व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT (Initial)

संख्या / No. : T-1082/1607/2017
माह / Month : April, 2017

JOHN DEERE, 5310 V3 TRACTOR

सत्यमेव जयते

भारत सरकार
कृषि एवं किसान कल्याण मंत्रालय
(कृषि, सहकारिता एवं किसान कल्याण विभाग)
GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE AND FARMERS WELFARE
(DEPARTMENT OF AGRICULTURE, CO-OPERATION AND FARMERS WELFARE)
केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान
ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५
CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE
(An ISO : 9001 - 2008 Certified Institute)
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Manufacturer : **M/s. John Deere India Pvt. Ltd.**
Gat No. 166 - 167 & 271 - 291,
Off Pune - Nagar Road, Sanaswadi,
Pune – 412 208 (M.S.)

Month: April	Test Report No. T-1082/1607/2017	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 2007), and IS: 12207-2014
Period of Test	:	May, 2016 to March, 2017
Test Report No	:	**T- 1082/1607/2017**
Month/Year	:	**April, 2017**

i) The results reported in this report are observed values and no corrections have been applied for atmospheric and site conditions.

ii) The data given in this report pertains 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.)

S E L E C T E D C O N V E R S I O N S

Sl. No	Units	Conversion Factor
1	**Force:**	
	1 kgf	9.80665 N
		2.20462 lbf
2	**Power:**	
	1 hp	1.01387metric hp (Ps)
		745.7 W
	1 Ps	735.5 W
	1 kW	1.35962 Ps
3	**Pressure:**	
	1 psi	6.895 kPa
	1 kgf/cm^2	98.067 kPa = 735.56 mm of Hg
	1 bar	100 kPa = 10 N/cm^2
	1 mm of Hg	1.3332 m-bar

A B B R E V I A T I O N S

apa	As per applicant
TDC	Top Dead Centre
IS	Indian Standard
LHS/RHS	Left Hand Side/ Right Hand Side
Hg.	Mercury
Temp.	Temperature
N.R.	Not recorded
rpm	Revolutions per minute
O.D/I.D	Outer diameter/ Inner diameter
N.A.	Not available/ Not applicable
PTO	Power take-off
R.H.	Relative Humidity

C O N T E N T S

Manufacturer	:	**M/s. John Deere India Pvt. Ltd. Gat No . 166 - 167 & 271 - 291, Off Pune - Nagar Road, Sanaswadi, Pune– 412 208 (M.S.)**
Location of plant	:	**M/s. John Deere India Pvt. Ltd. Survey No. 501, Village – Khatamba Jamgod, Dewas Bhopal Highway, Dewas (Madhya Pradesh) 455115**
Test requested by (applicant)	:	The manufacturer
Selected for test by	:	The applicant
Place of running-in	:	At manufacturer's works
Duration of said running-in (h):		
- Engine	:	12
- Transmission	:	12
Method of Selection	:	The tractor was submitted directly by the applicant for test. Hence method of selection is not known.

1. SPECIFICATIONS

1.1 Tractor:

Make : John Deere

Model : 5310 V3

Variants, if any :

S. No.	Variant models (*)	Variant features
1.	5310 V1	Change in B range selection speeds.
	***The variant model have not been tested at this Institute yet.**	

Type	:	Four wheeled, Rear wheel driven, General Purpose, Agricultural Tractor.
Year of manufacture	:	BL-F (November, 2015)
Chassis number	:	1PY5310EKFA006924
Country of Origin	:	India

1.2 Engine:

Make	:	John Deere
Model	:	3029 HPY 60
Type	:	Four stroke, turbo charged, liquid cooled, direct injection, diesel engine.
Serial number	:	PY3029H058374
Engine speed (Manufacturer's recommended production setting), (rpm):		
- Maximum speed at no load,	:	2550 to 2650
- Low idle speed	:	800 to 900
- Speed at maximum torque	:	1300 to 1500
Rated speed, (rpm):		
- For PTO use	:	2400
- For drawbar use	:	2400

1.3 Cylinder & Cylinder Head:

Number	:	Three
Disposition	:	Vertical, inline
Bore/stroke, (mm)	:	106.5 / 110
Capacity as specified by the applicant, (cc)	:	2940
Compression ratio	:	18.7 **:** 1
Type of cylinder head	:	Monoblock,
Type of cylinder liners	:	Wet, replaceable
Type of combustion chamber	:	Direct injection
Arrangement of valves	:	Inline, Overhead
Valve clearance (cold):		
- Inlet valve, (mm)	:	0.35
- Exhaust valve, (mm)	:	0.45

1.4 Fuel System:

Type of fuel feed system	:	Gravity and force feed

1.4.1 Fuel tank:

Capacity, (l)	:	70.0
Location	:	Behind Operator's seat
Provision for draining of sediments/water	:	Provided
Material of fuel tank	:	Plastic

1.4.2 Water separator:

Make	:	Engine tech
Type	:	Inverted funnel gravity separation
Location	:	In between fuel tank & feed pump on LHS of engine.
Capacity, (l)	:	0.45

1.4.3 Fuel feed pump:

Make	:	Bosch, India
Type	:	plunger
Model/Group combination No.	:	FP/KE22AD 45/2
Provision of sediment bowl	:	**Not provided**
Method of drive	:	Through camshaft of fuel injection pump

1.4.4 Fuel filters:

Make	:	Bosch, India
Model/Group combination No	:	9 450 030 117
Number(s)	:	Two
Type of elements:		
- Primary	:	Cloth
- Secondary	:	Paper
Capacity of final stage filter, (l)	:	0.45

1.4.5 Fuel Injection pump:

Make	:	Bosch, India
Model/Group Combination No.	:	F 002 A4Z 004, PES3A90D320RS4000
Type	:	In-line, plungers
Serial number	:	55823846
Method of drive	:	Through timing gears

1.4.6 Fuel injectors:

Make	:	Bosch, India
Nozzle holder no.	:	F 002 C70 571 558
Nozzle no.	:	DSLA 154P5638
Type	:	Multihole (Five holes)
Manufacturer's production pressure setting, (MPa)	:	25.5 - 26.9
Injection timing	:	1 degree before TDC (Static Injection timing)
Firing order	:	1 – 2 – 3

1.4.7 Governor:

Make	:	Bosch, India
Model/Group Combination No.	:	RSV425**...**1200A5C1704R
Type	:	Mechanical, centrifugal, variable speed
Rated engine speed, (rpm)	:	2400
Governed range of engine speed, (rpm)	:	800 to 2650

1.4.8 Fuel cooler

Make	:	Not specified
Overall dimension	:	Length – 200 mm, Height – 130 mm, Thickness – 30 mm
Number of tubes	:	Eight numbers of heat exchange tubes were provided
Location and operation	:	Aluminum tube type heat exchanger is provided in front of radiator, under the bonnet. The excess (or unused/return) fuel coming from the fuel injection pump, nozzles and fuel filter is cooled and returned to the fuel tank.

1.5 Air Intake System:

1.5.1 Pre cleaner : Not provided

1.5.2 Air cleaner:

Make	:	Donaldson
Type	:	Dry
Location	:	In front of radiator, under the bonnet.
Range of suction pressure at maximum power, (kPa)	:	5.2 to 5.4

Details of element:		**Primary**	**Secondary**
- Size (OD/ID), mm	:	135.0/88.1	73.8/64.2
- Length, (mm)	:	325	313
- Type	:	Cellulose fiber paper	Polyester felt

Provision of dust unloading valve	:	Provided
Air flow restriction indicator	:	Provided

	Maintenance schedule	:	Clean elements when air flow restriction indicator glows or 250 hours, whichever is earlier and replace elements once in a year.

1.5.3 Charge Air Cooler

Make	:	Not specified
Model	:	Not specified
Overall dimensions	:	Length – 375 mm, Height – 130 mm, Thickness – 65 mm.
Number of tubes	:	Eleven numbers of heat exchange tubes were provided
Location & operation	:	Charge air cooler is provided In front of radiator, under the bonnet. Air drawn from the secondary filter element of air cleaner was supplied to turbocharger. The turbocharger forces pressurized air to charge air cooler through hose. The air flows from charge air cooler to cylinder head through hose.

1.6 Exhaust System:

Type of silencer	:	Updraft (Cylindrical)
Position of silencer outlet with respect to SIP, (mm):		
- Vertical	:	930
- Longitudinal	:	1295
- Lateral	:	400 (on LHS)
Range of exhaust gas pressure at maximum power, (kPa)	:	170.8 to 171.6
Provision of spark arresting device	:	None
Provision against entry of rain water	:	A bend is provided at the top of silencer.

1.6.1 Turbocharger:

Make	:	Borg Warner
Model	:	S1B030
Type	:	Waste gate having 12 vanes in compressor unit and 6 numbers in turbine unit of outlet vanes.
Boost (Pressure ratio)	:	2 (apa)
Speed at rated engine speed, (rpm)	:	150000 (apa)
Method of lubrication	:	Force feed lubrication from main oil gallery of engine.
Location	:	Above engine, under the bonnet

1.7 Lubricating system:

Type	:	Forced feed-cum-splash
Oil sump capacity, (l)	:	7.00
Total lub oil capacity, (l)	:	8.40
Oil change period	:	First change after 100 hours and subsequently after every 250 hours of operation.
Cooling device, (if any)	:	Plate type oil cooler having seven numbers of plates is provided.

1.7.1 Filters:

Make	:	John deere
Type	:	Full flow, spin-on through away paper element.
Number	:	One

1.7.3 Pump:

Type	:	Gear
Method of drive	:	Through timing gears
Pressure release setting,(kPa)	:	345 (apa)
Minimum permissible pressure, (kPa)	:	275, at rated engine speed (apa)

1.8 Cooling system:

Type	:	Force circulation of coolant
Coolant as recommended	:	John Deere “Pre-Diluted COOLANT” having 20/80 mixture of ethylene glycol and de-ionized water.
Details of Pump	:	Centrifugal, Open impeller of 95 mm diameter having six numbers of vanes, and driven through crankshaft pulley by a cogged ‘V’-belt common to alternator.
Details of fan	:	Suction type having nine polypropylene blades of 450 mm diameter and mounted on water pump shaft.
Means of temperature control	:	Thermostat
Bare radiator capacity, (l)	:	3.63
Expansion flask capacity, (l)	:	1.10
Total coolant capacity, (l)	:	8.37
Radiator cap pressure, (kPa)	:	96

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 and model	:	Exide Express, MHD 880
Type	:	Lead acid
Capacity and rating	:	12V, 88 Ah at 20 hours discharge rate
Location	:	In-front of radiator under the bonnet.

1.10.2 Starter:

Make	:	Lucas-TVS
Model	:	M-14
Type	:	Pre-engaging, solenoid operated
Power rating, (kW)	:	12V, 2.5 kW
Serial Number	:	26024033A

1.10.3 Generator:

Make	:	Bosch, India
Model	:	RE234714
Type	:	Alternator
Output rating	:	14V, 43 A
Method of drive	:	Driven through crank shaft pulley by a cogged "V"-belt common to water pump.
Serial number	:	0124110008

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**
Front Lights:				
- Head lights	2,12V, 60/ 55W	1260	155 x 95	800
- Parking lights	2, 12V, 5W	1455	85 x 65	275
- Turn Indicators-cum-hazard indicators	2, 12V, 21W	1455	95 x 65	195
Rear lights:				
- Brake light-cum- Tail light	2, 12,V, 21/5W	1405	85 x 75	345
- Turn Indicators-cum-hazard indicators	2,12V, 21W	1405	85 x 75	165
-Plough light (On RHS mudguard)	1, 12 V, 55 W	1470	135 x 75	480
- Reflector(s) RED	2	1420	85 x 25	260
Registration plate light	Part of rear light assembly			

1.10.6 Main switch : Key turn type, having three positions viz: **OFF, circuit ON** and **START**

1.10.7 Light switch : Rotary type having five positions viz.

i) Off
ii) Parking lights + Dash board lights
iii) Head lights (short beam) + (ii)
iv) Head lights (long beam) + (ii)
v) Head light (long beam) only

1.10.8 Horn:

Make	:	Addon
Type	:	2B,12V, Electromagnetically vibrated diaphragm
Location	:	In front of radiator, under the bonnet

1.10.9 Fuse box : Contains 12 number of fuses having following capacities:

Capacity	5A	10A	15A	20A	25A	30A
Number	01	02	02	04	02	01

1.10.10 Details of other electrical accessories:

1.10.10.1 Flasher Unit:

Make	:	Macurex
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 Safety switch : Starter will operate only when the main gear shifting lever is in neutral position.

1.11 Instrument panel details:

i) Engine speed-cum-digital cumulative digital run-hour-meter (0-30 x 100 rpm)
ii) Coolant temperature gauge (with colour zones)
iii) Fuel level gauge (with colour zones)
iv) Lubricating oil pressure indicator lamp
v) Light switch (Rotary type)
vi) Main switch (key-turn type)
vii) Horn push button
viii) Air cleaner clogging indicator
ix) PTO shaft engage indicator
x) Battery charging warning indicator
xi) Turn signal indicator & hazard Light indicator
xii) Turning indicator two way switch
xiii) Head light (long beam) indicator lamp
xiv) Hazard warning switch
xv) Hand accelerator lever.
xvi) Fuel cut-off knob.
xvii) Steering control wheel.
xviii) Rear view mirror

1.12 Transmission System:

1.12.1 Clutch:

Make	:	Luk, India
Type	:	Dual, Dry, Friction pads & plates
No. of friction plate(s)	:	Two
Size (mm):		
- Transmission (OD/ID)	:	278.25 / 167.7 ϕ having four pads, each pad of 27.27 cm^2 contact area.
- PTO	:	27.57 cm^2 contact area of each pad having three pads
Material of clutch lining	:	Cerametallic
Method of operation:		
- Transmission	:	By depressing a pedal, provided on LHS
- PTO	:	By hand lever on LHS of operator's seat

1.12.2 Gear box:

Make : John Deere

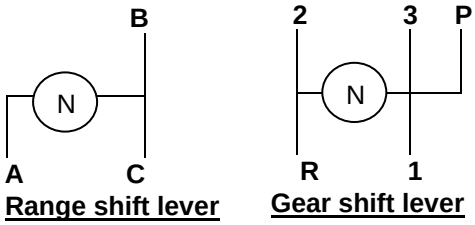
Model : 9Fx3R transmission (apa)

Type : Mechanical, Constant mesh & sliding gears for low range selection.

No. of speeds:

- Forward : 9
- Reverse : 3

Gear shifting pattern :



Range shift lever **Gear shift lever**

Location of gear shifting levers : **i)** Gear shift lever is on RHS of the operator's seat

ii) Range shift lever is on LHS of the operator's seat.

Oil capacity, (l) : 35.0 (Common with hydraulic, differential, brake, steering, rear axle & final drive systems).

Oil changing period : First change after 1100 hours and subsequently after every 1250 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 **16.9 -28** size tyres of **670** mm radius index, (kmph)
Forward	A1	270.89	2.24
	A2	148.35	4.09
	A3	125.00	4.85
	B1	114.92	5.28
	B2	62.84	9.65
	B3	52.78	11.48
	C1	41.83	14.49
	C2	22.88	26.49
	C3	19.27	31.46
Reverse	AR	161.33	3.76
	BR	68.35	8.87
	CR	24.86	24.39

1.12.4 Differential:

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

Reduction through crown wheel and pinion : 3.416 **:** 1 (41/12T)

Oil capacity of differential unit, (l)	:	35.0 (Common with hydraulic, gearbox, brake, steering, rear axle & final drive systems).
Oil changing period	:	First change after 1100 hours and subsequently after every 1250 hours of operation.
Differential lock:	:	Provided
Type	:	Dog clutch
Location	:	On RHS of differential
Method of operation	:	By depressing a pedal provided on RHS of operator's seat.

1.12.5 Rear axle and Final Drive:

Type	:	Planetary reduction unit, accommodated inside the rear axle housing on both sides after brake.
Reduction through final drive	:	6.857 **:** 1 (Sun gear -14T, planet-33T & ring gear -82T)
Oil capacity of final drive, (l)	:	35.0 (Common with gear box, hydraulic, differential, brake & Steering systems)
Oil changing period	:	First change after 1100 hours and subsequently after every 1250 hours of operation.

1.13 Power lift (Hydraulic System):

Make	:	John Deere (apa)
Identification mark	:	Not available
Type	:	Open centre, live, ADDC
No. and type of cylinder	:	One, single acting
Type of linkage lock for transport	:	Auxiliary knob is provided on distributor act as transport lock

1.13.1 Hydraulic pump:

-Make	:	Eaton (apa)
-Type	:	Gear (Tandem)
-Location & drive	:	On RHS of engine, through timing gears.
No. & type of filter(s)	:	One, Full flow spin-on throw away type filter
Hydraulic oil capacity, (l)	:	35.0 (Common with gear box, differential, brake, steering, rear axle and final drive system).
Oil change period	:	First change after 1100 hours and subsequently after every 1250 hours of operation.
Provision for external tapping	:	Provided
Details of control levers:		**i)** Position control lever **ii)** Draft control lever **iii)** Auxiliary knob on distributor
Method of draft sensing	:	Through top link

1.13.2 Three point linkage:

Sl. No.	Observations		As per IS: 4468-(Part-1) -1997, **(Cat.I / Cat.II),** (mm)	As measured, (mm)	Remarks
I.	**Upper hitch points:**				
	a)	Dia of hitch pin hole	19.30 to19.50/ 25.70 to 25.90	25.78	Conforms to Cat. II
	b)	Width of ball	44.0 (max.) / 51.0 (max.)	44.20	--do--
II.	**Lower hitch points:**				
	a)	Dia of hitch pin hole	22.40 to 22.65/ 28.70 to 29.00	28.72	Conforms to Cat. II
	b)	Width of ball	34.8 to 35.0 / 44.8 to 45.0	35.00	Conforms to Cat. I
III.	Lateral distance from lower hitch point to centre line of tractor		359/435	359	--do--
IV.	Lateral movement of lower hitch points		100 (min)/ 125 (min)	190	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	565	--do--
VI.	Transport height		820 (min) / 950 (min)	935	Conforms to Cat. I
VII.	Power range		560 (min)/ 650 (min)	615	--do--
VIII.	Leveling adjustment		100 (min)/ 100 (min)	260	Conforms to Cat. I & II
IX.	Lower hitch point tyre clearance		100 (min)/ 100 (min)	170	--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 **670** 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	830	830
2.	Length of lift arm	B	265	265
3.	Length of lift rods	C	475 to 580	530
4.	Length of top link	D	500 to 710	595
5.	Distance of lift rod connection point from pivot point of lower link.	E	425	425
6.	Distance of lower link pivot point from rear wheel axis:			
	-Horizontally	F	160, behind	160, behind
	-Vertically	G	170, below	170, below
7.	Distance of upper link pivot point from rear wheel axis:			
	-Horizontally	H	400, 415 & 425, behind	400, behind
	-Vertically	J	200, 245 & 280, above	280, above

1.	2.	3.	4.	5.
8.	Distance of lift arm pivot point from rear wheel axis:			
	-Horizontally	K	185, behind	185, behind
	-Vertically	L	310, above	310, above
9.	Height of lower hitch points relative to the rear wheel axis:			
	- In high position	M	55 to 265	145, above
	- In low position	N	- 600 to - 350	470, below
10.	Height of lower link hitch points when locked in transport position	--	Any height within lift range	

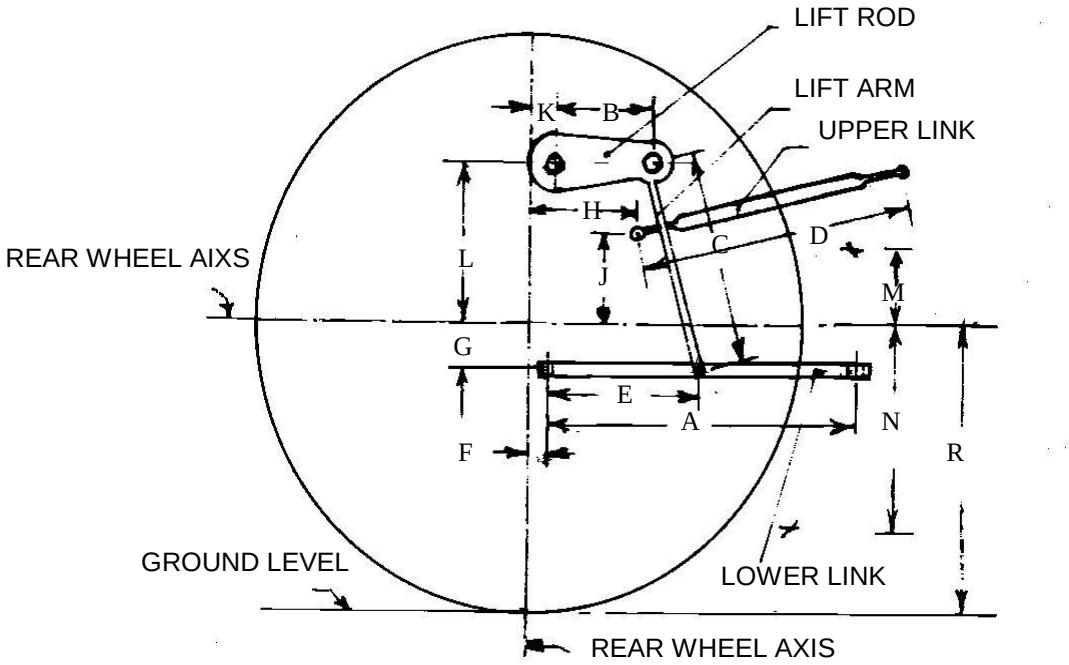
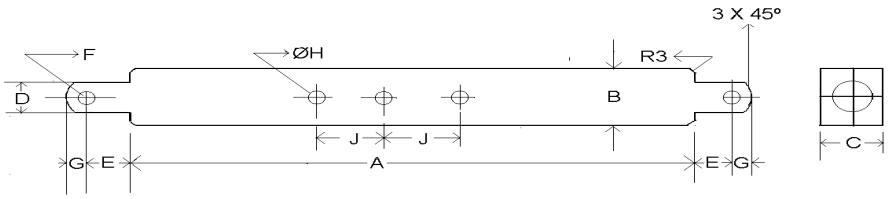


Fig.1 (a): DIMENSIONAL NOTATIONS FOR TABLE OF LINKAGE GEOMETRY

1.13.4 Drawbar:

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

Notation	As per IS: 12953-1995 (Cat. I) / (Cat. II), (mm)	As measured, (mm)	Remarks
A	683 ± 1.5 / 825 ± 1.5	682	Conforms to Cat. I
B	75 (min) / 75 (min)	75.2	Conforms to Cat. I & II
C	30 (min) / 30 (min)	30.2	--do--
D∅	21.79 to 22.00 / 27.79 to 28.00	27.8	--do--
E	39.0 (min) / 49.0 (min)	64.7	--do--
F∅	12.0 (min) / 12.0 (min)	12.2	--do--
G	15.0 (min) /15.0 (min)	22.5	--do--
H∅	25 ± 1 / 25 ± 1	24.6	--do--
J	80 ± 1.5 / 80 ± 1.5	80.5	--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

1.13.4.3 Provision for coupling of trailer brakes : Not provided

1.14 Power take-off shaft:

Type	:	Type-1, 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)	:	546
Distance behind rear axle, (mm)	:	425
Engine to PTO speed ratio	:	4.400 : 1
Whether the PTO shaft is capable of transmitting the full power of engine	:	Yes

1.14.1 Specification of power take-off shaft:

Specification	As per IS:4931-1995 (Type-I)	As observed	Remarks
Nominal speed, (rpm)	540 ± 10	540 rpm of PTO shaft corresponds to 2376 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--
Dimensions, (mm) (See Fig. 2):			
D∅	34.79 ± 0.06	34.96	Conforms
d∅	28.91± 0.05	28.93	--do--
B∅	29.4 ± 0.1	29.4	--do--
A∅ (Optional)	8.3	Not available	Not applicable
W	8.69 - 0.09 - 0.16	8.62	Conforms
a	7	7	--do--
b (optional)	25 ± 0.5	Not available	Not applicable
c	38	38.7	Conforms
X	30°	30°	--do--
B	76 (min)	79.6	--do--
h	450 to 675	655	--do--

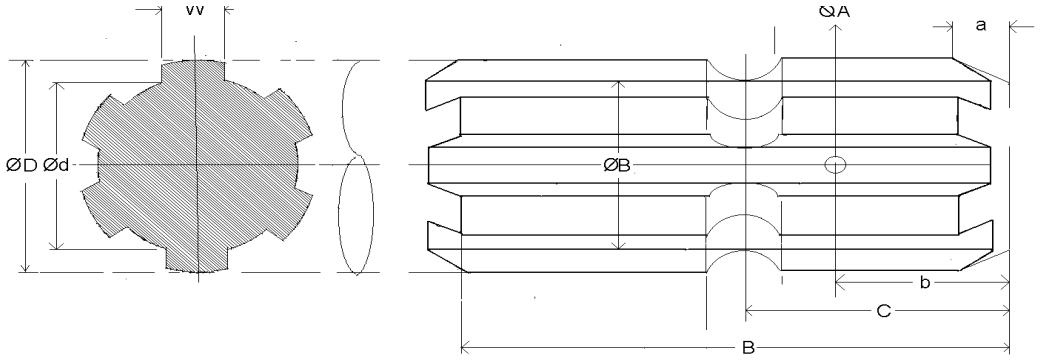


Fig.2 (a) DIMENSIONAL NOTATIONS FOR TYPE-I POWER TAKE-OFF SHAFT

1.14.2 Provision of power take-off shaft shield: Provided

Specifications of power take-off shaft shield for type I & II PTO [See Fig. 2(b)]:			
Specification	As per IS: 4931-1995	As observed	Remarks
k	70 (min)	225	Conforms
m	125 ± 5	120	-do-
n	85 ± 5	90	-do-
p	285 ± 5	290	-do-
r	76 (max)	08	-do-

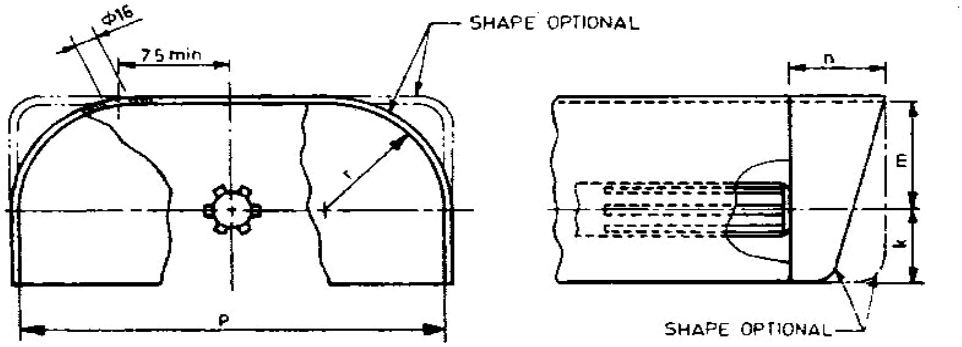


Fig.2. (b): DIMENSIONAL NOTATION OF PTO SHAFT MASTER SHIELD

1.15 Towing hitch:

1.15.1 Front : Not provided

1.15.2 Rear:

Type	:	Clevis
Location	:	At rear of transmission housing.
Height above ground level, (mm):		
- Maximum	:	725
- Minimum	:	525
Number of positions	:	04
Type of adjustment	:	By changing the position of hitch on its mounting bracket.
Distance of hitch point, (mm):		
- From rear axle centre	:	520
- From power take-off shaft end	:	95
Dia of pin hole, (mm)	:	33
Width of clevis, (mm)	:	75.3

1.16 Steering:

Make of distributor	:	Danfoss
Type	:	Open centre, Hydrostatic
Location	:	Above clutch housing
Method of operation	:	Manual, by steering control wheel
Diameter of steering control wheel, (mm)	:	410
Type & make of pump	:	Gear (Tandem), Eaton
Location	:	On RHS of engine
Method of drive	:	Through engine timing gears
Number, Type & Make of hydraulic ram cylinder	:	One, Double acting (single connecting) and Ognibene
Lubricant capacity (l)	:	35.0 (Common with gear box, hydraulic, differential, final drive & brake systems)
Oil change period	:	First change after 1100 hours and subsequently after every 1250 hours of operation.

1.17 Brakes:

1.17.1 Service Brake:

Make	:	John Deere (apa)
Type	:	Mechanical, Oil immersed disc brakes.
Location	:	On rear axle shaft
No. of friction disc(s)	:	One (on each wheel side)
Area of liners, (cm^2)	:	492.6 (on each wheel side)
Material of liners	:	Paper lining
Method of operation	:	Independent or combined pedal operation by right foot.

1.17.2 Parking Brake:

Type	:	Pawl & Park
Location & method of operation	:	Gear shift lever in 'PARK' position act as parking brake.

1.18 Wheel Equipment:

1.18.1 Steered Wheel(s):

Make	:	CEAT
Number(s)	:	Two
Type of tyre(s)	:	Pneumatic, ribbed
Size	:	6.50-20
Ply rating	:	8
Maximum permissible loading capacity of each tyre at 200 kPa pressure, (kgf)	:	550 (As per ITTAC Manual)
Recommended inflation pressure, (kPa):		
- for field work	:	200
- for transport	:	200
Standard track width, (mm)	:	1405 (std.), & 1735
Method of changing track width	:	By reversing the wheel discs.
Make & size of wheel rim	:	WILP & 5.0 F x 20

1.18.2 Drive wheel(s):

Make	:	CEAT
Number(s)	:	Two
Type of tyre(s)	:	Pneumatic, traction
Size	:	16.9 - 28

	Ply rating	:	12
	Maximum permissible loading capacity of each tyre at 130 kPa inflation pressure, (kgf)	:	1850 (As per ITTAC Manual)
	Recommended inflation pressure, (kPa):		
	- For field work	:	100
	- For transport	:	130
	Track width, (mm)	:	1420 (std.),1500,1610,1700 &1810
	Method of changing track width	:	By reversing wheel disc and changing the position of disc on offset rim lugs.
	Make & size of wheel rim	:	SSWL & W15 L x 28
1.18.3	**Wheel base, (mm)**	:	2070
	Method of changing wheel base, if any, and range.	:	None

1.19 Operator's seat:

Make	:	Harita Seating
Type	:	Cushioned
Type of suspension	:	Two helical coil springs
Type of dampening	:	Hydraulic shock absorber
Range of adjustment, (mm):		
- Vertical	:	Nil
- Lateral	:	Nil
- Longitudinal	:	± 70

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) Longitudinal distance from SIP to centre of differential lock pedal.

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).

1.20.4 Conformity with IS: 12239 (Part -1)- 1996 (Reaffirmed in March, 2007):

Meets the requirements of IS: 12239 (Part-1)-1996 (Reaffirmed in March, 2007), **except the following:**

i) Provision of spark arresting device in the exhaust system.

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

Meets the requirements of **IS:12239 (Part-2)-1999 (Re-affirmed in March, 2009), except the following:**

i) Working clearance between gear shift lever (in park position) and the mudguard does not meet the requirement of the above referred standard.

1.20.6 Conformity with IS: 14683-1999 (Reaffirmed in March, 2009):

Lighting provided on the tractor meets the requirement of IS: 14683-1999 (Reaffirmed in March, 2009).

1.20.7 Rear view mirror:

Rear view mirror has been provided

1.20.8 Slow moving emblem:

Slow moving emblem has been provided.

1.21 Labelling of tractor as per IS: 10273-1987 (Reaffirmed in March, 2009):

The labelling plate is riveted on LHS of front axle support and provides the following information:

Name of Manufacturer	**John Deere India Pvt. Ltd. , Pune, (India)**
Make	John Deere
Model	5310 V3
Year of manufacture	BL-F (November, 2015)
Engine Serial Number	PY3029H058374
Chassis Serial Number	1PY5310EKFA006924
Maximum P.T.O Power, kW	36.4
Specific fuel consumption, g/kwh (g/hph)	325

1.22 Ballast Mass, (kg):

Particular		As used during drawbar test	As used during field test		As used during Haulage test
			Dry land	Puddling	
Front	C.I. weight	230	230	Nil	230
	Water	Nil	Nil	Nil	Nil
Rear	C.I. weight	290	290	Full cage wheels	290
	Water	360	360		Nil
	Additional ballast, if any	Nil			

1.23 Masses:

Particulars		Mass of the tractor without operator but with all the liquid reservoirs full,(kg)		
		Front	Rear	Total
i)	Unballasted	725	1385	2110
ii)	With ballast as used during drawbar performance test	1050	1940	2990
iii)	With ballast as used during Field test:			
iv)	- Dry land operation other than rotavation	1050	1940	2990
	- Wet land operation	740	1375	2095
	With ballast as used during haulage test with trailer hitch, canopy and drawbar	1050	1625	2675

1.24 Overall dimensions, (mm):

Condition	Length, (mm)	Width, (mm)	Height, (mm)		Ground Clearance, (mm)
			With exhaust pipe	Without exhaust pipe	
Without Ballast	3525	1870	2280	1690	430(Below rear hitch bracket)

1.25 Number of external lubricating points:

- Oiling : Nil
- Grease cups : 02
- Grease nipples : 08

1.26 Colour of tractor:

Chassis & engine	:	Green
Sheet Metal:		
Bonnet	:	Green
Mudguard	:	Green
Rim & disc	:	Yellow

1.27 Optional features, if any : None

2. FUEL AND LUBRICANTS

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

2.2 Lubricants:

Particulars		As recommended by the manufacturer	As used during the test
1.	Engine oil	SAE 15W-40	As recommended
2.	Transmission, Hydraulic, Steering and brake systems oil	John Deere Hy Guard	Oil originally filled in the tractor was not changed
3.	Grease	John Deere high temperature Extreme pressure Non-clay grease	Servo grease MP

3. PTO PERFORMANCE TEST

Date(s) of test	:	28.07.2016 & 29.07.2016
Tractor run at the Institute prior to start of PTO test, (h)	:	0.25
Type of dynamometer bench used	:	Eddy current, Fuchino 1000 S

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

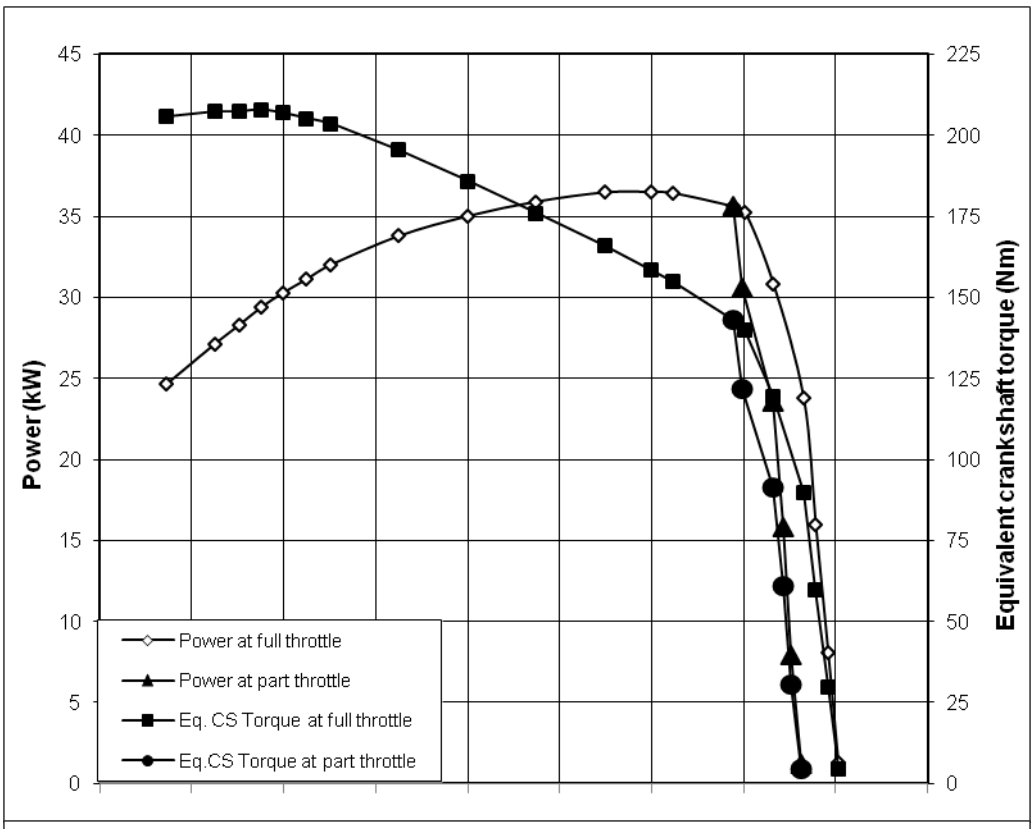
Table – 1

Power (kW)	Speed, (rpm)		Fuel consumption			Specific energy, (kWh/l)
	P.T.O.	Engine	l/h	kg/h	Specific, (kg/ kWh)	
1	**2**	**3**	**4**	**5**	**6**	**7**
a) Maximum power - 2 hours test:						
36.5	511	2247	13.44	11.24	0.308	2.71
34.1	511	2248	12.80	10.70	0.314	2.66*****
b) Power at rated engine speed (2400 rpm):						
35.3	546	2402	13.90	11.62	0.329	2.54
33.3	546	2402	13.56	11.34	0.341	2.46*****
c) Power at standard power take-off speed (540±10 rpm):						
35.6	540	2376	13.74	11.49	0.322	2.57
33.6	540	2376	13.48	11.27	0.336	2.49*****
d) Varying load at rated engine speed:						
i) Torque corresponding to maximum power:						
35.3	546	2402	13.90	11.62	0.329	2.54
ii) 85% of the torque obtained at maximum power:						
30.9	560	2464	12.68	10.60	0.344	2.43
iii) 75% of the torque obtained in (ii):						
23.8	575	2530	9.77	8.17	0.344	2.43

1	2	3	4	5	6	7
iv) 50% of the torque obtained in (ii) :						
16.0	581	2556	7.57	6.33	0.396	2.11
v) 25% of the torque obtained in (ii):						
8.1	587	2583	5.69	4.76	0.587	1.43
vi) Unloaded:						
1.3	592	2605	4.26	3.56	2.738	0.31
e) Varying loads at Standard PTO speed:						
i) Torque corresponding to maximum power available at standard PTO speed (540 ± 10 rpm):						
35.6	540	2376	13.74	11.49	0.322	2.57
ii) 85% of the torque obtained in (i):						
30.6	545	2398	12.15	10.16	0.332	2.52
iii) 75% of the torque defined in (ii):						
23.6	560	2464	9.38	7.84	0.333	2.51
iv) 50% of the torque defined in (ii):						
15.9	565	2486	7.30	6.10	0.385	2.17
v) 25% of the torque defined in (ii):						
8.0	569	2504	5.43	4.54	0.569	1.47
vi) Unloaded:						
1.2	574	2526	4.03	3.37	2.808	0.298

*** Under High ambient conditions**

		Natural ambient	**High ambient**
-No load maximum engine speed, (rpm)	:	2605	2592
-Equivalent crankshaft torque at maximum power, (Nm)	:	154.89	144.73
-Maximum equivalent crankshaft torque, (Nm)	:	208.07	190.45
-Engine speed at maximum equivalent crankshaft torque, (rpm)	:	1351	1351
- Back up torque, (%)	:	34.3	31.6
-**Smoke level**, maximum light absorption coefficient, (per meter)	:	0.54	--
- Range of atmospheric conditions:			
Temperature, (^{o}C)	:	27 to 28	41 to 45
Pressure, (kPa)	:	97.5 to 98.1	98.7 to 99.3
Relative humidity, (%)	:	57 to 69	27 to 42
- Maximum temperatures, (^{o}C):			
Engine oil	:	104	117
Coolant	:	85	100
Fuel	:	41	58
Air intake	:	29	47
Exhaust gas	:	488	483
- Pressure at maximum power:			
Intake air, (kPa)	:	5.2 to 5.4	5.1
Exhaust gas, (kPa)	:	170.8 to 171.6	150.8 to 152.4
- Consumptions:			
Lub oil, (g/kwh)	:	--	0.61
Coolant (% of total coolant capacity)	:	--	Nil



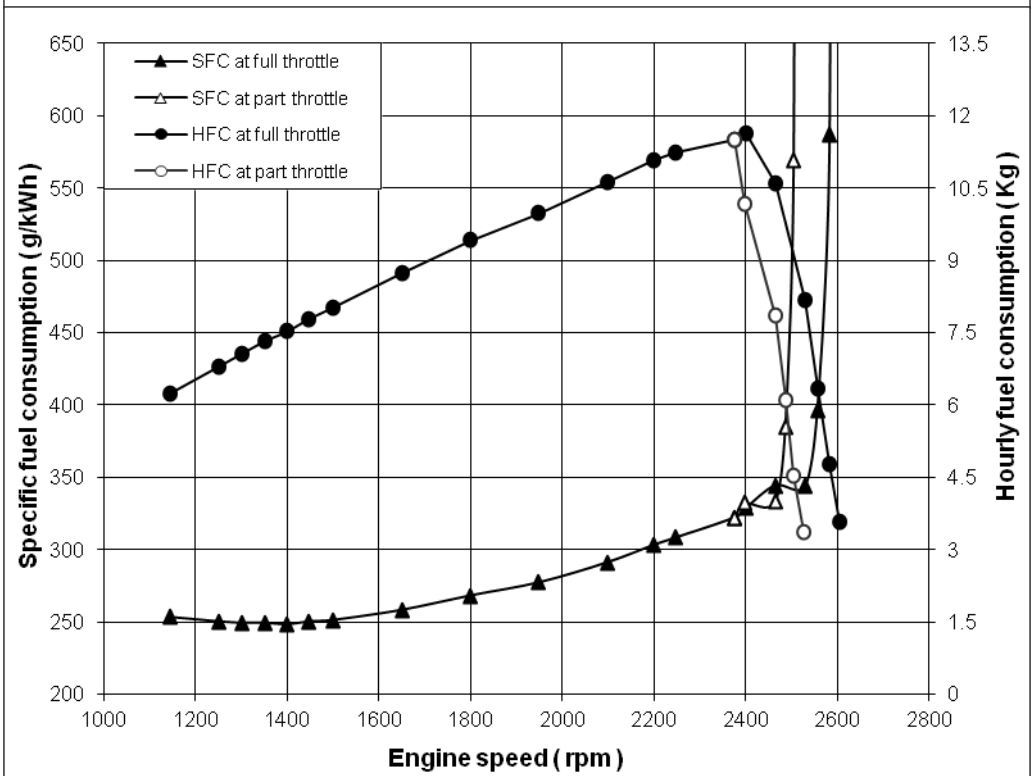


Fig. 3 : PTO PERFORMANCE CHARACTERISTICS
(Natural Ambient)

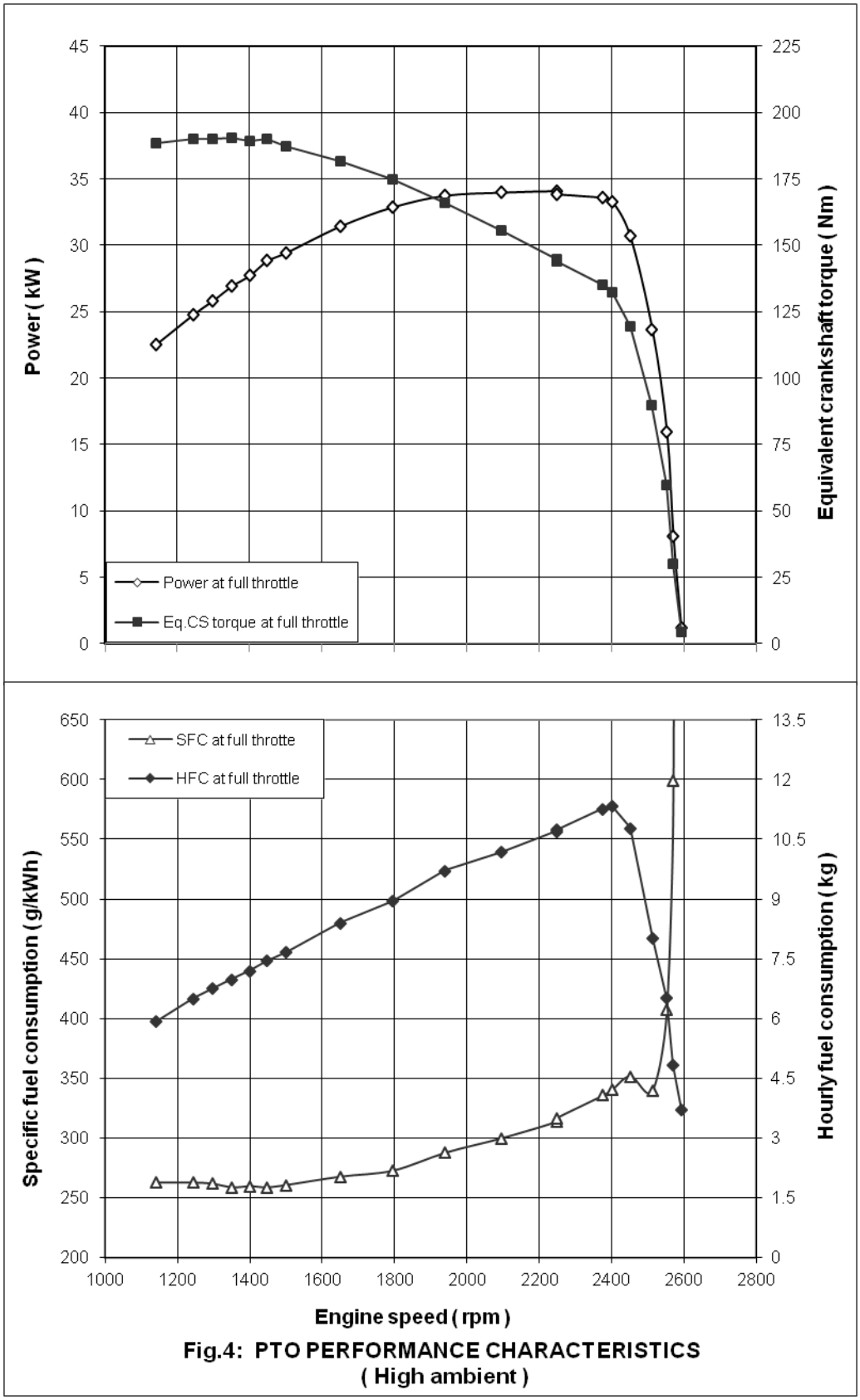


Fig.4: PTO PERFORMANCE CHARACTERISTICS
(High ambient)

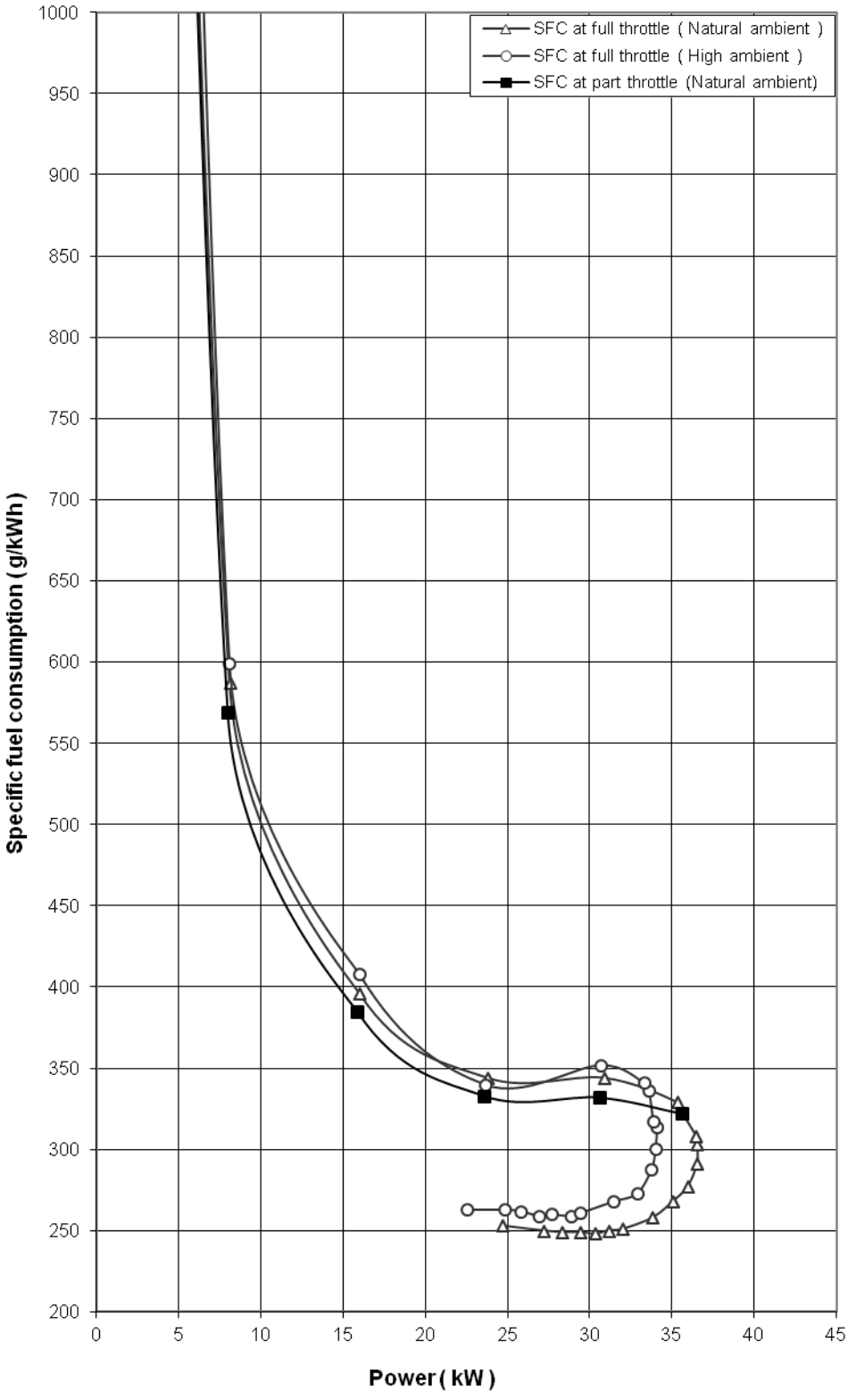


Fig. 5: PTO PERFORMANCE CHARACTERISTICS

4. DRAWBAR PERFORMANCE TEST

Date(s) of test	:	05.12.2016 to 06.12.2016, 07.12.2016 & 08.12.2016
Tractor run at the Institute prior to start of drawbar test, (h)	:	42.7
Type of track	:	Concrete
Height of drawbar, (mm):		
- Without ballast	:	600
- With ballast	:	550

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**

5. POWER LIFT AND HYDRAULIC PUMP PERFORMANCE TEST

Date(s) of test	:	21.07.2016 & 22.07.2016
Tractor run at the Institute prior to start of hydraulic test, (h)	:	2.1
Pump speed at rated engine speed, (rpm)	:	2400

5.1 Hydraulic power test:

Pump delivery rate at minimum pressure and rated engine speed, (lpm)	:	26.77
Maximum hydraulic power, (kW)	:	6.5
Pump delivery rate at maximum hydraulic power, (lpm)	:	23.00
Pressure at maximum hydraulic power, (MPa)	:	170
Sustained pressure of the open relief valve, (MPa)	:	20.0

Tapping point:

a) Relief valve test	:	External circuit
b) Pump performance test	:	At pump outlet
Temperature of hydraulic fluid, (°C)	:	60 to 64

5.2 Lifting capacity test:

Test	Height of lower hitch point above ground in down position, (mm)	Vertical move-ment, with lifting forces, (mm)	Maximum corrected force exerted through full range, (kN)	Maximum correspon ding pressure, (MPa)	Moment about rear axle, (kN-m)	Maximum tilt angle of mast from vertical (degrees)
At hitch points	200	585	17.96	18.0	17.78	--
On the standard frame	200	580	15.53	18.0	24.85	7.5

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)	Fuel consumption (l/h)	Specific energy (kWh/l)	Atmospheric conditions Temp (^{0}C)	Atmospheric conditions Pressure (kPa)	Atmospheric conditions R.H (%)	Temperature, (°C) Fuel	Temperature, (°C) Trans. oil	Temperature, (°C) Coolant	Temperature, (°C) Engine oil	Max. sustained pull, (kN)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
i) Maximum power test (Tractor unballasted):																
A1	2.09	10.0	17.32	2570	15.0	0.587	7.02	1.43	23	99.8	36	31	56	86	97	18.17
A2	3.73	18.4	17.70	2522	15.2	0.460	10.12	1.82	23	99.8	42	30	53	87	99	18.47
A3	4.35	20.9	17.31	2460	14.6	0.453	11.33	1.85	24	99.4	45	30	63	88	101	17.80
B1	4.87	22.2	16.44	2454	12.0	0.431	11.45	1.94	24	99.4	53	32	61	88	101	17.35
B2	9.02	29.6	11.81	2297	4.7	0.383	13.56	2.18	24	99.3	43	31	56	89	104	16.43
B3	10.38	30.7	10.64	2213	4.3	0.353	12.96	2.33	24	99.4	45	31	52	89	104	13.35
ii) Maximum power test (Tractor ballasted):																
A1	2.03	12.6	22.31	2551	15.1	0.512	7.72	1.63	21	99.3	45	28	58	85	97	23.30
A2	3.57	22.8	22.93	2464	15.4	0.454	12.38	1.84	24	99.3	45	32	59	88	101	24.30
A3	4.23	25.1	21.31	2441	14.7	0.438	13.15	1.91	25	99.5	40	33	61	88	103	23.50
B1	4.65	27.2	21.06	2430	13.4	0.424	13.80	1.97	34	99.6	39	31	58	89	102	22.82
B2	8.07	29.6	13.21	2134	6.4	0.382	13.53	2.19	23	99.7	43	31	56	89	104	17.13
B3	10.01	29.2	10.50	2205	5.5	0.369	12.89	2.27	22	99.7	47	30	50	88	103	14.78

Contd...Table – 2

Gear	Travel Speed, (km/h)	Draw-bar power (kW)	Draw-bar pull, (kN)	Engine speed (rpm)	Wheel Slip, (%)	Fuel consumption (kg/kWh)	Fuel consumption (l/h)	Specific energy (kWh/l)	Atmospheric conditions Temp (°C)	Atmospheric conditions Pressure (kPa)	Atmospheric conditions R.H (%)	Temperature, (°C) Fuel	Temperature, (°C) Trans. oil	Temperature, (°C) Coolant	Temperature, (°C) Engine oil	Max. sustained pull, (kN)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
iii)	**Five hours test at 75 percent of pull obtained at max. power (Ballasted wheeled tractor):**															
B1	5.12	22.5	15.83	2496	7.4	0.412	11.09	2.03	11 to 24	99.5 to 99.8	40 to 60	20 to 33	36 to 64	85 to 88	96 to 102	--
iv)	**Five hours test at pull corresponding to 15 percent wheel slip (Ballasted wheeled tractor):**															
A2	3.65	23.3	22.93	2457	--	0.443	12.35	1.89	24 to 30	99.2 to 99.4	24 to 47	31 to 36	64 to 77	88 to 90	104 to 106	--

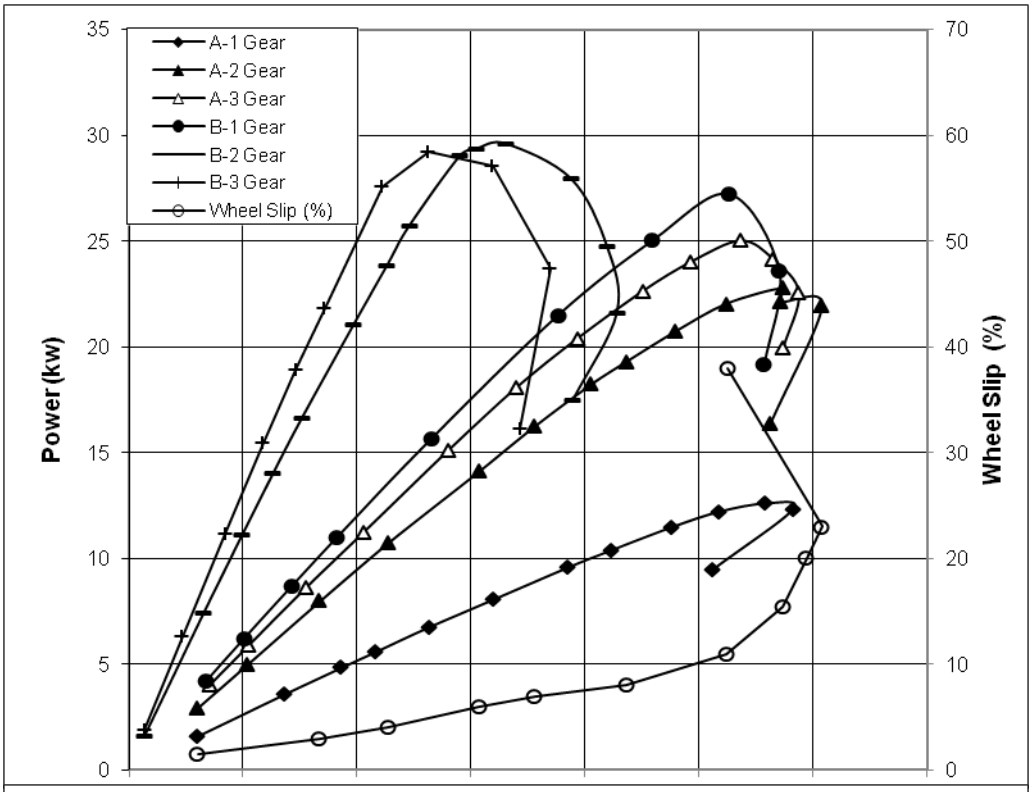
i) The coolant (liquid) and lub oil consumption during 10 hours test were observed as **Nil & 4.76 ml/h** respectively.

ii) Creeping of tyres, (mm):

- LHS: Nil
- RHS: Nil

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

Engine oil	:	106
Coolant	:	90
Transmission oil	:	77
Fuel	:	36



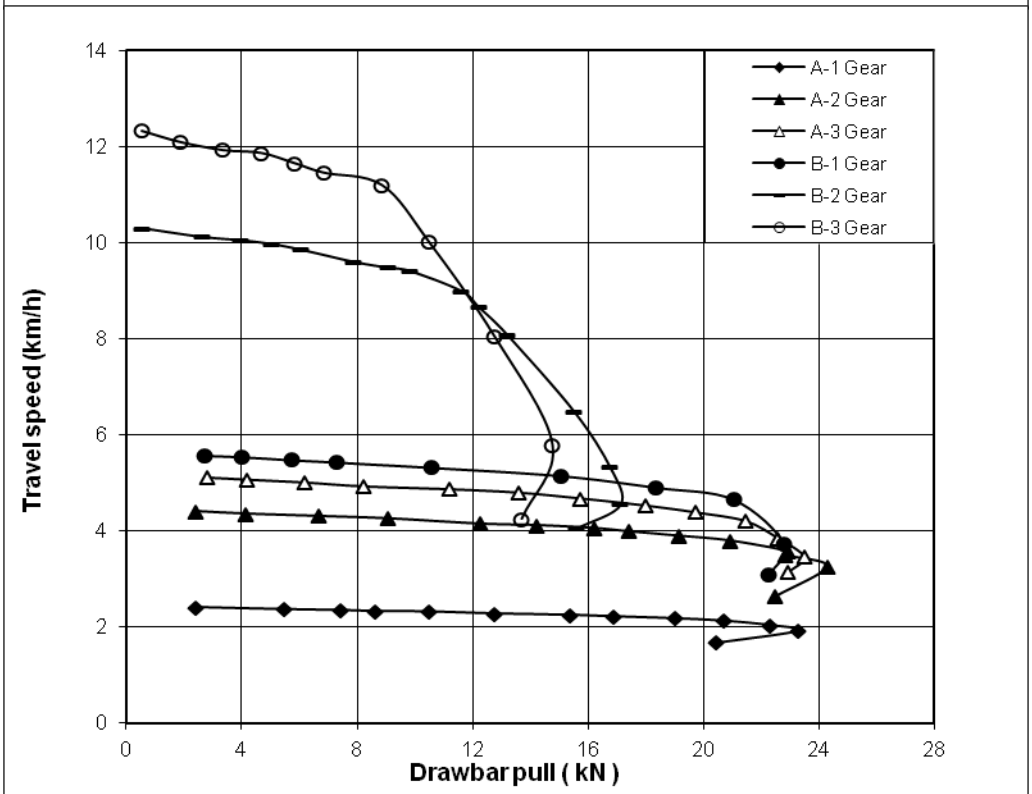


Fig. 6 DRAWBAR PERFORMANCE CHARACTERISTICS
(Ballasted condition)

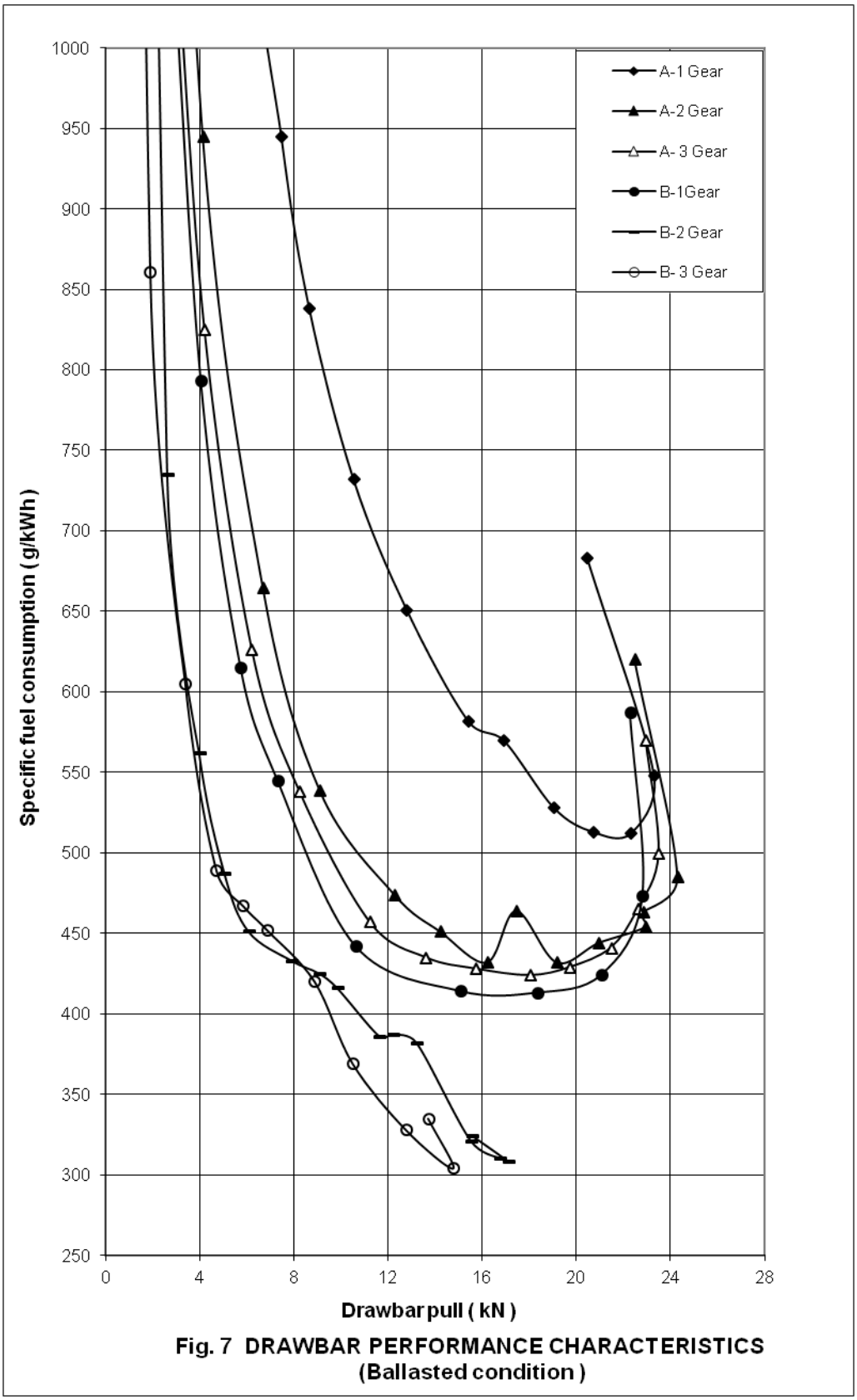


Fig. 7 DRAWBAR PERFORMANCE CHARACTERISTICS
(Ballasted condition)

5.3 Maintenance of lift load:

Force applied at the frame, (kN) : 13.98

Temperature of hydraulic fluid at the start of test, (^{o}C) : 60

Test data:

Elapsed time (minute)	5	10	15	20	25	30
Cumulative drop in height of lift, (mm)	00	00	00	01	02	02

6. BRAKE TEST

6.1 Service brake:

6.1.1 Cold brake test:

Date of test: : 25.07.2016 & 08.08.2016

Type of track : Concrete

Maximum attainable speed (kmph):

- Unballasted Tractor : 34.6

-Road Ballasted Tractor : 34.6

		At maximum attainable speed			
unballasted tractor	Braking device control force, (N)	515	392	269	147
	Mean deceleration, (m/sec^2)	3.77	3.36	3.12	2.50
	Stopping distance, (m)	12.40	13.74	14.79	18.47
With road Ballasted tractor	Braking device control force, (N)	477	374	271	169
	Mean deceleration, (m/sec^2.)	3.56	3.18	3.11	2.50
	Stopping distance, (m)	12.92	14.53	14.86	18.47

		At 25 kmph travel speed			
unballasted tractor	Braking device control force, (N)	446	358	271	183
	Mean deceleration, (m/sec^2)	3.49	2.94	2.80	2.50
	Stopping distance, (m)	7.11	8.19	8.60	9.65
With road Ballasted tractor	Braking device control force, (N)	482	390	297	205
	Mean deceleration, (m/sec^2.)	3.40	3.05	2.73	2.50
	Stopping distance, (m)	7.25	7.90	8.83	9.65

6.1.2 Brake fade test:

		At maximum attainable speed			
With road Ballasted tractor	Braking device control force, (N)	521	406	292	177
	Mean deceleration, (m/sec^2)	3.49	3.16	3.01	2.50
	Stopping distance, (m)	13.39	14.61	15.32	18.47

		At 25 kmph travel speed			
With road Ballasted tractor	Braking device control force, (N)	526	423	319	216
	Mean deceleration, (m/sec^2)	3.40	2.89	2.68	2.50
	Stopping distance, (m)	7.57	8.36	8.99	9.65

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

Abnormal vibration : None

The brakes were heated by : Self braking

6.2 Parking brake test:

Particulars	Parked on 18 percent slope		Parked on 12 percent slope with trailer of 2.12 tones.	
	Facing up	Facing down	Facing up	Facing down
Braking device control force, (N)	210	240	197	204
Efficacy of parking brake	---------- Effective ----------			

7. NOISE MEASUREMENT

7.1 Noise at bystander's position:

Date of test : 07.06.2016
Type of track : Concrete
Background noise level, dB(A) : 55.4

Atmospheric conditions:

Temperature, (°C) : 40
Pressure, (kPa) : 99.4
Relative humidity, (%) : 25
Av. wind velocity, (m/s) : 0.7

Test data:

S. No.	G e a r	Traveling speed before acceleration, (kmph)	Noise level, dB(A)
1.	A1	1.84	83
2.	A2	3.37	82
3.	A3	3.97	82
4.	B1	4.32	83
5.	B2	7.95	82
6.	B3	9.37	82
7.	C1	11.85	82
8.	C2	21.60	81
9.	C3	25.20	80

7.2 Noise at operator's ear level:

Date of test : 06.12.2016
Type of track : Concrete
Background noise level, dB(A) : 56

Atmospheric conditions:

Temperature, (°C) : 24
Pressure, (kPa) : 99.7
Relative humidity, (%) : 34
Average wind velocity, (m/s) : 1.4

Test data:

Gear	Drawbar pull at which the tractor develops the max. noise level, (kN)	Corresponding traveling speed, (kmph)	Noise level dB(A)
A1	13.59 to 17.32	2.26 to 2.09	92
A2	6.98 to 17.70	4.31 to 3.73	93
A3	17.11 to 17.31	4.40 to 4.35	94
B1	16.30 to 16.48	5.02 to 4.74	92
B2*	10.95 to 11.16	9.47 to 9.41	95
B3	9.04 to 9.19	11.42 to 11.26	94

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

8. MECHANICAL VIBRATION MEASUREMENT

Date of test : 03.08.2016
Type of test surface : Concrete

Sl. No.	Measuring points		Vibration, microns			
			At load corresponding to 85% of max. PTO power		At no load	
			HD	VD	HD	VD
1	**2**		**3**	**4**	**5**	**6**
i)	Foot rest	Left	380*	210*	270*	330*
		Right	360*	330*	100	180*
ii)	Steering wheel		60	160*	60	40
iii)	Seat	Back	100	180*	50	60
		Bottom	60	100	60	30
iv)	Mudguard	Left	90	100	40	50
		Right	70	70	60	50
v)	Head light	Left	50	80	50	120*
		Right	150*	100	100	80
vi)	Battery base, centre		270*	240*	100	60
vii)	Tail light	Left	70	120*	150*	60
		Right	140*	190*	180*	120*
viii)	Plough light		140*	240*	60	120*
ix)	Gear shifting lever		210*	100	180*	70
x)	Accelerator lever	Hand	210*	120*	30	60
		Foot	100	120*	80	130*
xi)	Brake pedal	Left	160*	130*	40	120
		Right	80	100*	100	40
xii)	Clutch pedal		90	80	30	40
xiii)	Main hydraulic control lever		60	30	80	90
xiv)	PTO engaging lever		100	240*	50	30
xv)	Differential lock		130*	60	60	30

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

9. LOCATION OF CENTRE OF GRAVITY

Condition	Particulars	Coordinates
Tractor under unballasted condition but with all the liquid reservoirs full & the operator replaced by a 75 kg mass on the seat	Height above ground, (mm)	808
	Distance forward from the vertical plane containing the axis of rear wheels, (mm)	721
	Distance from the median plane parallel to the longitudinal axis of tractor bisecting the track, (mm)	9.6 (towards RHS)

10. TURNING ABILITY

Characteristics	Minimum turning diameter, (m)		Minimum clearance diameter, (m)	
	LHS	RHS	LHS	RHS
Brake applied	6.10	6.20	6.44	6.52
Brake released	6.95	6.95	7.25	7.27

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 **7000 mm** which is **3.38** times of wheel base i.e. 2070 mm.

ii) The non-visible space in LHS & RHS is **3250 mm** on each side, which is **2.29** times of rear standard track width i.e. 1420 mm**.**

iii) The major parts creating masking effect is silencer.

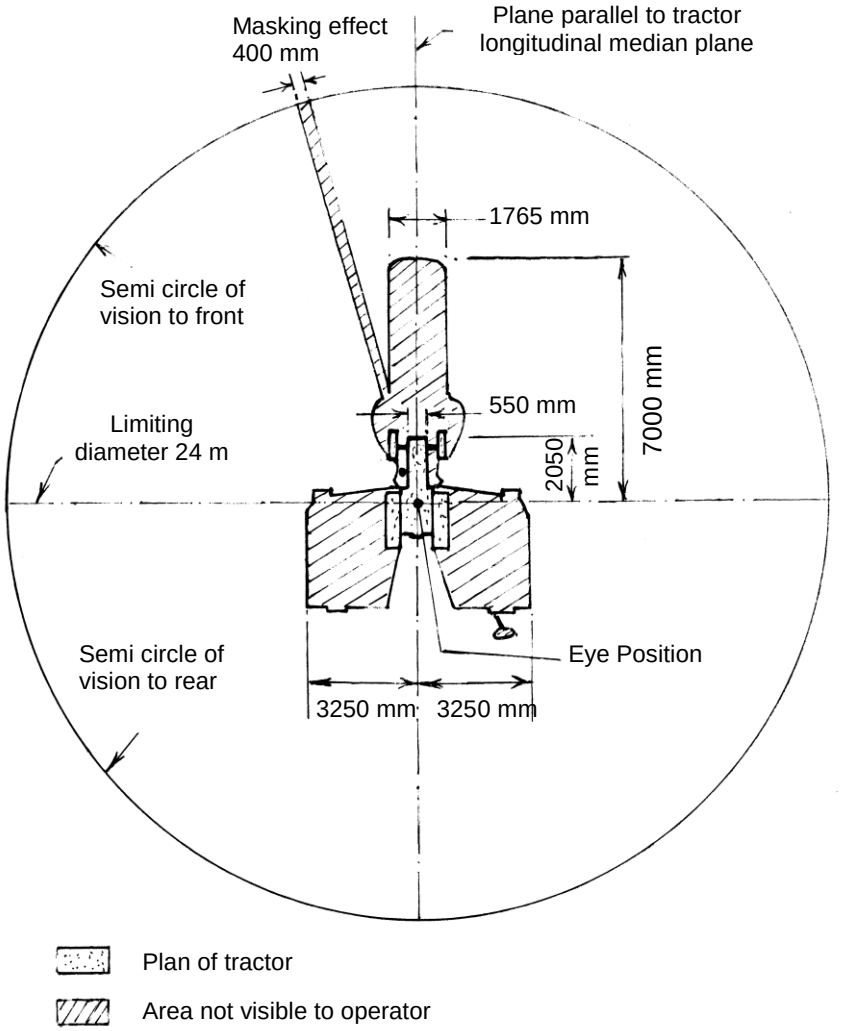


Fig. 8: OPERATOR'S FIELD OF VISION

12. FIELD TEST

12.1 The field tests comprising of Disc ploughing, rotavation and puddling (including five hours of water proof test) were conducted for 10.3, 10.2 and 15.3 hours respectively.
All the field tests were conducted at the full accelerator settings, when the no load speed of the engine was 2590 to 2640 rpm.

12.2 The brief specifications of the implements used during field tests are given in **Annexure – I & II**

12.3 The summary of field test observation with disc ploughing, rotavation and 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,)	11 to 12	15 to 19	14
iii)	Bulk density of soil, (g/cc)	1.2 to 1.4	1.50 to 2.0	--
iv)	Cone index, (kgf/sq.cm)/ Pudding index (%)	6.81 to 8.16	6.81 to 9.36	86
v)	Gear used	A-2	A-1	A-3
vi)	Av. Speed of operation, (kmph)	3.33 to 3.71	2.36 to 2.44	4.42 to 4.47
vii)	Av. Wheel slip (%) / Av. travel reduction, (%)	11.33 to 12.31	-1.1 to 0.1	5.89 to 6.46
viii)	Av. depth of cut, (cm) / Av. depth of puddle, (cm)	16 to 18	8	25
ix)	Av. working width, (cm)	89 to 90	149 to 150	--
x)	Area covered, (ha/h)	0.270 to 0.292	0.278 to 0.301	--
xi)	**Fuel consumption:**			
	- (l/h)	5.68 to 5.92	6.82 to 7.76	6 to 6.38
	- (l/ha)	21.04 to 17.46	22.66 to 27.91	--
xii)	Av. draft of implement, (kN)	6.96 to 7.65	--	--

Remarks: The average lub oil and coolant consumptions during the entire field tests were observed as **1.40 ml/h** and **Nil** respectively.

12.4 Wet land cultivation (Puddling Operation):

12.4.1 The tractor was fitted with full cage wheel for carrying out the puddling operation. The brief specification of the full cage wheel used is given in **Annexure- II.**

12.4.2 After completion of puddling and water proof test, the tractor was partially dismantled to check effectiveness of sealing provided against ingress of water and/or mud in various assemblies/components as per requirements of IS: 11082-1984 “Technical requirements of Agricultural tractors for wet land cultivation”. The observations were as under.

S. No.	Location	Whether ingress of mud and/or water	Remark
1.	King pin assemblies	No	None
2.	Stub axles	No	
3.	Centre pin assembly	No	
4.	Clutch housing	No	
5.	Brake housing	No	
6.	Engine sump, transmission, hydraulic, brake & steering gearbox housing oils	No	
7.	Starter motor	No	
8.	Alternator	No	

13. HAULAGE TEST

Type of trailer:	:	Two wheel (Single axle)	Four wheel (Double axle)
Gross mass of trailer, (tonnes)	:	5.0	7.0
Height of trailer hitch above ground level, (mm)	:	550	560
Gear used during the test for negotiating slopes upto 8%	:	C-3	C-3
Average travel speed, (kmph)	:	25.69 to 25.85	24.77 to 26.68
Average fuel consumption:			
- (l/h)	:	5.71 to 5.72	6.14 to 6.61
- (ml/km/tonnes)	:	44.3 to 44.5	35.4
Average distance traveled per litre of fuel consumption, (km)	:	4.50 to 4.52	4.04
General observations:			
Effectiveness of brakes	:	Effective	Effective
Maneuverability of tractor-trailer combination	:	Satisfactory	Satisfactory

14. COMPONENTS / ASSEMBLY INSPECTION

The engine and other assemblies were dismantled after **89.8** hours of tractor operation at this Institute.

14.1 Engine:

14.1.1 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	106.49	106.48	106.49	106.48	106.49	106.48	106.77
2	106.49	106.48	106.49	106.48	106.50	106.48	
3	106.49	106.48	106.49	106.48	106.49	106.48	

14.1.2 Piston:

Piston No.	Piston diameter, (mm)					Piston to cylinder liner clearance at skirt, (mm)	
	Top (above top compression ring)		At skirt		Max. permissible wear limit,		
	Thrust Side	Non-thrust side	Thrust side	Non-thrust side		As observed	Discard limit
1.	104.74	104.75	106.38	**	106.30	0.110	0.32
2.	104.73	104.74	106.38	**		0.111	
3.	104.74	104.75	106.39	**		0.096	

** **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	Mid-dle	Bot-tom	Top	Mid-dle	Bot-tom	Top	Mid-dle	Bot-tom	
1st comp. ring	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.75
2nd comp. ring	0.65	0.65	0.65	0.74	0.74	0.74	0.65	0.65	0.65	2.00
Oil ring	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.75

14.1.4 Ring side clearance:

R i n g s	Ring side clearance, (mm)			Max. permissible clearance limit, (mm)
	Piston-I	Piston-II	Piston-III	
1st Compression ring	----------Taper rings----------			Taper rings
2nd Compression ring	0.038	0.038	0.046	0.25
Oil ring	0.057	0.043	0.041	0.92

14.1.5 Main bearings:

Bearing No.	Diametrical Clearance, (mm)	Crankshaft end float, (mm)	Maximum permissible wear limit, (mm)	
			Diametrical clearance	Crankshaft end float
1.	0.087 to 0.095	0.20	0.65	0.85
2.	0.104 to 0.121			
3.	0.089 to 0.111			
4.	0.088 to 0.102			

14.1.6 Big end bearings:

Bearing No.	Clearance, (mm)		Maximum permissible wear limit, (mm)	
	Diametrical	Axial	Diametrical	Axial
1	0.078 to 0.158	0.35	0.65	0.85
2	0.069 to 0.179	0.35		
3	0.098 to 0.157	0.35		

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

Any marked sign of overheating of valves : None

Pitting of seat/faces of valves : None

Any visual damage to the teeth of timing gears : None

Spring Rate, (N/mm):

- Intake valve spring : 20.42 to 23.52
- Exhaust valve spring : 20.42 to 24.41

Against discard limit of 17.0 N/mm.

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

- Intake valve : 0.048 to 0.064
- Exhaust valve : 0.061 to 0.099

Against the discard limit of 0.16 mm

14.2 Clutch: **Observation**

Any marked wear on clutch friction plates : None

Condition of clutch release bearing	:	Normal	
Condition of pilot bearing	:	Normal	
Condition of springs and diaphragm	:	Normal	
Presence of oil in clutch housing	:	None	
Any marks on fly wheel/pressure plate	:	None	
Overall thickness of clutch plate, (mm):			
- Transmission	:	10.28 to 10.38	Wear up to rivet head
- PTO	:	7.67 to 7.71	
Height of lining over rivet head, (mm):			
- Transmission clutch	:	1.09 to 1.40	Wear up to rivet head
- PTO clutch	:	0.52 to 1.16	

14.3 Transmission gears:

Any visual damage, pitting & chipping of any transmission gear teeth	:	None	
Backlash between crown wheel and pinion, (mm)	:	0.517	0.60 mm, by Shim adjustment.

14.4 Brakes:

Description	Initial specified thickness of brake disc, (mm)	Measured thickness of brake disc after test, (mm)	Measured depth of oil groove of brake lining, (mm)	Minimum permissible depth of oil groove of brake lining, (mm)
Left	Not specified	5.06 to 5.12	1.15 to 1.43	Wear up to oil groove depth
Right	Not specified	5.09 to 5.51	1.24 to 1.52	

14.5 Front axle:

Any marked wear of king pins	:	None	
Condition of king pin bushes	:	Normal	
Clearance between king pin & bush, (mm)	:	0.06 to 0.16	Against the discard limit of 0.80 mm
Condition of thrust bearing	:	Normal	
Condition of bearings for stub axles	:	Normal	
Condition of seals for stub axles and king pins	:	Normal	
Clearance between centre pin and bush, (mm)	:	0.01 to 0.07	Against the discard limit of 0.80 mm

14.6 Steering system:

Visual condition of the components of complete steering assembly	:	Normal

14.7 Starter motor & Alternator:

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

15. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

Sl. No.	Adjustments / Defects / Breakdowns and Repairs	Tractor run hours
	---Nill---	

16. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

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

S. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	Values declared by the applicant (D)/ Requirement (R)	As observed	Whether meets the require-ments (Yes/No.)
1	2	3	4	5	6	7
16.1.1	**PTO Performance :**					
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: -5 / +10% for PTO power >26 kW. –7.5/+10% for PTO power ≤ 26 kW or-5 / +10% for Engine power >26 kW. –7.5/+10% for Engine power ≤ 26 kW	36.4 (D)	36.5	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	36.4 (D)	35.3	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+ 5%	325 (D)	308	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	229 (D)	208.1	**No**
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10 percent, min (R)	34.3	Yes
f)	**Maximum operating temperature (^{O}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	117	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	100	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	3.14 (R)	0.61	Yes

h)	Smoke level	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hatridge value (**As per CMVR**)	3.25 per metre	0.54	Yes
16.1.2	**Drawbar performance :**					
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	21.92 (D) 19.06 (R)	22.93	Yes
b)	Maximum drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	15.44 (D) 13.44 (R)	17.70	Yes
c)	Maximum drawbar power without ballast, (kW).	Evaluative	Minimum 80 % of PTO power as referred in Sl No. i) a) of PTO performance in case of tractors having total static mass > 1500 kg Minimum 75 % of PTO power as referred in Sl 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 Sl No. i) a) of engine performance in case of tractors which do not have a PTO shaft.	29.1 (D) 29.2 (R)	30.7	Yes
d)	Max. transmission oil temperature (^{0}C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	110 (D)	77	Yes
16.1.3	**Power lift and hydraulic pump performance :**					
a)	Maximum lifting capacity throughout the range of lift, (kN):					
	1) At hitch points	Non Evaluative	[Tolerance of minus 10%]	17.50 (D)	17.96	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	12.9 (D) 8.59 (R)	15.53	Yes
b)	Maximum drop in the height of the point of application of the force after each 5 minutes interval for a total duration of 30 minute, (mm)	Non Evaluative	[Tolerance of plus 5 mm]	50 (D)	02	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 ballast, (m):					
	1) Cold brake	Evaluative	10	10	7.25	Yes
	2) Hot brake	Evaluative	10	10	7.57	Yes

b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s^2 (N)	Evaluative	600	600 (R)	183 to 216	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)	83	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96 (R)	95	Yes
16.1.6	**Amplitude of mechanical vibrations at :**					
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R)	380	**No**
	2) Right foot rest	Non Evaluative			360	**No**
	3) Seat (with driver seated)	Non Evaluative			100	Yes
	4) Steering Wheel	Non Evaluative			160	**No**
16.1.7	**Air Cleaner :**					
	Air cleaner oil pull over (%)	Non Evaluative	0.25 % (Maximum)	Dry type air cleaner is provided	Not applicable	**--**
16.1.8	**Haulage requirements :**					
a)	Gross mass of the trailers, (tones):					
	1) Two wheel	Non Evaluative	--	5.0 (D)	5.0	Yes
	2) Four wheel		--	7.0 (D)	7.0	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
	1) Two wheel	Non Evaluative	--	4 to 6 (D)	4.50 to 4.52	Yes
	2) Four wheel		--	4 to 6 (D)	4.04	Yes
c)	Fuel consumption (cc/km/tonne):					
	1) Two wheel	Non Evaluative	--	30 to 40 (D)	44.3 to 44.5	**No**
	2) Four wheel		--	30 to 40 (D)	35.40	Yes
16.1.9	**Wetland cultivation :**					
	Sealing for the following assemblies:	Evaluative	**The identified assemblies should essentially meet the requirement of IS: 11082. No water ingress in the identified assembly given in column-2. If tractor does not meet the requirements of wetland cultivation, it may be recommended for dry land operation only.**	There should be no ingress of water and/or mud	No ingress of water and/or mud was observed	Yes
	1) Clutch assembly	-do-				
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
	4) Engine oil	-do-				
	5) Transmission oil	-do-				

1	2	3	4	5	6	7

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)	--	Conforms	Yes
b)	Lighting arrangement	Evaluative	As per CMVR	--	Conforms	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)	--	Conforms	Yes
d)	Technical requirements for PTO shaft	Non-Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--	Conforms	Yes
e)	Dimension of three point linkage	Non-Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	--	Conforms	Yes
f)	Specification of linkage and swinging drawbars	Non-Evaluative	Should meet the requirements of IS 12953 and IS 12362 (part 3) (as amended from time to time)	--	Conforms	Yes

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	JOHN DEERE		Yes
	2) Model	Evaluative		5310 V3		Yes
	3) Year of manufacture	Evaluative		BL-F (November, 2015)		Yes
	4) Engine number	Evaluative		PY3029H058374		Yes
	5) Chassis number	Evaluative		1PY5310EKFA006924		Yes
	6) Declaration of PTO power, (kW)	Evaluative		36.4		Yes
	7) Specific fuel consumption, (g/kwh)	Evaluative		325		Yes

16.1.12	**Discard limit for:**					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	106.77 (D)	106.48 to 106.50	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.32	0.1 to 0.11	Yes
(c)	**Ring end gap (mm):**					
	- Top comp. ring	Evaluative	-do-	0.75	0.45	Yes
	- 2nd comp. ring		-do-	2.00	0.65 to 0.74	Yes
	- Oil ring		-do-	0.75	0.40	Yes
(d)	**Ring groove clearance (mm):**					
	- Top comp. ring	Evaluative	-do-	Tappered	Tappered	---
	- 2nd comp. ring		-do-	0.25	0.038 to 0.046	Yes
	- Oil ring		-do-	0.92	0.041 to 0.057	Yes
(e)	**Clearance of main bearings (mm):**					
	- Diametrical clearance	Evaluative	-do-	0.65	0.087 to 0.121	Yes
	- Crankshaft end float	Evaluative	-do-	0.85	0.20	Yes

1	2	3	4	5	6	7

(f)	**Clearance of big end bearings, (mm):**					
	- Diametrical	Evaluative	-do-	0.65	0.069 to 0.179	Yes
	- Axial	Evaluative	-do-	0.85	0.35	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.80	0.06 to 0.16	Yes
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.80	0.01 to 0.07	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 require-ments (Yes/No.)
1.	Critical	Evaluative	No critical breakdown	None	Yes
2.	Major	Evaluative	Not more than two and neither of them should be repetitive in nature	None	Yes
3.	Minor	Evaluative	Not more than five and frequency of each should not be more than two.	None	Yes
4.	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed five, that is, (2 major + 3 minor) or 5 minor breakdowns.	None	Yes

16.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2014:

S. No.	Characteristic	Requirements as per IS: 12207-2014	As observed	Whether meets the require-ments (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	ROPS not fitted	Not applicable
2.	Accessories	Trailer hitch, linkage drawbar may be provided.	Provided	Yes
		Front tow hook	Not provided	**No**

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)] **:** 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)]	**:**	Conforms
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]	**:**	Conforms
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 **36.5 kW** against the declaration of **36.4 kW** which meets the requirement of IS: 12207-2014 with regard to tolerance limit.

ii) The specific fuel consumption corresponding to maximum power was measured as **308 g/kWh** against the declaration of **325g /kWh**, which is within the tolerance limit of IS: 12207-2014.

iii) The maximum equivalent crankshaft torque was observed as **208.1 Nm** against the declaration of **229 Nm** and which does not meet the requirement of IS: 12207-2014 with regard to tolerance. This should be looked into for necessary corrective action.

iv) The percentage drop in maximum power during natural ambient and high ambient condition was observed as 6.6 %, which was considered on higher side. This should be looked into for necessary corrective action.

v) The backup torque is **34.3**%.

16.4.1.2 Hydraulic Performance :

i) The moment about rear axle with standard frame was calculated as **24.85 kN-m**. Whereas, the moment about front axle was calculated as **14.72 kN-m** under unballasted condition and **21.32 kN-m** under ballasted condition. The moment about rear axle is on higher side as compared to the moment about front axle even under ballasted condition. It is, therefore, recommended that the lifting capacity of the hydraulic system may be reduced suitably or ballast recommendation may be reviewed to avoid the front lifting of the tractor.

ii) The maximum tilt angle of mast from vertical was recorded as 7.5 degree only against the minimum requirement of 10.0 degree. This should be looked into for necessary corrective action.

16.4.1.3 Mechanical vibration:

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

16.4.1.4 Three point linkage:

Some of the parameters conform to Cat. I and some of them conform to Cat. II. Keeping in view the spirit of standardization, necessary improvement may be incorporated.

16.4.1.5 Linkage drawbar:

Some of the parameters of the drawbar linkage conform to Cat.-I and some of them conform to Cat.-II. Keeping in view of the spirit of standardization, the necessary improvements may be incorporated.

16.4.1.6 Operator's Seat

The Longitudinal distance from SIP to centre of differential lock pedal does not meet the requirement of IS: 12343-1998 (Re-affirmed in March, 2009) and calls for necessary corrective action.

16.4.1.7 Location and movement of operator's controls:

Working clearance between gear shift lever (in park position) and the mudguard does not meet the requirement of the IS: 12239 (Part-2)-1996. This should be looked into for necessary corrective action.

16.4.1.8 Labelling Plate:

The maximum PTO power has been specified as 36.4 kW (49.5 hp) vide labelling plate of the tractor. As per the conversion, the power of 36.4 kW is equals to 48.8 hp and not equals to 49.5 hp. This needs to be looked into for necessary corrective action.

16.4.2 Field performance test:

16.4.2.1 Haulage performance:

The fuel consumption (ml/km/tonne) with two wheel trailer was observed as 44.3 to 44.5 ml/km/tonne against the declaration of 30 to 40 ml/km/tone for two wheel trailer. This does not meet the requirement of IS: 12207-2014 and therefore, should be looked into for necessary corrective action.

16.4.2.2 Wetland cultivation (Puddling operation):

No ingress of mud and / or water was noticed during puddling operation of the tractor and meet the requirements of IS: 11082-1984 (Technical requirements of agricultural tractors for wetland operation). Therefore, the tractor is found as suitable for wetland operation (Puddling).

16.5 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 of spark arresting device in exhaust system.
ii) The working clearance around main gear shifting lever does not meet the requirement of IS: 12239 (part-2)-1999.
iii) Front tow hook shall be provided.

16.7 Adequacy of Literature supplied with machine:

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

i) Operator's Manual (For 5310, 5310 V3, 5310 V5, 5050E, 5055E, 5060E, 5065E & 5075E tractor models).
ii) Technical manual Part 1 & 2 (For 5310, 5310 V3, 5310 V5, 5050E, 5055E, 5060E, 5065E & 5075E tractor models).
iii) Parts Catalogue (For 5310, 5310 V3 & 5310 V5 tractor models).

16.7.2 The given literature supplied was found adequate. However, the following points needs to be incorporated in owners/operators manual.

i) Details of all variants along with their features at a glance should be provided in the operator's manual.

16.7.3 The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.

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	10, Months (May, 2016 to March, 2017)	Yes	--

TESTING AUTHORITY:

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AGRICULTURAL ENGINEER

C. V. CHIMOTE
TEST ENGINEER

Y.K.RAO
SENIOR AGRICULTURAL ENGINEER

J. J. R. NARWARE
DIRECTOR

18. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
18.1	16.4.1.3	We will take necessary action.
18.2	16.4.2.1	We will take necessary action.
18.3	16.6 (iii)	We are in process to design for to give provision of front tow hook.

ANNEXURE- I

BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST

S.No	Parameters	Disc Plough	Rotavator
1.	Make	M&M	Shaktiman
2.	Type	Mounted	Mounted
3.	No. of Disc/blades	03	36 in 7 flange
4.	Type of Disc/blades	Plane, Concave	Hatchet
5.	Size of bottoms/blades, (mm)	610	250 x 65 x 8
6.	Spacing of bottoms/flanges, (mm)	520	250
7.	Lower hitch point span, (mm)	855	620
8.	Mast height, (mm)	440	650
9.	**Overall dimensions, (mm):**		
	- Length	1890	1630
	- Width	1080	630
	- Height	1070	1170
10.	Gross mass, (kg)	365	495

ANNEXURE – II

BRIEF SPECIFICATION OF FULL CAGE WHEEL

S. No.	Parameters	Specifications
1.	Type	Full cage wheel
2.	Dia, (mm)	1280
3.	Width, (mm)	850
4.	No. and types of lugs	24, Straight lugs made of M.S. angle section welded to angle iron frame
5.	Size of angle section, (mm)	50 x 50 x 6
6.	Length of lugs, (mm)	425
7.	Spacing of lugs, (mm)	160
8.	Weight of each cage wheels (kg)	145

ANNEXURE- III

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	PTO performance test	11.5
3.	Power lift and hydraulic pump performance test	4.1
4	Drawbar performance test	18.8
5.	Turning ability	0.2
6.	Location of centre of gravity	0.2
7.	Operator's field of vision	--
8.	Brake test	2.1
9.	Noise measurement	1.8
10.	Mechanical vibration test	1.0
11.	Nominal speed test	0.8
B.	**FIELD TEST:**	
1.	Disc ploughing	10.3
2.	Rotavation	10.2
3.	Puddling (including 5 hrs water proof test)	15.3
C.	**HAULAGE TEST:**	6.4
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	7.1
	TOTAL:	**89.8**