbar pull with standard ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	14.00 (D) 14.15 (R) Minimum	19.05	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.	23.5 (D) 23.5 (R) Minimum	23.5	Yes
d)	Max. transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	125 (D)	89	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%]	11.76 (D)	14.88	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) 6.92 (R)	11.08	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 (R) Maximum	20	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 standard ballast*, (m):					
	1) Cold brake	Evaluative	10	10 (R)	8.06	Yes
	2) Hot brake	Evaluative	10	10 (R)	8.88	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (R)	464 to 480	Yes

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

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
* The manufacturer has not recommended ballasting for road test, therefore the brake test was conducted under standard ballast condition only.						
16.1.5	Noise measurement:					
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	88 (R)	82	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96 (R)	93	Yes
16.1.6	Amplitude of mechanical vibrations at :					
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R)	60	Yes
	2) Right foot rest	Evaluative			60	Yes
	3) Seat (with driver seated)	Non Evaluative	100 microns (max)	100 (R)	120	No
	4) Steering Wheel	Non Evaluative	100 microns (max)	100 (R)	140	No
16.1.7	Haulage requirements :					
a)	Gross mass of the trailers, (tones):					
	1) Two wheel	Non Evaluative	--	3.5 (D)	3.5	Yes
	2) Four wheel	Evaluative	--	4.5 (D)	4.5	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
	1) Two wheel	Non Evaluative	--	8.0 to 9.0 (D)	5.26 to 5.27	No
	2) Four wheel	Evaluative	--	8.0 to 9.0 (D)	4.67 to 4.68	No
c)	Fuel consumption (cc/km/tonne):					
	1) Two wheel	Non Evaluative	--	30 to 35 (D)	54.23 to 54.30	No
	2) Four wheel	Evaluative	--	30 to 35 (D)	47.50 to 47.55	No
16.1.8	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) Transmission oil	-do-				

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

1	2	3	4	5	6	7
16.1.9	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)	--	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)	--	Does not meet the requirement	No
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)	--	Meets the requirement	Yes
16.1.10	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		EURO 45 E5		Yes
	3) Year of manufacture	Evaluative		LG (i.e. February, 2018)		Yes
	4) Engine number	Evaluative		E3418236		Yes
	5) Chassis number	Evaluative		T053372408LG		Yes
	6) Declaration of PTO power, (kW)	Evaluative		29.4		Yes
16.1.11	Discard limit for :					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	98.30	98.038 to 98.048	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non-Evaluative		0.45	0.131 to 0.136	Yes
(c)	Ring end gap (mm) :					
	- Top comp. ring	Evaluative	-do-	2.0	0.40 to 0.45	Yes
	- 2 nd comp. ring		-do-	2.0	0.80 to 1.00	Yes
	- Oil ring		-do-	2.0	0.70 to 0.75	Yes
(d)	Ring groove clearance (mm) :					
	- Top comp. ring	Evaluative	-do-	0.35	---Tapped---	--
	- 2 nd comp. ring		-do-	0.20	0.054 to 0.059	Yes
	- Oil ring		-do-	0.15	0.045 to 0.048	Yes

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

1	2	3	4	5	6	7	
(e)	Clearance of main bearings (mm):						
	-	Diametrical clearance	Evaluative	-do-	0.40	0.066 to 0.089	Yes
	-	Crankshaft end float	Evaluative	-do-	0.67	0.35	Yes
(f)	Clearance of big end bearings, (mm):						
	-	Diametrical	Evaluative	-do-	0.40	0.047 to 0.089	Yes
	-	Axial	Evaluative	-do-	0.60	0.25	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	N.A	N.A	--	
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.50	0.25 to 0.36	Yes	
16.1.12	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	
16.1.13	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	No			
		If ROPS fitted it should meet the requirement of IS: 11821-1992 (Reaffirmed in October, 2017)	Not provided	Not applicable			
2.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Provided	Yes			

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

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 2014)] : Conforms
- ii) Agricultural tractors - Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS:4931-1995 (Reaffirmed 2014)] : **Does not conform**
- iii) Agricultural wheeled tractors - Rear mounted three-point linkage: Part 1 Category 1, 2, 3 & 4 (Fourth Revision) [IS 4468 (Part-1):1997 (Reaffirmed 2017)] : **Does not conform**
- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed October, 2017)] : Conforms
- v) Agricultural tractors - Operator's seat technical requirement [IS 12343 –1998 (First revision) (Reaffirmed 2014)] : **Does not conform**
- vi) Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision): [IS 12239 (PT-1) 1996/ISO 4254-1:1989 (Reaffirmed October, 2017)] : **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 2014)] : **Does not conform**
- viii) Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) IS: 8133-1983 (Reaffirmed 2014)] : **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 2014)] : Conforms
- x) Agricultural Tractors and Machinery - Lighting device for travel on public roads (IS: 14683-1999) (Reaffirmed 2014)] : Conforms

16.4 Salient Observations:

16.4.1 Laboratory tests:

16.4.1.1 PTO Performance Test:

- i) The maximum PTO power was recorded as **29.4 kW** against the declaration of **29.4 kW**, which meets the requirement of IS: 12207-2014 with regard to tolerance limit.
- ii) The specific fuel consumption corresponding to maximum power was recorded as **260 g/kWh** against the declaration of **267 g/kWh**, which is within the tolerance limit of IS: 12207-2014.
- iii) The backup torque is **27.4 %**.
- iv) The power drop under natural and high ambient condition was recorded as **6.8 %** which is considered on higher side. This should be looked into for necessary corrective action.

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

16.4.1.2 Drawbar performance test:

During ten hours drawbar test creeping of RHS and LHS of rear tyre over the rims was recorded as 25 and 28 mm respectively. This should be looked into for necessary corrective action.

16.4.1.3 Mechanical Vibration:

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

16.4.1.4 Operator's seat:

The width of seat, longitudinal and vertical distance from Seat Index Point to centre of differential lock pedal, vertical distance from Seat Index Point to centre of steering control wheel & foot rest should meet the requirement as per IS:12353-1998 (Reaffirmed in 2014).

16.4.1.5 Specification of Power Take-Off shaft:

The dimension "dØ" & "BØ" of PTO shaft does not meet the requirement of the IS: 4931 -1995 (Reaffirmed in 2014). This should be looked into for necessary corrective action.

16.4.1.6 Specification of Three point linkage:

The dimension of width of ball , lateral distance from lower hitch point to centre line of tractor and power movement range does not meet the requirement of IS: 4468 - 1997 (Part-1) (Reaffirmed 2014). This should be looked into for necessary corrective action.

16.4.7 Nominal speed:

The nominal speed of the tractor recorded as **21.59 & 31.08** in high reverse **RH3 & RH4** respectively. The speed recorded in reverse gear **RH3 & RH4** is not safe as far as the reversing of tractor is concerned. This should be looked into for necessary 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 found as suitable for wetland operation (Puddling).

16.4.2.2 Haulage Test:

- i) The distance travelled per litre of fuel consumption with two wheel & four wheel trailer was observed as 5.26 to 5.27 km/l & 4.67 to 4.68 km/l against the declaration 8.0 to 9 .0 km/l. This does not meet the requirement of IS: 12207-2014 and therefore, should be looked into for necessary corrective action.
- ii) Specific fuel consumption during haulage test with two & four wheel trailer was recorded as **54.23 to 54.29 & 47.49 to 47.55 ml/km/tonne** respectively against the declaration of **30 to 35 ml/km/tonne** respectively. 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.

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

16.6 Recommendation with regard to safety on tractor:

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

- i) There should be provision for spark arresting device in exhaust system.
- ii) The fuel shut-off knob should remain in stop position.
- iii) The working clearance between the position control and draft control lever should be provided as per IS: 12239 (Part-2) – 1999.
- iv) The longitudinal and vertical distance from Seat Index Point to centre of differential lock pedal. This should be within the limit for easy handling of tractor.
- v) The vertical distance of clutch, brake and accelerator pedal from Seat Index Point. This should be within the limit for easy handling of tractor.
- vi) There should be provision to attach trailer brake valve.

16.7 Adequacy of Literature supplied with machine:

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

- i) Operator' manual of Escorts Euro 45 E5 tractor model.
- ii) Spare parts catalogue Escorts Euro 45 E5 tractor model
- iii) Service manual Escorts Euro 45 E5 and 45 F25 tractor model

16.7.2 The printed literatures supplied with the test sample are in English. The literature may be bought out as per IS: 8132-1999 (Reaffirmed in 2014) for the guidance of user and service personnel in national as well as other regional languages.

17. CITIZEN CHARTER

Time frame for Testing & Evaluation as per Citizen Charter	Duration of Test	Whether the Test Report is released within the time frame given in Citizen Charter	Remarks
10 Months	09 Months (September, 2018 to May, 2019)	Yes	--

TESTING AUTHORITY:



PRAMOD YADAV
AGRICULTURAL ENGINEER



C.V. CHIMOTE
TEST ENGINEER



J.J.R. NARWARE
DIRECTOR

The report compiled by: **Shri Pratyush satya**, Senior Technical Assistant

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

18. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
18.1	16.3 (ii), (iii), (v), (vi), (vii) & (viii), 16.4.1.5, 16.4.1.6 & 16.6	These are being studied & corrective action will be taken in near future.
18.2	16.4.1.1 (iv), 16.4.1.2 & 16.4.1.3	Your valuable comments & suggestions for improvement are well known. Under our policy of continuous product improvement this aspects are further being looked into and will try to eliminate these deviations soon wherever necessary.
18.3	16.4.1.17	We are in discussion with our suppliers for possible options. Action in this regard will be implemented in future soon after proper internal validation.

ANNEXURE- I

BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST

S. No.	Parameters	Disc Plough	Rotavator	Roto puddler
1	Make	Farmking	New swan Enterprises	Escorts
2	Type	Mounted	Mounted	Mounted
3	No. of Discs / Blades	Two	42 in 8 flanges	46
4	Type of Discs / Blades	Plain concave	Hatchet	Hatchet
5	Size of Discs / Blades (mm)	580	270 x 87 x 7	225 x 45 x 6.6
6	Spacing of Discs /Flanges, (mm)	510	75	75
7	Lower hitch point span, (mm)	705	700	755
8	Mast height, (mm)	560	470	660
9	Overall Dimensions (mm):			
	Length	1820	1270	2045
	Width	1330	2160	940
	Height	1350	960	1215
10	Gross Mass, (Kg)	355	490	385

Details of Deep lug tyre as recommended by applicant for wet land cultivation

Parameters		Front Tyre	Rear Tyre
Make	:	BKT	BKT
Numbers	:	Two	Two
Type of tyre	:	Pneumatic, traction	Pneumatic, traction
Size	:	8.30-20	14.9-28
Ply rating	:	06	08
Number of lugs	:	14	16
Average lug height, after test, (mm)	:	45	56

T- 1257/1784/2019	ESCORTS LIMITED, EURO 45 E5 (Brand name: POWERTRAC) TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/07/2022)

ANNEXURE-II

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	PTO performance test	9.9
3.	Power lift and hydraulic pump performance test	1.2
4.	Drawbar performance test	16.0
5.	Turning ability	0.5
6.	Location of centre of gravity	0.3
7.	Operator's field of vision	0.2
8.	Brake test	0.8
9.	Noise measurement	1.9
10.	Mechanical vibration test	1.0
11.	Nominal speed test	1.4
B.	FIELD TEST:	
1.	Disc ploughing	10.7
2.	Rotavation	10.3
3.	Puddling (including 5.0 hours water proof test)	10.3
C.	HAULAGE TEST:	5.0
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	15.0
TOTAL:		84.2