(यह परीक्षण रिपोर्ट 30/04/2026 तक वैध है। / THIS TEST REPORT IS VALID UP TO : 30/04/2026)

TAFE, MF 1030 MAHASHAKTI TRACTOR

सत्यमेव जयते

भारत सरकार

कृषि एवं किसान कल्याण मंत्रालय

कृषि, सहकारिता एवं किसान कल्याण विभाग

मशीनीकरण एवं प्रौद्योगिकी प्रभाग

GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS WELFARE

(Department of Agriculture, Cooperation & Farmers Welfare, Mechanization & Technology Division)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO : 9001 - 2015 Certified Institute)

Tractor Nagar, Budni (M.P.) 466 445

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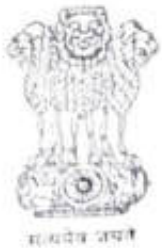
Telephone : 07564 - 234729, 234743

Manufacturer : **M/s. Tractor and Farm Equipment Limited,**
Post Box No. 3302, (New 77), 35 Mahatma Gandhi Road, Nungambakkam, Chennai - 600 034 (Tamil Nadu)

Month: April	Test Report No. T- 1529/2057/2021	Year: 2021



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Type of Test	:	**COMMERCIAL (First Batch Test)**
Test code/Procedure	:	IS: 5994-1998 (Reaffirmed in 2014), IS: 9253-2013 and IS: 12207-2019.
Period of Test	:	**April, 2020 to February, 2021**
Test Report No.	:	**T- 1529/2057/2021**
Month/Year	:	**April, 2021**

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.)

v) This is the First batch test report and therefore, should be read in conjunction with the test report of base model i.e. **"TAFE, MF 1030 MAHASHAKTI"** Tractor bearing test report no. **T-747/1255/2010 (November, 2010)**, Supplementary test report vide no. **T-1199/1726/2018 (November, 2018)** & Commercial Administrative Extension test report vide no. **T- 1365/1892/2020** released in **March, 2020**.

vi) This report form part-I of test report and report on User's Survey Forming part-II shall be released later.

SELECTED CONVERSIONS

SELECTED CONVERSIONS		
S. 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

CONTENTS

The **"TAFE, MF 1030 MAHASHAKTI"** tractor had undergone "Initial Commercial Test" at this Institute bearing report No. **T-747/1255/2010** was released in **November, 2010**. Thereafter, the firm had made some modification in the specification of the tractor and permanently incorporated and tested under Supplementary Test vide test report No. **T-1199/1726/2018**, released in **November, 2018 &** Commercial Administrative extension test vide test report No. **T-1365/1892/2020**, released in **March, 2020**. Now the applicant has submitted an application vide letter no. **Nil** dated 01.09.2018 for batch testing of **"TAFE, MF 1030 MAHASHAKTI" TRACTOR**.

All necessary tests as per Table-1 of clause 6.0 of IS: 5994 - 1998 (Reaffirmed in 2014) were carried out and test report released as under.

Manufacturer	:	**M/s. Tractor and Farm Equipment Limited,** Post Box No. 3302, (New 77), 35 Mahatma Gandhi Road, Nungambakkam, Chennai - 600 034 (Tamil Nadu)
Location of other manufacturing plants (apa)	:	**M/s. Tractor and Farm Equipment Limited,** Kalladipatti Plant, 10/205, Kalladipatti (P.O.), Pin code- 624201, Dindigul district, (Tamil Nadu)
	:	**M/s. Tractor and Farm Equipment Limited,** Doddaballapur plant, Plot No. 1, Kiadb Industrial Estate, Doddaballapur Bangalore - 561203
Test requested by (applicant)	:	The manufacturer
Selected for test by	:	The Testing Authority
Place of running-in	:	At manufacturer work place
Duration of said running-in, (h):		
- Engine	:	12
- Transmission	:	16
Method of Selection	:	The test sample was selected randomly out of five tractors from the production line by the representative of testing authority.

Details of tractors made available for random selection :

Sr.No.	Chassis Number	Engine Number
i)	MEA03901BL2285843	S318.118774
ii)	MEA03901BL2285844	S318.118773
iii)	MEA03901BL2285852	S318.118772
iv)	**MEA03901BL2285854**	**S318.118770**
v)	MEA03901BL2285859	S318.118771

1. SPECIFICATIONS

1.1 Tractor:

Make	:	TAFE
Model	:	MF 1030 MAHASHAKTI
Brand name	:	None
Type	:	Four wheeled, rear wheel driven, unit construction, general purpose, agricultural tractor
Month & Year of manufacture	:	02 & 2020
Chassis number	:	MEA03901BL2285854
Country of origin	:	India

1.2 Engine:

Make	:	Simpson
Model	:	T III A S 318.1- F5

	Type	:	Four stroke, naturally aspirated, water cooled, direct injection, diesel engine.
	Serial number	:	S318.118770
	Year of manufacture	:	Not Available
1.2.1	**Engine speed (rpm), (Manufacturer's recommended production settings):**		
	- Maximum speed at no load	:	2050 to 2200
	- Low idle speed	:	600 to 800
	- Speed at maximum torque	:	1000 to 1400
	Rated speed, (rpm):		
	- For PTO use	:	2000
	- For drawbar use	:	2000
1.3	**Cylinder & Cylinder Head:**		
	Number	:	Three
	Disposition	:	Vertical, Inline
	Bore/stroke, (mm)	:	88.9/122 (apa)
	Capacity as specified by the applicant, (cc)	:	2272
	Compression ratio	:	18.0 ± 0.3 : 1
	Type of cylinder head	:	Monoblock
	Type of cylinder liners	:	Dry, replaceable
	Type of combustion chamber	:	Open chamber
	Arrangement of valves	:	Overhead, inline
	Valve clearance (cold/hot):		
	- Inlet valve, (mm)	:	0.30/0.25
	- Exhaust valve, (mm)	:	0.30/0.25
1.4	**Fuel System:**		
	Type of fuel feed system	:	Gravity and force feed
1.4.1	**Fuel tank:**		
	Capacity, (l)	:	46.0
	Location	:	Above engine, under the bonnet
	Provision for draining of sediments/ water	:	Water separator is provided
	Material of fuel tank	:	Metallic
1.4.2	**Water separator**		
	Make	:	Hilux
	Type	:	Inverted funnel, gravity separation
	Location	:	On LHS of engine, between fuel tank and fuel feed pump.
1.4.3	**Fuel feed pump:**		
	Make	:	Bosch, India
	Type	:	Plunger with hand primer
	Model, Group combination number	:	FP/KSG22AD104, F002A50038
	Location	:	On Fuel Injection pump.
	Method of drive	:	Through camshaft of Fuel Injection Pump

1.4.4 Fuel filters:

Make	:	Bosch, India
Model/Group combination No.	:	F002H20151
Number	:	Two
Type of elements:		
- Primary	:	Cloth
- Secondary	:	Paper
Capacity of final stage filter, (l)	:	0.43

1.4.5 Fuel Injection pump:

Make	:	Bosch, India
Model/Group combination No.	:	F002AOZ543, PES3A90D320RS2000
Type	:	Inline, plunger
Serial number	:	03771623
Method of drive	:	Through timing gears

1.4.6 Fuel injectors:

Make	:	Bosch, India
Model/Group combination No.:		
-Holder Number	:	F002 C70 009
-Nozzle Number	:	DSLA146P1007
Type	:	Multihole (Five holes)
Manufacturer's production pressure setting, (MPa)	:	23 to 24
Injection timing	:	11 ±1 degree before TDC
Firing order	:	1 - 2 - 3

1.4.7 Governor:

Make	:	Bosch, India
Model/Group combination No.	:	RSV375...1000A4C1410R
Type	:	Mechanical, centrifugal, variable speed
Serial number	:	03815758
Rated engine speed, (rpm)	:	600 to 2200
Governed range of engine speed, (rpm)	:	2000

1.5 Air intake system:

1.5.1 Pre-cleaner:

Make	:	TAFE (apa)
Type	:	Centrifugal with transparent dust collector.
Location	:	Above main air cleaner inlet tube, outside the bonnet.

1.5.2 Air cleaner:

Make	:	TAFE (apa)
Type	:	Oil Bath
Location	:	On RHS of the engine under the bonnet
Oil capacity (l)	:	0.50
Range of suction pressure at maximum power, (kPa)	:	2.0 to 2.1
Service schedule	:	Change after every 10 hours operation in dusty condition or after every 50 hours of operation in normal working condition.

1.6	**Exhaust System:**		
	Type of silencer	:	Updraft (cylindrical)
	Position of silencer outlet with respect to SIP, (mm):		
	- Vertical	:	1080
	- Longitudinal	:	1160
	- Lateral	:	345 (on LHS)
	Range of exhaust gas pressure at maximum power, (kPa)	:	5.3 to 6.0
	Provision of spark arresting device	:	**None**
	Provision against entry of rain water	:	A bend is provided at the top of silencer
1.6.1	**Turbocharger/EGR**	:	**Not Provided**
1.7	**Lubricating system:**		
	Type	:	Forced feed-cum-splash
	Oil sump capacity,(l)	:	6.5
	Total lub oil capacity, (l)	:	7.0
	Oil change period	:	First change after 50 hours and subsequently after every 200 hours of operation.
	Type of cooling device, (if any)	:	**Not Provided**
1.7.1	**Filters:**		
	Make	:	Bosch, India
	Type	:	Full flow, spin-on, replaceable paper element
	Number	:	One
	Capacity, (l)	:	0.5
1.7.2	**Pump:**		
	Type	:	Rotary lobe
	Method of drive	:	Through timing gear
	Pressure release setting, (kPa)	:	343 to 448
	Minimum permissible pressure, (kPa)	:	176.5
1.8	**Cooling system:**		
	Type	:	Forced circulation of coolant and water
	Brand name of the coolant	:	Not specified
	Coolant water ratio	:	1 : 1 (apa)
1.8.1	**Details of Pump**	:	Centrifugal, semi open impeller having six vanes of 69.5 mm diameter and driven through crankshaft pulley by a cogged "V" belt.
1.8.2	**Details of fan**	:	Suction type having six polypropylene blades of 385 mm diameter and mounted on water pump.
	Means of temperature control	:	Thermostat
	Bare radiator capacity, (l)	:	1.5
	Coolant expansion tank capacity,(l)	:	1.1
	Total coolant capacity, (l)	:	8.5
	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 and model	:	Amaron & 95D31RMF
Type	:	Lead Acid
Capacity and rating	:	12V, 70 Ah at 20 hour discharge rating
Location	:	Above clutch housing under the bonnet

1.10.2 Starter:

Make	:	Auto Lek
Model	:	STM – 1804 A
Type	:	Pre-engaging solenoid operated
Power rating	:	12V, 2.0 kW
Serial number	:	NA

1.10.3 Generator:

Make	:	Pricol
Model	:	7055
Type	:	Alternator
Serial number	:	NA
Output rating	:	12V, 35 Amp
Method of drive	:	Through water pump pulley by a cogged "V" belt.

1.10.4 Voltage regulator : In-built with 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)
Front Lights:				
- Head lights	2,12V, 60/55W	1030	120 Φ	610
- Parking lights	2, 12V, 5W	1320	45 x 55	205
-Turn cum hazard light	2, 12V, 21W	1320	45 x 110	125
Rear lights:				
- Tail light / Stop light	2,12V, 21/5W	1285	90 x 75	180
- Turn Indicators-cum-hazard indicators	2,12V, 21W	1285	90 x 75	90
- Plough light (On RHS mudguard)	1,12V, 55W	1370	125 x 70	305
- Reflector(s) (Red)	2	1285	45 x 55	135
- Registration plate light	1, 12V, 5W	1090	20 x 85	825

1.10.6	**Main switch**	:	Key turn type, having three position viz: i) OFF ii) 'Circuit' ON iii) START
1.10.7	**Light switch**	:	Rotary type having four positions viz. i) OFF ii) Parking lights + Dash board lights 'ON' iii) Head lights (short beam) + (ii) iv) Head lights (long beam) + (ii)
1.10.8	**Horn:**		
	Make	:	Addon
	Type	:	12 V, 2B, Electromagnetically vibrated diaphragm
	Location	:	In front of radiator under the bonnet
1.10.9	**Fuse box**	:	Contains four number of fuses of following capacity:

Capacity	20 A	15 A	10 A
No. of fuse	01	03	01

1.10.10	**Details of other electrical accessories:**		
1.10.10.1	**Starting safety switch**	:	**Provided**
1.10.10.2	**Flasher Unit:**		
	Make	:	BGLI
	Capacity:		
	- Turn signal	:	12V, 21W x 2 + 2W x 1
	- Hazard signal	:	12V, 21W x 4 + 2W x 2
	Flashes/min.	:	85
1.10.10.3	**Seven pin trailer socket**	:	Provided

1.11 Instrument panel details:

i)	Engine speed-cum-cumulative digital run-hour-meter (0 to 30) x 100 rpm	Provided
ii)	Coolant temperature gauge (with colour zones)	Provided
iii)	Fuel level gauge (with colour zones)	Provided
iv)	Lub.oil pressure indicator light	Provided
v)	Main swifch (key-turn type)	Provided
vi)	Light switch (Rotary type)	Provided
vii)	Battery volt meter gauge (with colour zones)	Provided
viii)	Hazard warning light switch	Provided
ix)	Turn indicator switch	Provided
x)	Turn-cum-hazard indicator lights (Tell-tale)	Provided
xi)	Battery charging indicator light	Provided
xii)	Head lamp (high beam) 'ON' indicator light	Provided
xiii)	Horn push button	Provided
xiv)	Hand accelerator lever	Provided
xv)	Steering control wheel	Provided
xvi)	Rear view mirror	Provided
xvii)	Engine stop knob	Provided

1.12 Transmission System:

1.12.1 Clutch:

Make	:	Amrep
Type	:	Single, dry friction plate
No. of friction plate, (s)	:	One
Size, (mm)	:	253.9 / 171.5 Φ
Method of operation	:	By depressing clutch pedal fully provided on LHS of operator's seat.

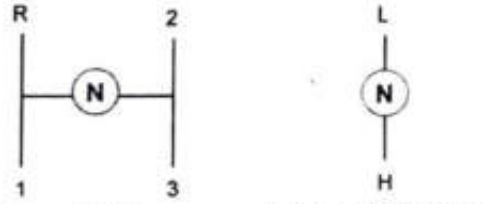
1.12.2 Gear box:

Make	:	TAFE (apa)
Type	:	Mechanical, Combination of Sliding mesh gears with epicyclic reduction unit for High/Low range selection.

No. of speeds:

- Forward	:	6
- Reverse	:	2

Location of gear shifting levers : Central shifting, In-front of operator's seat



Gear shift lever **Range shift lever**

Oil capacity, (l) : 27.5 (common with differential & hydraulic system).

Oil changing period : After every 600 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 **12.4-28** size tyres of **590 mm** radius index; (kmph)
Forward	L1	199.85	2.23
	L2	136.28	3.26
	L3	74.38	5.99
	H1	49.95	8.91
	H2	34.08	13.04
	H3	18.57	23.97
Reverse	LR	145.99	3.04
	HR	36.72	12.11

1.12.4 Differential :

Type	:	Crown wheel & pinion with differential unit accommodated inside the differential housing.
Reduction through crown wheel & bevel pinion	:	5.571 : 1 (39/7T)

Oil capacity, (l) : 27.5 (common with gearbox & hydraulic system).

Oil changing period : After every 600 hours of operation.

Differential lock : **Not Provided**

1.12.5 Rear axle & final drive : **No separate final drive unit provided**

1.13 Power lift (Hydraulic system):

- Make : TAFE (apa)
- Type : Open centre, Non live & ADDC
- No. and type of ram cylinder : One, single acting
- Type of linkage lock for transport : Hydraulic, isolating valve in fully closed position act as transport lock.

1.13.1 Hydraulic pump:

- Make : TAFE (apa)
- Type : Scotch yoke (piston pump)
- Location & drive : Inside transmission housing, through counter shaft.

No. & Type of filter : One wire mesh strainer inside transmission housing

Hydraulic oil capacity, (l) : 27.5 (common with gearbox & differential system).

Oil change period : After every 600 hours of operation.

Provision for external tapping : Provided

Details of control : i) Position control lever
ii) Draft control lever
iii) Transport lock knob on distributor

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
1	2	3	4	5
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)	43.9	Conforms to Cat. I & II
II.	**Lower hitch points:**			
	a) Dia of hitch pin hole	22.40 to 22.65 / 28.70 to 29.00	22.8/29.0	Conforms to Cat. II
	b) Width of ball	34.8 to 35.0 / 44.8 to 45.0	44.6	**Does not conform**
III.	Lateral distance from lower hitch point to centre line of tractor	359 / 435	364	**Does not conform**
IV.	Lateral movement of lower hitch points	100 (min) / 125 (min)	187	Conforms to Cat. I & II

1	2	3	4	5
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	500	Conforms to Cat. I
VI.	Transport height	820 (min) / 950 (min)	880	Conforms to Cat. I
VII.	Power range (Without force)	560 (min) / 650 (min)	670	Conforms to Cat. I & II
VIII.	Leveling adjustment	100 (min) / 100 (min)	300	Conforms to Cat. I & II
IX.	Lower hitch point tyre clearance	100 (min) / 100 (min)	285	Conforms to Cat. I & II
X.	Lower hitch point height	200 (max) / 200 (max)	170	Conforms to Cat. I & II

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	2	3	4	5
1.	Length of lower link	A	850	850
2.	Length of lift arm	B	220	220
3.	Length of lift rods	C	560	560
4.	Length of top link	D	600 to 785	690
5.	Distance of lift rod connection point from pivot point of lower link	F	440, 485	440
6.	Distance of lower link pivot point from rear wheel axis:			
	-Horizontally	E	55, forward	55, forward
	-Vertically	G	115, below	115, below
7.	Distance of upper link pivot point from rear wheel axis:			
	-Horizontally	H	135, behind	135, behind
	-Vertically	J	265, above	265, above
8.	Distance of lift arm pivot point from rear wheel axis:			
	-Horizontally	K	195, forward	195, forward
	-Vertically	L	230, above	230, above
9.	-Height of lower hitch points relative to the rear wheel axis:			
	- In high position	M	250 to 290	250, above
	- In low position	N	-420 to -285	420, below
10.	Height of lower link hitch points when locked in transport position	250		

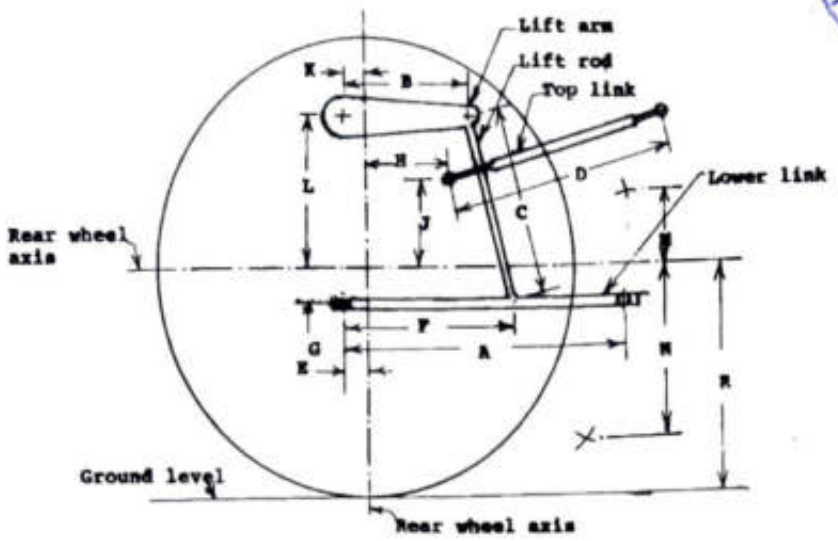


Fig. 1 (a): DIMENSIONAL NOTATIONS FOR TABLE OF LINKAGE GEOMETRY

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) / (Cat.II)**, (mm)	As measured, (mm)	Remarks
1	**2**	**3**	**4**
A	683 ± 1.5/825 ± 1.5	683	Conforms to Cat. I
B	75 (min)/75 (min)	81	Conforms to Cat. I & II
C	30 (min) / 30 (min)	31	Conforms to Cat. I & II
DØ	21.79 to 22.0/27.79 to 28.0	21.79	Conforms to Cat. I
E	39.0 (min/)49.0 (min)	51.9	Conforms to Cat. I & II
FØ	12.0 (min)/12.0 (min)	12.6	Conforms to Cat. I & II
G	15.0 (min)/15.0 (min)	16.5	Conforms to Cat. I & II
HØ	25 ± 1/25 ± 1	25	Conforms to Cat. I & II
J	80 ± 1.5/80 ± 1.5	80.0	Conforms to Cat. I & II
No. of holes	7/9	07	Conforms to Cat. I

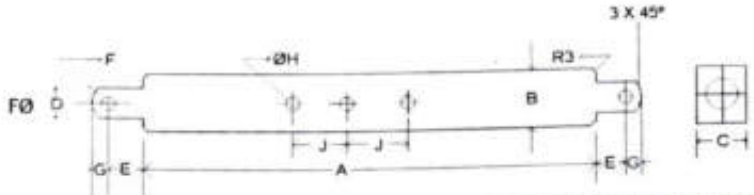


Fig. 1 (b): DIMENSIONAL NOTATIONS FOR LINKAGE DRAWBAR

1.13.4.2 Swinging drawbar : Not provided

1.13.4.3 Provision for coupling of trailer brakes : Not Provided

1.14 Power take-off shaft:

Type	:	Type-I, 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)	:	654
Distance behind rear axle, (mm)	:	295
Engine to PTO speed ratio	:	3.059 : 1
Whether the PTO shaft is capable of transmitting full power of the engine.	:	Yes

1.14.1 Specifications of Power Take-Off Shaft: [See Fig. 2]

Specification	As per IS:4931-1995 (Type-I) (reaffirmed in 2014)	As observed	Remarks
Nominal speed, (rpm)	540 ± 10	540 rpm of PTO shaft corresponds to 1652 rpm of engine respectively.	Conforms
No. of splines	6	6	Conforms
Direction of rotation	Clockwise	Clockwise	Conforms
Location	The position of the centre of the end of PTO shaft shall be within 50mm to right or left of the centre line of the tractor.	In centre	Conforms
Dimensions, (mm) (See Fig. 2):			
DØ	34.79 ± 0. 06	34.8	Conforms
dØ	28.91 ± 0.05	28.9	Conforms
BØ	29.4 ± 0.1	29.4	Conforms
AØ (optional)	8.30 ± 0.10	8.4	Conforms
W	8.69 – 0.09 -0.16	8.6	Conforms
a	7	7	Conforms
b(optional)	25 ± 0.5	25.0	Conforms
c	38	38	Conforms
X	30°	30°	Conforms
B	76 (min)	77	Conforms
h	450 to 675	460	Conforms

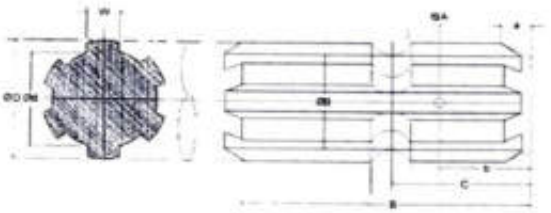


Fig. 2: DIMENSIONAL NOTATIONS FOR TYPE-I POWER TAKE-OFF SHAFT

1.14.2 Power Take-off Master Shield : Not provided

1.15 Towing hitch:

1.15.1 Front:

Type	:	Clevis
Location	:	At the front of tractor bumper
Height above ground level, (mm):	:	665
Type of adjustment	:	Fixed
Dia of pin hole, (mm)	:	54.6
Width of clevis, (mm)	:	33.0

1.15.2 Rear:

Type	:	Clevis
Location	:	At rear of differential housing
Height above ground level, (mm):		
- Maximum	:	620
- Minimum	:	495
No. of position	:	02
- Type of adjustment	:	By changing position of hitch on its mounting bracket
Distance of hitch point,(mm):		
- From rear axle centre	:	440
- From power take-off shaft end	:	145
Dia of pin hole, (mm)	:	32.6
Width of clevis, (mm)	:	89.1

1.16 Steering:

Make	:	Rane
Type	:	Mechanical, re-circulating ball & nut
Location of control wheel	:	Above clutch housing
Method of operation	:	Manual, by steering control wheel
Diameter of steering control wheel, (mm)	:	455
Steering oil capacity, (l)	:	0.80
Lubricant change period	:	After every 1200 hours of operation

1.17 Brakes:

1.17.1 Service Brake:

Make	:	TVS Girling
Type	:	Mechanical, Dry integral discs brake.
Location	:	On rear axle shaft, inside trumpet housing
No. of discs	:	Two (on each wheel side)
Area of liners, (cm^2)	:	913.8 (on each wheel side)
Material of liners	:	Paper based (apa)
Method of operation	:	Individual or combined pedal operation by right foot of operator

1.17.2 Parking Brake:

Type	:	Pawl & ratchet arrangement
Method of operation	:	Service brake act as parking brake when locked in position by a hand lever provided on LHS of the operator's seat.

1.18 Wheel Equipment:

1.18.1 Steered Wheel(s):

Make	:	MRF
Number	:	Two
Type of tyre	:	Pneumatic, ribbed
Size	:	6.00 -16
Ply rating	:	8
Maximum permissible loading capacity of each tyre recommended for road work, (kgf)	:	450 (as per ITTAC manual)
Recommended inflation pressure, (kPa) :		
- for field work	:	200
- for transport	:	230
Track width, (mm)	:	1315 (std.) & 1515
Method of changing track width	:	By reversing the wheel disc
Make & size of rim	:	WIL & 4.50E x 16

1.18.2 Driving wheel:

Make	:	MRF
Number	:	Two
Type of tyre	:	Pneumatic, traction
Size	:	12.4-28
Ply rating	:	12
Maximum permissible loading capacity of each tyre recommended for road work, (kgf)	:	1030 (as per ITTAC manual)
Recommended inflation pressure, (kPa)		
- for field work	:	98
- for transport	:	110
Track width, (mm)	:	1240, 1340(std.), 1440, 1500, 1540, 1620,1700 & 1820
Method of changing track width	:	By reversing & changing the position of wheel disc on off-set rim lugs.
Make & size of rim	:	WIL, W10 x 28

1.18.3 Wheel base, (mm) : 1765

Method of changing wheel base, if any : None

1.19 Operator's seat:

Make	:	Not Available
Type	:	Cushioned seat with back rest
Type of suspension	:	Two, Helical coil springs
Type of damping	:	One, Hydraulic shock absorber
Range of adjustment,(mm):		
- Vertical	:	Nil
- Lateral	:	Nil
- Longitudinal	:	± 25

1.20 Provision for safety and comfort of operator:

1.20.1 Operator's Seat:

All parameters meets the minimum requirements of IS: 12343-1998, (Reaffirmed in 2014).

1.20.2 Conformity with IS: 6283 (Part-1 & 2) – 2006 – 2007 (Re-affirmed in 2014):
Controls and displays are identifiable with symbols meets the requirements as per IS: **6283 (Part 1&2) – 2006 – 2007 (Re-affirmed in 2014), except the following:**

i) Oil lubricant type & its frequency were not 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 (Reaffirmed in October, 2017):
Meets the requirements of IS: 12239 (Part-1)-1996 (Reaffirmed in October, 2017), **except the following:**

i) The spark arrester is not been provided in the exhaust system.
ii) Vertical retainness is not provided on both sides of clutch and brake pedals.

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) PTO master shield has not been provided.
ii) Minimum Cautionary notice as per clause 11.2 of above referred standard has not been provided.
iii) Working clearance in between main gear shifting lever and range selection lever is less than the requirement.

1.20.6 Conformity with IS: 14683 – 1999 (Reaffirmed in 2014) :
Lighting requirements conform to IS: 14683-1999 (Reaffirmed in 2014).

1.20.7 Rear view mirror:
Rear view mirror is provided

1.20.8 Slow moving emblem : Provided

1.21 Labelling of tractor as per IS: 10273-1987 (Reaffirmed in 2014):
Location of labelling plate:- It is riveted on RHS of Dash board and provides the following information:

Name of Manufacturer	:	**Tractors and Farm Equipment Limited, Chennai, Tamil Naidu, India**
Make	:	TAFE
Model	:	MF 1030 Mahashakti
Month & Year of manufacture	:	02 / 21
Engine Serial Number	:	S318.118770
Chassis Serial Number	:	MEA03901BL2285854
Maximum PTO Power, kW	:	22.0
Specific fuel consumption, g/kWh	:	265

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	75	50	Nil	50
	Water	Nil	Nil	Nil	Nil
Rear	C.I. weight	560	280	Full cage wheel	280
	Water	230	230		230
	Additional weight, if any	Nil	Nil		Nil

1.22.1 Standard ballast (kg) if any:

Front	Rear
60 C.I. weight bumper	Nil

1.22.2 Masses:

Particulars		Mass of the tractor without operator but with all the liquid reservoirs full, (kg)		
		Front	Rear	Total
i)	With standard ballast	695	980	1675
ii)	With ballast as used during drawbar performance test	805	1735	2540
iii)	With ballast as used during haulage test	770	1470	2240

1.23 Overall dimensions:

Condition	Length, (mm)	Width, (mm)	Height, (mm)		Ground Clearance, (mm)
			With exhaust pipe	Without exhaust pipe	
With standard ballast	3315	1670	2245	1665 (at pre-air cleaner)	340 (Below transmission drain plug)

1.24 Number of external lubricating points:

- Oiling : Nil
- Grease nipples : 14
- Grease cups : 02

1.25 Colour of tractor:

Chassis : Grey

Sheet metal:

Bonnet, : Red
Mudguard : Red
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:

S. No.	Particulars	As recommended by the manufacturer	As used during the test
1.	Engine oil & Air cleaner	SAE 20W40	As recommended
2.	Steering housing	SAE - 140	
3.	Gearbox, Hydraulic, Differential, Rear axle and final drive oil	SAE 20W40	Oil originally filled in the tractor was not changed
4.	Grease	MP3 Lithium base	MP grease

3. PTO PERFORMANCE TEST

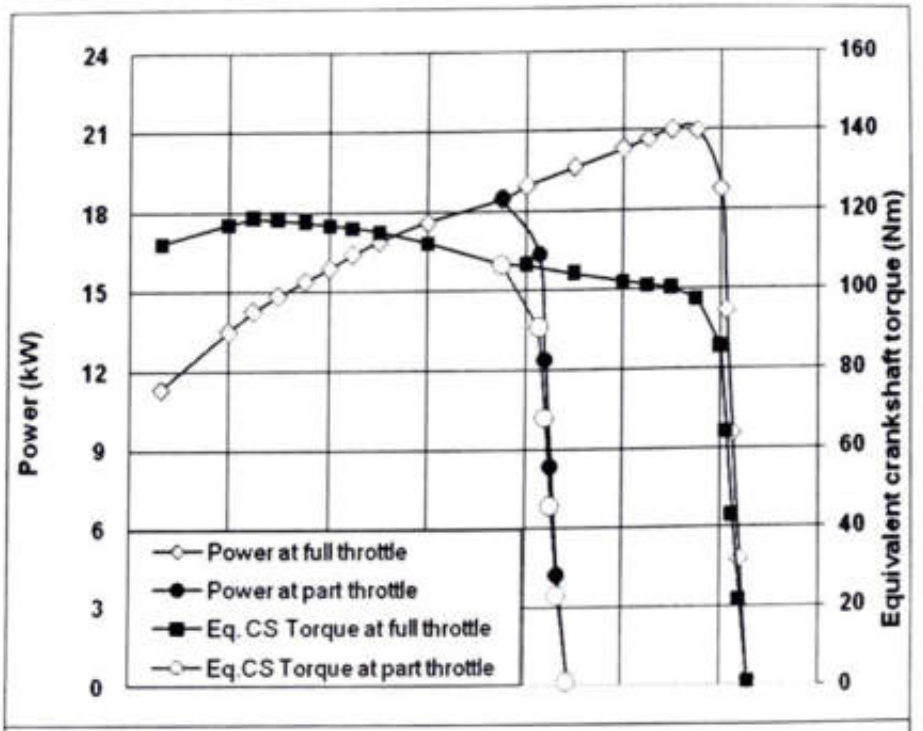
Date(s) of test : 16.07.2020 & 17.07.2020
Tractor run at the Institute prior to start of PTO test (h) : 7.5
Type of dynamometer bench used : SAJ AG 250 Eddy Current

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

Table – 1

Power, (kW)	Speed (rpm)		Fuel consumption			Specific energy (kWh/l)
	PTO	Engine	(l/h)	(kg/h)	Specific, (kg/ kWh)	
a) Maximum power – 2 hours test:						
21.0	654	2001	6.23	5.21	0.248	3.37
20.0	654	2001	5.95	4.97	0.249	3.36*
b) Power at rated engine speed (2000 rpm):						
21.0	654	2001	6.23	5.21	0.248	3.37
20.0	654	2001	5.95	4.97	0.249	3.36*
c) Power at standard power take-off speed (540 ± 10 rpm):						
18.5	540	1652	5.29	4.42	0.239	3.50
17.6	540	1652	5.07	4.24	0.241	3.47*
d) Varying loads at rated engine speed:						
i) Torque corresponding to maximum power available at rated engine speed:						
21.0	654	2001	6.23	5.21	0.248	3.37
ii) 85% of the torque obtained in (i):						
18.8	687	2102	5.77	4.82	0.256	3.26
iii) 75% of the torque obtained in (ii) :						
14.2	691	2114	4.65	3.89	0.274	3.05
iv) 50% of the torque obtained in (ii) :						
9.5	695	2126	3.65	3.05	0.321	2.60
v) 25% of the torque obtained in (ii) :						
4.8	700	2141	2.69	2.25	0.469	1.78
vi) Unloaded:						
0.2	705	2157	1.89	1.58	7.900	0.11
e) Varying loads at Standard PTO Speed:						
i) Torque corresponding to maximum power available at standard PTO speed: (540 ± 10 rpm):						
18.5	540	1652	5.29	4.42	0.239	3.50
ii) 85% of the torque obtained in (i) :						
16.4	565	1728	4.76	3.98	0.243	3.45
iii) 75% of the torque obtained in (ii) :						
12.4	569	1741	3.80	3.18	0.256	3.26
iv) 50% of the torque obtained in (ii):						
8.3	573	1753	2.95	2.47	0.298	2.81
v) 25% of the torque obtained in (ii) :						
4.2	578	1768	2.12	1.77	0.421	1.98
vi) Unloaded:						
0.2	585	1790	1.39	1.16	5.800	0.14

* Under high ambient conditions



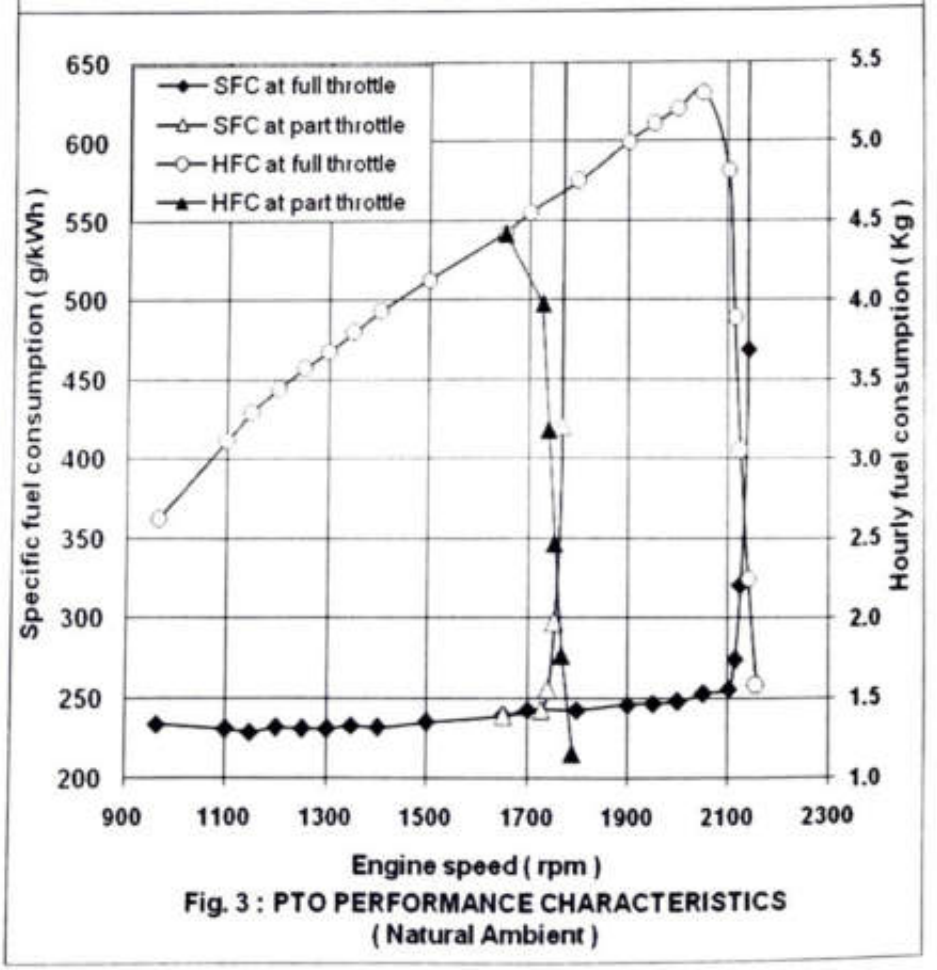


Fig. 3 : PTO PERFORMANCE CHARACTERISTICS
(Natural Ambient)

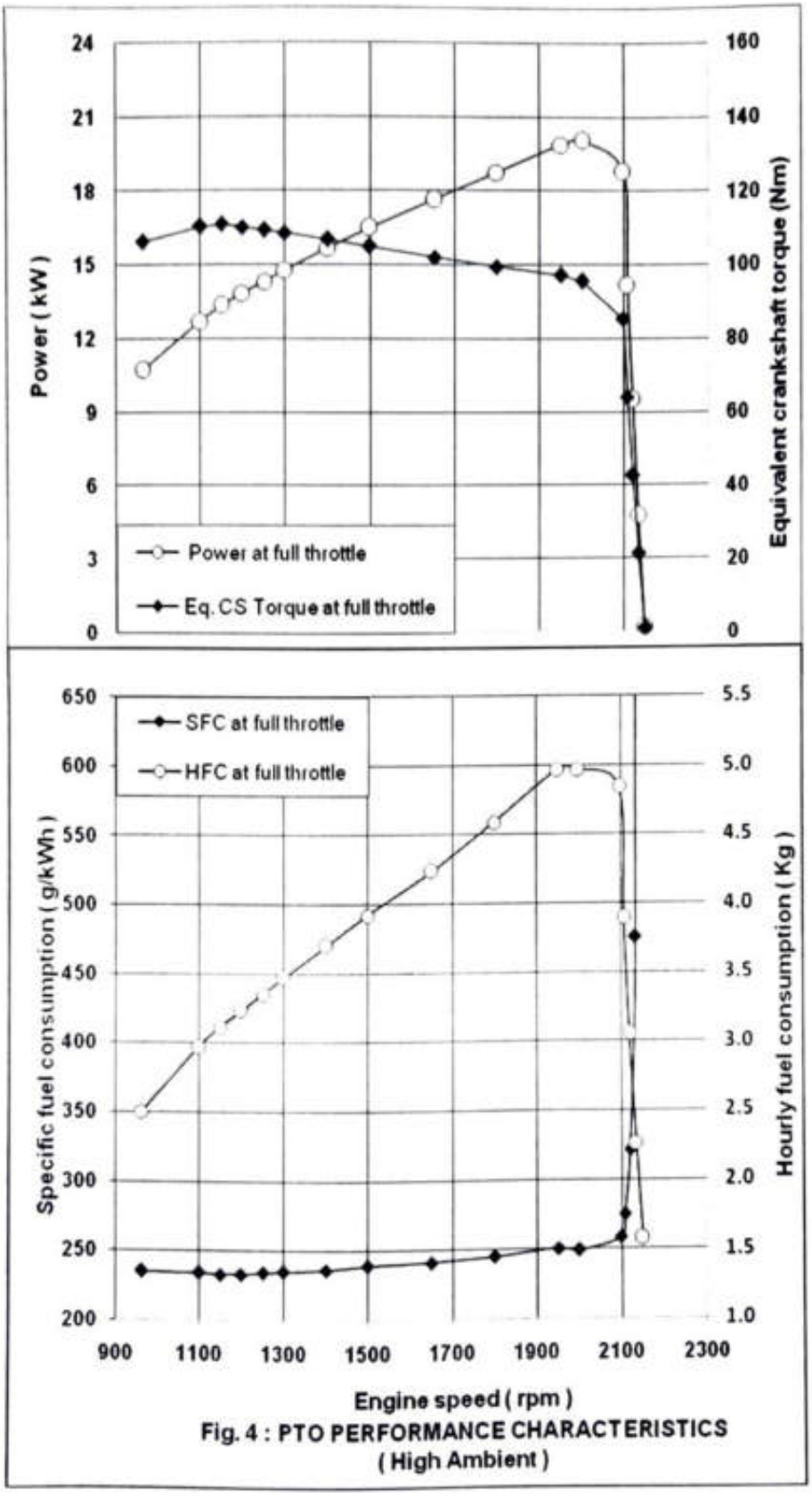


Fig. 4 : PTO PERFORMANCE CHARACTERISTICS
(High Ambient)

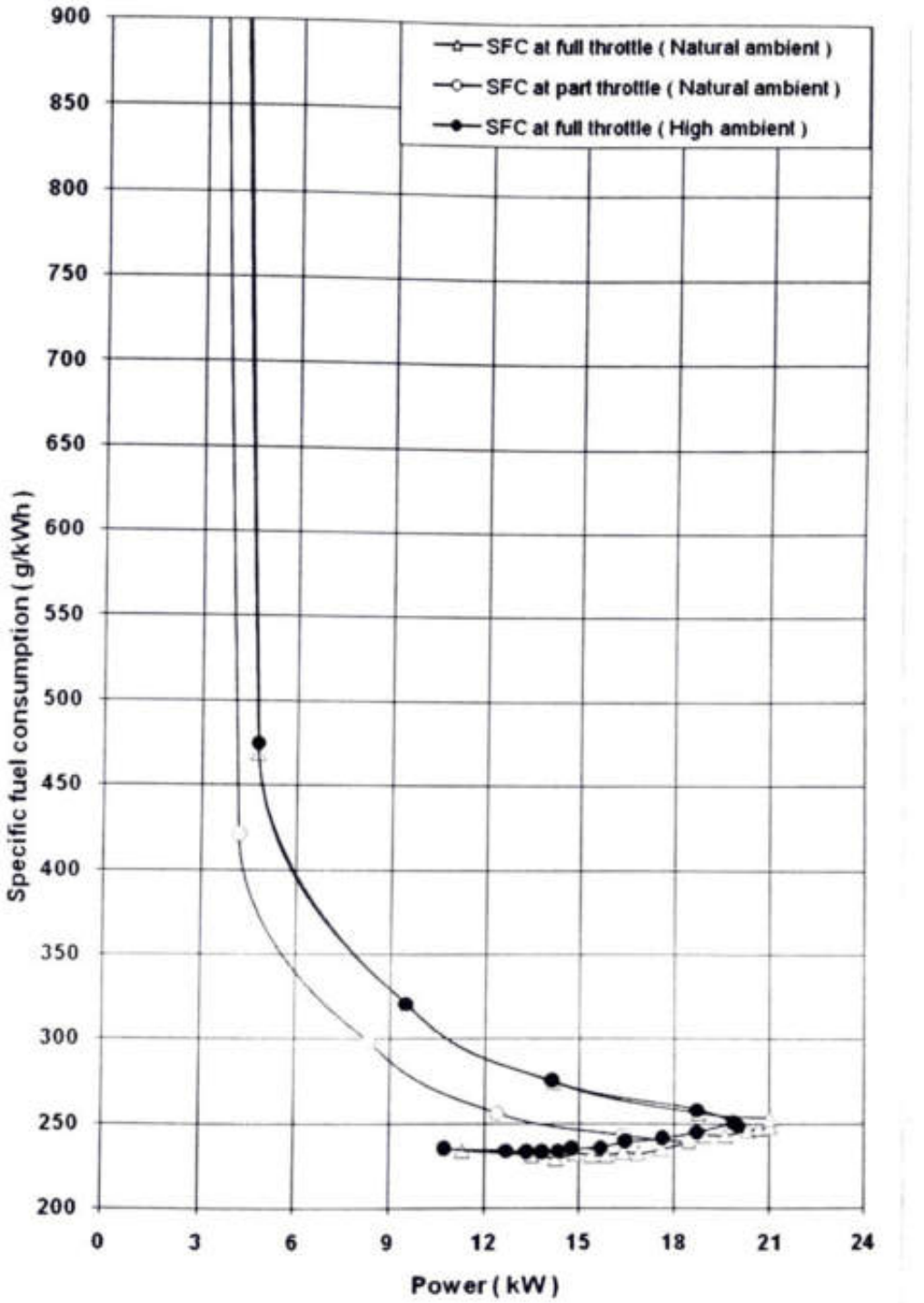


Fig. 5 : PTO PERFORMANCE CHARACTERISTICS

S. No.	Parameters	Natural Ambient	High Ambient
i)	No load maximum speed, (rpm)	2157	2150
ii)	Equivalent crankshaft torque at maximum power, (Nm)	100.3	95.6
iii)	Equivalent crankshaft torque at rated power, (Nm)	100.3	95.6
iv)	Maximum equivalent crank shaft torque, (Nm)	118.5	110.9
v)	Engine speed at maximum equivalent crankshaft torque, (rpm)	1150	1150
vi)	Backup torque, (%)	18.1	16.0
vii)	Smoke level, (m^{-1})	0.09	---
viii)	**Range of atmospheric condition :**		
	- Temperature, (^{O}C)	25 to 28	42 to 43
	- Pressure, (kPa)	97.5 to 97.9	99.0 to 99.2
	- Relative humidity, (%)	61 to 75	40 to 49
ix)	**Maximum Temperature, (^{O}C):**		
	- Engine oil	89	101
	- Coolant	83	95
	- Fuel	50	65
	- Air intake	33	48
	- Exhaust gas	487	461
x)	**Pressure at maximum power:**		
	- Intake air, (kPa)	2.0 to 2.1	2.0 to 2.1
	- Exhaust gas, (kPa)	5.3 to 6.0	10.4 to 13.2
xi)	**Consumptions:**		
	Lub. Oil, (g/kWh)	--	0.91
	-Coolant (% of total coolant capacity)	--	1.2

4. DRAWBAR PERFORMANCE TEST

Date(s) of test : 03.09.2020, 08.09.2020, 09.09.2020 & 29.12.2020

Tractor run at the Institute prior to start of drawbar performance test, (h) : 23.7

Type of track : Concrete

Height of drawbar, (mm):

-Without ballast : 600

- With ballast : 550

4.1 The results of drawbar performance test consisting of maximum power and pull with standard 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.**

DRAWBAR PERFORMANCE TEST

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. sust-ained pull, (kN)
						(kg/ kWh)	(l/h)		Temp (°C)	Pre-ssure (kPa)	R.H. (%)	Fuel	Trans. 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 standard ballasted condition):																
L1	2.06	8.4	14.65	2127	15.2	0.381	3.83	2.19	30	98.1	70	40	59	78	87	15.58
L2	2.99	12.0	14.45	2110	15.1	0.332	4.77	2.52	30	98.2	79	41	59	80	91	15.43
L3	5.62	19.0	12.14	2000	8.3	0.275	6.25	3.04	30	98.3	68	41	56	83	92	13.91
H1	8.73	19.1	7.85	2001	4.3	0.277	6.33	3.02	29	98.3	73	39	53	83	87	9.53
II) Maximum power test (Tractor ballasted condition):																
L1	2.01	12.1	21.69	2108	14.8	0.337	4.88	2.48	33	98.0	63	42	75	81	91	23.00
L2	2.83	16.9	21.43	2033	15.0	0.315	6.37	2.65	33	98.0	57	42	75	86	95	22.65
L3	5.79	19.9	12.40	2000	3.7	0.269	6.40	3.11	31	98.1	67	42	59	83	93	14.11
H1	8.79	19.5	7.99	2003	1.9	0.274	6.39	3.05	31	98.2	65	42	55	84	91	9.40

Contd..Table-2

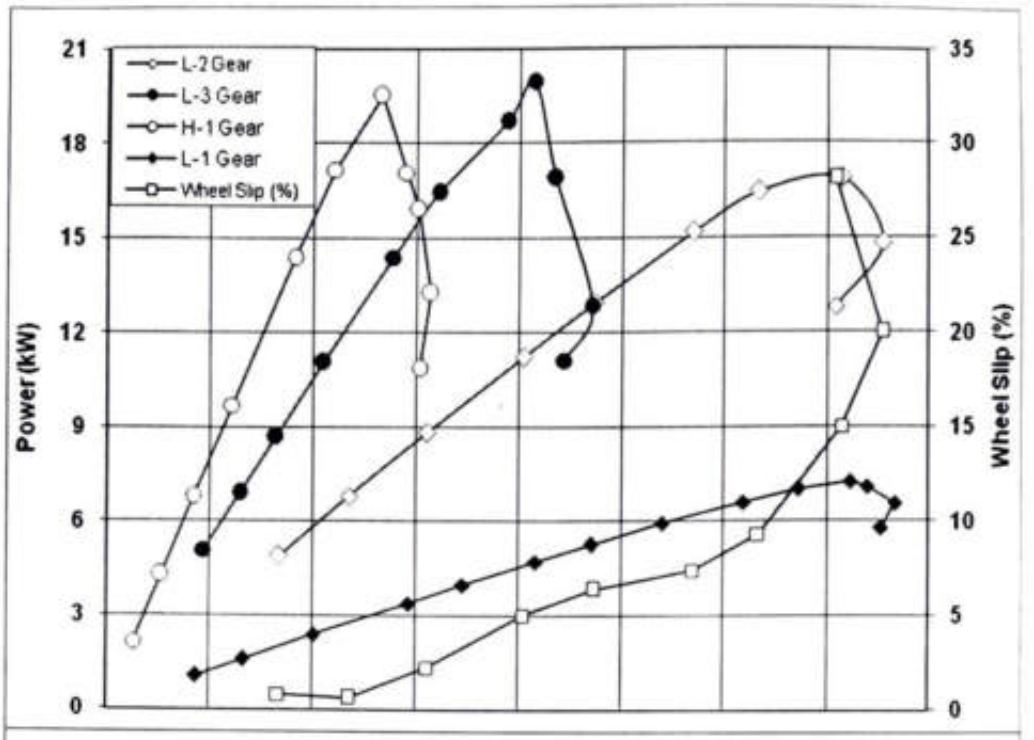
Gear	Travel Speed, (km/h)	Draw-bar power, (kW)	Draw-bar pull, (kN)	Engine Speed (rpm)	Wheel Slip, (%)	Fuel consumption (kg/kWh)	Fuel consumption (l/h)	Specific Energy, (kWh/l)	Atmospheric conditions: Temp (°C)	Atmospheric conditions: Pressure (kPa)	Atmospheric conditions: R.H. (%)	Temperature (°C): Fuel	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):																
L3	6.13	15.8	9.30	2105	3.4	0.289	5.46	2.89	26 to 32	98.1 to 98.3	64 to 79	34 to 44	50 to 75	77 to 82	85 to 95	--
iv) Five hours test at pull corresponding to 15 percent wheel slip (ballasted wheeled tractor):																
L2	3.01	17.95	21.46	2077	--	0.325	7.05	2.55	20 to 25	99.0 to 99.4	34 to 42	25 to 30	39 to 63	75 to 80	69 to 78	--

I) The coolant (water) and lub. oil consumption during 10 hours test both were observed Nil.

II) Tyre Creeping, (mm):
- LHS : 68
- RHS : 70

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

Engine oil	:	95
Coolant (water)	:	88
Transmission oil	:	77
Fuel	:	45



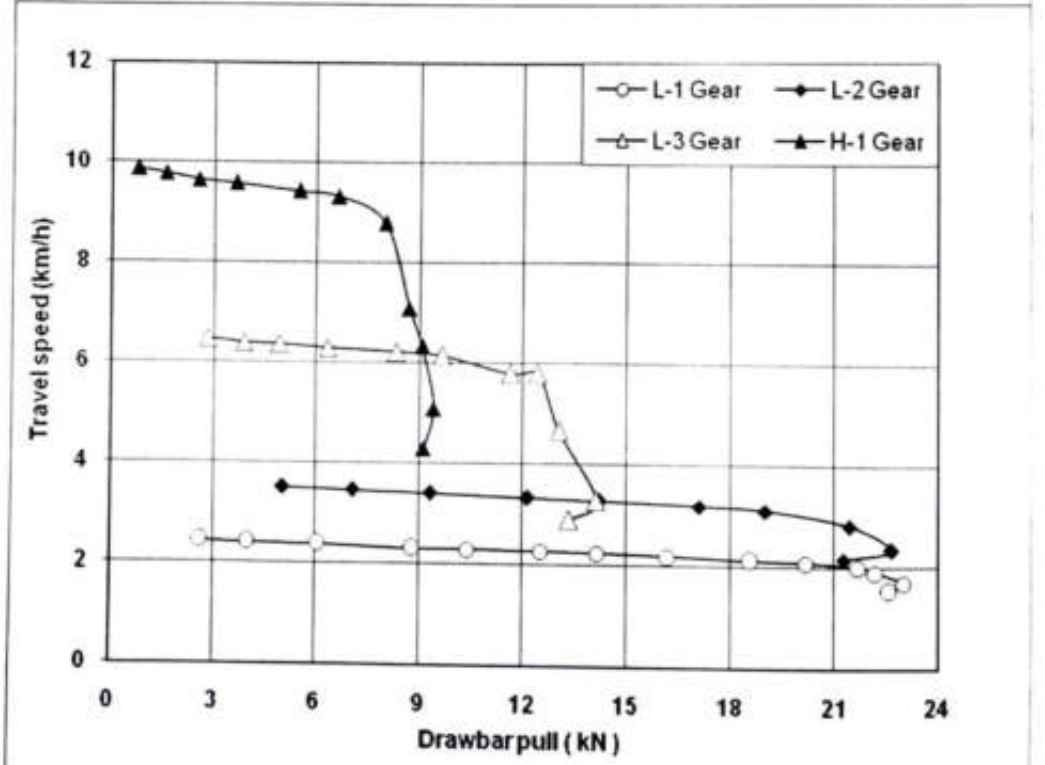


Fig.6: DRAWBAR PERFORMANCE CHARACTERISTICS (Ballasted Condition)

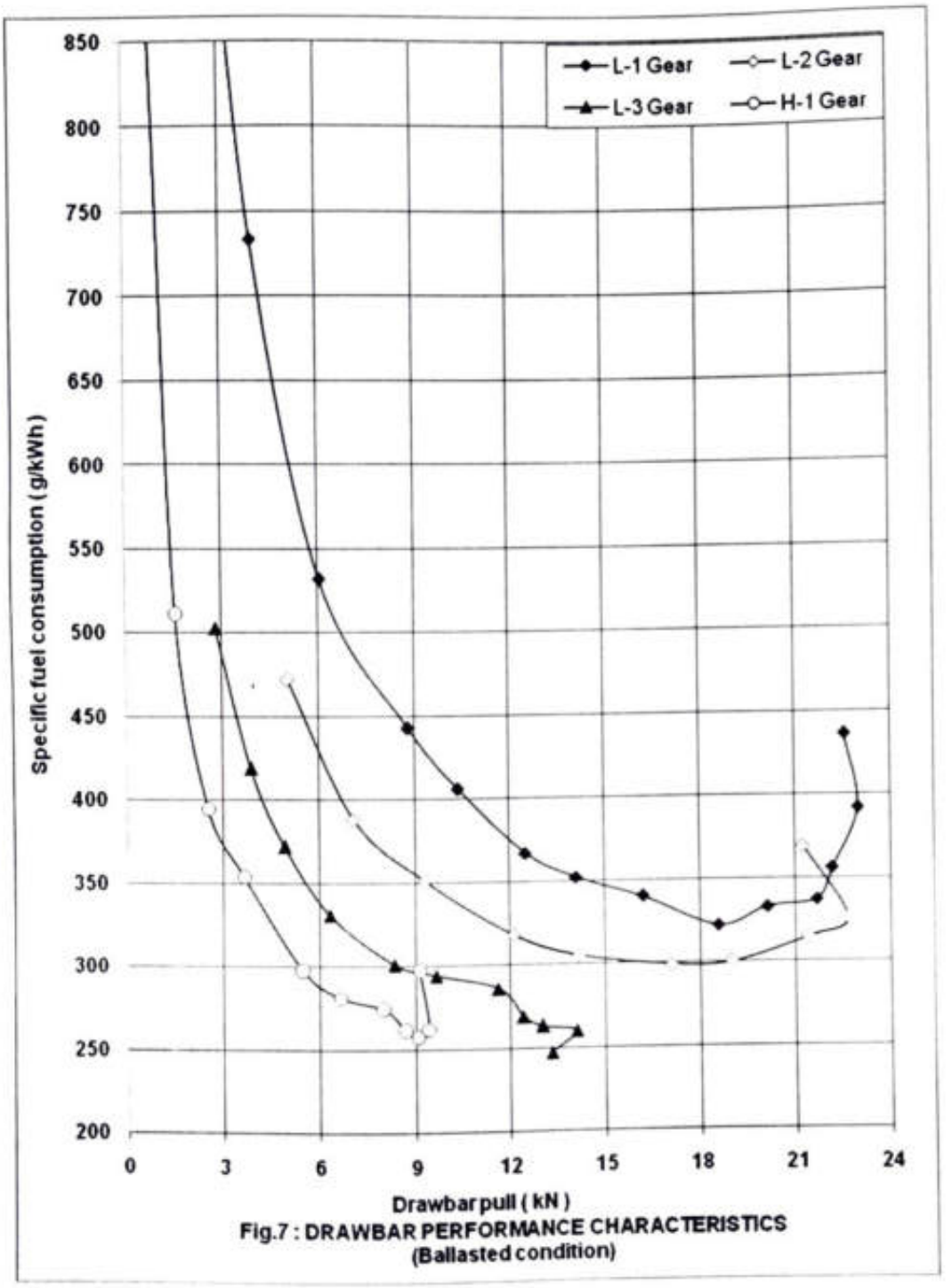


Fig.7 : DRAWBAR PERFORMANCE CHARACTERISTICS
(Ballasted condition)

5. POWER LIFT & HYDRULIC PUMP PERFORMANCE TEST

Date(s) of test : 27.07.2020 & 06.08.2020

Tractor run at the Institute prior to start of hydraulic test, (h) : 18.7

Pump speed at rated engine speed, (rpm) : 654

5.1 Hydraulic power test:

Pump delivery rate at minimum pressure and rated engine speed, (l/min) : 18.0

Maximum hydraulic power,(kW) : 4.6

Pump delivery rate at maximum hydraulic power, (l/min) : 15.5

Pressure at maximum hydraulic power, (MPa) : 18.0

Sustained pressure of the open relief valve, (MPa) : 20.0

Tapping point:

a) Relief valve test : External circuit

b) Pump performance test : External circuit

Temperature of hydraulic fluid, (°C) : 60 to 64

5.2 Lifting capacity test :

Test	Height of lower hitch point above ground in down position, (mm)	Vertical move-ment with lifting forces, (mm)	Maximum corrected force exerted through full range, (kN)	Corres-ponding pressure, (MPa)	Moment about rear axle, (kN-m)	Maximum tilt angle of mast from vertical (degrees)
At hitch points	170	625	9.22	18.0	7.33	--
On the standard frame	170	620	8.74	18.0	12.28	11.0

5.3 Maintenance of lift load:

Force applied at the frame, (kN) : 7.87

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)	10	15	20	20	20	20

6. BRAKE TEST

6.1 Service brake:

6.1.1 Cold brake test:

Date of test(s) : 05.05.2020 & 11.05.2020
Type of Track : Concrete
Maximum attainable speed (kmph):
- Unballasted tractor : 26.2
- Road ballasted tractor : 26.2

		At maximum attainable speed			
Standard ballasted tractor	Braking device control, force (N)	509	452	395	338
	Mean deceleration, (m/sec^2)	3.74	3.22	2.84	2.50
	Stopping distance, (m)	7.16	8.23	9.32	10.59
With Road ballasted tractor	Braking device control, force (N)	552	493	434	375
	Mean deceleration, (m/sec^2)	3.56	3.11	2.77	2.50
	Stopping distance, (m)	7.48	8.51	9.56	10.59
		At 25 kmph travel speed			
Standard ballasted tractor	Braking device control, force(N)	528	469	409	350
	Mean deceleration, (m/ sec^2)	3.55	3.01	2.77	2.50
	Stopping distance, (m)	7.09	8.01	8.70	9.65
With Road ballasted tractor	Braking device control, force (N)	555	495	434	374
	Mean deceleration, (m/sec^2)	3.40	3.00	2.75	2.50
	Stopping distance, (m)	7.33	8.03	8.77	9.65

6.1.1.2 Brake fade test:

	At maximum attainable speed			
Braking device control force (N)	587	525	464	406
Mean deceleration, (m/ sec^2)	3.53	2.93	2.76	2.50
Stopping distance, (m)	7.49	9.05	9.59	10.59

	At 25 kmph travel speed			
Braking device control force,(N)	558	506	455	403
Mean deceleration, (m/ sec^2)	3.24	2.73	2.65	2.50
Stopping distance, (m)	7.48	8.83	9.10	9.65

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

6.2 Parking brake test :

Particulars	18 percent slope		12 percent slope with trailer of 1.72 tones.	
	Up	Down	Up	Down
Braking device control force, (N)	246	251	248	289
Efficacy of parking brake	----------Effective----------			

7. NOISE MEASUREMENT

7.1 Noise at bystander's position:

Date of test : 05.05.2020
Type of track : Concrete
Background noise level, dB (A) : 54

Atmospheric conditions:

Temperature, (°C) : 32
Pressure, (kPa) : 97.3
Relative humidity, (%) : 36
Wind velocity, (m/s) : 1.2

TEST DATA :-

S. No.	Gear	Travelling speed before acceleration, (kmph)	Noise level, dB (A)
1.	L1	1.84	80
2.	L2	2.70	80
3.	L3	4.95	80
4.	H1	7.31	79
5.	H2	10.77	79
6.	H3	19.62	79

7.2 Noise at operator's ear level:

Date of test : 03.09.2020
Type of track : Concrete
Background noise level, dB(A) : 54

Atmospheric conditions:

Temperature, (°C) : 30
Pressure, (kPa) : 98.1
Relative humidity, (%) : 57
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	2.95 to 14.65	2.46 to 2.06	92
L2	4.81 to 13.17	3.54 to 3.17	92
*L3	6.20 to 11.74	6.30 to 5.62	93
H1	2.03 to 7.89	9.75 to 8.72	92

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

8. AIR CLEANER OIL PULL-OVER TEST

Date of test : 01.05.2020

Atmospheric conditions :

Temperature, (°C) : 32 to 38
Pressure, (kPa) : 100.5 to 101.2
Relative humidity, (%) : 12 to 25
Mass of oil before test, (g) : 408.6

Sl. No	Position of tractor	Loss of oil, (g)	Oil pull over, (%)	Engine oil pressure
i)	Tractor parked on level ground	0.5	0.12	Normal
ii)	Tractor tilted to 15 deg laterally with RHS up	0.4	0.10	Normal
iii)	Tractor tilted to 15 deg laterally with LHS up	0.3	0.07	Normal
iv)	Tractor tilted to 15 deg longitudinally with front end up	0.5	0.12	Normal
v)	Tractor tilted to 15 deg longitudinally with rear end up	0.4	0.10	Normal

9. MECHANICAL VIBRATION MEASUREMENT

Date of test : 04.08.2020
Type of test surface : Concrete

Sl No	Measuring points		Vibration, microns			
			At no load		At load corresponding to 85% of maximum PTO power	
			HD	VD	HD	VD
i)	Foot rest	Left	47	53	57	77
		Right	53	48	89	71
ii)	Steering control wheel		36	79	53	156*
iii)	Seat	Bottom	30	26	37	30
		Back	34	43	42	50
iv)	Mudguard	Left	127*	90	197*	172*
		Right	123*	88	127*	143*
v)	Head light	Left	38	53	45	76
		Right	30	30	40	42
vi)	Battery base, centre		70	45	85	133*
vii)	Tail light	Left	59	77	103*	130*
		Right	70	53	135*	129*
viii)	Plough light		174*	91	257*	166*
ix)	Gear shifting lever		35	29	41	53
x)	Accelerator lever	Hand	37	34	64	50
		Foot	31	34	72	59
xi)	Brake pedal	Left	154*	171*	124*	173*
		Right	86	46	99	57
xii)	Clutch pedal		69	57	94	93
xiii)	Main hydraulic control lever		33	21	45	37
xiv)	PTO engaging lever		32	33	39	46

*The amplitude of mechanical vibration is on higher side.

10. FIELD TEST

The major breakdowns were not observed in the field test during initial commercial testing of this tractor model having test report **No. T-747/1255/2010** released in **November, 2010**. So, as per the provision as laid down in clause **7.2 of IS: 12207- 2019,** the field test during the batch testing of this tractor model was not conducted.

11. HAULAGE TEST

Type of trailer:		**Two wheel (Single axle)**	**Four wheel (Double axle)**
Gross mass of trailer, (ton)	:	5.0	5.0
Height of trailer hitch above ground level, (mm)	:	570	550
Gear used during the test for negotiating slopes upto 8%	:	H-3	H-3
Average travel speed, (kmph)	:	24.77 to 24.92	24.77
Average fuel consumption:			
- (l/h)	:	3.89 to 3.98	3.80 to 4.25
- (ml/km/ton)	:	31 to 32	31 to 34
Average distance traveled per litre of fuel consumption, (km/l)	:	6.27 to 6.36	5.83 to 6.51
General observations:			
Effectiveness of brakes	:	Effective	Effective
Maneuverability of tractor-trailer combination	:	Satisfactory	Satisfactory

12. COMPONENTS/ASSEMBLY INSPECTION

The engine and other assemblies were dismantled after **53.7** hours of tractor operation at this Institute.

12.1 Engine:

12.1.1 Cylinder bore:

Cylinder No.	Cylinder bore dia, (mm)						Max. permissible wear limit, (mm)
	Top position		Middle position		Bottom position		
	Thrust side	Non-thrust side	Thrust side	Non-thrust side	Thrust side	Non-thrust Side	
1.	88.959	88.953	88.958	88.958	88.964	88.959	89.21
2.	88.953	88.952	88.952	88.960	88.954	88.958	
3.	88.957	88.953	88.953	88.962	88.960	88.953	

12.1.2 Piston:

Piston No.	Piston dia, (mm)				Piston to cylinder liner clearance at skirt (mm)	
	Top (above top compression ring)		At skirt			
	Thrust Side	Non-thrust Side	Thrust side	Non-thrust side	As observed	Max. permissible limit, (mm)
1.	88.377	88.234	88.804	88.507	0.160	Piston is discard when ring groove clearance exceed 0.25 mm with new ring
2.	88.372	88.238	88.802	88.514	0.158	
3.	88.388	88.244	88.810	88.513	0.152	

12.1.3 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	
1st Comp. Ring	0.25	0.30	0.30	0.25	0.30	0.30	0.25	0.30	0.30	1.50
2nd Comp. Ring	0.35	0.35	0.35	0.35	0.35	0.35	0.30	0.35	0.35	
Oil ring	0.30	0.30	0.30	0.30	0.30	0.30	0.25	0.30	0.30	1.32

12.1.4 Ring side clearance:

RIngs	Ring side clearance, (mm)			Max. Permissible clearance Limit, (mm)
	Piston-I	Piston-II	Piston-III	
1st Compression ring	0.067	0.070	0.067	0.25
2nd Compression ring	0.061	0.062	0.064	
Oil ring	0.037	0.042	0.046	

12.1.5 Main bearings:

Bearing No.	Diametrical Clearance, (mm)	Crankshaft end Float, (mm)	Max. permissible clearance limit, (mm)	
			Diametrical clearance	Crankshaft end float
1.	0.108 to 0.120	0.20	0.25	0.50
2.	0.117 to 0.130			
3.	0.109 to 0.111			
4.	0.100 to 0.104			

12.1.6 Big end bearings:

Bearing No.	Clearance, (mm)		Max. permissible clearance limit, (mm)	
	Diametrical	Axial	Diametrical	Axial
1.	0.082 to 0.096	0.25	0.25	0.75
2.	0.080 to 0.086	0.25		
3.	0.078 to 0.093	0.30		

12.1.7 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 : : 13.39 to 13.57
- Exhaust valve spring: : 13.39 to 13.51

Against discard limit of 9.81 N/mm

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

- Intake valve : 0.074 to 0.082
- Exhaust valve : 0.089 to 0.098

Against discard limit of 0.152 mm

12.2 Clutch:

Any marked wear on clutch friction plates	:	None	
Condition of clutch release bearing	:	Normal	
Condition of diaphragm and springs	:	Normal	
Condition of pilot bearing	:	Normal	
Any marks on fly wheel/ pressure plate	:	None	
Overall thickness of clutch plate, (mm):	:	8.75 to 8.87	Discard limit wear up to 5.5 mm
Height of lining over rivet head, (mm)	:	1.65 to 1.87	Discard when wear up to rivet head

12.3 Transmission gears:

Any visual damage, pitting & chipping of any transmission gear teeth.	:	None	
Backlash between crown wheel and pinion, (mm)	:	0.25	Discard limit 0.50 mm max.

12.4 Brakes:

Description	Initial specified thickness of brake lining, (mm)	Measured overall thickness of brake disc after test, (mm)	Height of brake lining over rivet head, (mm)	Minimum permissible height of brake lining over rivet head, (mm)
Left	6.30	12.51 to 12.60	1.41 to 1.66	Discard when wear up to rivet head
Right	6.30	12.44 to 12.99	1.26 to 1.57	

12.5 Front axle:

Any marked wear of king pins	:	None	
Any marked wear of king pin bushes	:	None	
Clearance between king pin and bushes, (mm)	:	0.104 to 0.154	Against the discard limit of 0.50 mm.
Condition of bearings for stub axles	:	Normal	
Condition of king pin bearings	:	Normal	
Condition of seals for stub axles and king pins	:	Normal	
Clearance between centre pin and bushes, (mm)	:	0.107 to 0.151	Against the discard limit of 1.25 mm.

12.6 Steering system:

Visual condition of the components of complete steering assembly	:	Normal	

12.7 Starter motor & Alternator:

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

13. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

Sl. No.	Adjustments/Defects/Breakdowns and Repairs	Tractor run hours
13.1	During drawbar performance under five hours test at the pull corresponding to 15% wheel slip, the LHS rear wheel tube valve got punctured due to excessive creeping of tyre over the rim **(LHS – 65 mm & RHS – 35 mm)**. Thereafter, on the request of the applicant, the tube was replaced with new one of same specification.	30.4
13.2	During repeat drawbar performance under five hours test at the pull corresponding to 15% wheel slip, the LHS rear wheel tube valve got punctured due to excessive creeping of tyre over the rim **(LHS – 70 mm & RHS – 50 mm)**. Thereafter, on the request of the applicant, the tube was replaced with new one of same specification.	36.9
13.3	Again during repeat drawbar performance RHS rear wheel tube valve got punctured due to excessive creeping of tyre over the rim **(LHS – 95 mm & RHS – 100 mm)**. Thereafter, on the request of the applicant, the tube was replaced with new one of same specification.	37.8
13.4	During maintenance of lift load under hydraulic performance test, vertical height from the point of application of force to ground surface drop drastically, bringing lower link to its lowermost position. On inspection, the 'O' ring of distributor was found damaged. To rectify the breakdown, the manufacturer had requested to replace the above mention parts having same parts number with new one.	21.4

S.No.	Name of Parts	Parts Number	Quantity
1.	'O' ring	0195561M01	02

This breakdown is considered as minor breakdown and categorized (**Mn-18**) as per IS: 12207-2019.

14. COMPARISON OF SPECIFICATION AND PERFORMANCE CHARACTERISTICS OF PREVIOUS SAMPLE (TEST REPORT NO.T-747/1255/2010, NOVEMBER, 2010 & COMMERCIAL ADMINISTRATIVE EXTENSION REPORT NO. T-1365/1892/2020 (MARCH, 2020) AND PRESENT SAMPLE

			Previous sample	Present sample
14.1	**Specification:**			
14.1.1	**Tractor:**			
	Make	:	TAFE	TAFE
	Model	:	MF 1030 Mahashakti	MF 1030 Mahashakti
14.1.2	**Engine:**			
	Make	:	SIMPSON & Co. Limited	SIMPSON & Co. Limited
	Model	:	T III AS 318.1-F5	T III AS 318.1-F5
	Bore/Stroke, (mm)	:	88.9/122	88.9/122
	Specified cubic capacity, (cc) (apa)	:	2272	2272
	Rated engine speed, (rpm)	:	2000	2000
14.1.2.1	**Fuel system:**			
	Make & model of fuel feed pump	:	Bosch, India & FP/KSG22AD104, F002A50038	Bosch, India & FP/KS22AD104, F002A50038

			Previous sample	Present sample
	Make & model of fuel filters	:	MICO LIC Bosch & F002H20122	Bosch, India & F002H20151
	Make and model of fuel injection pump	:	Bosch, India & F002AOZ543, PES3A90D320RS2000	Bosch, India & F002AOZ543, PES3A90D320RS2000
	Make & model of fuel injectors	:	Bosch, India & F002C70009	Bosch, India & F002 C70009
	Type of injector	:	Multihole (Five holes)	Multihole (Five holes)
	Manufacturer's production pressure setting, (MPa)	:	23.0 to 24.0	23.0 to 24.0
	Injection timing	:	11±1 Degree BTDC	11±1 Degree BTDC
	Make & model of governor	:	Bosch, India & RSV375...1000A4C1410R	Bosch, India & RSV375...1000A4C1410R
14.1.2.2	**Lubricating system:**			
	Total lubricating oil capacity, (l)	:	6.6	7.0
14.1.3	**Transmission:**			
14.1.3.1	**Clutch:**			
	Type of clutch plate	:	Single, dry friction plate	Single, dry friction plate
	Size, OD/ID,(mm):	:	254.4 / 171.4 Φ	253.9 / 171.5 Φ
14.1.3.2	**Gear Box:**			
	No. of speeds:			
	- Forward	:	6	6
	- Reverse	:	2	2
	Range of speed, (kmph) :			
	- Forward	:	2.23 to 23.97	2.23 to 23.97
	- Reverse	:	3.04 to 12.11	3.04 to 12.11
14.1.4	**Service Brake:**			
	Make	:	TVS Girling	TVS Girling
	Type	:	Mechanical, dry integral discs brake	Mechanical, dry integral discs brake
	No. of friction disc	:	Two (on each wheel side)	Two (on each wheel side)
	Area of liners, (cm^2)	:	829.0 (on each wheel side)	913.8 (on each wheel side)
14.1.5	**Wheel equipment:**			
	Make & Size of tyres	:		
	- Front	:	Good Year & 6.00 -16	MRF & 6.00 -16
	- Rear	:	Good Year & 12.4 -28	MRF & 12.4 -28
	Standard Track width, (mm):			
	- Front	:	1320	1315
	- Rear	:	1340	1340
14.1.5.1	**Wheel base, (mm)**	:	1780	1765

			Previous sample	Present sample
14.1.6	**Overall dimensions, (mm):**			
	- Length	:	3325	3315
	- Width	:	1685	1670
	-Height (with exhaust pipe)	:	2245	2245
	- Ground clearance, (mm)	:	345 (below transmission housing drain plug)	340 (below transmission drain plug)
14.1.7	**Operational mass of standard ballasted tractor (kg):**			
	- Front	:	730	695
	- Rear	:	1030	980
	- Total	:	1760	1675
14.1.8	**Conformity with following IS:**			
i)	Guide lines for declaration of power and specific fuel consumption and labeling of agricultural tractors (First revision) [IS 10273:1987 (Reaffirmed in 2014):]	:	Conformed	Conforms
ii)	Agricultural tractors – Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS: 4931-1995 (Reaffirmed in 2014)]	:	Conformed	Conforms
iii)	Agricultural wheeled tractors - Rear mounted three-point linkage: Part 1 Categories 1, 2, 3 & 4 (fourth revision) [IS 4468(Part-I):1997/ISO 730-1:1994 (Reaffirmed in Oct.,2017)]	:	**Did not conform**	**Does not conform**
iv)	Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in Oct.,2017)]	:	Conformed	Conforms
v)	Agricultural tractors - Operator's seat technical requirement [IS 12343 –1998 (First revision) (Reaffirmed in 2014)]	:	Conformed	Conforms
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 Oct.,2017)]	:	**Did not conform**	**Does not conform**
vii)	Tractors and machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays [IS: 6283 (Part-1 & Part-2) –2006 & 2007 (Reaffirmed in 2014)]/ ISO 3767-2:1991)]	:	Conformed	**Does not conform**
viii)	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)]	:	**Did not conform**	**Does not conform**
ix)	Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) [(IS: 8133 – 1983) (Reaffirmed in 2014)]	:	Conformed	Conforms
x)	Agricultural Tractor & Machinery Lighting device for travel on public roads [(IS: 14683-1999) (Reaffirmed in 2014)]	:	Conformed	Conforms

14.2	**Performance Characteristics:**	:		
14.2.1	**PTO Performance (*):**			
	Maximum Power, (kW)	:	21.2	21.0
	Power at Rated engine speed,(kW)	:	21.2	21.0
	Specific fuel consumption corresponding to maximum power, (g/kWh)	:	242	248
	Maximum temperatures (degree):			
	Engine oil	:	119	101
	Coolant	:	102	95
	Lub oil consumption, (g/kWh)	:	0.49	0.91
14.2.2	**Drawbar performance :**			
	Maximum power without ballasted / with standard ballasted tractor, (kW)	:	18.2	19.1
	Maximum pull without ballasted / with standard ballasted tractor, kN)	:	14.40	14.65
	Maximum transmission oil temperature (°C)	:	100	77
14.2.3	**Hydraulic performance:**			
	Hydraulic pump discharge at minimum pressure and rated engine speed (l/min.)	:	18.1	18.0
	Maximum hydraulic power, (kW)	:	3.9	4.6
	Sustained pressure of the open relief valve, (MPa)	:	18.0	20.0
	Maximum lifting capacity, (kN):			
	- At the hitch point	:	8.33	9.22
	- At the standard frame	:	7.86	8.74
	Total drop in height of lift during load maintenance test, (mm)	:	55	20

14.2.4 Brake performance test at 25 kmph speed (max.):

Parameter	Cold	Hot	Cold	Hot
Maximum Stopping distance, (m)	6.70	7.23	7.33	7.48
Maximum force exerted on the brake Pedal effort required to achieve deceleration of 2.5 m/sq sec, (N)	390 to 455		374 to 403	
Weather parking brake is effective at a force of 600N at foot pedal (s) or 400 N at hand lever	Effective		Effective	

14.2.5	**Noise measurement:**			
	- Maximum noise at bystanders position, dB(A)	:	80	80
	- Maximum noise at operator's ear level, dB(A)	:	94	93
14.2.6	**Mechanical vibration:**			
	Maximum amplitude of vibration at (microns):			
	- Foot rest – LHS & RHS	:	640 & 730	77 & 89
	- Steering wheel	:	400	156
	-Driver's seat, (driver in seat):	:	210	50
14.2.7	**Air Cleaner oil Pull over test, (%)**	:	0.17	0.11

14.2.8 Haulage Test

		Two wheel trailer		Four wheel trailer	
		Previous	Present	Previous	Present
-Gross mass of trailer, (tonnes)	:	5.0	5.0	5.0	5.0
- Average speed, (kmph)	:	24.33 to 24.51	24.77 to 24.92	24.60 to 24.97	24.77
-Distance traveled per litre of fuel consumed, (km/l)	:	5.96	6.27 to 6.36	6.07 to 6.30	5.83 to 6.51
- Average fuel consumption (cc/km/tonne)	:	31.5 to 33.6	31.43 to 31.91	31.7 to 32.9	30.71 to 34.33

14.3 Qualifying performance (comparable limit) for batch model in comparison to ICT model (Vide test report No. T-747/1255/2010, November, 2010) (please refer clause 7.6 of IS:12207-2019):

S. No.	Characteristic	Requirements as per IS: 12207-2019		As observed		Whether meets the require-ments (Yes/No)
		Column – 4 of Table-1	Clause 7.6	Previous sample	Present sample	
1	2	3	4	5	6	7
14.3.1	**Drawbar performance:**					
a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Minimum 70% of static mass with ballast	The performance shall be within 7.5 of ICT or limit specified under column 3 whichever is higher	19.07	21.69	**No**
b)	Maximum drawbar pull without ballast or standard ballast corresponding to 15 percent wheel slip, (kN)	Minimum 70% of static mass of tractor without / standard ballast		14.40	14.65	Yes
c)	Maximum drawbar power without ballast or standard ballast, (kW).	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.		18.2	19.1	Yes
d)	Maximum transmission oil temperature (°C)	The declared value should not exceed the maximum value specified by oil company.		100	77	**No**

1	2	3	4	5	6	7
14.3.2	**Power lift and hydraulic pump performance :**					
a)	Maximum lifting capacity throughout the range of lift, (kN):					
	1) At hitch points	±10 percent	The performance shall be within 7.5 of ICT or limit specified under column 3 whichever is higher	8.33	9.22	No
	2) With the standard frame	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		7.86	8.74	No
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)	The observed value should not exceed 50 mm		55	20	No

14.4 Salient Observations:

14.4.1 Laboratory test:

	Previous Sample	Present Sample
14.4.1.1	**Drawbar Performance Test:**	
i)	During drawbar performance test, creeping of LHS rear tyre over the rims was observed as **40 mm**. This should be looked into for necessary corrective action.	i) During 10 hours drawbar performance test, creeping of LHS & RHS rear tyre over the rims was recorded as **68 mm & 70 mm** respectively. This should be looked into for necessary corrective action.
	---	ii) During ten hour drawbar performance test. Rear LHS tyre tube got puncture twice and once in RHS tyre tube due to excessive creeping of tyre over the rim, the same was replace with new one.
14.4.1.3	**Hydraulic Performance Test:**	
i)	During hydraulic lifting capacity test, the system pressure was maintained nearest to sustain pressure and was not dropping throughout the lifting range. On close inspection the stopper (washer float, Part no. 0181041M01, nut Part no. 0353918 X 01 and screw Part no. 0353502X0) of position control lever was found loose and dislocated on quadrant.	i) The moment about rear axle with standard frame was calculated as **12.28 kN-m**. Whereas, the moment about front axle was calculated as **12.03 kN-m** under standard ballasted condition. The moment about rear axle is on higher side as compared to the moment about front axle. It is, therefore, recommended that the lifting capacity of the hydraulic system may be reduced suitably or standard ballast recommendation may be reviewed to avoid the front lifting of the tractor.
	---	ii) During maintenance of lift load under hydraulic performance test, the vertical height from the point of application of force to ground surface drop drastically, bringing lower link to its lowermost position. On inspection, the 'O' ring was found damaged. To rectify the breakdown, the manufacturer had requested to replace the above mention parts having same parts number with new one.

S.No.	Name of parts	Parts	Quantity
1.	'O' ring	0195561M01	02

14.5 Adequacy of literature:

Following literatures has been supplied with the tractor for reference during the test.

a) Operator's manual	a) Operator's manual
b) Parts catalogue	b) Parts catalogue
c) Workshop manual	c) Workshop manual

15. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

15.1 On the basis of tests conducted the performance results have been summarized as evaluative (mandatory) and non-evaluative (not-mandatory) parameter 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
15.1.1	**PTO Performance :**					
a)	Max. power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: ± 5% for PTO power or engine power >26 kW, ± 10% for PTO power or Engine power ≤ 26 kW.	22.0 (D)	21.0	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	22.0 (D)	21.0	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% Max.	265 (D)	248	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	120 (D)	118.5	Yes
e)	Back-up torque, percent	Evaluative	12 percent, min.	12 (D) 12 (R)	18.1	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	132 (D)	101	Yes
	2) Coolant (liquid)	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.	110 (D)	95	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.48 (R) Maximum	0.91	Yes
h)	Smoke level, (m^{-1})	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hat ridge value (As per CMVR)	3.25 (R)	0.09	Yes

1	2	3	4	5	6	7
15.1.2	**Drawbar performance:**					
a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 70% of static mass with ballast	17.50 (D) 17.44 (R) Minimum	21.69	Yes
b)	Maximum drawbar pull with standard ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 70% of static mass of tractor without/ standard ballast	11.60 (D) 11.50 (R) Minimum	14.65	Yes
c)	Maximum drawbar power without ballast, or with standard ballast as the case may be, 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.	18.0 (D) 16.8 (R) Minimum	19.1	Yes
d)	Maximum transmission oil temperature (°C)	Evaluative	The declared value should not exceed the maximum value specified by oil company.	132 (D)	77	Yes
15.1.3	**Power lift and hydraulic pump performance :**					
a)	Maximum lifting capacity throughout the range of lift, (kN):					
	1) At hitch points	Evaluative	±10 percent	8.83 (D)	9.22	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	7.85 (D) 4.94 (R) Minimum	8.74	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) 50 (R) Maximum	20	Yes
15.1.4	**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 (R)	7.33	Yes
	2) Hot brake	Evaluative	10	10 (R)	7.48	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s^2 (N)	Evaluative	600	600 (R)	374 to 403	Yes

1	2	3	4	5	6	7
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 (R)	289	Yes
15.1.5	**Noise measurement :**					
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	88 (R)	80	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96 (R)	93	Yes
15.1.6	**Amplitude of mechanical vibrations at :**					
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R)	77	Yes
	2) Right foot rest		-do-		89	Yes
	3) Seat (with driver seated)		-do-		50	Yes
	4) Steering wheel		do-		156	**No**
15.1.7	**Air cleaner oil pull over :**					
	Maximum air cleaner oil pull over	Evaluative	0.25 % (max.)	0.25 % (max.)	0.11	Yes
15.1.8	**Haulage requirements :**					
a)	**Gross mass of the trailers, (tonne):**					
	1) Two wheel	Non Evaluative	As specified by the manufacturer	5.0 (D)	5.0	Yes
	2) Four wheel			5.0 (D)	5.0	Yes
b)	**Distance travelled / litre of fuel consumption, (km/l):**					
	1) Two wheel	Non Evaluative	As specified by the manufacturer	5.96 (D)	6.27 to 6.36	**No**
	2) Four wheel			6.07 to 6.30 (D)	5.83 to 6.51	**No**
c)	**Fuel consumption (ml/km/tonne):**					
	1) Two wheel	Non Evaluative	As specified by the manufacturer	31.5 to 33.6 (D)	31.43 to 31.91	**No**
	2) Four wheel			31.7 to 32.9 (D)	30.71 to 34.33	**No**
15.1.9	**Wetland cultivation :**					
	Sealing for the following assemblies:	Evaluative	The identified assemblies should essentially meet the requirement of IS: 11082. No water ingress in the identified assembly given in column-2. If tractor does not meet the requirements of wetland cultivation, it may be recommended for dry land operation only.	There should be no ingress of water and / or mud (R)	No ingress of mud and / or water was observed during ICT vide test report no. **T-747/1255/2010 (November 2010)**	Yes
	1) Clutch assembly	-do-				
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
	4) Engine Oil	-do-				
	5) Transmission Oil	-do-				

15.1.10	**Safety features :**					
a)	Guards against moving and hot parts		Evaluative	Belt drives, pulleys, silencer, hydraulics pipes(as per IS-12239 Part 2)	Meet the requirements	Yes
b)	Lighting arrangement		Evaluative	As per CMVR	Meet the requirements	Yes
c)	Seating requirements (Tractors having more than 1150 mm rear track width)		Non Evaluative	Should meet the requirements of IS: 12343 (As amended from time to time)	Meet the requirements	Yes
d)	Technical requirements for PTO shaft		Evaluative	Should meet the requirements of IS: 4931 (As amended from time to time)	Meet the requirements	Yes
e)	Dimensions of three point linkage		Non Evaluative	Should meet the requirements of IS: 4468 (Part-I) (As amended from time to time)	**Does not meet the requirements**	**No**
f)	Specifications of linkage drawbar		Evaluative	Should meet the requirements of IS 12953 (As amended from time to time)	Meet the requirements	Yes
g)	Specifications of Swinging drawbar (wherever fitted)		Evaluative	Should meet the requirements of IS 12362 (Part 3) (As amended from time to time)	**Not provided**	**Not applicable**
h)	1)	Maximum travelling speed at rated engine speed in reverse gears, kmph	Evaluative	Should not exceed 20 Kmph	(12.11 kmph) Meet the requirements	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 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**	**Not applicable**
15.1.11	**Labelling of tractors (Provision of labelling plate):**					
	1)	Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO in kW and year of manufacture in numerical MM | YY Digit 01-12 in box No.1 for MM will represent the month and next two digit in the box No.2 for YY will represent the year of manufacturing	TAFE	Yes
	2)	Model	Evaluative		MF 1030 Mahashakti	Yes
	3)	Month & Year of manufacture	Evaluative		02 / 20	Yes
	4)	Engine number	Evaluative		S318.118770	Yes
	5)	Chassis number	Evaluative		MEA03901BL2285854	Yes
	6)	Declaration of PTO power, kW	Evaluative		22.0	Yes
	7)	Specific fuel consumption (g/kWh)	Evaluative		265	Yes

1	2	3	4	5	6	7
15.1.12	**Discard limit for:**					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by Manufacturer	89.21	88.952 to 88.964	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		Piston is discard when ring groove clearance exceed 0.25 with new ring	0.152 to 0.160	Yes
(c)	Piston diameter at skirt, mm	Non Evaluative			88.802 to 88.810	Yes
(d)	**Ring end gap (mm):**					
	- Top comp. ring.	Evaluative	-do-	1.50	0.25 to 0.30	Yes
	- 2nd comp. ring.		-do-	1.50	0.30 to 0.35	Yes
	- Oil ring.		-do-	1.32	0.25 to 0.30	Yes
(e)	**Ring groove clearance (mm):**					
	- Top comp. ring.	Evaluative	-do-	0.25	0.067 to 0.070	Yes
	- 2nd comp. ring.	-do-	-do-	0.25	0.061 to 0.064	Yes
	- Oil ring.	-do-	-do-	0.25	0.037 to 0.046	Yes
(f)	**Clearance of main end bearings, (mm):**					
	- Diametrical	Evaluative	-do-	0.25	0.100 to 0.130	Yes
	- Crank shaft end float	Evaluative	-do-	0.50	0.20	Yes
(g)	**Clearance of big end bearings, (mm):**					
	- Diametrical	Evaluative	-do-	0.25	0.078 to 0.096	Yes
	- Axial	Evaluative	-do-	0.75	0.25 to 0.30	Yes
(h)	Clearance between king pin and bush,(mm)	Non Evaluative	-do-	0.50	0.104 to 0.154	Yes
(i)	Clearance between center pin and bush,(mm)	Non Evaluative	-do-	1.25	0.107 to 0.151	Yes
15.1.13	**Literature (Submission to test agency):**					
(a)	Operator manual	Evaluative	Provided / Not Provided	Provided	Provided	Yes
(b)	Parts Catalogue	Evaluative	Provided / Not Provided	Provided	Provided	Yes
(c)	Workshop/ Service manual	Evaluative	Provided / Not Provided	Provided	Provided	Yes
14.1.14	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	Provided	Not fitted	Not appli-cable
14.1.15	Standard accessories	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with tractor	Provided	Provided	Yes
14.1.16	Accessories (Optional)	Non Evaluative	Ballast weights if fitted should meet the requirement of CMVR.	Provided	Provided	Yes

15.2	CATEGORY OF BREAKDOWNS / DEFECTS :(As per clause 5.0 of IS-12207-2019)				
S. No.	Category of Breakdown	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	As observed	Whether meets the requirement (Yes/No.)
1.	Critical breakdown	Evaluative	There is no 'critical breakdown' during the course of testing	None	Yes
2.	Major breakdowns	Evaluative	There are not more than 1 major breakdowns and neither of them is of repetitive nature.	None	Yes
3.	Minor breakdowns	Evaluative	There are not more than 3 minor defects during the test and the frequency of each is not be more than two.	01 (**Mn**-18)	Yes
4.	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed four that is, (1 major + 3 minor) or 4 minor breakdowns.	None	Yes

15.3 Salient Observations:

15.3.1 Laboratory tests:

15.3.1.1 PTO Performance Test:

i) The maximum PTO power was recorded as **21.2 kW** and **21.0 kW** in case of previous and present tested samples respectively against the declaration of **22.0 kW,** which meets the evaluative requirement of IS: 12207-2019 with regard to tolerance limit.

ii) The specific fuel consumption corresponding to maximum power was recorded as **242 g/kWh** and **248 g/kWh** in case of previous and present tested samples respectively against the declaration of **265 g/kWh,** which meets the evaluative requirement of IS: 12207-2019 with regard to tolerance limit.

iii) The maximum equivalent crankshaft torque was recorded as **118.5 Nm** against the declaration of **120 Nm**, which is within the permissible limit as specified in IS: 12207-2019.

iv) The backup torque was observed **18.1** %, which meets the evaluative requirement of IS: 12207-2019 with regard to tolerance.

15.3.1.2 Drawbar performance test:

i) During ten hours drawbar performance test, creeping of LHS & RHS rear tyre over the rims was recorded as **68 & 70 mm** respectively. This should be looked into for necessary corrective action.

ii) During ten hour drawbar performance test. Rear LHS tyre tube got punctured two times and RHS tyre tube got punctured one time due to excessive creeping of tyre over the rim. Thereafter, on the request of the applicant, the tube was replaced with new one of same specification. The creeping of tyre was repetitive in nature and which may be due to change in specification of rear rim from "W11 to W10". Therefore, this should be looked into for necessary quality improvement.

15.3.1.3 Hydraulic performance test:

i) The moment about rear axle with standard frame was calculated as **12.28 kN-m**. Whereas, the moment about front axle was calculated as **12.03 kN-m** under standard ballasted condition. The moment about rear axle is on higher side as compared to the moment about front axle. It is, therefore, recommended that the lifting capacity of the hydraulic system may be reduced suitably or standard ballast recommendation may be reviewed to avoid the front lifting of the tractor.

ii) During maintenance of lift load hydraulic performance test. Vertical height from the point of application of force to ground surface drop drastically, bringing lower link to its lower most position. On inspection, the 'O' ring was found damaged. To rectify the breakdown, the manufacturer had requested to replace the above mention parts having same parts number with new one.

S.No.	Name of Parts	Parts Number	Quantity
1.	O ring	0195561M01	02

This breakdown was considered as minor breakdown and categorized (**Mn-18**) as per IS: 12207-2019.

15.3.1.4 Mechanical Vibration:

The amplitude of mechanical vibration on various assemblies marked as (*) in **Chapter - 9** 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.

15.3.1.5 Haulage Test:

i) The specific fuel consumption (ml/km/ton) with two wheel and four wheel trailer was recorded as **31 to 32** ml/km/ton & **31 to 34** ml/km/ton, against the declaration of **31.50 to 33.60** ml/km/ton & **31.70 to 32.90** ml/km/ton respectively, which does not meet the non – evaluative requirement of IS: 12207-2019 with regard to tolerance. This should be looked into for necessary corrective action.

ii) The distance travel per litre of fuel consumption with two wheel and four wheel trailer was observed as **6.27 to 6.36** km/l & **5.83 to 6.51** km/l against the declaration of **5.96** km/l & **6.07 to 6.30** km/l respectively, which does not meet the non – evaluative of IS: 12207-2019 with regard to tolerance. This should be looked into for necessary corrective action.

15.3.1.6 Three point linkage:

i) The dimension of width of ball & lateral distance from lower hitch point to centre line of tractor does not meet the requirement of IS: 4468-(Part-1)1997(Reaffirmed in Oct., 2017). This should be looked into for necessary corrective action.

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

15.3.1.7 Field performance:

15.3.1.7.1 Wetland operation:

No ingress of mud and / or water was observed during initial commercial test, tested vide test no.T-747/1255/2010, (November).

15.4 Maintenance / Service Problems:

No noticeable maintenance or service problems were observed during the test.

15.5 Recommendation with regard to safety on tractor:

The following requirements, inter alia, may be considered for incorporation on the tractor:

i) Provision of spark arrester in the exhaust system.

ii) The working clearance between the draft control lever and position control lever should be provided as per the requirement of relevant Indian Standard.

iii) Vertical retainers at both sides of pedals should be provided as per relevant standard.

iv) Shield of PTO shaft is not been provided.

v) Differential lock may be provided.

vi) Grease lubricant, oil lubricant type and frequency chart be provided as per relevant standard.

15.6 Adequacy of Literature supplied with machine:

15.6.1 The following literatures were supplied with the test tractor for reference during the test:-

a) Operator manual of TAFE, MF 1030 MAHASHAKTI, MF 1035 DI V18, MF 245 DI, MF 241 DI & TAFE 30 DI ORCHARD PLUS Tractor model.

b) Parts Catalogue of TAFE, MF 1030 MAHASHAKTI Tractor.

c) Workshop/Service manual of TAFE, MF 1030 MAHASHAKTI, MF 1035 DI V18, MF 245 DI, MF 1035 DI MAHASHAKTI V1 Tractor model.

15.6.2 The supplied literature was found adequate. However, operator's manual was covered with Hindi, Service manual and Spare parts catalogue were covered with English. These literatures should be brought out in national as well as other regional languages of India for guidance of users.

16. CITIZEN CHARTER

Time frame for Testing & Evaluation as per Citizen Charter	Duration of Test	Whether the Test Report is released within the time frame given in Citizen Charter	Remarks
10 Months	11 Months (April, 2020 to February, 2020)	No	Delay due to occurrence of repetitive breakdown of tube puncture during drawbar test. The manufacturer has taken 3.7 months time period for repair/replacement of tube three times.

TESTING AUTHORITY:

SHWETABH SINGH
AGRICULTURAL ENGINEER

C.V. CHIMOTE
TEST ENGINEER

P.K. PANDEY
DIRECTOR

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

17. APPLICANT COMMENT'S

Para No.	Our Reference	Applicant's comments
17.1	15.3.1.2. (i) (ii), 15.3.1.3 (i) (ii), 15.3.1.4, 15.3.1.5 (i) (ii), 15.3.1.6(i) (ii), 15.5. & 15.6.2	We will study and take appropriate corrective actions.

ANNEXURE- I

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS	HOURS
1.	Running-in	--
2.	PTO performance test	11.2
3.	Drawbar performance test	15.2
4.	Power lift and hydraulic pump performance test	1.3
5.	Brake test	1.8
6.	Noise measurement	1.6
7.	Mechanical vibration test	1.0
8.	Nominal speed test	0.5
9.	Air Cleaner Oil Pull-Over Test	2.5
B.	HAULAGE TEST	6.7
C.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	11.9
	TOTAL:	53.7