



**EICHER, EICHER 551 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-1103/1629/2017

EICHER, EICHER 551 TRACTOR - Commercial (Initial)



**Manufacturer :** M/s. Eicher Tractors  
(A unit of TAFE Motors & Tractors Limited, a wholly owned subsidiary of TAFE), Plot No.1, Sector - D, Industrial Area, Mandideep – 462 046, Distt. Raisen (M.P.)

Month: August

Test Report No. T- 1103/1629/2017

Year: 2017

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 : August, 2016 to July, 2017  
 Test Report No. : **T-1103/1629/2017**  
 Month/Year : **August, 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 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

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	1.01387 metric hp (Ps)	Hg.	Mercury
		745.7 W	Temp.	Temperature
	1 Ps	735.5 W	N.R.	Not recorded
	1 kW	1.35962 Ps	rpm	Revolutions per minute
3	<b>Pressure:</b>		O.D/I.D	Outer diameter/ Inner diameter
	1 psi	6.895 kPa	N.A.	Not available/ Not applicable
	1 kgf/cm <sup>2</sup>	98.067 kPa = 735.56 mm of Hg	PTO	Power take-off
	1 bar	100 kPa = 10 N/cm <sup>2</sup>	R.H	Relative Humidity
	1 mm of Hg	1.3332 m-bar		



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<b>Manufacturer</b>	: M/s. Eicher Tractors (A unit of TAFE Motors & Tractors Limited, a wholly owned subsidiary of TAFE), Plot No.1, Sector - D, Industrial Area, Mandideep – 462 046, Distt. Raisen (M.P.)
<b>Test requested by (applicant)</b>	: The manufacturer
<b>Place of running-in</b>	: At Applicant's works
<b>Duration of said running-in, (h):</b>	
- Engine	: 21
- Transmission	: 32
<b>Method of Selection</b>	: The tractor was submitted directly by the applicant for test. Hence, method of selection is not known.

### 1. SPECIFICATIONS

<b>1.1 Tractor:</b>	
Make	: Eicher
Model	: Eicher 551
Variants, if any	: Not specified
Type	: Four wheeled, rear-wheel driven, general purpose agricultural tractor
Year of manufacture	: 2015
Chassis number	: 923615447289
Country of origin	: India
<b>1.2 Engine:</b>	
Make	: Eicher
Model	: 320D49
Type	: Liquid cooled, four stroke, naturally aspirated, direct injection, diesel engine
Serial number	: 523026414272
Year of manufacture	: 2015
Country of origin	: India
<b>1.2.1 Engine speed(Manufacturer's recommended production setting), (rpm):</b>	
- Maximum speed at no load	: 2150 to 2250
- Low idle speed	: 600 to 800
- Speed at maximum torque	: 1000 to 1400
<b>Rated speed, (rpm):</b>	
- For PTO use	: 2000
- For drawbar use	: 2000
<b>1.3 Cylinder &amp; Cylinder Head:</b>	
Number	: Three
Disposition	: Vertical, Inline
Bore/stroke, (mm)	: 108/120 (apa)



	Capacity as specified by the applicant, (cc)	:	3298
	Compression ratio	:	18.5 ± 0.5 : 1
	Type of cylinder head	:	Monoblock
	Type of cylinder liners	:	Wet, replaceable
	Type of combustion chamber	:	Re-entrant, cavity on piston head
	Arrangement of valves	:	Overhead, inline
	<b>Valve clearance (cold):</b>		
	- Inlet valve, (mm)	:	0.35
	- Exhaust valve, (mm)	:	0.35
<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)	:	46.6
	Location	:	Above clutch housing
	Provision for draining of sediments/ water	:	Not provided
	Material of fuel tank	:	Plastic
<b>1.4.2</b>	<b>Water Separator:</b>		
	Make	:	Alerts
	Type	:	Inverted funnel, gravity separation
	Location	:	Between fuel tank and primary fuel filter
	Capacity (l)	:	0.50
<b>1.4.3</b>	<b>Fuel feed pump:</b>		
	Make	:	Not visible
	Type	:	Plunger
	Model/Group combination No.	:	Not visible
	Provision of sediment bowl	:	Provided (metallic)
	Method of drive	:	Through cam shaft of fuel injection pump
	Location	:	On fuel injection pump
<b>1.4.4</b>	<b>Fuel filters:</b>		
	Make	:	Bosch India
	Model/Group combination No.	:	9450030119
	Number	:	Two
	<b>Type of elements:</b>		
	- Primary	:	Paper
	- Secondary	:	Paper
	Capacity of final stage filter, (l)	:	0.47
<b>1.4.5</b>	<b>Fuel Injection pump:</b>		
	Make	:	Bosch, India
	Model/Group combination No.	:	E040308300
	Type	:	Inline, plunger
	Serial number	:	52030559
	Method of drive	:	Through timing gears



- 1.4.6 Fuel injectors:**
- Make : Bosch, India  
 Nozzle holder Number : F 002 C70 017  
 Nozzle Number : DLLA 152 P 2193 458 090 7GG  
 Type : Multi holes (five holes)  
 Injector's pressure (kg/cm<sup>2</sup>) : 240  
 Manufacturer's production pressure setting, MPa : 27+ 0.8  
 Injection timing : 15 ± 1 degree before TDC  
 Firing order : 1- 2-3
- 1.4.7 Governor:**
- Make : Bosch, India  
 Model/Group combination No. : E042 251 700  
 Type : Mechanical, centrifugal, variable speed  
 Governed range of engine speed, (rpm) : 600 to 2250  
 Rated engine speed, (rpm) : 2000
- 1.5 Air intake system:**
- 1.5.1 Pre air cleaner:**
- Make : Eicher (apa)  
 Type : Centrifugal with transparent dust collector.  
 Location : Above the main air cleaner
- 1.5.2 Air cleaner:**
- Make : Eicher (apa)  
 Type : Oil bath  
 Location : In the front of engine, under the bonnet  
 Oil capacity (l) : 1.0  
 Range of suction pressure at maximum power, (kPa) : 3.07 to 3.20  
 Oil change period : After every 8 to 10 hours in dusty condition and after every 50 hours of operation in normal working condition.
- 1.6 Exhaust System:**
- Type of silencer : Updraft, (Elliptical)  
 Position of silencer outlet with respect to SIP, (mm):  
 - Vertical : 925  
 - Longitudinal : 1480  
 - Lateral : 415 (on RHS)  
 Range of exhaust gas pressure at maximum power, (kPa) : 8.93 to 9.20  
 Provision of spark arresting device : None  
 Provision against entry of rain water : A bend is provided at the top of silencer
- 1.7 Lubricating system:**
- Type : Forced feed-cum-splash  
 Oil sump capacity, (l) : 9.2  
 Total lub oil capacity, (l) : 10.2



Oil change period	:	First change after 50 hours and subsequently after every 200 hours of operation.
Cooling device, (if any)	:	None
<b>Filters:</b>		
Make	:	Eicher
Type	:	Full flow, Spin-on throw away, paper element
Number	:	One
<b>Pump:</b>		
Make	:	Eicher
Type	:	Gear (external meshing)
Method of drive	:	Through timing gears
Pressure release setting, ( kPa)	:	392.3 to 539.4 (apa)
Minimum permissible pressure, (kPa)	:	98.0 (apa)
<b>1.8 Cooling system:</b>		
Type	:	Forced circulation of coolant and water
Coolant as recommended	:	Ethylene Glycol
Coolant water ratio	:	3:7
Details of cooling pump	:	Centrifugal, semi open impeller with outer diameter of 82.84 mm and six numbers of vanes, driven through crank shaft pulley by coggod "V"-belt common to alternator.
Details of cooling fan	:	Suction type with six numbers of metallic blades of outer diameter of 415 mm driven through coggod V-belt by crank shaft pulley and mounted with common shaft of water pump.
Means of temperature control	:	Thermostat
Bare radiator capacity, ( l )	:	2.31
Coolant expansion tank capacity,( l )	:	0.78
Total coolant capacity, ( l )	:	8.20
Radiator cap pressure, kPa (kgf/cm <sup>2</sup> )	:	88 (0.9)
<b>1.9 Starting System:</b>		
Type	:	12V, DC, Electrical
Aid for cold starting	:	None
Any other device provided for easy starting	:	None
<b>1.10 Electrical System:</b>		
<b>1.10.1 Battery:</b>		
Make and model	:	Amaron & TR550D31L
Number	:	One
Type	:	Lead Acid
Capacity and rating	:	12V, 88 Ah at 20 hour discharge rating
Location	:	On RHS of flywheel housing in a separate metallic box.





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**1.10.2 Starter:**

Make : Panalfa  
 Model : 56-5757  
 Type : Pre-engaging, solenoid operated  
 Power rating : 12V, 2.8 kW (apa)  
 Serial number : Not available

**1.10.3 Generator:**

Make : Bosch, India  
 Model : F002G10140  
 Type : Alternator  
 Output rating : 14V, 11/23 Amps  
 Serial number : Not available  
 Method of drive : Through crankshaft pulley by a cogged "V" belt common to alternator

**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	1175	160 x 100	722
- Parking lights	2, 12V, 5W	1325	60 x 50	175
- Turn-cum-Hazard indicators	2, 12V, 21W	1325	60 x 50	115
<b>Rear lights:</b>				
Tail light - cum - Brake light	2, 12V, 21/5W	1280	65 x 65	160
Turn-cum-Hazard indicator	2, 12V, 21W	1280	65 x 70	95
- Plough light (on RHS mudguard)	1, 12V, 55 W	1410	135 x 100	325
- Reflectors (Red)	2	1280	55 x 30	210
-Registration plate light	Part of the rear tail light			

**1.10.6 Main switch** : Key turn type, having three position viz: OFF, Circuit ON & START

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



- 1.10.8**     **Horn:**  
 Make : Addon  
 Type : 2B, Electromagnetically vibrated diaphragm  
 Location : In front of engine, under the bonnet.
- 1.10.9**     **Fuse box** : Contains 6 numbers of fuses having following capacities:
- | Capacity | 10A | 15A | 30A |
|----------|-----|-----|-----|
| Number   | 02  | 03  | 01  |
- 1.10.10**     **Details of other electrical accessories:**
- 1.10.10.1**     **Flasher Unit:**  
 Make : Interface  
 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** : Starter will operate when clutch pedal is in fully depressed position.
- 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) Lubricating oil pressure gauge (with colour zones)
  - iii) Coolant temperature gauge (with colour zones)
  - iv) Fuel level gauge (with colour zones).
  - v) Voltmeter (with colour zones)
  - vi) Battery charging gauge (with colour zones).
  - vii) Battery charging warning indicator.
  - viii) Main switch (key turn type)
  - ix) Light switch (Rotary type)
  - x) Turn indicator –cum-hazard indicator lamp
  - xi) Hazard light switch
  - xii) Turn indicator light switch
  - xiii) Horn push button
  - xiv) Head lamp (long beam) 'ON' indicator lamp
  - xv) Head lamp (short beam) 'ON' indicator lamp
  - xvi) Steering control wheel
  - xvii) Hand accelerator lever
  - xviii) Fuel shut off - knob
  - xix) Rear view mirror
- 1.12**     **Transmission System:**
- 1.12.1**     **Clutch:**  
 Make : Luk India  
 Type : Dual, dry friction plates & pads  
 No. of friction plate : Two  
 Material of lining : Ceramettalic

**Size, OD/ID (mm):**

- Transmission : 277.28/167.37  $\varnothing$  having four pads of 27.5 cm<sup>2</sup> area of each pad
- PTO : 278.72/167.96  $\varnothing$

**Method of operation:**

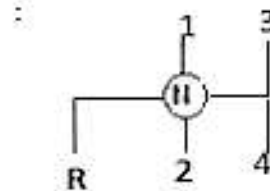
- Transmission : By pressing the pedal half way
- PTO : By pressing the pedal fully.

**1.12.2****Gear box:**

- Make : Eicher
- Model : Not specified
- Type : Mechanical, combination of constant & sliding mesh gears

**No. of speeds:**

- Forward : 8
- Reverse : 2

**Gear shifting pattern**Gear selection leverRange selection lever**Location of gear shifting levers with side shift :**

- Main gear shifting lever : RHS of operator's seat
- Range selection lever : LHS of operator's seat
- Oil capacity (l) : 42.0 (Common with differential, final drive, brakes, steering & hydraulic system)
- Oil changing period : After every 1000 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 14.9-28 size tyres of 640 mm radius index, (kmph)
Forward	L1	147.17	3.28
	L2	97.57	4.94
	L3	68.73	7.01
	L4	43.52	11.11
	H1	49.47	9.76
	H2	32.79	14.72
	H3	23.11	20.89
	H4	14.65	32.93
Reverse	LR	113.28	4.24
	HR	38.22	12.62



<b>1.12.4 Differential:</b>	
Type	: Crown wheel & bevel pinion with differential unit accommodated inside the differential housing.
Reduction through crown wheel & bevel pinion	: 3.600 : 1 (36/10 T)
Oil capacity (l)	: 42.0 (common with gear box, final drive, brakes, steering & hydraulic system)
Oil changing period	: After every 1000 hours of operation.
<b>Differential lock :</b>	<b>: Not provided</b>
<b>1.12.5 Rear axle &amp; final drive:</b>	
Type	: Bull gear & pinion type accommodated inside differential housing.
Reduction through final drive	: 4.07 : 1 (57T/14T)
Oil capacity of final drive, (l)	: 42.0 (Common with gear box, differential, brakes, steering(optional) & hydraulic system)
Oil changing period	: After every 1000 hours of operation.
<b>1.13 Power lift (Hydraulic System):</b>	
- Make	: Eicher (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 acts as transport lock
<b>1.13.1 Hydraulic pump:</b>	
- Make	: DTL
- Type	: Gear
- Location	: On RHS of engine
- Method of drive	: Through timing gears
No. & Type of filter	: One throw away type filter provided in returning line on RHS of ADDC housing and one strainer provided in the suction line.
Hydraulic oil capacity, ( l )	: 42.0 (Common with gearbox, differential, final drive, brakes & steering system)
Oil change period	: After every 1000 hours of operation
Provision for external tapping	: Provided
Details of control levers	: i) Position control lever (yellow) ii) Draft control lever (black) iii) A knob on distributor for transport lock iv) Another knob on distributor for external circuit
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
I.	<b>Upper hitch points:</b>			
	a)	Dia of hitch pin hole	19.30 to 19.50 / 25.70 to 25.90	25.88 Conforms to Cat. II
	b)	Width of ball	44.0 (max.) / 51.0 (max)	50.87 --do--
II.	<b>Lower hitch points:</b>			
	a)	Dia of hitch pin hole	22.40 to 22.65 / 28.70 to 29.00	29.00 Conforms to Cat. II
	b)	Width of ball	34.80 to 35.00 / 44.80 to 45.00	44.80 --do--
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)	160 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	575 Conforms to Cat. I & II
VI.	Transport height		820 (min) / 950 (min)	865 Conforms to Cat. I & II
VII.	Movement (power) range (Without force)		560 (min) / 650 (min)	645 Conforms to Cat. I
VIII.	Leveling adjustment		100 (min) / 100 (min)	250 Conforms to Cat. I & II
IX.	Lower hitch point tyre clearance		100 (min) / 100 (min)	280 --do--
X.	Lower hitch point height		200 (max) / 200 (max)	200 --do--

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

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

S. No.	Parameter	Notation	Dimension or range, (mm)	Setting used during test, (mm)
1	2	3	4	5
1.	Length of lower link	A	790	790
2.	Length of lift arm	B	250	250
3.	Length of lift rods	C	625 to 700	630
4.	Length of top link	D	545 to 700	600
5.	Distance of lift rod connection point from pivot point of lower link,	E	445, 475	445



1	2	3	4	5
6.	Distance of lower link pivot point from rear wheel axis:			
	-Horizontally	F	150, behind	150, behind
	-Vertically	G	125, below	125, below
7.	Distance of upper link pivot point from rear wheel axis:			
	-Horizontally	H	345, behind	345, behind
	-Vertically	J	240, 280 & 330, above	280, above
8.	Distance of lift arm pivot point from rear wheel axis:			
	-Horizontally	K	70, behind	70, behind
	-Vertically	L	360, above	360, above
9.	Height of lower hitch points relative to the rear wheel axis:			
	- In high position	M	70 to 225	205, above
	- In low position	N	- 595 to - 355	440, below
10.	Height of lower link hitch points when locked in transport position		205 mm above	

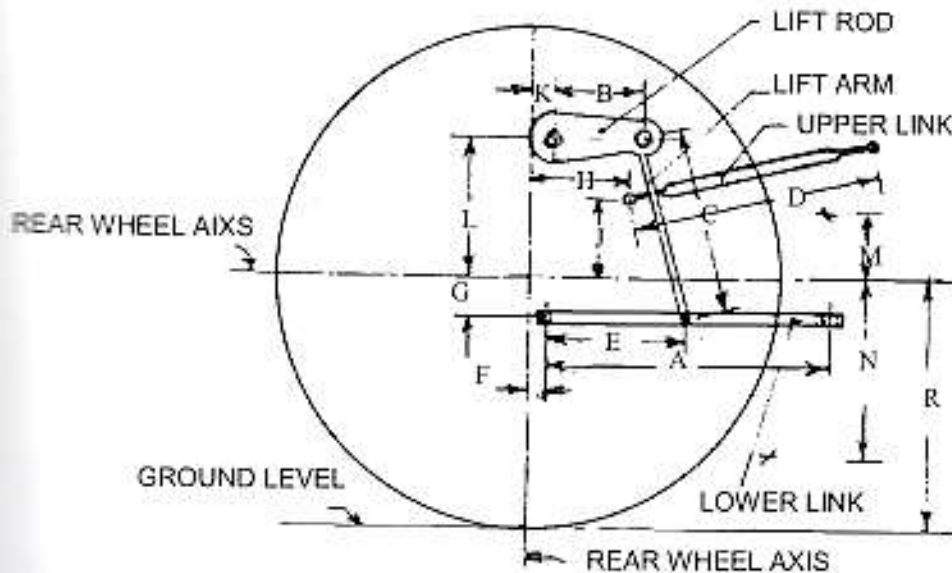


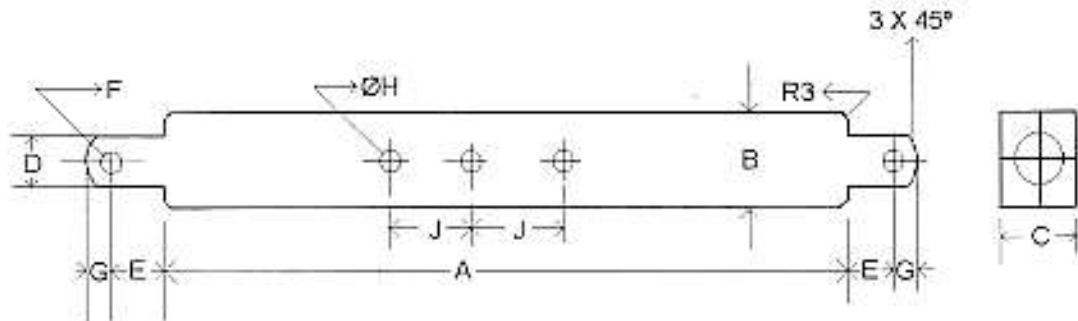
Fig.1 (a): DIMENSIONAL NOTATIONS FOR TABLE OF LINKAGE GEOMETRY

## 1.13.4 Drawbar:

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

Notation	As per IS: 12953-1995 (Cat. I) / (Cat. II), (mm)	As measured, (mm)	Remarks
A	683 ± 1.5 / 825 ± 1.5	683	Conforms to Cat-I
B	75 (min) / 75 (min)	75.0	Conforms to Cat-I & II
C	30 (min) / 30 (min)	30.28	- do -
D $\emptyset$	21.79 to 22.00 / 27.79 to 28.00	27.8	Conforms to Cat-II

1	2	3	4
E	39.0 (min) / 49.0 (min)	64.0	Conforms to cat-I & II
F $\varnothing$	12.0 (min) / 12.0 (min)	12.0	-do-
G	15.0 (min) / 15.0 (min)	23.0	-do-
H $\varnothing$	25 $\pm$ 1 / 25 $\pm$ 1	25.0	-do-
J	80 $\pm$ 1.5 / 80 $\pm$ 1.5	79.0	-do-
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
- 1.14 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 speed corresponding to rated engine speed (rpm) : 555
  - Distance behind rear axle, (mm) : 365
  - Engine to PTO speed ratio : 3,600 : 1
  - Whether the PTO shaft is capable of transmitting full power of the engine. : Yes
  - Other speeds, if any : 302,457,648,1022 & Reverse - 392

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

Specification	As per IS:4931-1995 (Type-I)	As observed	Remarks
1	2	3	4
Nominal speed, (rpm)	540 $\pm$ 10	540 rpm of PTO shaft corresponds to 1944 rpm of engine	Conforms
No. of splines	6	6	-do-
Direction of rotation	Clockwise	Clockwise	-do-
Location	The position of the centre of the end of PTO shaft shall be within 50 mm to right or left of the centre line of the tractor	Centrally located	-do-



1	2	3	4
<b>Dimensions (mm) [See Fig. 2(a)]:</b>			
D $\varnothing$	34.79 $\pm$ 0.06	34.83	-do-
d $\varnothing$	28.91 $\pm$ 0.05	28.86	-do-
B $\varnothing$	29.40 $\pm$ 0.10	29.50	-do-
A $\varnothing$ (optional)	8.3 $\pm$ 0.1	8.20	-do-
W	8.69 - 0.09 - 0.16	8.57	-do-
a	07	07	-do-
b	25 $\pm$ 0.5	24.50	-do-
c	38	38	-do-
X	30 <sup>D</sup>	30 <sup>D</sup>	-do-
B	76 (min)	86	-do-
h	450 to 675	610	-do-

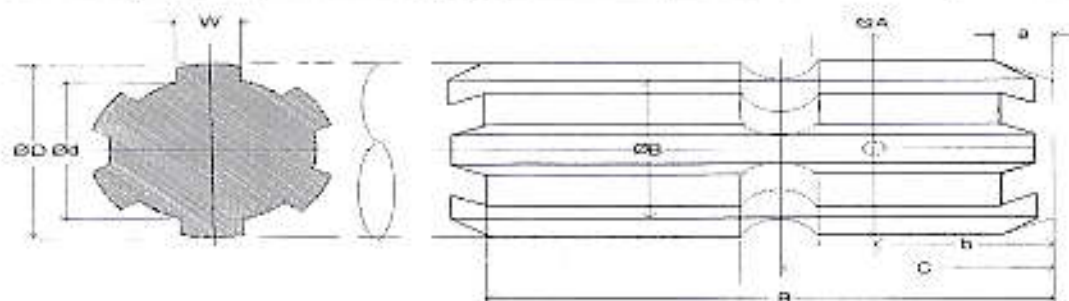


Fig. 2 (a): DIMENSIONAL NOTATIONS FOR TYPE-I POWER TAKE-OFF SHAFT

- 1.14.2 **Power Take-off Master Shield** : Not provided
- 1.15 **Towing hitch:**
- 1.15.1 **Front:**
- Type : Clevis
- Location : On the front axle support bracket
- Height above ground level,(mm) : 435 (fixed)
- Type of adjustment : None
- Width of clevis, (mm) : 61.0
- Dia of pin hole, (mm) : 22.0
- 1.15.2 **Rear:**
- Type : Clevis
- Location : At rear of transmission housing
- Height above ground level, (mm):
- Maximum : 750
  - Minimum : 520
  - No. of position : 04, at the step of 75 mm each
  - Type of adjustment : By changing the position of hitch on its mounting bracket and reversing the hitch





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	<b>Distance of hitch point,(mm):</b>	
	- From rear axle centre	: 465
	- From power take-off shaft end	: 100
	Dia of pin hole, (mm)	: 32.7
	Width of clevis, (mm)	: 75.7
<b>1.16</b>	<b>Steering system:</b>	
	Make	: ZF, India
	Type	: Mechanical with single drop arm
	Location	: Above clutch housing
	Method of operation	: Manual, by steering control wheel
	Diameter of steering control wheel, (mm)	: 455
	Steering oil capacity, ( l )	: 0.46 (std. fitment)
	Lubricant change period	: After every 1000 hours of operation
<b>1.17</b>	<b>Brakes:</b>	
<b>1.17.1</b>	<b>Service Brake:</b>	
	Make	: TVS Girling (apa)
	Type	: Oil immersed multi discs brakes
	Location	: On half axle of bull pinion shaft outside the differential housing
	No. of disc (s)	: Four (on each wheel side)
	Area of liners. (cm <sup>2</sup> )	: 945.91 (on each wheel side)
	Material of liners	: HO112.5 (apa)
	Method of operation	: Mechanical, Individual or combined pedal operation by right foot.
<b>1.17.2</b>	<b>Parking Brake:</b>	
	Type	: Pawl and ratchet arrangement
	Method of operation	: Service brake acts as parking brake when locked in position by a hand lever provided on RHS of operator's seat.
<b>1.18</b>	<b>Wheel Equipment:</b>	
<b>1.18.1</b>	<b>Steering Wheel(s):</b>	
	Make	: MRF Shakti life
	Number(s)	: Two
	Type of tyre	: Pneumatic, ribbed
	Size	: 6.00 -16
	Ply rating	: 8
	Maximum permissible loading capacity of each tyre at 200 kPa pressure, (kgf)	: 410 (As per ITTAC Manual)
	<b>Recommended inflation pressure, kPa :</b>	
	- for field work	: 177 to 206
	- for transport	: 177 to 206
	Track width, (mm)	: 1310 (Std.) & 1515
	Method of changing track width	: By reversing the wheel disc
	Make & size of rims	: AMW & 4.50 E x 16



- 1.18.2 Driving wheel:**
- |  |   |   |
|--|---|---|
| Make   | : | MRF shakti life   |
| Number   | : | Two   |
| Type of tyre   | : | Pneumatic, traction   |
| Size   | : | 14.9 - 28   |
| Ply rating   | : | 12  |
| Maximum permissible loading capacity of each tyre at 110 kPa pressure, (kgf) | : | 1410 (As per ITTAC Manual)  |
| <b>Recommended inflation pressure, (kPa):</b>                                |   |   |
| - for field work   | : | 90 to 98  |
| - for transport  | : | 96 to 110   |
| Track width, (mm)  | : | 1380 (std.), 1510, 1550, 1660 & 1770  |
| Method of changing track width   | : | By reversing the wheel disc and changing position of wheel disc on offset rim lugs. |
| Make & size of rim   | : | WILP & W13 x 28   |
- 1.18.3 Wheel base (mm)** : 1980  
**Method of changing wheel base, if any** : None
- 1.19 Operator's seat:**
- |                                   |   |                               |
|-----------------------------------|---|-------------------------------|
| Make                              | : | Harita (apa)                  |
| Type                              | : | Cushioned seat with back rest |
| Type of suspension                | : | Two Helical coil springs      |
| Type of dampening                 | : | Hydraulic shock absorber      |
| <b>Range of adjustment, (mm):</b> |   |                               |
| - Vertical                        | : | Nil                           |
| - Lateral                         | : | Nil                           |
| - Longitudinal                    | : | ± 60                          |
- 1.20 Provision for safety and comfort of operator:**
- 1.20.1 Conformity with IS:12343-1998 (Reaffirmed in March, 2009):**  
 The operator's seat meet the minimum requirements of IS: 12343-1998, (Re-affirmed in March,2009),except the following:  
 i) Width of seat.
- 1.20.2 Conformity with IS: 6283 (Part-1) – 2006 (Reaffirmed in March, 2009) & IS:6283 (Part-2) – 2007 (Reaffirmed in March, 2009):**  
 All the controls are identifiable with symbols as per IS: 6283 (Part-1 & 2)-1998.
- 1.20.3 Conformity with IS:8133-1983 (Reaffirmed in March, 2009):**  
 Location and movement of various controls meets the requirement of IS:8133-1983 (Re-affirmed in March, 2009), **except the following:**  
 i) Differential lock.
- 1.20.4 Conformity with IS: 12239 (Part-1)-1996 (Reaffirmed in February, 2012):**  
 Meets the requirements of IS:12239(Part-1)-1996, **except the following:**  
 i) Provision of spark arresting device in the exhaust system.



**1.20.5 Conformity with IS:12239 (Part-2)-1999 (Reaffirmed in March, 2009):**

Meets the requirements of IS:12239 (Part-2)-1999, except the following:

- i) Differential lock is not provided.
- ii) PTO master shield has not been provided.
- iii) Working clearance between position control lever and mudguard is less than 70mm.

**1.20.6 Conformity with IS: 14683 – 1999 (Re-affirmed in March, 2009) :**

Lightings meet the requirements of IS: 14683-1999.

**1.20.7 Rear view mirror:**

Rear view mirror is provided.

**1.20.8 Slow moving emblem:**

Slow moving emblem is 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 out side of the mudguard and provides the following information:

Name of Manufacturer	:	Eicher Tractors (A Unit of Tafe Motors And Tractors Limited), Mandideep, Dist - Raisen (M.P.) – India
Make	:	Eicher
Model	:	Eicher 551
Year of manufacture	:	2015
Engine serial number	:	523026414272
Chassis serial number	:	923615447289
Maximum P.T.O Power, kW	:	31.6
Specific fuel consumption, g/kWh	:	258

**1.22 Ballast Mass, (kg):**

Particulars	As used during drawbar test	As used during field test		As used during Haulage test
		Dry land		
Front	C.I. weight	50	50	Nil
	Water	Nil	Nil	Nil
Rear	C.I. weight	280	140	Nil
	Water	300	300	Nil
	Additional weight, if any	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) Without ballast	870	1320	2190
ii) With ballast as used during drawbar performance test.	925	1895	2820
iii) With ballast as used during field test	935	1745	2680
iv) With ballast as used during haulage test with trailer hitch, canopy and drawbar.	880	1340	2220

**1.24 Overall dimensions:**

Condition	Length, (mm)	Width, (mm)	Height, (mm)		Ground Clearance, (mm)
			With exhaust pipe	Without exhaust pipe	
Without ballast	3660	1775	2260	1755	375 (Below bumper)

**1.25 Number of external lubricating points:**

- Oiling : None
- Grease nipples : 13
- Grease cups : 02

**1.26 Colour of tractor:**

- Chassis & engine : Black
- Bonnet : Silver
- Mudguard, wheel discs & rims : Silver

**1.27 Optional features, if any**

- i) Single clutch
- ii) Power steering

**1.27.1 Details of Optional features:****1.27.1.1 Clutch:**

- Make : AMREP
- Type : Dry friction plate, diaphragm type
- No. of friction plate(s) : One
- Material of lining : Cerametallic
- Size, OD/ID (mm):**
- Transmission : 279.62 / 165.38 Ø
- Method of operation**
- Transmission : By pressing the clutch pedal fully provided on LHS of operator's seat.

**1.27.1.2 Power Steering:**

- Make of distributor : Danfoss
- Type : Open centre, Hydrostatic (power steering)
- Location : Above clutch housing
- Diameter of steering control wheel, (mm) : 455
- Method of operation : Manually, through steering control wheel
- Make and type of pump : Dowty
- Location : Mounted on RHS of engine
- Method of drive : Through timing gears
- Make, type & number of hydraulic ram cylinder : Not specified, double acting & one
- Location of ram cylinder : Above the front axle at rear side, centrally located
- Lubricant capacity of system (l) : 42.0 (Common with gearbox, differential, final drive, brakes & hydraulic system)
- Lubricant change period : After every 1000 hours of operation.



## 2. FUEL AND LUBRICANTS

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

### 2.2 Lubricants:

S.No.	Particulars	As recommended by the manufacturer	As used during the test
1.	Engine oil	15W40	SAE 15W40
2.	Air cleaner oil	15W40	SAE 15W40
3.	Transmission, differential, final drive and hydraulic system oil	Elf, 3l SF	Oil originally filled in the tractor was not changed
4.	Steering housing oil	Elf, 3 SF	-do-
5.	Grease	Multi purpose	Servo Grease MP

## 3. PTO PERFORMANCE TEST

- Date(s) of test : 06.12.2016 & 07.12.2016  
 Tractor run at the Institute prior to start : 9.82  
 of PTO test (h)  
 Type of dynamometer bench used : Eddy Current, ESF 1000S

- 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)	
1	2	3	4	5	6	7
<b>a) Maximum power – 2 hours test:</b>						
31.3	555	1998	9.04	7.56	0.242	3.46
30.1	555	1998	8.73	7.30	0.243	3.45*
<b>b) Power at rated engine speed (2000 rpm):</b>						
31.3	555	1998	9.04	7.56	0.242	3.46
30.1	555	1998	8.73	7.30	0.243	3.45*
<b>c) Power at standard power take-off speed (540 ± 10 rpm):</b>						
31.1	539	1940	8.85	7.40	0.238	3.51
29.8	540	1944	8.61	7.20	0.242	3.46*
<b>d) Varying loads at rated engine speed:</b>						
<b>i) Torque corresponding to maximum power available at rated engine speed:</b>						
31.3	555	1998	9.04	7.56	0.242	3.46
<b>ii) 85% of the torque obtained in (i):</b>						
28.0	582	2095	8.34	6.98	0.249	3.36
<b>iii) 75% of the torque obtained in (ii) :</b>						
21.2	588	2117	6.89	5.76	0.272	3.08



1	2	3	4	5	6	7
iv) 50% of the torque obtained in (ii) :						
14.3	592	2131	5.57	4.66	0.326	2.57
v) 25% of the torque obtained in (ii) :						
7.2	595	2142	4.23	3.54	0.492	1.70
vi) Unloaded:						
1.3	603	2171	3.25	2.72	2.092	0.40
e) Varying loads at standard PTO speed:						
i) Torque corresponding to maximum power available at standard PTO speed (540 ± 10 rpm):						
31.1	539	1940	8.85	7.40	0.238	3.51
ii) 85% of the torque obtained in ( i ):						
27.6	563	2027	8.10	6.77	0.245	3.41
iii) 75% of the torque defined in (ii):						
20.8	567	2041	6.65	5.56	0.267	3.13
iv) 50% of the torque defined in (ii):						
14.0	571	2056	5.32	4.45	0.318	2.63
v) 25% of the torque defined in (ii):						
7.1	575	2070	4.07	3.40	0.479	1.74
vi) Unloaded:						
1.2	583	2099	3.03	2.53	2.108	0.40

\* Under high ambient conditions

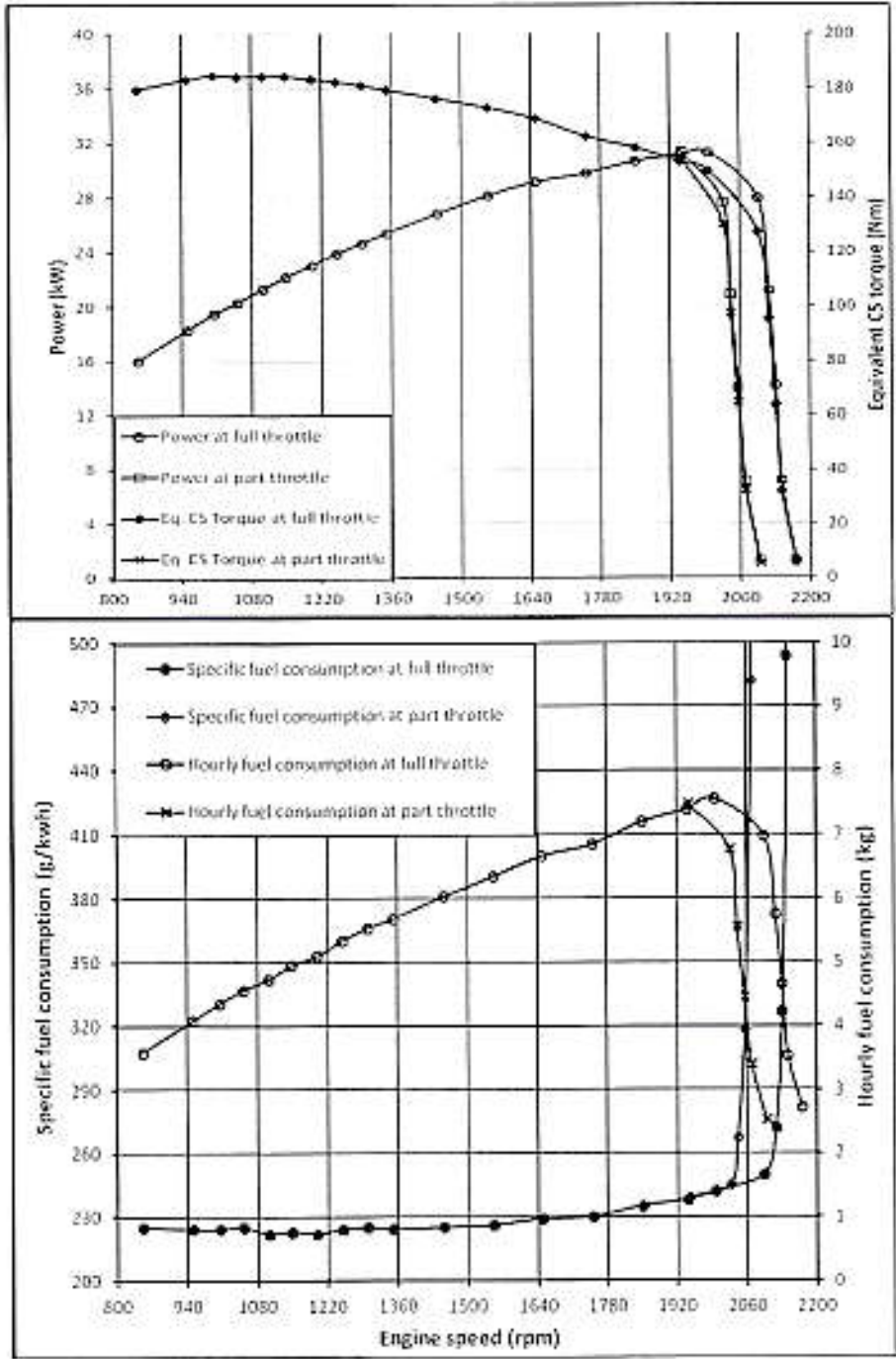


Fig.3: PTO PERFORMANCE CHARACTERISTICS (NATURAL AMBIENT)

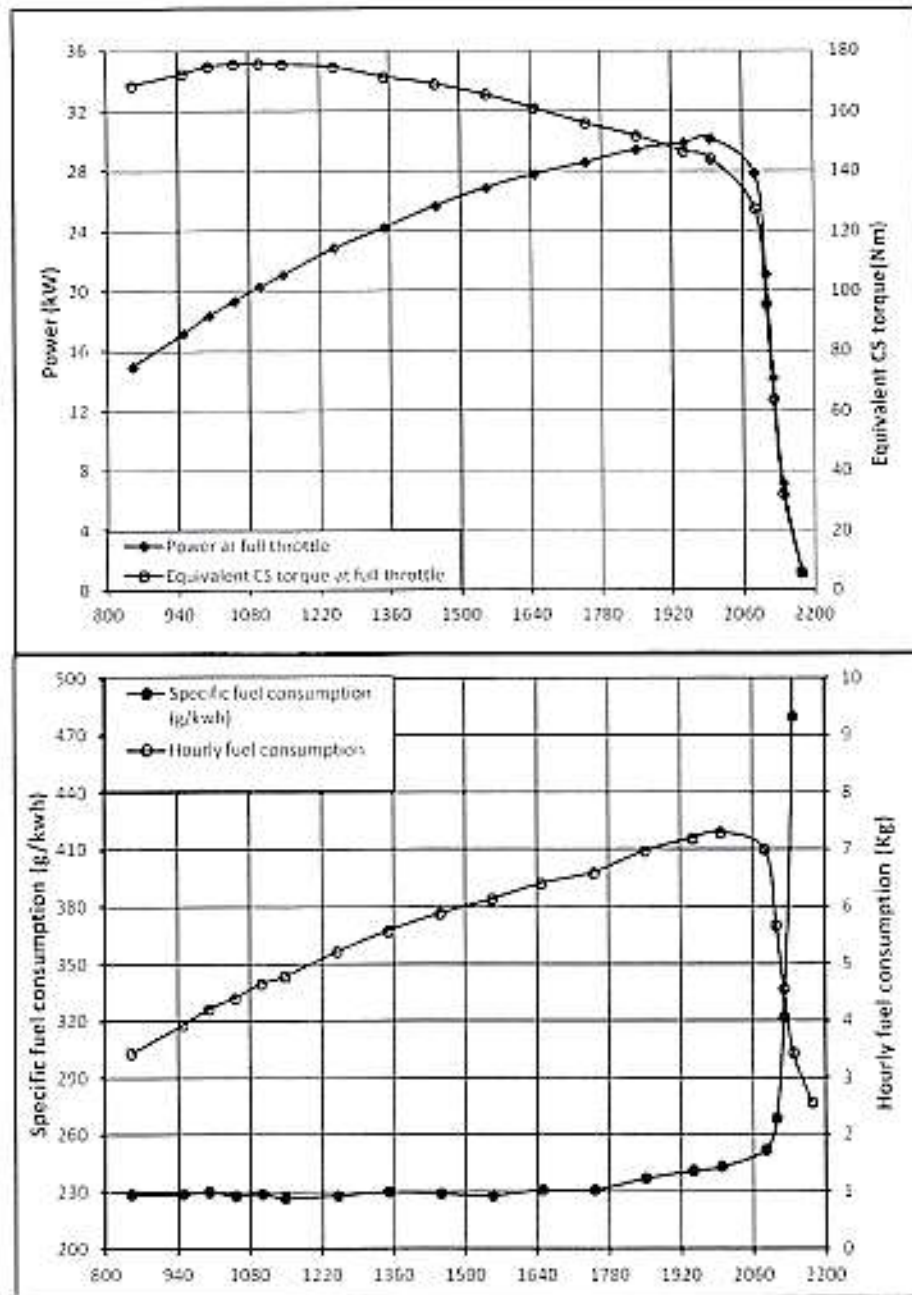


Fig.4: PTO PERFORMANCE CHARACTERISTICS (HIGH AMBIENT)



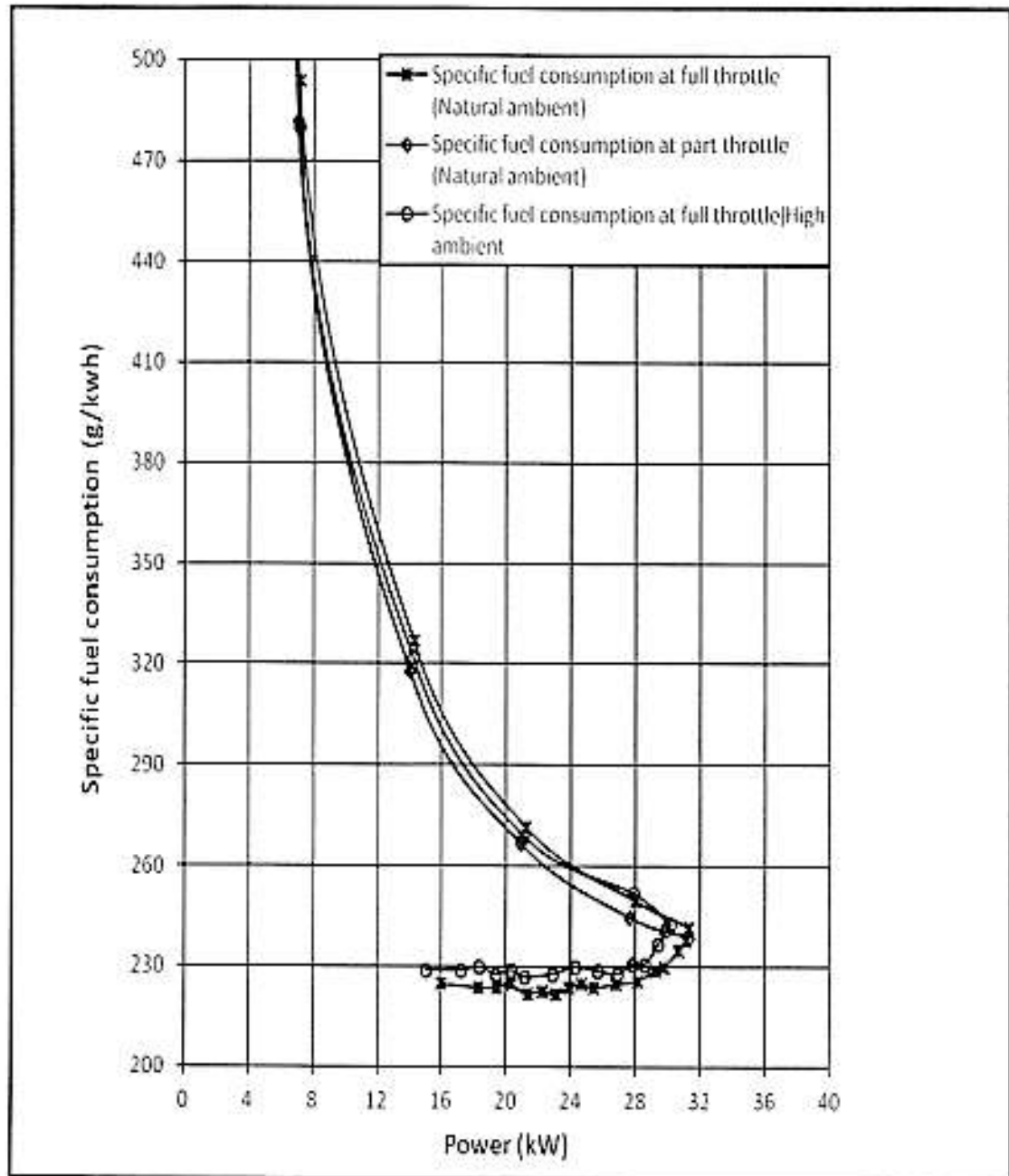


Fig.5: PTO PERFORMANCE CHARACTERISTICS



	<u>Natural ambient</u>	<u>High ambient</u>
-No load maximum engine speed, (rpm)	2171	2174
-Equivalent crankshaft torque at maximum power, (Nm)	149.83	143.97
-Maximum equivalent crankshaft torque, (Nm)	184.76	175.86
-Engine speed at maximum equivalent crankshaft torque, (rpm)	1004	1102
- Backup torque, (%)	23.31	22.15
Smoke level, maximum light absorption coefficient, per meter	0.22	--
<b>-Range of atmospheric conditions:</b>		
Temperature ( °C)	26 to 27	42 to 44
Pressure, (kPa)	99.29 to 99.81	100.49 to 101.11
Relative humidity (%)	20 to 27	23 to 40
<b>-Maximum temperatures, (°C):</b>		
Engine oil	101	111
Coolant	79	93
Fuel	41	58
Air intake	29	46
Exhaust gas	517	511
<b>-Pressure at maximum power:</b>		
Intake air, ( kPa )	3.07 to 3.20	2.80
Exhaust gas, ( kPa )	8.93 to 9.20	9.33 to 9.40
<b>-Consumptions :</b>		
Lub oil, (g/kWh)	--	0.50
Coolant, (% of total coolant capacity)	--	Nil

#### 4. DRAWBAR PERFORMANCE TEST

Date(s) of test	: 19.04.2017, 20.04.17 & 21.04.2017
Tractor run at the Institute prior to start of drawbar test, (h)	: 29.67
Type of track	: Concrete
<b>Height of drawbar, (mm):</b>	
- Without ballast	: 600
- With ballast	: 525

- 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)	Drawbar power, (kW)	Drawbar pull, (kN)	Engine Speed, (rpm)	Wheel Slip, (%)	Fuel consumption		Specific Energy, (kWh/t)	Atmospheric conditions				Temperature (°C)			Max. sustained pull, (kN)
						(kg/kWh)	(lt/h)		Temp (°C)	Pressure (kPa)	RH, (%)	Fuel	Trans. oil	Cylinder Liner temp	Engine oil	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<b>i) Maximum power test (Tractor Unballasted):</b>																
L1	3.01	14.6	17.42	2110	15.2	0.369	6.44	2.27	31	98.6	20	37	61	86	99	18.52
L2	4.50	21.6	17.24	2084	14.7	0.326	8.42	2.56	26	98.5	21	35	61	86	100	17.66
L3	6.62	26.2	14.24	2002	8.0	0.292	9.15	2.86	26	98.6	27	33	58	86	97	17.16
L4	10.82	27.0	8.99	1998	4.9	0.263	9.14	2.95	25	98.5	25	32	56	86	97	11.75
H1	9.43	28.4	10.84	2001	5.8	0.271	9.21	3.08	24	98.5	23	31	53	85	96	13.54
<b>ii) Maximum power test (Tractor ballasted):</b>																
L1	2.96	18.5	22.51	2094	14.9	0.338	7.48	2.47	30	98.5	23	39	63	87	100	24.53
L2	4.52	25.3	20.14	2002	9.7	0.297	8.99	2.91	30	98.5	24	37	61	87	101	23.39
L3	6.66	26.6	14.38	1997	6.1	0.267	9.13	2.91	29	98.5	24	36	58	89	99	17.81
L4	10.85	26.6	8.83	2006	3.9	0.265	9.06	2.94	28	98.5	22	35	55	86	97	11.82
H1	9.41	27.3	10.44	1998	4.7	0.260	9.14	2.99	26	98.4	23	33	52	86	97	13.28



Contd. Table - 2

G e a r	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 load- and pull, (kN)	
						(kg/ kWh)	(l/h)		Temp (°C)	Pre- sure (kPa)	H.H. (%)	Fuel	Trans- oil	Cabin- oil Temp		Engi- ne 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>																
L2	4.99	20.9	15.09	2097	6.4	0.305	7.76	2.76	26 to 35	98.3 to 98.5	23 to 35	32 to 43	34 to 77	65 to 69	76 to 103	--
<b>iv) Five hours test at pull corresponding to 15 percent wheel slip (ballasted wheeled tractor):</b>																
L1	2.92	18.3	22.56	2085	--	0.337	7.52	2.42	38 to 39	97.7 to 98.0	13 to 21	46 to 48	61 to 75	84 to 88	97 to 102	--

i) The lubricating oil and coolant consumption during 10 hours test was observed as nil for both.

ii) Tyre Creeping, (mm):

- LHS : 55  
- RHS : 50

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

Engine oil : 103  
Coolant : 91  
Transmission oil : 77  
Fuel : 48

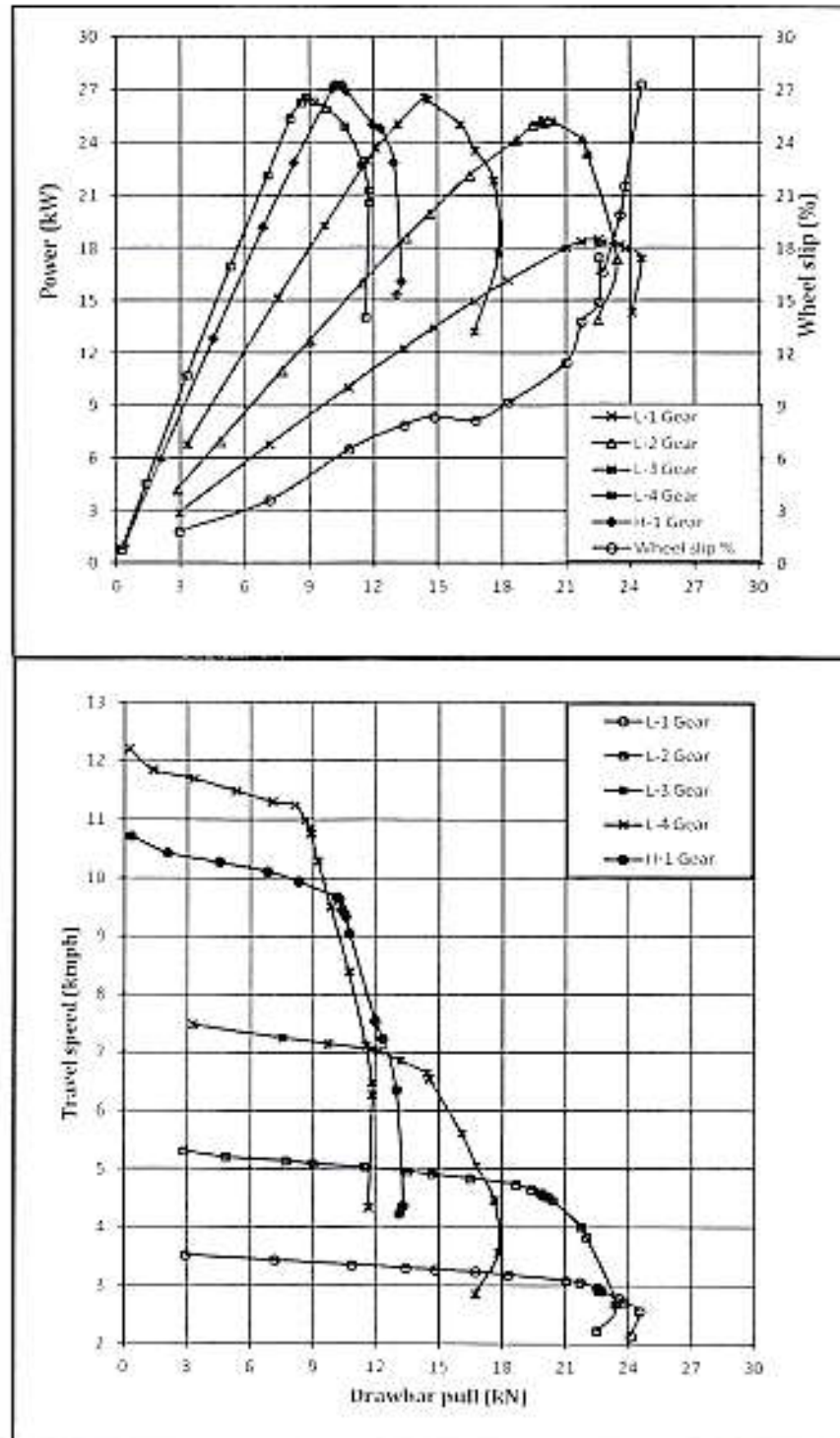


Fig.6: DRAWBAR PERFORMANCE CHARACTERISTICS

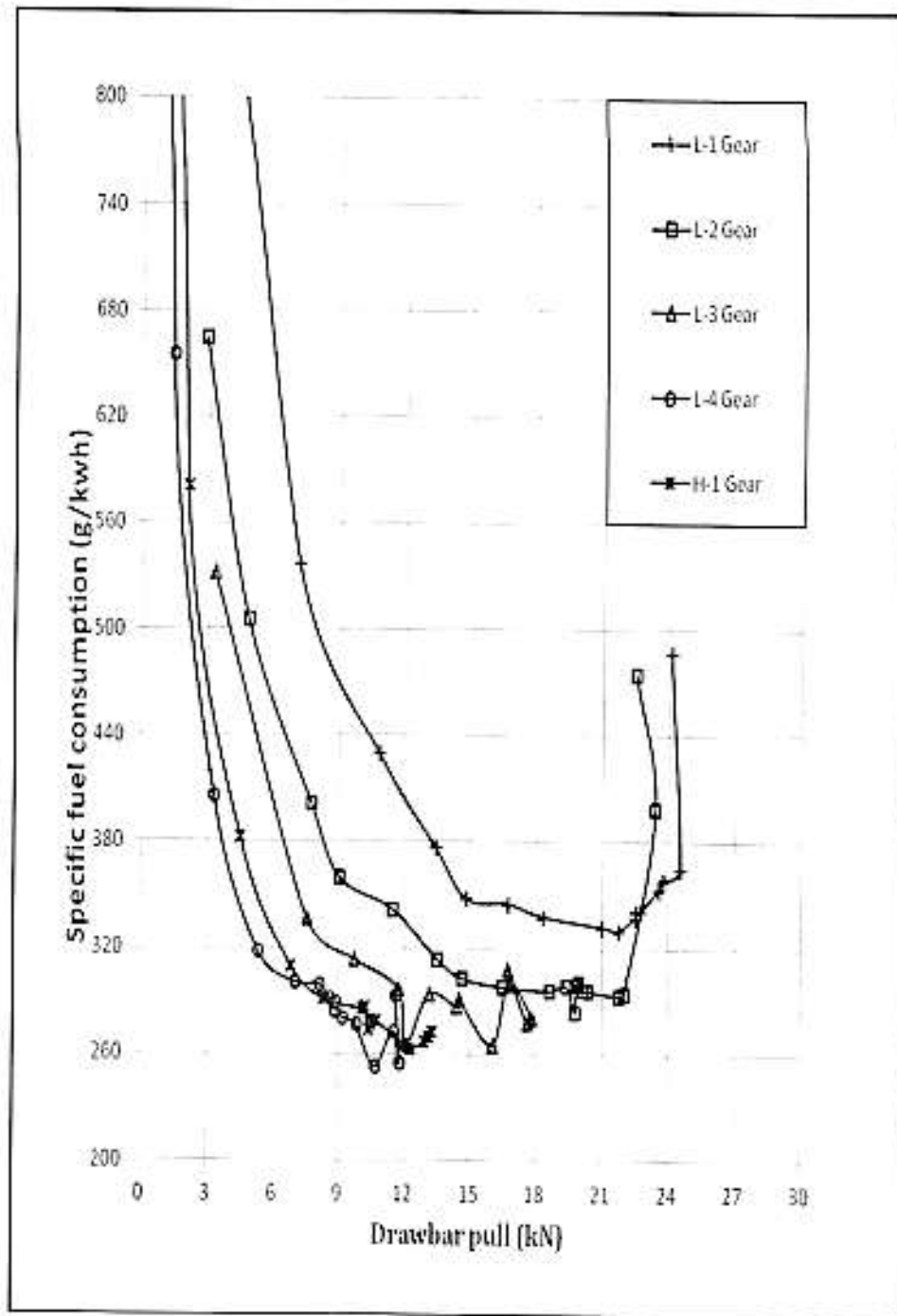


Fig.7: DRAWBAR PERFORMANCE CHARACTERISTICS



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

Date(s) of test : 09.08.2016, 11.08.2016 & 12.08.2016  
 Tractor run at the Institute prior to start of hydraulic test, (h) : 0.20  
 Pump speed at rated engine speed,(rpm) : 2000

#### 5.1 Hydraulic power test:

Pump delivery rate at minimum pressure and rated engine speed, (l/min) : 23.30  
 Maximum hydraulic power, (kW) : 5.93  
 Pump delivery rate at maximum hydraulic power, (l/min) : 22.25  
 Pressure at maximum hydraulic power, (MPa) : 16.5  
 Sustained pressure of the open relief valve, (MPa) : 18.0

#### Tapping point:

a) Relief valve test : External circuit  
 b) Pump performance test : At pump outlet  
 Temperature of hydraulic fluid, (°C) : 60 to 61

#### 5.2 Lifting capacity test :

Test	Height of lower hitch point above ground in down position, (mm)	Vertical movement with lifting forces, (mm)	Maximum 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	645	17.50	17.2	16.45	--
On the standard frame	200	645	12.68	17.4	19.78	13.6

#### 5.3 Maintenance of lift load:

Force applied at the frame, (kN) : 11.41  
 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)	00	01	02	03	04	05



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**6. BRAKE TEST**

**6.1 Service brake:**

**6.1.1 Cold brake test:**

Date of test(s) : 30.08.2016  
 Type of Track : Concrete  
 Maximum attainable speed (kmph):  
 Unballasted : 35.00

		At maximum attainable speed			
Un ballasted tractor	Braking device control, force (N)	504	426	334	235
	Mean deceleration, (m/sec <sup>2</sup> )	3.24	3.03	2.82	2.50
	Stopping distance, (m)	14.58	15.61	16.77	18.90

		At 25 kmph travel speed			
Un ballasted tractor	Braking device control, force(N)	525	425	325	224
	Mean deceleration, (m/sec <sup>2</sup> )	3.17	2.97	2.78	2.50
	Stopping distance, (m)	7.95	8.13	8.67	9.65

**6.1.2 Brake fade test:**

		At maximum attainable speed			
Un ballasted tractor	Braking device control force(N)	532	433	348	271
	Mean deceleration, (m/sec <sup>2</sup> )	3.15	3.01	2.76	2.50
	Stopping distance, (m)	14.98	15.73	17.08	18.90

		At 25 kmph travel speed			
Un ballasted tractor	Braking device control force, (N)	545	465	385	304
	Mean deceleration, (m/sec <sup>2</sup> )	3.20	2.94	2.78	2.50
	Stopping distance, (m)	7.78	8.19	8.68	9.65

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

**Remarks:** The applicant had not recommended any ballasting for road application. Hence, the brake fade test was conducted in unballasted condition.

**6.2 Parking brake test:**

Particulars	18 percent slope		12 percent slope with trailer mass of 2.20 tonnes.	
	Up	Down	Up	Down
Braking device control force, (N)	240	270	330	319
Efficacy of parking brake	-----Satisfactory -----			





## 7. NOISE MEASUREMENT

- 7.1 Noise at bystander's position:**
- Date of test : 06.09.2016  
 Type of track : Concrete  
 Background noise level, dB (A) : 53.1
- Atmospheric conditions:**
- Temperature, (°C) : 33  
 Pressure, (kPa) : 98.4  
 Relative humidity, (%) : 62  
 Wind velocity, (m/s) : 1.4

### TEST DATA:

S. No.	Gear	Travelling speed before acceleration, (kmph)	Noise level, dB (A)
1.	L1	2.70	81
2.	L2	4.04	80
3.	L3	5.76	80
4.	L4	9.02	80
5.	H1	7.99	80
6.	H2	11.59	79
7.	H3	16.95	81
8.	H4	26.44	81

- 7.2 Noise at operator's ear level:**
- Date of test : 19.04.2017  
 Type of track : Concrete  
 Background noise level, dB(A) : 57.1
- Atmospheric conditions:**
- Temperature, (°C) : 32  
 Pressure, (kPa) : 98.6  
 Relative humidity, (%) : 19  
 Wind velocity, (m/s) : 1.5

### Test Data :

Gear	Drawbar pull at which the tractor develops the max. noise level, (kN)	Corresponding travelling speed, (kmph)	Noise level dB (A)
L1	7.32 to 17.41	3.43 to 3.01	90
L2	16.79 to 16.96	4.63 to 4.50	91
L3*	9.39 to 11.38	7.19 to 7.07	95
L4	8.98	10.64	94
H1	1.47 to 8.07	10.88 to 10.25	91

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



### 8. AIR CLEANER OIL PULL-OVER TEST

Date of test	:	29.09.2016
<b>Atmospheric conditions:</b>		
Temperature, (°C)	:	34
Pressure, (kPa)	:	96.5 to 96.8
Relative humidity, (%)	:	66 to 70
Mass of oil before test, (g)	:	960.7

Sl. No.	Position of tractor	Loss of Oil, (g)	Oil pull-Over, (%)	Engine oil pressure
i)	Tractor parked on level ground	0.40	0.04	Normal
ii)	Tractor tilted 15° laterally with RHS up	Nil	Nil	Normal
iii)	Tractor tilted 15° laterally with LHS up	0.90	0.09	Normal
iv)	Tractor tilted 15° longitudinally with front end up	Nil	Nil	Normal
v)	Tractor tilted 15° longitudinally with rear end up	0.20	0.02	Normal

### 9. MECHANICAL VIBRATION MEASUREMENT

Date of test	:	09.12.2016
Type of test surface	:	Concrete

Sl. No.	Measuring points	Vibration, microns				
		At no load		At load corresponding to 85% of maximum PTO power		
		VD	HD	VD	HD	
i)	Foot rest	Left	120*	160*	70	130*
		Right	160*	130*	160*	110*
ii)	Steering control wheel	110*	80	120*	70	
iii)	Seat	Back	60	50	40	30
		Bottom	40	30	60	40
iv)	Mudguard	Left	60	100	120*	90
		Right	170*	130*	150*	150*
v)	Head light	Left	60	130*	90	100
		Right	70	150*	60	90
vi)	Battery base, centre	90	100	150*	120*	
vii)	Tail light	Left	100	60	60	140*
		Right	70	160*	100	160*
viii)	Plough light	240*	150*	120*	210*	
ix)	Gear shifting lever	60	60	30	40	
x)	Accelerator lever	Hand	60	40	140*	90
		Foot	70	60	70	60
xi)	Brake pedal	Left	70	100	110*	120*
		Right	150*	100	160*	160*
xii)	Clutch pedal	90	60	120*	270*	
xiii)	Main hydraulic control lever	40	30	40	40	
xiv)	PTO engaging lever	60	30	60	40	

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



### 10. LOCATION OF CENTRE OF GRAVITY

Condition	Particulars	Coordinates
Tractor under un-ballasted condition but with all the liquid reservoirs full & the operator replaced by a 75 kg mass on the seat.	Height above ground, (mm)	900.5
	Distance forward from the vertical plane containing the axis of rear wheels, (mm)	800.6
	Distance from the median plane parallel to the longitudinal axis of tractor bisecting the track, (mm)	06 (on RHS)

### 11. TURNING ABILITY

Characteristics	Minimum turning diameter, (m)		Minimum clearance diameter, (m)	
	LHS	RHS	LHS	RHS
<b>With standard fitment</b>				
Brake applied	6.20	6.28	6.70	6.78
Brakes released	6.88	7.01	7.44	7.57
<b>With optional fitment</b>				
Brake applied	6.35	6.23	7.01	6.89
Brakes released	7.09	7.06	7.65	7.62

### 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.

- The non-visible space in front is 7300 mm which is 3.69 times of its wheel base (i.e. 1980 mm).
- The non-visible space in LHS & RHS is 2800 mm which is 2.03 times of its rear track width (i.e. 1380 mm).
- The major parts creating masking effect are silencer and pre-cleaner.

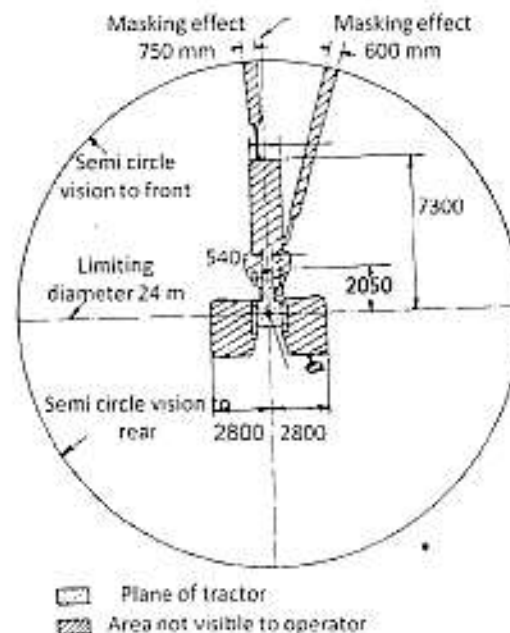


Fig.8: OPERATOR'S FIELD OF VISION



### 13. FIELD TEST

- 13.1 The field tests comprising of Disc Ploughing, rotavation and puddling (including water proof test for five hours) were conducted for 10.4, 10.2 and 16.9 hours respectively. All the field tests were conducted at the full accelerator settings, when the no load speed of the engine was 2160 to 2196 rpm.
- 13.2 The brief specifications of the implements used during field tests are given in **Annexure - I & II**.
- 13.3 The summary of field test observation with Disc plough, rotavator & puddling is given in **Table - 3**.

**Table - 3**

#### SUMMARY OF FIELD PERFORMANCE TEST

S.No.	Parameter/operation	Disc Ploughing	Rotavation	Puddling
i)	Type of soil	Heavy	Heavy	Heavy
ii)	Av. soil moisture, (%) / Av. depth of standing water (cm)	16 to 18	7 to 9	13
iii)	Bulk density of soil, (g/cc)	2.0 to 2.1	1.5 to 1.6	--
iv)	Cone index, (kgf/sq.cm) / Puddling index, (%)	5.10 to 6.81	6.81 to 7.66	84 to 86
v)	Gear used	L-1	L-1	L-1
vi)	Av. speed of operation, (kmph)	2.96 to 3.08	3.48 to 3.54	3.17 to 3.19
vii)	Av. wheel slip, (%) / Av. Travel reduction, (%)	10.8 to 13.6	-1.15 to -1.65	10.4 to 11.5
viii)	Av. depth of cut, (cm) / Av. Depth of puddles, (cm)	22	6	21 to 29
ix)	Av. working width, (cm)	93 to 97	167 to 176	--
x)	Area covered, (ha/h)	0.212 to 0.243	0.490 to 0.514	--
xi)	<b>Fuel consumption:</b>			
	- (l/h)	3.93 to 4.20	5.38 to 5.46	4.29 to 4.36
	- (l/ha)	17.31 to 18.56	10.47 to 11.15	--
xii)	Av. draft of implement, (kN)	7.61	--	--

**Remarks:** The average lub oil & coolant consumption during the entire field tests was observed to be Nil & 1.87 ml/h respectively.

#### 13.4 Wet land cultivation (Puddling):

- 13.4.1 The tractor was fitted with Full cage wheel for conducting the puddling operation. The brief specification of Full cage wheel as used is given in **Annexure- II**.
- 13.4.2 After completion of puddling test and water proof test, the tractor was partially dismantled to check effectiveness of sealing provided against ingress of water and / or mud in various assemblies / components as per requirements of IS : 11082 - 1984 (Technical requirement of agriculture tractors for wet land cultivation). The observations recorded were as under.



S.No.	Location	Whether ingress of mud and/or water	Remarks
1.	King pin assemblies	No	No ingress of water & mud found in any assembly
2.	Stub axles	No	
3.	Centre pin assembly	No	
4.	Clutch housing	No	
5.	Brake housing	No	
6.	Engine sump, transmission, hydraulic oil, steering and air cleaner oil	No	
7.	Starter motor	No	
8.	Alternator	No	

#### 14. HAULAGE TEST

Type of trailer	:	<b>Two wheel</b> <b>(Single axle)</b>	<b>Four wheel</b> <b>(Double axle)</b>
Gross mass of trailer, (tonne)	:	4.0	5.0
Height of trailer hitch above ground level, (mm)	:	580	610
Gear used during the test for negotiating slopes up to 8%	:	H4	H4
Average travel speed, (kmph)	:	32.06 to 32.31	30.19 to 33.09
<b>Average fuel consumption:</b>			
- (l/h)	:	5.97 to 6.13	5.99 to 6.40
- (cc/km/tonne)	:	46.5 to 47.4	38.7 to 39.7
Average distance traveled per litre of fuel consumption, (km)	:	5.27 to 5.37	5.04 to 5.17
<b>General observations:</b>			
Effectiveness of brakes	:	Effective	Effective
Maneuverability of tractor-trailer combination	:	Satisfactory	Satisfactory

#### 15. COMPONENTS / ASSEMBLY INSPECTION

The engine and other assemblies were dismantled after 85.95 hours of tractor operation at this Institute.

##### 15.1 Engine:

##### 15.1.1 Cylinder bore:

Cylinder No.	Cylinder bore dia, (mm)						Maximum 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.	108.04	108.00	108.06	108.00	108.03	108.00	108.25
2.	108.03	108.01	108.03	108.01	108.02	108.02	
3.	108.03	108.01	108.03	108.01	108.03	108.02	

**15.1.2 Piston:**

Piston No.	Piston dia. (mm)				Max. permissible wear limit of piston dia. (mm)	Clearance between piston and cylinder liner at the skirt of the piston. (mm)	
	Top (above top compression ring)		At skirt			As observed	Maximum permissible limit
	Thrust side	Non-thrust side	Thrust side	Non-thrust side			
1.	107.498	107.427	107.891	**	107.680	0.169	0.60
2.	107.504	107.428	107.895	**		0.135	
3.	107.516	107.425	107.905	**		0.125	

**15.1.3 Ring end gap, (mm):**

Rings	Cylinder No. 1			Cylinder No. 2			Cylinder No. 3			Max. Permissible end gap limit, (mm)
	Top	Middle	Bottom	Top	Middle	Bottom	Top	Middle	Bottom	
1 <sup>st</sup> comp. ring	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	4.0
2 <sup>nd</sup> comp. ring	0.90	0.90	0.90	0.80	0.80	0.80	0.80	0.80	0.80	4.0
Oil Ring	0.60	0.60	0.60	0.50	0.50	0.50	0.60	0.60	0.60	4.0

**15.1.4 Ring side clearance:**

Rings	Ring side clearance, (mm)			Max. Permissible clearance Limit, (mm)
	Piston-I	Piston-II	Piston-III	
	--Tapper ring--			--
1 <sup>st</sup> Compression ring	0.127	0.131	0.135	0.25
2 <sup>nd</sup> Compression ring	0.076	0.079	0.080	0.25
Oil ring	0.076	0.075	0.077	0.25

**15.1.5 Main bearings:**

Bearing No.	Diometrical Clearance, (mm)	Crankshaft end float, (mm)	Max. permissible clearance limit, (mm)	
			Diometrical clearance	Crankshaft end float
1.	0.122 to 0.179	0.30	0.60	0.80
2.	0.123 to 0.172			
3.	0.143 to 0.237			
4.	0.126 to 0.135			

**15.1.6 Big end bearings:**

Bearing No.	Clearance, (mm)		Max. permissible clearance limit, (mm)	
	Diometrical	Axial	Diometrical	Axial
1.	0.078 to 0.127	0.50	0.60	0.80
2.	0.084 to 0.113	0.40		
3.	0.098 to 0.124	0.45		



**15.1.7 Valves, 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 : 16.05 to 16.45 | Against the discard limit of 8.0 N/ mm  
 -Exhaust valve : 16.28 to 16.94

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

Intake valve : 0.032 to 0.043 | Against the discard limit of 0.40 mm  
 Exhaust valve : 0.052 to 0.065

**15.2 Clutch: Observation**

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

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

-Transmission : 10.97 to 10.99 | Against discard limit of 0.2 mm over the rivet head  
 -PTO : 7.68 to 7.70

**Height of lining over rivet head, (mm):**

-Transmission : 1.38 to 1.85 | Against discard limit of 0.2 mm over the lining  
 - PTO : 0.56 to 1.15

**15.3 Transmission gears:**

Any visual damage, pitting & chipping of any transmission gear teeth. : None  
 Backlash between crown wheel and pinion, (mm) : 0.262

Discard limit not specified.

**15.4 Brakes:**

Description	Initial specified overall thickness of brake disc, (mm)	Measured thickness of brake disc after test, (mm)	Measured depth of lining over oil groove, (mm)	Minimum permissible depth of lining over oil groove, (mm)
Left	4.75 to 4.90	4.80 to 4.83	0.51 to 0.70	0.2
Right	4.75 to 4.90	4.83 to 4.85	0.54 to 0.67	

**15.5 Front axle: Observation**

Any marked wear of king pins : None  
 Any marked wear of king pin bushes : None  
 Clearance between king pin and bushes, (mm) : 0.01 to 0.11 | Against the discard limit of 0.60 mm  
 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) : 0.10 to 0.23 | Against the discard limit of 0.60 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	Adjustment/Defects/Breakdowns and Repairs	Category of breakdown	Tractor run hours
- Nil -			

**17. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS**

**17.1** 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>17.1.1 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	31.6 (D)	31.3	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	31.6 (D)	31.3	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+ 5%	258(D)	242	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	175(D)	184.8	Yes





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1	2	3	4	5	6	7
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10 percent, min(R)	23.31	Yes
f)	Maximum operating temperature, (°C)					
	1) Engine oil	Non Evaluative	The declared value should not exceed the max. value specified by the oil company and the observed value under high ambient condition should not exceed the declaration.	135(D)	111	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.	120 (D)	93	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	Maximum 2.43(R)	0.50	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)	0.22	Yes
<b>17.1.2</b>	<b>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	18.0 (D) 18.01 (R) Minimum	22.51	Yes
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	13.9 (D) 13.96 (R) Minimum	17.42	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.	25.3 (D) 25.0 (R) Minimum	28.4	Yes
d)	Max. transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	115 (D)	77	Yes



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1	2	3	4	5	6	7
17.1.3	<b>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%]	17.3 (D)	17.5	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	11.8 (D) 7.37 (R) Minimum	12.7	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)	05	Yes

17.1.4	<b>Brake performance at 25 kmph:</b>					
a)	Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with Un ballast* (m):					
	1) Cold brake	Evaluative	10	10 (R)	7.95	Yes
	2) Hot brake	Evaluative	10	10 (R)	7.78	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)	224 to 304	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
*The manufacturer has not recommended ballasting for road test. Therefore, the brake test was conducted under unballasted condition only.						

17.1.5	<b>Noise measurement :</b>					
a)	Maximum ambient noise emitted by the tractor, dB(A)	Evaluative	As per CMVR	88 (R)	81	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96 (R)	95	Yes
17.1.6	<b>Amplitude of mechanical vibrations at :</b>					
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R)	160	No
	2) Right foot rest	Evaluative		100 (R)	160	No



1	2	3	4	5	6	7
	3) Seat (with driver seated)	Non Evaluative		100 (R)	60	Yes
	4) Steering wheel			100 (R)	120	No
17.1.7	Air cleaner pull over:	Non Evaluative	0.25% (Max)	0.25%	0.09%	Yes
17.1.8	<b>Haulage requirements :</b>					
a)	Gross mass of the trailers, (tones):					
	1) Two wheel	Non	--	4.0 (D)	4.0	Yes
	2) Four wheel	Evaluative	--	5.0 (D)	5.0	Yes
b)	Distance travelled / liter of fuel consumption, (km/l):					
	1) Two wheel	Non	--	4.0 to 6.0 (D)	5.27 to 5.37	Yes
	2) Four wheel	Evaluative	--	4.0 to 6.0 (D)	5.04 to 5.17	Yes
c)	Fuel consumption (ml/km/tonne):					
	1) Two wheel	Non	--	32 to 42 (D)	46.5 to 47.4	No
	2) Four wheel	Evaluative	--	40 to 45 (D)	38.7 to 39.7	No

17.1.9	<b>Wetland cultivation :</b>					
	Sealing for the following assemblies:	Evaluative	The identified assemblies should essentially meet the requirement of IS: 11082. No water ingress in the identified assembly given in column-2. If tractor does not meet the requirements of wetland cultivation, it may be recommended for dry land operation only.	There should be no ingress of water and/or mud	No ingress of water and/or mud was observed	Yes
	1) Clutch assembly	-do-				
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
	4) Engine oil	-do-				
	5) Transmission oil	-do-				
17.1.10	<b>Safety features :</b>					
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



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1	2	3	4	5	6	7
d)	Technical requirements for PTO shaft	Non Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--do--	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)	Requirements as per clause no.4 of table no. 1	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.

17.1.11 Labeling of tractors (Provision of labeling plate):						
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	--	Eicher	Yes
	2) Model	Evaluative		--	Eicher 551	Yes
	3) Year of manufacture	Evaluative		--	2015	Yes
	4) Engine serial number	Evaluative		--	523026414272	Yes
	5) Chassis number	Evaluative		--	923615447289	Yes
	6) Declaration of PTO power, (kW)	Evaluative		--	31.6	Yes
17.1.12 Discard limit for:						
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	108.25	108.00 to 108.06	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.60	0.125 to 0.169	Yes
(c)	<b>Ring end gap (mm):</b>					
	- Top comp. ring.	Evaluative	-do-	4.0	0.50	Yes
	- 2 <sup>nd</sup> comp. ring.		-do-	4.0	0.80 to 0.90	Yes
	- Oil ring.		-do-	4.0	0.50 to 0.60	Yes
(d)	<b>Ring groove clearance (mm):</b>					
	- Top comp. ring.	Evaluative	-do-	0.25	0.127 to 0.135	Yes
	- 2 <sup>nd</sup> comp. ring.		-do-	0.25	0.076 to 0.080	Yes
	- Oil ring.		-do-	0.25	0.075 to 0.076	Yes
(e)	<b>Clearance of main bearings (mm):</b>					
	- Diametrical clearance	Evaluative	-do-	0.60	0.122 to 0.237	Yes
	- Crankshaft end float	Evaluative	-do-	0.80	0.30	Yes



1	2	3	4	5	6	7
(f)	<b>Clearance of big end bearings, (mm):</b>					
	- Diametrical	Evaluative	-do-	0.60	0.078 to 0.127	Yes
	- Axial	Evaluative	-do-	0.80	0.40 to 0.50	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.60	0.007 to 0.112	Yes
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.60	0.104 to 0.230	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 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

17.2 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 may be provided.	Provided	Yes

**17.3 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)] : Conforms
- 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]] : Conforms
- 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

**17.4 Salient Observations:****17.4.1 Laboratory tests:****17.4.1.1 PTO Performance:**

- i) The maximum PTO power was recorded as 31.3 kW against the declaration of 31.6 kW which meets the requirement of IS: 12207-2014 with regard to tolerance limit.
- ii) The specific fuel consumption corresponding to maximum power was measured as 242 g/kWh against the declaration of 258 g/kWh, which is within the tolerance limit of IS: 12207-2014.
- iii) The backup torque is 23.31%.



- 17.4.1.2 Drawbar performance test:**  
During 10 hour drawbar test, the creeping of LHS & RHS rear tyre over the rims was observed as 55 mm & 50 mm respectively, which was considered on higher side. This may be looked into for necessary corrective action.
- 17.4.1.3 Hydraulic performance test:**  
The moment about the rear axle was computed as 23.69 kN-m at standard frame, which is considered on higher side as compared to the moment from front axle i.e. 20.43 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.
- 17.4.1.4 Mechanical Vibration:**  
The amplitude of mechanical vibration on various assemblies marked as (\*) in Chapter-9 of this test report are on higher side especially at left and right foot rest and steering control wheel. This calls for dampening down of vibrations to improve the operational comfort and service life of components.
- 17.4.1.5 Three point linkage:**  
The lateral distance from lower hitch point to centre line of tractor does not meet the requirement of IS: 4468 (Part-1)-1997. This should be looked into for necessary corrective action.
- 17.4.1.6 Operator's Seat**  
The width of seat does not meet the requirement of IS: 12343-1998 (Re-affirmed in March, 2009) and calls for necessary corrective action.
- 17.4.1.7 Location and movement of operator's controls:**  
Location and movement of operator's controls meets the requirements of IS: 8133-1993, **except the following:**  
- Provision of differential lock. This should be looked into.
- 17.4.1.8 Operator's controls and displays:**  
Operator's controls and displays meets the requirements of IS: 6283 (Part I & II)-1998, **except the following:**  
i) Differential lock
- 17.4.1.9 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.
- 17.4.1.10 Constructional requirement with regard to safety:**  
The working clearance between Position control and fender has not been provided as per IS: 12239(Part-II) 1999. This should be looked into for corrective action.
- 17.4.1.11 PTO Master shield:**  
PTO master shield not provided on tractor as per the requirements of IS: 4931-1995. This should be looked into.



- 17.4.1.12 The discard limit regarding Max. Permissible ring end gap given by applicant is very higher side. This should be looked into for corrective action.
- 17.4.2 **Field performance test:**
- 17.4.2.1 **Haulage performance:**
- i) The fuel consumption (ml/km/tonne) with two wheel trailer was observed as 46.5 to 47.4 ml/km/tonne against the declaration of 32 to 42 ml/km/tonne. This does not meet the requirement of IS: 12207-2014 and therefore, should be looked into for necessary corrective action.
- 17.4.2.2 **Wet land cultivation (Puddling operation):**  
No ingress of mud/or water was noticed during puddling operation of the tractor. Hence, it meets the requirements of IS: 11082-1984 (Technical requirements of agricultural tractors for wetland operation). The tractor is found suitable for wetland operation (Puddling).
- 17.5 **Maintenance / Service Problems:**  
No noticeable maintenance/ service problem was observed during the test.
- 17.6 **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 exhaust system.  
ii) Provision of differential lock.  
iii) Provision of PTO shaft master shield.  
iv) The working clearance between the position control lever & fender should be provided as per the requirement of relevant Indian Standard.  
v) Provision of differential lock.  
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.
- 17.7 **Adequacy of Literature supplied with machine:**
- 17.7.1 The following literature was supplied with the tractor for reference during the test.
- i) Operator's Manual in respect of Eicher, Eicher 551 tractor.  
ii) Tractor Parts Catalogue in respect of Eicher, Eicher 551 tractor.  
iii) Service Manual in respect of Eicher, Eicher 551 tractor.
- 17.7.2 The supplied literature was found adequate.
- 17.7.3 The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.





T-1103/1629/2017	EICHER, EICHER 551 TRACTOR - Commercial (Initial)
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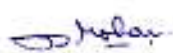
**18. CITIZEN CHARTER**

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	11 Months (August, 2016 to July, 2017)	No	Seasonal constraint

**TESTING AUTHORITY:**

  
**C. V. CHIMOTE**  
 TEST ENGINEER

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

  
**R.M. TIWARI**  
 SENIOR AGRICULTURAL  
 ENGINEER

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

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

**19. APPLICANT'S COMMENTS**

Para No.	Our Reference	Applicant's comments
19.1	17.4.1.2	Have taken up with tyre manufacturer for the improvement.
19.2	17.4.1.4	NVH project taken.
19.3	17.4.1.3,17.4.1.5,17.4.1.6,17.4.1.7,17.4.1.8, 17.4.1.9,17.4.1.10,17.4.1.11 & 17.4.1.12	These are being looked into and will be incorporate accordingly.
19.4	17.6	Recommendations are being looked into w.r.t design, development & implementation.

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

S. No	Item	Disc Plough	Rotavator
1.	Make	Mahindra	ACE
2.	Type	Mounted	Mounted
3.	No. of Disc/blades	Three	42, in 7 flange
4.	Type of Disc/blades	Plane concave	L shape
5.	Size of bottoms/blades, (mm)	610	250 x 80 x 7
6.	Spacing of bottoms/flanges, (mm)	520	250
7.	Lower hitch point span, (mm)	855	720
8.	Mast height, (mm)	440	530
9.	<b>Overall dimensions, (mm):</b>		
	- Length	1890	2040
	- Width	1080	1150
	- Height	1070	1160
10.	Gross mass, (kg)	365	420

**Annexure- II****BRIEF SPECIFICATION OF FULL CAGE WHEEL**

S. No.	Items	Specifications
1.	Type	Full cage wheel
2.	Dia, (mm)	1335
3.	Width, (mm)	1000
4.	No. and types of lugs	32, straight lugs made up of MS-angle section welded to angle iron frame.
5.	Size of angle section, (mm)	40 x 40 x 5
6.	Length of lugs, (mm)	490
7.	Spacing of lugs, (mm)	175
8.	Weight of each cage wheels (kg)	155

Annexure – IIITRACTOR RUN HOURS DURING TEST

<b>A.</b>	<b>LABORATORY AND TRACK TESTS:</b>	<b>HOURS</b>
1.	Running-in	--
2.	PTO performance test	12.07
3.	Power lift and hydraulic pump performance test	3.99
4.	Drawbar performance test	16.17
5.	Turning ability	0.2
6.	Location of centre of gravity	0.2
7.	Operator's field of vision	--
8.	Brake test	1.0
9.	Noise measurement	1.67
10.	Air Cleaner oil pullover test	3.50
11.	Mechanical vibration test	0.83
12.	Nominal speed test	0.50
<b>B.</b>	<b>FIELD TEST:</b>	
1.	Disc Plough	10.36
2.	Rotavation	10.16
3.	Wet land (puddling) operation (including water proof test)	16.91
<b>C.</b>	<b>HAULAGE TEST:</b>	5.19
<b>D.</b>	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	3.20
	<b>TOTAL:</b>	<b>85.95</b>