



**ESCORTS LIMITED, 45 F9
(BRAND NAME - FARMTRAC) 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.) ४६६ ४४५

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO : 9001 - 2008 Certified Institute)

Tractor Nagar, Budni (M.P.) 466 445

E-mail fmti-mp@gov.in

Website : <http://www.fmttibudni.gov.in>

Telephone : 07564 - 234729

Fax : 07564 - 234743

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

Manufacturer : M/s. Escorts Limited,
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 (Haryana) -121 003

Month: April	Test Report No. T-1085/1610/2017	Year: 2017
---------------------	---	-------------------

**GOVERNMENT OF INDIA
CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE
TRACTOR NAGAR, BUDNI (MADHYA PRADESH) 466445, INDIA**

E-mail: fnti-mp@gov.in
Web site: fnttibudni.gov.in

Telephone: 07564-234729

FAX: 07564-234743

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE – BUDNI	Page 2 of 34
--	---------------------

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

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

Test code/Procedure : IS: 5994-1998 (Reaffirmed in 2009)
IS: 12207-2014

Period of Test : March, 2017 to April, 2017

Test Report No. : **T-1085/1610/2017**

Month/Year : **April, 2017**

- 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 selected by the representative of testing authority, 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.).
- v) This is a Variant test report and therefore, should be read in conjunction with the Test Report of base model i.e. "FARMTRAC -CHAMPION F2" tractor bearing No. T-982/1506/2015, released in September, 2015.

SELECTED CONVERSIONS

SELECTED CONVERSIONS			ABBREVIATIONS	
Sl. No	Units	Conversion Factor		
1	Force:		apa	As per applicant
	1 kgf	9.80665 N	TDC	Top Dead Centre
		2.20462 lbf	IS	Indian Standard
2	Power:		LHS	Left Hand Side/ /RHS
	1 hp	1.01387metric hp (Ps)	Hg	Mercury
		745.7 W	Temp.	Temperature
	1 Ps	735.5 W	N.R.	Not recorded
	1 kW	1.35962 Ps	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	SIP	Seat Index Point

<u>Sr.No.</u>	<u>C O N T E N T S</u>	<u>Page no.</u>
1.	Scope of test	05
2.	Fuel & Lubricants	06
3.	Essential Test	07
	3.1 Specifications	07
	3.2 Nominal Speed	21
	3.2 PTO Power Performance	21
4.	Adjustments, Defects, Breakdowns & Repairs	23
5.	Comparison Between Base Model and Variant Model	27
6.	Summary of Observations, Comments & Recommendations	30
7.	Citizen Charter	31
8.	Applicant's comments	33
	Annexure - I	34

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

Manufacturer	: M/s. Escorts Limited, Plot No 2 & 3, Sector-13, Faridabad – 121 007 (Haryana)
Test requested by (applicant)	: M/s. Escorts R&D Center, 15/5, Mathura Road, Faridabad (Haryana) – 121 003
Selected for test by	: Manufacturer
Place of running-in & test carried out	: At manufacturer's works
Duration of said running-in, (h):	
- Engine	: 20
- Transmission	: 30
Method of Selection	: The tractor was directly submitted by the manufacturer. Hence, method of selection is not known.

1. SCOPE OF TEST

The “Escorts Limited, FARMTRAC CHAMPION F2” tractor had undergone Initial commercial testing at this Institute and test report No. T-982/1506/2015 released in September, 2015. Now, the applicant has submitted an application vide letter No – 45 F9-B-79/16 dated 12.09.2016 for testing of “ESCORTS LIMITED, 45 F9 (Brand Name: FARMTRAC)” TRACTOR as a variant of “Escorts Limited, FARMTRAC CHAMPION F2” tractor.

The applicant having enclosed a list of following differences in the technical specifications between tractor base model “Escorts Limited, FARMTRAC CHAMPION F2” and “ESCORTS LIMITED, 45 F9 (Brand Name: FARMTRAC) TRACTOR” and requested to test the “ESCORTS LIMITED, 45 F9 (Brand Name: FARMTRAC)” TRACTOR:-

The major changes between Base and Variant model are listed below:

S. No.	Parameters	Base Model (T-982/1506/2015)	Variant Model
1	2	3	4
1.	Tractor Model	FARMTRAC Champion F2	45 F9 (Brand Name: FARMTRAC)
2.	Prime-mover model	E3.234-3A	AE3.276B-3A
3.	Max. speed at no load, rpm	2475 to 2525	2305 to 2455
	Low idling speed, rpm	600 to 700	700 to 800
	Speed at max. torque, rpm	1200 to 1300	900 to 1100
4.	Nominal bore, mm	95	98
	Stroke, mm	110	122
	Cubic capacity, cc	2339	2761
5.	Recommended radiator pressure cap, kPa/kgf/Cm ²	(49)/0.5	(89)/0.9
	Bare radiator capacity, (l)	3.40	2.80
	Expansion tank cap. (l)	0.6	0.76
	Total capacity of cooling system, (l)	8.1	6.6
6.	Type of clutch	Single, dry friction plate	Dual, dry friction clutch

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

	No. Of friction plates	1	2
1	2	3	4
7.	Nominal Speed ,kmph	Forward: 2.67 to 30.80	2.82 to 32.61 (% of variation 5.62 to 5.88)
		Reverse:3.07 to 10.92	4.35 to 15.33 (% of variation 40.38 to 41.69)
8.	NO. of PTO speed available	Single	Multispeed
9.	Wheel base, mm	1875	2120
10.	Observed Max./Rated Power, under 2hour test, kW	28.1	32.3
	Observed Max. equivalent crankshaft torque, Nm	147.1	181.01
	Observed Equivalent crankshaft torque, at max. power, Nm	122.0	140.1

Subsequent to the examination of the case in light of Indian Standard IS: 12207-2014, the following tests were considered to be carried out:

- Specification checking in full
- Nominal speed test
- Full PTO Power Performance test

2. FUEL AND LUBRICANTS

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

2.2 Lubricants:

S. No.	Particulars	As recommended by the manufacturer	As used during the test
1.	Engine oil	SAE 15 W40 (API4) / SAE 20W40 (API CD/SF-IS:13656-EP-DL-2)	As recommended
2.	Air cleaner oil	SAE 15W40(API-4)-IS:13656-EP-DL-2	As recommended
3.	Gear box housing	SAE 80 W 90/EP 80 (API GL-5,IS :1118, EP, Type GL-5	Oil originally filled in the tractor was not changed
4.	Differential, final drive and hydraulic system oil	UTTO (TRACT ELFSF-31	
5.	Steering housing oil	SAE 90 (API GL-4,IS :1118-EP,Type GL-4	
6.	Grease	Servo Grease MP	Servo Grease MP

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
-------------------	---

3. ESSENTIAL TESTS

3.1 SPECIFICATION

		<u>Base Model</u>	<u>Variant Model</u>
3.1.1	Tractor:		
	Make	: Escorts Limited	Escorts Limited
	Model	: FARMTRAC Champion –F2	45 F9
	Brand name	: FARMTRAC	FARMTRAC
	Type	: Four wheeled, rear-wheel driven, general purpose Agricultural Tractor	
	Year of manufacture	: 2014	2016
	Chassis number	: T05 2315691	T05 2360585ME
	Country of origin	: India	India
3.1.2	Engine:		
	Make	: Escorts Limited (apa)	Escorts Limited (apa)
	Model	: E3.234-3A	AE3.276B-3A
	Type	: Four stroke, water cooled, naturally aspirated, direct injection, diesel engine.	
	Serial number	: E-2320152	E 23660 79
	Engine speed(Manufacturer's recommended production setting), (rpm):		
	- Maximum speed at no load	: 2475 to 2525	2305 to 2455
	- Low idle speed	: 600 to 700	700 to 800
	- Speed at maximum torque	: 1200 to 1300	900 to 1100
	Rated speed, (rpm):		
	- For PTO use	: 2200	2200
	- For drawbar use	: 2200	2200
3.1.3	Cylinder & Cylinder Head:		
	Number	: Three	Three
	Disposition	: Vertical, Inline	Vertical, Inline
	Bore/stroke, (mm)	: 95/110	98/122
	Capacity as specified by the applicant, (cc)	: 2339	2761
	Compression ratio	: 17.5 ± 5% : 1	17.5 ± 5% : 1
	Type of cylinder head	: Monoblock	Monoblock
	Type of cylinder liners	: Wet, replaceable	Wet, replaceable
	Type of combustion chamber	: Direct injection, open chamber in piston crown.	
	Arrangement of valves	: Overhead, inline	Overhead, inline
	Valve clearance (cold):		
	- Inlet valve, (mm)	: 0.30	0.30
	- Exhaust valve, (mm)	: 0.40	0.40
3.1.4	Fuel System:		
	Type of fuel feed system	: Gravity and force feed	

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

	<u>Base Model</u>	<u>Variant Model</u>
3.1.4.1 Fuel tank:		
Capacity, (l)	: 45.8	52.5
Location	: Above clutch housing	
Provision for draining of sediments/ water	: Not provided, however water separator is provided between fuel tank and feed pump.	
Material of fuel tank	: Metallic	Metallic
3.1.4.2 Water Separator:		
Make	: Hilux	Hilux
Type	: Inverted funnel, gravity separation	
Location	: In between fuel tank & fuel feed pump	
Capacity, (l)	: 0.50	0.50
3.1.4.3 Fuel feed pump:		
Make	: Bosch, India	Bosch, India
Type	: Plunger with hand primer	
Model/Group combination No.	: FP/KS22AD62, 9 440	FP/KSG22AD105, F002A50 040
Provision of sediment bowl	: Provided (Metallic)	Provided (Metallic)
Method of drive	: Through cam shaft of fuel injection pump	
3.1.4.4 Fuel filters:		
Make	: Bosch, India	Bosch, India
Model/Group combination No.	: 9 450 030 120	F 002 H20 187
Number	: Two	One
Type of elements:		
- Primary	: Cloth	Paper
- Secondary	: Paper	NA
Capacity of final stage filter, (l)	: 0.50	0.41
3.1.4.5 Fuel Injection pump:		
Make	: Bosch, India	Bosch, India
Model/Group combination No.	: F 002 AOZ 910, PES 3A90 D 410 RS3500	F 002 A3Z F07, PES 3A90D410 RS3500
Type	: Inline ,Plunger	Inline ,Plunger
Serial number	: 41962537	61860521
Method of drive	: Through timing gears	Through timing gears
3.1.4.6 Fuel injectors:		
Make	: Bosch, India	Bosch, India
Nozzle holder Number	: F 002 C70 023	F 002 C70 023 (Holder no)
Nozzle Number	: DSL A 144 P 5586	DSL A 146 P 5602 (nozzle no.)
Type	: Multi hole (Five holes)	Multi hole (Five holes)
Manufacturer's production pressure setting, Mpa	: 25.0 to 25.8	25.0 to 25.8
Injection timing	: 11 ± 1 degree before TDC	8 ± 1 degree before TDC
Firing order	: 1-2-3	1-2-3

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

	<u>Base Model</u>	<u>Variant Model</u>
3.1.4.7 Governor:		
Make	: Bosch, India	Bosch, India
Model/Group combination No.	: RSV 325... 1100 A1C 1698L	RSV 375... 1100 A4C 1799L
Type	: Mechanical, centrifugal,	variable speed
Governed range of engine speed, (rpm)	: 600 to 2525	700 to 2455
Rated engine speed, (rpm)	: 2200	2200
3.1.5 Air intake system:		
3.1.5.1 Pre-cleaner:		
Make	: Escorts (apa)	Escorts (apa)
Type	: Centrifugal with transparent dust collector.	
Location	: Above main air cleaner inlet tube, outside the bonnet.	
3.1.5.2 Air cleaner:		
Make	: Escorts (apa)	Escorts (apa)
Type	: Oil bath	Oil bath
Location	: In the front of the radiator, under the bonnet	
Oil capacity, (l)	: 1.0	1.0
Range of suction pressure at maximum power, (kPa)	: 3.47	2.4 to 2.6
Oil change period	: After every 10 hours of operation in dusty condition and after every 50 hours of operation in normal working condition.	
3.1.6 Exhaust System:		
Type of silencer	: Updraft, (Elliptical)	Updraft, (Elliptical)
Position of silencer outlet with respect to SIP, (mm):		
- Vertical	: 995	990
- Longitudinal	: 1450	1660
- Lateral	: 230 (on LHS)	165 (on LHS)
Range of exhaust gas pressure at maximum power, (kPa)	: 6.0 to 6.1	6.1 to 6.3
Provision of spark arresting device	: None	None
Provision against entry of rain water	: A bend is provided at the top of silencer	
3.1.7 Lubricating system:		
Type	: Forced feed-cum-splash	
Oil sump capacity,(l)	: 6.0	6.0
Total lub oil capacity, (l)	: 6.5	6.7
Oil change period	: First change after 100 hours of operation and subsequently after every 300 hours of operation	
Cooling device, (if any)	: None	None
Filters:		
Type	: Full flow, spin-on paper element	
Number	: One	One

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

	<u>Base Model</u>	<u>Variant Model</u>
Pump:		
Type	: Gear	Gear
Method of drive	: Through gear mounting	on camshaft
Pressure release setting, (kPa)	: 300 to 310 (apa)	300 to 310 (apa)
Minimum permissible pressure, (kPa)	: 98.1	98.1 (apa)
3.1.8 Cooling system:		
Type	: Forced circulation of water	Forced circulation of coolant
Details of Pump	: Centrifugal, semi-open impeller of diameter 75 mm (in Base model) and 104 mm(in Variant model) having eight number of vanes, and driven through crankshaft pulley by a cogged 'V'-belt common to alternator	
Details of fan	: Suction type having six polypropylene blades of 380 mm diameter and mounted on water pump shaft.	
Means of temperature control	: Thermostat	Thermostat
Bare radiator capacity, (l)	: 3.40	2.80
Expansion tank, (l)	: 0.60	0.76
Total coolant capacity, (l)	: 8.1	6.6
Radiator cap pressure, (kPa)	: 49	89
Details of Coolant used	:	
Brand Name	: --	Veedol –Zero-R
Coolant Water Ratio	: --	97:3
3.1.9 Starting System:		
Type	: 12V, DC, Electrical	12V, DC, Electrical
Aid for cold starting	: None	None
Any other device provided for easy starting	: None	None
3.1.10 Electrical System:		
3.1.10.1 Battery:		
Make and model	: Exide Freedom & AZD4D	Amaron & TRA 500R
Number	: One	One
Type	: Lead Acid	Lead Acid
Capacity and rating	: 12V, 75 Ah at 20 hour discharge rating	
Location	: On LHS of clutch housing in a separate metallic box.	
3.1.10.2 Starter:		
Make	: Lucas-TVS	PANALFA
Model	: M-14	155-0704
Type	: Pre-engaging, solenoid operated	
Power rating	: 12V, 2.2 kW	12V, 2.2 kW
Serial number	: 260240078A	Not Available

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

3.1.10.3 Generator:

Make	: Bosch, India	Bosch, India
Model	: F 002 G90 267	F 002 G90 267
Type	: Alternator	Alternator
Output rating	: 12V, 35 A	12V, 35 A
Serial number	: 453	Not Available
Method of drive	: Through crankshaft pulley by a cogged "V" belt common to water pump.	
	: In-built in alternator	

3.1.10.4 Voltage regulator

3.1.10.5 Details of lights For Base Model:

Description	No. & capacity of bulb	Height of the centre of beam above ground level, (mm)	Size, (mm)	Distance between centre of the beam and outside edge of tractor at standard rear track setting, (mm)
Front Lights:				
- Head lights	2, 12V, 35/35W	1000	135 Φ	490
- Parking lights	2, 12V, 5W	1265	65 x 65	175
- Turn-cum-hazard Indicator light	2, 12V, 21W	1265	65 x 70	95
- Reflector (white)	2	1265	55 x 30	205
Rear lights:				
- Brake -cum-Tail light	2, 12V, 21/5 W	1245	65 x 65	165
- Turn-cum-hazard Indicator light	2, 12V, 21W	1245	65 x 70	100
- Plough light (on RHS mudguard)	1, 12V, 55W	1390	125 Φ	330
- Reflectors (Red)	2	1245	30 x 55	210
- Registration plate light (RHS)	In-built in rear combination lamp assembly			

3.1.10.5 Details of lights For Variant Model:

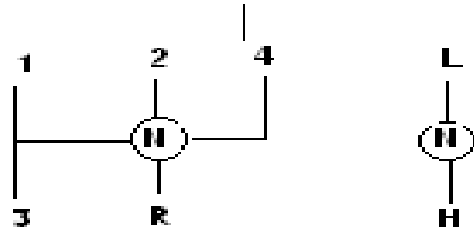
Description	No. & capacity of bulb	Height of the centre of beam above ground level, (mm)	Size, (mm)	Distance between centre of the beam and outside edge of tractor at standard rear track setting, (mm)
Front Lights:				
- Head lights	2, 12V, 35/35W	980	150 Φ	515
- Parking lights	2, 12V, 5W	1265	65 x 65	160
- Turn-cum-hazard Indicator light	2, 12V, 21W	1265	65 x 70	100
- Reflector (white)	2	1265	55 x 30	210
Rear lights:				
- Brake -cum-Tail light	2, 12V, 21/5 W	1270	65 x 62	170
- Turn-cum-hazard Indicator light	2, 12V, 21W	1270	65 x 70	110
- Plough light (on RHS mudguard)	1, 12V, 55W	1425	120 Φ	340
- Reflectors (Red)	2	1270	30 x 55	215
- Registration plate light (RHS)	Part of rear Combination Assembly			

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
-------------------	---

3.1.11	Instrument panel details:	<u>Base Model</u>	<u>Variant Model</u>
	i) Engine speed cum digital cumulative run hour meter (0 to 25 x 100 rpm)	Provided	Provided
	ii) Lubricating oil pressure indicator light	Provided	Provided
	iii) Water temperature gauge (with colour zones)	Provided	Provided
	iv) Fuel level gauge (with colour zones)	Provided	Provided
	v) Battery charging warning indicator light	Provided	Provided
	vi) Main switch (key-turn type)	Provided	Provided
	vii) Light switch (Rotary type)	Provided	Provided
	viii) Turn indicator light switch (two way)	Provided	Provided
	ix) Hazard warning light switch	Provided	Provided
	x) Turn-cum-hazard indicator lights (Tell-tale)	Provided	Provided
	xi) Head lamp (Long beam) 'ON' indicator light	Provided	Provided
	xii) Mobile charging socket	---	Provided
	xiii) Horn push button	Provided	Provided
	xiv) Fuel shut-off knob	Provided	Provided
	xv) Hand accelerator lever	Provided	Provided
	xvi) Steering control wheel	Provided	Provided
	xvii) Rear view mirror.	Provided	Provided

3.1.12	Transmission System:	<u>Base Model</u>	<u>Variant Model</u>
3.1.12.1	Clutch:		
	Make	: Luk, India	Luk, India
	Type	: Single, dry friction plate	Dual, dry friction plate
	No. of friction plate(s)	: One	Two
	Size, OD/ID (mm):		
	- Transmission	: 280 ϕ / 165.6 ϕ	280 ϕ / 165.0 ϕ
	-PTO	: NA	280 ϕ / 165.0
	Method of operation:		
	- Transmission	By pressing the clutch pedal, on LHS of operator's seat.	By pressing clutch pedal halfway provided on LHS of operator's seat.
	-PTO		By pressing clutch pedal fully provided on LHS of operator's seat.
3.1.12.2	Gear box:		
	Make	: Escorts (apa)	Escorts (apa)
	Model	: Not available	Not available
	Type	: Mechanical, Constant mesh gears	Mechanical, Constant mesh gears
	No. of speeds:		
	- Forward	: 8	8
	- Reverse	: 2	2

Gear shifting pattern For **Base & Variant Model** :



Gear selection lever Range selection lever

Location of gear shifting levers : The range shift lever and main gear shifting lever are provided in-front of operator's seat

	<u>Base Model</u>	<u>Variant Model</u>
Oil capacity, (l)	: 12.1(Separate from the differential and rear axle housing)	: 12.0 (Separate from the differential and rear axle housing)
Oil changing period	: After every 1200 hours of operation	

3.1.12.3 Differential:

Type : Crown wheel & bevel pinion with differential unit accommodated inside the differential housing.

	<u>Base Model</u>	<u>Variant Model</u>
Reduction through crown wheel & bevel pinion	: 5.714 : 1 (40/7 T)	: 5.714 : 1 (40/7 T)

	<u>Base Model</u>	<u>Variant Model</u>
Oil capacity ,(l)	: 22.8 (Common with rear axle, brake & hydraulic system)	: 20.5 (Common with rear axle, brake & hydraulic system)
Oil changing period	: After every 1200 hours of operation.	

Differential lock :

	<u>Base Model</u>	<u>Variant Model</u>
Type	: Dog clutch	: Dog clutch
Method of operation	: By pressing a pedal provided on RHS of operator's seat	

3.1.12.4 Rear axle & final drive:

	<u>Base Model</u>	<u>Variant Model</u>
Make	: Escorts (apa)	
Type	: Crown wheel & pinion with differential unit accommodated inside the differential housing	: No separate reduction unit is provided. Crown wheel and pinion serve as final drive

3.1.13 Power lift (Hydraulic System):

	<u>Base Model</u>	<u>Variant Model</u>
- Make	: Farmtrac (apa)	
- Type	: Open center, live, ADDC	
- No. and type of cylinder	: One, single acting	: One, single acting
- Type of linkage lock for transport	: Hydraulic, Shut off valve its fully in closed position acts as transport lock.	

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

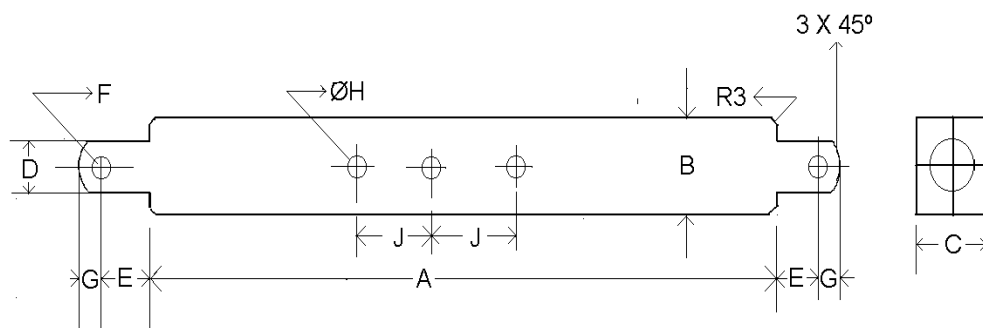
3.1.13.1 Hydraulic pump:	
- Make	: Rexroth Rexroth (apa)
- Type	: Gear Gear (apa)
- Location and drive	: On LHS of engine & driven through timing gears
No. & Type of filter	: One, spin-on paper element
Hydraulic oil capacity, (l)	: 22.8 (common with differential , rear axle, final drive & brake system) 20.5 (common with differential , rear axle, final drive & brake system)
Oil change period	: After every 1200 hours of operation
Provision for external tapping	: Provided Provided
Details of control levers	: i) Position control lever (black) ii) Draft control lever (Red) iii) Flow regulation and hydraulic lock knob (provided below operator's seat) iv) Auxiliary spool valve/external circuit
Method of draft sensing	: Through top link

3.1.13.2 Three point linkage:

S. No.	Observations	As per IS: 4468 (Part-I) – 1997 (Cat.I / Cat.II), (mm)	As measured, (mm)		Remarks
			Base	Variant	
1	2	3	4	5	6
I.	Upper hitch points:				
	a) Dia of hitch pin hole	19.30 to 19.50 / 25.70 to 25.90	25.8	25.9	Conforms to Cat. II
	b) Width of ball	44.0 (max.) / 51.0 (max)	51.0	51.0	--do--
II.	Lower hitch points:				
	a) Dia of hitch pin hole	22.40 to 22.65 / 28.70 to 29.0	29.0	22.48/28.91	Conforms to Cat. I & II
	b) Width of ball	34.80 to 35.0 / 44.80 to 45.0	44.9	44.82	Conforms to Cat. II
III.	Lateral distance from lower hitch point to centre line of tractor	359 / 435	364	364	Does not conform
IV.	Lateral movement of lower hitch points	100 (min) /125 (min)	150	155	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	490	485	Conforms to Cat. II
VI.	Transport height	820 (min)/950 (min)	895	895	Conforms to Cat. I
VII.	Movement (power) range (Without force)	560 (min)/650 (min)	590	635	Conforms to Cat. I
VIII.	Leveling adjustment	100 (min)/100 (min)	300	200	Conforms to Cat. I & II
IX.	Lower hitch point tyre clearance	100 (min)/100 (min)	190	125	--do--
X.	Lower hitch point height	200 / 200 (max)	200	200	--do--

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

3.1.13.3	Drawbar:			
3.1.13.3.1	Linkage Drawbar [Refer Fig. 1 (b)]:			
Notation	As per IS: 12953-1995 (Cat. I) / (Cat. II), (mm)	As measured, (mm)		Remarks for variant model
		Base model	Variant model	
A	683 ± 1.5 / 825 ± 1.5	683	683	Conforms to cat-I
B	75 (min) / 75 (min)	75.6	75.4	Conforms to cat-I&II
C	30 (min) / 30 (min)	32.3	31.4	--do--
D \varnothing	21.79 to 22.00 / 27.79 to 28.00	27.8	27.98	Conforms to cat-II
E	39.0 (min) / 49.0 (min)	56.5	57.8	Conforms to cat-I&II
F \varnothing	12.0 (min) / 12.0 (min)	12.0	12.0	--do--
G	15.0 (min) / 15.0 (min)	15.5	15.2	--do--
H \varnothing	25 ± 1 / 25 ± 1	24.9	25.1	--do--
J	80 ± 1.5 / 80 ± 1.5	79.5	80.2	-do-
No. of holes	7 / 9	07	07	Conforms to cat-I



1(b): DIMENSIONAL NOTATIONS FOR LINKAGE DRAWBAR

3.1.13.3.2	Swinging drawbar	Base model	Variant Model
3.1.13.3.3	Provision for coupling of trailer brakes	Not provided	Not provided
3.1.14	Power take-off shaft:		
	Type	: Type-I, Not Independent	
	Method of engaging	: By hand lever provided on LHS of operator's seat.	
	No. of shaft(s)	: One	One
	PTO speed corresponding to rated engine speed of 2200, (rpm)	: 656	656
	Distance behind rear axle, (mm)	: 325	325
	Engine to PTO speed ratio	: 3.353 : 1	3.353:1
	Whether the PTO shaft is capable of transmitting full power of the engine.	: Yes	Yes

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

Other speeds, if any : None Available (as listed under)

Other speeds corresponding to rated engine speed :

Gear	Engine to PTO speed ratio	PTO speed at rated engine speed
L1/H1	10.21:1	215.48
L2/H2	7.58:1	290.24
L3/H3	4.31:1	510.44
L4/H4	3.17:1	694.01
LR/HR	6.74:1	326.41

3.1.14.1 Specifications of Power Take-Off Shaft: [Refer Fig. 2 (a)]

Specification	As per IS:4931-1995, Type-I	As observed		Remarks
		Base model	Variant model	
1	2	3a	3b	4
Nominal speed (rpm)	540 ± 10	540 rpm of PTO corresponds to 1811 rpm of engine.	540 rpm of PTO corresponds to 1811 rpm of engine.	Conforms
No. of splines	6	6	6	Conforms
Direction of rotation	Clockwise	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.	Centrally located	Centrally located	Conforms
1	2	3a	3b	4
Dimensions (mm) [See Fig. 2(a)]:				
DØ	34.79 ± 0.06	34.75	34.76	Conforms
dØ	28.91 ± 0.05	28.90	28.91	-do-
BØ	29.4 ± 0.1	29.4	29.5	-do-
AØ (Optional)	8.3 ± 0.1	8.4	8.3	-do-
W	8.69 – 0.09 - 0.16	8.65	8.65	-do-
A	7	7	7	-do-
b (Optional)	25 ± 0.5	25.0	25.0	-do-
C	38	38	38	-do-
X	30 ⁰	30 ⁰	30 ⁰	-do-
B	76 (min)	85.0	86.0	-do-
H	450 to 675	480	480	-do-

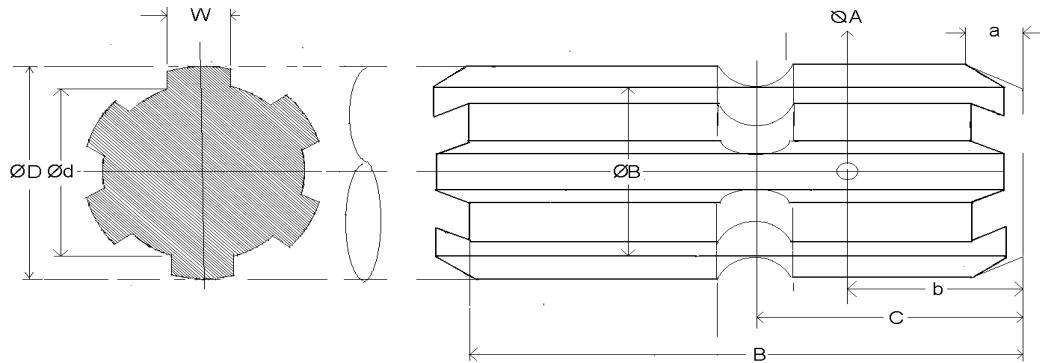


Fig. 2 (a): DIMENSIONAL NOTATIONS FOR TYPE-I POWER TAKE-OFF SHAFT

3.1.14.2	Master Shield of Power Take-Off Shaft:	Provided	Not provided
3.1.15	Towing hitch:	Base Model	Variant Model
3.1.15.1	Front:	Provided	Provided
	Type	: Clevis	Clevis
	Location	: At front of engine support	
	Height above ground level, (mm)	: 680	675
	Type of adjustment	: Fixed	Fixed
	Width of clevis, (mm)	: 47.0	46.9
	Dia of pin hole, (mm)	: 32.8	32.7
3.1.15.2	Rear:		
	Type	: Clevis	Clevis
	Location	: At rear of differential housing	
	Height above ground level, (mm):		
	- Maximum	: 685	685
	- Minimum	: 425	425
	-No. of position	: 8	8
	- Type of adjustment	: By changing the position of hitch on its mounting bracket	
	Distance of hitch point, (mm):		
	- From rear axle centre	: 445	445
	- From power take-off shaft end	: 120	120
	Dia of pin hole, (mm)	: 30.5	30.5
	Width of clevis, (mm)	: 68.3	68.3
3.1.16	Steering:		
	Make	: ZF India (apa)	RANE
	Type	: Mechanical, Re-circulating ball & nut type gear box having single drop arm	
	Location	: Above gearbox housing	
	Method of operation	: Manual, by steering control wheel	
	Diameter of steering control wheel, (mm)	: 450	430
	Lubricant capacity of system, (l)	: 0.90	1.0
	Lubricant change period	: After every 900 hours of operation.	

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

3.1.17	Brakes:	<u>Base Model</u>	<u>Variant Model</u>
3.1.17.1	Service Brake:		
	Make	: Brakes India Ltd.(apa)	
	Type	: Mechanical, oil immersed Multi disc brakes	
	Location	: On rear axle shaft	
	No. of disc (s)	: Five (on each wheel side)	
	Area of liners. (cm ²)	: 2152.5 (on each wheel side)	
	Material of liners	: JFP-208C (apa)	
	Method of operation	: Individual or combined pedal operation by right foot.	
	Oil capacity, (l)	: 22.8* ()	20.5*
	* Common with differential, rear axle , final drive & hydraulic system		
	Oil change period	: After every 1200 hours of operation.	
3.1.17.2	Parking Brake:		
	Type	: Pawl and ratchet arrangement	
	Method of operation	: By locking the service brakes in position by a hand lever provided on RHS of operator's seat.	
3.1.18	Wheel Equipment:		
3.1.18.1	Steering Wheel(s):		
	Make	: Good Year	Good Year
	Number(s)	: Two	Two
	Type of tyre	: Pneumatic, ribbed	Pneumatic, ribbed
	Size	: 6.00 -16	6.00 -16
	Ply rating	: 8	8
	Maximum permissible loading capacity of each tyre at 196 kpa, (kgf)	: 406	406
	Recommended inflation pressure, kPa :		
	- for field work	: 196	196
	- for transport	: 196	196
	Track width, (mm)	: 1325(std.) &1505	1350 (Std.) & 1530
	Method of changing track width	: By reversing the wheels	
	Make & size of rims	: WIL, 4.50 E x 16	SSWL & 4.50 E x 16
3.1.18.2	Driving wheel:		
	Make	: Good Year	Good Year
	Number	: Two	Two
	Type of tyre	: Pneumatic, traction	Pneumatic, traction
	Size	: 13.6 - 28	13.6 - 28
	Ply rating	: 12	12
	Maximum permissible loading capacity of each tyre at 108 kPa pressure, (kgf)	: 1100	1650 (as on tyre)
	Recommended inflation pressure, (kPa) :		
	- for field work	: 100	100
	- for transport	: 108	108
	Track width, (mm)	1350 (std.), 1410, 1530, 1580, 1710, 1810 and 1930	
	Method of changing track width	: By changing position of wheel disc on off-set rim lugs and reversing the wheel disc.	

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

3.1.18.2.1	Make & size of rim	: SSWL, W11 x 28		WIL & W11 x 28
3.1.18.3	Driving Wheel (Optional feature)	: 12.4-28, 12 PR		Not Provided
3.1.19	Wheel base (mm)	: 1875		2120
	Method of changing wheel base, if any	: None		None
	Operator's seat:			
	Make	:		Sietz (apa)
	Type	:		Cushioned
	Type of suspension	:		Two helical coil springs
	Type of dampening	:		Hydraulic shock absorber
	Range of adjustment, (mm):			
	- Vertical	: ± 30		± 30
	- Lateral	: Nil		Nil
	- Longitudinal	: ± 75		± 80
3.1.20	Provision for safety and comfort of operator:			
3.1.20.1	Conformity with IS:12343-1998 (Reaffirmed in March, 2009): Meets all the requirements, except the following :			
	Base Model ----		Variant Model	
			i) Length of seat is less than the requirement	
			ii) Vertical distance of seat index point to foot rest.	
3.1.20.2	Conformity with IS: 6283 (Part-1)-2006(Reaffirmed in March, 2009) & IS:6283(Part-2)-2007 (Reaffirmed in March, 2009):			
	Symbols for operator controls and displays specific to agricultural tractor are provided as per IS: 6283 (Part -1 & 2) both in base and variant model.			
3.1.20.3	Conformity with IS:8133-1983 (Reaffirmed in March, 2009):			
	Location and movement of various controls meets the requirement of IS:8133-1983 (Re-affirmed in March, 2009), except the following:			
	Base Model		Variant Model	
	i) Fuel shut-off knob does not remain in "STOP" position without application of sustainable manual effort.		i) Fuel shut-off knob does not remain in "STOP" position without application of sustainable manual effort.	
3.1.20.4	Conformity with IS: 12239 (Part-1)-1996 (Reaffirmed in February, 2012):			
	Meets the requirements of IS:12239(Part-1)-1996, except the following:			
	i) Provision of spark arresting device in the exhaust system.		i) Provision of spark arresting device in the exhaust system.	
3.1.20.5	Conformity with IS:12239 (Part-2)-1999 (Reaffirmed in March, 2009):			
	Meets the requirements of IS:12239 (Part-2)-1999, except the following:			
	i) The working clearance between the position control lever & draft control lever has not been provided as per the requirement.		i) The working clearance between the position control lever & draft control lever has not been provided as per the requirement.	
	ii) The working clearance between the position control lever & mud guard has not been provided as per the requirement.		ii) The working clearance between the position control lever & mud guard has not been provided as per the requirement.	

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

3.1.20.6 Conformity with IS: 14683 – 1999 (Re-affirmed in March, 2009) :
Lightings meet the requirements of IS: 14683-1999.

3.1.20.7 Rear view mirror:
Rear view mirror is provided.

3.1.21 Mass of tractor, (kg):	<u>Base model</u>	<u>Variant model</u>
	Without ballast	Without ballast
- Front :	740	710
- Rear :	1190	1220
- Total :	1930	1930

3.1.22 Over all dimensions (mm):	<u>Base model</u>	<u>Variant model</u>
- Length :	3260	3240
- Width :	1700	1730
- Height :	2250	2230
Minimum ground clearance, (mm) :	380 (Below hydraulic outlet pipeline)	400 (Below battery mounting box)

3.1.23 Labelling of tractor as per IS: 10273-1987 (Reaffirmed in March, 2009):
The Labelling plate riveted on LHS of gear box, provides the following information:

Name of Manufacturer	Escorts Limited , AGRI MACHINERY Group)
Make	Escorts Limited
Model	45 F9
Brand Name	FARMTRAC
Chassis serial number	T 052360585 ME
Engine serial number	E 2366079
Maximum P.T.O Power, kW	32.3
Specific fuel consumption, g/kWh	250
Year of manufacturer	ME (2016 as per coding letter)

3.1.24 Number of external lubricating points:	<u>Base Model</u>	<u>Variant Model</u>
- Oiling :	Nil	Nil
- Grease nipples :	17	17
- Grease cups :	02	02

3.1.25 Colour of tractor:	<u>Base Model</u>	<u>Variant Model</u>
Chassis and engine :	Blue	Blue
Sheet metal:		
Bonnet :	Blue	Blue
Mudguards , Rims & discs :	White	White

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

3.2 NOMINAL SPEED TEST

Movement	Gear No.	No. of engine revolutions for one revolution of driving wheel		Nominal speed at rated engine speed when fitted with		Variation in nominal speed (%)
				13.6-28 size tyres of 610 mm radius index, (kmph)	13.6-28 size tyres of 610 mm radius index, (kmph)	
		Base model	Variant model	Base model	Variant model	
	L1	188.16	179.8	2.67	2.82	5.62
	L2	140.58	132.8	3.60	3.81	5.83
	L3	79.94	75.3	6.33	6.71	6.00
	L4	58.71	55.4	8.62	9.13	5.92
	H1	53.18	50.1	9.55	10.10	5.76
	H2	39.37	37.3	12.87	13.55	5.28
	H3	22.33	21.2	22.66	23.90	5.47
	H4	16.41	15.5	30.80	32.61	5.88
	RL	165.65	116.3	3.07	4.35	41.69
	RH	46.25	33.0	10.92	15.33	40.38

3.3 PTO PERFORMANCE TEST

S. No.	Particulars	Base Model	Variant Model
1.	Date(s) of test	26.03.2015 & 01.04.2015	27.03.2017 & 28.03.2017
2.	Tractor run at this Institute/in Plant prior to start of PTO test, (h)	3.5	0.25
3.	Dynamometer test bench used	Fuchino ESF 1000 S Eddy current	Eddy Current, 700 ECA3-5

3.3.1 Major changes have been done in the technical specifications of the engine of the variant model, therefore complete PTO performance test of the tractor was carried out and the results of the test are as under in **table-1** and graphically represented in Fig. 3, 4 and 5.

Table-1

Tractor	Power, (kW)	Speed, (rpm)		Fuel Consumption			Specific energy, (kWh/l)
		PTO	Engine	(l/h)	(kg/h)	(kg/kWh)	
	1	2	3	4	5	6	7
a) Maximum power – 2 hours test							
Base model	28.1	656	2199	8.37	7.0	0.249	3.36
Variant model	32.3	656	2200	10.43	8.72	0.270	3.09
	30.1	656	2200	9.85	8.23	0.273	3.06*
Details of the test results of Variant model:							
b) Power at rated engine speed (2200 rpm):							
	32.3	656	2200	10.43	8.72	0.270	3.09
	31.1	679	2249	9.19	7.69	0.247	3.38*
c) Power at standard power take-off speed (540 ± 10 rpm):							
	28.4	540	1811	8.51	7.11	0.251	3.34
	27.7	540	1811	7.99	6.66	0.241	3.47*

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

1	2	3	4	5	6	7
d) Varying loads at rated engine speed (2200 rpm):						
i) Torque corresponding to maximum power available at rated engine speed:						
32.3	656	2200	10.43	8.72	0.270	3.09
ii) 85% of the torque obtained in (i) :						
28.0	669	2243	9.06	7.57	0.270	3.09
iii) 75% of the torque obtained in (ii) :						
21.2	676	2267	7.24	6.06	0.285	2.93
iv) 50% of the torque obtained in (ii) :						
14.3	684	2292	5.58	4.66	0.326	2.57
v) 25% of the torque obtained in (ii):						
7.2	692	2320	4.13	3.45	0.476	1.76
vi) Unloaded:						
0.3	700	2347	2.83	2.37	9.424	0.09
e) Varying loads at standard PTO speed (540 ± 10 rpm):						
i) Torque corresponding to maximum power available at standard PTO speed						
28.4	540	1811	8.55	7.15	0.252	3.32
ii) 85% of the torque obtained in (i) :						
24.9	557	1869	7.52	6.28	0.253	3.31
iii) 75% of the torque obtained in (ii) :						
18.9	565	1895	5.96	4.98	0.263	3.18
iv) 50% of the torque obtained in (ii) :						
12.8	572	1918	4.52	3.78	0.296	2.82
v) 25% of the torque obtained in (ii):						
6.5	579	1941	3.22	2.69	0.415	2.02
vi) Unloaded:						
0.02	583	1954	2.00	1.68	7.663	0.11

* Under high ambient conditions

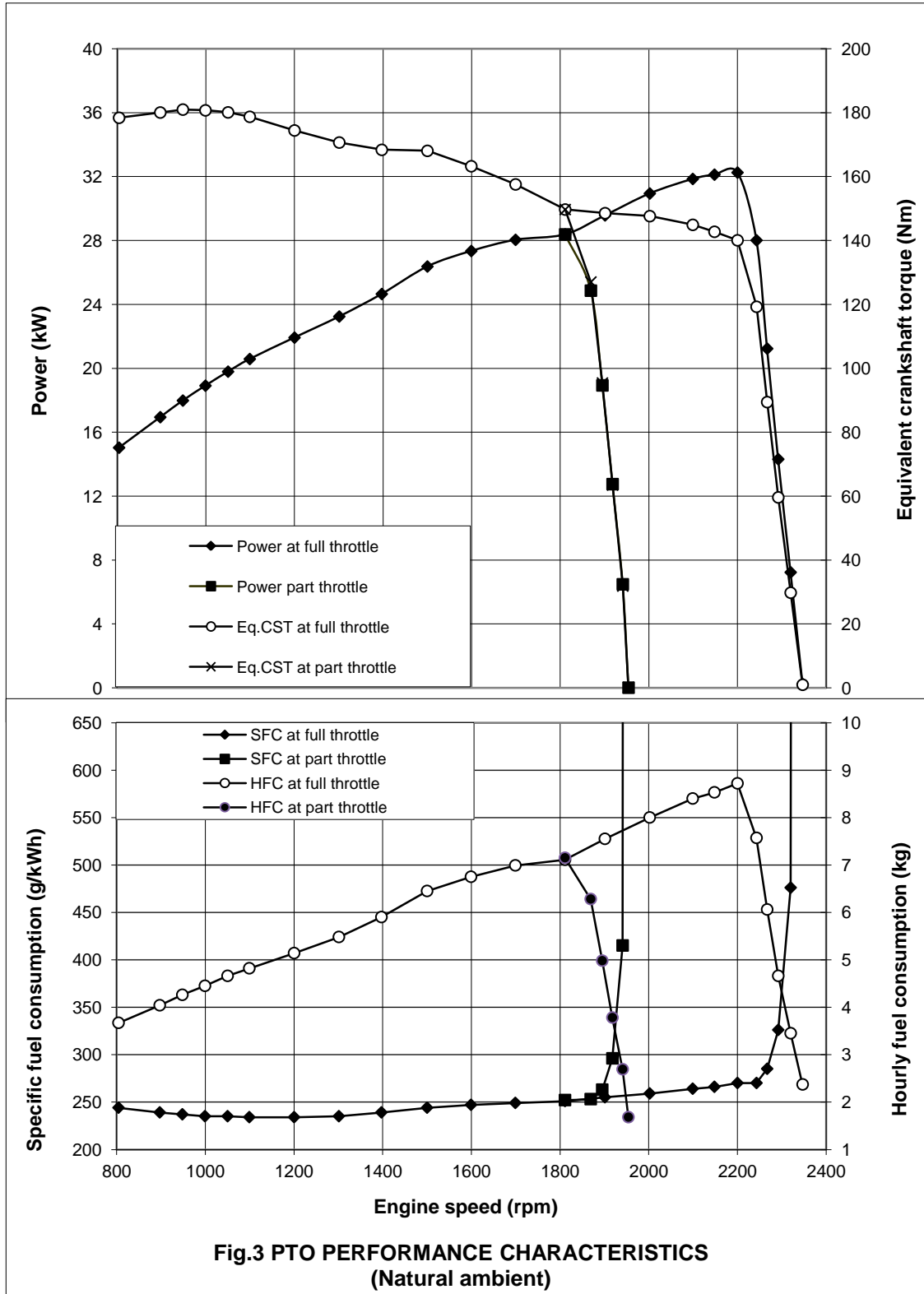
Particulars	Base Model		Variant model	
	Natural ambient	High ambient	Natural ambient	High ambient
1	2	3	4	5
-No load maximum engine speed, (rpm)	2491	2478	2347	2350
-Equivalent crankshaft torque at maximum power, (Nm)	122	116.5	140.1	130.7
-Maximum equivalent crankshaft torque, (Nm)	147.1	139.3	181.01	170.67
- Backup torque, (%)	20.6	-	29.2	-
-Engine speed at maximum Equivalent crankshaft torque, (rpm)	1150	1200	948	948
Smoke level , maximum light absorption coefficient (per meter)	0.32	--	0.27	--
Range of atmospheric conditions:				
- Temperature, (deg.C)	25 to 29	42 to 45	25 to 30	42 to 45
- Pressure, (kPa)	98.5 to 99.3	99.3 to 100.1	99 to 100	99.9 to 100.8
- Relative humidity, (%)	27 to 33	2 to 7	33 to 60	15 to 22

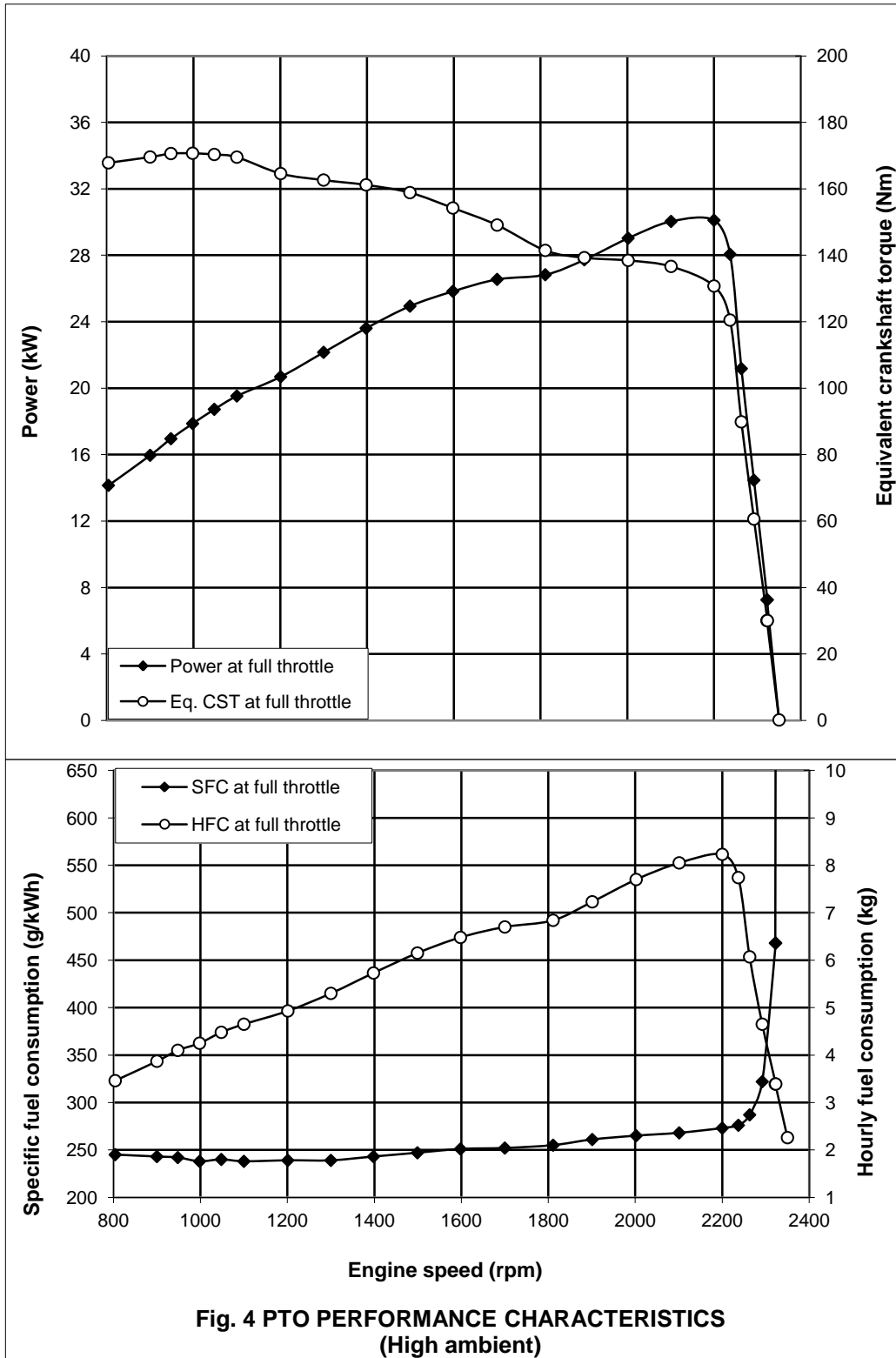
T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

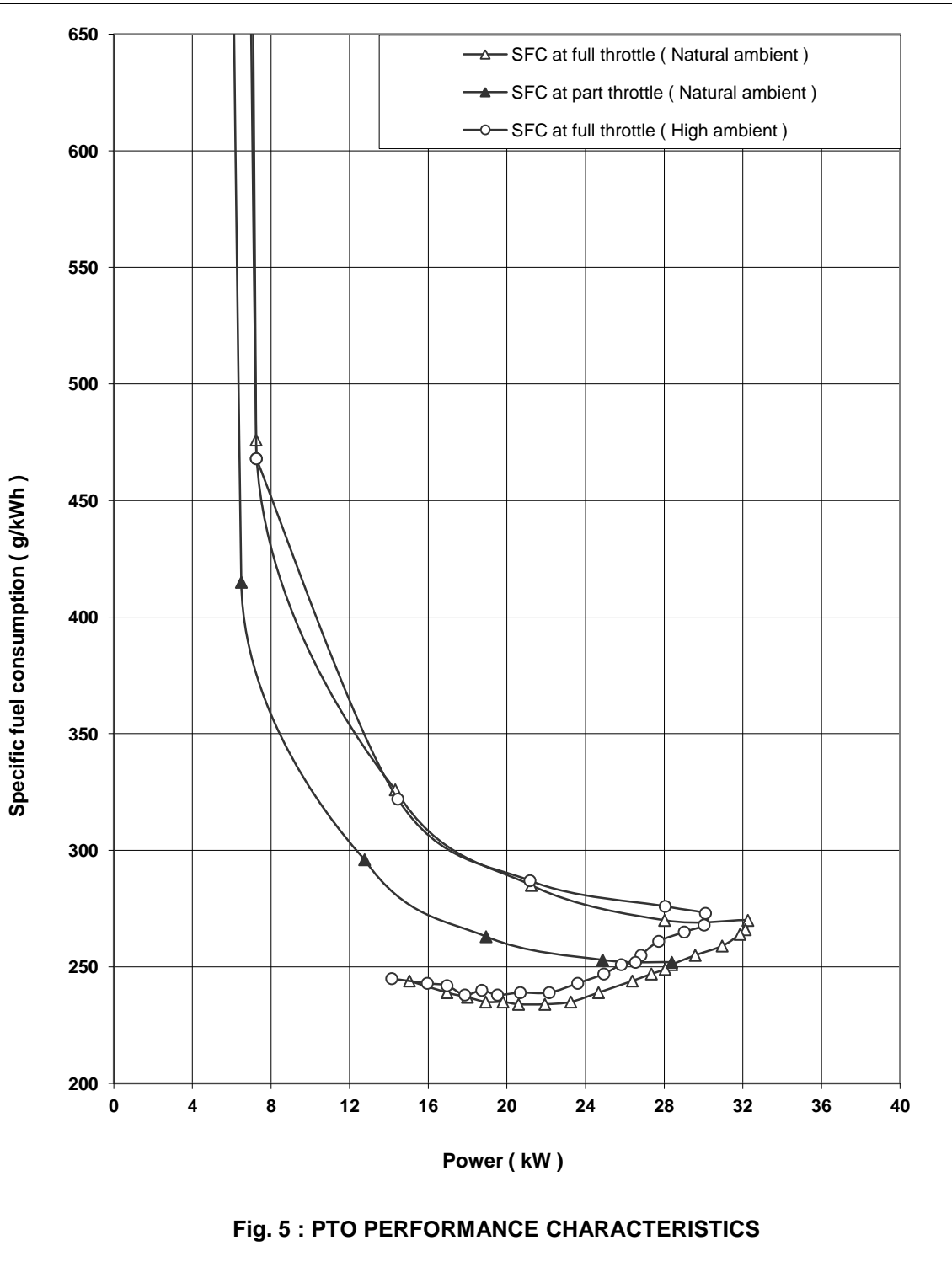
1	2	3	4	5
Maximum temperatures ,(°C):				
- Engine oil	99	108	105	111
- Coolant	85	97	87	95
- Fuel	32	63	40	52
- Air intake	29	45	32	56
- Exhaust gas	510	500	583	586
Pressure at maximum power:				
- Intake air, (kPa)	3.5	3.0 to 3.7	3.1	3.1 to 3.2
- Exhaust gas,(kPa)	6.0 to 6.1	5.6 to 5.7	8.0 to 8.7	8.9 to 10.9
Consumptions:				
- Lub. oil, (g/kWh)	--	0.23	--	0.24
- Coolant, (% of total coolant capacity)	--	Nil	--	0.91

4. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

Sl. No.	Adjustments/Defects/Breakdowns and Repairs	Tractor run hours
1	-----NONE-----	---







T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

5. COMPARISON BETWEEN BASE MODEL AND VARIANT MODEL (Based on Table 3 & 4 of Indian Standard 12207: 2014)						
Sl. No.	Clause No	Features	Observation on base model (T-982/1506/2015) September ,2015	Observation on variant model	Remakes	
1	2	3	4	5	6	
1.	i)	Clutch				
		Single/dual/Dry / wet/ Independent clutch/Increase in size of clutch	Single , dry friction plate of 279.7 mm diameter	Dual , dry friction plates of 280 mm diameter each	Changed	
2.	ii)	Air intake system	Naturally aspirated		No change	
	a)	Air cleaner	Same configuration in base & variant models (refer para 3.1.5) except :		No change	
		Intake pressure, at max. power, (kPa)	3.5	3.1	Similar	
3.	iii)	Exhaust system	Same configuration in base & variant models (refer para 3.1.6),except :		No change	
		Range of exhaust gas Pressure, at max. power, (kPa)	6.0 to 6.1	6.1 to 6.3	Similar	
4.	iv)	Gear box:				
		Type	Mechanical ,constant mesh gears		No change	
Reduction ratio of transmission:						
	Movement	Gear	Base model	Variant model	Variation (%)	Remark
	Forward	L1	188.16:1	179.4:1	-4.66	Changed
		L2	140.58:1	132.8:1	-5.53	Changed
		L3	79.94:1	75.3:1	-5.80	Changed
		L4	58.71:1	55.4:1	-5.64	Changed
		H1	53.18:1	50.1:1	-5.79	Changed
		H2	39.37:1	37.3:1	-5.26	Changed
		H3	22.33:1	21.2:1	-5.06	Changed
		H4	16.41:1	15.5:1	-5.55	Changed
	Reverse	LR	165.65:1	116.3:1	-29.79	Changed
		HR	46.25:1	33.0:1	-28.65	Changed
5.	v) Range of Nominal speeds (kmph) & % variation:					
	- Forward		2.67 to 30.80	2.82 to 32.61 (% of variation 5.62 to 5.88)	Changed	
	- Reverse		3.07 to 10.92	4.35 to 15.33 (% of variation 40.38 to 41.69)	Changed	
	Additional no. of speed		None	None	No change	

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

1	2	3	4	5	6
6.	vi)	Fitment change of Engine accessories:			
		- Expansion tank	Provided	Provided	No change
		-Expansion tank capacity,(l)	0.60	0.76	Changed
		- Radiator	Provided	Provided	No change
		- Bare radiator capacity, (l)	3.40	2.80	Changed
		-Total coolant capacity ,(l)	8.10	6.60	Changed
		- Additional hydraulic pump	None	None	No change
		- Air compressor	None	None	No change
	- Oil cooler	Not Provided	Not Provided	No change	
7.	vii)	Brake system:			
		Type	Mechanical, Oil immersed disc brakes		No change
8.	viii)	Type of three point linkage (type rear/front mounted)	Same configuration in base & variant models (refer para 3.1.13.2)		No change
9.	ix)	PTO shaft (s) location & its type	Same configuration in base & variant models (refer para 3.1.14 & 3.1.14.1) ,except		No change
		Available speed	Single	Multispeed	Changed
		Rear/front mounted	Rear mounted	Rear mounted	No change
10.	x)	Type of drive:	2WD	2WD	No change
11.	xi) a)	Hydraulic System:			
		Location & type of Hydraulic pump drive	Same configuration in base & variant models (refer para 3.1.13.1)		No change
12.	b) c)	Positioning of Hydraulic Sensing Mechanism			
		Lower link, top link, etc.	Through top link	Through top link	No change
13.	xii)	Final Reduction:	Same configuration in base & variant models (refer para 3.1.12.4)		No change
14.		Type of fuel Injection pump:			
		Inline/Rotary/Common rail	Inline plungers	Inline plungers	No change
		Fuel Injection timing (degree before TDC)	11± 1	8 ± 1	Changed
15.	xiii)	Change related to statutory/ regulatory requirements (As per Table 4):			
	a)	Engine operating principle (spark/ compression ignition, two/four stroke)	Compression Ignition, 4 stroke		No change
	b)	Number & arrangement of cylinders	Three cylinder, vertical inline		No change
	c)	Maximum declared PTO power, (kW)	27.8	32.3	Changed
	d)	Engine displacement, (cc)	2339	2761	Changed
	e)	Rated engine speed, (rpm)	2200	2200	No change
	f)	Naturally aspirated/turbo charged	Naturally Aspirated		No change

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

1	2	3	4	5	6
16.	xiv)	Change related to ergonomics, safety comfort, statutory / regulatory requirements:			
	a)	IS: 10273	Conformed	Conforms	No change
	b)	IS: 4931	Did not conform	Does not conform	No change
	c)	IS: 4468	Did not conform	Conforms	Changed
	d)	IS: 12953	Conformed	Conforms	No change
	e)	IS:12343	Conformed	Conforms	No change
	f)	IS:12239 (Pt-I)	Did not conform	Does not conform	No change
	g)	IS:12239 (Pt-II)	Did not conform	Does not conform	No change
	h)	IS:8133	Did not conform	Does not conform	No change
	i)	IS: 6283	Conformed	Conforms	No change
	j)	IS:14683	Conformed	Conforms	No change
17.	xv)	Other changes:			
	a)	Model of Engine	E3.234-3A	AE3.276B-3A	Changed
	b)	Max. speed at no load, rpm	2475 to 2525	2305 to 2455	Changed
	c)	Low idling speed, rpm	600 to 700	700 to 800	Changed
	d)	Speed at max. torque, rpm	1200 to 1300	900 to 1100	Changed
	e)	Fuel injection pump model	F 002 AOZ 910	F 002 A3Z F07	Changed
	f)	Nominal bore, mm	95	98	Changed
	g)	Stroke, mm	110	122	Changed
	h)	Recommended radiator pressure cap, kPa	49	89	Changed
	i)	Bare radiator capacity, (l)	3.40	2.80	Changed
	j)	Expansion tank cap. (l)	0.6	0.76	Changed
	k)	Total capacity of cooling system, (l)	8.1	6.6	Changed
	l)	Wheel base, mm	1875	2120	Changed
	m)	Make of steering control system & Diameter of steering control wheel, (mm)	ZF India (apa), 450	RANE, 430	Changed

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

6. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

6.1 On the basis of test conducted the performance results have been summarized as evaluative (mandatory) and non – evaluative (not mandatory) parameters applicable for qualifying Minimum Performance Criteria as per clause-4 table-1 of Indian Standard 12207: 2014 for acceptance of tractor for the purpose of subsidies/NABARD financing for the applicable features for this tractor model.

Sl. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	Values declared by the applicant/ requirement		As observed		Whether Variant model meets the requirem ents (Yes/No)
				Base model	Variant Model	Base model	Variant model	
1	2	3	4	5 a	5 b	6 a	6 b	7
6.1.1	PTO Performance :							
a)	- Max. Power under 2 hrs. 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	27.8 (D)	32.3 (D)	28.1	32.3	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	27.8 (D)	28.1 (D)	28.1	32.3	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+ 5%	250 (D)	250 (D)	249	270	No
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	143.0 (D)	193.0 (D)	147.1	181.0	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10% Min (D)		20.6	29.2	Yes
f)	Maximum operating temperature, (°C)							
	i) 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)		108	111	Yes

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

1	2	3	4	5 a	5 b	6 a	6 b	7	
	ii)	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.	118 (D)	97	95	Yes	
g)	Engine oil consumption, (g/kWh)		Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.49 (R)	2.70 (R)	0.23	0.25	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)	0.32	0.27	Yes	
6.1.2	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	Escorts Limited		Yes	
	2)	Model	Evaluative		FARMTRAC Champion F2	45 F9		Yes	
	3)	Brand Name	---		--	FARMTRAC			
	4)	Year of manufacture	Evaluative		2014	2016		Yes	
	5)	Engine serial number	Evaluative		E 2320152	E 23660 79		Yes	
	6)	Chassis serial number	Evaluative		T 2315691	T 05 2360585 ME		Yes	
	7)	Declaration of PTO power, kW	Evaluative		27.8 (37.2)	32.3		Yes	
6.1.3	Literature (Submission to test agency)								
(a)	Operator manual		Evaluative	Provided/ Not Provided	As per relevant IS Code (IS 8132)	Provided		Yes	
(b)	Parts Catalogue		Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided		Yes	
(c)	Workshop/Service manual		Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided		Yes	

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

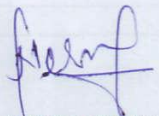
- 6.2 Salient Observations:**
- 6.2.1 Laboratory tests:**
- 6.2.1.1 PTO Performance:**
- i) The backup torque is 29.2 %.
 - ii) The specific fuel consumption corresponding to maximum power was measured as **270** g/kWh against the declaration of 250 g/kWh, which is Not within the tolerance limit as specified in IS: 12207-2014.
- 6.2.1.2 Three point linkage:**
The lateral distance from lower hitch point to center line of tractor does not meet the requirements of IS-4468-(Part I)-1997. This should be looked into for necessary corrective action.
- 6.2.1.3 Specifications Master shield of Power Take-off Shaft:**
The PTO master shield have not been provided. This should be looked into for necessary corrective action.
- 6.3 Maintenance / Service Problems:**
No noticeable maintenance/ service problem was observed during the test.
- 6.4 Recommendation with regard to safety on tractor:**
The following requirements, inter alia, may be considered for incorporation on the tractor:
- i) Provision for spark arresting device in exhaust system.
 - ii) The working clearance around the hydraulic draft and position control levers may be provided as per IS: 12239 (Part-2) – 1999.
- 6.5 Adequacy of Literature supplied with machine:**
The following literature of model " 45 F9 Brand Name: Farmtrac " tractor has been supplied with the tractor
- i) Operator's Manual
 - ii) Tractor's part's catalogue
 - iii) Service Manual
- 6.5.1** The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.

The results of the tests carried out on variant model Escorts Ltd. "FARMTRAC 45 F9 Brand Name: Farmtrac " tractor " have been compared with those on base model "FARMTRAC CHAMPION F2 tractor" and found within the limit as specified in Indian Standard : 12207:2014.

7. 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	March, 2017 & April, 2017 (2 Months)	Yes	None

TESTING AUTHORITY:


NITESH KUMAR VERMA
 AGRICULTURAL ENGINEER


C.V. CHIMOTE
 TEST ENGINEER


Y.K.RAO
 SENIOR AGRICULTURAL
 ENGINEER


J.J.R. NARWARE
 DIRECTOR

Test report compiled by **Shri, NITESH KUMAR VERMA**, Agricultural Engineer

8. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
8.1	6.2.1.1	These being studied & Corrective action would be taken in near future.
8.2	6.2.1.1, 6.2.1.3, 6.4, 6.5.1	Your valuable comments & suggestions for improvement are well taken. Under our policy of continuous product improvement these aspects are future being looked into & will try to eliminate these deviation soon wherever necessary.

T- 1085/1610/2017	ESCORTS LIMITED, 45 F9 (Brand Name : FARMTRAC) TRACTOR- Commercial (Variant)
--------------------------	---

Annexure-I

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS	<u>HOURS</u>
1.	Running-in	Nil
2.	Theoretical speed test	1.0
3.	PTO Performance test	10.4
B.	Miscellaneous test and other run hours, including idle run transportation, trial and preparation for test.	0.1
TOTAL		11.9