

यह परीक्षण रिपोर्ट 31/10/2022 तक वैध है / THIS TEST REPORT IS VALID UPTO 31/10/2022)



INDO FARM, 3035 DI C-MESH TRACTOR



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GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS WELFARE

(Deptt. of Agricultural, Cooperation & Farmer's Welfare, Mechanization & Technology Division)

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(An ISO 9001: 2015 Certified Institute)

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T- 1272/1799/2019	INDO FARM, 3035 DI C-MESH TRACTOR - Commercial (Initial)
	(THIS TEST REPORT IS VALID UPTO 31/10/2022)

Manufacturer : M/s. Indo Farm Equipment Ltd,
EPIP-II, Village-Thana, Baddi-173205, Distt.
Solan, (HP)

Month: October	Test Report No. T- 1272/1799/2019	Year: 2019
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Type of Test : **COMMERCIAL (Initial)**

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

Period of Test : October, 2018 to July, 2019

Test Report No. : **T-1272/1799/2019**

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

Sl. No	Units	Conversion Factor	A B B R E V I A T I O N S	
1.	Force:		Apa	As per applicant
	1 kgf	9.80665 N	TDC	Top Dead Centre
		2.20462 lbf	IS	Indian Standard
2.	Power:		LHS/RHS	Left Hand Side/ Right Hand Side
	1 mechanical horsepower	1.01387 metric horsepower	Hg	Mercury
		745.7 W	Temp.	Temperature
	1 metric horsepower	735.5 W	N.R.	Not recorded
	1 kW	1.35962 metric horsepower	Rpm	Revolutions per minute
3.	Pressure:		O.D/I.D	Outer diameter/ Inner diameter
	1 psi	6.895 kPa	N.A.	Not available/ Not applicable
	1 kgf/cm ²	98.067 kPa = 735.56 mm of Hg	PTO	Power take-off
	1 bar	100 kPa = 10 N/cm ²	R.H.	Relative Humidity
	1 mm of Hg	1.3332 m-bar		

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The applicant has submitted an application vide letter No. Ref:IF/3035 DI C-Mesh/ICT2018-19/1, dated 26.05.2018 for ICT Testing of “**INDO FARM, 3035 DI C-MESH**” therefore, the tractor was subjected to different tests as per IS Standards as IS: 5994-1998 (Reaffirmed in 2014) and IS: 12207-2014 and IS: 9253-2013. Thereafter, fourth revision of IS: 12207 and published in month of July, 2019 and test report is released as under:

Manufacturer	:	M/s. Indo Farm Equipment Ltd, EPIP-II, Village-Thana, Baddi-173205, Distt. Solan, (HP)
Test requested by (applicant)	:	The manufacturer
Selected for test by	:	Applicant
Place of running-in	:	At manufacturer's works
Duration of said running-in (h):		
- Engine	:	05
- Transmission	:	10
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	:	Indo Farm
Model	:	3035 DI C-Mesh
Variants, if any	:	None
Brand name	:	Indo Farm
Type	:	Four wheeled, rear wheel driven, standard Agricultural Tractor
Month & Year of manufacture	:	04 & 18 (April, 2018)
Chassis number	:	DNW3035000001CM
Country of Origin	:	India
1.2 Engine:		
Make	:	Indo Farm
Model	:	Indo Farm 3035 DI
Type	:	Four stroke, naturally aspirated, liquid cooled, direct injection, diesel engine.
Serial number	:	C3286B00002NW
Engine speed (Manufacturer's recommended production setting, (rpm) :		
- Maximum speed at no load, (rpm)	:	2240 to 2360
- Low idle speed, (rpm)	:	500 to 600
- Speed at maximum torque, (rpm)	:	1200 to 1400
Rated speed, (rpm):		
- For PTO use	:	2100
- For drawbar use	:	2100
1.3 Cylinder & Cylinder Head:		
Number	:	Three
Disposition	:	Vertical, inline
Bore/stroke, (mm)	:	105/110
Capacity as specified by the applicant, (cc)	:	2858 (apa)
Compression ratio, (apa)	:	19.0± 0.5 : 1

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	Type of cylinder head	: Individual
	Type of cylinder liners	: Wet, replaceable
	Type of combustion chamber	: Re-entrant type
	Arrangement of valves	: Over head, Inline
	Valve clearance (cold/hot):	
	- Inlet valve, (mm)	: 0.3 / 0.3
	- Exhaust valve, (mm)	: 0.4 / 0.4
1.4	Fuel System:	
	Type of fuel system	: Gravity and force feed
	Fuel tank:	
	Capacity, (l)	: 62.80
	Location	: Above clutch housing
	Provision for draining of sediments /water	: Provided
	Material of fuel tank	: CRS 'D'
1.4.1	Water separator	
	Make	: Allena Auto (apa)
	Type	: Inverted funnel, gravity separation
	location	: In between fuel tank and feed pump
1.4.2	Fuel feed pump:	
	Make	: Bosch, India
	Type	: Plunger
	Model/Group combination No.	: FP/KSG 22AD 105, F002 A50 040
	Provision of sediment bowl	: Provided
	Method of drive	: Through cam shaft of fuel injection pump
1.4.3	Fuel filters:	
	Make	: Bosch, India
	Model/Group combination No.	: 9 450 030 119
	Number	: Two
	Type of element:	
	- Primary	: Paper
	- Secondary	: Paper
	Capacity of final stage filter, (l)	: 0.40
1.4.4	Fuel Injection pump:	
	Make	: Bosch, India
	Model/Group combination No.	: F 040 AOZ 553, PES 3A90D320RS2000
	Type	: Inline, plunger
	Serial number	: 81941892
	Method of drive	: Through timing gears
1.4.5	Fuel injectors:	
	Make	: Bosch, India
	Nozzle Holder No.	: F 002 C70 552
	Nozzle No.	: DSLA 146 P 1610
	Type	: Multi hole (Five holes)
	Manufacturer's production pressure setting, (MPa)	: 25.0 to 25.8
	Injection timing	: 10° ± 1 before TDC
	Firing order	: 1-3-2

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- 1.4.6 Governor:**
 Make : Bosch, India
 Model/Group combination No. : RSV300...1050A1C2274R
 Type : Mechanical, centrifugal, variable speed.
 Rated engine speed, (rpm) : 2100
 Governed range of engine speed, (rpm) : 500 to 2360
- 1.5 Air Intake System:**
- 1.5.1 Pre-cleaner: Not provided**
- 1.5.2 Air cleaner:**
 Make : Luman
 Type : Dry type
 Location : In front of radiator, under the bonnet.
 Range of suction pressure at maximum power, (kPa) : 2.7 to 3.2
- | Details of paper element: | Primary element | Secondary element |
|----------------------------------|-------------------------|--------------------------|
| - Size (OD/ID), (mm) | : 125.6 / 85.4 | 78.0 / 64.5 |
| - Length, (mm) | : 315.0 | 305.0 |
| - Type | : Cellulose fiber paper | Polyester felt |
- Air flow restriction indicator : Provided
 Dust unloading valve : Provided
 Maintenance schedule : **Primary element:** clean after every 300 hours or earlier depending on chocking condition and replace the element after every 3 cleanings of 900 hours of operation.
Secondary element: replace element after every three times replacement of primary element.
- 1.6 Exhaust system:**
 Type of silencer : Updraft, (Elliptical)
Position of silencer outlet with Respect to SIP, (mm):
 - Vertical : 1105
 - Longitudinal : 1470
 - Lateral : 410 (on RHS)
 Range of exhaust gas pressure at maximum power, (kPa) : 5.5 to 5.7
 Provision of spark arresting device : None
 Provision against entry of rain water : A bend is provided on the outlet of silencer.
- 1.7 Lubricating system:**
 Type : Force feed cum splash
 Oil sump capacity, (l) : 7.50
 Total lub oil capacity, (l) : 8.75
 Oil change period : First change after 50 hours and subsequently after every 200 hours of operation.
 Cooling device, (if any) : None

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	Filters:	
	Make	: Indo Farm (apa)
	Type	: Full flow, spin-on, throw away, paper element.
	Number	: One
	Pump:	
	Type	: Gear
	Method of drive	: Through timing gear
	Pressure release setting, (kPa)	: 392 ± 49 (apa)
	Minimum permissible pressure, (kPa)	: 98 to 147 (apa)
1.8	Cooling system:	
	Type	: Forced circulation of coolant
	Brand name of coolant	: Valvoline Cummins (apa)
	Coolant water ratio	: 1 : 3 (apa)
	Details of pump	: Centrifugal, semi-open impeller of 89.6 mm diameter, having 12 number of vanes and driven through crankshaft pulley by a cogged "V"-belt common to alternator.
	Details of fan	: Suction type, 06 plastic blades of 383.5 mm diameter and mounted on water pump shaft.
	Means of temperature control	: Thermostat
	Bare radiator capacity, (l)	: 4.50
	Capacity of expansion flask, (l)	: 1.00
	Total coolant capacity, (l)	: 9.80
	Radiator cap pressure, (kPa)	: 49
1.9	Starting System:	
	Type	: 12V, DC, Electrical
	Aid for cold starting	: None
	Any other device provided for easy starting.	: None
1.10	Electrical System:	
1.10.1	Battery:	
	Make & Model	: Exide & MF70Z
	Type	: Lead acid
	Capacity and rating	: 12V, 75 Ah at 20 hours discharge rate
	Location	: In-front of radiator under the bonnet.
1.10.2	Starter:	
	Make	: Spark minda
	Model	: Not available
	Type	: Pre-engaging solenoid operated
	Capacity and rating	: 12V, 2.7 kW
	Serial Number	: 16022 0748A
1.10.3	Generator:	
	Make	: Spark minda
	Model	: Not available
	Type	: Alternator
	Serial number	: I6037 1948-K
	Output rating	: 12V, 42 Amp

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Method of drive : Through crankshaft pulley by a cogged V-belt common to water pump.

1.10.4 Voltage regulator: : In built with alternator

1.10.5 Details of lights:

Description	No. & capacity of bulbs	Height of the centre of beam above ground level,(mm)	Size of beam, (mm)	Distance between centre of the beam and outside edge of tractor at standard rear track setting, (mm)
Front Lights:				
- Head lights	2, 12V, 60/55 W	1260	155 x 110	753
- Parking lights	2, 12V, 5 W	1255	60 x 65	150
- Turn-cum-hazard Indicator light	2, 12V, 21 W	1255	70 x 65	85
-Reflector (w)	2	1255	30 x 55	195
Rear lights:				
- Stop light/Tail light	2, 12V, 21/5 W	1190	60 x 65	165
- Turn-cum-hazard Indicator light	2, 12V, 21 W	1190	70 x 65	100
Reflector (R)	2	1190	35 x 55	210
Plough light	1, 12 V, 35 W	1410	125 Φ	130
Registration plate light	Part of rear parking light			

1.10.6 Main switch : Key turn type having three positions viz.
i) OFF
ii) Circuit 'ON'
iii) START

1.10.7 Light switch : Rotary type having five positions viz.
i) OFF
ii) Parking + dash board light
iii) Head light (short beam) + (ii)
iv) Head light (long beam) + (ii)
v) Turn indicator switch
vi) Horn push button

1.10.8 Horn:
Make : Addon
Type : 2B, electromagnetically vibrated diaphragm type
Location : In front of radiator, under the bonnet

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

30 A	20 A	10 A
01	01	04

1.10.10 Details of other electrical accessories:

1.10.10.1 Flasher Unit:

Make : Wesco
Capacity:
-Turn signal : 21W x 2 + 2W x 1
- Hazard signal : 21W x 4 + 2W x 2
Flashes/Min. : 85

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1.11 Instrument panel details:

- i) Engine rpm cum cumulative digital run hour meter (0 to 30) x 100 rpm
- ii) Water temperature gauge (with coloured zones)
- iii) Lubricating oil pressure gauge (with coloured zones)
- iv) Fuel level gauge (with coloured zones)
- v) Turn cum hazard light indicator
- vi) Battery charging warning indicator
- vii) Starting switch (key-turn-type)
- viii) Light switch (rotary type)
- ix) Hazard indicator light switch
- x) Head light long beam 'ON' indicator
- xi) Air cleaner clogging indicator light
- xii) Voltmeter (with colour zones)
- xiii) Mobile charging socket
- xiv) Steering control wheel
- xv) Fuel shut-off knob
- xvi) Hand accelerator lever
- xvii) Rear view mirror

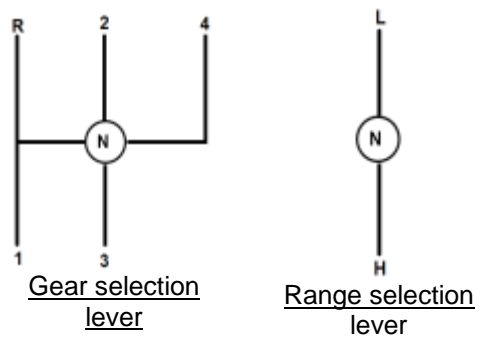
1.12 Transmission System:

1.12.1 Clutch:

- Make : Chera
- Type : Single, dry friction plate
- No. of friction plate, (s) : One
- Material : Non-asbestos (apa)
- Size, (OD/ID) (mm) : 279.3 / 166.0 Φ and 28.44 cm² contact area of each pad having four pads.
- Method of operation : By pressing the clutch pedal provided on LHS of operator's seat.

1.12.2 Gear box:

- Make : Indo Farm
- Type : Constant mesh
- No. of speeds:**
 - Forward : 08
 - Reverse : 02
- Gear shifting pattern :



- Location of gear shifting levers : Side shift arrangement
 - Main gear shift lever : RHS of operator's seat
 - Range selector lever : LHS of operator's seat.
- Oil capacity, (l) : 57.5 (common with differential, rear axle & final drive, hydraulic and brakes system).
- Oil changing period : Change after every 1600 hours of operation.

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1.12.3 Nominal Speeds:

Movement	Gear No.	No of engine revolutions for one revolution of driving wheel	Nominal speed at rated engine speed when fitted with 12.4-28 size tyres of 590 mm radius index, (kmph)
Forward	L1	238.65	1.96
	L2	167.66	2.78
	L3	106.16	4.40
	L4	64.73	7.22
	H1	59.54	7.85
	H2	41.83	11.16
	H3	26.47	17.62
	H4	16.13	28.94
Reverse	LR	179.95	2.60
	HR	44.83	10.43

1.12.4 Differential unit:

- Type : Crown wheel and bevel pinion with differential unit accommodated inside the differential housing.
- Reduction through crown wheel & pinion : 3.166 : 1 (38/12 T)
- Oil capacity of differential unit, (l) : 57.5 (common with gear box, rear axle & final drive, hydraulic and brakes system).
- Oil changing period : Change after every 1600 hours of operation.

Differential lock : **Not provided**

1.12.5 Rear axle & Final drive:

- Make : Indo Farm (apa)
- Type : Bull gear and pinion type final drive accommodated inside the differential housing.
- Reduction through final drive : 5.091 : 1 (56/11 T)
- Oil capacity of final drive, (l) : 57.5 (common with gear box, differential housing, hydraulic & brakes system).
- Oil changing period : Change after every 1600 hours of operation.

1.13 Power lift (Hydraulic system):

- Make : Indo Farm (apa)
- Type : Open centre, live, ADDC
- No. and type of cylinder : One, single acting
- Type of linkage lock for transport : Hydraulic, a "Response valve knob" in fully closed position acts as a transport lock.

1.13.1 Hydraulic pump :

- Make : United gear
- Type : Gear
- Location & drive : On RHS of engine and driven through timing gears.
- No. & type of filters : Two, one fine wire mesh strainer and one spin- on throw away type filter.
- Hydraulic oil capacity, (l) : 57.5 (common with gear box, differential, rear axle & final drive and brakes system).
- Oil change period : Change after every 1600 hours of operation.
- Provision for external tapping : Provided

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Details of control levers:

- i) Position control lever
- ii) Draft control lever
- iii) Response valve knob
- iv) External control knob

Method of draft sensing

: Through top link

1.13.2 Three point linkage:

S. No.	Observations	As per IS: 4468- (Part-1) -1997, (Reaffirmed in Oct., 2017) (Cat.I / Cat.II), (mm)	As measured (mm)	Remarks
I.	Upper hitch points:			
a)	Dia of hitch pin hole	19.30 to 19.50 / 25.70 to 25.90	25.9	Conforms to Cat. II
b)	Width of ball	44.0 (max.) / 51.0 (max.)	51.0	Conforms to Cat. II
II.	Lower hitch points:			
a)	Dia of hitch pin hole	22.40 to 22.65 / 28.70 to 29.00	28.90	Conforms to Cat. II
b)	Width of ball	34.8 to 35.0 / 44.8 to 45.0	45.0	Conforms to Cat. II
III.	Lateral distance from lower hitch point to centre line of tractor	359 / 435	368	Does not conform
IV.	Lateral movement of lower hitch points	100 (min) / 125 (min)	225	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	530	Conforms to Cat. I
VI.	Transport height	820 (min)/ 950 (min)	865	Conforms to Cat. I
VII.	Power range (without force)	560(min)/ 650 (min)	600 & 645	Conforms to Cat. I
VIII.	Leveling adjustment	100 (min)/ 100 (min)	270	Conforms to Cat. I & II
IX.	Lower hitch point clearance	100 (min)/ 100 (min)	280	Conforms to Cat. I & II
X.	Lower hitch point height	200 (max)/ 200 (max)	200	Conforms to Cat. I & II

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

The following are dimensions observed, corresponding to 590 mm as tyre dynamic radius index:

S. No.	Parameter	Notation	Dimension or range, (mm)	Setting used during test, (mm)
1.	Length of lower link	A	795	795
2.	Length of lift arm	B	240	240
3.	Length of lift rods	C	655 to 750	660
4.	Length of top link	D	535 to 735	555
5.	Distance of lift rod connection point from pivot point of lower link	E	400	400
6.	Distance of lower link pivot point from rear wheel axis:			
	-Horizontally	F	100, behind	100, behind
	-Vertically	G	150, below	150, below
7.	Distance of upper link pivot point from rear wheel axis:			
	-Horizontally	H	370, 370 & 370, behind	370, behind
	-Vertically	J	265, 295 & 324, above	295, above
8.	Distance of lift arm pivot point from rear wheel axis:			
	-Horizontally	K	50, forward	50, forward
	-Vertically	L	380, above	380, above
9.	Height of lower hitch points relative to the rear wheel axis:			
	- In high position	M	90 to 275	255
	- In low position	N	-550 to -285	390
10.	Height of lower link hitch points when locked in transport position		255	

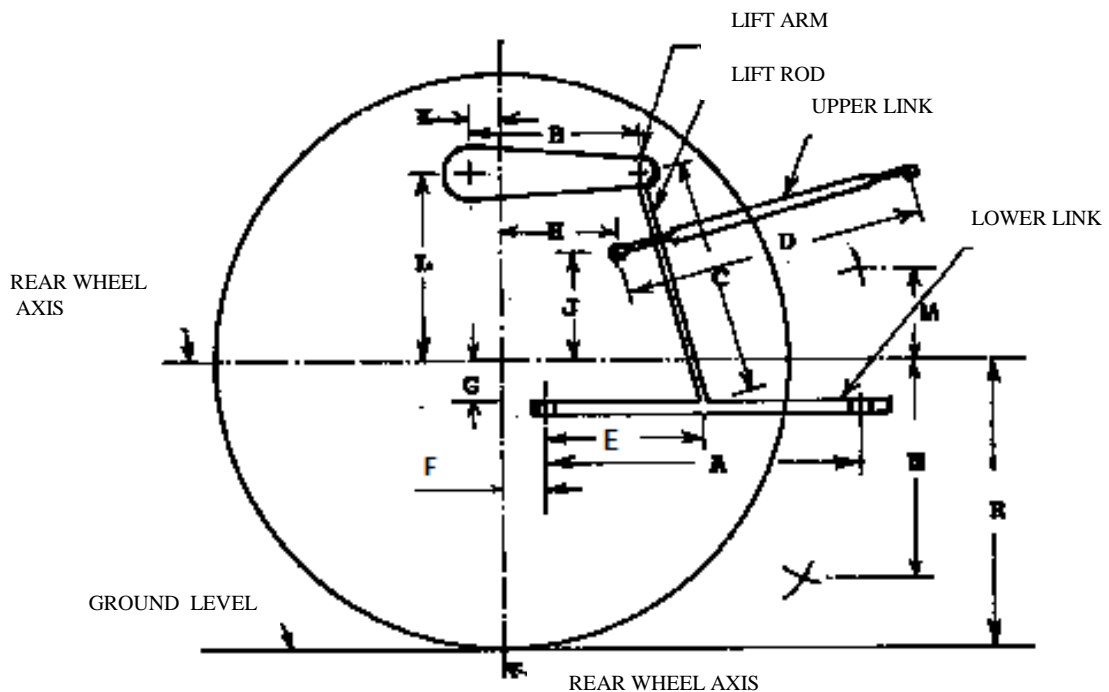


Fig. 1 (a): DIMENSIONAL NOTATIONS FOR TABLE OF LINKAGE GEOMETRY

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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) / (Cat.II), (mm)	As measured, (mm)	Remarks
A	683 ± 1.5 / 825 ± 1.5	684.5	Conforms to Cat.-I
B	75 (min) / 75 (min)	75	Conforms to Cat. I & II
C	30 (min) / 30 (min)	30	Conforms to Cat. I & II
D \varnothing	21.79 to 22.0 / 27.79 to 28.0	28.0	Conforms to Cat. II
E	39.0 (min) / 49.0 (min)	56.3	Conforms to Cat. I & II
F \varnothing	12.0 (min) / 12.0 (min)	12.4	Conforms to Cat. I & II
G	15.0 (min) / 15.0 (min)	15.7	Conforms to Cat. I & II
H \varnothing	25 ± 1 / 25 ± 1	25	Conforms to Cat. I & II
J	80 ± 1.5 / 80 ± 1.5	79.9	Conforms to Cat. I & II
No. of holes	7 / 9	7	Conforms to Cat. I

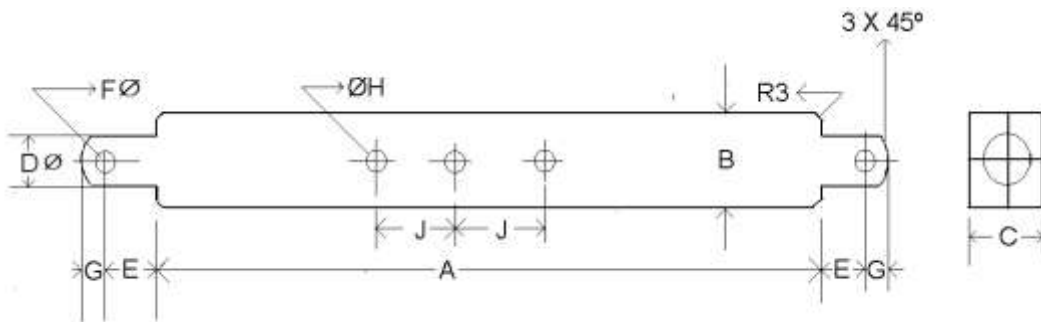


Fig. 1 (b): DIMENSIONAL NOTATIONS FOR LINKAGE DRAWBAR

1.13.4.2 Swinging drawbar: : Not provided

1.14 Power take-off shaft:

Type : Type-I, Not Independent
Method of engaging : By a hand lever provided on LHS of operator's seat
No. of shaft,(s) : One
PTO speed corresponding to rated engine speed, (rpm) : 675
Distance behind rear axle, (mm) : 355
Engine to PTO speed ratio : 3.111 : 1
Weather the PTO shaft is capable of transmitting full power of the engine. : Yes
Other speeds, if any : Yes, as following

Gear	Engine to PTO speed ratio	PTO speed at Rated engine speed (rpm)	Gear	Engine to PTO speed ratio	PTO speed at Rated engine speed (rpm)
L-1	6.402 : 1	338	H-1	6.402 : 1	338
L-2	4.497 : 1	467	H-2	4.497 : 1	467
L-3	2.853 : 1	736	H-3	2.853 : 1	736
L-4	1.734 : 1	1211	H-4	1.734 : 1	1211
LR	4.828 : 1	435	HR	4.828 : 1	435

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1.14.1 Specifications of Power Take-Off Shaft: -

Specification	As per IS: 4931-1995 (Reaffirmed in 2014), Type-I	As observed	Remarks
Nominal speed, (rpm)	540 ± 10	540 rpm of PTO shaft corresponds to 1980 rpm of engine	Conforms
No. of splines	6	6	Conforms
Direction of rotation	Clockwise	Clockwise	Conforms
Location	The position of the centre of the end of PTO shaft shall be within 50 mm to right or left of the centre line of the tractor.	In the centre line of the tractor	Conforms
Dimensions, (mm) {See Fig. 2(a)}:			
D∅	34.79 ± 0.06	34.80	Conforms
d∅	28.91 ± 0.05	28.90	Conforms
B∅	29.40 ± 0.10	29.30	Conforms
A∅ (Optional)	8.30 ± 0.10	8.30	Conforms
W	8.69 – 0.09 -0.16	8.66	Conforms
a	7	7	Conforms
b	25 ± 0.50	25.0	Conforms
c	38.0	38.0	Conforms
x	30°	30°	Conforms
B	76 (min)	90	Conforms
h	450 to 675	587	Conforms

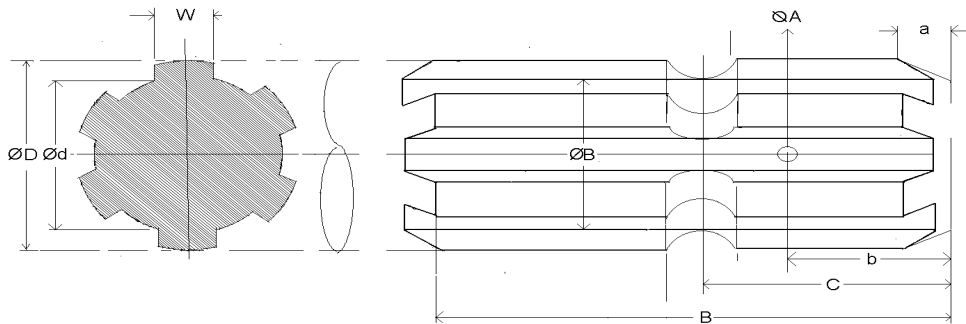


Fig. 2: DIMENSIONAL NOTATIONS FOR TYPE-I POWER TAKE-OFF SHAFT

1.14.2 Power Take-off Master Shield : Not Provided

1.15 Towing hitch:

1.15.1 Front:

Type : Clevis
 Location : At front axle support bracket.
 Height above ground level, (mm) : 705
 Number of positions : One
 Type of adjustment : Fixed
 Dia of pin hole, (mm) : 33.7
 Width of clevis, (mm) : 61.8

1.15.2 Rear:

Type : Clevis
 Location : At rear of differential housing.

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Height above ground level, (mm):

- Maximum	: 820
- Minimum	: 495
Number of positions	: 08
Type of adjustment	: By changing and reversing the position of hitch on its mounting bracket.

Distance of hitch point, (mm):

- From rear wheel centre	: 480
- From power take-off shaft end	: 115
Dia of pin hole,	: 34.3
Width of clevis,	: 82.0

1.16 Steering:

Make	: Rane
Type	: Mechanical, re-circulating ball type with single drop arm.
Location	: On Bell housing.
Method of operation	: Manual, through steering control wheel.
Diameter of steering control wheel, (mm)	: 430

1.17 Brakes:

1.17.1 Service Brake:

Make	: Ratek Pheon Friction Tech. pvt. Ltd. (apa)
Type	: Mechanical, oil immersed multi discs
Location	: On differential half axle shaft
No. of disc(s)	: 03 (on each wheel side)
Area of liners, (cm ²)	: 702.0 (on each wheel side)
Material of liners	: Non-asbestos (apa)
Method of operation	: Individual or combined RHS foot pedal operated.

1.17.2 Parking Brake:

Type	: Pawl and ratchet arrangement
Location and method of operation	: Service brake act as a parking brake when locked in position by a hand lever provided on RHS of operator's seat.

1.18 Wheel Equipment:

1.18.1 Steered Wheel,(s):

Make	: MRF Shakti
Number	: 2
Type of tyre	: Pneumatic, ribbed
Size	: 6.00-16
Ply rating	: 8
Maximum permissible loading capacity of each tyre at 235 kPa pressure, (kgf)	: 460 (apa)
Recommended inflation pressure, (kPa) :	
- For field work	: 235
- For transport	: 235
Track width, (mm)	: 1340 (std.) & 1540
Method of changing track width	: By reversing the wheel wheel
Make & size of rim	: WIL & 4.50 E x 16

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- 1.18.2 Drive wheel(s):**
 Make : MRF Shakti
 Number : 2
 Type of tyre : Pneumatic, traction
 Size : 12.4-28
 Ply rating : 12
 Maximum permissible loading capacity of each tyre at 135 kPa pressure, (kgf) : 1148
Recommended inflation pressure, (kPa):
 - For field work : 98
 - For transport : 135
 Track width, (mm) : 1330, 1390, 1450 (std.), 1490, 1680, 1730, 1770 & 1850
 Method of changing track width : By reversing wheel disc and changing position of disc on offset rim lugs.
 Make & size of rim : WILP & W11 x 28
- 1.18.3 Wheel base, (mm) : 2015**
 Method of changing wheel base, if any, and range : **None**
- 1.19 Operator's seat:**
 Make : SAL (apa)
 Type : Cushioned seat with backrest
 Type of suspension : Two helical coil springs
 Type of damping : Hydraulic shock absorber
Range of adjustment, (mm):
 Vertical : Nil
 Lateral : Nil
 Longitudinal : ± 40
- 1.20 Provision for safety and comfort of operator:**
- 1.20.1 Operator's Seat :**
Conformity with IS: 12343-1998 (Reaffirmed in 2014):
 All parameters meets the minimum requirements of IS: 12343-1998, (Re-affirmed in 2014), **except the following:**
 i) Vertical distance from seat index point to the centre of clutch pedal.
 ii) Vertical distance from seat index point to the centre of brake pedal.
- 1.20.2 Conformity with IS: 6283 (Part-1) – 2006 (Re-affirmed in 2014) & IS: 6283 (Part-2) – 2007 (Re-affirmed in 2014):**
 Controls are identifiable with symbols as per IS: 6283 (Part-1) – 2006 (Re-affirmed in 2014) & IS: 6283 (Part-2) – 2007 (Re-affirmed in 2014).
- 1.20.3 Conformity with IS:8133-1983 (Re-affirmed in 2014), except the following:**
 Location and movement of various controls meets the requirement of IS:8133-1983 (Re-affirmed in 2014), **except the following:**
 i) The fuel shut-off knob does not remain in stop position.
- 1.20.4 Conformity with IS: 12239 (Part-1)-1996 (Re-affirmed in October, 2017):**
 Meets the requirements of IS: 12239 (Part-1)-1996 (Re-affirmed in October, 2017), **except the following:**
 i) Width of foot step.
 ii) Provision of spark arresting device in the exhaust system.

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1.20.5 Conformity with IS:12239 (Part-2)-1999 (Re-affirmed in 2014):

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

- i) Working clearance around position & draft control lever and also in between position control lever & gear lever is less than the minimum requirement.
- ii) Provision of master shield for power take-off.

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

Lighting requirements conform to IS: 14683-1999.

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 2014):

Location of labelling plate: The labelling plate is riveted on outside of LHS fender and provides the following information:

Name of Manufacturer	Indo Farm Equipment Limited
Make	Indo Farm
Model	3035 DI C-Mesh
Month & Year of manufacturer	04 & 18 (April, 2018)
Engine Serial Number	C3286B00002NW
Chassis Serial Number	DNW3035000001CM
Maximum P.T.O Power, kW	22.5
Specific fuel consumption, g/kWh	270

1.22 Ballast Conditions:

Particulars		As used during drawbar test	As used during field test		As used during Haulage test
			Dry land	Wet land	
Front	C.I. weight	Nil	Nil	Half cage Wheel with puddler	Nil
	Water	Nil	Nil		Nil
Rear	C.I. weight	400	200		Nil
	Water	220	220		Nil

1.22.1 Standard ballast, if any: None

1.23 Masses:

Particulars		Mass of the tractor without operator but with all the liquid reservoirs full, (kg)		
		Front	Rear	Total
i)	Without ballast	815	1215	2030
ii)	With ballast as used during drawbar performance test	810	1840	2650
iii)	With ballast as used during field test	825	1625	2450
iv)	As used during wet land operation (half cage wheel with puddler)	825	1310	2135
v)	As used during haulage test with trailer hitch and canopy	820	1240	2060

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1.24 Overall dimensions:

Condition	Length, (mm)	Width, (mm)	Height, (mm)		Ground clearance, (mm)
			With exhaust pipe	Without exhaust pipe	
Without ballast	3750	1785	2415	1685 (at steering wheel)	375 (below differential housing)

1.25 Number of external lubricating Points:

- Oiling	: Nil
- Greasing cups	: 02
- Greasing nipples	: 20

1.26 Colour of tractor:

Chassis & engine	: Black
Sheet metal:	
Bonnet and mudguard	: Green
Wheel rim & disc	: Silver

2. FUEL AND LUBRICANTS

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

2.2 Lubricants:

Sl. No.	Particulars	As recommended by the manufacturer	As used during the test
1.	Engine	SAE 20W40	As recommended
2.	Transmission, brakes, & Hydraulic system	Tract ELFMM 2900	Oil originally filled in the tractor's system was not changed
3.	Steering system	EP 80	-do-
4.	Grease	Multipurpose grease	As recommended

3. PTO PERFORMANCE TEST

Date(s) of test	: 12.11.2018 & 13.11.2018
Tractor run at the Institute prior to start of PTO test (h)	: 1.8
Type of dynamometer bench	: SAJ AG-250, Eddy Current

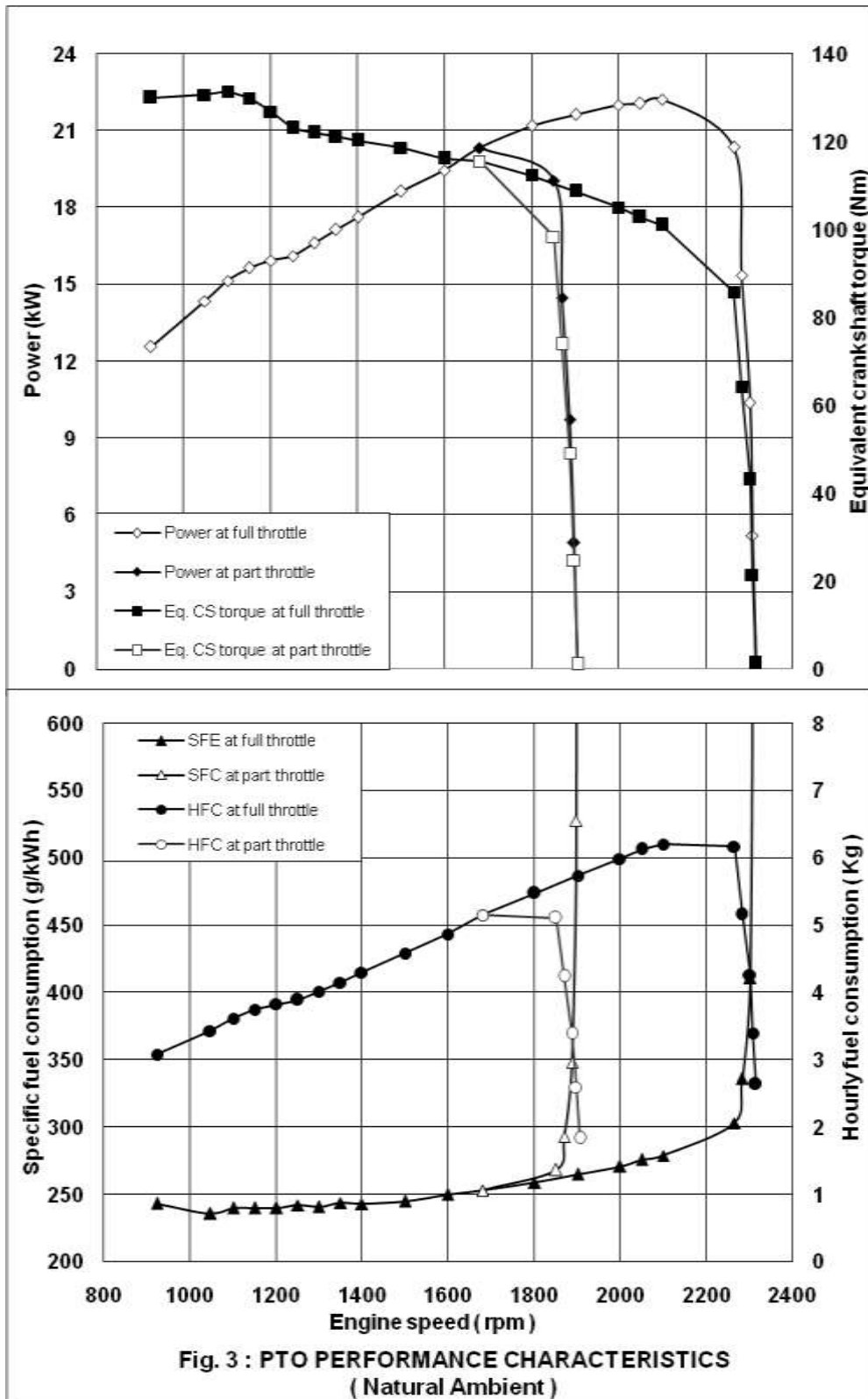
3.1 The results of power take-off performance are tabulated in Table-1 and graphically represented in **Fig. 3, 4 and 5**.

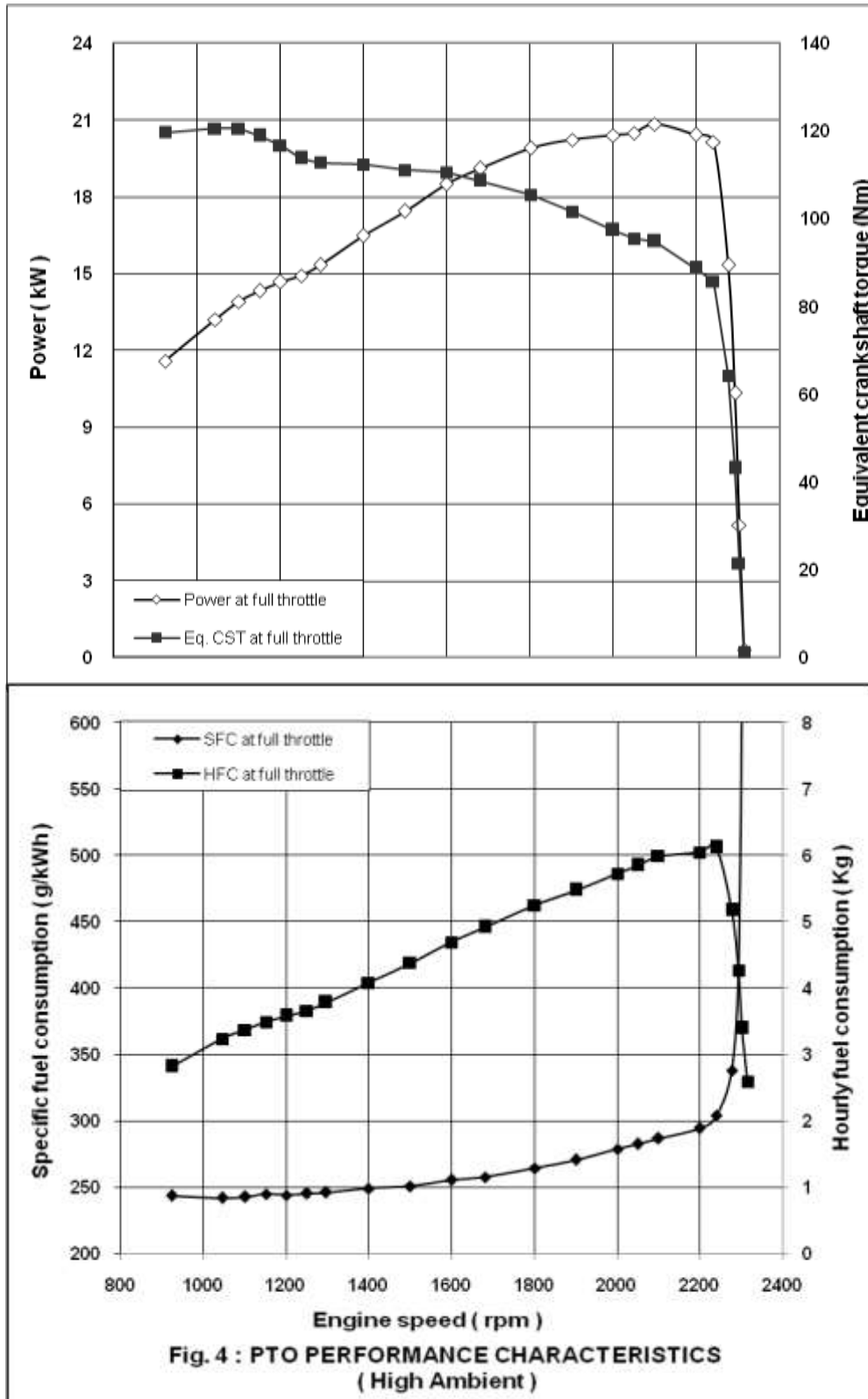
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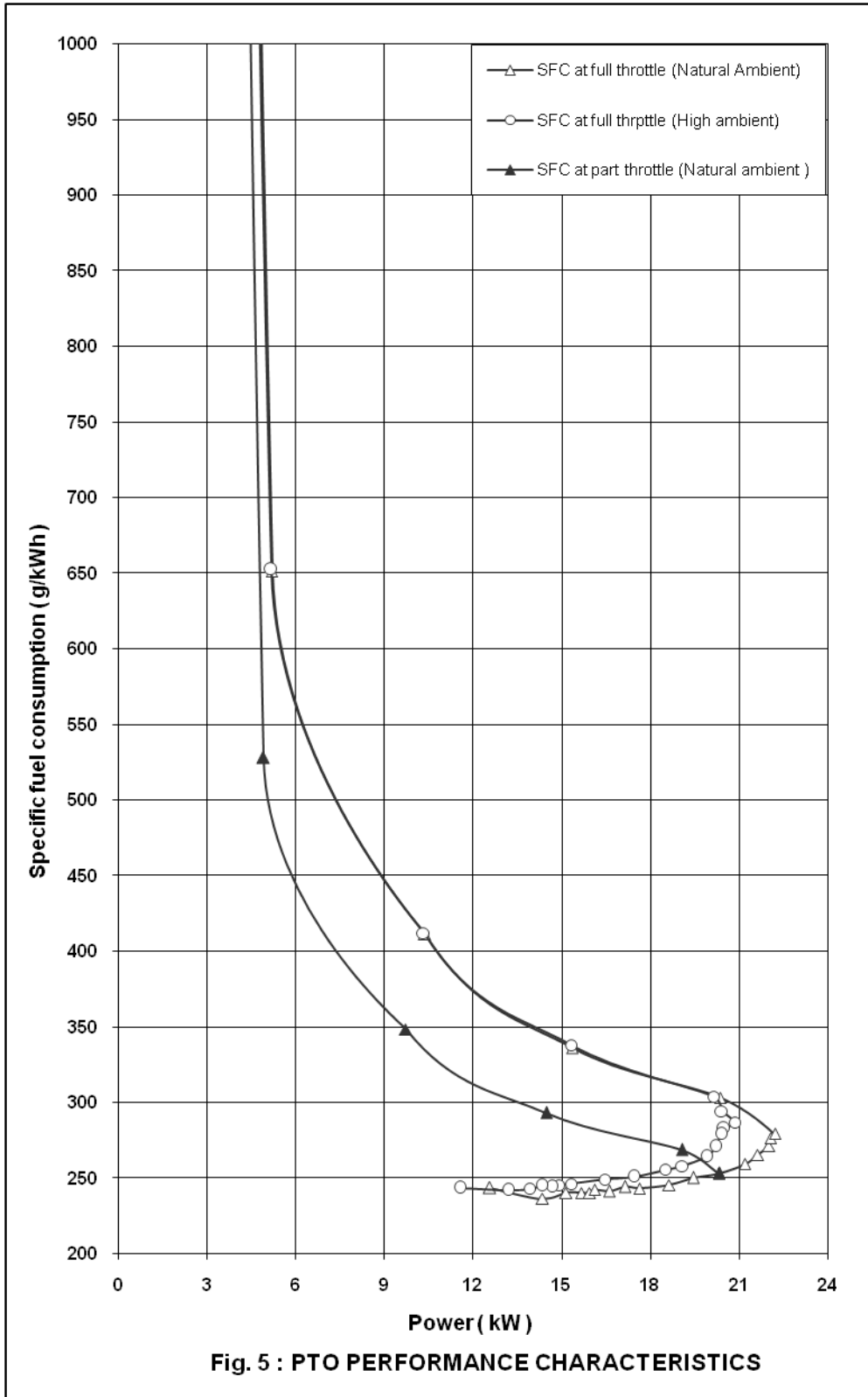
Table – 1

Power, (kW)	Speed (rpm)		Fuel consumption			Specific energy (kWh/l)
	PTO	Engine	(l/h)	(kg/h)	Specific, (kg/ kWh)	
1	2	3	4	5	6	7
a) Maximum power – 2 hours test:						
22.2	675	2100	7.43	6.21	0.280	2.99
20.9	675	2100	7.06	5.90	0.282	2.96*
b) Power at rated engine speed (2100 rpm):						
22.2	675	2100	7.43	6.21	0.280	2.99
20.9	675	2100	7.06	5.90	0.282	2.96*
c) Power at standard power take-off speed (540 ± 10 rpm):						
20.3	540	1680	6.16	5.15	0.254	3.30
19.1	540	1680	5.89	4.92	0.258	3.24*
d) Varying loads at rated engine speed:						
i) Torque corresponding to maximum power available at rated engine speed:						
22.3	675	2100	7.43	6.21	0.280	2.99
ii) 85% of the torque obtained in (i):						
20.4	728	2265	7.38	6.17	0.302	2.76
iii) 75% of the torque obtained in (ii):						
15.4	734	2283	6.17	5.16	0.335	2.50
iv) 50% of the torque obtained in (ii):						
10.4	740	2302	5.11	4.27	0.411	2.03
v) 25% of the torque obtained in (ii):						
5.2	742	2308	4.07	3.40	0.654	1.28
vi) Unloaded:						
0.3	744	2315	3.16	2.64	8.800	0.09
e) Varying loads at part throttle:						
i) Torque corresponding to maximum power available at standard PTO speed (540 ± 10 rpm):						
20.3	540	1680	6.16	5.15	0.254	3.30
ii) 85% of the torque obtained in (i):						
19.1	595	1851	6.11	5.11	0.267	3.13
iii) 75% of the torque defined in (ii):						
14.5	601	1870	5.07	4.24	0.292	2.86
iv) 50% of the torque defined in (ii):						
9.7	607	1888	4.05	3.39	0.349	2.39
v) 25% of the torque defined in (ii):						
4.9	610	1898	3.11	2.60	0.531	1.58
vi) Unloaded:						
0.2	613	1907	2.21	1.84	9.200	0.09

* Under high ambient conditions







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	<u>Natural ambient</u>	<u>High ambient</u>
-No load maximum engine speed, (rpm) :	2315	2315
-Equivalent crankshaft torque at maximum power, (Nm) :	101.1	95.0
- Maximum equivalent crankshaft torque, (Nm) :	131.5	120.6
-Engine speed at maximum equivalent crankshaft torque, (rpm) :	1101	1101
- Back-up torque, percent :	30.1	26.9
-Smoke level, maximum light absorption coefficient (per meter) :	0.17	--
- Range of atmospheric conditions:		
Temperature, (°C) :	26 to 29	42 to 44
Pressure, (kPa) :	99.0 to 99.4	99.7 to 100.2
Relative humidity, (%) :	43 to 47	23 to 29
- Maximum temperatures (degree):		
Engine oil :	95	105
Coolant (water) :	77	89
Fuel :	46	59
Air intake :	45	61
Exhaust gas :	471	482
- Pressure at maximum power:		
Intake air, (kPa) :	2.7 to 3.2	4.0 to 4.1
Exhaust gas,(kPa) :	5.5 to 5.7	5.9 to 6.4
- Consumptions:		
Lub. oil, (g/kWh) :	--	0.22
Coolant (water % of total coolant capacity) :	--	Nil

4. DRAWBAR PERFORMANCE TEST

Date(s) of test	:	19.03.2019, 20.03.2019 & 22.03.2019
Tractor run at the Institute prior to start of drawbar performance test, (h)	:	18.2
Type of track	:	Concrete
Height of drawbar, (mm):		
- Without ballast	:	550
- With ballast	:	500

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

Table - 2**DRAWBAR PERFORMANCE TEST**

Gear	Travel Speed, (km/h)	Draw-bar power, (kW)	Draw-bar pull, (kN)	Engine Speed, (rpm)	Wheel Slip, (%)	Fuel consumption		Specific Energy, (kW/h/l)	Atmospheric conditions			Temperature (°C)			Max. sustained pull, (kN)	
						(kg/kWh)	(l/h)		Temp (°C)	Pre-ssure (kPa)	R.H. (%)	Fuel	Trans. oil	Coolant (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 with Unballasted condition):																
L1	1.84	6.9	13.48	2281	15.1	0.586	4.84	1.43	32	98.6	25	47	59	78	104	14.61
L2	2.58	10.0	14.00	2264	15.4	0.487	5.83	1.72	30	98.7	26	46	58	78	104	14.45
L3	4.02	15.4	13.80	2218	15.1	0.403	7.42	2.08	30	98.7	28	45	58	80	104	14.74
L4	7.01	17.3	8.88	2100	4.7	0.356	7.37	2.35	30	98.8	37	46	56	81	103	11.85
H1	7.65	18.1	8.52	2101	4.5	0.338	7.32	2.47	29	98.8	30	45	55	81	104	11.08
H2	11.13	17.4	5.62	2107	2.4	0.358	7.35	2.34	28	99.0	28	43	39	78	100	7.49
ii) Maximum power test (Tractor with ballasted condition):																
L1	1.80	9.6	19.16	2272	15.3	0.487	5.59	1.72	33	98.4	30	49	59	78	105	20.49
L2	2.54	12.9	18.29	2254	15.1	0.430	6.64	1.94	33	98.5	33	49	58	79	103	20.24
L3	4.07	17.3	15.26	2103	7.9	0.356	7.37	2.35	32	98.5	32	48	56	80	104	19.14
L4	7.03	17.3	8.85	2102	3.0	0.356	7.37	2.35	30	98.6	33	46	53	81	103	12.04
H1	7.63	17.9	8.44	2098	3.1	0.346	7.41	2.42	29	98.7	31	46	50	81	101	11.21
H2	11.07	16.5	5.36	2101	1.1	0.371	7.32	2.25	29	98.7	29	44	36	80	99	7.33

Contd.. Table-2

Gear	Travel Speed, (km/h)	Draw-bar power, (kW)	Draw-bar pull, (kN)	Engine Speed, (rpm)	Wheel Slip, (%)	Fuel consumption		Specific Energy, (kWh/l)	Atmospheric conditions				Temperature, (°C)			Max. sustained pull, (kN)
						(kg/kWh)	(l/h)		Temp (°C)	Pre-ssure (kPa)	R.H. (%)	Fuel	Trans. oil	Coolant (water)	Eng-ine oil	
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):																
L3	4.48	14.2	11.45	2261	6.93	0.404	7.02	2.03	26	99.27	29	41	54	78	102	--
iv) Five hours test at pull corresponding to 15 percent wheel slip (ballasted wheeled tractor):																
L2	2.56	13.0	18.29	2253	15.02	0.431	6.88	1.89	32	99.00	25	48	63	79	105	--

i) The coolant (water) and lub oil consumption during 10 hours test were observed as **10.0** and nil **ml/h** respectively.

ii) Tyre Creeping, (mm):

- LHS : 20
- RHS : 25

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

Engine oil : 105
Coolant (water) : 81
Transmission oil : 59
Fuel : 49

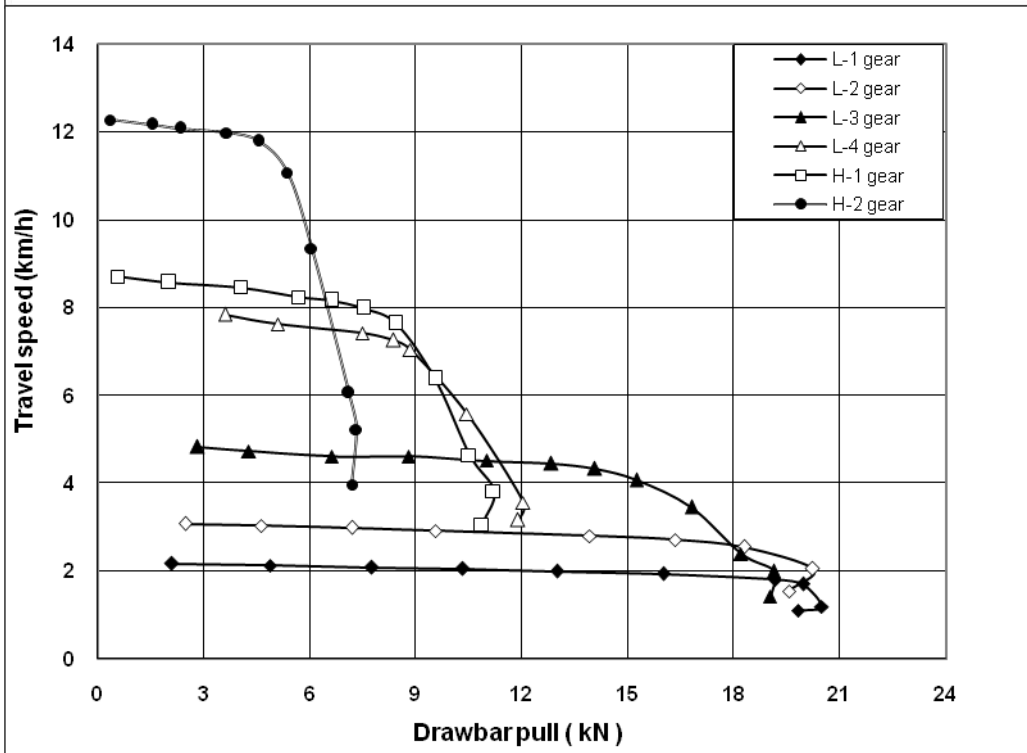
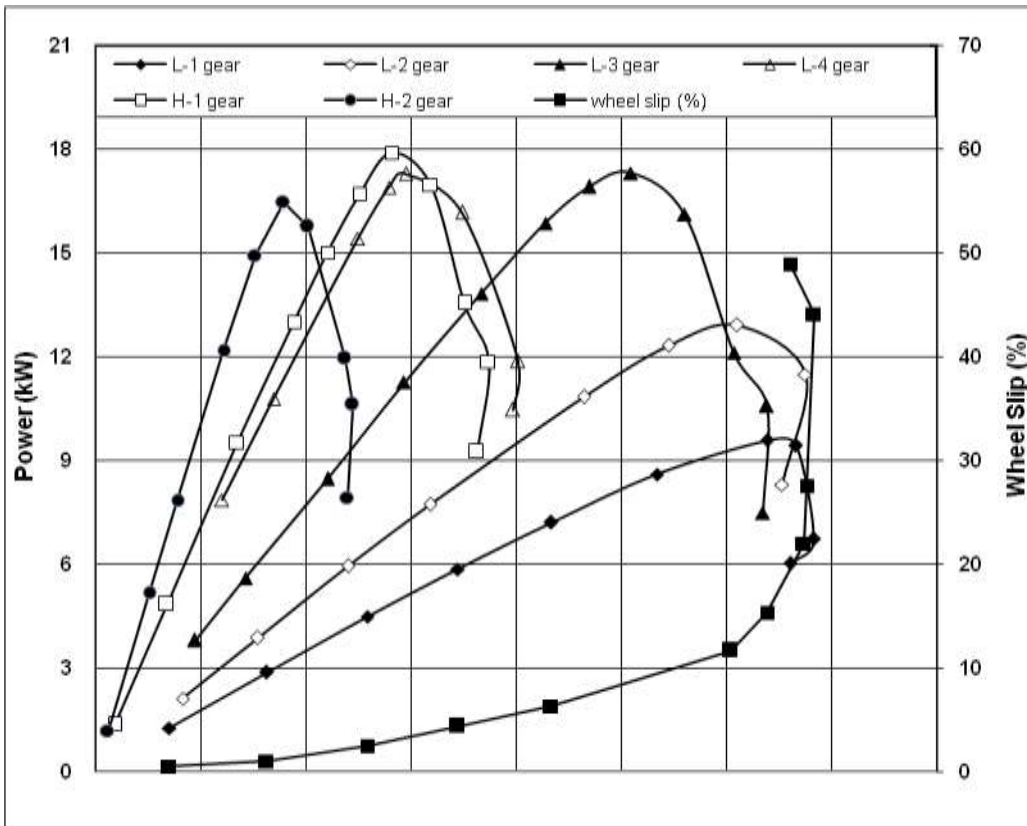
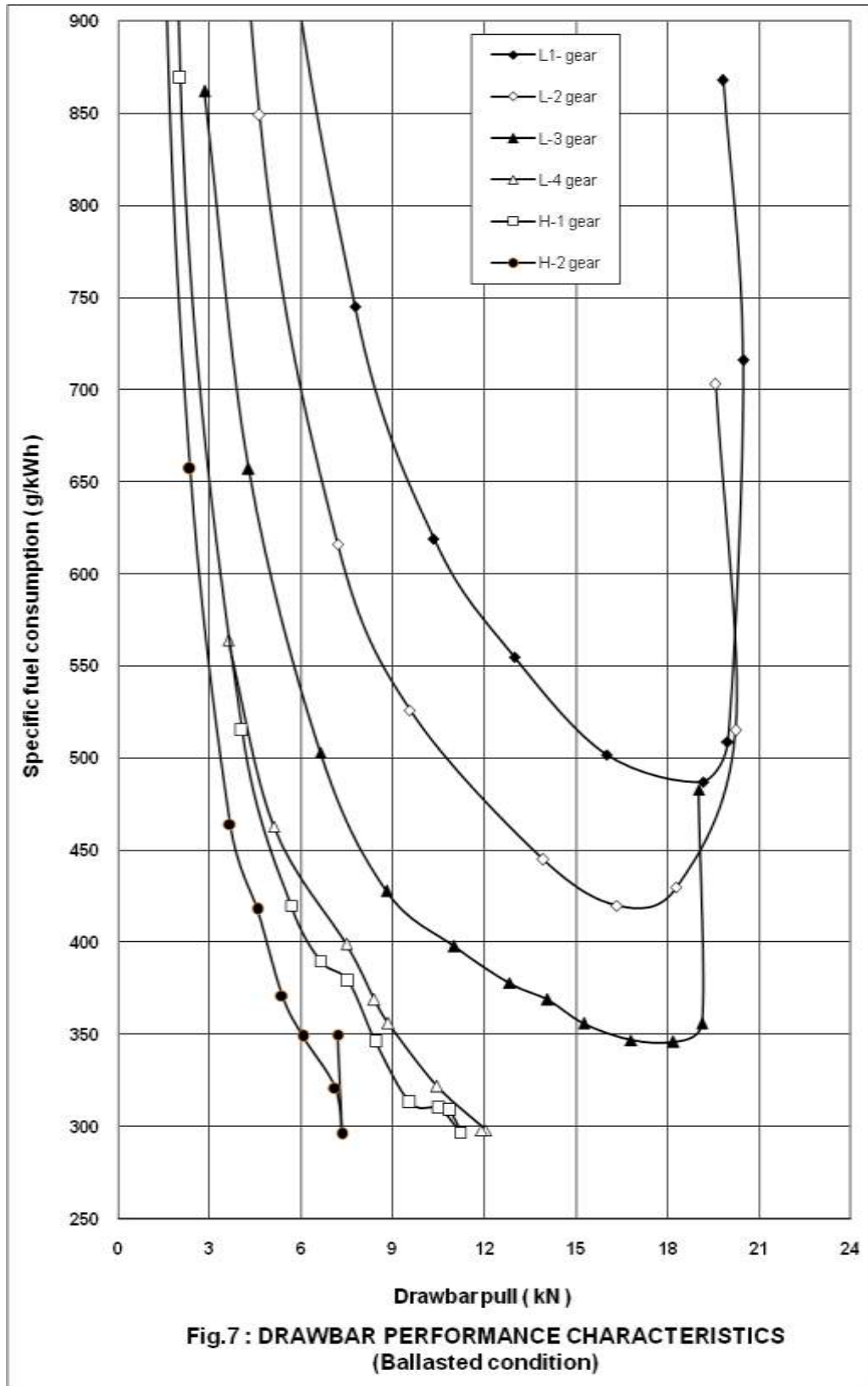


Fig. 6 : DRAWBAR PERFORMANCE CHARACTERISTICS (Ballasted Condition)



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5. POWER LIFT AND HYDRAULIC PUMP PERFORMANCE TEST

Date(s) of test : 27.12.2018, 01.01.2018 & 02.01.2018
Tractor run at the Institute prior to start of hydraulic test, (h) : 13.6
Pump speed at rated engine speed, (rpm) : 2100

5.1 Hydraulic power test:

Pump delivery rate at min. pressure and rated engine speed, (l/min) : 24.5
Maximum hydraulic power, (kW) : 6.0
Pump delivery rate at maximum hydraulic power, (l/min) : 21.9
Pressure at maximum hydraulic power, (MPa) : 16.5
Sustained pressure of the open relief valve, (MPa) : 20.0

Tapping point:

a) Relief valve test : External circuit
b) Pump performance test : 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 Movement with lifting forces, (mm)	Maximum corrected force exerted through full range, (kN)	Corresponding pressure, (MPa)	Moment about rear axle, (kN-m)	Maximum tilt angle of mast from vertical, (degrees)
At hitch points	200	620	15.67	18.0	14.02	--
On the standard frame	200	625	9.86	18.0	14.84	16

5.3 Maintenance of lift load:

Force applied at the frame, (kN) : 8.87
Temperature of hydraulic fluid at the start of test, (°C) : 60

Test data:

Elapsed Time, (minute)	5	10	15	20	25	30
Cumulative drop in height of lift, (mm)	18	25	30	32	35	35

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6. BRAKE TEST

6.1 Service brake:

6.1.1 Cold brake test:

Date of test : 12.12.2018 & 25.03.2019
 Type of track : Concrete
 Maximum attainable speed, (kmph):
 - Unballasted : 32.0
 - - With road ballasted : Not applicable

		At maximum attainable speed			
Unballasted tractor	Braking device control force, (N)	520	422	324	226
	Mean deceleration, (m/sec ²)	3.19	3.02	2.87	2.50
	Stopping distance, (m)	12.48	13.08	13.76	15.80
		At 25 kmph travel speed			
Unballasted tractor	Braking device control force, (N)	451	375	299	223
	Mean deceleration, (m/sec ²)	3.23	3.00	2.75	2.50
	Stopping distance, (m)	7.55	8.04	8.78	9.65

6.1.2 Brake fade test:

		At maximum attainable speed			
Unballasted tractor	Braking device control force, (N)	550	444	338	232
	Mean deceleration, (m/sec ²)	3.18	3.00	2.82	2.50
	Stopping distance, (m)	12.54	13.18	14.02	15.80
		At 25 kmph travel speed			
Unballasted tractor	Braking device control force, (N)	587	494	402	309
	Mean deceleration, (m/sec ²)	3.11	2.95	2.74	2.50
	Stopping distance, (m)	7.71	8.17	8.80	9.65

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

Remark: The manufacturer has not recommended ballasting for road test, therefore the brake test was conducted under unballasted condition only.

6.2 Parking brake test:

Particulars	Parked on 18 percent slope		Parked on 12 percent slope with trailer of 2.32 tonnes.	
	Facing Up	Facing Down	Facing Up	Facing Down
Braking device control force, (N)	283	285	329	341
Efficacy of parking brake	----- Effective -----			

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7. NOISE MEASUREMENT

7.1 Noise at bystander's position:

Date of test : 06.11.2018
 Type of track : Concrete
 Background noise level, dB (A) : 54

Atmospheric conditions:

Temperature, (°C) : 29
 Pressure, (kPa) : 98.1
 Relative humidity, (%) : 42
 Wind velocity, (m/s) : 0.9 to 2.5

Test Data:

S. No.	G e a r	Travelling speed before acceleration, (kmph)	Noise level , dB (A)
1.	L1	1.64	83
2.	L2	2.33	83
3.	L3	3.67	83
4.	L4	6.02	83
5.	H1	6.54	82
6.	H2	9.33	82
7.	H3	14.69	82
8.	H4	24.13	81

7.2 Noise at operator's ear level:

Date of test : 19.03.2019
 Type of track : Concrete
 Background noise level, dB (A) : 53

Atmospheric conditions:

Temperature, (°C) : 32
 Pressure, (kPa) : 98.4
 Relative humidity, (%) : 25
 Wind velocity, (m/s) : 1.2

Test Data:

Gear	Drawbar pull at which the tractor develops the maximum noise level, (kN)	Corresponding travelling speed, (kmph)	Noise level dB (A)
L1	5.44 to 13.48	2.12 to 1.82	94
L2	13.53 to 14.00	2.64 to 2.58	95
L3	6.93 to 13.92	4.70 to 3.99	95
*L4	3.84 to 8.68	7.92 to 7.14	94
H1	5.79 to 7.61	8.35 to 8.00	95
H2	0.74 to 5.49	12.54 to 11.29	95

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

8. MECHANICAL VIBRATION MEASUREMENT

Date of test : 29.01.2019

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
i)	Foot rest	Left	60	90	30	30
		Right	90	70	50	40
ii)	Steering wheel		130*	140*	70	100
iii)	Seat	Bottom	20	20	20	20
		Back	60	20	60	20
iv)	Mudguard	Left	100	100	60	90
		Right	60	90	60	30
v)	Head light	Left	60	40	70	90
		Right	60	40	60	90
vi)	Battery base, centre		70	70	40	50
vii)	Tail light	Left	60	90	90	170*
		Right	60	40	60	40
viii)	Plough light		190*	220*	100	170*
ix)	Gear shifting lever		30	40	30	30
x)	Accelerator lever	Hand	100	110*	90	110*
		Foot	90	80	60	70
xi)	Brake pedal	Left	150*	190*	70	100
		Right	180*	280*	80	220*
xii)	Clutch pedal		140*	90	100	120*
xiii)	Main hydraulic control lever		40	80	40	40
xiv)	PTO engaging lever		60	60	10	20
xv)	Differential lock lever		NA	NA	NA	NA

* 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)	733
	Distance forward from the vertical plane containing the axis of rear wheels, (mm)	798
	Distance from the median plane parallel to the longitudinal axis of tractor bisecting the track, (mm)	9.8 (towards RHS)

10. TURNING ABILITY

Characteristics	Minimum turning diameter,(m)		Minimum clearance diameter,(m)	
	LHS	RHS	LHS	RHS
Brakes released	8.51	8.46	9.01	8.98
Brake applied	7.33	7.20	7.87	7.72

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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**. The observations are as under:

1. The non visible space in front is **7800 mm** which is **3.87** times of wheel base (i.e. 2015 mm).
2. The non-visible space on LHS and RHS is **2550 mm** which is **1.76** times of standard rear track width (i.e. 1450 mm).
3. Silencer creates the masking effect.

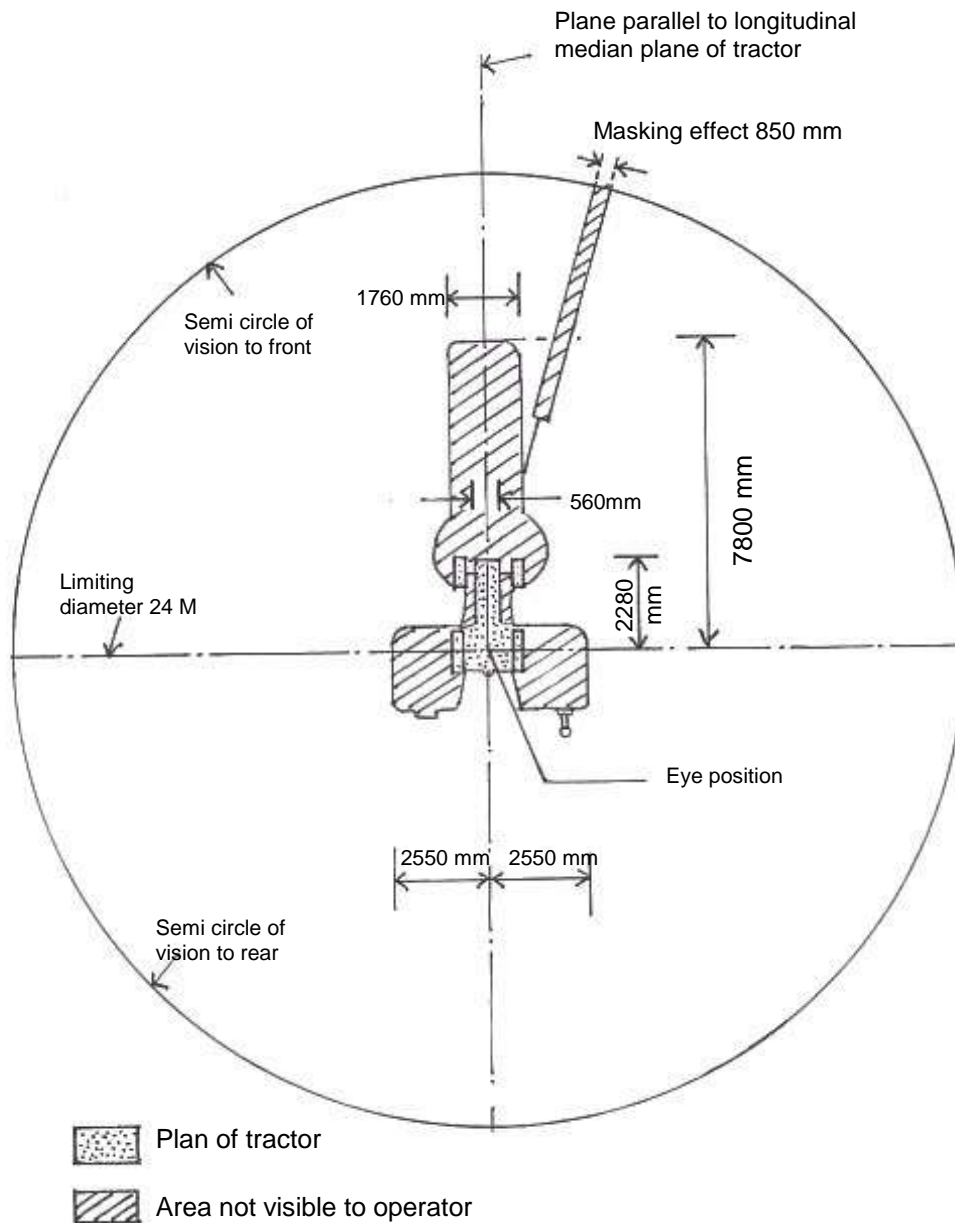


Fig. 8: Operator's field of vision

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12. FIELD TEST

- 12.1** The field tests comprising of Disc Ploughing, rotavation and puddling (including water proof test) were conducted for **10.5, 10.9** and **15.5** hours respectively. All the field tests were conducted at the full accelerator settings, when the no load speed of the engine varied from **2299** to **2300 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 Plough, rotavator and puddling is given in **Table - 3**.

Remarks: During transportation of tractor along with plough for conducting dry land field operation leakage of oil (**1st time**) observed from the hydraulic delivery pipe line. Hence the test was suspended. Applicant vide letter no. 3035 DI-C-Mesh/ICT/Apr./1/26/2018-1 dated 03/04/2019, requested to repair (Brazing) the ferrul of delivery pipe line, which comes under Minor category of breakdowns as per IS: 12207 – 2014. The same was repaired and fitted on tractor. Thereafter during rotovation operation leakage of oil (**2nd time**) observed from the hydraulic delivery pipe line. Hence the test was suspended and applicant requested to repair (Brazing) the ferrul of delivery pipe line, which comes under Minor category of breakdowns as per IS: 12207 – 2014. The same was repaired and fitted on tractor. Again during rotovation operation leakage of oil (**3rd time**) observed from the hydraulic delivery pipe line. The above minor breakdown was repetitive in nature and occurred more than two times and further repair or replacement of the same pipe line was not permitted as per IS: 12207-2014.

Applicant vide letter no. 3035 DI-C-Mesh/ICT/Apr./1/2019-5 dated 25/04/2019, requested to replace the hydraulic pipe line with improved design. Keeping in view the replacement of hydraulic pipe line with improved design, it has been decided to conduct field test under **supplementary test** as per clause no. 3.2.4 (a) of IS: 12207 – 2014.

Table – 3

SUMMARY OF FIELD PERFORMANCE TEST

Sl. 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 17	6 to 8	11 to 14
iii)	Bulk density of soil, (g/cc)	1.60	1.50	-
iv)	Cone index, (kg/sq.cm) / Puddling index, (%)	9.36 to 10.04	8.27 to 8.51	77 to 79
v)	Gear used	L-2	L-2	L-2
vi)	Av. speed of operation, (kmph)	2.34 to 2.35	3.00 to 3.03	2.39
vii)	Av. wheel slip, (%) / Av. Travel reduction, (%)	16.5 to 19.0	-2.4 to -2.0	19.3 to 20.2
viii)	Av. depth of cut, (cm) / Av. Depth of puddles, (cm)	20	6	27 to 28
ix)	Av. working width, (cm)	69	122 to 123	--
x)	Area covered, (ha/h)	0.123 to 0.127	0.269 to 0.284	--
xi)	Fuel consumption:			
	- (l/h)	3.70 to 3.87	4.83 to 4.84	4.07 to 4.14
	- (l/ha)	26.03 to 31.44	17.01 to 18.00	--
xii)	Av. draft of implement, (kN)	7.0 to 7.1	--	--

Remarks: The average lub oil and coolant (water) consumptions during the entire field tests were observed **2.71** and **12.42 ml/h** respectively.

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12.4 Wet land cultivation (Puddling):

12.4.1 The tractor was fitted with half cage wheels and puddler for conducting the puddling operation. The brief specifications of half cage wheels and puddler are given in **Annexure – I and II.**

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

S.No.	Location	Whether ingress of mud/or water	Remarks
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, air cleaner & steering gearbox 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)	4.0	5.0
Height of trailer hitch above ground level, (mm)	520	620
Gear used during the test for negotiating slopes upto 8%	H4	H4
Average travel speed, (kmph)	30.26 to 30.64	29.90 to 30.26
Average fuel consumption:		
- (l/h)	5.33 to 5.41	5.78 to 5.85
- (ml/km/tonne)	41.73 to 43.52	38.68
Average distance travelled per litre of fuel consumption, (km)	5.59 to 5.74	5.17
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 92.7 hours of tractor operation at this Institute.

14.1 Engine:

14.1.1 Cylinder bore:

Cylinder No.	Cylinder bore dia, (mm)						Max. permissible limit, (mm)
	Top position		Middle position		Bottom position		
	Thrust side	Non-thrust side	Thrust side	Non-thrust side	Thrust side	Non-thrust side	
1.	105.083	104.063	105.079	105.057	105.080	105.063	105.3

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2.	105.074	105.063	105.072	105.057	105.069	105.065	
3.	105.059	105.064	105.058	105.059	105.064	105.106	

14.1.2 Piston:

Piston No.	Piston dia, (mm)				Max. permissible wear limit,	Piston to cylinder liner clearance at skirt (mm)	
	Top (above top compression ring)		At skirt			As observed	Max. permissible limit,
	Thrust Side	Non-thrust side	Thrust side	Non-thrust side			
1.	104.413	104.419	104.939	*	104.71	0.144	0.45
2.	104.415	104.413	104.935	*		0.139	
3.	104.416	104.413	104.939	*		0.125	

* Not measured due to design features.

14.1.3 Ring end gap:

Rings	Ring end gap, (mm)									Max. Permissible end gap limit, (mm)
	Cylinder No.1			Cylinder No.2			Cylinder No.3			
	Top	Middle	Bottom	Top	Middle	Bottom	Top	Middle	Bottom	
1 st comp ring	0.40	0.45	0.65	0.40	0.45	0.45	0.50	0.50	0.50	2.0
2 nd comp ring	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.0
Oil ring	0.60	0.60	0.65	0.50	0.55	0.55	0.50	0.50	0.50	2.0

14.1.4 Ring side clearance:

Rings	Ring side clearance, (mm)			Max. Permissible clearance Limit, (mm)
	Piston-I	Piston-II	Piston-III	
1st Compression ring	----- Tapered -----			
2 nd Compression ring	0.078	0.079	0.085	0.22
Oil ring	0.037	0.038	0.038	0.20

14.1.5 Main bearings:

Bearing No.	Diametrical Clearance, (mm)	Crankshaft end float, (mm)	Max. permissible clearance limit, (mm)	
			Diametrical clearance	Crankshaft end float
1.	0.053 to 0.063	0.18	0.40	0.60
2.	0.063 to 0.066			
3.	0.055 to 0.072			
4.	0.052 to 0.056			

14.1.6 Big end bearings:

Bearing No.	Clearance, (mm)		Max. permissible clearance limit, (mm)	
	Diametrical	Axial	Diametrical	Axial
1.	0.080 to 0.103	0.20	0.60	0.70
2.	0.095 to 0.103	0.20		
3.	0.089 to 0.091	0.20		

14.1.7 Valve, guides and timing gears:

Observation

Any marked sign of overheating of valves : None
Pitting of seat/faces of valves : None

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Any visual damage to the teeth of timing gears : None

Spring Rate, (N/mm):

Observation

Intake valve spring : 6.96 to 7.16 | Against the discard limit of 5 N/mm

Exhaust valve spring : 6.96 to 7.16

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

Intake valve : 0.060 to 0.063 | Against discard limit of 0.60 mm

Exhaust valve : 0.059 to 0.061

14.2 Clutch:

Any marked wear on clutch friction plate(s) : None

Condition of clutch release bearing : Normal

Condition of pilot bearing : Normal

Condition of diaphragm springs. : Normal

Presence of oil in clutch housing : None

Any marks on fly wheel/pressure plate : None

Overall thickness of clutch plate, (mm) : 10.28 to 10.66 | Against discard limit of 6.6 mm

Height of lining over rivet head, (mm) : 1.36 to 1.84 | Against discard limit of 0.1 mm

14.3 Transmission gears:

Any visual damage, pitting & chipping of any transmission gear teeth : None

Backlash between crown wheel and Pinion, (mm) : 0.224 | Against discard limit of 0.60 mm

14.4 Brakes:

Description	Initial specified thickness of brake disc, (mm)	Measured overall thickness of brake disc after test, (mm)	Measured height of lining over oil groove, (mm)	Minimum permissible height of brake lining over oil groove, (mm)
Left	4.9±1	4.865 to 4.972	1.22 to 2.21	0.21
Right	4.9±1	4.865 to 4.954	1.31 to 2.10	

14.5 Front axle:

Any marked wear of king pins : None

Any marked wear of king pin bushes : None

Clearance between king pins and bushes, (mm) : 0.121 to 0.125 | Against discard limit of 0.40 mm

Condition of thrust bearings : 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) : 0.121 to 0.134 | Against discard limit of 0.40 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

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Condition of bearings and other : Normal
Components

15. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

Sl. No.	Adjustments/Defects/Breakdowns and Repairs	Tractor run hours
15.1	During drawbar performance test under unballasted condition leakage of oil observed from the hydraulic delivery pipe line (Part No. 4088501A). Hence the test was suspended. Applicant vide letter no. Nil dated 18/03/2019, requested to replace delivery pipe line with new one having same specification, which comes under Major (Mj-21) category of breakdowns as per IS: 12207 – 2014.	19.2
15.2	During transportation of tractor along with plough for conducting dry land field operation leakage of oil (1 st time) observed from the hydraulic delivery pipe line. Hence the test was suspended. Applicant vide letter no. 3035 DI-C-Mesh/ICT/Apr./1/26/2018-1 dated 03/04/2019, requested to repair (Brazing) the ferrul of delivery pipe line, which comes under Minor category of breakdowns as per IS: 12207 – 2014. The same was repaired and fitted on tractor.	36.3
15.3	Thereafter during rotoation operation leakage of oil (2 nd time) observed from the hydraulic delivery pipe line. Hence the test was suspended and applicant requested to repair (Brazing) the ferrul of delivery pipe line, which comes under Minor category of breakdowns as per IS: 12207 – 2014. The same was repaired and fitted on tractor. Again during rotoation operation leakage of oil (3 rd time) observed from the hydraulic delivery pipe line. The above minor breakdown was repetitive in nature and occurred more than two times and further repair or replacement of the same pipe line was not permitted as per IS: 12207-2014. Applicant vide letter no. 3035 DI-C-Mesh/ICT/Apr./1/2019-5 dated 25/04/2019, requested to replace the hydraulic pipe line with improved design. Keeping in view the replacement of hydraulic pipe line with improved design, it has been decided to conduct field test under supplementary test as per clause no. 3.2.4 (a) of IS: 12207 – 2014.	44.1

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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: 12207-2019 for acceptance of the tractor for the purpose of subsidies/NABARD financing are summarized as under:

S. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	Values declared by the applicant (D) / Requirement(R)	As observed	Whether meets the requirements (Yes/No.)
1	2	3	4	5	6	7
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 per cent for PTO Power & or engine power > 26 kW ± 10 per cent for PTO Power & or engine ≤ 26 kW	22.5 (D)	22.2	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	22.5 (D)	22.2	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% Max.	270 (D)	280	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	$\pm 8\%$	125 (D)	131.5	Yes
e)	Back-up torque, percent	Evaluative	12 percent, min.	15.0 (D)	30.1	Yes
f)	Maximum operating temperature, ($^{\circ}$C)					
	1) Engine oil	Evaluative	The declared value should not exceed the max. value specified by the oil company and the observed value under high ambient condition should not exceed the declaration.	125 (D)	105	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 (D)	89	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.83 (R)	0.22	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 meter (D)	0.17 per m	Yes

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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 70% of static mass with ballast	18.19 (D) 16.80 (R) Minimum	19.16	Yes
b)	Max drawbar pull without ballast or with standard ballast, as the case may be corresponding to 15 percent wheel slip or 7 percent track slip, kN	Evaluative	Minimum 70% of static mass of tractor without ballast or with standard ballast	13.07 (D) 13.94 (R) Minimum	14.00	Yes
c)	Maximum drawbar power without ballast, (kW).	Evaluative	Minimum 80 % of PTO power as referred in SI No. i) a) of PTO performance in case of tractors having total static mass > 1500 kg Minimum 75 % of PTO power as referred in SI No. i) a) of PTO performance in case of light weight tractors having 1500 kg total static mass of tractor Minimum 75 % of the engine power as referred in SI No. i) a) of engine performance in case of tractors which do not have a PTO shaft.	19.0 (D) 17.8 (R) Minimum	18.1	Yes
d)	Max. transmission oil temperature (°C)	Evaluative	The declared value should not exceed the maximum value specified by oil company	120 (D)	59	Yes
16.1.3	Power lift and hydraulic pump performance :					
a)	Maximum lifting capacity throughout the range of lift, (kN):					
	1) At hitch points	Evaluative	± 10 %	14.50 (D)	15.67	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	10.00 (D) 5.23 (R) Minimum	9.86	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	Observed value should not exceed 50 mm.	≤50 (D)	35	Yes

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1	2	3	4	5	6	7
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 unballasted*, (m):					
	1) Cold brake	Evaluative	10	10 (D)	7.55	Yes
	2) Hot brake	Evaluative	10	10 (D)	7.71	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (D)	223 to 309	Yes
c)	Whether parking brake is effective at a force of 600 N at foot pedal(s) or 400 N at hand lever, N	Evaluative	Yes / No	Yes (D)	Yes	Yes
* The manufacturer has not recommended ballasting for road test, therefore the brake test was conducted under standard ballast condition only.						
16.1.5	Noise measurement :					
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	88 dB (A) for > 1.5 tonne GVW & 85 dB (A) for < 1.5 tonne GVW (as per CMVR)	88 (R)	83	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	96 (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)	90	Yes
	2) Right foot rest	Evaluative			90	Yes
	3) Seat (with driver seated)	-do-	100 microns (max)	100 (R)	60	Yes
	4) Steering Wheel	-do-	100 microns (max)	100 (R)	140	No
16.1.7	Haulage requirements :					
a)	Gross mass of the trailers, (tones):					
	1) Two wheel	Non Evaluative	--	4.0 (D)	4.0	Yes
	2) Four wheel	Evaluative	--	5.0 (D)	5.0	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
	1) Two wheel	Non Evaluative	--	5 to 8 (D)	5.59 to 5.74	Yes
	2) Four wheel	Evaluative	--	5 to 8 (D)	5.17	Yes
c)	Fuel consumption (cc/km/tonne):					
	1) Two wheel	Non Evaluative	--	25 to 50 (D)	41.73 to 43.52	Yes
	2) Four wheel	Evaluative	--	25 to 50 (D)	38.68	Yes

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1	2	3	4	5	6	7
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)	--	Meets the requirement	Yes
b)	Lighting arrangement	Evaluative	As per CMVR	--	Meets the requirement	Yes
c)	Seating requirement (Tractors having more than 1150 mm rear track width)	Non Evaluative	Should meet the requirements of IS 12343 (as amended from time to time)	--	Does not meet the requirement	No
d)	Technical requirements for PTO shaft	Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--	Meets the requirement	Yes
e)	Dimension of three point linkage	Non Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	--	Does not meet the requirement	No
f)	Specification of linkage drawbar	Evaluative	Should meet the requirements of IS 12953 (as amended from time to time)	--	Meets the requirement	Yes
g)	Specification of swinging drawbar (wherever fitted)	Evaluative	Should meet the requirements of IS 12362 (part 3) (as amended from time to time)	--	Not fitted	Not applicable
h)	1) Maximum travelling speed at rated engine speed in reverse gears, Kmph	Evaluative	Should not exceed 20 Kmph	--	10.43 Kmph	Yes
	2) Audible warning signal on tractor	Evaluative	As soon as the travelling speed in reverse gear reaches to 20 kmph, an audible warning signal on tractor shall be activated. The safety aspects about the operation of shuttle technology shall be brought in operation and manufacturer/dealer shall ensure the training on this aspect to operator before the delivery of tractor.	--	Not applicable	--

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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 maximum PTO Power in kW and year of manufacture in numerical form. MM YY	Indo Farm		Yes
	2) Model	Evaluative		3035 DI C-MESH		Yes
	3) Year of manufacture	Evaluative		04 & 18 (i.e. April, 2018)		Yes
	4) Engine number	Evaluative		C3286B00002NW		Yes
	5) Chassis number	Evaluative		DNW3035000001CM		Yes
	6) Declaration of PTO power, (kW)	Evaluative		22.5		Yes
16.1.11	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	105.3	105.058 to 105.106	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.45	0.125 to 0.144	Yes
(c)	Piston diameter, (mm)	Non Evaluative		104.71	104.935 to 104.939	Yes
(d)	Ring end gap (mm):					
	- Top comp Ring	Evaluative	-do-	2.0	0.40 to 0.65	Yes
	- 2 nd comp. Ring		-do-	2.0	1.00	Yes
	- Oil ring		-do-	2.0	0.50 to 0.60	Yes
(e)	Ring groove clearance (mm):					
	- Top comp. Ring	Evaluative	-do-	---Tapered---		--
	- 2 nd comp. Ring			0.22	0.078 to 0.085	Yes
	- Oil ring			0.20	0.037 to 0.038	Yes
(f)	Clearance of main bearings (mm):					
	- Diametrical clearance	Evaluative	-do-	0.40	0.052 to 0.072	Yes
	- Crankshaft end float	Evaluative	-do-	0.60	0.18	Yes
(g)	Clearance of big end bearings, (mm):					
	- Diametrical	Evaluative	-do-	0.60	0.080 to 0.103	Yes
	- Axial	Evaluative	-do-	0.70	0.20	Yes
(h)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.40	0.109 to 0.125	Yes
(i)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.40	0.0.121 to 0.134	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

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1	2	3	4	5	6	7
16.1.13	Fitment of Roll Over Protective Structure (ROPS): For Tractors having more than 1150 mm rear track width	Evaluative	ROPS should meet the requirement of IS: 11821 or OECD code or equivalent International Standard as per CMVR	--	Not fitted	Not applicable
16.1.14	Standard accessories	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with the tractor	--	Provided	Yes
16.1.15	Accessories (optional)	Non Evaluative	Ballast weights, if fitted, should meet the requirement of CMVR.	--	Provided	Yes
16.2	CATEGORY OF BREAKDOWNS / DEFECTS :					
S. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	As observed	Whether meets the requirements (Yes/No.)	
1.	Critical	Evaluative	No critical breakdown	None	Yes	
2.	Major	Evaluative	Not more than two and neither of them should be repetitive in nature	One (Mj-21)	Yes	
3.	Minor	Evaluative	Not more than five and frequency of each should not be more than two.	Three	*Yes	
4.	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed five i.e. (2 Major + 3 Minor) or (1 Major + 4 Minor) or 5 minor breakdowns.	Four	*Yes	

*** The breakdowns occurred during drawbar test (Mj-21) and repeat field test (Minor & 3 times). Thus as per clause 3.2.4 of IS: 12207-2014 and with the approval of competent authority, the supplementary test was conducted and result are reported in this report. No breakdown/ defect were observed during the supplementary test.**

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 2014)] : **Conforms**
- ii) Agricultural tractors - Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS:4931-1995 (Reaffirmed 2014)] : **Conforms**
- iii) Agricultural wheeled tractors - Rear mounted three-point linkage: Part 1 Category 1, 2, 3 & 4 (Fourth Revision) [IS 4468 (Part-1):1997 (Reaffirmed 2017)] : **Does not conform**
- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed October, 2017)] : **Conforms**
- v) Agricultural tractors - Operator's seat technical requirement [IS 12343 –1998 (First revision) (Reaffirmed 2014)] : **Does not conform**

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- 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 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 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 2014)] : **Does not conform**
- 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 2014)] : **Conforms**
- x) Agricultural Tractors and Machinery - Lighting device for travel on public roads (IS: 14683-1999) (Reaffirmed 2014)] : **Conforms**

16.4 Salient Observations:

16.4.1 Laboratory tests:

16.4.1.1 PTO performance test:

- i) The maximum PTO power was recorded as **22.2 kW** against the declaration of **22.5 kW**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
- ii) The specific fuel consumption corresponding to maximum power was recorded as **280 g/kWh** against the declaration of **270 g/kWh**, which is within the tolerance limit of IS: 12207-2019.
- iii) The backup torque is **30.1%**.
- iv) The drop in maximum power under natural and high ambient condition was recorded as **5.9 %** which is considered on higher side. This should be looked into for necessary corrective action.

16.4.1.2 Drawbar performance test:

- i) During drawbar performance test under unballasted condition leakage of oil observed from the hydraulic delivery pipe line (Part No. 4088501A). Applicant vide letter no. Nil dated 18/03/2019, requested to replace delivery pipe line with new one having same specification, which comes under **Major (Mj-21)** category of breakdowns as per IS: 12207 – 2014. This should be looked into for necessary corrective action.
- ii) During ten hours drawbar test, creeping of LHS and RHS rear tyre over the rims was recorded as **20 and 25 mm**. 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. This calls for dampening down of vibrations especially on steering control wheel to improve the operational comfort and service life of components.

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16.4.1.4 Specification of three point linkage:

The lateral distance from lower hitch point to centre line of tractor does not meet the requirement of IS: 4468 (Part-1)-1993. This should be looked into for necessary corrective action.

16.4.1.5 PTO Master shield:

PTO master shield has not provided on tractor as per the requirements of IS: 4931-1995. This should be looked into.

16.4.1.6 Operator's work place:

Operator's work place meets the requirements of IS: 12239 (part-I) 1996 (Reaffirmed in 2014), except the following:

- i) Width of step.
- ii) Provision of spark arresting device in the exhaust system.

16.4.1.7 Location and operation of Controls:

Location and movement of various controls meets the requirement of IS: 8133-1983 (Re-affirmed in 2014), except the following:

- i) Control for stop the engine is provided but it does not remain in the stop position without application of sustained manual effort.
- ii) Differential lock is not provided.

16.4.1.8 Field Performance:

16.4.1.8.1 Dry land operation:

During transportation of tractor along with plough for conducting dry land field operation leakage of oil (**1st time**) observed from the hydraulic delivery pipe line (Part No.4088501A). Hence the test was suspended. Applicant vide letter no. 3035 DI-C-Mesh/ICT/Apr./1/26/2018-1 dated 03/04/2019, requested to repair (Brazing) the ferrul of delivery pipe line, which comes under Minor category of breakdowns as per IS: 12207 – 2014. The same was repaired and fitted on tractor. Thereafter during rotoation operation leakage of oil (**2nd time**) observed from the hydraulic delivery pipe line. Hence the test was suspended and applicant requested to repair (Brazing) the ferrul of delivery pipe line, which comes under Minor category of breakdowns as per IS: 12207 – 2014. The same was repaired and fitted on tractor. Again during rotoation operation leakage of oil (**3rd time**) observed from the hydraulic delivery pipe line. The above minor breakdown was repetitive in nature and occurred more than two times and further repair or replacement of the same pipe line was not permitted as per IS: 12207-2014.

Applicant vide letter no. 3035 DI-C-Mesh/ICT/Apr./1/2019-5 dated 25/04/2019, requested to replace the hydraulic pipe line with improved design. Keeping in view the replacement of hydraulic pipe line with improved design, it has been decided to conduct field test under **supplementary test** as per clause no. 3.2.4 (a) of IS: 12207 – 2014. **The tractor meet the evaluative requirements only after supplementary test therefore, it is recommended that, the hydraulic pipe line (Part No. 40088501AB) with improved design should be provided in the regular production and tractors already sold.**

16.4.1.8.2 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 or service problem was observed during the test.

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- 16.6 Recommendation with regard to safety on tractor:**
The following requirements, inter alia, may be considered for incorporation on the tractor:
- There should be provision for spark arresting device in exhaust system.
 - The fuel shut-off knob should remain in stop position.
 - PTO shaft master shield should be provided to avoid the accident.
 - The working clearance between the position control lever & draft control lever and position control lever & gear shifting lever should be provided as per IS: 12239 (Part-2) – 1999.
 - Provision of differential lock in tractor.
 - Vertical distance from Seat Index Point to centre of clutch & brake pedal should meet the minimum requirement as per IS: 12343-1998.
- 16.7 Adequacy of Literature supplied with machine:**
- 16.7.1** Literature was supplied with the tractor for reference during the test.
- Operator & service manual of Indo Farm 3090 DI, 3075 DI, 3055 DI, 3055 NV, 3048 DI, 3040 DI and 3035 DI (C-MESH TRACTORS SERIES – 2WD/4WD) tractor models.
 - Parts catalogue of (C-MESH TRACTORS SERIES) 3035 DI, 3040 DI (2WD), 3048 DI 3055 NV, 3055 DI and 3065 DI (2WD/4WD) tractor models.
 - Work shop manual for 3035 DI C-MESH, 3048 DI C-MESH, 3055 DI C-MESH and 3065 DI C-MESH tractor models.
- 16.7.2** The supplied literature was found adequate, except the following
However, these literatures should also be brought out in other vernacular languages of India for guidance of users.

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	09 Months (October, 2018 to July, 2019)	Yes	---


TESTING AUTHORITY:



PRAMOD YADAV
AGRICULTURAL ENGINEER



C.V. CHIMOTE
TEST ENGINEER



J.J.R. NARWARE
DIRECTOR

The report compiled by: **Shri Shivkumar Sharma**, Senior Technical Assistant

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18. Applicant's Comments

Para No.	Our Reference	Applicant's comments
18.1	16.1.6 (4), 16.1.9 (c) 7 (e), 16.4.1 (iv), 16.6 & 16.7.2	We are looking into this for future improvement.
18.2	16.3 (iii), (v), (vi), (vii) & (viii)	We are looking into these for strict compliance to the relevant Indian standards.
18.3	16.4.1.2 (i) & 16.4.1.8.1	Corrective action already taken by improving hydraulic delivery pipe design
18.4	16.4.1.2 (ii)	We will review this aspect.
18.5	16.4.1.4, 16.4.1.5, 16.4.1.6 & 16.4.1.7	We are looking into these for strict compliance to the relevant Indian standards.
18.6	16.4.1.3	We would make efforts to reduce the steering wheel vibration.

ANNEXURE- I

BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST

S.No.	Parameters	Disc Plough	Rotavator	Puddler
1	Make	Sonalika	Agristar	Not available
2	Type	Mounted	Mounted	Mounted
3	No. of Discs / Blades	Two	30 in	12 (6 in each gang)
4	Type of Discs / Blades	Plain concave	'L' shape	Notched concave
5	Size of Discs / Blades (mm)	660	200 x 55 x 7.1	450
6	Spacing of Discs /Flanges,(mm)	555	225	170
7	Lower hitch point span,(mm)	760	570	800
8	Mast height, (mm)	600	630	500
9	Overall Dimensions (mm):			
	-Length	1940	1100	900
	-Width	1040	1490	2440
	-Height	1220	1090	1050
10	Gross Mass, (Kg)	280	360	240

ANNEXURE-II

BRIEF SPECIFICATION OF HALF CAGE WHEEL

S. No.	Parameters	Specification
1	Type	Half cage wheel
2	Outer dia. (mm)	1090
3	Width (mm)	340
4	No. & Type of Lugs	12, straight lugs made of MS angle section welded to angle iron frame
5	Size of angle section, (mm)	50 x 50 x 5
6	Length of lug, (mm)	340
7	Spacing of lug, (mm)	285
8	Weight of each cage wheel (kg)	60

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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	1.3
4.	Drawbar performance test	16.0
5.	Turning ability	0.3
6.	Location of centre of gravity	0.2
7.	Operator's field of vision	--
8.	Brake test	1.3
9.	Noise measurement	1.3
10.	Mechanical vibration test	0.9
11.	Nominal speed test	0.7
B.	FIELD TEST:	
1.	Disc ploughing	10.5
2.	Rotavation	10.9
3.	Puddling (including water proof test)	15.5
C.	HAULAGE TEST:	5.5
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	17.7
	TOTAL:	92.7