



## PREET 3549 CHALLENGER 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

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T- 1113/1639/2017

PREET 3549 CHALLENGER TRACTOR - Commercial (Initial)

**Manufacturer**

: M/s. Preet Tractors Pvt. Ltd.  
Post Box No. 28, Patiala Road,  
Nabha (Punjab) - 147 201

**Month:** October

**Test Report No.** T- 1113/1639/2017

**Year :** 2017



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**GOVERNMENT OF INDIA**

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

Test code/Procedure : IS: 5994-1998 (Reaffirmed in 2009)  
IS: 9253-2001 (Reaffirmed in 2012) and IS: 12207-2014.

Period of Test : October, 2016 to September, 2017

Test Report No. : **T- 1113/1639/2017**

Month/Year : **October, 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 submitted by the applicant, for tests.
- iii) The results presented in this report do not in any way attribute to the durability of the machine.
- iv) This report should not be reproduced in part or full without prior permission of the Director, Central Farm Machinery Training and Testing Institute, Budni (M.P.)

### SELECTED CONVERSIONS & ABBREVIATIONS

SELECTED CONVERSIONS			ABBREVIATIONS	
Sl. No	Units	Conversion Factor		
1	<b>Force:</b>		apa	As per applicant
	1 kgf	9.80665 N	TDC	Top Dead Centre
		2.20462 lbf	IS	Indian Standard
2	<b>Power:</b>		LHS/RHS	Left Hand Side/ Right Hand Side
	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
			O.D/I.D	Outer diameter/ Inner diameter
3	<b>Pressure:</b>		N.A.	Not available/ Not applicable
	1 psi	6.895 kPa	PTO	Power take-off
	1 kgf/cm <sup>2</sup>	98.067 kPa = 735.56 mm of Hg	R.H	Relative Humidity
	1 bar	100 kPa = 10 N/cm <sup>2</sup>		
	1 mm of Hg	1.3332 m-bar		



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Manufacturer	:	M/s. Preet Tractors Pvt. Ltd. Post Box No. 28, Patiala Road, Nabha (Punjab) -147 201
Test requested by (applicant)	:	The manufacturer
Selected for test by	:	The manufacturer
Place of running - in	:	At manufacturer's work
Duration of running-in, (h):		
- Engine	:	15.0
- Transmission	:	10.0
<b>Method of Selection:</b>	:	The test sample was submitted directly by the applicant for test. Hence, method of selection is not known.

## 1. SPECIFICATIONS

<b>1.1 Tractor:</b>		
Make	:	PREET
Model	:	3549 CHALLENGER
Variants, if any	:	None
Brand name	:	PREET
Type	:	Four wheeled, rear wheel driven, standard, agricultural Tractor.
Year of manufacture	:	2016
Chassis number	:	02163518345
Country of origin	:	India
<b>1.2 Engine:</b>		
Make	:	PREET
Model	:	3549
Type	:	Four stroke, water cooled, naturally aspirated, direct injection, diesel engine
Engine Serial number	:	P335-06062
<b>1.2.1 Engine speed (Manufacturer's recommended production setting), (rpm):</b>		
- Maximum speed at no load	:	2250 to 2350
- Low idle speed	:	550 to 650
- Speed at max. torque	:	1200 to 1400
<b>Rated speed, (rpm):</b>		
- For PTO use	:	2100
- For drawbar use	:	2100
<b>1.3 Cylinder &amp; Cylinder Head:</b>		
Number	:	Three
Disposition	:	Vertical, inline
Bore/stroke, (mm)	:	100/118 (apa)
Capacity as specified by the applicant, (cc)	:	2781
Compression ratio	:	18.2 (±1) : 1 (apa)
Type of cylinder head	:	Individual
Type of cylinder liners	:	Wet, replaceable
Type of combustion chamber	:	Re-entrant cavity on piston crown
Arrangement of valves	:	Overhead, Inline
<b>Valve clearance, (cold/hot):</b>	:	
- Inlet valve, (mm)	:	0.30/0.30
- Exhaust valve, (mm)	:	0.40/0.40



<b>1.4</b>	<b>Fuel System:</b>		
	Type of fuel feed system	:	Gravity and force feed
<b>1.4.1</b>	<b>Fuel tank:</b>		
	Capacity, (l)	:	65.0
	Location	:	Above clutch housing
	Provision for draining of sediments/ water	:	Not provided
	Material of fuel tank	:	Metallic
<b>1.4.2</b>	<b>Water separator:</b>		
	Make	:	SE (Setya Enterprises)
	Type	:	Gravity separation, Inverted funnel type
	Location	:	Mounted on LHS of engine in between fuel tank and fuel feed pump.
	Capacity, (l)	:	0.40
<b>1.4.3</b>	<b>Fuel feed pump :</b>		
	Make	:	Bosch, India
	Model/Group combination No.	:	FP/KE 22AD48/2, 9 440 030 011
	Type	:	Plunger with hand primer
	Provision of sediment bowl	:	Provided (metallic)
	Method of drive	:	Through camshaft of fuel injection pump
<b>1.4.4</b>	<b>Fuel filters:</b>		
	Make	:	Bosch, India
	Model/Group combination No.	:	9 450 030 118
	Number	:	Two
	<b>Type of elements:</b>		
	- Primary	:	Cloth
	- Secondary	:	Paper
	Capacity of final stage filter, (l)	:	0.45
<b>1.4.5</b>	<b>Injection pump:</b>		
	Make	:	Bosch, India
	Model/Group combination No.	:	F002AOZ851, PES3A90D320RS3500
	Type	:	Inline, plunger
	Serial number	:	46070684
	Method of drive	:	Through timing gears
<b>1.4.5</b>	<b>Fuel injectors:</b>		
	Make	:	Bosch, India
	Nozzle holder number	:	F002 C70 552
	Nozzle number	:	DSLA 148P 5566
	Type	:	Multi hole (Five holes)
	Manufacturer's production pressure setting, (MPa)	:	25 ± 0.8
	Injection timing	:	12 ± 1 degree before TDC
	Firing order	:	1- 3 - 2
<b>1.4.6</b>	<b>Governor:</b>		
	Make	:	Bosch, India
	Model/Group combination No.	:	RSV 300 ... 1050A5C1518R
	Type	:	Mechanical, Centrifugal, Variable speed
	Governed range of engine speed, (rpm)	:	550 to 2350
	Rated engine speed, (rpm)	:	2100

**1.5 Air Intake System:**

**1.5.1 Pre-cleaner** : Not provided

**1.5.2 Air cleaner:**

Make : LUMAN  
 Type : Dry Type  
 Location : In front of radiator, under the bonnet.  
 Range of suction pressure at maximum power, (kPa) : 2.80

**Details of element :**

	<u>Primary element</u>	<u>Secondary element</u>
- Size (OD/ID)	126.6/85.1	78.5/61.2
- Length, (mm)	310	294.1
- Type	Paper	Fabric
- No of element	One	One
Air flow restriction indicator	: Provided on the dashboard	
Dust Unloading valve	: Provided	
Service maintenance schedule	:	

- i) Clean primary element after every 300 hours of operation or when Air flow restriction indicator glow on dashboard.
- ii) Replace primary element after three times cleaning or 900 hours of operation (Whichever earlier).

**1.6 Exhaust System:**

Type of silencer : Updraft, (Cylindrical)  
 Position of silencer outlet with respect to SIP, (mm):  
 - Vertical : 920  
 - Longitudinal : 1510  
 - Lateral : 465 (on RHS)  
 Range of exhaust gas pressure at maximum power, (kPa) : 6.40 to 6.53  
 Provision of spark arresting device : None  
 Provision against entry of rain water : A bend is provided on the outlet of silencer

**1.7 Lubricating system:**

Type : Force feed-cum-splash  
 Oil sump capacity, (l) : 7.0  
 Total lub oil capacity, (l) : 8.2  
 Oil change period : Change after every 250 hours of operation.  
 Cooling device, (if any) : Not provided

**1.7.1 Filters:**

Type : Full flow Spin-on, Paper element  
 Number : One

**1.7.2 Pump:**

Type : Gear  
 Method of drive : Through timing gear  
 Pressure release setting, (kPa) : 441 - 490 (aps)  
 Minimum permissible pressure, (kPa) : 98

**1.8 Cooling system:**

Type : Forced circulation of coolant

**1.8.1 Details of Pump**

: Centrifugal, semi open impeller of 90 mm dia. having 12 vanes, and driven through crankshaft pulley by a cogged 'V' belt in common with alternator.



- 1.8.2** Details of fan : Suction type, having six metallic blades of 382 mm diameter and mounted on water pump shaft.
- Means of temperature control : Thermostat  
 Bare radiator capacity, ( l ) : 2.5  
 Coolant expansion tank capacity, (l) : 1.0  
 Total coolant capacity, ( l ) : 8.0  
 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 : AMARON & FR800D13R  
 Number : One  
 Type : Lead acid  
 Capacity and rating : 12V, 75 Ah at 20 hours discharge rate  
 Location : On RHS of clutch housing in a separate metallic box.
- 1.10.2 Starter:**  
 Make : Panalfa  
 Model : Not available  
 Type : Pre-engaging, solenoid operated  
 Power rating : 12 V, 2.7 kW  
 Serial number : PT038-1516
- 1.10.3 Generator:**  
 Make : Panalfa  
 Model : Not provided  
 Type : Alternator  
 Serial number : PT051-1216-A  
 Output rating : 12V, 42 A  
 Method of drive : Through crankshaft pulley by a cogged 'V' belt common to water pump.
- 1.10.4 Voltage regulator** : In-built in 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)
1	2	3	4	5
<b>Front Lights:</b>				
- Head lights	2, 12V, 60/55W	1130	100 x 160	710
- Parking lights	2, 12V, 5W	1270	65 x 65	180
- Turn Indicator-cum-Hazard warning lights	2, 12V, 21W	1270	70 x 65	110
- Reflectors	2	1270	30 x 55	230
<b>Rear lights:</b>				
- Brake light-cum-Tail light	2, 12V, 21/5 W	1255	65 x 65	185





1	2	3	4	5
-Turn indicator-cum-Hazard warning lights	2, 12V, 21 W	1255	70 x 65	120
- Plough light (on RHS)	1, 12V, 55 W	1345	75 x 125	350
- Reflectors	2, Red	1255	30 x 55	230
- Registration plate light (RHS)	Part of tail lamp in rear Parking Light			

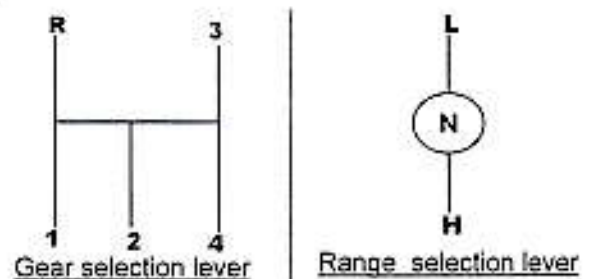
- 1.10.6 Main switch** : Key turn type, having three position viz:  
i) OFF  
ii) Circuit ON  
iii) START
- 1.10.7 Horn:**  
Make : Minda  
Type : 2B, Electromagnetically vibrated diaphragm  
Location : In front of radiator, under the bonnet
- 1.10.8 Light switch** : Rotary type having six positions viz.  
i) OFF  
ii) Parking light + Dash board light 'ON'  
iii) Head lights (long beam) + (ii)  
iv) Head lights (short beam) +(ii)  
v) Turn Indicator switch  
vi) Horn push button
- 1.10.9 Fuse box** : Contains 6 fuses of 15 A capacities each.
- 1.10.10 Details of other electrical accessories:**
- 1.10.10.1 Flasher Unit:**  
Make : Electronic flasher  
Capacity:  
- Turn signal : 12V, 21W x 2 + 2W x 1  
- Hazard signal : 12V, 21W x 4 + 2W x 2  
Flashes/min. : 85
- 1.10.10.2 Starting Safety switch** : Not provided
- 1.10.10.3 Seven pin trailer socket** : Provided
- 1.11 Instrument panel details:**
- Engine speed-cum-cumulative analog type run hour meter.
  - Coolant temperature gauge (with colour zones)
  - Lubricating oil pressure gauge
  - Fuel level gauge (with colour zones)
  - Volt meter
  - Main switch (key turn type)
  - Light switch (Rotary type)
  - Hazard warning light switch
  - Turn indicator light switch (Two-way)
  - Head light long beam on indicator
  - Battery charging warning indicator lamp
  - Horn push button
  - Hand throttle lever
  - Steering control wheel
  - Fuel shut off knob
  - Back view mirror
  - Mobile charging socket

**1.12 Transmission System:****1.12.1 Clutch:**

- Make : Luk ,India  
 Type : Dual, dry friction plates & pads  
 No. of friction plate(s) : Two  
 Size, (OD/ID),(mm):  
 - Transmission : 278.9/168.4  $\phi$  (26.6 cm<sup>2</sup> contact area of each pad having 04 pads)  
 - PTO : 277.1/167.7  $\phi$  (26.7 cm<sup>2</sup> contact area of each pad having 04 pads)  
 Material of clutch lining : Ceramic  
**Method of operation:**  
 Transmission : By depressing a pedal on LHS, halfway  
 PTO : By depressing the same clutch pedal fully.

**1.12.2 Gear box:**

- Make : PREET  
 Type : Mechanical, Sliding mesh with epicyclic high-low reduction unit  
**No. of speeds:**  
 - Forward : 08  
 - Reverse : 02  
**Gear shifting pattern** :

**Location of gear shifting lever:**

- Main gear shifting lever : In front of the operator's seat.  
 - High/Low range shifting lever : In front of the operator's seat.

Oil changing period : Change after every 1600 hours of operation.

**1.12.3 Nominal Speed:**

Movement	Gear No.	No. of engine revolutions for one revolution of driving wheel	Nominal speed at rated engine speed when fitted with 13.6 - 28 size tyres of 610 mm radius index, (kmph)
1	2	3	4
Forward	L-1	201.22	2.40
	L-2	153.17	3.15
	L-3	98.89	4.88
	L-4	62.47	7.73
	H-1	51.04	9.46
	H-2	38.76	12.46
	H-3	25.03	19.28
	H-4	15.87	30.43
Reverse	LR	143.84	3.36
	HR	36.51	13.25



- 1.12.4 Differential unit:**
- Type : Crown wheel and bevel pinion with differential unit, accommodated inside the differential housing.
- Reduction through crown wheel and bevel pinion : 3.231: 1 (42/13 T)
- Oil capacity of differential unit, (l) : 50.0 (Common to gear box ,final drive & hydraulic system)
- Oil changing period : Change after every 1600 hours of operation.
- Differential lock :** : **Not provided**
- 1.12.5 Rear axle & final drive:**
- Type : Bull gear & pinion type accommodated inside differential housing.
- Reduction through final drive : 4.909 : 1 (54/11T)
- Oil capacity of final drive, (l) : 50.0 (Common to gear box ,differential unit & hydraulic system)
- Oil changing period : Change after every 1600 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 : A knob is provided on distributor when fully closed position act as a transport lock.
- 1.13.1 Hydraulic pump:**
- Make : United
- Type : External gear
- Location & drive : On RHS of engine & through timing gears
- No. & Type of filter : One, full flow, paper element and one strainer in suction line.
- Hydraulic oil capacity, (l) : 50.0 (Common to gear box ,differential unit & final drive)
- Oil change period : Change after every 1600 hours of operation.
- Provision for external tapping : Not provided
- Details of control levers : i) Position control lever (Black)  
ii) Draft control lever (Red)  
iii) Response control knob (Black)
- Method of draft sensing : Through top link

**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
1	2	3	4	5
<b>I.</b>	<b>Upper hitch points:</b>			
a)	Dia of hitch pin hole	19.30 to 19.50 / 25.70 to 25.90	25.74	Conforms to Cat.II
b)	Width of ball	44.0 (max.) / 51.0 (max)	51.0	Conforms to Cat.II
<b>II.</b>	<b>Lower hitch points:</b>			
a)	Dia of hitch pin hole	22.40 to 22.65 / 28.70 to 29.00	29.0	Conforms to Cat.II
b)	Width of ball	34.80 to 35.00 / 44.80 to 45.00	44.88	Conforms to Cat.II



1	2	3	4	5
III.	Lateral distance from lower hitch point to centre line of tractor	359 / 435	364	Does not conform
IV.	Lateral movement of lower hitch points.	100 (min) / 125 (min)	220	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	515	Conforms to Cat. I
VI.	Transport height	820 (min)/ 950 (min)	810	Does not conform
VII.	Power range (without load)	560 (min)/ 650 (min)	575	Conforms to Cat. I
VIII.	Leveling adjustment	100 (min)/ 100 (min)	230	Conforms to Cat. I
IX.	Lower hitch point tyre clearance	100 (min)/ 100 (min)	225	Conforms to Cat. I & II
X.	Lower hitch point height	200 (max) / 200 (max)	200	Conforms to Cat. I & II

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

The following are dimensions observed, corresponding to 610 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	780	780
2.	Length of lift arm	B	245	245
3.	Length of lift rods	C	660 to 700	685
4.	Length of top link	D	525 to 720	525
5.	Distance of lift rod connection point from pivot point of lower link	E	385 & 450	450
6.	Distance of lower link pivot point from rear wheel axis:			
	-Horizontally	F	95, behind	95, behind
	-Vertically	G	155, below	155, below
7.	Distance of upper link pivot point from rear wheel axis:			
	-Horizontally	H	350, behind	350, behind
	-Vertically	J	255, 285 & 315 above	285, above
8.	Distance of lift arm pivot point from rear wheel axis:			
	-Horizontally	K	80, forward	80, forward
	-Vertically	L	360, above	360, above
9.	Height of lower hitch points relative to the rear wheel axis:			
	- In high position	M	110 to 200	165
	- In low position	N	- 570 to - 340	410
10.	Height of lower link hitch points when locked in transport position		165	

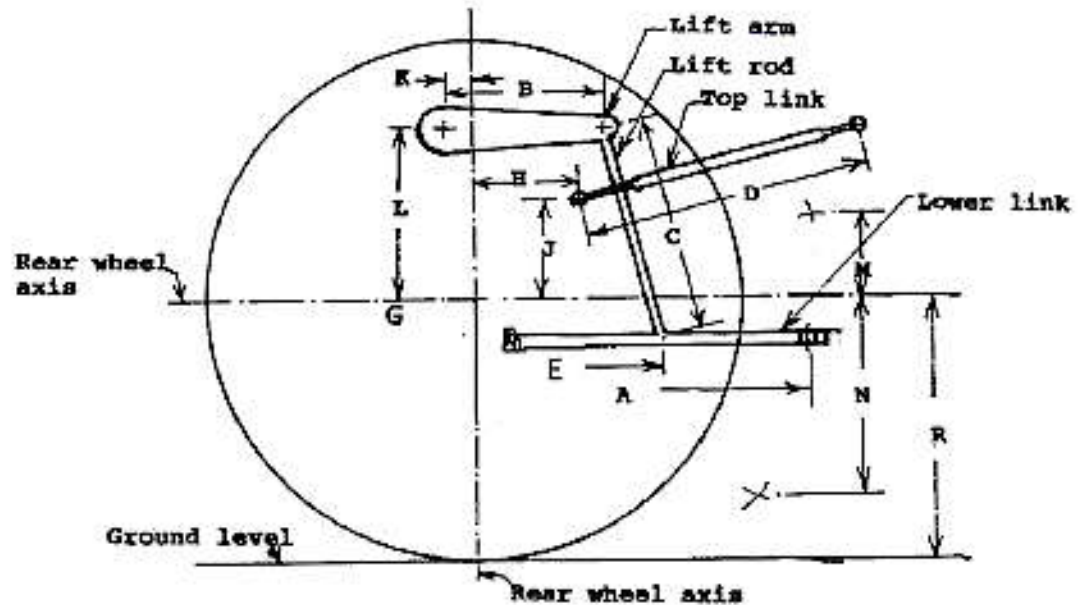
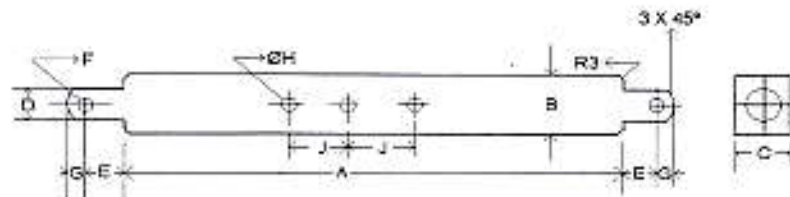


Fig.1 (a): DIMENSIONAL NOTATIONS FOR TABLE OF LINKAGE GEOMETRY

1.13.4 Drawbar:

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

Notation	As per IS: 12953-1995 (Cat. I) / (Cat. II), (mm)	As measured, (mm)	Remarks
1	2	3	4
A	683 ± 1.5 / 825 ± 1.5	683	Conforms to Cat-I
B	75 (min) / 75 (min)	74.14	Conforms to Cat-I & II
C	30 (min) / 30 (min)	29.27	Conforms to Cat-I & II
D $\varnothing$	21.79 to 22.00 / 27.79 to 28.00	27.94	Conforms to Cat-II
E	39.0 (min) / 49.0 (min)	54.50	Conforms to Cat-I & II
F $\varnothing$	12.0 (min) / 12.0 (min)	12.23	Conforms to Cat-I & II
G	15.0 (min) / 15.0 (min)	16.70	Conforms to Cat-I & II
H $\varnothing$	25 ± 1 / 25 ± 1	25.29	Conforms to Cat-I & II
J	80 ± 1.5 / 80 ± 1.5	80.0	Conforms to Cat-I & II
No. of holes	7 / 9	7	Conforms to Cat-I



1(b): DIMENSIONAL NOTATIONS FOR LINKAGE DRAWBAR

1.13.4.2 Swinging drawbar : Not provided

1.13.4.3 Provision for coupling of trailer brakes : Not provided



## 1.14 Power take-off shaft:

Type	: Type-I, Independent
Method of engaging	: By a hand lever provided on LHS of operator's seat.
No. of shaft(s)	: One
PTO speed corresponding to rated engine speed, (rpm)	: 643
Distance behind rear axle, (mm)	: 360
Engine to PTO speed ratio	: 3.267:1
Whether the PTO shaft is capable of transmitting full power of the engine.	: Yes
Other speeds, if any	: None

## 1.14.1 Specifications of Power Take-Off Shaft: -

Specification	As per IS:4931-1995 (Type-I)	As observed	Remarks
1	2	3	4
Nominal speed, (rpm)	540 ± 10	540 (540 rpm of PTO shaft corresponding to 1764 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 50mm to right or left of the centre line of the tractor	8.0 mm LHS from center line of tractor	Conforms
<b>Dimensions, (mm) (See Fig. 2):</b>			
D <sub>o</sub>	34.79 ± 0.06	34.85	Conforms
d <sub>o</sub>	28.91 ± 0.05	29.10	<b>Does not conform</b>
E <sub>o</sub>	29.4 ± 0.1	29.50	Conforms
A <sub>o</sub>	8.3 ± 0.1	8.40	Conforms
W	8.69 - 0.09 - 0.16	8.57	Conforms
a	07	07	Conforms
b	25 ± 0.5	25.0	Conforms
c	38	38	Conforms
X	30°	30°	Conforms
B	76 (min)	79.5	Conforms
h	450 to 675	615	Conforms

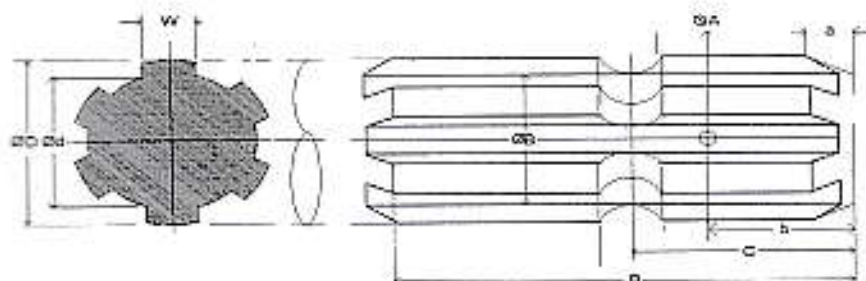


Fig. 2: DIMENSIONAL NOTATIONS FOR TYPE-I POWER TAKE-OFF SHAFT



<b>1.14.2</b>	<b>Power Take-off Master Shield</b>	: Not provided
<b>1.15</b>	<b>Towing hitch:</b>	
<b>1.15.1</b>	<b>Front:</b>	
	Type	: Clevis
	Location	: At the front of engine supports.
	Height above ground level,(mm)	: 660
	Type of adjustment	: None
	Width of clevis,(mm)	: 66.6
	Diameter of pin hole	: 29.0
<b>1.15.2</b>	<b>Rear:</b>	
	Type	: Clevis
	Location	: At the rear of transmission housing
	Height above ground level, (mm):	
	- Maximum	: 650
	- Minimum	: 500
	- No. of positions	: 03
	Type of adjustment	: By changing the hitch position and reversing it on the mounting bracket.
	<b>Distance of hitch point,(mm):</b>	
	- From rear axle centre	: 475
	- From power take-off shaft end	: 115
	Dia of pin hole, (mm)	: 40.75
	Width of clevis, (mm)	: 78.0
<b>1.16</b>	<b>Steering:</b>	
	Make of distributor	: ZF
	Type	: Mechanical with single drop arm, Worm & roller type
	Location	: Above Clutch housing
	Method of operation	: Manual, by steering control wheel
	Diameter of steering control wheel, (mm)	: 430
	Lubricant capacity, (litre)	: 0.40
	Lubricant change period	: Not specified by the applicant
<b>1.17</b>	<b>Brakes:</b>	
<b>1.17.1</b>	<b>Service Brake:</b>	
	Make	: Not Specified
	Type	: Mechanical, dry disc brakes
	Location	: On half axle shaft outside the differential housing,
	No. of friction disc	: 02 (on each side)
	Area of liners, (cm <sup>2</sup> )	: 737.4 (on each side)
	Material of liners	: Not Specified
	Method of operation	: Independent/combined pedal operation by right foot.
<b>1.17.2</b>	<b>Parking Brake:</b>	
	Type	: Pawl and ratchet arrangement to lock service brake in position.
	Location & Method of operation	: Service brake acts as 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:**

Make	:	Good Year
Number	:	Two
Type of tyre	:	Pneumatic, ribbed
Size	:	6.00-16
Ply rating	:	08
Maximum permissible loading capacity of each tyre at 450 kPa pressure, (kgf)	:	675
<b>Recommended inflation pressure, (kPa) :</b>		
- for field work	:	235
- for transport	:	235
Track width, (mm)	:	1320 (std.) & 1560
Method of changing track width	:	By reversing the wheel discs
Make & size of wheel rim	:	SSWL & 4.5Ex16

**1.18.2 Driving wheel:**

Make	:	Good Year
Number	:	Two
Type of tyre	:	Pneumatic, traction
Size	:	13.6-28
Ply rating	:	12
Maximum permissible loading capacity of each tyre at 230 kPa pressure, (kgf)	:	1800
<b>Recommended inflation pressure, (kPa) :</b>		
- for field work	:	93
- for transport	:	140
Track width, (mm)	:	1375(Std.), 1405, 1515, 1605, 1725, 1745 & 1865
Method of changing track width	:	By reversing the wheel disc and changing the position of wheel disc on off-set rim lugs.
Make & Size of wheel rim	:	CWPL, W12x28

<b>1.18.3 Wheel base, (mm)</b>	:	2085
Method of changing wheel base, if any and range	:	None

**1.19 Operator's seat :**

Make	:	Sukata (apa)
Type	:	Cushioned
Type of suspension	:	Two helical coil springs.
Type of dampening	:	Hydraulic shock absorber.
<b>Range of adjustment,(mm):</b>		
- Vertical (back rest)	:	Nil
- Lateral	:	Nil
- Longitudinal	:	± 80

**1.20 Provision for safety and comfort of operator :**

- 1.20.1 Operator's Seat: Conformity with IS: 12343-1998: (Re-affirmed in March, 2009).**  
The operator's seat meet the minimum requirements of IS: 12343-1998, (Re-affirmed in March,2009),except the following:
- Inclination of seat towards the rear direction.





- 1.20.2 Conformity with IS: 6283 (Part-1) – 2006 (Reaffirmed in March, 2009) & IS:6283 (Part-2) – 2007 (Reaffirmed in March, 2009):**  
Controls are identifiable with symbols as per IS: 6283 (Part-1 & 2)-1998, **except the following:**
- Oil, grease lubrication type and its frequency is not mentioned.
  - Differential lock has not been provided.
- 1.20.3 Conformity with IS:8133-1983 (Re-affirmed in March, 2009):**  
Location and movement of various controls meet the requirement of IS: 8133-1983, **except the following:**
- The fuel shut off lever does not remain in 'STOP' position without sustained manual effort.
  - Differential lock
- 1.20.4 Conformity with IS: 12239 (Part-1)-1996 (Re-affirmed in February, 2012):**  
Meets the requirements of IS:12239 (Part-1)-1996, **except the following:**
- Provision of spark arresting device in the exhaust system is not provided.
  - Width of foot step is 185 mm against the minimum requirement of 200 mm.
- 1.20.5 Conformity with IS:12239 (Part-2)-1999 (Re-affirmed in March, 2009):**  
Meets the requirements of IS:12239 (Part-2)-1999, **except the following:**
- Working clearance between draft control lever and position control lever is less than 70mm.
  - PTO master shield has not been provided.
  - The provision of track guards not higher than the circumference of the wheel.
- 1.20.6 Conformity with IS:4468 (Part-1)-1997:**  
Meets the requirements of IS:4468 (Part-1)-1997, **except the following:**
- Lateral distance from lower hitch point to center line of tractor.
- 1.20.7 Conformity with IS:4931-1995:**  
Meets the requirements of IS:4931-1995, **except the following:**
- The dimension "dc".
- 1.20.8 Conformity with IS: 14683 – 1999 (Re-affirmed in March, 2009) :**  
All lighting arrangements meet the requirements of IS: 14683-1999.
- 1.20.9 Rear view mirror:**  
Rear view mirror has been provided.
- 1.20.10 Slow moving emblem:**  
Slow moving emblem has been provided.
- 1.21 Labelling of tractor as per IS: 10273-1987 (Reaffirmed in March, 2009):**  
**Location of labelling plate:-** The labelling plate is riveted on LHS at gearbox housing and provides the following information:

<b>Name of Manufacturer</b>	:	<b>PREET TRACTORS PRIVATE LIMITED PATIALA ROAD, NABHA (Pb) INDIA</b>
<b>Make</b>	:	<b>PREET</b>
<b>Model</b>	:	<b>3549 CHALLENGER</b>
<b>Engine serial number</b>	:	<b>P335 - 06062</b>
<b>Chassis serial number</b>	:	<b>02163518345</b>
<b>Year of manufacture</b>	:	<b>February, 2016</b>
<b>Max. P.T.O Power, kW (hp)</b>	:	<b>23.2 (31.11)</b>
<b>Specific Fuel Consumption, kg/kWh (kg/hph)</b>	:	<b>0.280(0.206)</b>

**1.22 Ballast Mass (kg) :**

Particular		As used during drawbar test	As used during dry land field test	As used during road/haulage test
Front	C.I. weight	170	170	170
	Water	Nil	Nil	Nil
Rear	C.I. weight	280	280	280
	Water	200	200	Nil
	Additional weight	Nil	Nil	Nil

**1.23 Masses:**

Particulars		Mass of the tractor without operator but with all the liquid reservoirs full, (kg)		
		Front	Rear	Total
i)	Standard ballast	725	1200	1925
ii)	With ballast as used during drawbar performance test	950*	1625	2575
iii)	With ballast as used during field test (ploughing)	950*	1625	2575
iv)	With ballast as used during haulage test	950*	1455	2360

\* The difference in weight is due to weight transfer.

**1.24 Overall dimensions:**

Condition	Length, (mm)	Width, (mm)	Height, (mm)		Ground Clearance, (mm)
			With exhaust pipe	Without exhaust pipe	
Without ballast	3690	1750	2220	1675 (steering wheel)	395 (below differential housing)

**1.25 Number of external lubricating points:**

- Oiling : Nil
- Grease nipples : 16
- Grease cups : 02

**1.26 Colour of tractor:**

- Chassis & engine : Blue
- Bonnet & Mudguard : Blue
- Rim and disc : White

**1.27 Optional features, if any : None****2. FUEL AND LUBRICANTS**

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

**2.2 Lubricants:**

S. No.	Particulars	As recommended by the manufacturer	As used during the test
1.	Engine oil	SAE 20W40	SAE 20W40
2.	Transmission & hydraulic system oil	Unitrac (Valvoline)	Oil originally filled in the systems were not changed.
3.	Grease	MP Grease - 3	MP Grease - 3

## 3. PTO PERFORMANCE TEST

Date(s) of test : 09.12.2016 & 13.12.2016  
 Tractor run at the Institute prior to start of : 6.65  
 PTO test (h)  
 Type of dynamometer bench : Eddy Current, Fuchino ESF-1000S

3.1 Thereafter, PTO performance test was conducted & the results of Power take-off performance are tabulated in Table-1 and graphically represented in Fig. 3, 4 & 5.

Table – 1

Power, (kW)	Speed (rpm)		Fuel consumption			Specific energy (kWh/l)
	PTO	Engine	(l/h)	(kg/h)	Specific, (kg/ kWh)	
1	2	3	4	5	6	7
<b>a) Maximum power – 2 hours test:</b>						
21.6	628	2052	7.32	6.12	0.283	2.95
21.0	643	2100	7.25	6.06	0.289	2.90*
<b>b) Power at rated engine speed (2100 rpm):</b>						
21.5	643	2100	7.42	6.20	0.288	2.90
21.0	643	2100	7.25	6.06	0.289	2.90*
<b>c) Power at standard power take-off speed (540 ± 10 rpm):</b>						
20.6	540	1764	6.48	5.42	0.263	3.18
19.7	540	1764	6.33	5.29	0.269	3.11*
<b>Varying loads at rated engine speed:</b>						
<b>i) Torque corresponding to maximum power available at rated engine speed:</b>						
21.5	643	2100	7.42	6.20	0.288	2.90
<b>ii) 85% of the torque obtained in (i):</b>						
19.1	671	2192	6.96	5.82	0.305	2.74
<b>iii) 75% of the torque obtained in (i) :</b>						
14.4	676	2208	5.83	4.87	0.338	2.47
<b>iv) 50% of the torque obtained in (ii):</b>						
9.7	681	2225	4.74	3.96	0.408	2.05
<b>v) 25% of the torque obtained in (ii):</b>						
4.9	686	2241	3.77	3.15	0.643	1.30
<b>vi) Unloaded:</b>						
0.0	689	2251	2.93	2.45	NR	NR
<b>e) Varying loads at Standard PTO Speed:</b>						
<b>i) Torque corresponding to maximum power available at standard PTO speed (540 ± 10 rpm):</b>						
20.6	540	1764	6.48	5.42	0.263	3.18
<b>ii) 85% of the torque obtained in (i):</b>						
18.4	566	1849	6.0	5.02	0.273	3.07
<b>iii) 75% of the torque obtained in (ii):</b>						
14.0	572	1869	4.93	4.12	0.294	2.84
<b>iv) 50% of the torque obtained in (ii):</b>						
9.4	577	1885	3.90	3.26	0.347	2.41
<b>v) 25% of the torque obtained in (ii):</b>						
4.8	583	1905	2.98	2.49	0.519	1.61
<b>vi) Unloaded:</b>						
0.0	590	1928	2.15	1.80	NR	NR

\*Under High ambient conditions

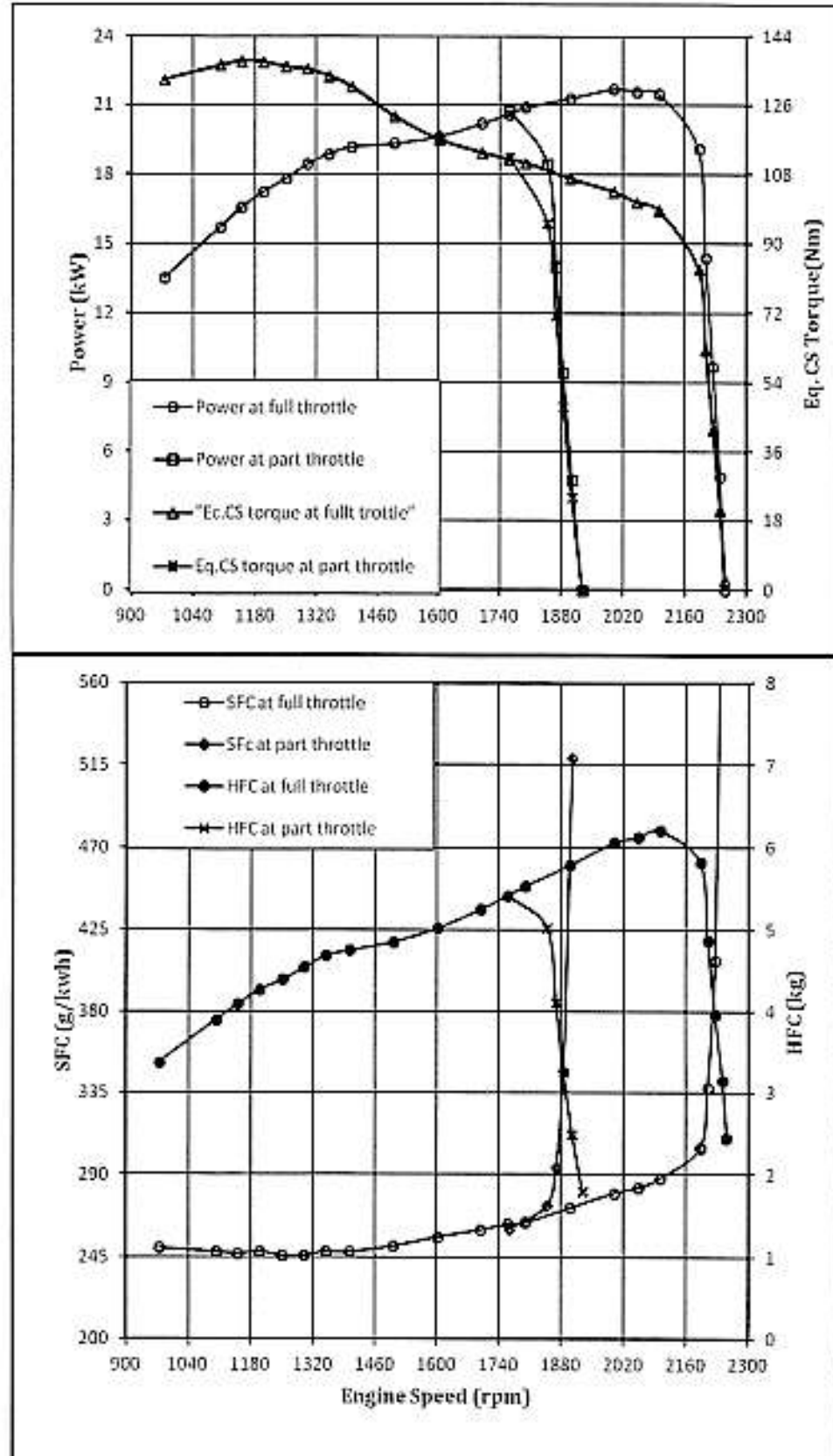


Fig.3: PTO PERFORMNACE CHARACTERISTICS (NATURAL AMBIENT)

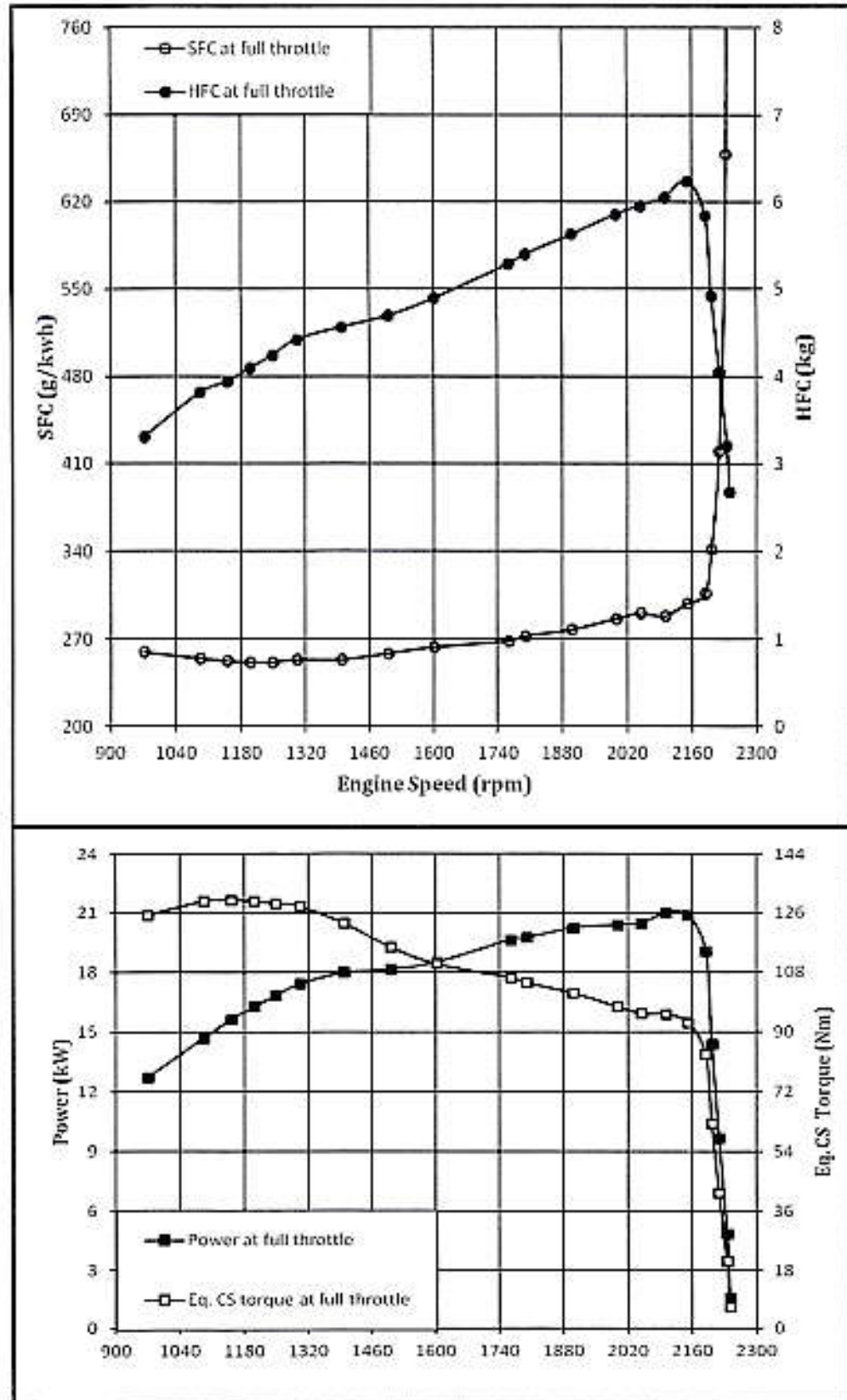


Fig.4: PTO PERFORMANCE CHARACTERISTICS (HIGH AMBIENT)

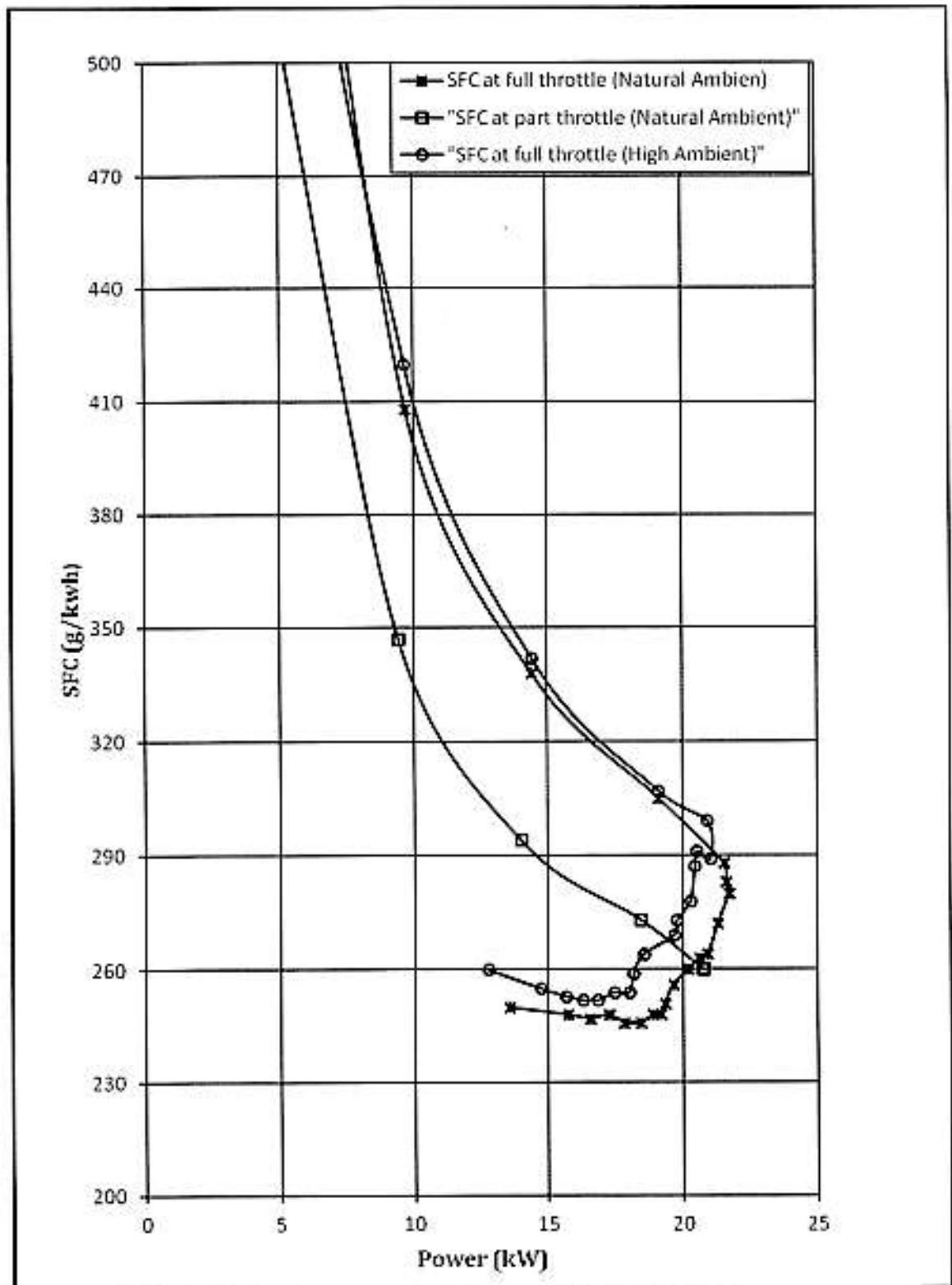


Fig.5: PTO PERFORMANCE CHARACTERISTICS



	<u>Natural ambient</u>	<u>High ambient</u>
-No load maximum engine speed, (rpm) :	2251	2241
-Equivalent crankshaft torque at maximum power,(Nm ) :	100.63	95.48
-Maximum equivalent crankshaft torque, (Nm) :	137.51	129.88
-Engine speed at maximum equivalent crankshaft torque, (rpm) :	1150	1150
Backup torque, (%) :	36.65	36.03
Smoke level (maximum light absorption coefficient, per meter) :	0.09	-
<b>- Range of atmospheric conditions:</b>		
Temperature, ( °C) :	27 to 31	41 to 44
Pressure, (kPa) :	99.03 to 99.46	100.00 to 100.60
Relative humidity, (%) :	6 to 21	3 to 28
<b>-Maximum temperatures, (°C):</b>		
Engine oil :	102	113
Coolant (Water) :	85	96
Fuel :	46	60
Air intake :	52	67
Exhaust gas :	518	517
<b>-Pressure at maximum power:</b>		
Intake air, (kPa) :	2.80	2.93
Exhaust gas, (kPa) :	6.40 to 6.53	7.60 to 7.73
<b>-Consumptions:</b>		
Lub oil, (g/kWh) :	--	0.95
Coolant (% of total coolant capacity) :	--	0.63

#### 4. DRAWBAR PERFORMANCE TEST

Date(s) of test :	25.05.2017 , 27.05.2017 & 28.05.2017
Tractor run at the Institute prior to start of drawbar test, (h) :	28.55
Type of track :	Concrete
<b>Height of drawbar, (mm):</b>	
- Without ballast :	600
- With ballast :	560

- 4.1 The results of drawbar performance test consisting of maximum power and pull without ballast / with ballast and ten hours test are tabulated in **Table – 2** The results of the tests with ballast, are also represented graphically in **Fig. 6 & 7**.



Table - 2

## DRAWBAR PERFORMANCE TEST

Gear	Travel Speed, (Km/h)	Draw-bar power, (KW)	Draw-bar pull, (kN)	Engine Speed (rpm)	Wheel Slip, (%)	Fuel consumption (kg/kWh)	Specific Energy, (kWh/l)	Atmospheric conditions			Temperature (°C)				Max. sustained pull, (kN)
								Temp (°C)	Pressure (kPa)	R. H. (%)	Fuel	Trans oil	Coolant (Water)	Engine oil	
1	2	3	4	5	6	7	8	10	11	12	13	14	15	16	17
<b>i) Maximum power test (Tractor Unballasted):</b>															
L-1	2.30	9.1	14.18	2280	15.4	0.51	5.58	35	98.0	33	46	81	80	98	16.06
L-2	2.99	12.0	14.37	2259	15.4	0.43	6.12	35	98.0	34	45	80	81	100	15.52
L-3	4.42	16.5	13.46	2100	13.2	0.36	7.11	34	98.1	35	43	78	85	100	15.00
L-4	7.24	18.6	9.25	2054	8.2	0.31	6.96	33	98.1	36	41	75	85	100	11.27
H-1	9.13	19.3	7.59	2100	7.5	0.32	7.32	32	98.1	36	39	63	82	97	9.59
<b>ii) Maximum power test (Tractor ballasted):</b>															
L-1	2.20	11.4	18.70	2240	15.1	0.431	5.88	37	97.8	38	46	81	82	100	20.55
L-2	2.88	15.2	18.97	2226	14.8	0.391	7.11	36	97.9	46	45	81	82	100	20.54
L-3	4.49	17.2	13.77	2102	9.2	0.346	7.12	34	97.9	41	43	80	86	102	18.37
L-4	7.33	17.9	8.77	2100	6.3	0.338	7.24	33	97.9	44	40	75	84	99	12.19
H-1	9.19	18.5	7.24	2101	4.1	0.346	7.66	29	97.9	44	36	56	80	92	9.85





Contd. Table-2

Gear	Travel Speed, (km/h)	Draw-bar power, (kW)	Draw-bar pull, (kN)	Engine Speed, (rpm)	Wheel Slip, (%)	Fuel consumption		Specific Energy, (kWh/l)	Atmospheric conditions			Temperature (°C)			Max. sustained pull, (kN)	
						(kg/kWh)	(l/h)		Temp (°C)	Pressure (kPa)	R.H. (%)	Fuel	Trans. oil	Coolant (Water)		Eng. ing oil
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<b>iii) Five hours test at 75 percent of pull obtained at max. Power (ballasted wheeled tractor):</b>																
L-3	4.90	14.06	10.33	2227	6.29	0.390	6.68	2.10	27 to 32	97.9 to 98.1	44 to 51	34 to 40	39 to 81	78 to 80	82 to 99	-
<b>iv) Five hours test at pull corresponding to 15 percent wheel slip (ballasted wheeled tractor):</b>																
L-2	2.85	15.0	18.97	2241	--	0.396	7.26	2.07	32 to 3/8	97.5 to 98.0	42 to 49	40 to 46	83 to 88	83 to 90	102 to 107	--

i) The coolant and lub. oil consumption during 10 hours test were observed as 5 ml/h and Nil respectively.

ii) Tyre Creeping, (mm):

-LHS : Nil

-RHS : 25

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

Engine oil : 103

Coolant : 90

Transmission oil : 83

Fuel : 46

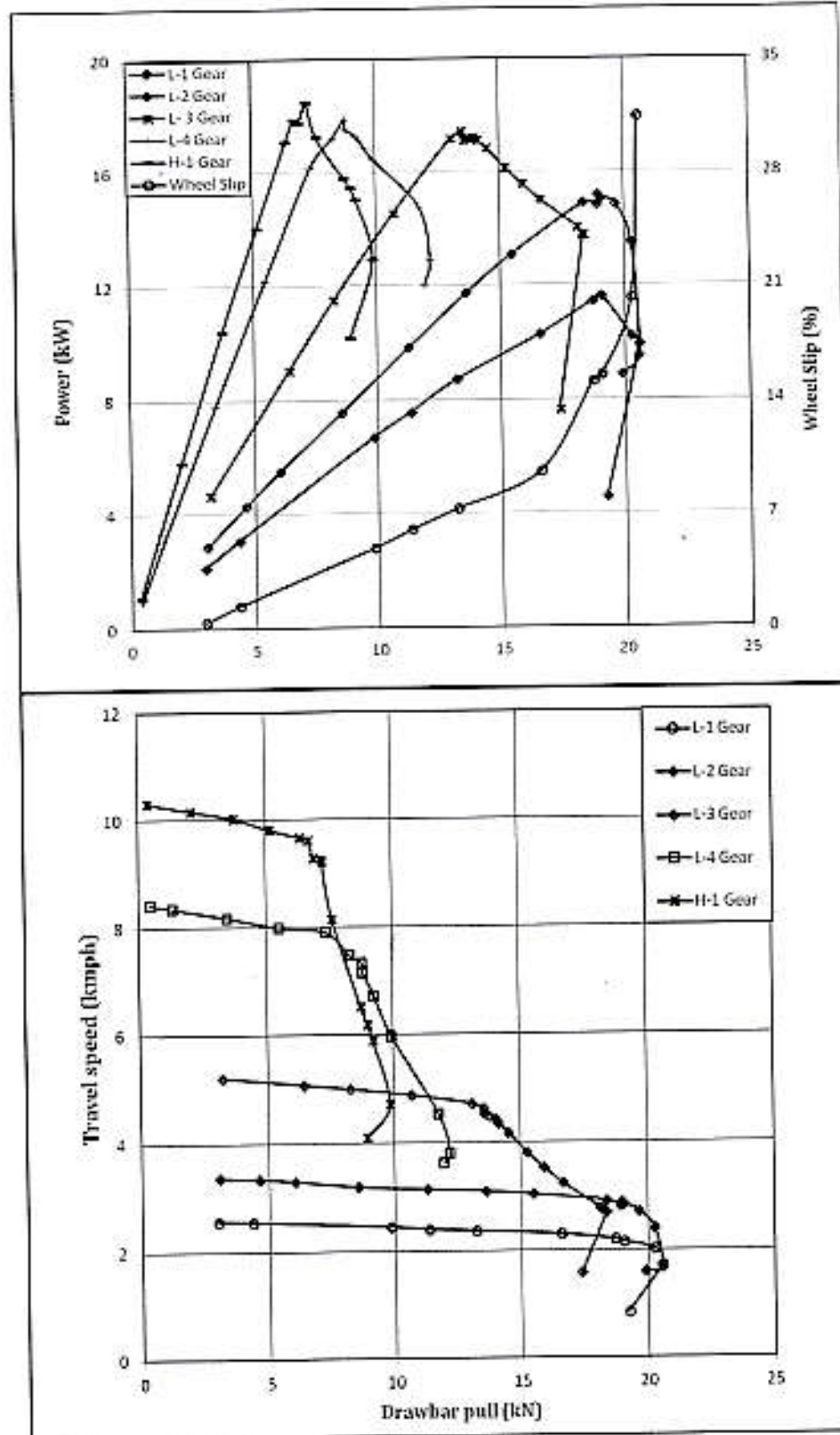


Fig.6: DRAWBAR PERFORMANCE CHARACTERISTICS

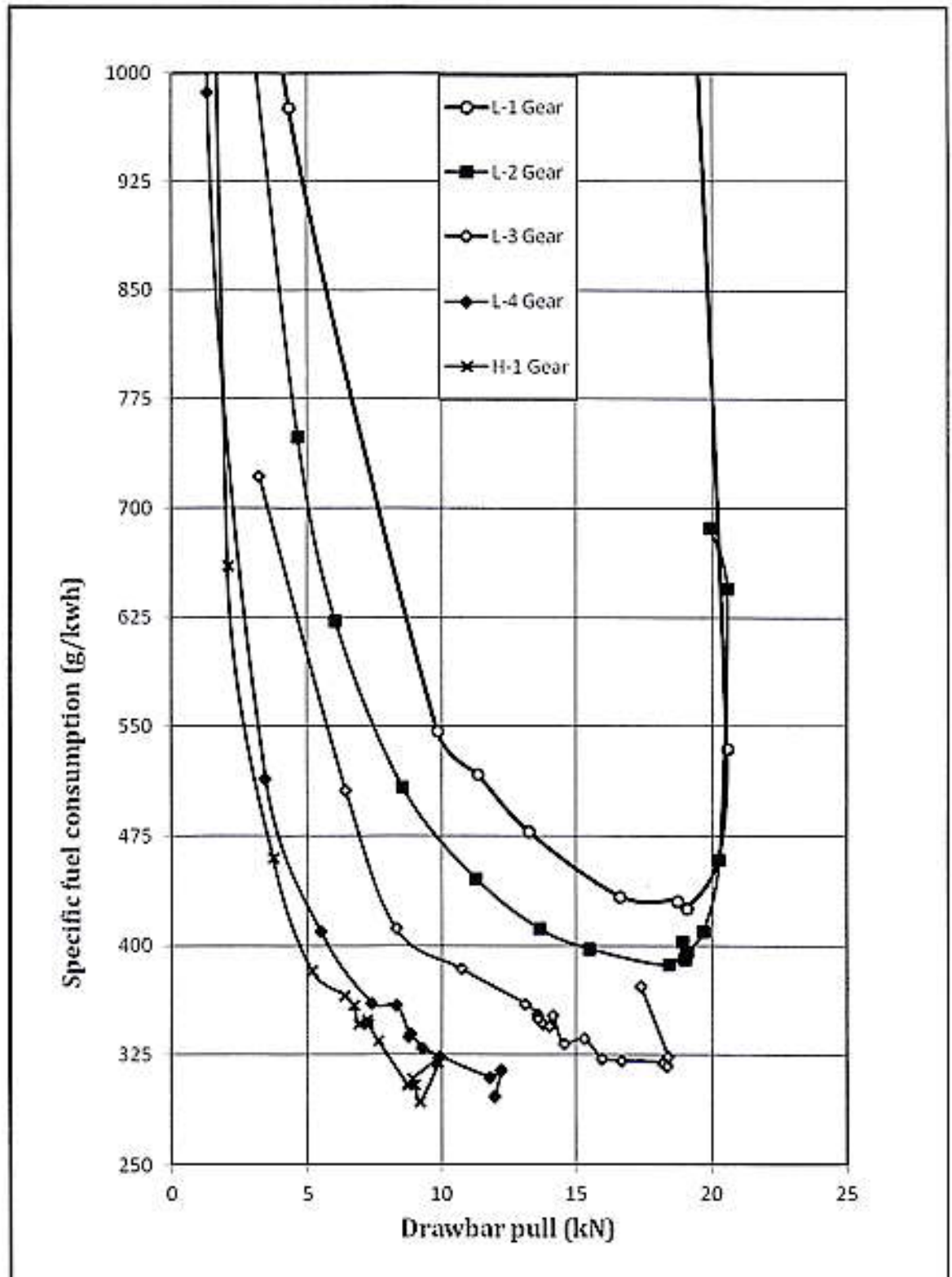


Fig.7: DRAWBAR PERFORMANCE CHARACTERISTICS



### 5. POWER LIFT AND HYDRAULIC PUMP PERFORMANCE TEST

Date(s) of test : 03.11.2016 & 04.11.2016  
 Tractor run at the Institute prior to start of hydraulic test, (h) : 1.43  
 Pump speed at rated engine speed, (rpm) : 2100

#### 5.1 Hydraulic power test:

Pump delivery rate at minimum pressure and rated engine speed, (l/min) : 30.81  
 Maximum hydraulic power, (kW) : 7.3  
 Pump delivery rate at maximum hydraulic power, (l/min) : 29.01  
 Pressure at maximum hydraulic power, (MPa) : 15.0  
 Sustained pressure of the open relief valve, (MPa) : 20.0

#### Tapping point:

a) Relief valve test : At external circuit  
 b) Pump performance test : At pump outlet  
 Temperature of hydraulic fluid, (°C) : 60 to 66

#### 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)	Max. tilt angle of mast from vertical (degrees)
At hitch points	200	560	19.26	18.0	16.85	--
On the standard frame	200	550	16.07	18.0	23.86	8.40

#### 5.3 Maintenance of lift load:

Force applied at the frame, (kN) : 14.46  
 Temperature of hydraulic fluid at the start of test, (°C) : 60

#### Test data:

Elapsed time (minute)	5	10	15	20	25	30
Cumulative drop in height of lift, (mm)	06	14	14	15	16	17



## 6. BRAKE TEST

### 6.1 Service brake:

#### 6.1.1 Cold brake test:

Date of test(s)	:	06.12.2016 & 29.05.2017
Type of Track	:	Concrete
Maximum attainable speed (kmph):		
- Without Ballast	:	33.9
- Ballasted	:	33.9

		At 35 Kmph travel speed			
Unballasted tractor	Braking device control, force (N)	568	432	298	161
	Mean deceleration, (m/sec <sup>2</sup> )	3.45	3.14	3.03	2.50
	Stopping distance, (m)	12.96	14.11	14.63	17.73
Ballasted tractor	Braking device control force(N)	540	450	359	268
	Mean deceleration, (m/sec <sup>2</sup> .)	3.36	3.14	3.03	2.50
	Stopping distance, (m)	13.07	14.13	14.65	17.73

		At 25 kmph travel speed			
Unballasted tractor	Braking device control, force(N)	501	415	328	241
	Mean deceleration, (m/ sec <sup>2</sup> )	3.21	2.84	2.75	2.50
	Stopping distance, (m)	7.72	8.49	8.77	9.65
Ballasted tractor	Braking device control force,(N)	522	437	353	268
	Mean deceleration, (m/sec <sup>2</sup> )	3.08	2.90	2.79	2.50
	Stopping distance, (m)	7.88	8.32	8.64	9.65

#### 6.1.2 Brake fade test:

		At 35 Kmph travel speed			
Braking device control force (N)		541	454	366	279
Mean deceleration, (m/ sec <sup>2</sup> )		3.38	3.09	2.85	2.50
Stopping distance, (m)		13.24	14.33	15.53	17.73

		At 25 kmph travel speed			
Braking device control force,(N)		527	446	365	284
Mean deceleration, (m/ sec <sup>2</sup> )		3.08	2.85	2.74	2.50
Stopping distance, (m)		7.98	8.47	8.81	9.65

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

#### 6.1.3 Parking brake test:

Particulars	18 percent slope		12 percent slope with trailer of 1.94 tones.	
	Up	Down	Up	Down
Braking device control force, (N)	357	332	262	280
Efficacy of parking brake	-----Effective-----			



## 7. NOISE MEASUREMENT

### 7.1 Noise at bystander's position:

Date of test : 20.10.2016  
 Type of track : Concrete  
 Background noise level, dB (A) : 56.6  
**Atmospheric conditions:**  
 Temperature, (°C) : 33  
 Pressure, (kPa) : 97.3  
 Relative humidity (%) : 40  
 Wind velocity, (m/s) : 1.0

#### Test Data:

S. No.	Gear	Traveling speed before acceleration, (kmph)	Noise level, dB (A)
1.	L-1	2.01	81
2.	L-2	2.67	82
3.	L-3	4.11	81
4.	L-4	6.44	81
5.	H-1	7.93	81
6.	H-2	10.45	81
7.	H-3	16.15	81
8.	H-4	25.47	81

### 7.2 Noise at operator's ear level:

Date of test : 26.05.2017  
 Type of track : Concrete  
 Background noise level, dB(A) : 52.7  
**Atmospheric conditions:**  
 Temperature, (°C) : 35  
 Pressure, (kPa) : 98.0  
 Relative humidity, (%) : 35  
 Wind velocity, (m/s) : 2.0

#### Test Data:

Gear	Drawbar pull at which the tractor developed the max. noise level, (kN)	Corresponding traveling speed, (kmph)	Noise level, dB(A)
L-1	14.18	2.30	92.0
L-2	13.64 to 14.37	3.04 to 2.99	92.0
L-3	11.06 to 13.46	4.79 to 4.42	93.0
L-4*	5.35 to 8.77	8.14 to 7.52	92.0
H-1	7.26 to 7.36	9.50 to 9.44	93.0

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



### 8. MECHANICAL VIBRATION MEASUREMENT

Date of test : 14.12.2016  
Type of test surface : Concrete

Sl. No.	Measuring points		Vibration, microns			
			At no load		At load corresponding to 85% of max. PTO power	
			VD	HD	VD	HD
1	2		3	4	5	6
i)	Foot rest	Left	90	120*	170*	150*
		Right	100	130*	170*	200*
ii)	Steering wheel		90	60	100	80
iii)	Seat	Bottom	70	40	130*	60
		Back	40	40	120*	60
iv)	Mudguard	Left	60	70	100	160*
		Right	120*	90	70	130*
v)	Head light	Left	40	40	70	150*
		Right	40	30	170*	160*
vi)	Battery base, centre		30	50	70	70
vii)	Tail light	Left	130*	180*	130*	170*
		Right	100	150*	120*	150*
viii)	Plough light		60	160*	110*	200*
ix)	Gear shifting lever		130*	60	120*	90
x)	Accelerator lever	Hand	140*	90	200*	110*
		Foot	90	70	100	60
xi)	Brake pedal	Left	140*	130*	150*	110*
		Right	190*	100	130*	130*
xii)	Clutch pedal		90	100	140*	130*
xiii)	Main hydraulic control lever		50	60	90	60
xiv)	PTO engaging lever		30	40	60	70

\*The amplitude of mechanical vibration is on higher side.

### 9. LOCATION OF CENTRE OF GRAVITY

Condition	Particulars	Coordinates
Tractor under standard ballasted condition but with all the liquid reservoirs full & the operator replaced by a 75 kg mass on the seat	Height above ground, (mm)	831.9
	Distance forward from the vertical plane containing the axis of rear wheels, (mm)	778.1
	Distance from the median plane parallel to the longitudinal axis of tractor bisecting the track, (mm)	6.71 (in RHS)

### 10. TURNING ABILITY

Characteristics	Minimum turning diameter, (m)		Minimum clearance diameter, (m)	
	LHS	RHS	LHS	RHS
Brakes released	7.74	8.03	8.16	8.45
Brake applied	6.83	6.88	7.35	7.40



### 11. OPERATOR'S FIELD OF VISION

The operator's field of vision to the front and rear from the operator's seat is represented in Fig.8:

- i) The non visible space in front is 5825 mm which is 2.79 times of wheel base (i.e.2085 mm).
- ii) The non-visible space in LHS & RHS is 2350 mm each which is 1.71 times of rear track width (i.e.1375 mm).
- iii) No masking effect.

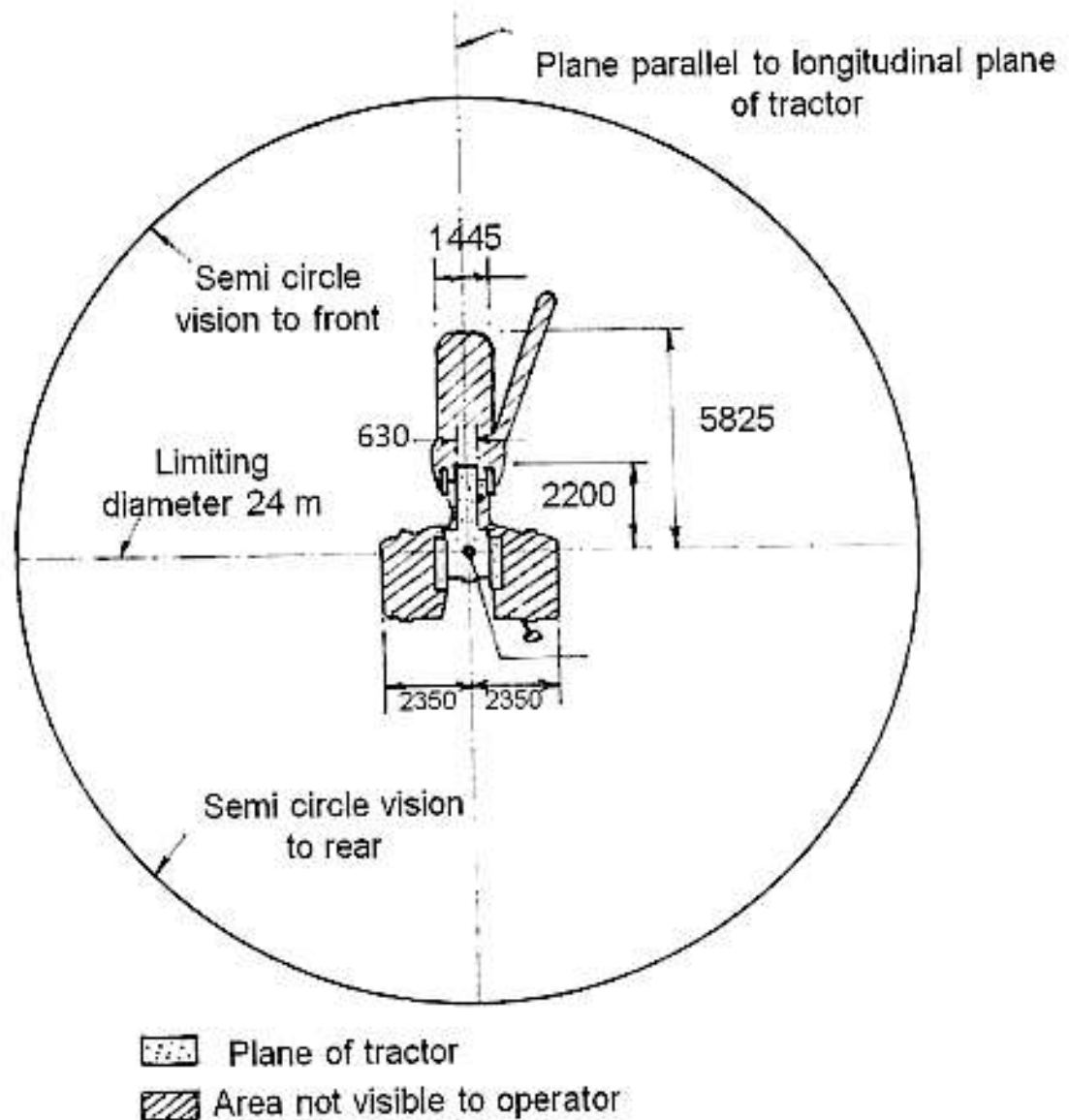


Fig.8: OPERATOR'S FIELD OF VISION





## 12. FIELD TEST

- 12.1 The field tests comprising of Disc ploughing and rotavation were conducted for 22.2 and 16.2 hours respectively.  
All the field tests were conducted at the full accelerator settings, when the no load speed of the engine varied from 2150 to 2260 rpm.
- 12.2 The brief specifications of the implements used during field tests are given in **Annexure – I**
- 12.3 The summary of field test observation with Disc plough and rotavator is given in Table – 3.

**Table – 3**

### SUMMARY OF FIELD PERFORMANCE TEST

S No.	Parameter/operation	Disc Ploughing	Rotavation
i)	Type of soil (refer IS:7926-1975)	Light sandy soil	Light sandy soil
ii)	Av. Soil moisture, (%)	6 to 8	8 to 13
iii)	Bulk density of soil, (g/cc)	1.8 to 2.0	2.0
iv)	Cone index, (kg/cm <sup>2</sup> )	6.30 to 8.17	7.32 to 8.51
v)	Gear used	L-2	L-2
vi)	Av. Speed of operation, (kmph)	2.95 to 3.18	3.32 to 3.78
vii)	Av. Wheel slip, (%)	5.9 to 12.5	- 0.86 to 0.79
viii)	Av. Depth of cut, (cm)	27 to 30	7 to 9
ix)	Av. Working width, (cm)	36 to 50	115 to 121
x)	Area covered, (ha/h)	0.101 to 0.142	0.366 to 0.371
xi)	<b>Fuel consumption:</b>		
	- (l/h)	4.08 to 4.19	4.73 to 5.27
	- (l/ha)	29.01 to 40.40	12.86 to 14.28
xii)	Av. Draft of implement, (kN)	4.3 to 4.5	---

**Remarks:** The average lub oil and coolant (water) consumptions during the entire field tests were observed to be 1.30 ml/h & 3.91 ml/h respectively.

### 12.4 Wet land cultivation (Puddling Operation):

The manufacturer does not recommend for wet land cultivation (puddling operation). Hence, **test was not** conducted.

## 13. HAULAGE TEST

Type of trailer	:	<b>Two wheel (Single axle)</b>	<b>Four wheel (Double axle)</b>
Gross mass of trailer (tonne)	:	4.0	5.0
Height of trailer hitch above ground level, (mm)	:	580	595
Gear used during the test for negotiating slopes upto 8%	:	H4	H4
Average travel speed, (kmph)	:	27.57 to 28.92	27.78 to 28.14
Average fuel consumption:			
- (l/h)	:	4.90 to 4.96	5.03
- (ml/km/tonne)	:	42.3 to 45.0	35.8 to 36.3
Average distance traveled per litre of fuel consumption, (km)	:	5.56 to 5.91	5.51 to 5.56
<b>General observations:</b>			
Effectiveness of brakes	:	Effective	Effective
Maneuverability of tractor-trailer combination	:	Satisfactory	Satisfactory



#### 14. COMPONENTS/ASSEMBLY INSPECTION

The engine and other assemblies were dismantled after 93.8 hours of tractor operation at this Institute.

##### 14.1 Engine:

##### 14.1.1 Cylinder bore:

Cylinder No.	Cylinder bore dia, (mm)						Max. permissible wear limit, (mm)
	Top position		Middle position		Bottom position		
	Thrust side	Non-thrust side	Thrust side	Non-thrust side	Thrust side	Non-thrust Side	
1.	99.99	100.01	100.00	100.01	100.00	100.01	100.40
2.	100.00	100.01	100.00	100.00	100.01	100.00	
3.	100.00	100.01	100.00	100.00	100.01	100.00	

##### 14.1.2 Piston:

Piston No.	Piston dia, (mm)				Max. permissible wear limit, for piston dia. at the skirt (mm)	Clearance between piston to cylinder liner at the skirt (mm)	
	Top (above top compression ring)		At skirt			As measured	Max. permissible limit
	Thrust side	Non-thrust side	Thrust side	Non-thrust Side			
1.	99.262	99.224	99.873	*	99.60	0.134	0.80
2.	99.277	99.224	99.868	*		0.142	
3.	99.277	99.235	99.866	*		0.142	

\*Not measured due to piston design features.

##### 14.1.3 Ring end gap:

Rings	Ring end gap, (mm)									Max. permissible ring end gap limit, (mm)
	Cylinder No. 1			Cylinder No. 2			Cylinder No. 3			
	Top	Middle	Bottom	Top	Middle	Bottom	Top	Middle	Bottom	
1 <sup>st</sup> comp. ring	0.35	0.35	0.35	0.35	0.35	0.35	0.40	0.40	0.40	2.0
2 <sup>nd</sup> comp. ring	0.90	0.90	0.90	0.85	0.85	0.85	0.90	0.90	0.90	
Oil ring	0.40	0.40	0.40	0.45	0.45	0.45	0.35	0.40	0.40	

##### 14.1.4 Ring side clearance:

Rings	Ring side clearance, (mm)			Max. Permissible clearance Limit, (mm)
	Piston-I	Piston-II	Piston-III	
1 <sup>st</sup> Compression ring	--Tapered ring--			--
2 <sup>nd</sup> Compression ring	0.042	0.044	0.047	0.50
Oil ring	0.050	0.066	0.053	

**14.1.5 Main bearings:**

Bearing No.	Diametrical Clearance, (mm)	Crankshaft end float, (mm)	Max. permissible clearance limit, (mm)	
			Diametrical clearance	Crankshaft end float
1.	0.082 to 0.090	0.18	0.9	1.0
2.	0.079 to 0.104			
3.	0.049 to 0.101			
4.	0.094 to 0.108			

**14.1.6 Big end bearings:**

Bearing No.	Clearance, (mm)		Max. permissible clearance limit, (mm)	
	Diametrical	Axial	Diametrical	Axial
1.	0.084 to 0.087	0.35	0.90	1.0
2.	0.093 to 0.106	0.35		
3.	0.068 to 0.085	0.35		

**14.1.7 Valve, guides and timing gears:**

	<u>Observation</u>
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):**

	Inner	Outer
Intake valve spring	: 2.16 to 2.35	7.01 to 7.46
Exhaust valve spring	: 2.35 to 2.94	7.65
Against discard limit (N/mm)	1.5	5

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

- Intake valve	: 0.067 to 0.072	Against discard limit of 0.15 mm
- Exhaust valve	: 0.043 to 0.058	

**14.2 Clutch:**

Any marked wear on clutch friction plates	: Yes
Condition of clutch release bearing	: Normal
Condition of pilot bearing	: Normal
Condition of springs and release leavers	: Normal
Presence of oil in clutch housing	: None
Any marks on fly wheel/ pressure plate	: None

**Overall thickness of clutch plate, (mm):**

- Transmission	: 11.03 to 11.11	Against the discard limit of wear up to rivet head
- PTO	: 7.60 to 7.64	
<b>Height of lining over rivet head, (mm):</b>		
- Transmission	: 2.69 to 2.84	
- PTO	: 0.28 to 0.92	

**14.3 Transmission gears:**

Any visual damage, pitting & chipping of any transmission gear teeth	: None	
Backlash between crown wheel and pinion, (mm)	: 0.27	Against the discard limit of 0.80 mm

**14.4 Brakes:**

Description	Initial specified overall thickness of brake disc, (mm)	Measured thickness of brake disc after test, (mm)	Measured height of lining over rivet head, (mm)	Minimum permissible height of brake lining over the rivet head, (mm)
Left	5.0	12.91 to 13.11	1.12 to 1.88	1.0
Right	5.0	12.98 to 13.18	1.24 to 2.22	

**14.5 Front axle:**

	<u>Observation</u>	
Any marked wear of king pins	: None	
Any marked wear of king pin bushes	: None	
Clearance between king pin and bushes, (mm)	: Not measured due to spherical design of bush.	
Condition of bearings for stub axles	: Normal	
Condition of thrust bearings	: Normal	
Condition of seals for stub axles and king pins	: Normal	
Clearance between centre pin and bushes, (mm)	: 0.14 to 0.16	Against the discard limit of 1.0 mm

**14.6 Steering system:**

Visual condition of the components of complete steering assembly : Normal

**14.7 Starter motor & Alternator:**

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

**15. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS**

Sl. No	Adjustment/Defects/Breakdowns and Repairs	Category of breakdown	Tractor run hours
	----- None -----		



### 16. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

- 16.1 Evaluative (mandatory) / Non-evaluation (Non-mandatory) parameter applicable for qualifying Minimum Performance criteria as per Clause-4 (Table-1) of IS: 12207-2014 for acceptance of the tractor for the purpose of subsidies/NABARD financing are summarized as under:

S. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	Values declared by the applicant (D)/ Requirement (R)	As observed	Whether meets the requirements (Yes/No.)
1	2	3	4	5	6	7
<b>16.1.1 PTO Performance :</b>						
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: -5 / +10% for PTO power >26 kW, -7.5/+10% for PTO power ≤ 26 kW or -5 / +10% for Engine power >26 kW, -7.5/+10% for Engine power ≤ 26 kW	23.2 (D)	21.6	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	23.2 (D)	21.5	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	280 (D)	283	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	135 (D)	137.51	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10 percent, min. (D)	36.65	Yes
<b>f) Maximum operating temperature, (°C)</b>						
	1) Engine oil	Non Evaluative	The declared value should not exceed the max. Value specified by the oil company and the observed value under high ambient condition should not exceed the declaration.	130 (D)	113	Yes
	2) Coolant (water)	Evaluative	The declared value should not exceed the boiling temperature of coolant under the pressurized or otherwise and the observed value under high ambient condition should not exceed the declaration.	118 (D)	96	Yes



1	2	3	4	5	6	7
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	Maximum 2.89 (R)	0.95	Yes
h)	Smoke level	Evaluative	Maximum light absorption coefficient of 3.25 per metre or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	3.25 per meter (R)	0.09	Yes
<b>16.1.2 Drawbar performance :</b>						
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	16.50 (D) 16.42 (R) Minimum	18.97	Yes
b)	Max. drawbar pull with standard ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	12.36 (D) 12.27 (R) Minimum	14.37	Yes
c)	Maximum drawbar power without ballast, (kW).	Evaluative	Minimum 80 % of PTO power as referred in SI No. i) a) of PTO performance in case of tractors having total static mass > 1500 kg Minimum 75 % of PTO power as referred in SI No. i) a) of PTO performance in case of light weight tractors having 1500 kg total static mass of tractor Minimum 75 % of the engine power as referred in SI No. i) a) of engine performance in case of tractors which do not have a PTO shaft.	18.6 (D) 17.3 (R) Minimum	19.3	Yes
d)	Max. transmission oil temperature, (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	120 (D)	83	Yes
<b>16.1.3 Power lift and hydraulic pump performance :</b>						
a)	Maximum lifting capacity throughout the range of lift, (kN):					
1)	At hitch points	Non Evaluative	[Tolerance of minus 10%]	11.75 (D)	19.26	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	5.46 (D) 5.09 (R) Minimum	18.07	Yes
b)	Maximum drop in the height of the point of application of the force after each 5 minutes interval for a total duration of 30 Minutes, (mm)	Non Evaluative	Observed value should not exceed 50 mm.	50 (D)	17	Yes

16.1.4 Brake performance at 25 kmph:							
a)	Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with road ballasted (m):						
	1)	Cold brake	Evaluative	10	10 (R)	7.88	Yes
	2)	Hot brake	Evaluative	10	10 (R)	7.98	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s <sup>2</sup> (N)		Evaluative	600	600 (R)	268 to 284	Yes
c)	Whether parking brake is effective at a force of 600 N at foot pedal(s) or 400 N at hand lever		Evaluative	Yes / No	Yes (R)	Yes	Yes

16.1.5 Noise measurement :							
a)	Maximum ambient noise emitted by the tractor, dB(A)		Evaluative	As per CMVR	88 (R)	82	Yes
b)	Maximum noise at operator's ear level dB(A)		Evaluative	As per CMVR	96 (R)	93	Yes

16.1.6 Amplitude of mechanical vibrations at :							
	1)	Left foot rest	Non Evaluative	100 microns (max)	100 (R)	150	No
	2)	Right foot rest			100 (R)	200	No
	3)	Seat (with driver seated)			100 (R)	130	No
	4)	Steering wheel			100 (R)	100	Yes

16.1.7	Air cleaner pull over (%)	Non Evaluative	0.25% (Max)	Dry type air cleaner is provided	Not applicable
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16.1.8 Haulage requirements :							
a)	Gross mass of the trailers, (tones):						
	1)	Two wheel	Non Evaluative	--	4.0	4.0	Yes
	2)	Four wheel	Evaluative	--	5.0	5.0	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):						
	1)	Two wheel	Non Evaluative	--	3.0 to 7.0	5.56 to 5.91	Yes
	2)	Four wheel	Evaluative	--	3.0 to 7.0	5.51 to 5.56	Yes
c)	Fuel consumption (ml/km/tonne):						
	1)	Two wheel	Non Evaluative	--	25.0 to 50.0	42.3 to 45.0	Yes
	2)	Four wheel	Evaluative	--	25.0 to 50.0	35.8 to 36.3	Yes



16.1.9		Wetland cultivation :				
	Sealing for the following assemblies:	Evaluative	The identified assemblies should essentially meet the requirement of IS: 11092. 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 wetland cultivation (puddling operation).	Not recommend	Not applicable
1)	Clutch assembly					
2)	Brake housing					
3)	Front axle hubs					
4)	Engine oil					
5)	Transmission oil					

16.1.10		Safety features :				
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes As per IS 12239 (part 2)	Requirements as per clause no.4 of table no.1	Meets the requirement	Yes
b)	Lighting arrangement	Evaluative	As per CMVR	--do--	Meets the requirement	Yes
c)	Seating requirement (Tractors having more than 1150 mm rear track width)	Non Evaluative	Should meet the requirements of IS 12343 (as amended from time to time)	--do--	Does not meet the requirement	No
d)	Technical requirements for PTO shaft	Non Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--do--	Does not meet the requirement	No
e)	Dimension of three point linkage	Non Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	--do--	Does not meet the requirement	No
f)	Specification of linkage drawbar	Non Evaluative	Should meet the requirements of IS 12953 and IS 12362 (part 3) (as amended from time to time)	--do--	Meets the requirement	Yes
g)	Specification of swinging drawbar	Non Evaluative		--do--	Not provided	N.A.

16.1.11		Labelling of tractors (Provision of labelling plate):				
1)	Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	-	PREET	Yes
2)	Model	Evaluative		-	3549 CHALLENGER	Yes
3)	Year of manufacture	Evaluative		-	FEBRUARY, 2016	Yes
4)	Engine number	Evaluative		-	P335 - 06062	Yes
5)	Chassis number	Evaluative		-	02163518345	Yes
6)	Declaration of PTO power, (kW)	Evaluative		-	23.2	Yes





16.1.12 Discard limit for:						
(a)	Cylinder bore diameter, (mm)	Evaluative	To be declared by the manufacturer	100.40	99.99 to 100.01	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative	-do-	0.80	0.134 to 0.142	Yes
(c)	<b>Ring end gap (mm):</b>					
	- Top comp. ring.	Evaluative	-do-	2.0	0.35 to 0.40	Yes
	- 2 <sup>nd</sup> comp. ring.		-do-	2.0	0.85 to 0.90	Yes
- Oil ring.	-do-		2.0	0.40 to 0.45	Yes	
(d)	<b>Ring groove clearance (mm):</b>					
	- Top comp. ring.	Evaluative	-do-	0.50	Tapered	-
	- 2 <sup>nd</sup> comp. ring.		-do-	0.50	0.042 to 0.047	Yes
- Oil ring.	-do-		0.50	0.050 to 0.066	Yes	
(e)	<b>Clearance of main bearings (mm):</b>					
	- Diametrical clearance	Evaluative	-do-	0.90	0.05 to 0.11	Yes
	- Crankshaft end float	Evaluative	-do-	1.0	0.18	Yes
(f)	<b>Clearance of big end bearings, (mm):</b>					
	- Diametri-cal	Evaluative	To be declared by the manufacturer	0.90	0.07 to 0.11	Yes
	- Axial	Evaluative	-do-	1.0	0.35	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.6	0.08 to 0.10	Yes
(h)	Clearance between center pin and bush, (mm)	Non Evaluative	-do-	1.0	0.14 to 0.16	Yes

16.1.13 Literature (Submission to test agency)						
(a)	Operator manual	Evaluative	Provided/Not Provided	Provided	Provided	Yes
(b)	Parts Catalogue	Evaluative	Provided/Not Provided	Provided	Provided	Yes
(c)	Workshop/ Service manual	Evaluative	Provided/Not Provided	Provided	Provided	Yes

16.1.14 CATEGORY OF BREAKDOWNS / DEFECTS :					
S. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	As observed	Whether meets the requirements (Yes/No.)
1.	Critical	Evaluative	No critical breakdown	None	Yes
2.	Major	Evaluative	Not more than two and neither of them should be repetitive in nature	None	Yes
3.	Minor	Evaluative	Not more than five and frequency of each should not be more than two.	None	Yes



4.	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed five, that is, (2 major + 3 minor) or 5 minor breakdowns.	None	Yes
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16.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2014:				
S. No.	Characteristic	Requirements as per IS: 12207-2014	As observed	Whether meets the requirements (Yes/No.)
1.	Fitment of ROPS	With a provision for fitment of ROPS.	Not provided	No
		If ROPS fitted it should meet the requirement of IS: 11821-1992.	Not provided	Not applicable
2.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Provided	Yes

### 16.3 Conformity with following IS:

- i) Guidelines for declaration of power and specific fuel consumption and labeling of agricultural tractors (First revision) [IS 10273:1987 (Reaffirmed in March, 2009)] : Conforms
- ii) Agricultural tractors – Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS: 4931-1995 (Reaffirmed in March, 2009)] : Does not conform
- iii) Agricultural wheeled tractors - Rear mounted three-point linkage: Part 1 Categories 1, 2, 3 & 4 (fourth revision) [IS 4468 (Part-I):1997 (Reaffirmed in February, 2012)] : Does not conform
- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in February, 2012)] : Conforms
- v) Agricultural tractors - Operator's seat technical requirement [IS 12343 –1998 (First revision) (Reaffirmed in March, 2009)] : Does not conform
- vi) Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision) : [IS 12239 (Part-1)-1996 (Reaffirmed in February, 2012) / ISO 4254-1:1989] : Does not conform
- vii) Tractors and machinery for agriculture and forestry – Technical means for ensuring safety Part 2: Tractors (first revision) IS 12239 (Part-2)-1999 (Reaffirmed in March, 2009)] : Does not conform
- viii) Tractors and machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays – Symbols for Agricultural Tractors and Machinery [IS: 6283 (Part-2) – 2007(Reaffirmed in March, 2009) / ISO 3767-2:1991]] : Does not conform
- ix) Guidelines for location and operation of operator controls on agricultural tractors and machinery (first revision) (IS: 8133 – 1983) (Reaffirmed in March, 2009) / ISO 3789: 1982] : Does not conform
- x) Agricultural Tractor & Machinery Lighting device for travel on public roads [IS: 14683-1999 (Reaffirmed in March, 2009)] : Conforms



#### 16.4 Salient Observations:

##### 16.4.1 Laboratory tests:

##### 16.4.1.1 PTO Performance:

- i) The maximum PTO power was recorded as **21.6 kW** against the declaration of **23.2 kW**, which meets the requirement of IS: 12207-2014 with regard to tolerance limit.
- ii) The specific fuel consumption corresponding to maximum power was recorded as **283 g/kWh**, against the declaration of **280 g/kWh**, which is within the tolerance limit of IS: 12207-2014.
- iii) The backup torque is **36.65%**.

##### 16.4.1.2 Drawbar Performance :

- i) During ten hours drawbar test, creeping of RHS rear tyre over the rim was observed as 25 mm. This should be looked into for necessary corrective action.

##### 16.4.1.3 Hydraulic Performance:

- i) The moment about rear axle was computed as 23.86 kN-m at standard frame, which is considered on higher side as compared to the moment from front axle i.e. 15.65 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 the front lifting of the tractor.
- ii) The maximum tilt angle of mast from vertical recorded as 8.40 degree against the minimum requirement of 10 degree. This should be looked into for necessary corrective action.

##### 16.4.1.4 Mechanical Vibration:

The amplitude of mechanical vibration marked as (\*) in chapter-8 of this report is on higher side especially at LHS and RHS foot rest & operator's seat. This calls for reduction in amplitude of vibration in view of improving service life of the component(s) and the operator's comfort.

##### 16.4.1.5 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.

##### 16.4.1.6 Operator's Seat :

The inclination of seat towards rear direction does not meet the minimum requirements of IS: 12343-1998 (Re-affirmed in March, 2009). This should be looked into for corrective action.

##### 16.4.1.7 Symbols for operator's controls and displays:

Oil, grease lubrication type and its frequency are not identifiable with the symbols as per IS: 6283 (Part I & II)-1998. This should be looked into for corrective action.

##### 16.4.1.8 Location and movement of operator's controls:

Location and movement of operator's controls meets the requirements of IS: 8133-1993, **except the following:**

- i) The fuel shut off lever does not remain in 'STOP' position without sustained manual effort.
- ii) Differential lock

##### 16.4.1.9 Operator's work place:

Operator's work place meets the requirements of IS-12239(part-I)—1996, **except the following:**

- i) Spark arresting device in the exhaust system is not provided.
- ii) Width of foot step is not provided as per the above standard.
- iii) Differential lock



- 16.4.1.10 Constructional requirement with regard to safety:**  
The working clearance between Position control and draft control lever has not been provided as per IS: 12239(Part-II) 1999. This should be looked into for corrective action.
- 16.4.1.11 Specification of Power Take Off Shaft:**  
The dimensions 'dø' of the PTO shaft does not meet the requirements of IS-4931-1995. This should be looked into for necessary corrective action.
- 16.4.1.12 PTO Master shield:**  
PTO master shield not provided on tractor as per the requirements of IS: 4931-1995. This should be looked into.
- 16.4.2 Field performance:**
- 16.4.2.1 Wet land cultivation (Puddling Operation):**  
The manufacturer has recommended that the tractor is not suitable for wetland cultivation (puddling operation) and therefore, the wetland cultivation (puddling operation) was not conducted. It is recommended that in all the literature this fact that the tractor is not suitable for wetland (puddling) operation should be mentioned clearly & boldly in all the relevant literature of the tractor & also a cautionary notice regarding non-suitability of tractor for puddling operation may be displayed on the bonnet of the tractor.
- 16.5 Maintenance / Service Problems:**  
No noticeable maintenance/ service problem was observed during the test.
- 16.6 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 the exhaust system.
  - ii) Provision of differential lock.
  - iii) PTO shaft master shield should be provided to avoid the accident.
  - iv) The fuel shut-off lever does not remain in "STOP" position.
  - v) The working clearance between the draft control lever & position control lever should be provided as per the requirement of relevant Indian Standard.
  - vi) The rear tyres should be guarded so that operator's feet may not come in contact with the wheels.
  - vii) The lateral distance from lower hitch point to center line of tractor should be provided as per the requirement of relevant Indian Standard.
- 16.7 Adequacy of Literature supplied with machine:**  
The following literature was supplied with the tractor for reference during the test.
- a) Operator's Manual in respect of PREET 3549 CHALLENGER tractor.
  - b) Tractor Parts Catalogue in respect of PREET 3549 CHALLENGER tractor.
  - c) Service Manual in respect of PREET 3549 CHALLENGER tractor.
- 16.7.1** The supplied literature was found adequate.
- 16.7.2** The literatures supplied by applicant should also in national as well as other regional languages for the guidance of users and service personnel.



## 17. CITIZEN CHARTER

Time frame for Testing & Evaluation as per Citizen Charter	Duration of Test	Whether the Test Report is released within the time frame given in Citizen Charter	Remarks
10 Months	11 Months (October, 2016 to September, 2017)	No	Due to seasonal constraints

**TESTING AUTHORITY:**

**C.V.CHIMOTE**  
TEST ENGINEER

**Y.K. RAO**  
SENIOR AGRICULTURAL ENGINEER

**J.J.R.NARWARE**  
DIRECTOR

This test report is compiled by Shri. Shwetabh Singh, Senior Tech. Assistant

## 18. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
18.1	16.1.6 (1),(2) & (3)	We will look into for corrective action.
18.2	16.1.10 (c)	
18.3	16.1.10 (d)	
18.4	16.1.10 (e)	

**Annexure-I****BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST**

S. No.	Item	Rotavator	Disc Plough
1.	Make	Howard	ITL
2.	Type	Mounted	Mounted
3.	No. of blades/bottoms, (mm)	30, in 6 flanges	Three
4.	Type of blades/ bottoms, (mm)	Hatchet	Concave
5.	Size of blades/ bottoms, (mm)	215 x 75 x 5	650
6.	Spacing of blades / bottoms, (mm)	250	560
7.	Lower hitch point span, (mm)	710	860
8.	Mast height, (mm)	465	615
9.	<b>Overall dimensions, (mm):</b>		
	- Length	1035	1850
	- Width	1790	855
	- Height	960	1200
10.	Gross mass	295	295

**Annexure - II****TRACTOR RUN HOURS DURING TEST**

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	PTO performance test	12.16
3.	Power lift and hydraulic pump performance test	2.59
4.	Drawbar performance test	16.84
5.	Turning ability	0.4
6.	Location of centre of gravity	-
7.	Operator's field of vision	-
8.	Brake test	2.58
9.	Noise measurement	1.5
10.	Mechanical vibration test	1.0
11.	Nominal speed test	0.75
B.	<b>FIELD TEST:</b>	
1.	Rotavation	16.17
2.	Disc Ploughing	22.21
C.	<b>HAULAGE TEST:</b>	6.89
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	10.74
	<b>TOTAL:</b>	<b>93.84</b>