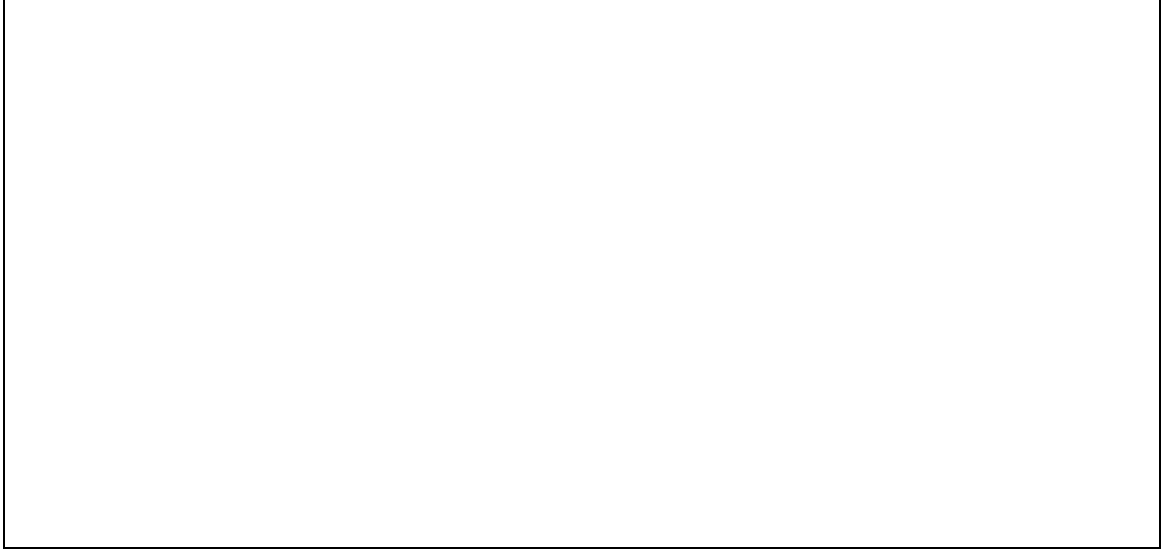


व्यावसायिक परीक्षण रिपोर्ट (प्रारंभिक)
COMMERCIAL TEST REPORT (Initial)

संख्या/No. : T- 1534/2062/2021
माह/Month : April, 2021

(यह परीक्षण रिपोर्ट 30/04/2024 तक वैध है / THIS TEST REPORT IS VALID UPTO 30/04/2024)



PREET, 2549 AGRITRAC 4WD TRACTOR



भारत सरकार

कृषि एवं किसान कल्याण मंत्रालय

(कृषि, सहकारिता एवं किसान कल्याण विभाग, मशीनीकरण एवं प्रौद्योगिकी प्रभाग)

GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS WELFARE

(Department of Agriculture, Cooperation & Farmers Welfare, Mechanization & Technology Division)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

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T- 1534/2062/2021	PREET, 2549 AGRITRAC 4WD TRACTOR– Commercial (Initial)
	THIS TEST REPORT IS VALID UPTO 30/04/2024

Manufacturer : M/s. Preet Tractors Private Limited
Post Box No. 28, Patiala Road,
Nabha (Punjab) – Pin 147 201

Month: April	Test Report No. T- 1534/2062/2021	Year: 2021
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सत्यमेव जयते

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T- 1534/2062/2021	PREET, 2549 AGRITRAC 4WD TRACTOR– Commercial (Initial)
	THIS TEST REPORT IS VALID UPTO 30/04/2024

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

Test code/Procedure : IS: 5994-1998 (Reaffirmed in 2014)
IS: 9253-2013 and IS: 12207-2019

Period of Test : March, 2020 to March, 2021

Test Report No. : **T-1534/2062/2021**

Month/Year : **April, 2021**

-
- 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 was selected randomly from production line by the representative of testing authority for test.
- 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.)
-

SELECTED CONVERSIONS & ABBREVIATIONS

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 / 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	Rpm	Revolutions per minute
	1 kW	1.35962 Metric horse power	O.D / I.D	Outer diameter/ Inner diameter
3.	Pressure:		N.A.	Not available/ Not applicable
	1 psi	6.895 kPa	PTO	Power take-off
	1 kgf/cm ²	98.067 kPa = 735.56 mm of Hg	R.H.	Relative Humidity
	1 bar	100 kPa = 10 N/cm ²	SIP	Seat Index Point
	1 mm of Hg	1.3332 m-bar		

T- 1534/2062/2021	PREET, 2549 AGRITRAC 4WD TRACTOR– Commercial (Initial)
	THIS TEST REPORT IS VALID UPTO 30/04/2024

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T- 1534/2062/2021	PREET, 2549 AGRITRAC 4WD TRACTOR– Commercial (Initial)
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Manufacturer : M/s. Preet Tractors Private Limited
Post Box No. 28, Patiala Road,
Nabha (Punjab) – Pin 147 201

Test requested by (applicant) : The manufacturer
Selected for test by : The testing authority
Place of running-in : At manufacturer's work place

Duration of said running-in (h):
- Engine : 10
- Transmission : Nil
Method of Selection : The test sample was selected randomly out of five tractors from the production line by the representative of testing authority.

Details of tractors made available for random selection:

S. No.	Chassis No.
1	NCW25AG00054/B
2	HEA25AG00097/B
3	TEA25AG00102/B
4	TEA25AG00104/B
5	TEA25AG00105/B

1. SPECIFICATIONS

1.1 Tractor:
Make : Preet
Model : 2549 Agritrac 4WD
Variants, if any : None
Brand name : Preet
Type : Four wheeled, Four-wheel driven (4WD), Unit construction, Standard, Agricultural Tractor

Month & Year of manufacture : 07 18
Chassis number : NCW25AG00054/B
Country of Origin : India

1.2 Engine:
Make : Preet
Model : Preet 2549
Type : Four stroke, naturally aspirated, water cooled, direct injection, diesel engine
Serial number : P225-00059
Engine speed (Manufacturer's recommended production setting, (rpm)) :
- Maximum speed at no load,(rpm) : 2100 to 2200
- Low idle speed, (rpm) : 600 to 700
- Speed at maximum torque, (rpm) : 1200 to 1300
Rated speed, (rpm):
- For PTO use : 2000
- For drawbar use : 2000

1.3 Cylinder & Cylinder Head:
Number : Two
Disposition : Vertical, inline
Bore/stroke, (mm) : 100/118
Capacity as specified by the applicant,(cc) : 1854 (apa)
Compression ratio, (apa) : 18.2 ± 1 : 1
Type of cylinder head : Monoblock
Type of cylinder liners : Wet, replaceable
Type of combustion chamber : Re-entrant cavity toroidal on piston crown
Arrangement of valves : Over head, Inline

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	Valve clearance (cold/hot):	
	- Inlet valve, (mm)	: 0.30/0.30
	- Exhaust valve, (mm)	: 0.40/0.40
1.4	Fuel System:	
	Type of fuel system	: Gravity and force feed
1.4.1	Fuel tank:	
	Capacity, (l)	: 25.00
	Location	: Above clutch housing
	Provision for draining of sediments /water	: Not Provided
	Material of fuel tank	: Metallic
1.4.2	Water separator:	
	Make	: SE
	Type	: Transparent, Inverted funnel, gravity separation
	Location	: On LHS of engine, between fuel tank and Fuel feed pump
1.4.3	Fuel feed pump:	
	Make	: Bosch, India
	Type	: Plunger with hand primer
	Model/Group combination No.	: FP/KSG22AD55/2, 9440030032
	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.	: 9450030118
	Number	: Two
	Type of elements:	
	- Primary	: Cloth
	- Secondary	: Paper
	Capacity of final stage filter, (l)	: 0.40
1.4.5	Fuel Injection pump:	
	Make	: Bosch, India
	Model/Group combination No.	: F 002 A0Z 881, PES2A90D320RS3500
	Type	: Inline, plunger
	Serial number	: 85306792
	Method of drive	: Through timing gears
	Location	: On LHS of engine
1.4.6	Fuel injectors:	
	Make	: Bosch, India
	Model/Group combination No.:	
	Nozzle Holder No.	: F 002 C70 552
	Nozzle No.	: DSLA 148P 5566
	Type	: Multi hole (Five holes)
	Manufacturer's production pressure setting, (MPa)	: 25.0 ± 0.8
	Injection timing	: 12° ± 1° before TDC
	Firing order	: 1-2
1.4.7	Governor:	
	Make	: Bosch, India
	Model/Group combination No.	: RSV300...1000A2C1680R
	Type	: Mechanical, Centrifugal, Variable speed.
	Rated engine speed, (rpm)	: 2000
	Governed range of engine speed,(rpm)	: 600 to 2200

T- 1534/2062/2021	PREET, 2549 AGRITRAC 4WD TRACTOR– Commercial (Initial)
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1.5	Air Intake System:	
1.5.1	Pre-cleaner:	
	Make	: Imee (India) Enterprise (apa)
	Type	: Centrifugal with transparent dust collector
	Location	: On LHS of engine, Above inlet of main air cleaner tube, outside the bonnet
1.5.2	Air cleaner:	
	Make	: Preet (apa)
	Type	: Oil bath
	Location	: On LHS of engine, outside the bonnet
	Oil capacity (l)	: 0.50
	Range of suction pressure at maximum power, (kPa)	: 2.7 to 2.9
	Oil change period	: After every 8 hours of operation in dusty condition and after every 250 hours of operation in normal working condition.
1.6	Exhaust system:	
	Type of silencer	: Horizontal, Cylindrical Down draught,
	Position of silencer outlet with Respect to SIP, (mm):	
	- Downward	: 175
	- Longitudinal	: 1665
	- Lateral	: 485 (on RHS)
	Range of exhaust gas pressure at maximum power, (kPa)	: 10.8 to 11.2
	Provision of spark arresting device	: Not provided
	Provision against entry of rain water	: A bend is provided at the outlet of silencer
1.7	Lubricating system:	
	Type	: Force feed cum splash
	Oil sump capacity, (l)	: 2.50
	Total lub oil capacity, (l)	: 3.25
	Oil change period	: After every 250 hours of operation.
	Cooling device, (if any)	: Not provided
	Filters:	
	Make	: Preet (apa)
	Type	: Full flow, spin-on throw away, paper element
	Number	: One
	Pump:	
	Type	: Gear
	Method of drive	: Through timing gears
	Pressure release setting, (kPa)	: 441 to 490 (apa)
	Minimum permissible pressure, (kPa)	: 98 (apa)
1.8	Cooling system:	
	Type	: Forced circulation of water
	Details of pump	: Centrifugal, semi-open impeller of 89.8 mm outer diameter, having 12 number of vanes and driven through crankshaft pulley by a cogged "V"-belt common to alternator.
	Details of fan	: Suction type, having six numbers of metallic blades of 342 mm outer diameter and mounted on water pump shaft.

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	THIS TEST REPORT IS VALID UPTO 30/04/2024

Means of temperature control : Thermostat
 Bare radiator capacity, (l) : 2.50
 Capacity of expansion flask, (l) : Not applicable
 Total coolant capacity, (l) : 5.90
 Radiator cap pressure, (kPa) : 88

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 : Exide & MF70Z
 Type : Lead acid
 Capacity and rating : 12V, 75 Ah at 20 hours discharge rate
 Location : On RHS of clutch housing, in separate metallic box

1.10.2 Starter:

Make : Spark Minda
 Model : Not available
 Type : Pre-engaging solenoid operated
 Capacity and rating : 12V and 2.7 kW
 Serial Number : Not available

1.10.3 Generator:

Make : Spark Minda
 Model : PT232
 Type : Alternator
 Serial number : Not available
 Output rating : 12V, 42 Amp
 Method of drive : Through crankshaft pulley by a cogged V-belt common to water pump.

1.10.4 Voltage regulator:

: In built with alternator

1.10.5 Details of lights

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, 60/55W	1005	160 x 90	435
- Parking lights	2, 12V, 5W	915	40 x 65	200
-Turn cum hazard light	2, 12V, 21W	915	75 x 65	145
Rear lights:				
- Stop light	2, 12V, 21 W	900	40 x 70	220
- Tail light	2, 12V, 5W	900	40 x 70	180
-Turn cum hazard light	2, 12V, 21W	900	40 x 70	140
- Reflectors (Red)	2	900	40 x 70	180
- Plough light (on RHS mudguard)	1, 12V, 55W	1070	125 Φ	185
- Registration plate light	Part of rear (RHS) light assembly			

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1.10.6	Main switch	: Key turn type, having three position viz: i) OFF ii) 'Circuit' ON iii) START
1.10.7	Light switch	: Rotary type having six positions viz. i) OFF ii) Parking lights + Dash board lights 'ON' iii) Head lights (short beam) + position (ii) iv) Head lights (long beam) + position (ii) v) Turn indicator switch vi) Horn push button
1.10.8	Horn:	
	Make	: Addon
	Type	: 12 V, 2B, Electromagnetically vibrated
	Location	: In front of radiator, under the bonnet
1.10.8	Fuse box	: Contains 6 fuses of 15 A capacity each.
1.10.10	Details of other electrical accessories:	
1.10.10.1	Starting safety switch	: Not provided
1.10.10.2	Flasher Unit:	
	Make	: Interface
	Capacity:	
	- Turn signal	: 12V, 21W x 2 +2W x 1
	- Hazard signal	: 12V, 21W x 4 + 2Wx2
	Flashes/min.	: 12V, 85
1.10.10.3	Seven pin trailer socket	: Provided
1.11	Instrument panel details:	
	i)	Engine speed-cum-cumulative run hour meter (0 - 30 x 100 rpm).
	ii)	Water temperature gauge (with colour zones)
	iii)	Lubricating oil pressure gauge (with colour zones)
	iv)	Fuel level gauge (with colour zones)
	v)	Battery charging meter gauge (with colour zones)
	vi)	Battery charging warning indicator
	vii)	Head light long beam on indicator
	viii)	Turn cum hazard light indicators
	ix)	Main switch (key turn type)
	x)	Light switch (Rotary type)
	xi)	Hazard light switch
	xii)	Mobile charging socket
	xiii)	Hand throttle lever
	xiv)	Steering control wheel
	xv)	Fuel shut off knob
	xvi)	Rear view mirror
1.12	Transmission System:	
1.12.1	Clutch:	
	Make	: Luk India Ltd.
	Type	: Single, Dry friction diaphragm plate with pads
	No. of friction plate, (s)	: One
	Size, [OD/ID (mm)]:	: 280.0 / 168.4 Φ mm and having four pads of 28.6 cm ² area of each pad
	Material of clutch lining	: Non asbestos
	Method of operation	: By depressing clutch pedal fully provided on LHS of operator's seat

1.12.2 Gear box:

Make : PREET
 Type : Mechanical, Combination of sliding mesh & synchromesh gears with epicyclic reduction unit for high /low range selection

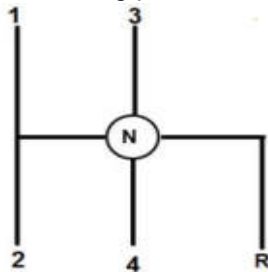
No. of speeds:

- Forward : 08
 - Reverse : 02

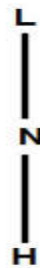
Location of gear shifting levers

- Main gear shift lever : In front of the operator's seat
 - Range selector lever : On RHS of operator's seat
 - 4WD / 2WD selection lever : On LHS of operator's seat

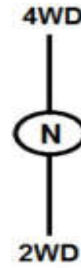
Gear shifting pattern:



Main Gear selection lever



Range selection lever



4WD / 2WD selection lever

Oil capacity, (l) : 27.90 (Common with rear differential, rear axle, rear final drive, hydraulic, brake and steering system)

Oil changing period : After every 1500 hours of operation

1.12.3 Nominal Speeds:

Movement	Gear No.	No of engine revolutions for one revolution of driving wheel	Nominal speed at rated engine speed when fitted with 8.30-20 size tyres of 420 mm radius index, (kmph)
Forward	L1	218.76	1.45
	L2	130.00	2.43
	L3	80.77	3.92
	L4	54.87	5.76
	H1	55.59	5.68
	H2	33.09	9.57
	H3	20.55	15.40
	H4	13.94	22.71
Reverse	LR	291.68	1.09
	HR	74.08	4.27

1.12.3.1 Number of front wheel revolutions for one revolution of rear wheel : 1.483:1

1.12.4 Rear Differential unit:

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

Reduction through crown wheel & pinion : 3.636 : 1 (40/11 T)

Oil capacity of differential unit, (l) : 27.90 (Common with gear box, rear axle, rear final drive, hydraulic, brake and steering system)

Oil changing period : After every 1500 hours of operation

1.12.4.1 Rear Differential lock : Not provided

- 1.12.5 Rear axle & Rear Final drive:**
- Type : Bull & pinion reduction unit accommodated inside the differential housing
 - Reduction through final drive : 3.833:1 (46/12 T)
 - Oil capacity of final drive, (l) : 27.90 (Common with gear box, rear differential housing, hydraulic & brake and steering system)
 - Oil changing period : After every 1500 hours of operation
- 1.12.6 Front Differential unit:**
- Type : Crown wheel and bevel pinion with differential unit accommodated inside the centre of front axle housing
 - Reduction through crown wheel & pinion : 5.833 : 1 (35/6 T)
 - Oil capacity of front differential unit,(l) : 3.50 (Common with front axle housing and front final drive)
 - Oil changing period : After every 1000 hours of operation
- 1.12.7 Front axle & Front Final drive:**
- Type : Crown wheel and bevel pinion accommodated inside housing near wheel hub
 - Reduction through final drive : 1.933 :1 (29/15 T)
 - Oil capacity of final drive, (l) : 3.50 (Common with front differential housing)
 - Oil changing period : After every 1000 hours of operation
- 1.13 Power lift (Hydraulic System):**
- Make : Preet (apa)
 - Type : Open center, live, ADDC
 - No. and type of cylinder : One, single acting
 - Type of linkage lock for transport : Hydraulic, response control knob in fully closed position act as transport lock.
- 1.13.1 Hydraulic pump:**
- Make : Dowty
 - Type : Gear
 - Location and drive : On LHS of engine and driven through timing gears
 - No. & Type of filter : Two
 - (i) One, fine wire mesh strainer inside the housing and.
 - (ii) One, full flow spin on paper element in suction pipeline
 - Hydraulic oil capacity, (l) : 27.90 (Common with transmission, brake and steering system)
 - Oil change period : After every 1500 hours of operation
 - Provision for external tapping : Provided
 - Details of control levers :
 - i) Position control lever
 - ii) Draft control lever
 - iii) Response control knob on distributor
 - Method of draft sensing : Through top link

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	THIS TEST REPORT IS VALID UPTO 30/04/2024

1.13.2 Three point linkage:

S. No.	Observations	As per IS:4468-1997(Part-I) (Reaffirmed in October, 2017) (Cat.1 / Cat.1N), (mm)	As measured (mm)	Remarks	
I	Upper hitch points:				
	a)	Dia. of hitch pin hole	19.30 to 19.50 / 19.30 to 19.51	19.32	Conforms to Cat. 1 & 1N
	b)	Width of ball	44.0 (max.) / 44.0 (max.)	43.58	Conforms to Cat. 1 & 1N
II	Lower hitch points:				
	a)	Dia. of hitch pin hole	22.40 to 22.65 / 22.40 to 22.73	22.58	Conforms to Cat. 1 & 1N
	b)	Width of ball	34.8 to 35.0 / 34.8 to 35.0 /	35.00	Conforms to Cat. 1 & 1N
III	Lateral distance from lower hitch point to centre line of tractor		359 / 218	218	Conforms to Cat. 1N
IV	Lateral movement of lower hitch points		100 (min) / 50 (min)	50	Conforms to Cat. 1N
V	Distance from end of power take-off to centre of lower hitch point (lower links in horizontal position)		450 to 575 / 300 to 375	415	Does not conform
VI	Transport height		820 (min)/ 600 (min)	575	Does not conform
VII	Power range (without force)		560(min)/ 420 (min)	340	Does not conform
VIII	Levelling adjustment		100 (min)/ 75 (min)	100	Conforms to Cat. 1 & 1N
IX	Lower hitch point clearance		100 (min)/ 100 (min)	315	Conforms to Cat. 1 & 1N
X	Lower hitch point height		200 (max)/ 200 (max)	200	Conforms to Cat. 1 & 1N

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

The following are dimensions observed, corresponding to **420 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	530	530
2.	Length of lift arm	B	230	230
3.	Length of lift rods	C	465 to 495	490
4.	Length of top link	D	365 to 495	400
5.	Distance of lift rod connection point from pivot point of lower link	E	355	355
6.	Distance of lower link pivot point from rear wheel axis:			
	-Horizontally	F	180, behind	180, behind
	-Vertically	G	25, below	25, below

1	2	3	4	5
7.	Distance of upper link pivot point from rear wheel axis:			
	-Horizontally	H	305, behind	305, behind
	-Vertically	J	370, above	370, above
8.	Distance of lift arm pivot point from rear wheel axis:			
	-Horizontally	K	45, behind	45, behind
	-Vertically	L	350, above	350, above
9.	Height of lower hitch points relative to the rear wheel axis:			
	- In high position	M	110 to 155	120, above
	- In low position	N	-235 to -165	220, below
10.	Height of lower link hitch points when locked in transport position	Any height within lift range		

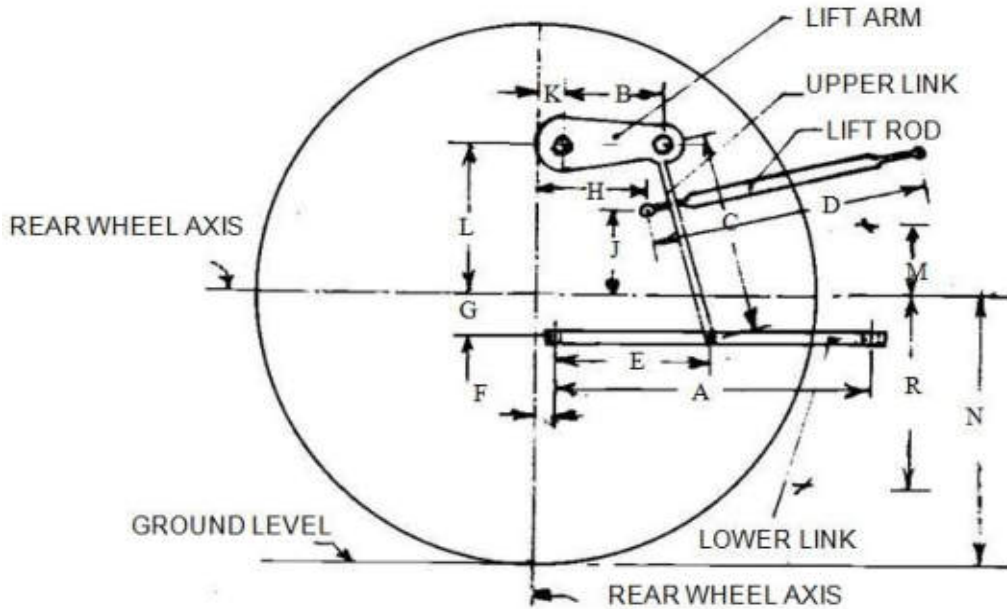


Fig. 1 (a): DIMENSIONAL NOTATIONS FOR TABLE OF LINKAGE GEOMETRY

1.13.4 Drawbar:

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

Notation	As per IS: 12953-1995 (Cat. 1N) (mm)(Reaffirmed in Oct,2017)	As measured, (mm)	Remarks
A	400 ± 1.5	400.0	Conforms to Cat. 1N
B	75 (min)	76.2	Conforms to Cat. 1N
C	30 (min)	30.5	Conforms to Cat. 1N
D \emptyset	21.79 to 22.0	21.9	Conforms to Cat. 1N
E	39.0 (min)	44.6	Conforms to Cat. 1N
F \emptyset	12.0 (min)	12.4	Conforms to Cat. 1N
G	15.0(min)	20.1	Conforms to Cat. 1N
H \emptyset	25 ± 1	24.4	Conforms to Cat. 1N
J	80 ± 1.5	80.2	Conforms to Cat. 1N
No. of holes	05	05	Conforms to Cat. 1N

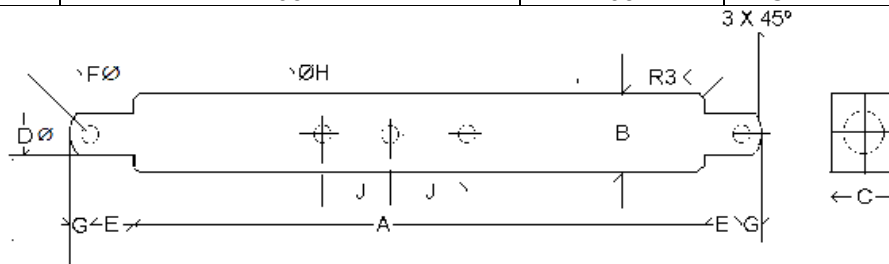


Fig. 1 (b): DIMENSIONAL NOTATIONS FOR LINKAGE DRAWBAR

- 1.13.4.2 Swinging drawbar:** : Not provided
- 1.14 Power take-off shaft:**
- Type : Type-I, Not Independent
- Method of engaging : By a hand lever provided on LHS of operator's seat.
- No. of shaft,(s) : One
- PTO shaft speed corresponding to rated engine speed, (rpm) : 554
- Distance behind rear axle, (mm) : 290
- Engine to PTO speed ratio : 3.612:1
- Whether the PTO shaft is capable of transmitting the full power of engine : Yes
- Other PTO shaft speed, corresponding to rated engine speed, if any : Multispeed PTO is provided

Gear No.	Engine to PTO speed ratio	PTO speed corresponding to rated engine speed
L1 / H1	3.612 : 1	554
L2 / H2	2.146 : 1	932
L3 / H3	1.335 : 1	1498
L4 / H4	0.906 : 1	2208
LR / HR	4.816 : 1	415

1.14.1 Specification of Power Take-Off Shaft

Specification	As per IS: 4931-1995 (Type-1) (Reaffirmed in 2014)	As observed	Remarks
Nominal speed, (rpm)	540 ± 10	540 rpm of PTO shaft corresponds to 1950 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 tractor	Conforms
Dimensions, (mm) (Refer Fig. 2):			
D \emptyset	34.79 ± 0.06	34.84	Conforms
d \emptyset	28.91 ± 0.05	28.93	Conforms
B \emptyset	29.40 ± 0.10	29.50	Conforms
A \emptyset (Optional)	8.30 ± 0.10	8.27	Conforms
W	8.69 – 0.09 -0.16	8.55	Conforms
a	7	7	Conforms
b	25 ± 0.50	24.80	Conforms
c	38.0	38.0	Conforms
x	30°	30°	Conforms
B	76 (min)	83.0	Conforms
h	350 to 675	430	Conforms

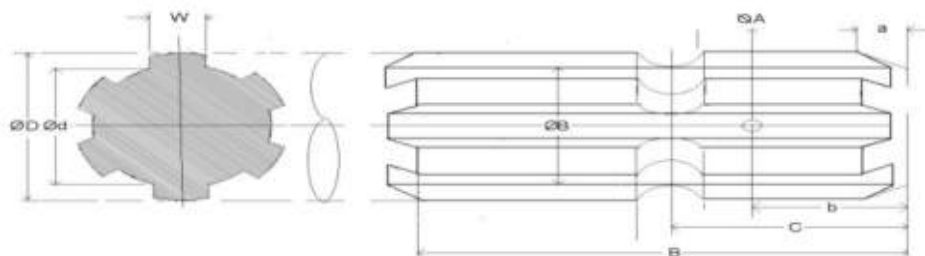


Fig. 2(a): DIMENSIONAL NOTATIONS FOR TYPE-I POWER TAKE-OFF SHAFT

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1.14.2	Master Shield of Power Take-Off	: Not provided
	Shaft:	
1.15	Towing hitch:	
1.15.1	Front:	
	Type	: Clevis
	Location	: At front, on front axle support bracket
	Height above ground level, (mm)	: 585 (fixed)
	Type of adjustment	: None
	Dia of pin hole,	: 65.00
	Width of clevis,	: 28.45
1.15.2	Rear:	
	Type	: Clevis
	Location	: At rear of differential housing.
	Height above ground level, (mm):	: 500 (fixed)
	Number of positions	: One
	Type of adjustment	: None
	Distance of hitch point, (mm):	
	- From rear wheel centre	: 390
	- From power take-off shaft end	: 100
	Dia of pin hole,	: 25.35
	Width of clevis,	: 74.96
1.16	Steering system:	
	Make	: Preet (apa)
	Type	: Hydrostatic, Power steering
	Location	: Above clutch housing
	Method of operation	: Manually, through steering control wheel
	Diameter of steering control wheel, (mm)	: 380
	Distributor:	
	Make of distributor	: Ognibene (apa)
	Type	: Hydrostaic, Open centre
	Location	: Above clutch housing
	Pump:	
	Make & type	: Dowty & Gear
	Location & drive	: On LHS of engine and driven through timing gear coupled with FIP gear by mechanical coupling
	Hydraulic cylinder:	
	Make	: Ognibene (apa)
	Number & Type	: 01 & Double acting, Single connecting
	Location	: In front of front axle, on LHS
	Lubrication capacity (l)	: 27.90 (Common with gear box, rear axle, rear final drive, hydraulic and brake system)
	Oil change period	: After every 1500 hours of operation.
1.17	Brakes:	
1.17.1	Service Brake:	
	Make	: Ratek Pheon Friction Tech. Pvt. Ltd.
	Type	: Mechanical oil immersed, Multi disc
	Location	: At rear half axle shaft , outside the differential housing
	No. of disc(s)	: 04 (on each wheel side)
	Area of liners, (cm ²)	: 413.10 (on each wheel side)
	Material of liners	: Non asbestos (apa)
	Method of operation	: Independent or combined operation of brake pedal provided on RHS of operator's seat

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- 1.17.2 Parking Brake:**
Type : Latch
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 : BKT
Number : Two
Type of tyre : Pneumatic, Traction
Size : 6.00-12
Ply rating : 06
Maximum permissible loading capacity of each tyre at inflation pressure recommended for road work, kg : 400 @200 (as per manufacturer)
Recommended inflation pressure, (kPa) :
- For field work : 175
- For transport : 200
Track width, (mm) : 860 (std.), 940
Method of changing track width : By reversing the wheel disc
Make & size of rim : CWPL & 4J × 12
- 1.18.2 Drive wheel(s):**
Make : BKT
Number : Two
Type of tyre : Pneumatic, Traction
Size : 8.3-20
Ply rating : 6
Maximum permissible loading capacity of each tyre at recommended pressure for road work, kg : 540@150 (as per ITTAC Manual)
Recommended inflation pressure, (kPa):
- For field work : 130
- For transport : 150
Track width, (mm) : 920 (std.)
Method of changing track width : None
Make & size of rim : CWPL & W7 x 20
- 1.18.3 Wheel base, (mm) : 1590**
Method of changing wheel base, if any, and range : **None**
- 1.19 Operator's seat:**
Make : SAL
Type : Cushioned seat with backrest
Type of suspension : 02, Helical coil spring
Type of damping : Hydraulic shock absorber
Range of adjustment, (mm):
Vertical : Nil
Lateral : Nil
Longitudinal : ± 95
- 1.20 Provision for safety and comfort of operator:**
- 1.20.1 Conformity with IS: 12343-1998 (Reaffirmed in 2014)**
All parameters meet the minimum requirements of IS: 12343-1998, (Re-affirmed in 2014).

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1.20.2 Conformity with IS: 6283 (Part-1 & 2) – 2006 – 2007 (Re-affirmed in 2014):

Controls and displays are identifiable with symbols meets the requirements as per IS: 6283 (Part 1&2) – 2006 – 2007 (Re-affirmed in 2014) , **except the following:**

- i) Grease & oil lubricant type & frequency chart has not been provided.

1.20.3 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).

- i) Fuel shut-off knob does not remain in stop position.
ii) Safety switch is not provided to avoid accidental start.

1.20.4 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).

1.20.5 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:**

- i) The spark arrester has not been provided in the exhaust system.
ii) Working clearance between the draft control lever and mudguard was measured 50 mm against the minimum requirement of 70 mm.
iii) Differential lock has not been provided.
iv) Master shield for PTO has not been provided.

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

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

1.20.7 Rear view mirror:

Rear view mirror has been provided.

1.20.8 Slow moving vehicle emblem:

Slow moving vehicle 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 intermediate housing and provides the following information:

Name of Manufacturer	:	PREET TRACTORS PRIVATE LIMITED Patiala Road, Nabha (Pb) India
Make	:	PREET
Model	:	2549 AGRITRAC 4WD
Month & Year of manufacturer	:	07/18
Engine Serial Number	:	P225-00059
Chassis Serial Number	:	NCW25AG00054/B
Maximum P.T.O Power, kW	:	14.5
Specific fuel consumption, g/kWh	:	280

1.22 Ballast Conditions:

Particulars		As used during drawbar test	As used during field test	As used during Haulage test
			Dry land	
Front	C.I. weight, kg	85	85	85
	Water, kg	Nil	Nil	Nil
Rear	C.I. weight, kg	100	100	50
	Water, kg	Nil	Nil	Nil
	Additional weight, if any	Nil	Nil	Nil

1.22.1 Standard ballast, if any : Not provided

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1.22.2 Masses:

Particulars		Mass of the tractor without operator but with all the liquid reservoirs full, (kg)		
i)	Without ballast	505	710	1215
ii)	With ballast as used during drawbar performance test	630	760	1390
iii)	With ballast as used during ploughing, rotavation dry land field test	630	760	1380
iv)	With ballast as used during haulage test (including trailer hitch, canopy & linkage drawbar)	635	720	1355

1.23 Overall dimensions:

Condition	Length, (mm)	Width, (mm)	Height, (mm)		Ground clearance, (mm)
			With exhaust pipe	Without exhaust pipe	
Without ballast	2805	1160	940	1350 (At steering control wheel)	195 (Below transmission housing drain plug)

1.24 Number of external lubricating Points:

- Oiling : Nil
- Greasing cups : Nil
- Greasing nipples : 15

1.25 Colour of tractor:

- Chassis & engine : Black
- Sheet metal:**
- Bonnet & Mudguard : Green
- Wheel rim & disc : White

1.26 Optional features, if any : Not provided

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 and Air cleaner oil	20W40	As recommended
2.	Gearbox, differential, rear axle, rear final drive, hydraulic, brake and steering system oil	Unitrac (Valvoline)	Oil originally filled in the tractor systems were not changed
3.	Front differential, front axle & front final drive housing oil	Not specified	--do--
4.	Grease	MP Grease-3	Servo Grease MP

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3. PTO PERFORMANCE TEST

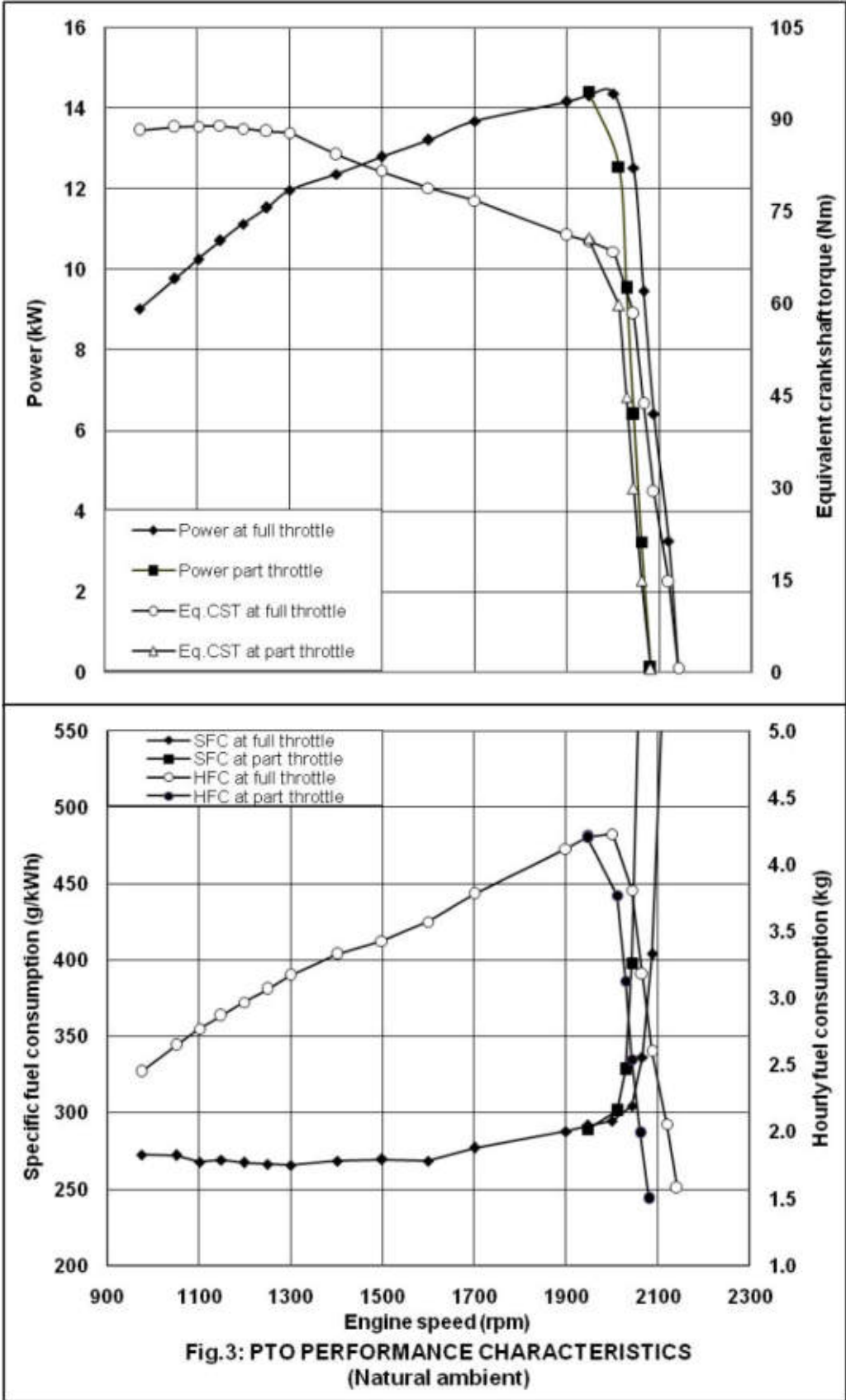
Date(s) of test : 08.06.2020 & 09.06.2020
Tractor run at the Institute prior to start of : 8.54
PTO test (h)
Type of dynamometer bench : SAJ AG-250, Eddy Current

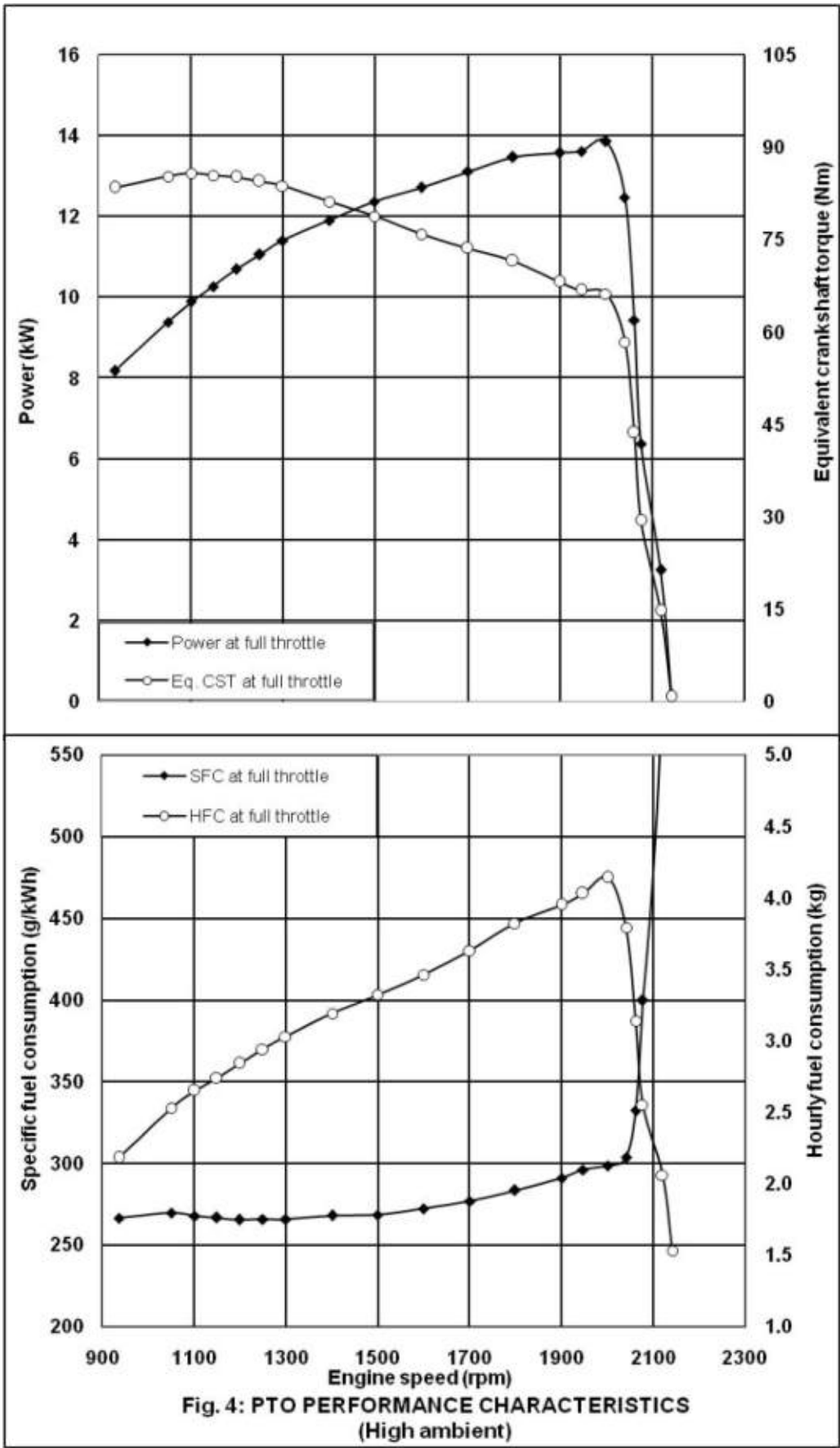
- 3.1 The results of power take-off performance are tabulated in Table-1 and graphically represented in Fig. 3, 4 and 5.

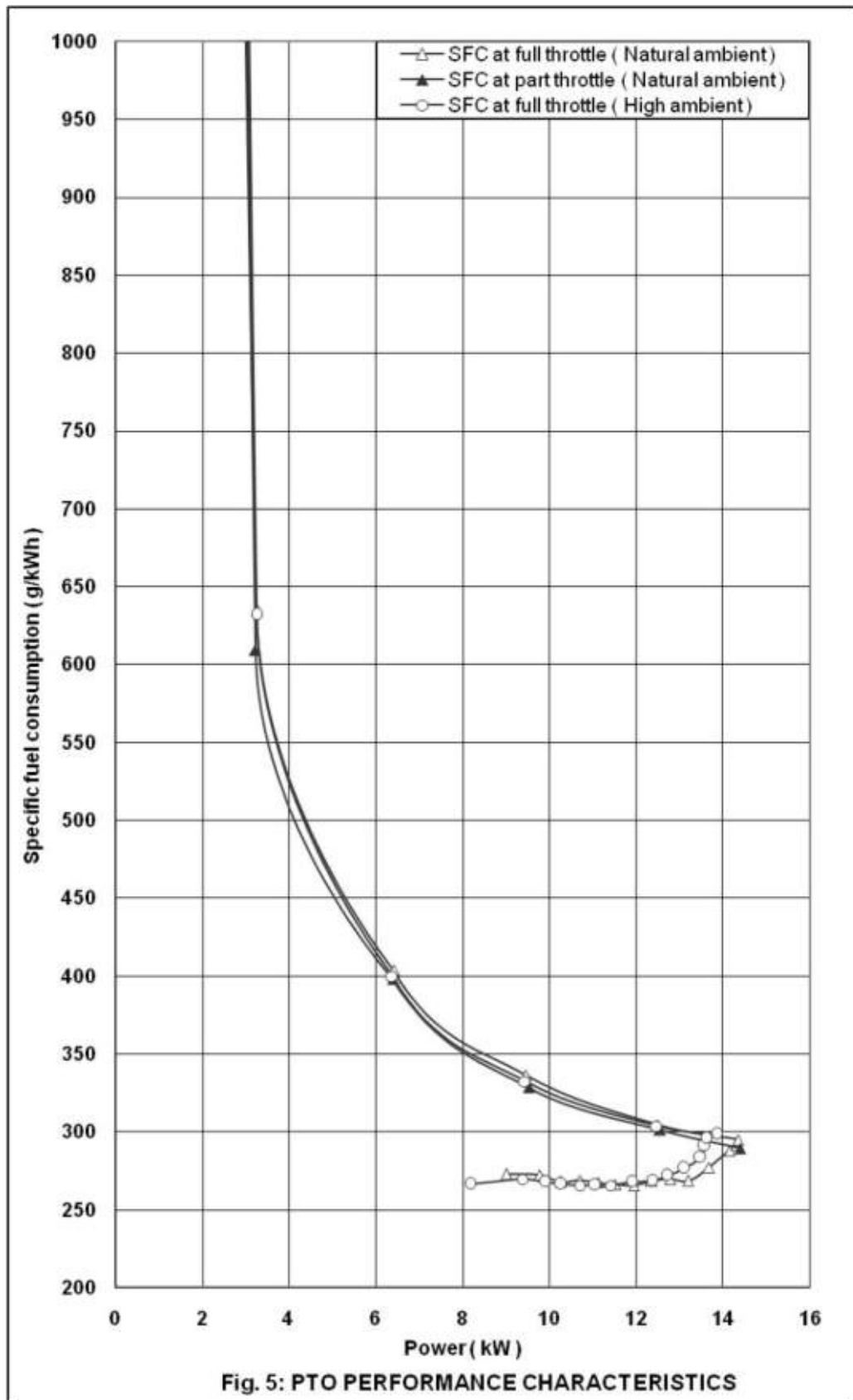
Table – 1

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:						
14.4	554	2001	5.06	4.23	0.294	2.85
13.7	554	2001	4.83	4.04	0.295	2.84*
b) Power at rated engine speed (2000 rpm):						
14.4	554	2001	5.06	4.23	0.294	2.85
13.7	554	2001	4.83	4.04	0.295	2.84*
c) Power at standard power take-off speed (540 ± 10 rpm):						
14.3	539	1947	5.03	4.21	0.294	2.84
13.6	539	1947	4.82	4.03	0.296	2.82*
d) Varying loads at rated engine speed (2000 rpm) :						
i) Torque corresponding to maximum power available at rated engine speed(2000 rpm):						
14.4	554	2001	5.06	4.23	0.294	2.85
ii) 85% of the torque obtained in (i):						
12.5	566	2044	4.55	3.81	0.305	2.75
iii) 75% of the torque obtained in (ii):						
9.5	572	2066	3.80	3.18	0.335	2.50
iv) 50% of the torque obtained in (ii):						
6.4	578	2088	3.10	2.60	0.406	2.06
v) 25% of the torque obtained in (ii):						
3.3	587	2120	2.47	2.06	0.624	1.34
vi) Unloaded:						
0.1	593	2142	1.89	1.58	15.800	0.05
e) Varying loads at standard PTO speed (540 ± 10 rpm):						
i) Torque corresponding to maximum power available at standard PTO speed (540 ± 10 rpm):						
14.3	539	1947	5.03	4.21	0.294	2.84
ii) 85% of the torque obtained in (i):						
12.6	555	2012	4.51	3.77	0.299	2.79
iii) 75% of the torque defined in (ii):						
9.5	562	2030	3.75	3.13	0.329	2.53
iv) 50% of the torque defined in (ii):						
6.4	566	2044	3.04	2.54	0.397	2.11
v) 25% of the torque defined in (ii):						
3.2	571	2062	2.38	1.99	0.622	1.34
vi) Unloaded:						
0.1	576	2081	1.79	1.50	15.000	0.06

* Under high ambient conditions







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		<u>Natural ambient</u>	<u>High ambient</u>
i)	No load maximum engine speed, (rpm) :	2142	2142
ii)	Equivalent crankshaft torque at maximum power, (Nm) :	68.5	65.4
iii)	Equivalent crankshaft torque corresponding to rated engine speed, (Nm) :	68.5	65.4
iv)	Maximum equivalent crankshaft torque, (Nm) :	89.0	85.8
v)	Engine speed at maximum equivalent crankshaft torque, (rpm) :	1149	1102
vi)	Backup torque, (%) :	29.9	31.2
vii)	Smoke level (maximum light absorption coefficient, per meter) :	0.16	---
viii)	Range of atmospheric conditions:		
	Temperature, (°C) :	27 to 28	42 to 45
	Pressure, (kPa) :	98.0 to 98.4	99.0 to 99.7
	Relative humidity, (%) :	61 to 69	33 to 39
ix)	Maximum temperatures, (°C):		
	Engine oil :	108	116
	Coolant (Water + Coolant) :	98	109
	Fuel :	59	71
	Air intake :	28	47
	Exhaust gas :	580	583
x)	Pressure at maximum power:		
	Intake air, (kPa) :	2.7 to 2.9	2.6 to 2.9
	Exhaust gas, (kPa) :	10.8 to 11.2	13.1 to 14.7
xi)	Consumptions:		
	Lub oil, (g/kWh) :	--	2.17
	Coolant (% of total coolant capacity) :	--	0.85

4. DRAWBAR PERFORMANCE TEST

Date(s) of test	:	02.07.2020, 03.07.2020 & 06.07.2020
Tractor run at the Institute prior to start of drawbar performance test, (h)	:	32.32
Type of track	:	Concrete
Height of drawbar, (mm):		
- With ballast	:	450
- With unballast	:	450

- 4.1** The results of drawbar performance test in 4WD engaged condition consisting of maximum power and pull with unballast, 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**.

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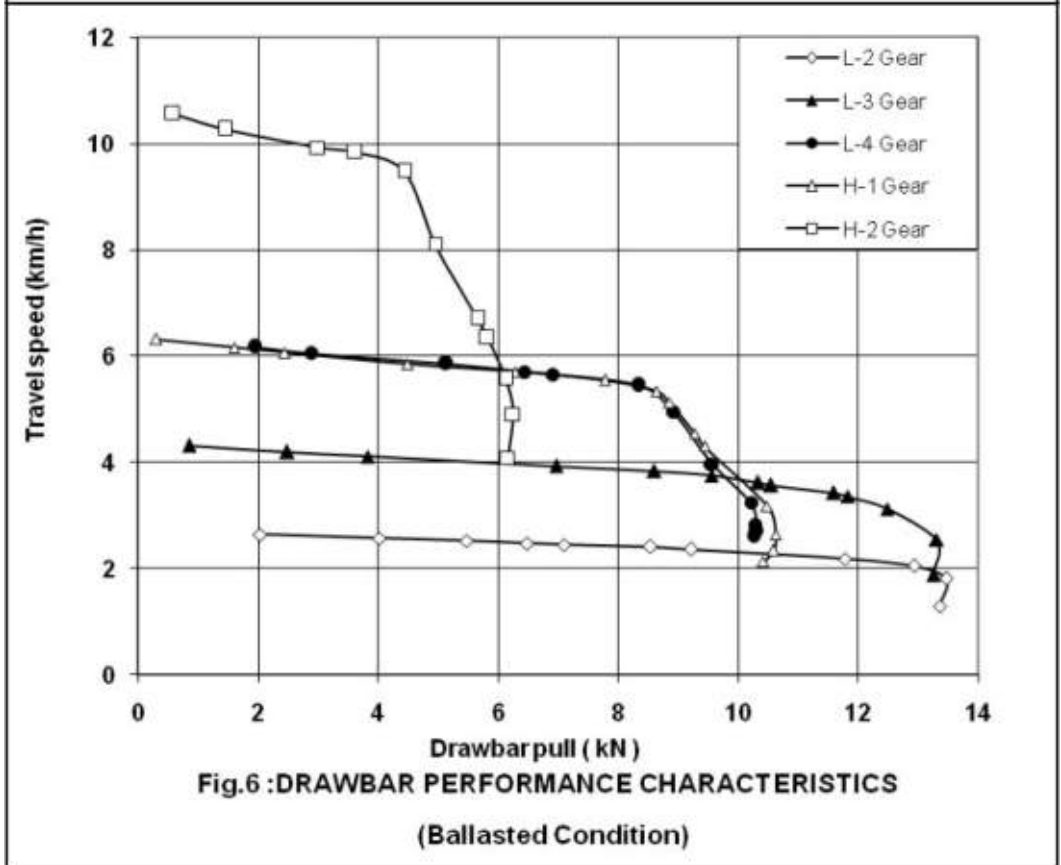
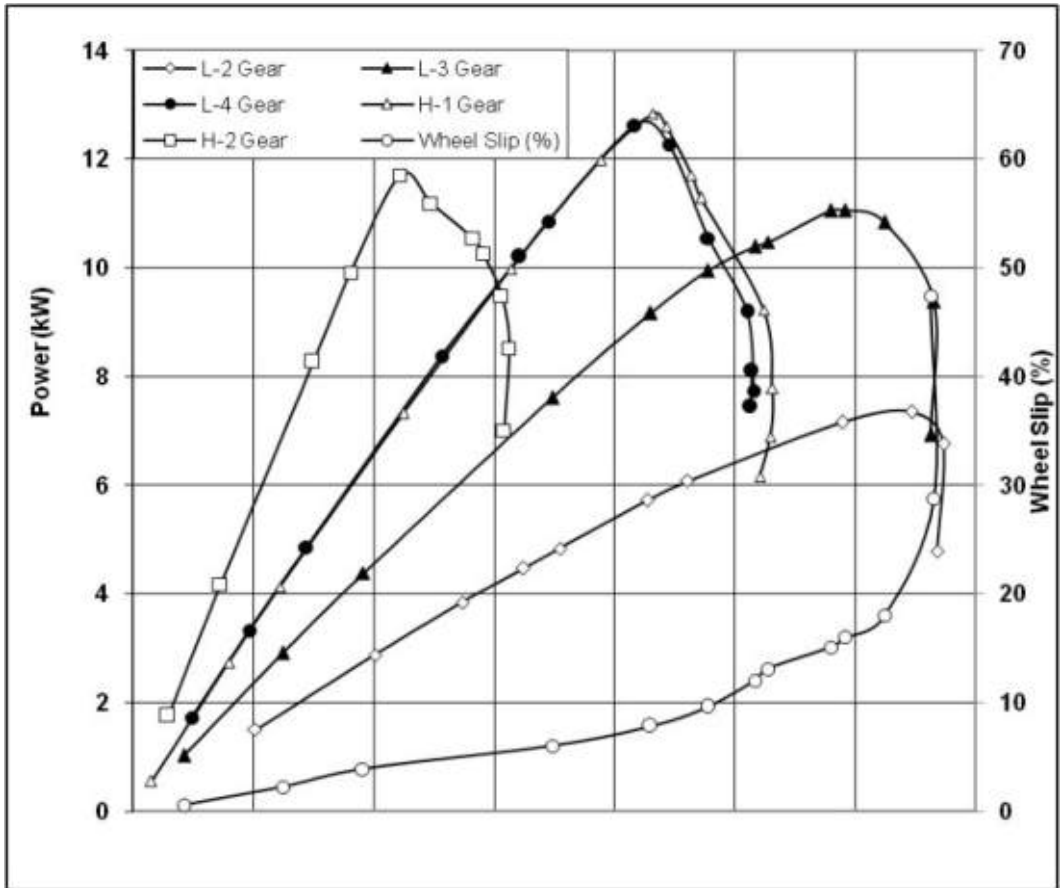
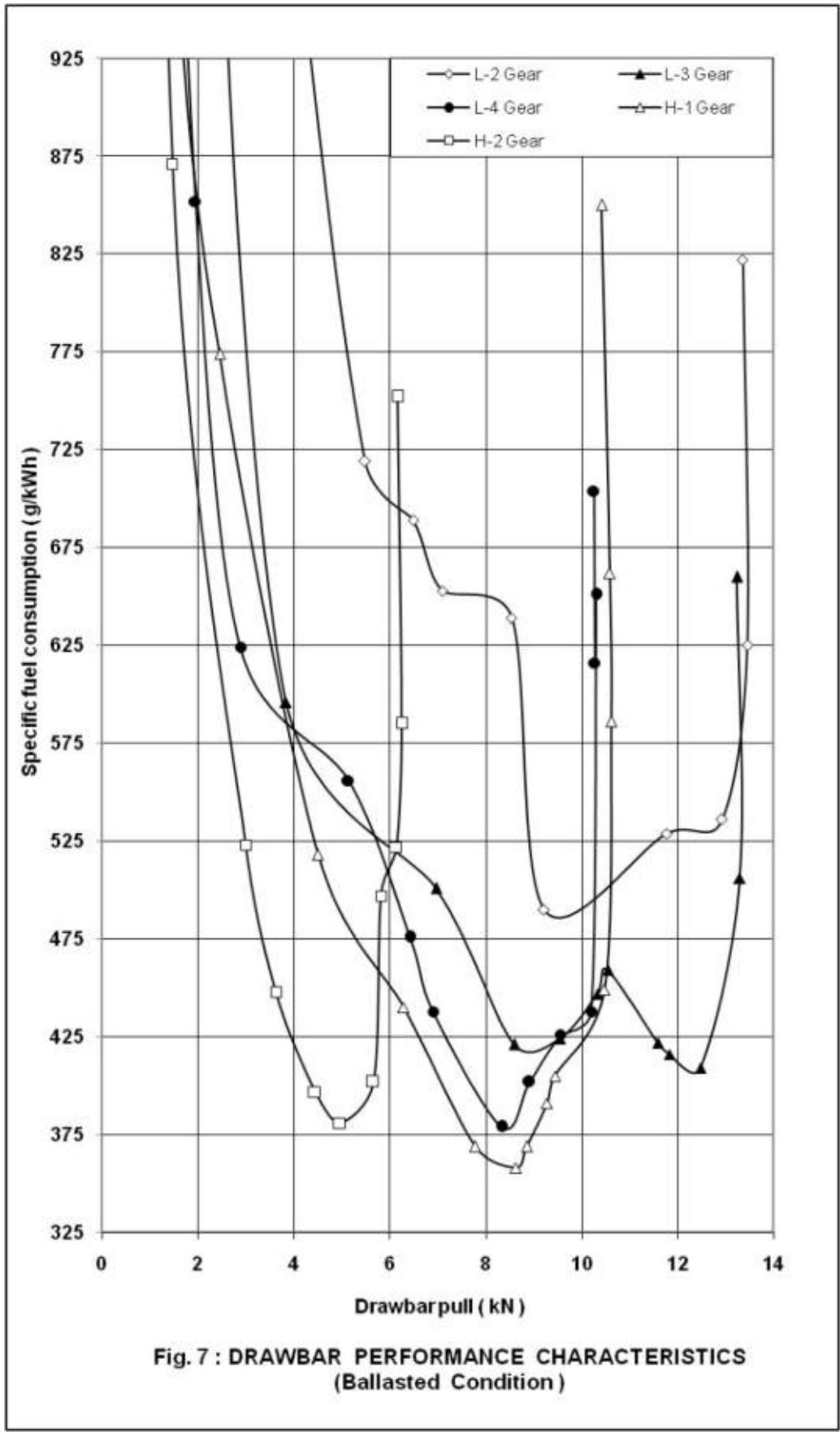


Fig.6 :DRAWBAR PERFORMANCE CHARACTERISTICS (Ballasted Condition)



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5. POWER LIFT AND HYDRAULIC PUMP PERFORMANCE TEST

Date(s) of test : 12.06.2020
 Tractor run at the Institute prior to start of hydraulic test, (h) : 19.86
 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) : 17.0
 Maximum hydraulic power,(kW) : 3.1
 Pump delivery rate at maximum hydraulic power, (l/min) : 17.5
 Pressure at maximum hydraulic power, (MPa) : 10.5
 Sustained pressure of the open relief valve, (MPa) : 12.5

Tapping point:

a) Relief valve test : External circuit
 b) Pump performance test : Pump outlet
 Temperature of hydraulic fluid, (°C) : 60 to 63

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	315	9.54	11.25	6.77	-
On the standard frame	200	315	8.57	11.25	11.31	10.7

5.3 Maintenance of lift load:

Force applied at the frame, (kN) : 7.71
 Temperature of hydraulic fluid at the start of test, (°C) : 60

Test data:

Elapsed Time, (minute)	05	10	15	20	25	30
Cumulative drop in height of lift, (mm)	10	25	35	40	45	50

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6. BRAKE TEST

6.1 Service brake:

6.1.1 Cold brake test:

Date of test : 13.03.2020 & 16.03.2020
 Type of track : Concrete
 Maximum attainable speed, (kmph):
 -Without Ballast : 24.3
 -With Road Ballasted : 24.3

		At maximum attainable speed			
Unballasted tractor	Braking device control, force (N)	536	462	388	314
	Mean deceleration, (m/sec ²)	3.09	2.94	2.85	2.50
	Stopping distance, (m)	7.35	7.75	8.00	9.11
Road ballasted tractor	Braking device control force(N)	545	470	396	321
	Mean deceleration, (m/sec ² .)	2.93	2.87	2.77	2.50
	Stopping distance, (m)	7.74	7.94	8.24	9.11

6.1.2 Brake fade test:

		At maximum attainable speed			
Road ballasted tractor	Braking device control force, (N)	561	496	430	364
	Mean deceleration, (m/sec ²)	2.94	2.81	2.69	2.50
	Stopping distance, (m)	7.83	8.09	8.46	9.11

Maximum deviation of tractor from its original course, (m) : None
 Abnormal vibration : None
 The brakes were heated by : Self braking

6.2 Parking brake test:

Particulars	Parked on 18 percent slope		Parked on 12 percent slope with trailer of 1.355 tonnes.	
	Facing Up	Facing Down	Facing Up	Facing Down
Braking device control force, (N)	188	182	234	263
Efficacy of parking brake	----- Effective -----			

7. NOISE MEASUREMENT

7.1 Noise at bystander's position:

Date of test : 18.03.2020
 Type of track : Concrete
 Background noise level, dB (A) : 50
Atmospheric conditions:
 Temperature, (°C) : 26
 Pressure, (kPa) : 97.2
 Relative humidity, (%) : 35
 Wind velocity, (m/s) : 2.2

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Test Data:

S. No.	Gear	Travelling speed before acceleration, (kmph)	Noise level, dB(A)
1.	L1	1.18	79
2.	L2	1.97	79
3.	L3	3.17	78
4.	L4	4.64	79
5.	H1	4.76	79
6.	H2	7.48	79
7.	H3	12.32	79
8.	H4	18.20	79

7.2 Noise at operator's ear level:

Date of test : 02.07.2020
 Type of track : Concrete
 Background noise level, dB(A) : 55.2

Atmospheric conditions:

Temperature, (°C) : 33
 Pressure, (kPa) : 97.3
 Relative humidity, (%) : 58
 Wind velocity, (m/s) : 1.1

Test Data:

Gear	Drawbar pull at which the tractor develops the max. noise level, (kN)	Corresponding travelling speed, (kmph)	Noise level dB(A)
L2	6.19 to 9.76	2.43 to 2.24	90
L3	8.22 to 9.56	3.77 to 3.52	91
*L4	2.61 to 7.78	6.11 to 5.38	90
H1	6.62 to 8.12	5.58 to 5.29	92
H2	3.86 to 4.67	9.90 to 9.46	91

* Gear corresponds to the nominal travelling speed nearest to 7.5 kmph

8. AIR CLEANER OIL PULL-OVER TEST

Date of test : 23.03.2020
 Tractor run at the Institute prior to start of : 4.79
 air cleaner oil pull-over test, (h)

Atmospheric conditions:

Temperature, (°C) : 28 to 42
 Pressure, (kPa) : 97.0 to 97.4
 Relative humidity, (%) : 30 to 42
 Mass of oil before test, (g) : 362.6

Sl. No	Position of tractor	Loss of oil (g)	Oil pull-Over (%)	Engine oil pressure
i)	Tractor parked on level ground	0.80	0.22	Normal
ii)	Tractor tilted 15° laterally on RHS	0.10	0.03	Normal
iii)	Tractor tilted 15° laterally on LHS	0.70	0.19	Normal
iv)	Tractor tilted 15° longitudinally with front end up	0.40	0.11	Normal
v)	Tractor tilted 15° longitudinally with rear end up	0.20	0.06	Normal

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9. MECHANICAL VIBRATION MEASUREMENT

Date of test : 15.06.2020
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	109*	169*	90	77
		Right	209*	156*	120*	140*
ii)	Steering wheel		85	159*	46	72
iii)	Seat	Bottom	77	55	18	47
		Back	210*	50	113*	77
iv)	Mudguard	Left	140*	200*	81	92
		Right	183*	244*	92	104*
v)	Head light	Left	153*	240*	118*	105*
		Right	149*	198*	107*	129*
vi)	Battery base, centre		133*	194*	68	40
vii)	Tail light	Left	201*	224*	92	190*
		Right	158*	254*	102*	164*
viii)	Plough light		336*	376*	207*	229*
ix)	Gear shifting lever		198*	155*	83	45
x)	Accelerator lever	Hand	201*	169*	129*	86
		Foot	96	121*	101*	154*
xi)	Brake pedal	Left	167*	149*	90	130*
		Right	148*	110*	56	64
xii)	Clutch pedal		80	100	69	82
xiii)	Main hydraulic control lever		62	63	48	57
xiv)	PTO engaging lever		62	74	43	27

* The amplitude of mechanical vibration is on higher side.

10. LOCATION OF CENTRE OF GRAVITY

Condition	Particulars	Coordinates
Tractor under unballasted condition with all the liquid reservoirs full & the operator replaced by a 75 kg mass on the seat	Height above ground, (mm)	512
	Distance forward from the vertical plane containing the axis of rear wheels, (mm)	665
	Distance from the median plane parallel to the longitudinal axis of tractor bisecting the track, (mm)	4 (towards RHS)

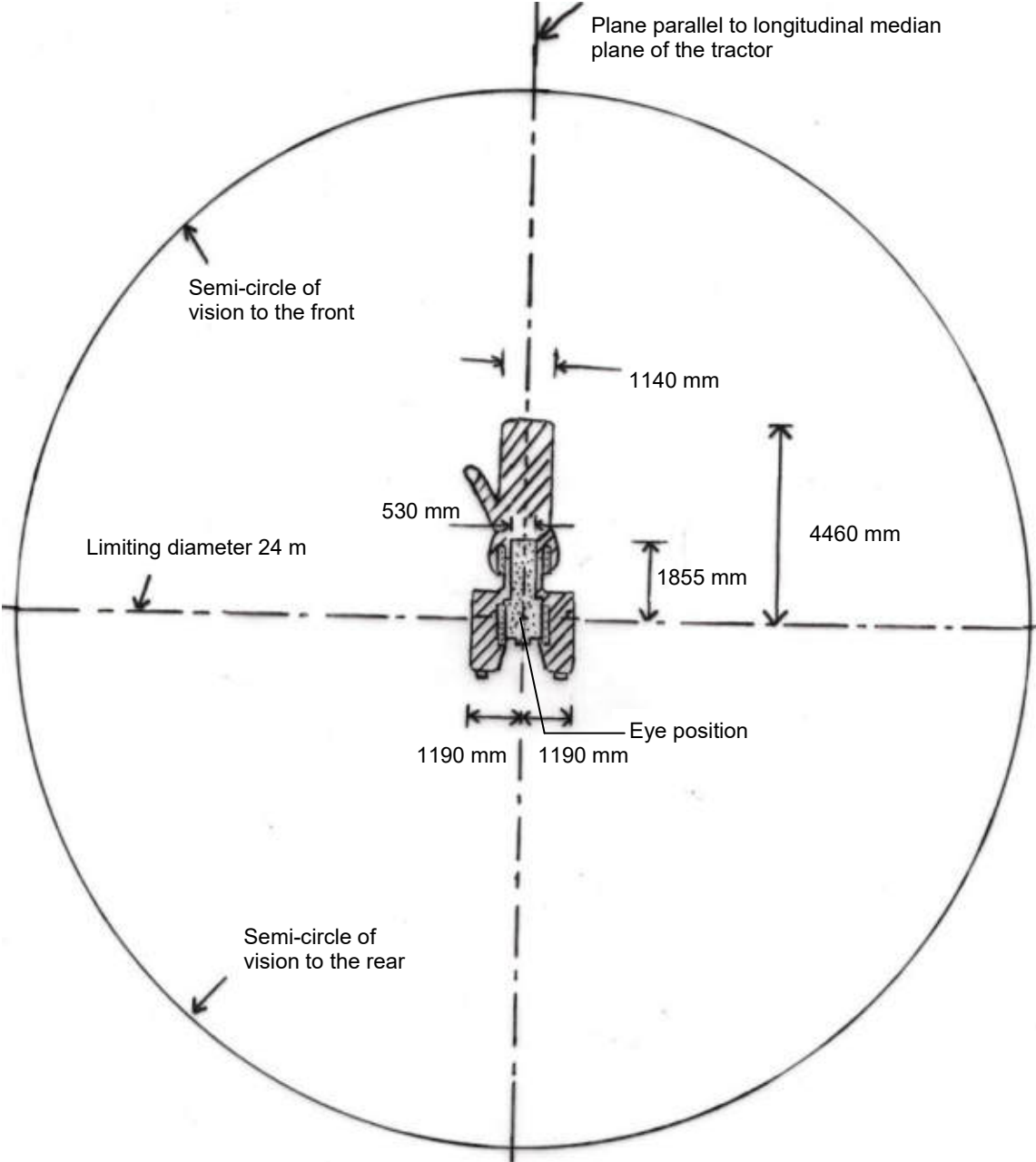
11. TURNING ABILITY



Characteristics		Minimum turning diameter,(m)		Minimum clearance diameter,(m)	
		LHS	RHS	LHS	RHS
In 4WD condition	Brakes released	6.64	7.03	7.10	7.37
	Brake applied	4.97	5.07	5.47	5.49
In 2WD condition	Brakes released	6.24	6.70	6.66	7.06
	Brake applied	5.07	5.51	5.41	5.81

12. 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. 8**. The observations are as under:

1. The non visible space in front is **4460 mm** which is **2.81** times of wheel base (i.e. 1590 mm).
2. The non-visible space on LHS and RHS is **1190 mm** which is **1.29** times of standard rear track width (i.e. 920 mm).



	Plan of Tractor
	Area not visible to operator

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13. FIELD TEST

- 13.1** During the field test with M.B. Plough, after 11.92 hours of ploughing operation RHS steering drop arm was broken. This breakdown is categorized under **Critical (C-18)** as per IS: 12207- 2019. Hence this tractor was not meeting the evaluative requirement of IS: 12207- 2019. Thereafter applicant has submitted letter no. R&D/83/ICT/PREET dated 04.11.2020 and request for “**Repeat Test**” after replacing RHS steering drop arm (Part No. PG1002015). Same has been examined and accepted by the testing authority as per clause 3.2.3 of IS: 12207- 2019. Thereafter, repeat test was conducted after replacing RHS steering drop arm of same specification
- 13.2 Repeat Test:**
- 13.2.1** The field tests comprising of mouldboard ploughing and rotavation were conducted for **21.2** and **15.3** hours respectively.
All the field tests were conducted at the full accelerator settings, when the no load speed of the engine varied from **2067** to **2174 rpm**.
- 13.2.2** The brief specifications of the implements used during field tests are given in **Annexure – I**
- 13.3.3** The summary of field test observation with mouldboard plough and rotavator is given in **Table - 3**.

Table – 3

SUMMARY OF FIELD PERFORMANCE TEST

Sl. No.	Parameter/operation	Disc Ploughing	Rotavation
i)	Type of soil	Heavy	Heavy
ii)	Av. soil moisture, (%)	12 to 20	11 to 14
iii)	Bulk density of soil, (g/cc)	1.6 to 1.8	1.5 to 1.7
iv)	Cone index, (kg/sq.cm)	6.30 to 7.66	5.78 to 7.66
v)	Gear used	L-2	L-2
vi)	Av. speed of operation, (kmph)	2.01 to 2.23	2.47 to 2.58
vii)	Av. wheel slip, (%) / Av. Travel reduction, (%)	16.0 to 20.0	-1.2 to -0.3
viii)	Av. depth of cut, (cm)	16 to 19	8 to 10
ix)	Av. working width, (cm)	41 to 50	94 to 95
x)	Area covered, (ha/h)	0.070 to 0.088	0.205 to 0.213
xi)	Fuel consumption:		
	- (l/h)	3.02 to 3.06	3.64 to 3.94
	- (l/ha)	34.65 to 43.69	17.09 to 18.76
xii)	Av. draft of implement, (kN)	4.12 to 4.91	--

Remarks: The average lubricating oil and coolant (water) consumptions during the entire field tests were observed **Nil** and **4.94 ml/h** respectively.

Remark:

- (i) During repeat field test with plough, fan blade was got bent & cracked and touched to the radiator which has resulted in the leakage of water (coolant) from radiator assembly. The leakage of water (coolant) from the radiator (due to breakage of radiator tubes) has been considered as consequential failure and only the primary defect i.e. bending & cracking of fan blade has been counted as **Major defect Mj-1** as per IS:12207-2019. Thereafter, cooling fan (Part No. PG0103006, 1 No.) and radiator (Part No. PG0103001, 1 No.) were replaced with new one of same specifications.
- (ii) Again during field test with plough, it was observed that the 2nd gear was automatically shifting to neutral position. On inspection, teeth of 2nd gear was found broken & also its locking circlip was found misplaced. This defect has been categorized as **Major defect Mj-9** as per IS: 12207-2019. Thereafter, 2nd gear (Part No. PG0301018, 1 No.) & circlip (1 No.) were replaced with new one of same specification.
- (iii) During field test with rotavator, hydraulic sensor tube mounting bolt of hydraulic system was broken. Thereafter, Hexagonal bolt (Part No. H002016) was replaced with new one of same specification.

13.3.4 Wet land cultivation (Puddling):

The manufacturer has recommended that the tractor is not suitable for wet land cultivation (puddling) test. Therefore, the wet land cultivation (puddling and water proof) test has not been conducted.

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14. HAULAGE TEST

Type of trailer:		Two wheel (Single axle)
Gross mass of trailer, (tonnes)	:	1.5
Height of trailer hitch above ground level, (mm)	:	480
Gear used during the test for negotiating slopes upto 8%	:	H4
Average travel speed, (kmph)	:	23.12 to 24.05
Average fuel consumption:		
- (l/h)	:	3.03 to 3.18
- (ml/km/tonne)	:	85.4 to 91.1
Average distance travelled per litre of fuel consumption, (km)	:	7.32 to 7.80
General observations:		
Effectiveness of brakes	:	Effective
Manoeuvrability of tractor-trailer combination	:	Satisfactory

15. COMPONENTS/ASSEMBLY INSPECTION

The engine and other assemblies were dismantled after **120.1** hours of tractor operation at this Institute.

15.1 Engine:

15.1.1 Cylinder bore:

Cylinder No.	Cylinder bore diameter, (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.	100.012	100.009	100.013	100.018	100.007	100.010	100.40
2.	100.006	100.017	100.007	100.003	100.008	100.001	

15.1.2 Piston:

Piston No.	Piston diameter, (mm)				Max. permissible wear limit,(mm)	Piston to cylinder liner clearance at skirt (mm)	
	Top (above top compression ring)		At skirt			As observed	Max. permissible limit, (mm)
	Thrust Side	Non-thrust side	Thrust Side	Non-thrust side			
1.	99.269	99.222	99.841	***	99.376	0.172	0.80
2.	99.254	99.212	99.833	***		0.184	

15.1.3 Ring end gap:

Rings	Ring end gap, (mm)						Max. Permissible end gap limit, (mm)
	Cylinder No.1			Cylinder No.2			
	Top	Middle	Bottom	Top	Middle	Bottom	
1 st comp ring	0.35	0.35	0.35	0.30	0.30	0.35	2.00
2 nd comp ring	0.95	0.95	0.90	0.95	1.00	1.00	2.00
Oil ring	0.75	0.80	0.80	0.75	0.75	0.80	2.00

15.1.4 Ring side clearance:

Rings	Ring side clearance, (mm)		Max. Permissible clearance Limit, (mm)
	Piston-I	Piston-II	
1st Compression ring	----- Tapered -----		Not applicable
2 nd Compression ring	0.042	0.045	0.50
Oil ring	0.031	0.037	0.50

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15.1.5 Main bearings:

Bearing No.	Diametrical Clearance, (mm)	Crankshaft end float, (mm)	Max. permissible clearance limit, (mm)	
			Diametrical clearance	Crankshaft end float
1.	0.100 to 0.109	0.30	0.90	1.00
2.	0.100 to 0.102			
3.	0.099 to 0.107			

15.1.6 Big end bearings:

Bearing No.	Clearance, (mm)		Max. permissible clearance limit, (mm)	
	Diametrical	Axial	Diametrical	Axial
1.	0.091 to 0.095	0.20	0.90	1.00
2.	0.086 to 0.092	0.25		

15.1.7 Valve, guides and timing gears: Observation

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

Spring Rate, (N/mm):

Intake valve spring:
- Inner : 2.24 to 2.45
- Outer : 2.26 to 2.58
Exhaust valve spring:
- Inner : 7.25 to 7.78
- Outer : 7.28 to 7.82

Against discard limit of 1.50 N/mm for inner and 5.00 N/mm for outer spring

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

Intake valve : 0.070
Exhaust valve : 0.07to 0.08

Against the discard limit of 0.15 mm

15.2 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): 10.90 to 11.06
Height of lining over rivet head, (mm) : 2.78 to 2.92

Against the discard limit of up to rivet head

15.3 Transmission gears:

Any visual damage, pitting & chipping of any transmission gear teeth : None
Backlash between crown wheel and Pinion, (mm) : 0.34

Against discard limit of 0.80 mm and adjusted by shim

15.4 Brakes:

Description	Initial specified thickness of brake liner, (mm)	Measured overall thickness of brake disc after test, (mm)	Measured depth of oil groove, (mm)	Minimum permissible depth of oil groove of brake lining (mm)
Left	5.0	3.14 to 3.28	0.32 to 0.63	1.00
Right	5.0	3.14 to 3.35	0.38 to 0.66	

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15.5 Front axle:

Condition of front axle seals, bushes & bearing pins : Normal
Any visual damage, pitting & chipping of front axle transmission gear teeth : None
Bearing No. of front final drive : Turbo 6010 & TATA 6204
Clearance between centre pin and bush, (mm) : 0.12 to 0.29 | Against discard limit of 1.00 mm

15.6 Steering system:

Visual condition of the components of complete steering assembly : Normal

15.7 Starter motor & Alternator:

Presence of soil/oil in housing : None
Condition of bearings and other Components : Normal

16. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

Sl. No.	Adjustments/Defects/Breakdowns and Repairs	Tractor run hours
1.	During PTO performance test, some hitting noise was observed from the transmission housing. Leakage of gear oil was also observed from gearbox & differential housing due to manufacturing defect of casting.	0.50
2.	During Hydraulic performance test, presence of water was found in the hydraulic oil & become sludge. Thereafter, hydraulic oil and oil filter (Part No. P1501080) were replaced with new one of same specifications.	19.86
3.	After completion of drawbar performance test, front tyre lugs were worn out completely. Thereafter, on the request of applicant front tyre of size 6.00-12, 6 PR - 02 Nos. were replaced with new one of same specifications.	49.14
4.	During the field test following defects / breakdowns were occurred:	
(i)	During field test with plough, RHS steering drop arm was broken. Hence this tractor was not meeting the evaluative requirement of IS:12207-2019. This defect has been categorized as critical defect C-18 as per IS:12207-2019. Thereafter applicant has submitted letter No. R&D/83/ICT/PREET dated 04.11.2020 and request for " Repeat Test " after replacing RHS steering drop arm (Part No. PG1002015). Same has been examined and accepted by the testing authority as per clause 3.2.3 of IS: 12207- 2019. Thereafter, field test was conducted after replacing RHS steering drop arm of same specification	64.61
(ii)	Again during field test with plough, fan blade was got bent & cracked and touched to the radiator which has resulted in the leakage of water (coolant) from radiator assembly. The leakage of water (coolant) from the radiator (due to breakage of radiator tubes) has been considered as consequential failure and only the primary defect i.e. bending & cracking of fan blade has been counted as Major defect Mj-1 as per IS:12207-2019. Thereafter, cooling fan (Part No. PG0103006, 1 No.) and radiator (Part No. PG0103001, 1 No.) were replaced with new one of same specifications.	64.71
(iii)	Again during field test with plough, it was observed that the 2 nd gear was automatically shifting to neutral position. On inspection, teeth of 2 nd gear was found broken & also its locking circlip was found misplaced. This defect has been categorized as Major defect Mj-9 as per IS:12207-2019. Thereafter, 2 nd gear (Part No. PG0301018, 1 No.) & circlip (1 No.) were replaced with new one of same specification.	78.08
iv)	During field test with rotavator, sensor tube mounting bolt of hydraulic system was got broken. This defect has not been categorized as per IS: 12207-2019. Thereafter, hexagonal bolt (Part No. H002016, 1 No.) was replaced with new one of same specification.	104.51

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17. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

17.1 On the basis of tests conducted the performance results have been summarized as evaluative (mandatory) and non-evaluative (not-mandatory) parameter applicable for qualifying Minimum Performance Criteria as per Clause-4 (Table-1) of IS: 12207-2019 for acceptance of the tractor for the purpose of subsidies/NABARD financing are summarized as under:

S. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	Values declared by the applicant (D)/ Requirement (R)	As observed	Whether meets the requirements (Yes/No.)
1	2	3	4	5	6	7
17.1.1	PTO Performance :					
a)	Maximum power under 2 h test, kW (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of ± 5 percent for PTO power and or engine power > 26 kW ± 10 percent for PTO power and or engine \leq 26 kW	14.5 (D)	14.4	Yes
b)	Power at rated engine speed, kW	Non Evaluative	-do-	14.5 (D)	14.4	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+10 percent Max.	280 (D)	294	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8 percent	110 (D)	89.0	No
e)	Back-up torque, percent	Evaluative	12 percent	12 (D) 12 (R)	29.9	Yes
f)	Maximum operating temperature, ($^{\circ}$C)					
	1) Engine oil	Evaluative	The declared value should not exceed the max. value specified by the oil company and the observed value under high ambient condition should not exceed the declaration.	132 (D)	116	Yes
	2) Coolant / cylinder liner temperature, in case of air cooled engine	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.	120 (D)	109	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.95 (R) maximum	2.17	Yes
h)	Smoke level, m ¹	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 hatridge value (As per CMVR)	3.25 (R) maximum	0.16	Yes

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1	2	3	4	5	6	7	
17.1.2 Drawbar performance :							
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip or 7 percent slip, kN	Non Evaluative	Minimum 70 percent of static mass with ballast	9.51 (D)	11.78	Yes	
				9.55 (R)			
b)	Max. drawbar pull without ballast, as the case may be corresponding to 15 percent wheel slip or 7 percent track slip, kN	Evaluative	Minimum 70 percent of static mass of tractor without ballast or with standard ballast, as the case may be	8.25 (D)	9.96	Yes	
				8.34 (R)			
c)	Maximum drawbar power without ballast, or with standard ballast as the case may be, 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.	10.87 (D)	12.5	Yes	
				10.80 (R)			
d)	Max. transmission oil temperature (°C)	Evaluative	The declared value should not exceed the maximum value specified by oil company	120 (D)	83	Yes	
17.1.3 Power lift and hydraulic pump performance :							
a)	Maximum lifting capacity throughout the range of lift, (kN):						
	1)	At hitch points	Evaluative	[Tolerance of ± 10%]	9.80 (D)	9.54	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	5.40 (D) 3.39 (R) Minimum	8.57	Yes
b)	Maximum drop in the height of the point of application of the force after each 5 min. interval for a total duration of 30 min/ mm	Evaluative	The observed value should not exceed 50 mm.	50 (R)/(D) maximum	50	Yes	
17.1.4 Brake performance at 25 kmph travel speed							
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)	7.74	Yes
	2)	Hot brake	Evaluative	10	10 (R)	7.83	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (R)	321 to 364	Yes	
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)	263	Yes	

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1	2	3	4	5	6	7
17.1.5	Noise measurement:					
a)	Maximum ambient noise emitted by the tractor at bystanders position, dB(A)	Evaluative	88 dB(A) for >1.5 tonne GVW and 85 dB(A) for <1.5 tonne GVW (as per CMVR)	85 (R)	79	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96 (R)	92	Yes
17.1.6	Amplitude of mechanical vibrations at :					
	1) Left foot rest	Non Evaluative	100 microns (Max.)	100 (R)	169	No
	2) Right foot rest	Evaluative			209	No
	3) Seat (with driver seated)	Non Evaluative	100 microns (Max.)	100 (R)	210	No
	4) Steering wheel	Non Evaluative	100 microns (Max.)	100 (R)	159	No
17.1.7	Air cleaner pull over test (%)					
	Maximum air cleaner pull over, (%)	Evaluative	0.25% (max)	0.25% (max)	0.22	Yes
17.1.8	Haulage requirements :					
a)	Gross mass of the trailers, (tonnes):					
	Two wheel	Non Evaluative	--	1.5 (D)	1.5	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
	Two wheel	Non Evaluative	--	1 to 5 (D)	7.32 to 7.80	No
c)	Fuel consumption (ml/km/tonne):					
	Two wheel	Non Evaluative	--	10 to 50 (D)	85.4 to 91.1	No
17.1.9	Wet land 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.	The manufacturer has recommended that the tractor is not suitable for wet land cultivation	Not Recommended	Not Applicable
	1) Clutch assembly	-do-				
	2) Brake housing	-do-				
	3) Front axle assembly hubs	-do-				
	4) Engine oil	-do-				
	5) Transmission oil	-do-				

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1	2	3	4	5	6	7
17.1.10	Safety features :					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes (As per IS 12239 part 2)		Meets the requirement	Yes
b)	Lighting arrangement	Evaluative	As per CMVR		Meets the requirement	Yes
c)	Seating requirements (Tractors having more than 1150 mm rear track width)	Non-Evaluative	Should meet the requirements of IS 12343 (as amended from time to time)		Meets the requirement	Yes
d)	Technical requirements for PTO shaft	Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)		Meets the requirement	Yes
e)	Dimension of three point linkage	Non-Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)		Does not meet the requirement	No
f)	Specification of linkage drawbars	Evaluative	Should meet the requirements of IS 12953 (as amended from time to time)		Meets the requirement	Yes
g)	Specification of Swinging drawbars	Evaluative	Should meet the requirements of IS 12362 (Part 3)		Not provided	Not applicable
h)	1) Maximum travelling speed at rated engine speed in reverse gears, Kmph	Evaluative	Should not exceed 20 kmph		4.27 kmph (Meets the requirement)	Yes
	2) Audible warning signal on tractor	Evaluative	As soon as the travelling speed in reverse gear reaches to 20 kmph, an audible warning signal on tractor shall be activated. The safety aspects about the operation of shuttle technology shall be brought in operation and manufacturer/dealer shall ensure the training on this aspect to operator before the delivery of tractor.		Not fitted	Not applicable

17.1.11 Labelling of tractors (Provision of labelling plate):						
1)	Make	Evaluative	Should conform to the requirements of CMVR along-with maximum PTO power in kW and year of manufacture in numerical form MM YY Digit 01-12 in box No.1 for MM will represent the months & next two digits in box No.2 for YY will represent the year of manufacturing.		PREET	Yes
2)	Model	Evaluative			2549 AGRITRAC 4WD	Yes
3)	Month & Year of manufacture	Evaluative			07/18	Yes
4)	Engine number	Evaluative			P225-00059	Yes
5)	Chassis number	Evaluative			NCW25AG00054/B	Yes
6)	Declaration of PTO power, (kW)	Evaluative			14.5	Yes

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1	2	3	4	5	6	7
17.1.12	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	100.40 (D)	100.001 to 100.018	Yes
(b)	Piston to cylinder liner Clearance at skirt (mm)	Non Evaluative		0.80 (D)	0.172 to 0.184	Yes
(c)	Piston diameter at skirt, mm	Non Evaluative	-do-	99.376 (D)	99.833 to 99.841	Yes
(d)	Ring end gap (mm):					
	- Top comp. ring	Evaluative	-do-	2.00 (D)	0.30 to 0.35	Yes
	- 2 nd comp. ring		-do-	2.00 (D)	0.95 to 1.00	Yes
	- Oil ring		-do-	2.00 (D)	0.75 to 0.80	Yes
(e)	Ring groove clearance (mm):					
	- Top comp. ring	Evaluative	--Tapered rings--			Not applicable
	- 2 nd comp. ring		-do-	0.50 (D)	0.031 to 0.042	Yes
	- Oil ring		-do-	0.50 (D)	0.037 to 0.045	Yes
(f)	- Diametrical clearance of main bearings	Evaluative	-do-	0.90 (D)	0.099 to 0.109	Yes
(g)	Clearance of big or small end bearings, (mm):					
	- Diametrical	Evaluative	-do-	0.90 (D)	0.086 to 0.095	Yes
	- Axial	Evaluative	-do-	1.00 (D)	0.20 to 0.25	Yes
(h)	- Crankshaft end float, (mm)	Evaluative	-do-	1.00 (D)	0.30	Yes
(j)	Clearance between kingpin and bush, (mm)	Non Evaluative	-do-	Bearing No. Turbo 6010, Tata 6204		Not applicable
(k)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	1.00 (D)	0.12 to 0.29	Yes
17.1.13	Literature (Submission to test agency)					
(a)	Operator manual	Evaluative	Provided / Not Provided	Provided	Provided	Yes
(b)	Parts Catalogue	Evaluative	Provided / Not Provided	Provided	Provided	Yes
(c)	Workshop/ service manual	Evaluative	Provided / Not Provided	Provided	Provided	Yes
17.1.14	Fitment of Roll Over Protective Structures (ROPS):For tractors having more than 1150 mm rear track width	Evaluative	ROPS should meet the requirement of IS 11821 or OECD code or equivalent International Standard	Provided	Not fitted	Not applicable

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1	2	3	4	5	6	7
17.1.15	Standard accessories	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with the tractor	Provided	Provided	Yes
17.1.16	Accessories (optional)	Non Evaluative	Ballast weights, if fitted, should meet the requirement of CMVR	Provided	Provided	Yes

17.2 CATEGORY OF BREAKDOWNS / DEFECTS :					
S. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	As observed	Whether meets the Requirements (Yes/No)
1.	Critical	Evaluative	No critical breakdown	None	Yes
2.	Major	Evaluative	Not more than two and neither of them should be repetitive in nature	Two (Mj1 & Mj9)	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.	Two (Mj1 & Mj9)	Yes

17.3 Conformity with following IS:

- i) Guide lines for declaration of power and specific fuel consumption and labelling of agricultural tractors (First revision) [IS 10273:1987 (Reaffirmed in 2014):] : **Conforms**
- ii) Agricultural tractors – Rear mounted power take-off - Types 1, 2 and 3 (third revision)[IS: 4931-1995 (Reaffirmed in 2014)] : **Conforms**
- iii) Agricultural wheeled tractors - Rear mounted three-point linkage: Part 1 Categories 1, 2, 3 & 4 (fourth revision) [IS 4468(Part-I):1997/ISO 730-1:1994 (Reaffirmed in Oct.,2017)] : **Does not conform**
- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in Oct.,2017)] : **Conforms**
- v) Agricultural tractors - Operator's seat technical requirement [IS 12343 –1998 (First revision) (Reaffirmed in 2014)] : **Conforms**
- 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 in Oct.,2017)] : **Conforms**
- vii) Tractors and machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays [IS: 6283 (Part-1 & Part-2) –2006 & 2007 (Reaffirmed in 2014)]/ ISO 3767-2:1991]] : **Does not conform**
- viii) Tractors and machinery for agriculture and forestry – Technical means for ensuring safety Part 2: Tractors (first revision) (IS 12239 (PT-2) 1999) (Reaffirmed in 2014)] : **Does not conform**
- ix) Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) (IS: 8133 – 1983) (Reaffirmed in 2014)] : **Does not conform**
- x) Agricultural Tractor & Machinery Lighting device for travel on public roads [(IS: 14683-1999) (Reaffirmed in 2014)] : **Conforms**

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17.4 Salient Observations:

17.4.1 Laboratory tests:

17.4.1.1 PTO performance test:

- i) The maximum PTO power was recorded as **14.4 kW** against the declaration of **14.5 kW**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit and meet the requirement.
- ii) The specific fuel consumption corresponding to maximum power was recorded as **294 g/kWh** against the declaration of **280 g/kWh**, which is within the tolerance limit of IS: 12207-2019
- iii) The maximum equivalent crankshaft torque was recorded as **89.0 N-m** against the declaration of **110.0 N-m**, which does not meet the requirement of IS: 12207-2019 with regard to tolerance limit. This should be looked into for necessary corrective action.
- iv) The backup torque is **29.9 %** and meets the requirement of IS: 12207-2019
- v) During PTO performance test, some hitting noise was observed from the transmission housing. Leakage of gear oil was also observed from gearbox & differential housing due to manufacturing defect of casting. This should be looked into for necessary corrective action.

17.4.1.2 Drawbar Performance test :

- i) The maximum drawbar pull with ballasted & unballasted condition corresponding to 15 % wheel slip was recorded as **11.78 kN & 9.96 kN** respectively against the declaration of **9.51 kN & 8.25 kN**, which is within the tolerance limit as specified in IS:12207-2019.
- ii) The maximum drawbar power with unballast was recorded as **12.5 kW** against the declaration of **10.87 kW**, which is within the tolerance limit as specified in IS: 12207-2019.
- iii) After completion of drawbar performance test, front tyre lugs were worn out completely. Thereafter, on the request of applicant front tyre of size 6.00-12, 6 PR - 02 Nos. were replaced with new one of same specifications. This should be looked into for necessary corrective action.

17.4.1.3 Hydraulic Performance:

- i) The maximum lifting capacity throughout the range of lift at hitch points and with standard frame was recorded as **9.54 kN & 8.57 kN** respectively against the declaration of **9.80 kN & 5.4 kN** respectively & which meets the requirement of IS: 12207-2019.
- ii) The maximum lifting capacity on standard frame throughout the range of lift was observed as **8.57 kN** and the moment about rear axle was computed as **11.31 kN-m**, which is considered on higher side compared to the moment from front axle i.e. **7.88 kN-m**. It is therefore, recommended that the lifting capacity of the hydraulic system may be reduced suitably or standard ballast mass at front axle may be provided to avoid front lifting of the tractor.
- iii) During Hydraulic performance test, presence of water was found in the hydraulic oil & become sludge. Thereafter, hydraulic oil and oil filter (Part No. P1501080) were replaced with new one of same specifications. This should be looked into for necessary corrective action.

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17.4.1.4 Mechanical vibration:

The amplitude of mechanical vibration on various assemblies marked as (*) in Chapter – 9 of this test report. This calls for dampening down of vibrations especially on foot rest, operator’s seat and steering control wheel to improve the operational comfort and service life of components.

17.4.1.5 Specification of three point linkage:

- i) Distance from end of PTO shaft to centre of lower hitch point
- ii) Transport height and power moment range (without load)
Above said parameters does not meet the requirement of IS: 4468 (Part-1)-1997(Reaffirmed in October 2017). This should be looked into for necessary corrective action.

17.4.1.6 Haulage test:

- i) Distance travelled per litre of fuel consumption was recorded 7.32 to 7.80 km/l against the declaration of 1 to 5 km/l. This should be looked into for necessary corrective action.
- ii) Specific Fuel consumption with two wheel trailer was recorded as 85.4 to 91.1 ml/km/tonne against the declaration of 10 to 50 ml/km/tonne. This does not meet the requirement of IS: 12207-2019 and therefore should be looked into for necessary corrective action.

17.4.1.7 Chassis serial number:

Chassis serial number on tractor and on labelling plate is embossed / punched as “NCW25AG00054/B”. Use of special signs or characters in the chassis number is not permitted as per CMVR. This should be looked into for necessary corrective action.

17.4.1.8 Field performance:

17.4.1.8.1 Dry land operation:

- i) During field test with plough, RHS steering drop arm was broken. Hence this tractor was not meeting the evaluative requirement of IS:12207-2019. This defect has been categorized as **critical defect C-18** as per IS:12207-2019.

Thereafter applicant has submitted letter No. R&D/83/ICT/PREET dated 04.11.2020 and request for “Repeat Test” after replacing RHS steering drop arm (Part No. PG1002015). Same has been examined and accepted by the testing authority as per clause 3.2.3 of IS: 12207- 2019. Thereafter, field test was conducted after replacing RHS steering drop arm of same specification

- ii) Again during field test with plough, fan blade was got bent & cracked and touched to the radiator which has resulted in the leakage of water (coolant) from radiator assembly. The leakage of water (coolant) from the radiator (due to breakage of radiator tubes) has been considered as consequential failure and only the primary defect i.e. bending & cracking of fan blade has been counted as **Major defect Mj-1** as per IS:12207-2019. Thereafter, cooling fan (Part No. PG0103006, 1 No.) and radiator (Part No. PG0103001, 1 No.) were replaced with new one of same specifications.
- iii) Again during field test with plough, it was observed that the 2nd gear was automatically shifting to neutral position. On inspection, teeth of 2nd gear was found broken & also its locking circlip was found misplaced. This defect has been categorized as **Major defect Mj-9** as per IS:12207-2019. Thereafter, 2nd gear (Part No. PG0301018, 1 No.) & circlip (1 No.) were replaced with new one of same specification.
- iv) During field test with rotavator, sensor tube mounting bolt of hydraulic system was got broken. This defect has not been categorized as per IS: 12207-2019. Thereafter, hexagonal bolt (Part No. H002016, 1 No.) was replaced with new one of same specification.

All of the above needs to be looked into for necessary corrective action.

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17.4.1.8.2 Wetland cultivation (Puddling Operation)

The manufacturer has recommended that the tractor is not suitable for wet land cultivation (puddling). Therefore, the fact that the tractor is not suitable for wet land cultivation (puddling) should be mentioned clearly and boldly in all the marketing literature relevant to the product.

17.4.1.9 Maintenance / Service Problems:

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

17.5 Recommendation with regard to safety on tractor:

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

- i) Provision for spark arrester in exhaust system should be provided as per IS-12239 (Part-I) 1996 (reaffirmed in Oct. 2017).
- ii) There should be provision of differential lock IS: 12239 (Part-2) – 1999 (Reaffirmed in 2014).
- iii) Fuel shut-off knob should be remained in stop position as per IS: 8133 -1983 (Reaffirmed in 2014).
- iv) Grease lubricant type & frequency and Oil lubricant type & frequency should be provided on the tractor as per IS: 6283 (Part-1 & 2) – 1998 (Reaffirmed in 2014).
- iv) Safety switch should be provided to avoid accidental start of the tractor as per IS: 8133 -1983 (Reaffirmed in 2014).
- vi) The working clearance between the draft control lever and mudguard was recorded 55 mm against the minimum requirement of 70 mm. It should be as per IS: 12239 (Part-2) – 1999 (Reaffirmed in 2014).

17.6 Adequacy of Literature supplied with machine:

17.6.1 The following literatures were supplied with the test tractor for reference during the test:-

- a) Operator/ Service Manual of Preet 2049/2549 Agritrac 2/4WD Tractor
- b) Spare Parts Catalogue of Preet 2049/2549 Agritrac 2/4WD Tractor
- c) Service Manual of Preet 2549 Agritrac 4WD Tractor

The supplied literature was not found adequate as it does not covers the following information. Therefore, it is recommended that relevant literature may be updated by incorporating the following information:

- i) The lubricant grade & maintenance schedule for transmission, hydraulic, brake & steering system oil given in operator's manual does not match with specification submitted by the applicant.
- ii) Lubricant grade recommended for front axle housing and front final drive has not been mentioned in the operator's & service manual submitted by the applicant.
- iii) List of matching implements, trailers and other farming equipments.

17.6.2 However, these literatures should also be brought out in other vernacular languages of India for guidance of users.

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18. 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	13 Months (March, 2020 to March, 2021)	Yes	Delay due to various breakdown occurred in the field test of tractor & also manufacturer has taken 03 months to resolve the different problems occurred in the tractor during course of testing.

TESTING AUTHORITY:


RAJNEESH PATEL
 AGRICULTURAL ENGINEER


C.V. CHIMOTE
 TEST ENGINEER


P.K. PANDEY
 DIRECTOR

The report compiled by **Smt. Poonam Khurasia**, Senior Technical Assistant

19. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant Comments
19.1	17.4.1.1 (iii), 17.4.1.4, 17.4.1.5 (i) & (ii), 17.4.1.6 (i) & (ii) , 17.4.1.7 & 17.4.1.8.1 (i), (ii),(iii) & (iv)	We will look into for corrective action.

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ANNEXURE-I

BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST

S. No.	Parameters	M.B. Plough	Rotavator
1	Make	Mahindra	Not Available
2	Type	Mounted	Mounted
3	No. of bottom / blades	Two	20 blade on 5 flange
4	Type of bottom / blades	General Purpose	L shape
5	Size of bottom / blades (mm)	190	265 x 65 x 6.5
6	Spacing of bottom /flanges, (mm)	230	200
7	Lower hitch point span, (mm)	670	575
8	Mast height, (mm)	470	920
9	Overall Dimensions (mm):		
	Length	1105	730
	Width	790	1230
	Height	870	930
10	Gross Mass, (Kg)	85	225

ANNEXURE - II

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	10.0
2.	PTO performance test	11.3
3.	Power lift and hydraulic pump performance test	1.7
4.	Drawbar performance test	15.2
5.	Turning ability	0.5
6.	Location of centre of gravity	0.8
7.	Operator's field of vision	Nil
8.	Air cleaner oil pull over	2.5
9.	Mechanical vibration test	0.8
10.	Brake test	1.5
11.	Noise measurement	1.0
12.	Nominal speed test	1.8
B.	FIELD TEST:	
1.	M.B. ploughing	21.2
2.	Rotavation	15.3
C.	HAULAGE TEST:	7.0
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	29.5
TOTAL:		120.1