Lk[;k / No. : **T- 1254/1781/2019**

ekg / Month : **July , 2019**

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CONFIDENTIAL TEST REPORT

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परिवर्तित

CONVERTED TO COMMERCIAL TEST REPORT

(यह परीक्षण रिपोर्ट 31/07/2022 तक वैध है / THIS TEST REPORT IS VALID UPTO 31/07/2022)

JOHN DEERE 3028EN TRACTOR

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GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE AND FARMERS WELFARE
(Department of Agricultural, Cooperation & Farmer's Welfare, Mechanization & Technology Division)

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CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE
(An ISO 9001: 2015 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. John Deere India Pvt. Ltd.**
Survey No. 501, Village – Khatamba Jamgod,
Dewas Bhopal Highway, Dewas
(Madhya Pradesh) 455115

Month: July	Test Report No. T- 1254/1781/2019	Year: 2019

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Type of Test : **CONFIDENTIAL-**

		(CONVERTED TO COMMERCIAL TEST)
Test code/Procedure	:	IS: 5994-1998 (Reaffirmed in 2014), IS: 9253-2001(Reaffirmed in 2007), and IS: 12207-2014
Period of Test	:	November, 2018 to June, 2019
Test Report No	:	**T- 1254/1781/2019**
Month/Year	:	**July, 2019**

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.)

SELECTED CONVERSIONS

SELECTED CONVERSIONS		
Sl. No	**Units**	**Conversion Factor**
1	**Force:**	
	1 kgf	9.80665 N
		2.20462 lbf
2	**Power:**	
	1 Mechanical horse power	1.01387 Metric horse power
		745.7 W
	1 Metric horse power	735.5 W
	1 kW	1.35962 Metric horse power
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

ABBREVIATIONS	
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
SIP	Seat Index Point

C O N T E N T S

Initially the applicant had submitted the application of **"JOHN DEERE 3028EN"** tractor for confidential test vide letter no. nil dated 11.04.2018. After releasing the draft test report, applicant had submitted a letter vide no. Nil dated 10.07.2019 for conversion of nature of test from confidential test to commercial test. The request of the applicant has been examined and accepted for conversion of nature of test as per relevant commercial test procedures. Hence, this confidential test report is released under commercial test.

Manufacturer & Location of plant	**:**	**M/s. John Deere India Pvt. Ltd. Gat No. 166 - 167 & 271 - 291, Off Pune - Nagar Road, Sanaswadi, Pune– 412 208 (M.S.)**
	:	**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	**:**	08
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	**:**	3028 EN
Variants, if any **:**	**:**	**None**
Type	**:**	Four wheel, 4WD, standard Agricultural Tractor.
Year of manufacture	**:**	BL-H (i.e, November, 2017)
Chassis number	**:**	1PY3028EEHA000001
Country of Origin	**:**	India

1.2 Engine:

Make	**:**	Yanmar Co. Ltd. Japan
Model	**:**	3TNV82A-KJPT
Type	**:**	Four stroke, liquid cooled, naturally aspirated, direct injection, diesel engine.
Serial number	**:**	CH3W13DE5446
Engine speed (Manufacturer's recommended production setting), (rpm):		
- Maximum speed at no load,	**:**	2910 to 3010
- Low idle speed	**:**	900 to 1000
- Speed at maximum torque	**:**	1150 to 1250
Rated speed, (rpm):		
- For PTO use	**:**	2800
- For drawbar use	**:**	2800

1.3 Cylinder & Cylinder Head:

Number	:	Three
Disposition	:	Vertical, inline
Bore/stroke, (mm)	:	82 / 84
Capacity as specified by the applicant, (cc)	:	1331
Compression ratio	:	19.2±0.5 : 1
Type of cylinder head	:	Monoblock,
Type of cylinder liners	:	Wet, Non-replaceable
Type of combustion chamber	:	Cavity on piston crown
Arrangement of valves	:	Inline, Overhead
Valve clearance (cold/hot):		
- Inlet valve, (mm)	:	0.15 to 0.25
- Exhaust valve, (mm)	:	0.15 to 0.25

1.4 Fuel System:

Type of fuel feed system	:	Gravity and force feed

1.4.1 Fuel tank:

Capacity, (l)	:	32.0
Location	:	Above bell housing under bonnet
Provision for draining of sediments/water	:	Provided
Material of fuel tank	:	PE-LLD (apa)

1.4.2 Water separator:

Make	:	Taiyo Giken (apa)
Type	:	Inverted funnel gravity separation
Location	:	In between fuel tank & feed pump on RHS of engine.
Capacity, (l)	:	0.25

1.4.3 Fuel feed pump:

Make	:	U-Shin (apa)
Type	:	Diaphragm
Model/Group combination No.	:	YMR No.:119225-52102 (apa)
Provision of sediment bowl	:	**Not provided**
Method of drive	:	Electrically operated

1.4.4 Fuel filters:

Make	:	Nippon Rokaki (apa)
Model/Group combination No	:	119802-55801
Number(s)	:	One
Type of elements:	:	Full flow, spin-on through away paper element.
Capacity of final stage filter, (l)	:	0.35

1.4.5 Fuel Injection pump:

Make	:	Yanmar Co. Ltd. Japan
Model/Group Combination No.	:	W1985251410 C001
Type	:	Mono plunger, distribution
Serial number	:	20160705
Method of drive	:	Through timing gears

1.4.6 Fuel injectors:

Make	:	Yanmar Co. Ltd. Japan
Holder no.	:	VBAM
Nozzle no.	:	162P165VAE1, YDLLA6D29
Type	:	Multihole (Five holes)
Manufacturer's production pressure setting, (MPa)	:	21.575±0.981
Injection timing	:	16.3 ± 1° Before TDC
Firing order	:	1 – 3 – 2

1.4.7 Governor:

Make	:	Yanmar Co. Ltd. Japan
Model/Group Combination No.	:	Inbuilt with Fuel Injection Pump
Type	:	Mechanical, centrifugal, variable speed
Rated engine speed, (rpm)	:	2800
Governed range of engine speed, (rpm)	:	900 to 3010

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)	:	3.4 to 3.7	
Details of element:		**Primary**	**Secondary**
- Size (OD/ID), mm	:	105.3/63.5	59.0/45.0
- Length, (mm)	:	265	260
- Type	:	Cellulose fiber paper	Polyester felt
Provision of dust unloading valve	:	Provided	
Air flow restriction indicator	:	Provided	
Maintenance schedule	:	Replace primary element after every 1000 hrs. of operation.	

1.6 Exhaust System:

Type of silencer	:	Downdraft (Cylindrical)
Position of silencer outlet with respect to SIP, (mm):		
- Vertical	:	665
- Longitudinal	:	1800
- Lateral	:	245 (on LHS)
Range of exhaust gas pressure at maximum power, (kPa)	:	6.4 to 6.7
Provision of spark arresting device	:	None
Provision against entry of rain water	:	Horizontal, downdraft opening

1.7 Lubricating system:

Type	:	Forced feed
Oil sump capacity, (l)	:	4.00
Total lub oil capacity, (l)	:	4.20
Oil change period	:	First change after 100 hours and subsequently after every 250 hours of operation.
Cooling device, (if any)	:	None

1.7.1 Filters:

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

1.7.2 Pump:

Type	:	Trochoid pump
Method of drive	:	Through timing gears
Pressure release setting,(kPa)	:	290 (apa)

1.8 Cooling system:

Type	:	Force circulation of coolant and water
Coolant as recommended	:	Ethylene glycol
Coolant water ratio	:	20 : 80
Details of Pump	:	Centrifugal, Open impeller of 60.0 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 seven polypropylene blades of 380.0 mm diameter and mounted on water pump shaft.
Means of temperature control	:	Thermostat
Bare radiator capacity, (l)	:	2.00
Expansion flask capacity, (l)	:	0.80
Total coolant capacity, (l)	:	4.80
Radiator cap pressure, (kPa)	:	88

1.9 Starting System:

Type	:	12V DC, Electrical
Aid for cold starting	:	None
Any other device provided for easy starting	:	None

1.10 Electrical System:

1.10.1 Battery:

Make and model	:	Exide & FEF1-55D23L (MF)
Type	:	Lead acid
Capacity and rating	:	12V, 45 Ah at 20 hours discharge rate
Location	:	In-front of radiator under the bonnet.

1.10.2 Starter:

Make	:	Denso
Model	:	YM129129-77010
Type	:	Pre-engaging, solenoid operated
Power rating, (kW)	:	12V, 1.2 kW
Serial Number	:	228000-0251

1.10.3 Generator:

Make	:	Bosch India
Model	:	F002 G90514
Type	:	Alternator
Output rating	:	12V, 50 A
Method of drive	:	Driven through crank shaft pulley by a cogged "V"-belt common to water pump.
Serial number	:	30778

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	915	145 x 80	415
- Parking lights	2, 12V, 5W	1160	110 x 35	85
- Turn Indicators-cum-hazard indicators	2, 12V, 21W	1195	110 x 35	85
Rear lights:				
- Brake light-cum- Tail light	2, 12,V, 21/5W	1160	110 x 35	85
- Turn Indicators-cum-hazard indicators	2,12V, 21W	1195	110 x 35	85
-Plough light (On RHS mudguard)	1, 12 V, 55 W	1230	130 x 70	310
- Reflector (R)	2	1105	100 x 40	90
Registration plate light	1, 12V, 5W	1050	30 Φ	150

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)

1.10.8 Horn:

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

1.10.9 Fuse box : Contains 11 number of fuses of following capacity:

Capacity	05 A	10 A	15 A	25 A
No. of fuse	03	01	05	02

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 not operate unless,

(i) The forward & reverse shift lever is not in the neutral position and

(ii) PTO lever is not in OFF position.

1.11 Instrument panel details:

i) Engine speed-cum-cumulative digital run-hour-meter (0-35 x 100 rpm)
ii) Coolant temperature gauge (with colour zones)
iii) Fuel level gauge (with colour zones)
iv) Lubricating oil pressure indicator indicator
v) Light switch (Rotary type)
vi) Main switch (key-turn type)
vii) Horn push button
viii) Air cleaner clogging indicator
ix) Battery charging warning indicator
x) Turn signal indicator cum hazard Light indicator
xi) Turn light indicator switch
xii) Head light (long beam) indicator lamp
xiii) Hazard light switch
xiv) Hand accelerator lever.
xv) Forward –reverse gear shifting lever
xvi) Steering control wheel.
xvii) Rear view mirror

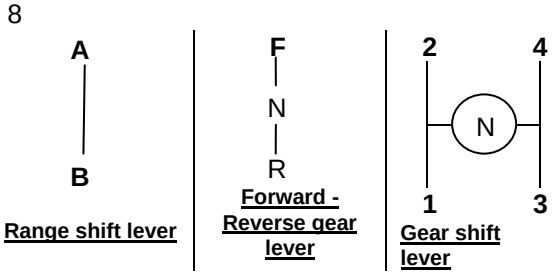
1.12 Transmission System:

1.12.1 Clutch:

Make	:	Luk
Type	:	Single, Dry friction plates
No. of friction plate(s)	:	One
Size (OD/ID), mm:	:	240.0 / 160.8 Φ
Material of clutch lining	:	Organic 8402 (apa)
Method of operation:	:	By depressing a pedal fully, provided on LHS of operator's seat.

1.12.2 Gear box:

Make	:	John Deere
Type	:	Mechanical, Constant mesh gears
No. of speeds:		
- Forward	:	8
- Reverse	:	8
Gear shifting pattern	:	



Location of gear shifting levers : **i)** Gear shift lever is provided on RHS of the operator's seat.
ii) Range shift lever is provided on LHS of operator's seat.
iii) Forward - Reverse gear lever is provided on LHS of Dashboard.

Oil capacity, (l) : 36.0 (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 **8.30 -24** size tyres of **470** mm radius index, (kmph)	Nominal speed at rated engine speed when fitted with **9.5-24** size tyres of **495** mm radius index, (kmph) **(Optional)**
Forward	A1	315.66	1.57	1.66
	A2	238.79	2.08	2.19
	A3	123.25	4.02	4.23
	A4	93.53	5.30	5.58
	B1	86.88	5.72	6.02
	B2	65.69	7.56	7.96
	B3	33.88	14.61	15.38
	B4	25.71	19.31	20.32
Reverse	RA1	302.45	1.64	1.73
	RA2	228.71	2.17	2.28
	RA3	118.15	4.19	4.41
	RA4	89.64	5.54	5.84
	RB1	83.26	5.96	6.27
	RB2	62.96	7.88	8.30
	RB3	32.52	15.27	16.07
	RB4	24.70	20.09	21.15

Number of revolutions of front wheels for one revolution of driving wheel (for 4WD) **:** 1.663 :1

1.12.4 Differential:

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

Reduction through crown wheel and pinion : 4.556 **:** 1 (41/9T)

Oil capacity of differential unit, (l) : 36.0 (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:

Type : Pin type

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	:	Bull gear pinion
Reduction through final drive	:	6.273 : 1 (69/11T)
Oil capacity of final drive, (l)	:	36.0 (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.

1.12.6 Front differential :

Type	:	Crown wheel & bevel pinion with differential unit accommodated inside the centre of front axle housing.
Reduction through crown wheel & bevel pinion	:	3.36:1 (37/11T)
Oil capacity, (l)	:	4.00 (common with front axle and front final drive)
Oil changing period	:	First change after 100 hours and subsequently after every 600 hours of operation.
Differential lock:	:	**Not Provided**

1.12.7 Front axle & front final drive:

Make	:	Dana
Type	:	Crown wheel & bevel pinion accommodated inside the front axle housing (near front wheel hub) , Portal bevel gear .
Reduction through final drive	:	3.42:1 (41/12T)
Oil capacity of final drive, (l)	:	4.0 (common with front differential)
Oil changing period	:	First change after 100 hours and subsequently after every 600 hours of operation.

1.13 Power lift (Hydraulic System):

Make	:	Mita
Identification mark	:	222623
Type	:	Open centre, live, ADDC
No. and type of cylinder	:	One, single acting
Type of linkage lock for transport	:	Hydraulic, a “Rate-of-drop knob” in fully closed position acts as a transport lock.

1.13.1 Hydraulic pump:

-Make	:	Dynamatics
-Type	:	Gear
-Location & drive	:	On LHS of engine, through timing gears
No. & type of filter(s)	:	Two, One suction strainer & One Full flow spin-on throw away type filter
Hydraulic oil capacity, (l)	:	36.0 (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 **iv)** Rate of drop knob.
Method of draft sensing	:	Through top link

1.13.2 Three point linkage:

Sl. No.	Observations		As per IS: 4468- (Part-2) - 1993 (Reaffirmed in 2014) **(Cat.1N),** (mm)	As measured (mm)	Remarks
1	**2**		**3**	**4**	**5**
I.	**Upper hitch points:**				
	a)	Dia of hitch pin hole	19.30 to 19.51	19.43	Conforms to Cat. 1N
	b)	Width of ball	44.0 (max)	43.9	-do-
II.	**Lower hitch points:**				
	a)	Dia of hitch pin hole	22.40 to 22.73	22.46	-do-
	b)	Width of ball	34.80 to 35.0	34.9	-do-
III.	Lateral distance from lower hitch point to centre line of tractor		218	218	Conforms to Cat. 1N
IV.	Lateral movement of lower hitch points		50 (min)	130	-do-
V.	Distance from end of power take-off to centre of lower hitch point (lower links in horizontal position)		300 to 375	527	**Does not conform to Cat. 1N**
VI.	Transport height		600 (min)	801	Conforms to Cat. 1N
VII.	Power range (Without force)		420 (min)	595	-do-
VIII.	Leveling adjustment		75 (min)	215	-do-
IX.	Lower hitch point tyre clearance		100 (min)	210	-do-
X.	Lower hitch point height		200 (max)	155	-do-

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

The following are dimensions observed, corresponding to **470** 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	610	610
2.	Length of lift arm	B	290	290
3.	Length of lift rods	C	424 to 458	458
4.	Length of top link	D	400 to 590	525
5.	Distance of lift rod connection point from pivot point of lower link.	E	335	335
6.	Distance of lower link pivot point from rear wheel axis:			
	-Horizontally	F	170, behind	170, behind
	-Vertically	G	95, below	95, below
7.	Distance of upper link pivot point from rear wheel axis:			
	-Horizontally	H	290, behind	290
	-Vertically	J	335, above	335
8.	Distance of lift arm pivot point from rear wheel axis:			
	-Horizontally	K	95, behind	95, behind
	-Vertically	L	340, above	340, above
9.	Height of lower hitch points relative to the rear wheel axis:			
	- In high position	M	280 to 331	280, above
	- In low position	N	- 315 to - 239	315, below
10.	Height of lower link hitch points when locked in transport position	--	280	

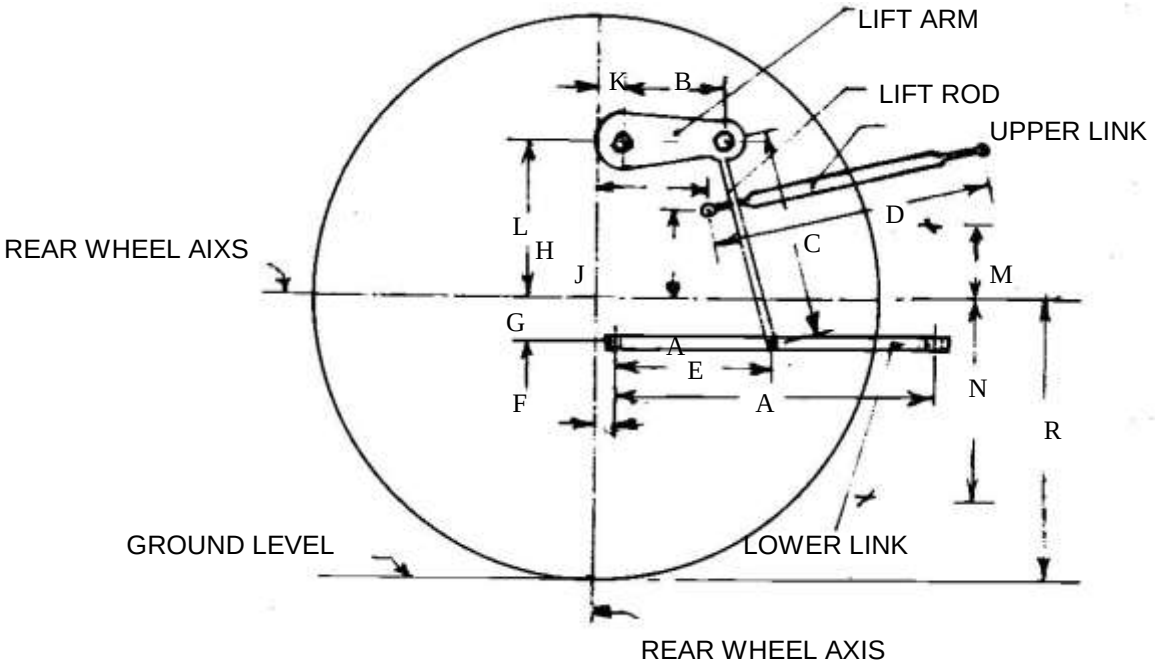
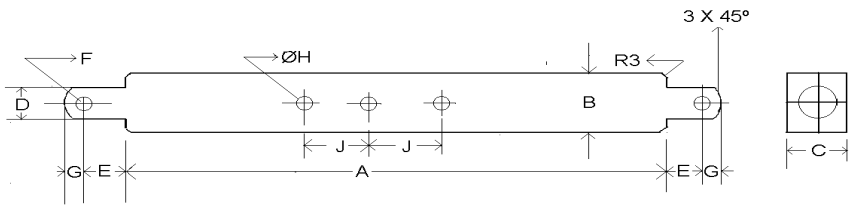


Fig.1 (a): DIMENSIONAL NOTATIONS FOR TABLE OF LINKAGE GEOMETRY

1.13.4 Drawbar:

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

Notation	As per IS: 12953-1990 (Reaffirmed in Oct.2017) **(Cat. I N)/ (mm)**	**As measured, (mm)**	**Remarks**
A	400 ± 1.5	400.5	Conforms to Cat. IN
B	75 (min)	76.4	-do-
C	30 (min)	31.9	-do-
D∅	21.79 to 22.0	21.89	-do-
E	39.0 (min)	39.0	-do-
F∅	12.0 (min)	12.0	-do-
G	15.0 (min)	15.3	-do-
H∅	25 ± 1	25.4	-do-
J	80 ± 1.5	80.1	-do-
No. of holes	05	05	-do-



1(b): <u>DIMENSIONAL NOTATIONS FOR LINKAGE DRAWBAR</u>

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, 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)	:	607
Distance behind rear axle, (mm)	:	250
Engine to PTO speed ratio	:	4.615 : 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 (Reaffirmed in 2014), Type-1	As observed	Remarks
Nominal speed, (rpm)	540 ± 10	540 rpm of PTO shaft corresponds to 2492 rpm of engine.	Conforms
No. of splines	6	6	Conforms
Direction of rotation	Clockwise	Clockwise	Conforms
Location	The position of the centre of the end of PTO shaft shall be within 50 mm to right or left of the centre line of the tractor	Centrally located	Conforms
Dimensions, (mm) (See Fig. 2):			
D∅	34.79 ± 0.06	34.82	Conforms
d∅	28.91± 0.05	28.87	Conforms
B∅	29.4 ± 0.1	29.46	Conforms
A∅ (Optional)	8.3	NA	--
W	8.69 - 0.09 - 0.16	8.66	Conforms
a	7	7	Conforms
b (optional)	25 ± 0.5	NA	--
c	38	38	Conforms
X	30°	30°	Conforms
B	76 (min)	88.0	Conforms
h	450 to 675	505	Conforms

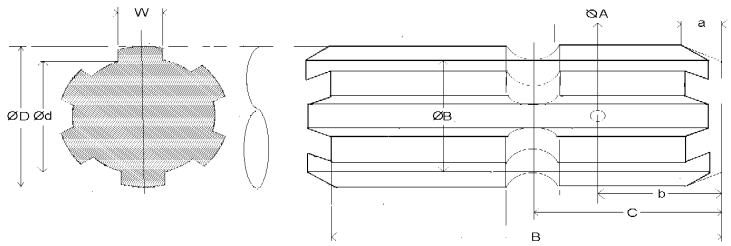


Fig.2 (a) DIMENSIONAL NOTATIONS FOR TYPE-I POWER TAKE-OFF SHAFT

1.14.2 Provision of power take-off shaft shield:

Specifications of power take-off shaft shield for type I & II PTO [See Fig. 2(b)]:			
Specification	As per IS: 4931-1995 (Reaffirmed in 2014)	As observed	Remarks
k	70 (min)	70	Conforms
m	125 ± 5	120	Conforms
n	85 ± 5	61	**Does not conform**
p	285 ± 5	230	**Does not conform**
r	76 (max)	51	Conforms

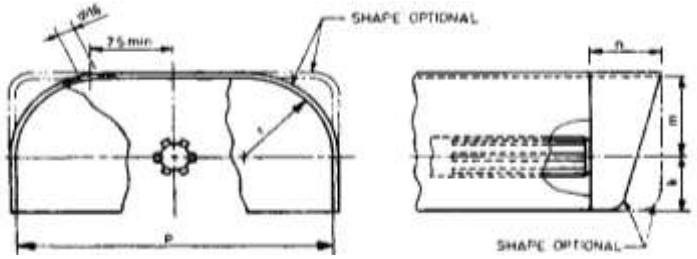


Fig.2. (b): DIMENSIONAL NOTATION OF PTO SHAFT MASTER SHIELD

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)	:	332
Number of positions	:	01
Type of adjustment	:	None
Distance of hitch point, (mm):		
- From rear axle centre	:	355
- From power take-off shaft end	:	250
Dia of pin hole, (mm)	:	32.9
Width of clevis, (mm)	:	65.0

1.16 Steering:

Make of distributor	:	Danfoss
Type	:	Hydrostatic
Location	:	Inside console
Method of operation	:	Manual, by steering control wheel
Diameter of steering control wheel, (mm)	:	360
Type & make of pump	:	Gear & Dynamatic
Location	:	On LHS of engine
Method of drive	:	Through engine timing gears
Number, Type & Make of hydraulic ram cylinder	:	One, Double acting and NA
Lubricant capacity, (l)	:	36.0 (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
Type	:	Mechanical, Oil immersed disc brakes.
Location	:	On bull pinion shaft inside rear axle housing
No. of friction disc(s)	:	Three (on each wheel side)
Area of liners, (cm^2)	:	583.5 (on each wheel side)
Material of liners	:	Paper lining (apa)
Method of operation	:	Independent or combined pedal operation by right foot.

1.17.2 Parking Brake:

Type	:	Pawl & Ratchet arrangement
Location & method of operation	:	By locking the service brake in position by hand lever provided below RHS of dashboard

1.18 Wheel Equipment:

1.18.1 Steered Wheel(s):

Make	:	MRF shakti-TF
Number(s)	:	Two
Type of tyre(s)	:	Pneumatic, traction
Size	:	180/85 D12
Ply rating	:	4
Maximum permissible loading capacity of each tyre recommended for road work, (kgf)	:	220
Recommended inflation pressure, (kPa):		
- for field work	:	110
- for transport	:	110
Standard track width, (mm)	:	900 (std.) & 925
Method of changing track width	:	By reversing the wheel discs.
Make & size of wheel rim	:	WILP & 5JA x 12

1.18.2 Drive wheel(s):

Make	:	MRF shakti life
Number(s)	:	Two
Type of tyre(s)	:	Pneumatic, traction
Size	:	8.3 - 24
Ply rating	:	8
Maximum permissible loading capacity of each tyre recommended for road work, (kgf)	:	430
Recommended inflation pressure, (kPa):		
- For field work	:	80
- For transport	:	80
Track width, (mm)	:	845 (std.), 865, 915 & 925
Method of changing track width	:	By reversing wheel disc and changing the position of disc on offset rim lugs.
Make & size of wheel rim	:	WILP & W7 x 24

1.18.3	**Wheel base, (mm)**	**:**	1570
	Method of changing wheel base, if any, and range.	**:**	None

1.19 Operator's seat:

Make	**:**	Harita Seating system ltd.
Type	**:**	Cushioned with back rest
Type of suspension	**:**	Two helical coil springs
Type of dampening	**:**	NA
Range of adjustment, (mm):		
- Vertical	**:**	Nil
- Lateral	**:**	Nil
- Longitudinal	**:**	± 25

1.20 Provision for safety and comfort of operator:

1.20.1 Conformity with IS:12343-1998 (Reaffirmed in 2014):

Not applicable as the rear track width of tractor is less than 1150 mm.

1.20.2 Conformity with [IS: 6283 (Part-1)- 2006 and IS: 6283 (Part-2)-2007 (Reaffirmed in 2014)].

Meets the requirements of [IS: 6283 (Part-1) - 2006 and IS: 6283 (Part-2)-2007 (Reaffirmed in 2014)]. **,**except the following:

i) The colour codes for engine revolution gauge has not been provided

1.20.3 Conformity with IS: 8133-1983 (Reaffirmed in 2014) :

Location and movement of various controls meets the requirement of IS: 8133-1983 (Reaffirmed in 2014).

1.20.4 Conformity with IS:12239 (Part-1)-1996 (Re-affirmed in 2017) :

Meets the requirements of IS: 12239 (Part-1)-1996 (Re-affirmed in 2017), **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 2014) :

Meets the requirements of IS:12239 (Part-2)-1999 (Reaffirmed in 2014), except the following:

i) Working clearance between position control & draft control lever does not meet the requirement.

1.20.6 Conformity with IS: 14683 – 1999 (Reaffirmed in 2014) :

Lighting provided on the tractor meets the requirement of IS: 14683-1999 (Reaffirmed in 2014).

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, 2014):
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	3028 EN
Year of manufacture	BL-H
Engine Serial Number	CH3W13DE5446
Chassis Serial Number	1PY3028EEHA000001
Maximum P.T.O Power, kW (hp)	17.2 (23.4)
Specific fuel consumption, g/kwh (g/hph)	294 (216)

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	140	140	Nil	Nil
	Water	Nil	Nil	Nil	Nil
Rear	C.I. weight	260	260	Half cage wheels	Nil
	Water	100	100		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	480	695	1175
ii)	With ballast as used during drawbar performance test	680	995	1675
iii)	With ballast as used during Field test:			
	- Dry land operation other than rotavation	690	980	1670
	- Wet land operation	475	760	1235
iv)	With ballast as used during haulage test with trailer hitch, canopy and drawbar	485	675	1160

1.24 Overall dimensions, (mm):

Condition	Length, (mm)	Width, (mm)	Height, (mm)		Ground Clearance, (mm)
			With exhaust pipe	Without exhaust pipe	
Without Ballast	2840	1090	495	1285 (at steering control wheel)	290 (Below transmission oil drain plug) 325 with 9.5 -24 tyre size (Optional) (Below transmission oil drain plug)

1.25 Number of external lubricating points:

- Oiling : Nil
- Grease cups : Nil
- Grease nipples : 09

1.26 Colour of tractor:

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

1.28 Optional features :

1.28.1 Steered wheel :

Make	:	Apollo
Number	:	02
Type of tyre	:	Pneumatic, traction
Size & ply rating	:	5-12 , 6PR
Maximum permissible loading capacity of each tyre at inflation pressure recommended for road work	:	200 kg @ 200 kPa
Recommended inflation pressure, (kPa):		
- for field work	:	205
- for transport	:	205
Make & size of rim	:	Wheels India Ltd., 4J A x 12

1.28.2 Driving wheel:

Make	:	MRF shakti life
Number	:	02
Type of tyre	:	Pneumatic, traction
Size & ply rating	:	9.5-24 & 8 PR
Maximum permissible loading capacity of each tyre at inflation pressure recommended for road work	:	570 kg @ 80 kPa
Recommended inflation pressure, (kPa):		
- for field work	:	80
- for transport	:	80
Make & size of rim	:	Wheels India Ltd & W 8 x 12

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^{o}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 : 11.01.2019 & 14.01.2019
Tractor run at the Institute prior to start of PTO test, (h) : 3.1
Type of dynamometer bench used : Eddy current, SAJ – AG 250

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:						
17.9	607	2801	5.94	4.97	0.278	3.01
17.2	607	2801	5.78	4.83	0.281	2.98*
b) Power at rated engine speed (2800 rpm):						
17.9	607	2801	5.94	4.97	0.278	3.01
17.2	607	2801	5.78	4.83	0.281	2.98*
c) Power at standard power take-off speed (540 ± 10 rpm):						
17.0	540	2492	5.39	4.51	0.265	3.15
16.4	540	2492	5.33	4.46	0.272	3.08*
d) Varying loads at rated engine speed:						
i) Torque corresponding to maximum power available at rated engine speed:						
17.9	607	2801	5.94	4.97	0.278	3.01
ii) 85% of the torque obtained in (i):						
15.5	619	2857	5.20	4.35	0.281	2.98
iii) 75% of the torque obtained in (ii):						
11.7	626	2889	4.16	3.48	0.297	2.81
iv) 50% of the torque obtained in (ii) :						
8.0	635	2931	3.32	2.77	0.346	2.41
v) 25% of the torque obtained in (ii):						
4.0	642	2963	2.48	2.07	0.518	1.61
vi) Unloaded:						
0.3	649	2995	1.75	1.47	4.900	0.17
e) Varying loads at standard PTO speed (540 ± 10 rpm):						
i) Torque corresponding to maximum power available at standard PTO speed						
17.0	540	2492	5.39	4.51	0.265	3.15
ii) 85% of the torque obtained in (i) :						
15.3	571	2635	4.94	4.13	0.270	3.10
iii) 75% of the torque obtained in (ii) :						
11.7	581	2681	3.97	3.32	0.284	2.95
iv) 50% of the torque obtained in (ii) :						
7.9	590	2723	3.11	2.60	0.329	2.54
v) 25% of the torque obtained in (ii):						
4.0	600	2769	2.30	1.92	0.480	1.74
vi) Unloaded:						
0.3	607	2801	1.58	1.32	4.400	0.19

*** Under High ambient conditions**

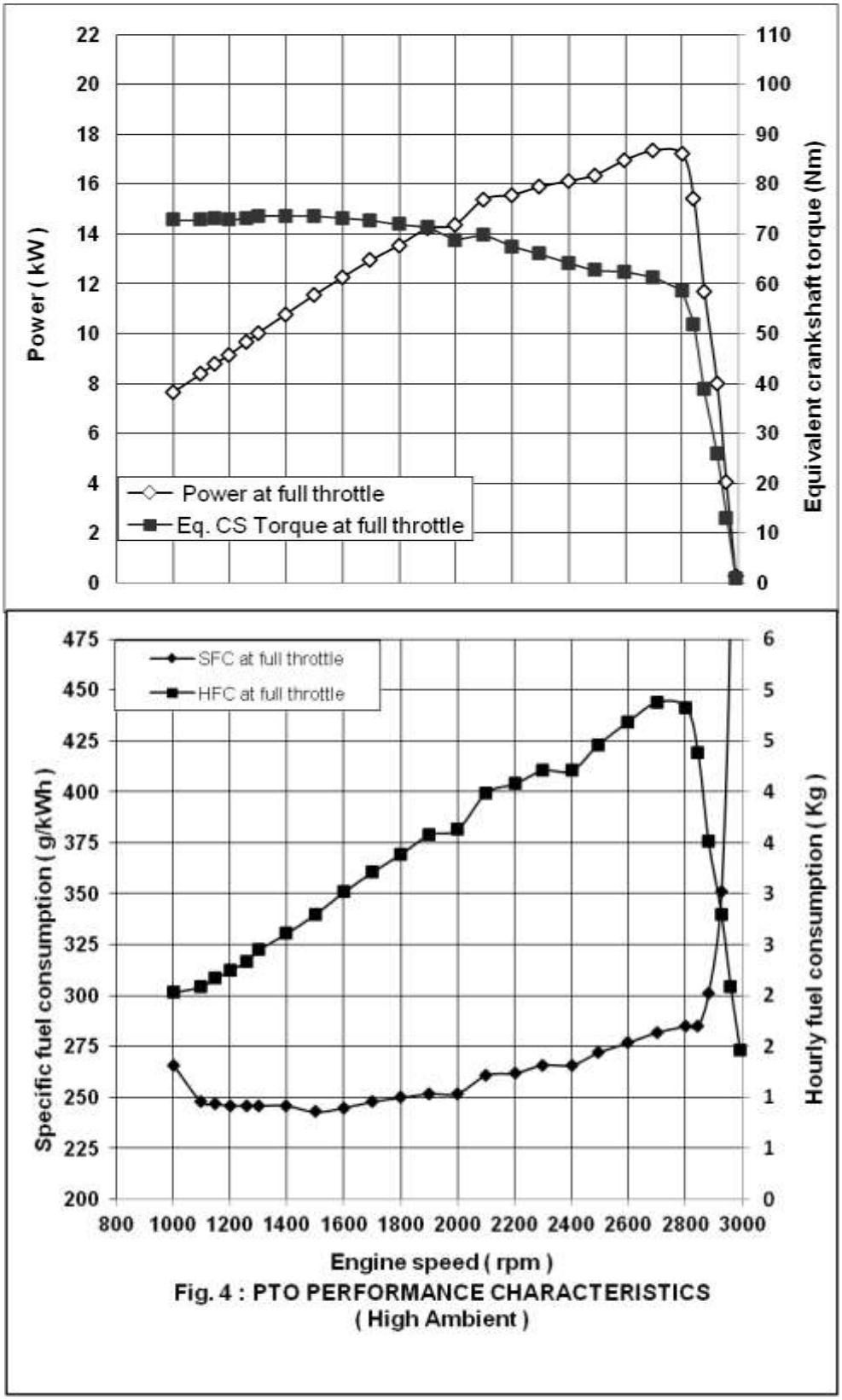


Fig. 4 : PTO PERFORMANCE CHARACTERISTICS
(High Ambient)

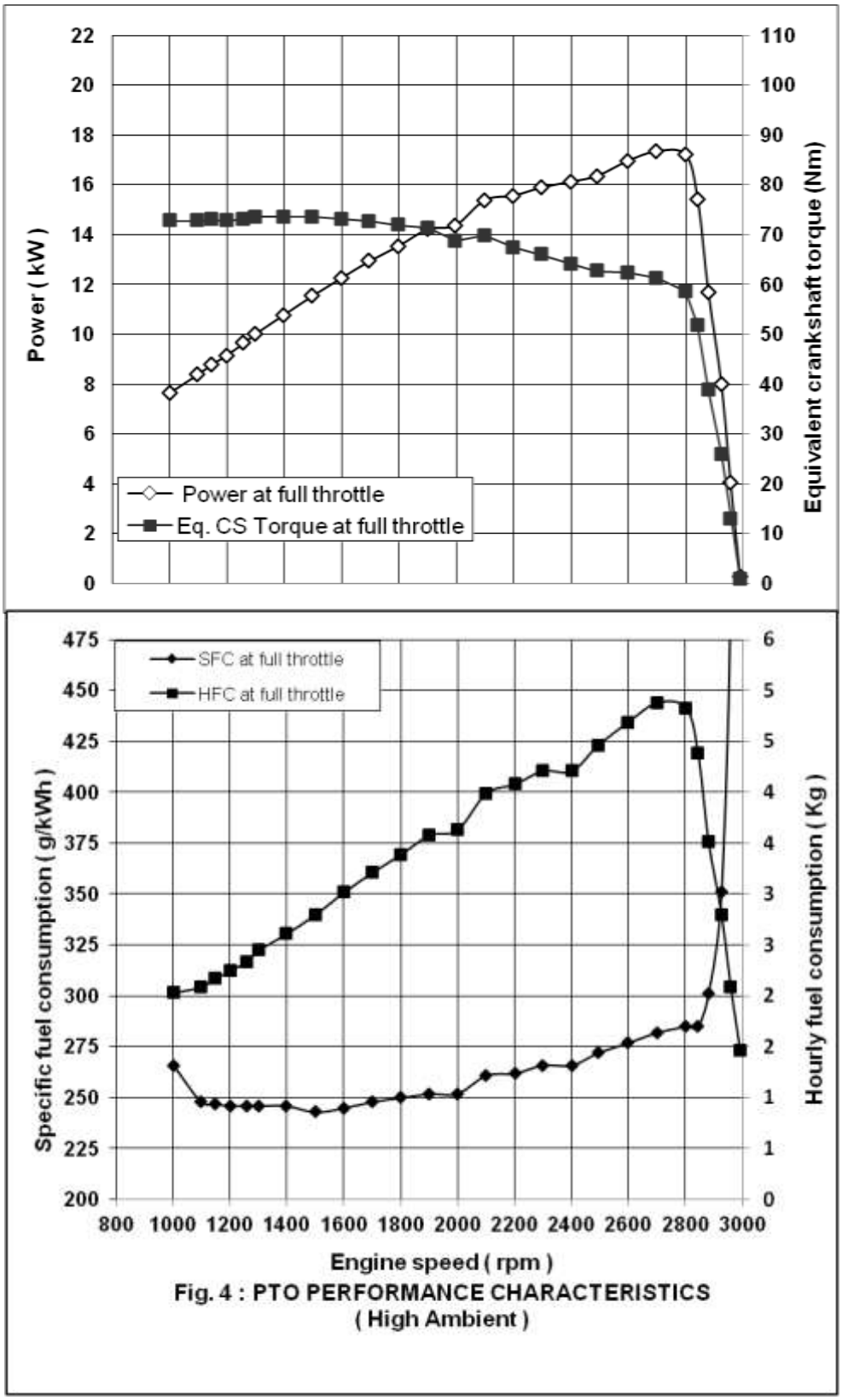


Fig. 4 : PTO PERFORMANCE CHARACTERISTICS
(High Ambient)

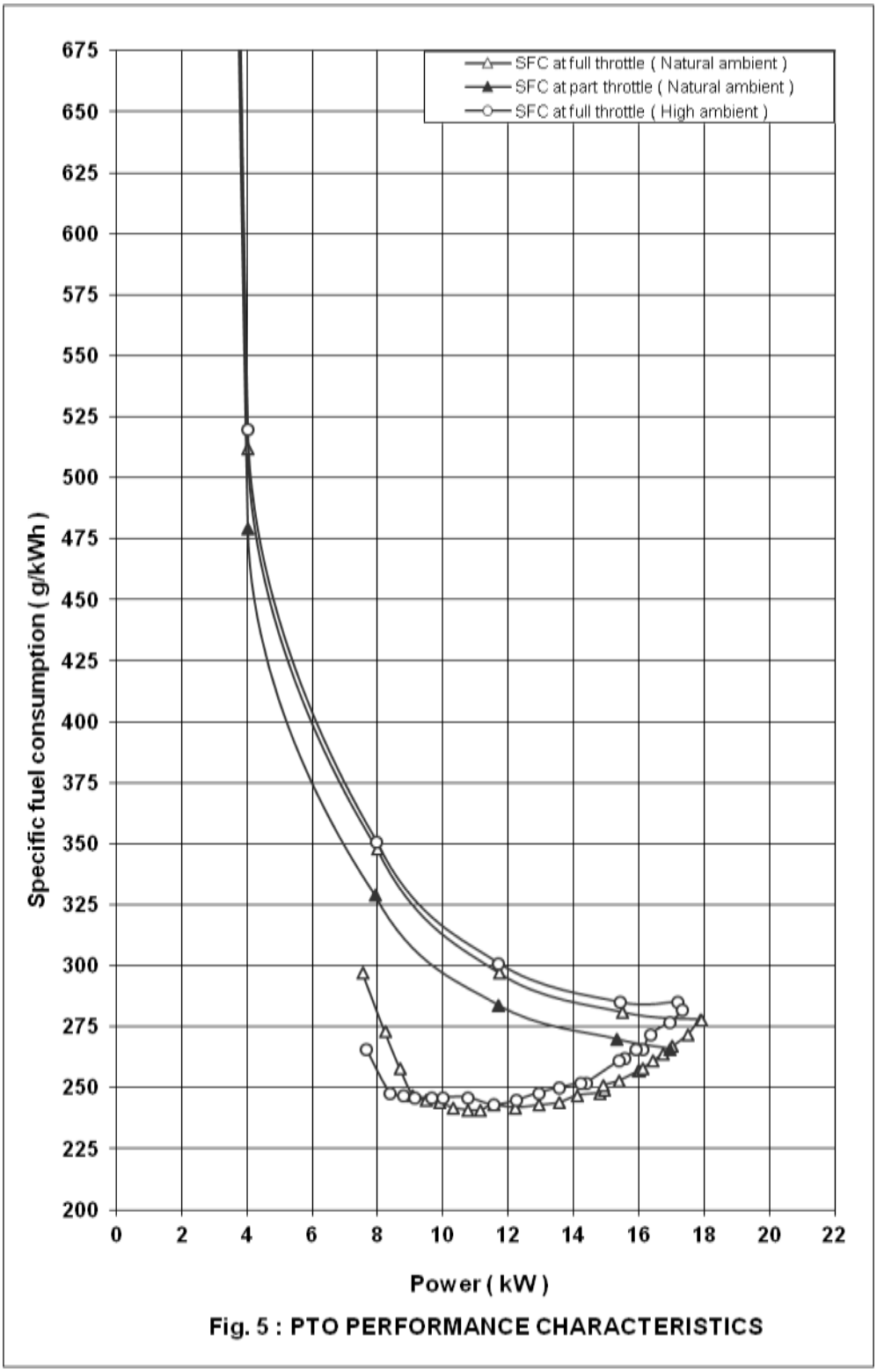


Fig. 5 : PTO PERFORMANCE CHARACTERISTICS

		Natural ambient	High ambient
-No load maximum engine speed, (rpm)	:	2995	2991
-Equivalent crankshaft torque at maximum power, (Nm)	:	61.0	58.6
-Maximum equivalent crankshaft torque, (Nm)	:	79.0	73.5
-Engine speed at maximum equivalent crankshaft torque, (rpm)	:	1098	1301
- Back up torque, (%)	:	29.5	25.4
-**Smoke level**, maximum light absorption coefficient, (per meter)	:	0.26	--
- Range of atmospheric conditions:			
Temperature, (^{o}C)	:	27 to 30	40 to 44
Pressure, (kPa)	:	99.4 to 99.7	100.4 to 101.0
Relative humidity, (%)	:	34 to 40	22 to 26
- Maximum temperatures, (^{o}C):			
Engine oil	:	89	98
Coolant	:	83	97
Fuel	:	55	67
Air intake	:	30	45
Exhaust gas	:	630	645
- Pressure at maximum power:			
Intake air, (kPa)	:	3.4 to 3.7	4.0 to 4.5
Exhaust gas, (kPa)	:	6.4 to 6.7	6.9 to 7.1
- Consumptions:			
Lub oil, (g/kwh)	:	--	0.62
Coolant (% of total coolant capacity)	:	--	Nil

4. DRAWBAR PERFORMANCE TEST

Date(s) of test	:	23.04.2019 to 26.04.2019
Tractor run at the Institute prior to start of drawbar test, (h)	:	30.7
Type of track	:	Concrete
Height of drawbar, (mm):		
- Without ballast	:	400
- With ballast	:	375

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

Table - 2

DRAWBAR PERFORMANCE TEST

Gear	Travel Speed, (km/h)	Draw-bar power, (kW)	Draw-bar pull, (kN)	Engine Speed, (rpm)	Wheel Slip, (%)	Fuel consumption		Specific Energy, (kWh/l)	Atmospheric conditions			Temperature (°C)				Max. sust-ained pull, (kN)
						(kg/kWh)	(l/h)		Temp (°C)	Pres-sure (kPa)	R.H. (%)	Fuel	Tran s. oil	Cool-ant (water)	Eng-ine oil	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
i) Maximum power test (Tractor unballasted with 4WD engaged condition):																
A2	1.86	5.2	10.02	2917	15.4	0.502	3.12	1.67	37	98.4	17	55	80	75	109	10.70
A3	3.53	9.8	10.01	2858	15.2	0.389	4.56	2.15	36	98.5	20	53	80	79	104	10.48
A4	4.63	12.8	9.94	2799	13.9	0.383	5.86	2.18	35	98.5	21	51	78	79	103	10.25
B1	5.13	13.8	9.67	2801	11.7	0.355	5.86	2.35	34	98.5	24	51	75	80	101	10.18
B2	7.21	14	7.01	2799	6.0	0.349	5.84	2.40	33	98.5	26	48	55	78	93	9.34
ii) Maximum power test (Tractor ballasted with 4WD engaged condition):																
A2	1.84	6.9	13.56	2893	15.4	0.433	3.57	1.93	40	98.3	13	57	81	78	107	14.33
A3	3.55	12.0	12.15	2801	12.8	0.400	5.74	2.09	38	98.4	14	54	81	86	104	13.69
A4	4.99	13.4	9.63	2805	7.1	0.365	5.85	2.29	37	98.5	15	53	78	84	103	11.12
B1	5.41	13.8	9.18	2800	6.6	0.365	5.84	2.36	37	98.5	16	51	75	84	103	10.64
B2	7.33	13.7	6.75	2805	4.4	0.356	5.83	2.35	36	98.6	17	50	56	80	96	8.79

Table-2 Contd..

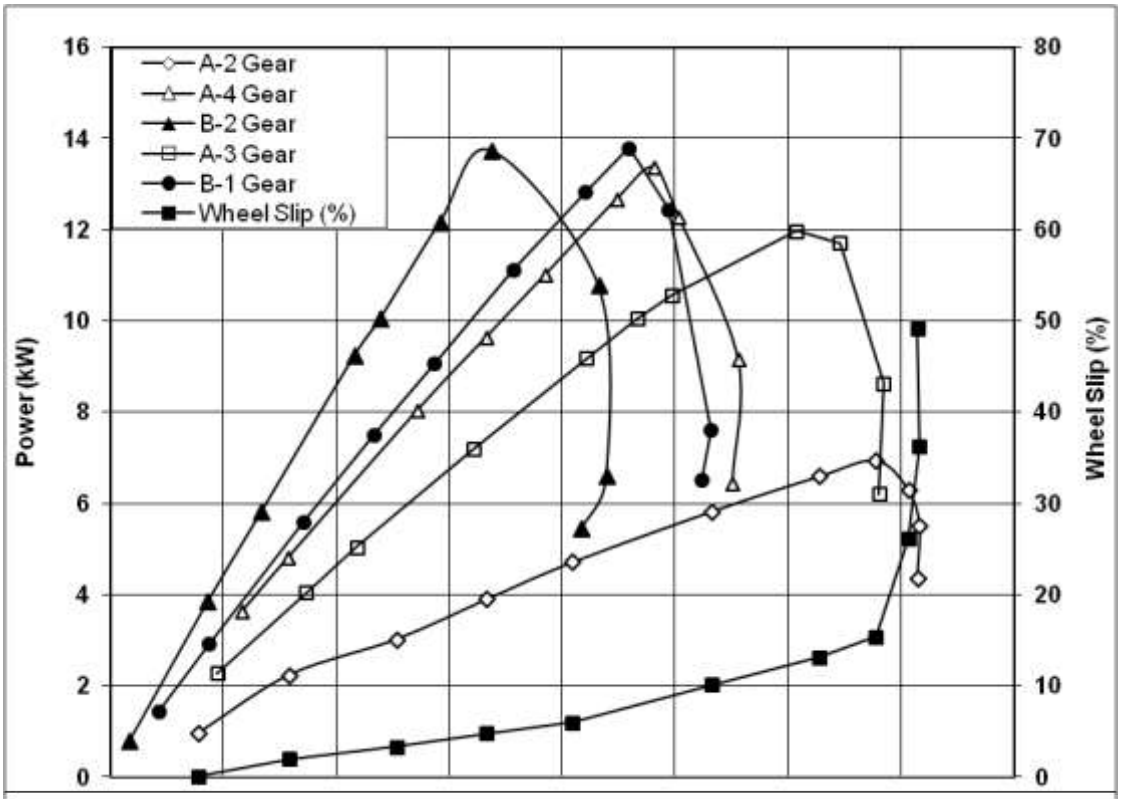
Contd..Table-2

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 (water)	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 with 4WD engaged):																
A3	3.94	9.98	9.11	2860	--	0.355	4.38	2.28	36 to 39	98.1 to 98.5	15 to 20	50 to 56	63 to 84	76 to 80	99 to 106	--
iv) Five hours test at pull corresponding to 15 percent wheel slip (ballasted wheeled tractor with 4WD engaged):																
A2	1.88	7.09	13.56	2892	13.4	0.436	3.80	1.86	31 to 39	98.2 to 98.6	14 to 24	44 to 57	59 to 81	74 to 77	96 to 104	--

i) The coolant (water) and lub oil consumption during 10 hours test were observed as 20 ml and Nil respectively.

ii) Tyre Creeping, (mm):
- LHS : Nil
- RHS : Nil

iii) Maximum temperatures during entire drawbar test, (°C):
Engine oil : 111
Coolant (water) : 90
Transmission oil : 84
Fuel : 57



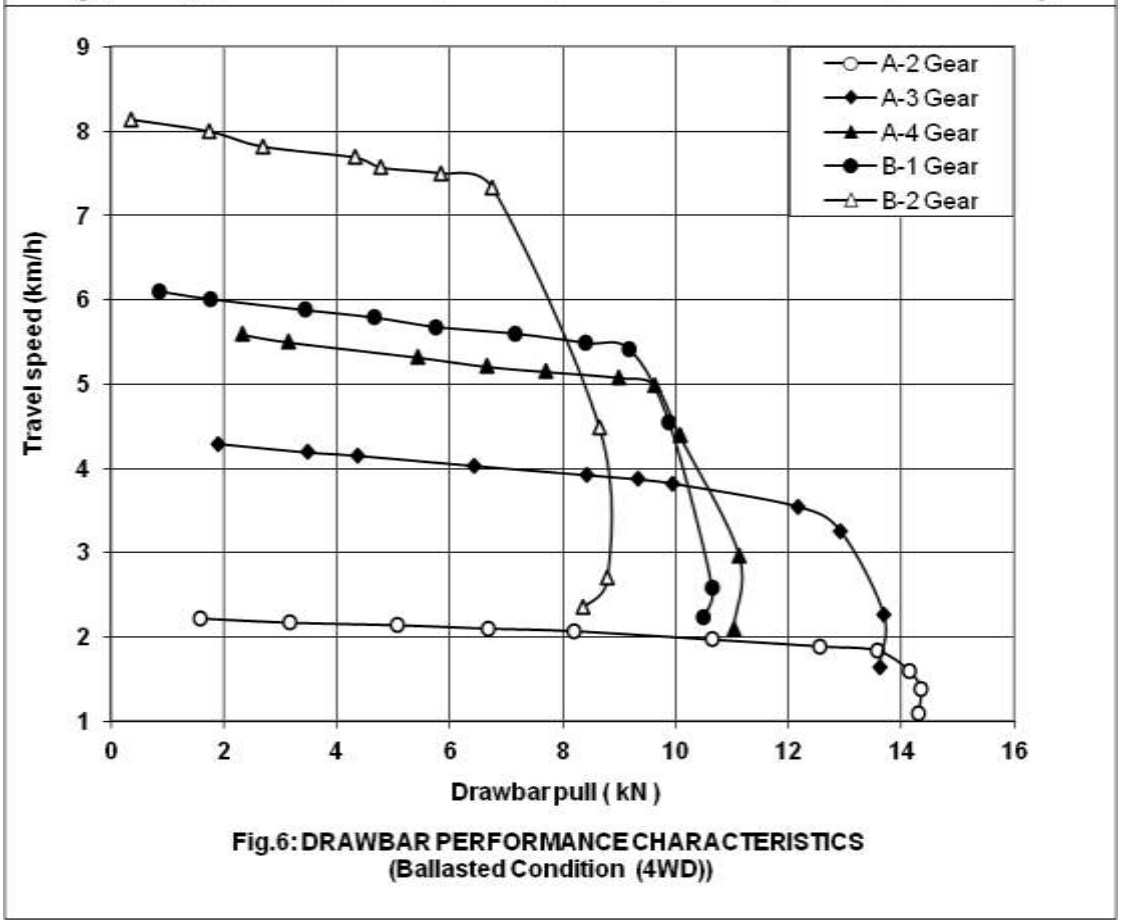


Fig.6: DRAWBAR PERFORMANCE CHARACTERISTICS (Ballasted Condition (4WD))

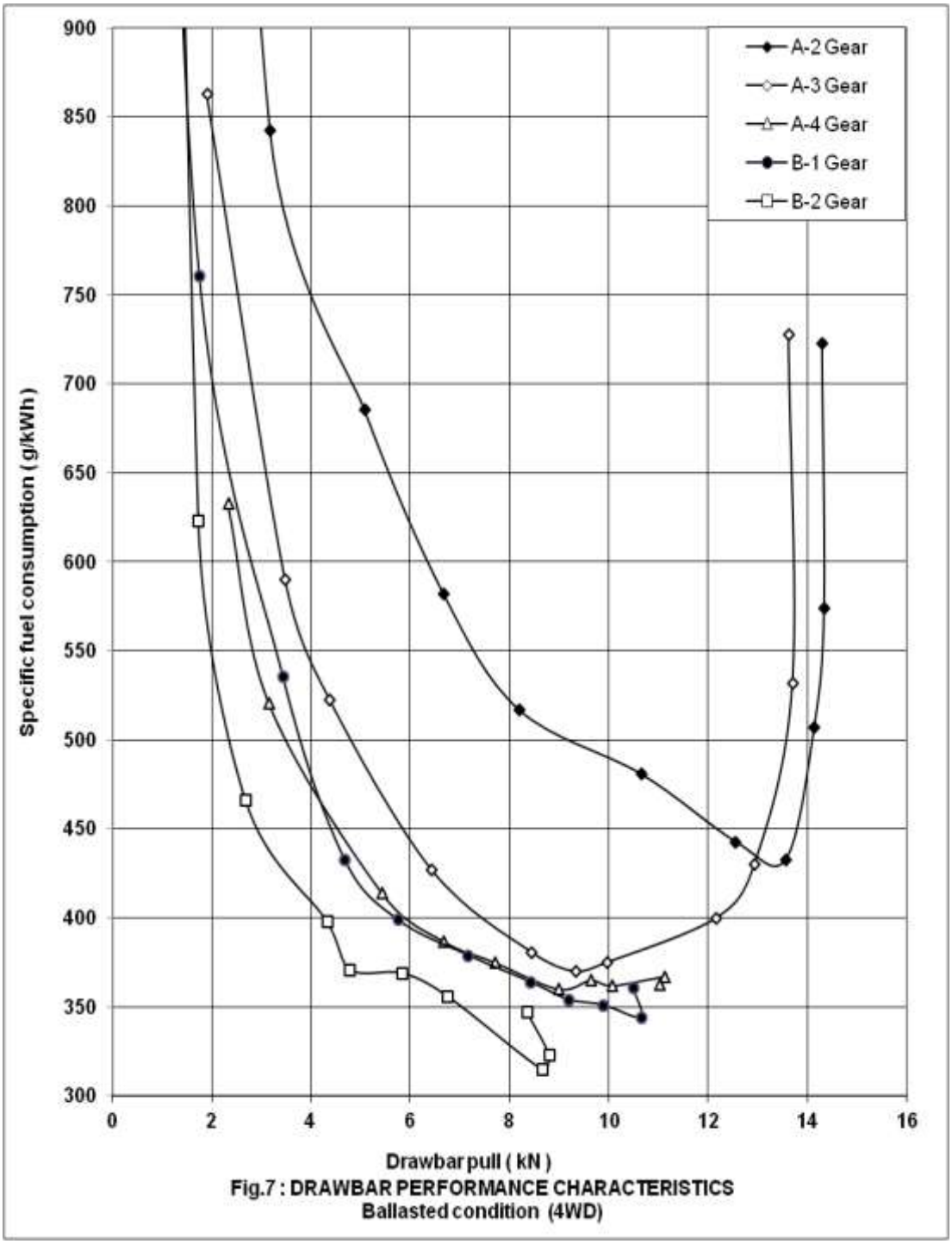


Fig.7 : DRAWBAR PERFORMANCE CHARACTERISTICS
Ballasted condition (4WD)

5. POWER LIFT AND HYDRAULIC PUMP PERFORMANCE TEST

Date(s) of test : 22.01.2019 & 23.01.2019
Tractor run at the Institute prior to start of hydraulic test, (h) : 17.7
Pump speed at rated engine speed, (rpm) : 2529

5.1 Hydraulic power test:

Pump delivery rate at minimum pressure and rated engine speed, (lpm) : 19.0
Maximum hydraulic power, (kW) : 5.1
Pump delivery rate at maximum hydraulic power, (lpm) : 18.0
Pressure at maximum hydraulic power, (MPa) : 17.0
Sustained pressure of the open relief valve, (MPa) : 19.3

Tapping point:
a) Relief valve test : External circuit
b) Pump performance test : At pump outlet
Temperature of hydraulic fluid, (°C) : 60 to 65

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 correspondi ng pressure, (MPa)	Moment about rear axle, (kN-m)	Maximum tilt angle of mast from vertical (degrees)
At hitch points	155	550	9.89	19.2	7.71	--
On the standard frame	155	550	7.88	19.1	10.95	10.5

Test data:

Elapsed time (minute)	5	10	15	20	25	30
Cumulative drop in height of lift, (mm)	15	30	35	35	40	42

6. BRAKE TEST

6.1 Service brake:

6.1.1 Cold brake test:

Date of test: : 24.12.2018
Type of track : Concrete
Maximum attainable speed (kmph):
- Unballasted Tractor : 20
-Road Ballasted Tractor : 20

		At 20 (max.) kmph travel speed			
Unballasted tractor	Braking device control force, (N)	414	400	370	310
	Mean deceleration, (m/sec^2)	4.06	3.86	3.35	2.50
	Stopping distance, (m)	3.80	4.00	4.60	6.17

6.1.2 Brake fade test:

		At 20 (max.) kmph travel speed			
unballasted tractor	Braking device control force, (N)	426	400	370	340
	Mean deceleration, (m/sec^2)	3.96	3.36	2.86	2.50
	Stopping distance, (m)	3.90	4.55	5.40	6.17

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

Abnormal vibration : None

The brakes were heated by : Self braking

6.2 Parking brake test:

Particulars	Parked on 18 percent slope		Parked on 12 percent slope with trailer of 1.88 tones.	
	Facing up	Facing down	Facing up	Facing down
Braking device control force, (N)	340	317	323	319
Efficacy of parking brake	---------- Effective ----------			

7. NOISE MEASUREMENT

7.1 Noise at bystander's position:

Date of test : 30.11.2018

Type of track : Concrete

Background noise level, dB(A) : 55.1

Atmospheric conditions:

Temperature, (°C) : 30

Pressure, (kPa) : 98.1

Relative humidity, (%) : 42

Av. wind velocity, (m/s) : 2.6

Test data:

S. No.	G e a r	Traveling speed before acceleration, (kmph)	Noise level, dB(A)
1.	A1	1.24	77
2.	A2	1.64	77
3.	A3	3.17	77
4.	A4	4.21	77
5.	B1	4.52	77
6.	B2	5.95	77
7.	B3	11.43	77
8.	B4	14.99	78

7.2 Noise at operator's ear level:

Date of test : 23.04.2019

Type of track : Concrete

Background noise level, dB(A) : 54

Atmospheric conditions:

Temperature, (°C) : 35

Pressure, (kPa) : 98.4

Relative humidity, (%) : 18

Average wind velocity, (m/s) : 1.2

Test data:

Gear	Drawbar pull at which the tractor develops the max. noise level, (kN)	Corresponding traveling speed, (kmph)	Noise level dB(A)
A2	9.49 to 10.02	1.93 to 1.86	90
A3	7.70 to 10.01	3.86 to 3.53	90
A4	9.94 to 9.97	4.63 to 4.62	91
B1	0.53 to 9.67	6.18 to 5.13	89
*B2	4.28 to 6.87	7.64 to 7.21	93

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

8. MECHANICAL VIBRATION MEASUREMENT

Date of test : 31.01.2019
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	20	20	10	20
		Right	30	10	20	20
ii)	Steering wheel		60	80	30	30
iii)	Seat	Back	60	60	20	20
		Bottom	50	40	20	20
iv)	Mudguard	Left	70	30	90	30
		Right	100	90	120*	60
v)	Head light	Left	40	40	30	30
		Right	40	60	30	40
vi)	Battery base		130*	100	70	60
vii)	Tail light	Left	30	90	40	70
		Right	100	90	40	60
viii)	Plough light		40	40	30	10
ix)	Gear shifting lever		60	40	10	20
x)	Accelerator lever	Hand	100	70	60	40
		Foot	30	30	30	30
xi)	Brake pedal	Left	30	30	30	20
		Right	30	20	20	10
xii)	Clutch pedal		60	60	40	40
xiii)	Main hydraulic control lever		120*	40	100	60
xiv)	PTO engaging lever		30	60	30	60
xv)	Differential lock		60	90	20	90

*** 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)	462.5
	Distance forward from the vertical plane containing the axis of rear wheels, (mm)	653.6
	Distance from the median plane parallel to the longitudinal axis of tractor bisecting the track, (mm)	5.2 (towards LHS)

10. TURNING ABILITY

With 2WD engaged condition:				
Characteristics	Minimum turning diameter,(m)		Minimum clearance diameter,(m)	
	RHS	LHS	RHS	LHS
Brake applied	5.16	5.14	5.36	5.34
Brakes released	5.74	5.68	5.94	5.88
With 4WD engaged condition:				
Brake applied	4.64	4.62	4.90	4.88
Brakes released	6.39	6.35	6.65	6.63

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 **4420 mm** which is **2.82** times of wheel base i.e. 1570 mm.

ii) The non-visible space in LHS & RHS is **1100 mm** on each side, which is **1.30** times of rear standard track width i.e. 845 mm**.**

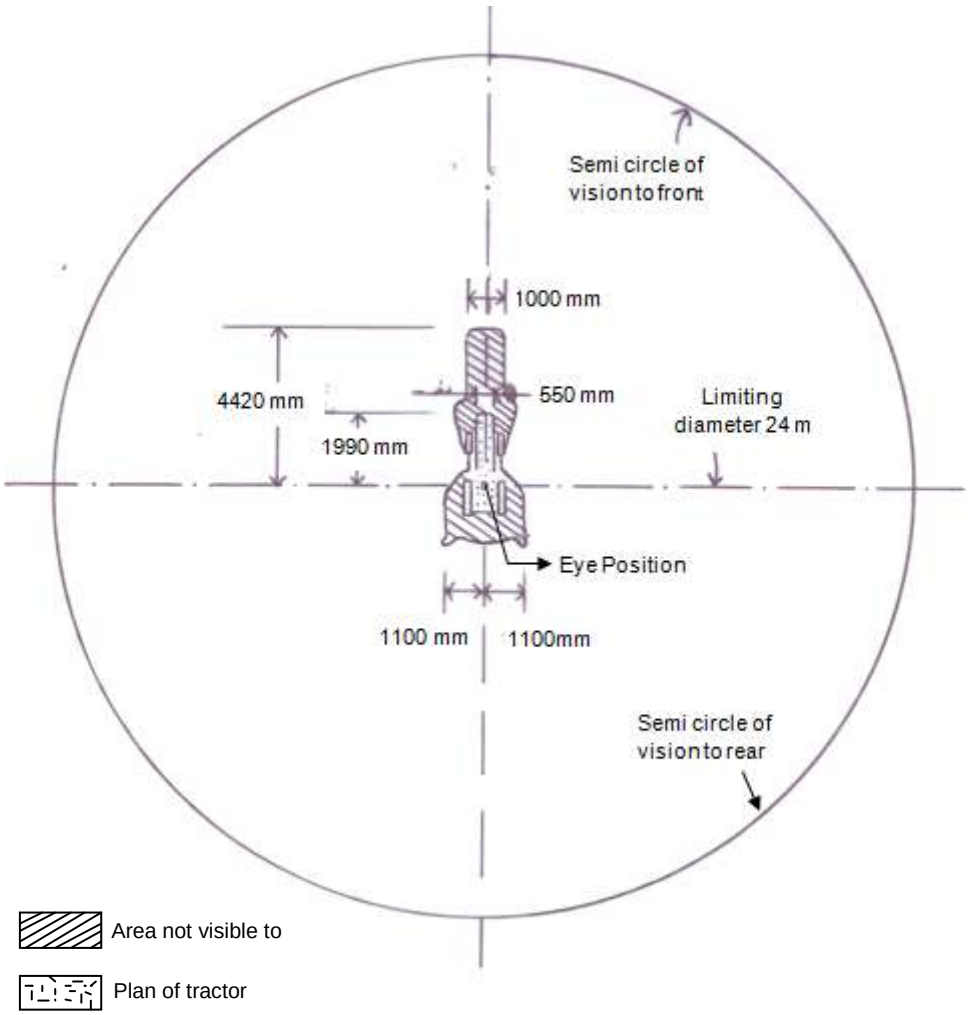


Fig. 8: OPERATOR'S FIELD OF VISION

12. FIELD TEST

12.1 The field tests comprising of MB plough, rotavation and puddling (including five hours of water proof test) were conducted for 10.9, 11.7 and 15.5 hours respectively.
All the field tests were conducted at the full accelerator settings, when the no load speed of the engine was 2900 to 2977 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	MB Plough	Rotavation	Puddling
i)	Type of soil	Medium	Heavy	Heavy
ii)	Av. Soil moisture (%)/ Av. depth of standing water, (cm,)	7 to 13	11 to 18	13 to 14
iii)	Bulk density of soil, (g/cc)	1.5 to 1.6	1.5 to 1.6	--
iv)	Cone index, (kgf/sq.cm)/ Pudding index (%)	8.34 to 9.70	8.93 to 9.63	84 to 86
v)	Gear used	A-3	A-2	A-2
vi)	Av. Speed of operation, (kmph)	3.29 to 3.83	2.15 to 2.16	2.01 to 2.03
vii)	Av. Wheel slip (%) / Av. travel reduction, (%)	7.3 to 19.7	-0.6 to -0.9	7.0 to 7.8
viii)	Av. depth of cut, (cm) / Av. depth of puddle, (cm)	15 to 20	5 to 6	33 to 35
ix)	Av. working width, (cm)	55 to 59	98 to 101	--
x)	Area covered, (ha/h)	0.137 to 0.167	0.172 to 0.196	--
xi)	**Fuel consumption:**			
	- (l/h)	2.63 to 2.87	2.51 to 3.03	2.85 to 3.02
	- (l/ha)	15.78 to 20.94	14.58 to 15.48	--
xii)	Av. draft of implement, (kN)	5.12 to 5.32	--	--

Remarks: The average lub oil and coolant consumptions during the entire field tests were observed as **Nil ml/h** and **4.23 ml/h** respectively.

12.4 Wet land cultivation (Puddling Operation):

12.4.1 The tractor was fitted with half cage wheel and mounted with rotavator 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.	Front axle and front final drive	No	None
2.	Clutch housing	No	
3.	Engine sump	No	
4.	Gearbox, Differential, Rear axle, Rear final drive, Steering gearbox, Brake & Hydraulic system	No	
5.	Starter motor	No	
6.	Alternator	No	

13. HAULAGE TEST

Type of trailer:	**:**	**Two wheel (Single axle)**
Gross mass of trailer, (tonnes)	**:**	1.5
Height of trailer hitch above ground level, (mm)	**:**	300
Gear used during the test for negotiating slopes upto 8%	**:**	B4
Average travel speed, (kmph)	**:**	19.98 to 20.08
Average fuel consumption:		
- (l/h)	**:**	2.85 to 2.89
- (ml/km/tonnes)	**:**	95.10 to 95.91
Average distance traveled per litre of fuel consumption, (km)	**:**	6.95 to 7.01
General observations:		
Effectiveness of brakes	**:**	Effective
Maneuverability of tractor-trailer combination	**:**	Satisfactory

14. COMPONENTS / ASSEMBLY INSPECTION

The engine and other assemblies were dismantled after **88.9** 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	82.032	82.033	82.032	82.032	82.032	82.032	82.200
2	82.032	82.033	82.028	82.032	82.032	82.032	
3	82.028	82.032	82.032	82.032	82.032	82.032	

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.	81.543	81.545	81.956	**	81.905	0.077	0.295
2.	81.545	81.550	81.954	**		0.079	
3.	81.554	81.551	81.954	**		0.078	

** **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	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.490
2nd comp. ring	0.40	0.40	0.40	0.40	0.40	0.40	0.45	0.40	0.40	0.490
Oil ring	0.30	0.35	0.35	0.30	0.35	0.35	0.35	0.35	0.35	0.490

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	0.069	0.068	0.068	0.235
2nd Compression ring	0.053	0.053	0.054	0.200
Oil ring	0.032	0.033	0.032	0.180

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.	0.055 to 0.056	0.174	0.15	0.28
2.	0.057 to 0.058			
3.	0.055 to 0.057			
4.	0.056 to 0.057			

14.1.6 Big end bearings:

Bearing No.	Clearance, (mm)		Maximum permissible wear limit, (mm)	
	Diametrical	Axial	Diametrical	Axial
1.	0.084 to 0.085	0.20	0.15	1.5
2	0.086 to 0.090	0.30		
3	0.083 to 0.087	0.30		

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 : 29.17 to 29.57
- Exhaust valve spring : 29.31 to 29.53

Against discard limit of 30.4 N/mm.

Clearance between valve guide and valve stem, (mm):
- Intake valve : 0.063 to 0.068
- Exhaust valve : 0.066 to 0.068

Against the discard limit of 0.18 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):	:	8.55 to 8.64	Upto riveted head
Height of lining over rivet head, (mm):	:	2.00 to 2.25	

14.3 Transmission gears:

Any visual damage, pitting & chipping of any transmission gear teeth	:	None	
Backlash between crown wheel and pinion, (mm)	:	0.26	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	3.94	3.980 to 3.997	0.52 to 0.89	Wear up to oil groove depth
Right	3.94	3.980 to 3.996	0.57 to 0.89	

14.5 Front axle:

Any marked wear of king pins	:	Not applicable	
Condition of king pin bushes	:	Not applicable	
Clearance between king pin & bush, (mm)	:	Not applicable	Against the discard limit of 0.15 mm
Condition of thrust bearing	:	Not applicable	
Condition of bearings for stub axles	:	Not applicable	
Condition of seals for stub axles and king pins	:	Not applicable	
Clearance between centre pin and bush, (mm)	:	Not applicable	Against the discard limit of 0.101 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
	None	

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	17.2 (D)	17.9	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	16.5 (D)	17.9	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+ 5%	294 (D)	278	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	86.9 (D)	79.0	**No**
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	20 %	29.5	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	98	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.	115	97	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.81 (R)	0.62	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	0.23	Yes

1	2	3	4	5	6	7
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	10.81 (D) 10.68 (R)	13.56	Yes
b)	Maximum drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	7.62 (D) 7.49 (R)	10.02	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.	13.76 (D) 13.43 (R)	14.0	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)	84	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%]	8.92 (D)	9.89	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	7.35 (D) 4.21 (R)	7.88	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	The observed value should not exceed 50 mm	50 (D)	42	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	3.8	Yes
	2) Hot brake	Evaluative	10	10	3.9	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s^2 (N)	Evaluative	600	600 (R)	310 to 340	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

1	2	3	4	5	6	7
16.1.5	**Noise measurement :**					
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	85 (R)	79	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96 (R)	93	Yes
16.1.6	**Amplitude of mechanical vibrations at :**					
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R)	20	Yes
	2) Right foot rest	Non Evaluative			30	Yes
	3) Seat (with driver seated)	Non Evaluative			50	Yes
	4) Steering Wheel	Non Evaluative			80	Yes
16.1.7	**Haulage requirements :**					
a)	Gross mass of the trailers, (tones):					
	1) Two wheel	Non Evaluative	--	1.5 (D)	1.5	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
	1) Two wheel	Non Evaluative	--	7 to 8 (D)	6.95 to 7.01	**No**
c)	Fuel consumption (cc/km/tonne):					
	1) Two wheel	Non Evaluative	--	75 to 83 (D)	95.1 to 95.9	**No**
16.1.8	**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-				
16.1.9	**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)	--	**Not applicable**	**--**
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-2) (as amended from time to time)	--	**Does not Conforms**	**No**
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

1	2		3	4	5	6	7
16.1.10	**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		3028 EN		Yes
	3)	Year of manufacture	Evaluative		BL-H		Yes
	4)	Engine number	Evaluative		CH3W13DE5446		Yes
	5)	Chassis number	Evaluative		1PY3028EEHA000001		Yes
	6)	Declaration of PTO power, (kW)	Evaluative		17.2		Yes
16.1.11	**Discard limit for:**						
(a)	Cylinder bore diameter, (mm)		Evaluative	To be specified by the manufacturer	82.200 (D)	82.028 to 82.033	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)		Non Evaluative		0.295	0.077 to 0.079	Yes
(c)	**Ring end gap (mm):**						
	-	Top comp. ring	Evaluative	-do-	0.490	0.40	Yes
	-	2nd comp. ring		-do-	0.490	0.40 to 0.45	Yes
	-	Oil ring		-do-	0.490	0.30 to 0.35	Yes
(d)	**Ring groove clearance (mm):**						
	-	Top comp. ring	Evaluative	-do-	0.235	0.068 to 0.069	Yes
	-	2nd comp. ring		-do-	0.200	0.053 to 0.054	Yes
	-	Oil ring		-do-	0.180	0.032 to 0.033	Yes
(e)	**Clearance of main bearings (mm):**						
	-	Diametrical clearance	Evaluative	-do-	0.15	0.055 to 0.058	Yes
	-	Crankshaft end float	Evaluative	-do-	0.28	0.174	Yes
(f)	**Clearance of big end bearings, (mm):**						
	-	Diametrical	Evaluative	-do-	0.15	0.083 to 0.090	Yes
	-	Axial	Evaluative	-do-	1.5	0.20 to 0.30	Yes
(g)	Clearance between king pin and bush, (mm)		Non Evaluative	-do-	0.15	Not applicable	Yes
(h)	Clearance between centre pin and bush, (mm)		Non Evaluative	-do-	0.101	Not applicable	Yes
16.1.12	**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

16.1.13	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.	Provided	Not applicable
		If ROPS fitted it should meet the requirement of IS: 11821-1992	ROPS not fitted	
2.	Accessories	Trailer hitch, linkage drawbar may be provided.	Provided	Yes
		Front tow hook	Not provided	**No**

16.3 Conformity with following IS:

i) Guide lines for declaration of power and specific fuel consumption and labelling of agricultural tractors (First revision) [IS10273: 1987 (Reaffirmed in 2014)] **:** Conforms

ii) Agricultural tractors - Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS: 4931-1995 (Reaffirmed in 2014)] . **:** Conforms

iii) Agricultural wheeled tractors - Three-point linkage: Part 2 Category 1N (Narrow Hitch) (Third Revision) [IS 4468 (Part-2):1993/ ISO 730-2:1979 (Reaffirmed in 2014)] **:** **Does not conform**

iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in October, 2017)]. **:** Conforms

v) Agricultural tractors - Operator's seat technical requirement [IS 12343 –1998 (First revision) (Reaffirmed in 2014)] **.** **:** Not applicable as the rear track width of tractor is less than 1150 mm.

vi) Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision): [IS 12239 (PT-1) 1996/ISO 4254-1:1989 (Reaffirmed in October, 2017)]. **:** **Does not conform**

vii) Tractors and machinery for agriculture and forestry – Technical means for ensuring safety Part 2: Tractors (first revision) (IS 12239 (PT-2) 1999) (Reaffirmed in 2014)]. **:** **Does not conform**

viii) Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) IS: 8133-1983 (Reaffirmed in 2014)]. **:** Conforms

ix) Tractors and machinery for agriculture and forestry, powered lawn and garden equipment - Symbols for operator controls and other displays Part 2 Symbols for agricultural tractors and machinery [IS:6283 (Part-1)- 2006 and IS: 6283 (Part-2)-2007 (Reaffirmed in 2014)]. **: Does not conform**

x) Agricultural Tractors and Machinery - Lighting device for travel on public roads (IS: 14683-1999) (Reaffirmed in 2014)]. **:** Conforms

16.4 Salient Observations:

16.4.1 Laboratory tests:

16.4.1.1 PTO performance:

i) The maximum PTO power was recorded as **17.9 kW** against the declaration of **17.2 kW** which meets the requirement of IS: 12207-2014 with regard to tolerance limit.

ii) The specific fuel consumption corresponding to maximum power was measured as **278 g/kWh** against the declaration of **294 g/kWh**, which is within the tolerance limit of IS: 12207-2014.

iii) The maximum equivalent crankshaft torque was observed as **79.0 N-m** against the declaration of **86.9 N-m**, 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 backup torque is **29.5** %.

16.4.1.2 Hydraulic Performance :

i) The moment about rear axle at hitch point and standard frame was calculated **7.71 kN-m & 10.95** respectively. Whereas, the moment about front axle was calculated as **7.39 kN-m** & **10.63 kN-m** under unballasted and ballasted condition respectively. 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.

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. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

16.4.1.4 Three point linkage:

The distance from end of power take- off to centre of lower hitch point (lower links in horizontal position) does not meet the requirements of [IS 4468 (Part-2):1993 (Cat-1N) (Reaffirmed in 2014)]. This should be looked into for necessary corrective action.

16.4.2 Field performance test:

16.4.2.1 Haulage performance:

i) The distance travel per litre of fuel consumption (km/litre) was observed as 6.95 to 7.01 km/litre against the declaration of 07 to 08 km/litre. This does not meet the requirement of IS: 12207-2014 and therefore, should be looked into for necessary corrective action.

ii) Specific fuel consumption during haulage test was recorded as **95.10 to 95.91 ml/km/tonne** against the declaration of **75 to 83 ml/km/tonne** respectively. Which is on higher side against the declaration. This is recommended to 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).

16.4.3 Component assembly inspection:

The spring index of valve clearance was recorded as 29.17 to 29.57 N/mm against the declaration of 30.4 N/mm for inlet & exhaust valves respectively .The initial specified declared limit is not corrected in the applicant specified document. This should be looked into for necessary corrective action.

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 between position control & draft control lever does not meet the requirement of IS: 12239 (part-2)-1999.

iii) Front tow hook shall be provided.

iv) The colour codes for engine revolution gauge has not been 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 3028EN and 3036EN tractor models).

ii) Technical/workshop manual Part-1, Part-2 & Part-3 (For 33036E, 3028EN and 3036EN tractor models).

iii) Parts Catalogue

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

i) Oil grade of transmission, hydraulic, steering & brake systems provided in service manual does not match with technical specification submitted by applicant.

16.7.3 The printed literatures supplied with the test sample are in English. The literature may be bought out as per IS: 8132-1999 (Reaffirmed in 2014) for the guidance of user and service personnel in national as well as other regional languages.

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	08, Months (November, 2018 to June, 2019)	Yes	--

TESTING AUTHORITY:

C. RAGHUWANSHI
AGRICULTURAL ENGINEER

C. V. CHIMOTE
TEST ENGINEER

J. J. R. NARWARE
DIRECTOR

The report compiled by: **Shri Vithato Keyho,** Senior Technical Assistant

18. APPLICANT'S COMMENTS

Para no.	Our reference	Comments
18.1	16.4.1.2 (i), 16.4.1.3, 16.4.1.4, 16.4.2.1 (i), (ii), 16.4.3,16.6 & 16.7.2	Your valuable comments & suggestions for improvements are well taken. Under our policy of continuous product improvement these aspects are further being looked into and will try to eliminate these deviations soon wherever necessary.

ANNEXURE- I

BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST

S. No	Parameters	MB Plough	Rotavator	Rotavator for puddling
1.	Make	Captain	Captain	Mahindra
2.	Type	Mounted	Mounted	Mounted
3.	No. of Disc/blades	02	30 in 6 flange	16 in 4 flange
4.	Type of Disc/blades	General Purpose	L- type	Hatchet
5.	Size of bottoms/blades, (mm)	225	95 x 50 x 6	220 x 68 x 8
6.	Spacing of bottoms/flanges, (mm)	200	156	190
7.	Lower hitch point span, (mm)	470	395	515
8.	Mast height, (mm)	470	445	365
9.	**Overall dimensions, (mm):**			
	- Length	985	780	745
	- Width	640	1200	1010
	- Height	870	870	790
10.	Gross mass, (kg)	85	180	100

ANNEXURE – II

BRIEF SPECIFICATION OF HALF CAGE WHEEL

S. No.	Parameters	Specifications
1.	Type	Half cage wheel
2.	Dia, (mm)	845
3.	Width, (mm)	250
4.	No. and types of lugs	10, Straight lugs made of M.S. angle section welded to angle iron frame
5.	Size of angle section, (mm)	40 x 40 x 5
6.	Length of lugs, (mm)	250
7.	Spacing of lugs, (mm)	235
8.	Weight of each cage wheels (kg)	40

ANNEXURE- III

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	PTO performance test	10.6
3.	Power lift and hydraulic pump performance test	1.0
4	Drawbar performance test	15.3
5.	Turning ability	0.3
6.	Location of centre of gravity	0.3
7.	Operator's field of vision	--
8.	Brake test	1.0
9.	Noise measurement	1.0
10.	Mechanical vibration test	0.9
11.	Nominal speed test	2.9
B.	**FIELD TEST:**	
1.	MB ploughing	10.9
2.	Rotavation	11.7
3.	Puddling (including 5 hrs water proof test)	15.5
C.	**HAULAGE TEST:**	8.26
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	9.2
	TOTAL:	**88.9**