MAHINDRA 265 DI MKM
(BRAND NAME : BHOOMIPUTRA) TRACTOR

सत्यमेव जयते

भारत सरकार
कृषि एवं किसान कल्याण मंत्रालय
(कृषि, सहकारिता एवं किसान कल्याण विभाग)
GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE AND FARMERS WELFARE
(DEPARTMENT OF AGRICULTURE, CO-OPERATION AND FARMERS WELFARE)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान
ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५
CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE
(An ISO : 9001 - 2015 Certified Institute)
Tractor Nagar, Budni (M.P.) 466 445
E-mail fmti-mp@nic.in Website : http://www.fmttibudni.gov.in
Telephone : 07564 - 234729 Fax : 07564 - 234743

Type of Test	:	**COMMERCIAL (First Batch Test)**
Test code/Procedure	:	IS: 5994-1998 (Reaffirmed in March 2009), IS:9253 (Reaffirmed in September ,2013), and IS: 12207-2014
Period of Test	:	December ,2016 to October, 2017
Test Report No.	:	**T-1120 /1646 /2017**
Month/Year	:	December , 2017

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

ii) The data given in this report pertain to the particular machine submitted by the applicant for test.

iii) The results presented in this report do not in any way attribute to the durability of the machine.

iv) This report should not be reproduced in part or full without prior permission of the Director, Central Farm Machinery Training and Testing Institute, Budni (M.P.).

v) This is a batch test report and should be read in conjunction with the Test Report of variant model i.e. **"MAHINDRA 265 DI MKM" Tractor** bearing **No. T-764/1272/2011 (April).**

SELECTED CONVERSIONS

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

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

CONTENTS

The tractor model "Mahindra 265 DI MKM" (Brand name: Bhoomiputra) had undergone Commercial (Variant) test vide test report number T-764 /1272 /2011(April) derived from the base model "Mahindra 265 DI" (Brand name: Bhoomiputra) bearing test report number No.T-737/1244,2010 (August). Now the applicant vide letter No. Nil, dated 28.09.2016 has declared that the base model "Mahindra 265 DI" (Brand name: Bhoomiputra) is not under production and submitted last chassis cut-off number as RAR27714 (April, 2010) and requested to consider "Mahindra 265 DI MKM" (Brand name: Bhoomiputra) as a base model for batch testing.

The competent authority has accepted the applicant's request under clause 7.5 of IS: 12207-2014, and therefore this tractor was subjected to all the tests as per clause 6.0, Table-1 of IS: 5994-1998 to be carried out during Initial Commercial Test as the original base model has been obsolete.

Manufacturer	:	**M/s. Mahindra & Mahindra Limited (Farm Equipment Sector) Akurli Road, Kandivli (E) MUMBAI – 400 101**
Location of other manufacturing plants (apa)	:	1. MahindraResearch Valley-AFS, Mahindra World City, Plot No. 41/1, Anjur P.O.: **Chengalpattu- Kanchipuram district – 603004.** 2. Akurli Road, Kandivli (E) **Mumbai – 400 101** 3. M/s. Mahindra & Mahindra Limited (Farm Equipment Sector) Hingna Road, Hingna MIDC **NAGPUR - 440016. (Maharashtra)** 4. M/s. Mahindra & Mahindra Limited (Farm Equipment Sector) Agri Business Development centre, Khatima Ranipet Highway, Udham singh nagar, Vil. Lalpur, Tehsil-Kichha, **RUDRAPUR-263153, (Uttranchal)** 5. M/s. Mahindra & Mahindra Limited (Farm Equipment Sector) Agri Development Centre, Vil-Mehla Tehsil-Dudu Jaipur- Ajmer Road, **JAIPUR-303007, (Rajasthan)** 6. Near Bidar "T" Junction , Mahindra Nagar, **Zaheerabad- 502 220** Medak District, Telangana.
Test requested by (applicant)	:	Manufacturer
Selected for test by	:	Testing Authority
Place of running-in	:	At applicant's works
Duration of said running-in (h):		
- Engine	:	15
- Transmission	:	30
Method of Selection	:	The test sample was selected randomly out of five tractors from the production line by the representative of testing authority.

1. SPECIFICATION

1.1 **Tractor:**

Make	:	Mahindra
Model	:	265 DI MKM
Brand name	:	Bhoomiputra
Variants, if any	:	None
Type	:	Four wheel, Rear-wheel drive, General Purpose, Agricultural Tractor
Year of manufacture	:	GG (i.e. October,2016)
Chassis number	:	NEBT00078
Country of Origin	:	INDIA

1.2 **Engine:**

Make	:	Mahindra
Model	:	MDI 17853A
Type	:	Four stroke, naturally aspirated, liquid cooled, direct injection, diesel engine.
Serial number	:	NEBT00078

Engine speed (Manufacturer's recommended production setting) (rpm) :

- Maximum speed at no load	:	2075 to 2175
- Low idle speed	:	750 to 850
- Speed at maximum torque	:	1300 to 1500
Rated speed, (rpm):		
- For PTO use	:	1900
- For drawbar use	:	1900

1.3 **Cylinder & Cylinder Head:**

Number	:	Three
Disposition	:	Vertical, inline
Bore/stroke, (mm)	:	88.9 / 110
Capacity as specified by the applicant, (cc)	:	2048 (apa)
Compression ratio, (apa)	:	20.2 : 1
Type of cylinder head	:	Monoblock
Type of cylinder liners	:	Wet, replaceable
Type of combustion chamber	:	Re-entrant cavity on piston crown
Arrangement of valves	:	Overhead, inline
Valve clearance (cold/hot):		
- Inlet valve, (mm)	:	0.40 / 0.30
- Exhaust valve, (mm)	:	0.50 / 0.40

1.4 **Fuel System:**

Type of fuel feed system	:	Gravity and force feed

1.4.1 **Fuel tank:**

Capacity, (l)	:	46.5
Location	:	Above clutch housing
Provision for draining of sediments/ water	:	Provided
Material of fuel tank	:	Metallic

1.4.2 **Water separator** : Not provided

1.4.3 **Fuel feed pump:**

Type	:	Plunger
Make	:	Bosch, India
Model/Group combination No.	:	FP/KS 22AD 62,9 440 030 029(apa)
Provision of sediment bowl	:	Provided (Metallic)
Method of drive	:	Through cam shaft of fuel injection pump

1.4.4 **Fuel filters:**

Make	:	Bosch, India
Model/Group combination No.	:	F 002 H20 117
Number	:	Two
Type of elements:		
- Primary	:	Cloth
- Secondary	:	Paper
Capacity of final stage filter, (l)	:	0.50

1.4.5 **Injection pump:**

Make	:	Bosch, India
Model/Group combination No.	:	F002 AOZ 736,PES 3A 85D 320 RS 2000
Type	:	Plunger, Inline
Serial number	:	65422822
Method of drive	:	Through timing gear

1.4.6 **Fuel injectors:**

Make	:	Bosch, India
Model/Group combination No./Holder No.	:	F002 C70 007
-Nozzle no.	:	653 310 342, (Holder No. DSLA 144P 1754)
Type	:	Multi hole (five holes)
Manufacturer's production pressure setting, (MPa)	:	25 + 0.8
Injection timing	:	6 ± 1 degree before TDC
Firing order	:	1 – 3 – 2

1.4.7 **Governor:**

Make	:	Bosch, India
Model/Group combination No.	:	RSV400...950A5C1592R.
Type	:	Mechanical, centrifugal, variable speed
Rated engine speed, (rpm)	:	1900
Governed range of engine speed (rpm)	:	750 to 2175

1.5 **Air Intake system:**

1.5.1 **Pre-cleaner:**

Make	:	Popular
Type	:	Centrifugal with transparent dust collector
Location	:	On air cleaner inlet tube, out side the bonnet.

1.5.2 **Air cleaner:**

Make	:	Not specified
Type	:	Combination of oil bath & dry type paper filter element.
Location	:	On RHS of engine, under the bonnet
Range of suction pressure at maximum power, (kPa)	:	2.8 to 2.9
Oil capacity,(l)	:	0.50
Maintenance schedule	:	Change oil after every 50 hours or earlier if required in dusty condition.

1.6	**Exhaust System:**		
	Type of silencer	:	Updraft (cylindrical)
	Position of silencer outlet with respect to SIP, (mm):		
	- Vertical	:	850
	- Longitudinal	:	1552
	- Lateral	:	290 (on RHS)
	Range of exhaust gas pressure at maximum power, (kPa)	:	2.3 to 3.2
	Provision of spark arresting device	:	**None**
	Provision against entry of rain water	:	A Bend is provided at the top of outlet.
1.7	**Lubricating system:**		
	Type	:	Force feed cum splash
	Oil sump capacity, (l)	:	5.00
	Total lub oil capacity, (l)	:	5.65
	Oil change period	:	First change after 250 hours of operation and subsequently after every 300 hours of operation
	Cooling device, (if any)	:	**None**
1.7.1	**Filters:**		
	Type	:	Wire mesh strainer at suction and one full flow spin on throw away paper element.
	Number	:	One
1.7.2	**Pump:**		
	Type	:	Gear (Eccentric Lobe)
	Method of drive	:	Through camshaft
	Pressure release setting, (kPa)	:	206.84 to 241.32
	Minimum permissible pressure, (kPa)	:	100
1.8	**Cooling system:**		
	Type	:	Forced circulation of coolant / water
	Coolant as recommended	:	Lubzs, having coolant water ratio 0.05: 1.
	Details of pump	:	Centrifugal, semi-open impeller of 82.09 mm diameter, having seven numbers of vanes and driven through crankshaft pulley by a cogged V-belt.
	Details of fan	:	Suction type having six plastic blades of 395 mm diameter, and mounted on water pump shaft.
	Means of temperature control	:	Thermostat
	Bare radiator capacity, (l)	:	1.75
	Capacity of expansion flask, (l)	:	0.9
	Total coolant capacity, (l)	:	6.2
	Radiator cap pressure, kPa (kg/cm^2)	:	88 (0.9)
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	:	Amaron & TR510D31L
	Type	:	Lead acid
	Capacity and rating	:	12V, 80 Ah at 20 hours discharge rate
	Location	:	On RHS of clutch housing in a separate metallic box.

1.10.2 Starter:

Make	:	Autolek
Model	:	1105V
Voltage/Type	:	Pre-engaging, solenoid operated
Capacity and rating	:	12V, 1.8 kW
Serial Number	:	NA

1.10.3 Generator:

Make	:	Lucas TVS
Model	:	A115
Type	:	Alternator
Serial number	:	NA
Output rating	:	12V, 36 Amp
Method of drive	:	Through a cogged V-belt common to water pump from crank shaft pulley.

1.10.4 Voltage regulator : In built in 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, 55/60W	1025	135 ϕ	480
- Parking lights	2, 12V, 5W	1280	35 x 62	150
- Turn-cum-Hazard Indicators	2, 12V, 21W	1280	75 x 62	95
Rear lights:				
-Tail -cum-parking light	2, 12V, 5W	1255	40 x 70	185
- Brake light	2, 12V, 21W	1255	40 x 70	185
- Turn-cum-Hazard Indicators	2, 12V, 21W	1255	40 x 70	100
Plough light (on RHS mudguard)	1, 12V, 55W	1340	110 ϕ	405
Reflectors (Red)	2	1255	35 x 55	145
Registration plate Light	Part of rear parking light			

1.10.6 Main switch : Key turn type having three positions viz.
- OFF
- Circuit ON
- START

1.10.7 Light switch : Rotary type having four positions viz.
i) Off
ii) Parking lights + dashboard lights 'ON'
iii) Head lights (long beam)+ ii)
iv) Head light (short beam) + ii)

1.10.8 Horn:

Make	:	MINDA
Type	:	12V, 2B, electromagnetically vibrated diaphragm type
Location	:	In-front of radiator, under the bonnet

1.10.9 Fuse box : Contains 6 numbers of fuses of following capacities :-

Capacity	5A	10A	15A	20A
Number	2	1	1	2

1.10.10 Details of other electrical accessories:

1.10.10.1 Flasher Unit:

Make	:	Interface
- Turn signal	:	12V, 21W x 2 + 2W x 1
- Hazard signal	:	12V, 21W x 4 + 2W x 2
Flashes/Min.	:	85

1.10.10.2 Seven pin socket for trailer lights : Provided

1.10.10.3 Safety against accidental start : **Not provided**

1.11 Instrument panel details:

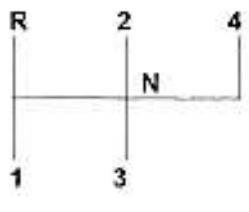
i) Engine speed-cum-cumulative run hour meter (digital, 0 to 2500)
ii) Coolant temperature gauge (with colour zones)
iii) Fuel level gauge (with colour zones)
iv) Lubricating oil pressure indicator light
v) Main switch (key-turn type)
vi) Light switch (Rotary type)
vii) Hazard light switch
viii) Turn-cum-hazard indicator lights tell-tale
ix) Battery charging warning indicator lamp
x) Head light long beam ON indicator light
xi) Parking brake indicator light
xii) Horn push button
xiii) Plough light switch
xiv) Plough light indicator
xv) Hand accelerator lever
xvi) Fuel shut-off control knob
xvii) Rear view mirror

1.12 Transmission System:

1.12.1 Clutch:

Make	:	Luk ,India (apa)
Type	:	Single dry friction plate
No. of friction plate, (s)	:	One
Size, OD/ID, (mm)	:	279.6/170.4 ϕ
Method of operation	:	Mechanical, by foot pedal on LHS

1.12.2 Gear box:

Make	:	Mahindra
Model	:	**Not specified**
Type	:	Mechanical, combination of sliding & constant mesh gears.
Gear shifting pattern	:	 
Location of gear shifting levers	:	Main & Low-High gear lever in front of operator's seat.

No. of speeds:

- Forward	:	08
- Reverse	:	02
Oil capacity, (l)	:	21.7 (Common with differential, final drive & rear axle)
Oil changing period	:	After every 1000 hours of operation.

1.12.3 Nominal Speed:

Movement	Gear No.	No of engine revolutions for one revolution of driving wheel	Nominal speed at rated engine speed when fitted with **12.4-28** size tyres of **590 mm** radius index, (kmph)
Forward	L1	158.49	2.66
	L2	91.12	4.70
	L3	64.02	6.61
	L4	45.50	9.18
	H1	53.51	7.90
	H2	31.58	13.37
	H3	21.92	19.31
	H4	15.47	27.28
Reverse	LR	105.02	4.02
	HR	35.56	11.88

1.12.4 Differential unit:

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

Reduction through crown wheel and bevel pinion : 4.182 : 1 (46/11T)

Oil capacity, (l) : 21.7 (Common with gearbox & rear axle)

Oil changing period : After every 1000 hours of operation

Differential lock : Not Provided

1.12.5 Rear axle & final drive:

Type : Bull gear and pinion reduction unit accommodated inside differential housing.

Reduction through final drive : 3.583:1 (43/12T)

Oil capacity of final drive, (l) : 21.7 (Common with gearbox & differential)

Oil changing period : After every 1000 hours of operation

1.13 Power lift:

Make : Mahindra

Type : Open centre, live & ADDC

No. and type of cylinder : One, single acting, inside hydraulic housing

Type of linkage lock for transport : Hydraulic, isolating valve in fully closed position act as transport lock.

1.13.1 Hydraulic pump:

- Make : Rexroth
- Type : Gear
- Location & drive : RHS of engine, through timing gears

No. & type of filters : Three

i) Wire mesh strainer at suction

ii) Full flow spin on paper element type on LHS of engine.

iii) Orifice filter on distributor.

Hydraulic oil capacity, (l) : 11.5

Oil change period : After every 1000 hours of operation.

Provision for external tapping : Provided

Details of control levers :

i) Position control lever (Black)

ii) Draft control lever (Red)

iii) Isolating valve.

Method of draft sensing : Through top link

1.13.2 **Three point linkage:**

S. No.	Observations		As per IS: 4468-(Part-1) -1997, (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.)	50.8	-do-
II.	**Lower hitch points:**				
	a)	Dia of hitch pin hole	22.40 to 22.65 / 28.70 to 29.00	28.91	-do-
	b)	Width of ball	34.8 to 35.0 / 44.8 to 45.0	45.0	-do-
III.	Lateral distance from lower hitch point to centre line of tractor.		359 / 435	435	-do-
IV.	Lateral movement of lower hitch points		100 (min) / 125 (min)	125	-do-
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	475	Conforms to Cat.I & II
VI.	Transport height		820 (min)/ 950 (min)	925	Conforms to Cat-I
VII.	Power range (without force)		560(min)/ 650 (min)	590	Conforms to Cat-I
VIII.	Leveling adjustment		100 (min)/ 100 (min)	310	Conforms to Cat.I & II
IX.	Lower hitch point clearance		100 (min)/ 100 (min)	130	-do-
X.	Lower hitch point height		200 (max)/ 200 (max)	200	-do-

1.13.3 **Linkage geometry dimensions [Refer Fig.-1(a)]:**
The following are dimensions observed, corresponding to **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	675	675
2.	Length of lift arm	B	285	285
3.	Length of lift rods	C	465 to 600	540
4.	Length of top link	D	495 to 725	600
5.	Distance of lift rod connection point from pivot point of lower link.	E	350	350
6.	Distance of lower link pivot point from rear wheel axis:			
	-Horizontally	F	150, behind	150, behind
	-Vertically	G	125, below	125, below
7.	Distance of upper link pivot point from rear wheel axis:			
	-Horizontally	H	250 behind	250, behind
	-Vertically	J	260, above	260, above

1	2	3	4	5
8.	Distance of lift arm pivot point from rear wheel axis:			
	-Horizontally	K	10, behind	10, behind
	-Vertically	L	275, above	275, above
9.	Height of lower hitch points relative to the rear wheel axis:			
	- In high position	M	100 to 335 above	200 above
	- In low position	N	- 550 to -200 below	390 below
10.	Height of lower link hitch points when locked in transport position		200,above	

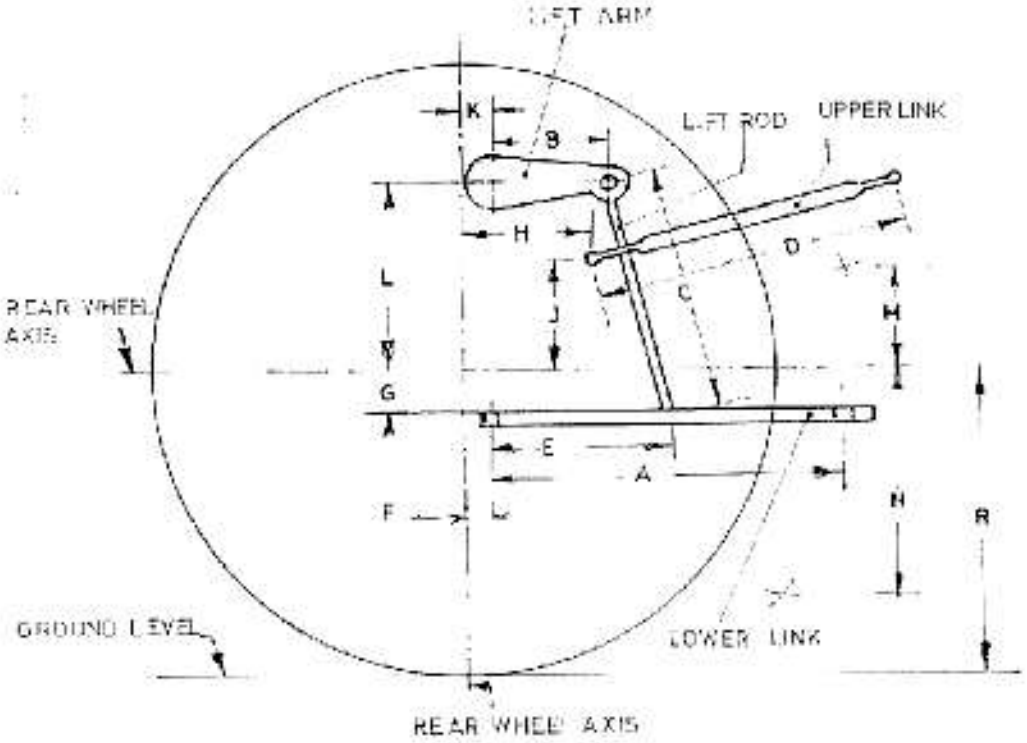


Fig. 1 (a): DIMENSIONAL NOTATIONS FOR TABLE OF LINKAGE GEOMETRY

1.13.4 Drawbar:

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

Notation	As per IS: 12953-1990, (Cat.I) / (Cat.II), (mm)	As measured, (mm)	Remarks
A	683 ± 1.5 / 825 ± 1.5	826.0	Conforms to Cat-II
B	75 (min) / 75 (min)	75.4	-do-
C	30 (min) / 30 (min)	32.1	-do-
DØ	21.79 to 22.0 / 27.79 to 28.0	27.8	-do-
E	39.0 (min) / 49.0 (min)	52.3	-do-
FØ	12.0 (min) / 12.0 (min)	12.5	-do-
G	15.0 (min) /15.0 (min)	16.8	-do-
HØ	25 ± 1 / 25 ± 1	25.0	-do-
J	80 ± 1.5 / 80 ± 1.5	80.0	-do-
No. of holes	7 / 9	09	-do-

1.13.4.2 Swinging drawbar : Not provided

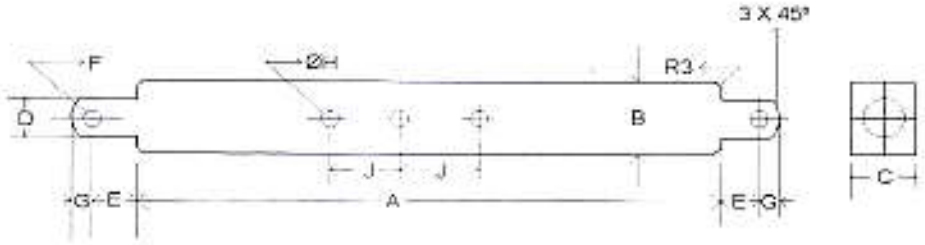


Fig. 1 (b): DIMENSIONAL NOTATIONS FOR LINKAGE TYPE DRAWBAR

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)	:	543 & 1584
Distance behind rear axle, (mm)	:	350
Engine to PTO speed ratio	:	3.500 :1 (Low) & 1.20:1 (High)
Power restriction, (if any)	:	**None**

1.14.1 **Specifications of Power Take-Off Shaft: -**

Specification	As per IS: 4931-1995 (Type-I)	As observed	Remarks
1	2	3	4
Nominal speed, (rpm)	540 ± 10	540 rpm of PTO shaft corresponds to 1890 rpm of engine.	Conforms
No. of splines	6	6	Conforms
Direction of rotation	Clockwise	Clockwise	-do-
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 the centre line of the tractor	-do-
Dimensions, (mm) (See Fig. 2):			
DØ	34.79 ± 0. 06	34.77	--do--
dØ	28.91 ± 0.05	28.9	-do-
BØ	29.4 ± 0.1	29.4	--do--
AØ (optional)	8.3 ± 0.1	8.3	-do-
W	8.69 - 0.09 - 0.16	8.65	-do-
a	7	7	-do-
b (optional)	25 ± 0.5	25.0	-do-
c	38	38	-do-
X	30°	30°	-do-
B	76 (min)	85.0	-do-
h	450 to 675	560	-do-

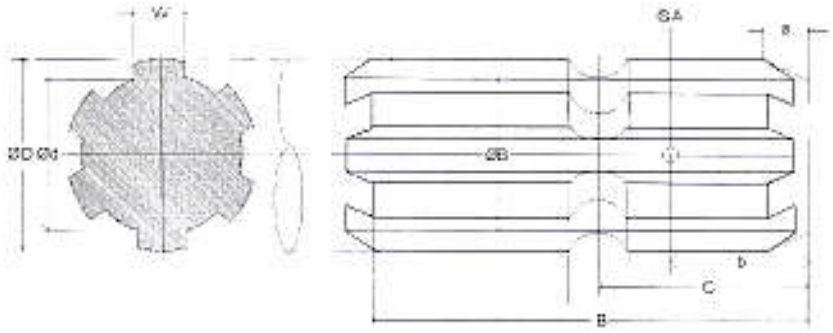


Fig. 2(a): DIMENSIONAL NOTATIONS FOR TYPE-I POWER TAKE-OFF SHAFT

1.14.2 Master Shield of Power Take-Off Shaft:

Specification	As per IS 4931-1995, (mm)	As Observed, (mm)	Remarks
K	70(Min.)	70	Conforms
M	125 ± 5	125	--do--
N	85 ± 5	90	--do--
p	285 ± 5	285	--do--
r	76 (Max.)	0	--do--

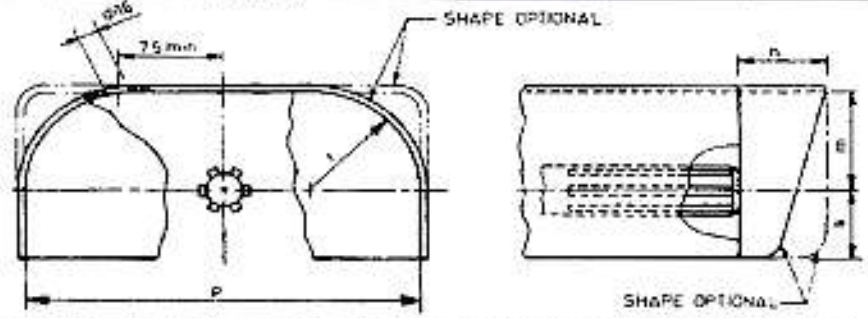


Fig. 2(b): DIMENSIONAL NOTATION FOR PTO SHAFT MASTER SHIELD

1.15 **Towing hitch:**

1.15.1 **Front** : **Not provided**

1.15.2 **Rear** :

Type : Clevis

Location : At rear of transmission housing

Height above ground level, (mm):

- Maximum : 525
- Minimum : 365
- No. of positions : 04
- Type of adjustment : By changing hitch position on its mounting bracket.

Distance of hitch point, (mm):

-From rear wheel centre : 420

-From power take-off shaft end : 70

Dia of pin hole, (mm) : 30.0

Width of clevis, (mm) : 105.0

1.16 **Steering:**

Make : Rane

Type : Mechanical, re-circulating balls & nut with single drop arm.

Location : Above clutch housing

	Method of operation	:	Manual, through steering control wheel
	Diameter of steering control wheel, (mm)	:	410
	Steering oil capacity, (l)	:	0.70
	Lubricant change period	:	After every 500 hours of operation
1.17	**Brakes:**		
1.17.1	**Service Brake:**		
	Make	:	TVS Girling
	Type	:	Mechanical dry disc
	Location	:	On differential half axle shaft, out side of differential housing.
	No. of disc(s)	:	Two (on each wheel side)
	Area of liners, (cm^2)	:	607.7 (on each wheel side)
	Material of liners	:	Non asbestos (apa)
	Method of operation	:	Manual, individual/combined operation by RHS foot pedal.
1.17.2	**Parking Brake:**		
	Type	:	Toggle link locking mechanism
	Location & Method of operation	:	Service brake act as parking brake when locked in position by a hand lever provided on RHS of the operator's seat.
1.18	**Wheel Equipment:**		
1.18.1	**Steered Wheel(s):**		
	Make	:	Good year
	Number(s)	:	Two
	Type of tyre	:	Pneumatic, ribbed
	Size	:	6.00 – 16
	Ply rating	:	8
	Maximum permissible loading capacity of each tyre at 196 kPa pressure (kgf)	:	400
	Recommended inflation pressure, (kPa) :		
	- For field work	:	167
	- For transport	:	196
	Track width, (mm)	:	1240 (std) and 1500
	Method of changing track width	:	By reversing the wheels
	Make & size of wheel rim	:	Wheels India Ltd, 4.5E x 16
1.18.2	**Drive wheel(s):**		
	Make	:	Apollo
	Number	:	Two
	Type of tyre	:	Pneumatic, traction
	Size	:	12.4-28
	Ply rating	:	12
	Maximum permissible loading capacity of each tyre at 137 kPa pressure, (kgf)	:	1160
	Recommended inflation pressure, (kPa):		
	- For field work	:	118
	- For transport	:	137
	Track width, (mm)	:	1250,1360 (std),1450, 1560,1590,1700,1800, & 1900
	Method of changing track width	:	By reversing the wheel disc & changing the position of wheel disc on off-set rim lugs.
	Make & size of wheel rim	:	SSWL & W 11 x 28
1.18.3	**Wheel base, (mm)**	:	1880
	Method of changing wheel base, if any, and range	:	None

1.19 **Operator's seat:**

Make	:	Polar Auto & Engineering Industries Private ltd.
Type	:	Cushioned
Type of Suspension	:	Two helical springs
Type of Damping	:	Hydraulic shock absorber
Range of adjustment, (mm):		
Vertical	:	Nil
Lateral	:	Nil
Longitudinal	:	±130

1.20 **Provision for safety and comfort of operator:**

1.20.1 **Operator's Seat:**

Meets the minimum requirements of IS: 12343-1998, (Re-affirmed in March, 2009) **except the following:**

i) Longitudinal distance from SIP to centre of steering control wheel.

1.20.2 **Conformity with IS: 6283 (Part 1 & 2)-1998 (Re-affirmed in March, 2009) :**

Controls and displays are identifiable with symbols as per IS : 6283 (Part 1&2) – 1998, meets the requirements.

1.20.3 **Conformity with IS : 8133-1983 (Re-affirmed in March, 2009) :**

Location and movement of various controls meets the requirement of IS : 8133-1983, **except the following:**

i) Safety switch against accidental start of the engine has not been provided.
ii) Fuel shut off lever does not remain in stop position.

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

Meets the requirements of IS: 12239 (Part-1) – 1996,except the following

i) The spark arrester has not been provided in the exhaust system.
ii) Power take-off master shield has not been provided for the PTO shaft
iii) Width of foot step.

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

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

i) Working clearance around the draft control lever & mudguard.

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

Lighting meets the requirements of IS: 14683 – 1999.

1.20.7 **Rear view mirror:**

Rear view mirror has been provided.

1.21 **Labelling of tractor As per IS: 10273- 1987 (Re-affirmed in March, 2009) :**

The labelling plate riveted on the RHS of battery box provides the following information:

Name of Manufacturer	M/s. Mahindra & Mahindra Limited, Farm Equipment Sector.
Make	MAHINDRA
Model	265 DI MKM
Chassis Serial Number	NEBT00078
Engine Serial Number	NEBT00078
Maximum PTO Power, kW (hp)	22.8 (30.6)
Specific fuel consumption, gm/kWh (g/hph)	245(183)
Month & Year of Manufacturing	GG (i.e. October,2016)

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

Particulars		As used during drawbar test	As used during field test		As used during Haulage test
			Dry land	Puddling	
Front	C.I. weight	80	Nil	Nil	Nil
	Water	Nil	Nil	Nil	Nil
Rear	C.I. weight	74	74	Half cage wheel	74
	Water	250	Nil	Nil	Nil
	Additional weight, if any	--	--	--	

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)	With Unballast	680	1060	1740
ii)	With ballast as used during drawbar performance test.	760	1390	2150
iii)	With ballast as used during field test	720	1130	1850
iv)	As used during wetland operation	720	1130	1850
v)	With ballast as used during haulage test with trailer hitch, canopy and drawbar.	680	1150	1835

1.24 **Overall dimensions:**

Condition	Length, (mm)	Width, (mm)	Height, (mm)		Ground Clearance, (mm)
			With exhaust Pipe	Without exhaust pipe	
With Unballast	3255	1670	2195	1650 (At steering wheel)	335 (below front axle ballast weight)

1.25 **Number of external lubricating points:**

- Oiling : **None**
- Grease cups : 02
- Grease nipples : 17

1.26 **Colour of tractor:**

Chassis & engine : Red
Sheet metal: : Red
Bonnet, Mudguard & Rim : Red

2. FUEL AND LUBRICANTS

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

2.2 **Lubricants:**

Sl. No.	Particulars	As recommended by the manufacturer	As used during the test
1.	Engine & air cleaner oil	SAE 20W 40	Servo super 20W40
2.	Transmission system oil	EP 90	Oil originally filled in the tractor was not changed
3.	Hydraulic system oil	VG 100	-do-
4.	Steering housing oil	SAE 140	-do-
5.	Grease	MP3 Lithium base	MP Grease

3. PTO PERFORMANCE TEST

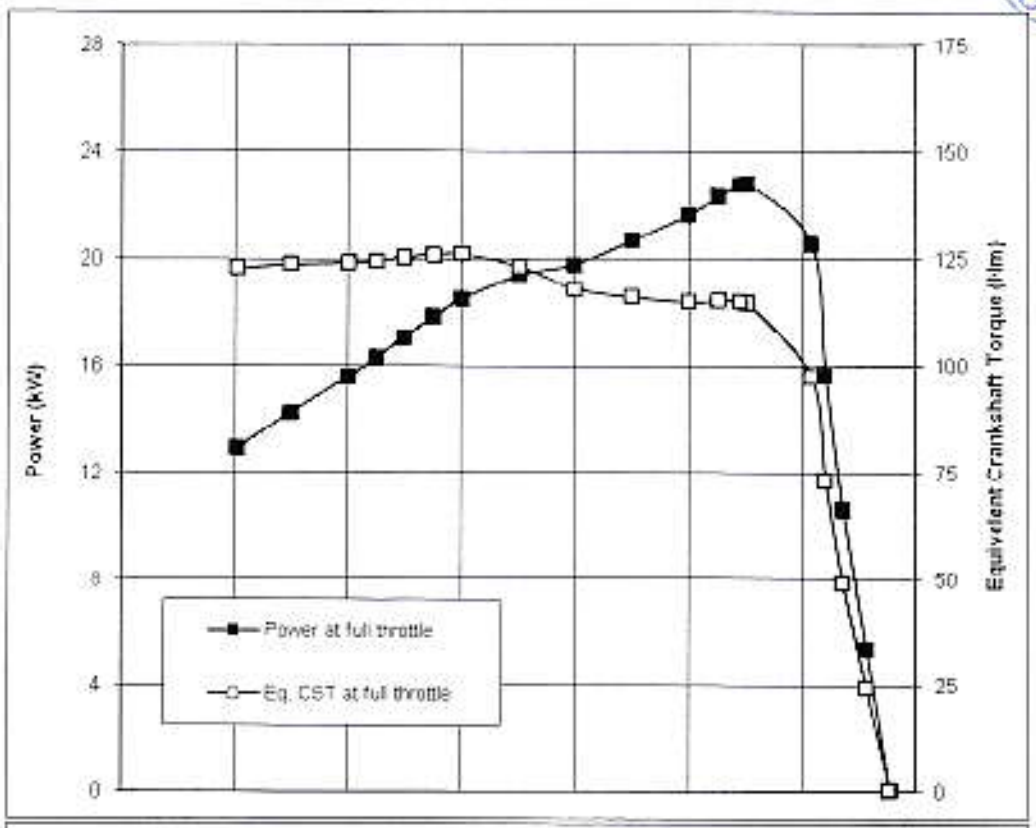
Date(s) of test : 06.01.2017 &10.01.2017
Tractor run at the Institute prior to start of PTO test (h) : 1.7
Type of dynamometer bench : Eddy current, SAJ AG 250

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

Table – 1

Power (kW)	Speed, (rpm)		Fuel consumption			Specific energy, (kWh/l)
	P.T.O.	Engine	(l/h)	(kg/h)	Specific, (kg/ kWh)	
1	2	3	4	5	6	7
a) Maximum power - 2 hours test:						
22.8	543	1901	6.50	5.44	0.239	3.50
21.6	543	1900	6.21	5.19	0.241	3.48*
b) Power at rated engine speed (1900 rpm):						
22.8	543	1901	6.50	5.44	0.239	3.50
21.6	543	1900	6.21	5.19	0.241	3.48*
c) Power at standard power take-off speed (540 ± 10 rpm):						
22.8	540	1890	6.50	5.43	0.238	3.50
21.9	540	1890	6.28	5.25	0.240	3.49*
d) Varying loads at rated engine speed:						
i) Torque corresponding to maximum power available at rated engine speed:						
22.8	543	1901	6.50	5.44	0.239	3.50
ii) 85% of the torque obtained in (i) :						
20.6	576	2016	5.85	4.89	0.237	3.52
iii) 75% of the torque obtained in (ii):						
15.6	583	2041	4.62	3.86	0.247	3.38
iv) 50% of the torque obtained in (ii) :						
10.6	592	2072	3.51	2.93	0.276	3.02
v) 25% of the torque obtained in (ii):						
5.4	604	2114	2.49	2.08	0.385	2.17
vi) Unloaded:						
0.10	616	2156	1.59	1.33	13.300	0.06
e) Varying loads at standard PTO speed:						
The varying load test at standard PTO speed was not conducted as the maximum PTO power of tractor was observed at 543 PTO rpm , which is within the range of standard PTO speed of 540 ± 10 rpm.						

*Under High ambient conditions



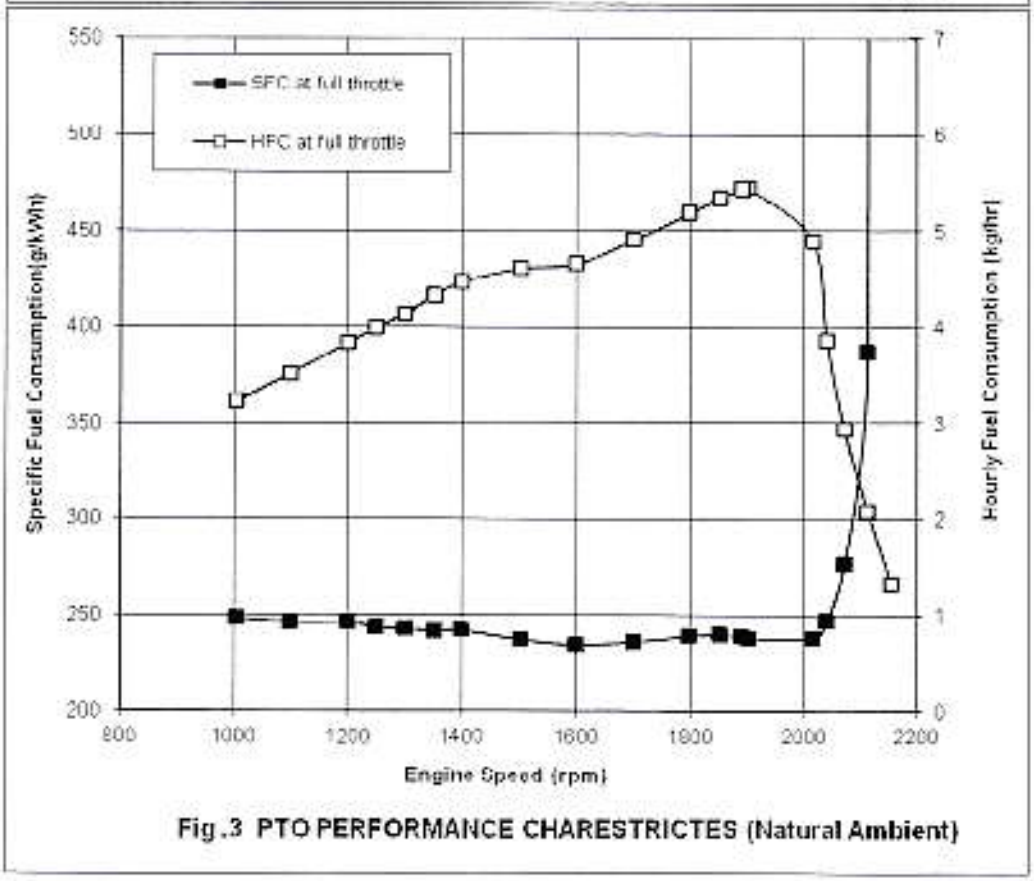


Fig.3 PTO PERFORMANCE CHARESTRICTES (Natural Ambient)

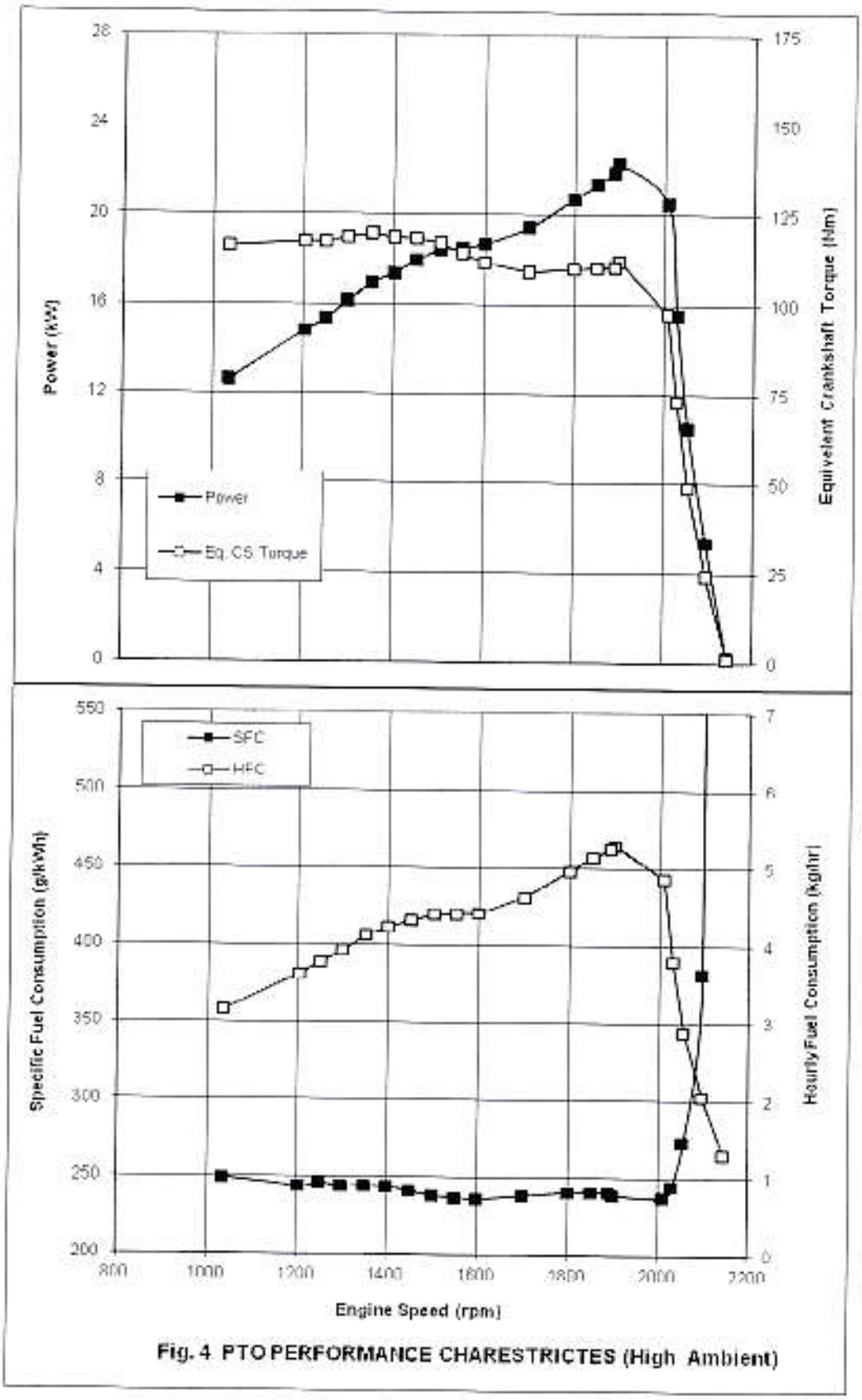


Fig. 4 PTO PERFORMANCE CHARESTRICTES (High Ambient)

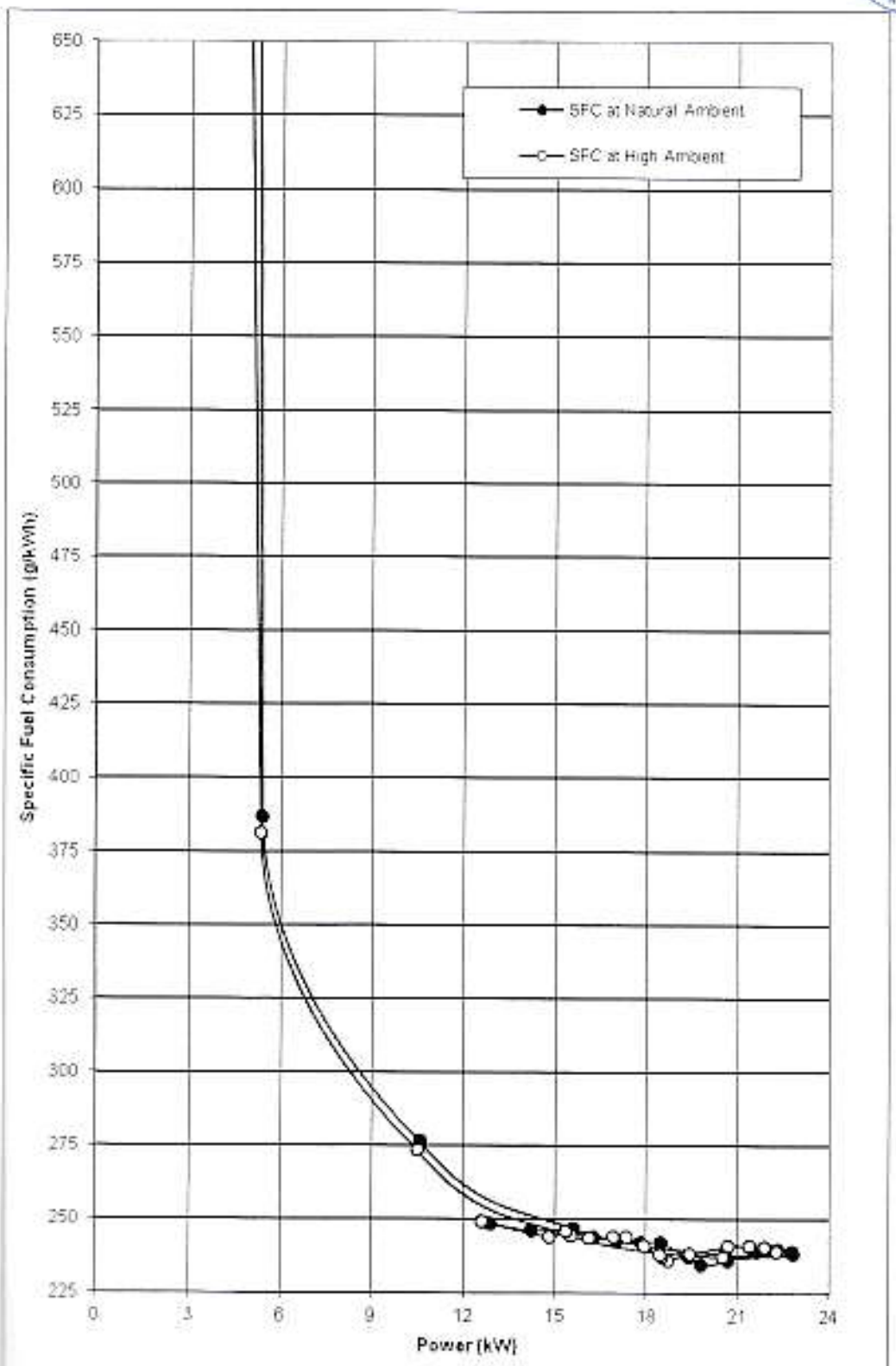


Fig.5 PTO PERFORMANCE CHARACTERISTICS

		Natural ambient	High ambient
-No load maximum engine speed, (rpm)	:	2156	2146
-Equivalent crankshaft torque at maximum power, (Nm)	:	114.7	108.3
-Maximum equivalent crankshaft torque, (Nm)	:	126.1	119.6
- Backup torque (%)	:	9.9	10.4
-Engine speed at maximum Equivalent crankshaft torque, (rpm)	:	1400	1351
Smoke level, maximum light absorption coefficient (per meter)	:	0.19	--
Range of atmospheric conditions:			
- Temperature, (deg.C)	:	24 to 29	41 to 44
- Pressure, (kPa)	:	98.84 to 99.29	99.81 to 99.93
- Relative humidity, (%)	:	38.3 to 51.7	18.3 to 19.3
Maximum temperatures (°C):			
- Engine oil	:	113	126
- Coolant	:	88	103
- Fuel	:	48	64
- Air intake	:	54	72
- Exhaust gas	:	574	587
Pressure at maximum power:			
- Intake air, (kPa)	:	2.8 to 2.9	3.2 to 3.5
- Exhaust gas,(kPa)	:	2.3 to 3.2	2.0 to 3.2
Consumptions:			
- Lub. oil, (g/kWh)	:	--	1.22
- Coolant, (% of total coolant capacity)	:	--	Nil

4. DRAWBAR PERFORMANCE TEST

Date(s) of test	:	15.06.2017,16.06.2017 & 17.06.2017
Tractor run at the Institute prior to start of drawbar performance test, (h)	:	32.6
Type of track	:	Concrete
Height of drawbar, (mm):		
- With unballast	:	640
- With ballast	:	600

4.1 The results of drawbar performance test consisting of maximum power and pull with unballast / ballast and ten hours test is 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 (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
i) Maximum power test (Tractor Unballasted):																
L1	2.48	10.0	14.46	2033	14.8	0.341	4.08	2.45	33	98.1	49	41	77	84	107	14.80
L2	4.33	17.0	14.11	2002	14.5	0.297	6.04	2.81	33	98.2	51	40	77	87	109	14.30
L3	6.66	20.3	10.96	1961	4.5	0.265	6.44	3.15	30	98.2	59	38	64	87	107	11.59
L4	9.49	21.4	8.10	1912	1.5	0.251	6.43	3.33	30	98.2	56	37	64	87	107	8.67
H1	8.10	19.9	8.85	1980	3.8	0.275	6.55	3.04	28	98.2	59	34	61	87	104	10.09
ii) Maximum power test (Tractor ballasted):																
L1	2.43	11.4	16.89	2026	15.1	0.341	4.65	2.45	27	98.3	68	34	61	84	106	17.39
L2	4.30	18.4	15.40	1955	11.9	0.297	6.54	2.81	24	98.3	75	30	58	86	105	17.39
L3	6.56	19.8	10.83	1951	4.2	0.279	6.61	3.00	25	98.3	80	31	56	86	102	11.92
L4	9.32	18.7	7.21	1915	1.2	0.294	6.58	2.84	25	98.3	56	32	55	86	103	8.02
H1	7.84	18.8	8.62	1944	3.9	0.293	6.59	2.85	26	98.2	69	32	52	85	98	9.83

Contd..Table-2

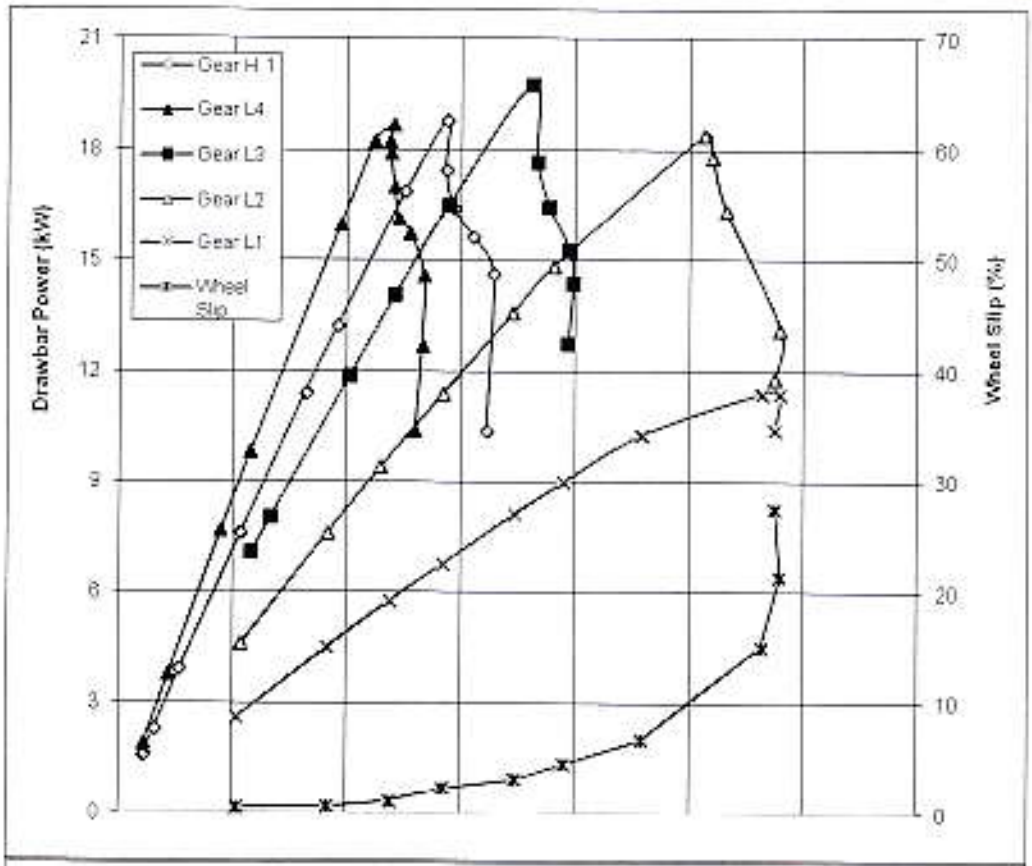
Gear	Travel Speed, (Km/h)	Draw-bar power, (kW)	Draw-bar pull, (kN)	Engine Speed, (rpm)	Wheel Slip, (%)	Fuel consumption (kg/kWh)	Fuel consumption (l/h)	Specific Energy, (kWh/l)	Atmospheric conditions Temp (°C)	Atmospheric conditions Pressure (kPa)	Atmospheric conditions R.H. (%)	Temperature (°C) Fuel	Temperature (°C) Trans. oil	Temperature (°C) Coolant	Temperature (°C) Engine oil	Max. sustained pull, (kN)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
iii) Five hours test at 75 percent of pull obtained at max. Power (ballasted wheeled tractor):																
L2	4.63	14.9	11.56	2017	4.6	0.309	5.51	2.70	24 to 28	98.1 to 98.3	63 to 71	29 to 34	50 to 77	84 to 85	99 to 109	--
iv) Five hours test at pull corresponding to 15 percent wheel slip (ballasted wheeled tractor):																
L1	2.53	11.9	16.91	2027	--	0.321	4.34	2.73	29 to 35	97.8 to 98.2	50 to 56	35 to 43	75 to 77	84 to 86	106 to 108	--

i) The coolant (water) and lub oil consumption during 10 hours test were observed as **4.9 ml/h** and **4.9 ml/h** respectively.

ii) Tyre Creeping, (mm):
- LHS : 15
- RHS : 27

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

Engine oil	:	111
Coolant (water)	:	97
Transmission oil	:	77
Fuel	:	43



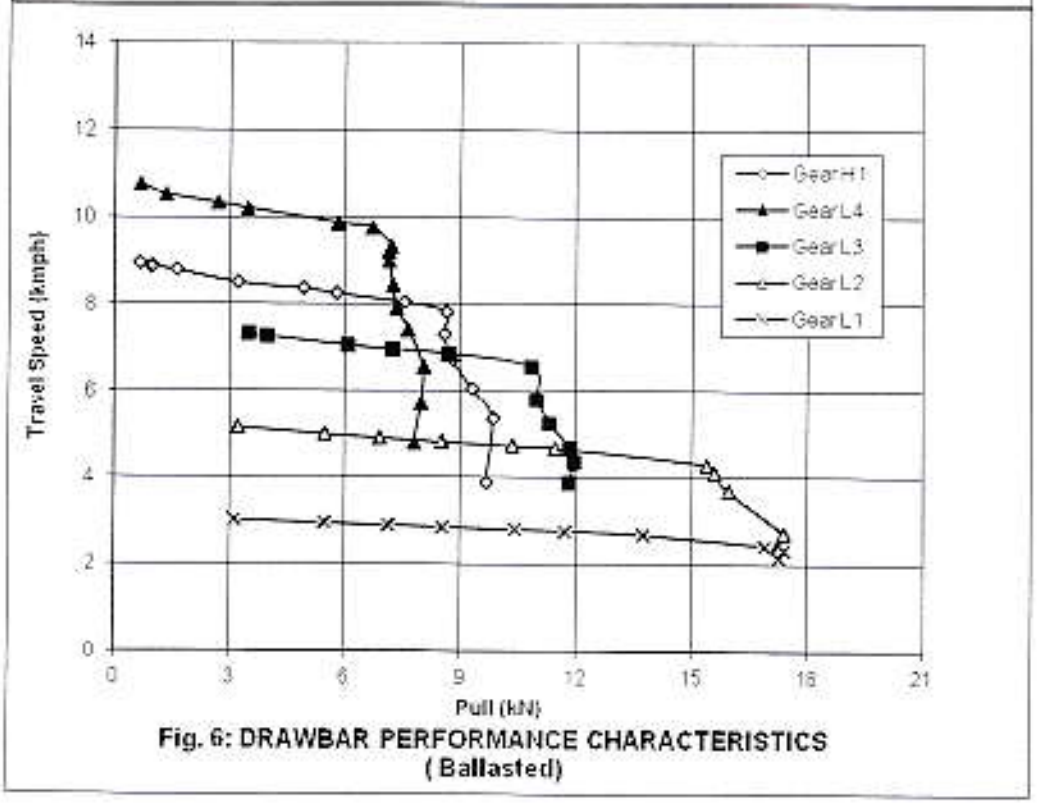


Fig. 6: DRAWBAR PERFORMANCE CHARACTERISTICS
(Ballasted)

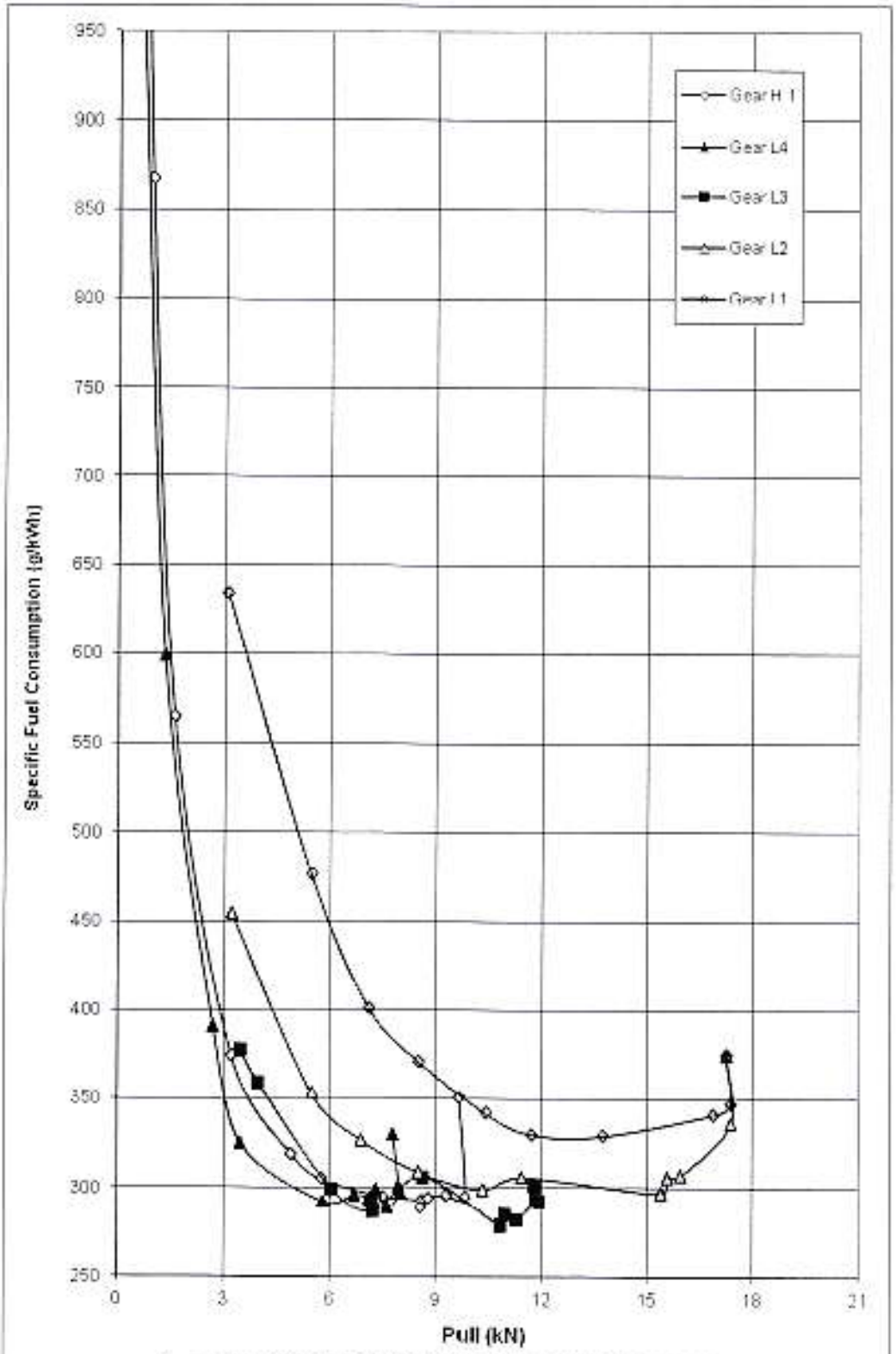


Fig. 7 DRAWBAR PERFORMANCE CHARACTERISTICS
(Ballasted)

5. POWER LIFT AND HYDRAULIC PUMP PERFORMANCE TEST

Date(s) of test : 01.02.2017 & 02.02.2017

Tractor run at the Institute prior to start of hydraulic test, (h) : 19.4

Pump speed at rated engine speed,(rpm) : 2394

5.1 Hydraulic power test:

Pump delivery rate at minimum pressure and rated engine speed (l/min) : 29.88

Maximum hydraulic power,(kW) : 6.87

Pump delivery rate at maximum hydraulic power, (l/min) : 26.64

Pressure at maximum hydraulic power, (MPa) : 15.5

Sustained pressure of the open relief Valve, (MPa) : 19.5

Tapping points:

a) Relief valve test : External circuit

b) Pump performance test : Pump outlet

Temperature of hydraulic fluid, (°C) : 60 to 67

5.2 Lifting capacity test:

Test	Height of lower hitch point above ground in down position, (mm)	Vertical Movement with lifting force, (mm)	Maximum corrected force exerted through full range, (kN)	Correspo -nding pressure (MPa)	Moment about rear axle, (kN-m)	Maximum lift angle of mast from vertical (degrees)
At hitch points	200	590	13.28	17.55	10.96	--
On the standard frame	200	580	8.37	17.55	12.01	20.5

5.3 Maintenance of lift load:

Force applied at the frame, (kN) : 7.53

Temperature of hydraulic fluid at the start of test, (°C) : 60

5.3 Test data:

Elapsed Time, (minute)	5	10	15	20	25	30
Cumulative drop in height of lift, (mm)	05	10	15	16	20	25

6. BRAKE TEST

6.1 Service brake:

6.1.1 Cold brake test:

Date of test: : 25.01.2017

Type of track : Concrete

Maximum attainable speed (kmph):

Unballasted : 31.8 kmph

Ballasted : 31.8 kmph

		Maximum attainable speed (kmph)			
Unballasted Tractor	Braking device control force, (N)	494	434	374	314
	Mean deceleration, (m/sec.sq.)	3.70	2.90	2.63	2.50
	Stopping distance, (m)	10.68	13.47	14.83	15.61
Road Ballasted Tractor	Braking device control force, (N)	578	501	425	348
	Mean deceleration, (m/sec.sq.)	3.63	3.43	3.07	2.50
	Stopping distance, (m)	10.77	11.38	12.72	15.61
		At 25 kmph travel speed			
Unballasted Tractor	Braking device control force, (N)	539	438	337	236
	Mean deceleration, (m/sec.sq.)	3.40	2.95	2.81	2.50
	Stopping distance, (m)	7.08	8.17	8.60	9.65
Road Ballasted Tractor	Braking device control force, (N)	550	506	461	417
	Mean deceleration, (m/sec.sq.)	3.42	3.12	2.66	2.50
	Stopping distance, (m)	7.25	7.73	9.07	9.65

6.1.2 Brake fade test:

		Maximum attainable speed (kmph)			
Road Ballasted Tractor	Braking device control force,(N)	592	514	437	359
	Mean deceleration, (m/sec.sq.)	3.68	3.46	2.92	2.50
	Stopping distance, (m)	10.87	11.27	13.37	15.61
		At 25 kmph travel speed			
Road Ballasted Tractor	Braking device control force, (N)	597	543	489	435
	Mean deceleration, (m/sec.sq.)	3.18	3.06	3.00	2.50
	Stopping distance, (m)	7.75	7.88	8.03	9.65

Max. deviation of tractor from its original course, (m) : **None**

Abnormal vibration : **None**

The brakes were heated by : Self braking

6.2 Parking brake test:

Particulars	Parked on 18 percent slope		Parked on 12 percent slope with trailer of 1.76 tonnes	
	Facing Up	Facing Down	Facing Up	Facing Down
Braking device control force, (N)	207	210	172	221
Efficacy of parking brake	---------- **Effective** ----------			

7. NOISE MEASUREMENT

7.1 **Noise at bystander's position:**

Date of test : 23.12.2016
Type of track : Concrete
Background noise level, dB (A) : 54.6

Atmospheric conditions:

Temperature, (°C) : 23
Pressure, (kPa) : 97.3
Relative humidity, (%) : 53
Wind velocity, (m/s) : 1.4

TEST DATA:

S. No.	G e a r	Travelling speed before acceleration, (kmph)	Noise level, dB (A)
1.	L1	3.22	78
2.	L2	5.50	77
3.	L3	7.94	77
4.	L4	11.24	77
5.	H1	9.27	77
6.	H2	15.80	78
7.	H3	22.74	79
8.	H4	31.85	81

7.2 **Noise at operator's ear level:**

Date of test : 15.06.2017
Type of track : Concrete
Background noise level, dB (A) : 53

Atmospheric conditions:

Temperature, (°C) : 33
Pressure, (kPa) : 98.1
Relative humidity, (%) : 48
Wind velocity, (m/s) : 1.0

TEST DATA:

Gear	Drawbar pull at which the tractor develops the max. noise level, (kN)	Corresponding traveling speed, (kmph)	Noise level dB (A)
L1	12.98 to 14.12	2.66 to 2.51	91
L2	10.7 to 14.11	4.75 to 4.33	92
*L3	10.98 to 11.04	6.65 to 6.50	93
L4	6.79 to 7.64	10.03 to 9.79	92
H1	8.43 to 8.95	8.06 to 7.79	91

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

8. AIR CLEANER OIL PULL-OVER TEST

Date(s) of test : 28.02.2017

Atmospheric conditions:

- Temperature, (°C) : 24 to 28
- Pressure, (kPa) : 97.5 to 97.7
- Relative humidity, (%) : 33 to 39

Mass of oil before test,(g) : 473.5

S. No.	Position of tractor	Loss of oil (g)	Oil pull - over (%)	Engine oil pressure
i)	Tractor parked on level ground	0.3	0.06	Normal
ii)	Tractor tilted 15° laterally on RHS	0.3	0.06	--do--
iii)	Tractor tilted 15° laterally on LHS	Nil	Nil	--do--
iv)	Tractor tilted 15° longitudinally with front end up	Nil	Nil	--do--
v)	Tractor tilted 15° longitudinally with front end down	0.3	0.06	--do--

9. MECHANICAL VIBRATION MEASUREMENT

Date of test : 04.02.2010

Type of test surface : Concrete

Sl. No.	Measuring points		Vibration, microns			
			At no load		At load corresponding to 85% of maximum PTO power	
			VD	HD	VD	HD
1	2		3	4	5	6
i)	Foot rest	Left	50	70	240*	100
		Right	50	80	60	180*
ii)	Steering wheel		70	70	60	130*
iii)	Seat	Bottom	20	30	30	30
		Back	20	20	20	30
iv)	Mudguard	Left	90	70	70	120*
		Right	80	50	90	70
v)	Head light	Left	60	110*	130*	230*
		Right	90	120*	30	40
vi)	Battery base, centre		90	30	190*	90
vii)	Tail light	Left	60	110*	60	90
		Right	100	90	130*	60
viii)	Plough light		130*	100	120*	70
ix)	Gear shifting lever		20	30	30	20
x)	Accelerator lever	Hand	60	80	130*	100
		Foot	90	120*	170*	240*
xi)	Brake pedal	Left	140*	70	40	60
		Right	40	70	150*	80
xii)	Clutch pedal		50	50	200*	70
xiii)	Main hydraulic control lever		10	30	20	20
xiv)	PTO engaging lever		140*	70	50	60
xv)	Differential lock		Not provided			

* The amplitude of mechanical vibration is on higher side.

10. LOCATION OF CENTRE OF GRAVITY

Condition	Particulars	Coordinates
Tractor under unballast condition but with all the liquid reservoirs full & the operator replaced by a 75 kg mass on the seat	Height above ground, (mm)	797
	Distance forward from the vertical plane containing the axis of rear wheels, (mm)	738
	Distance from the median plane parallel to the longitudinal axis of tractor bisecting the track, (mm)	7.5 (towards RHS)

11. TURNING ABILITY

Characteristics	Minimum turning diameter, (m)		Minimum clearance diameter, (m)	
	LHS	RHS	LHS	RHS
Brake applied	6.07	6.08	6.35	6.36
Brakes released	6.88	6.88	7.14	7.16

12. OPERATOR'S FIELD OF VISION

The operator's field of vision to the front and rear from the operator's seat is represented in **Fig. 8** as per the following details:

1. The non visible space in front is **6540 mm** which is **3.48** times of its wheel base (i.e. 1880 mm)
2. The non visible space in LHS & RHS is **2580 mm** which is **1.89** times of its rear track width (i.e. 1360 mm)
3. The major parts creating masking effect is silencer.

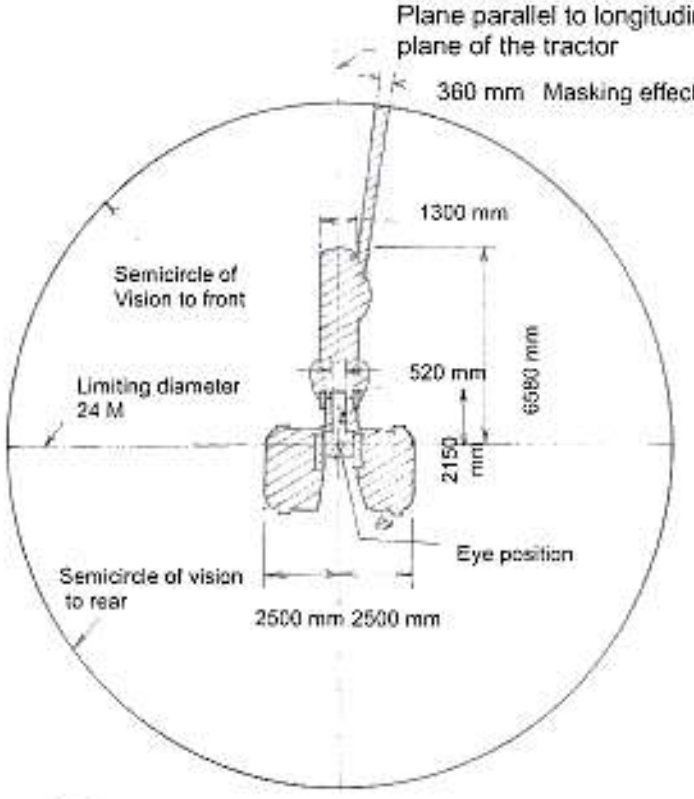


Fig. 8: OPERATOR'S FIELD OF VISION

13. FIELD TEST

13.1 The field tests comprising of disc ploughing, rotavation and puddling (including water proof test) were conducted for 10.45 and 10.41 and 15.49 hours respectively.

All the field tests were conducted at the full accelerator settings, when the no load speed of the engine was 2080 to 2135 rpm.

13.2 The brief specifications of the implements used during field tests are given in **Annexure-I.**

13.3 The summary of field test observation with two bottom disc plough, rotavator and puddler is given in **Table - 3.**

Table - 3

SUMMARY OF FIELD PERFORMANCE TEST

S. No.	Parameter/operation	Disc Ploughing	Rotavation	Puddling
1	2	3	4	5
i)	Type of soil (refer IS: 7926-1975)	Light	Light	Heavy
ii)	Av. soil moisture, (%) / Av. depth of standing water (cm)	7 to 8	7 to 9	15 to 18
iii)	Bulk density of soil, (g/cc)	1.9	1.9 to 2.0	--
iv)	Cone index, (kg/sq.cm) / Puddling index, (%)	6.8 to 7.3	6.3 to 8.2	72 to 77
v)	Gear used	L-1	L-1	L-1
vi)	Av. speed of operation, (kmph)	2.58 to 2.61	3.07 to 3.10	2.46 to 2.48
vii)	Av. wheel slip, (%) / Av. Travel reduction, (%)	15.3 to 15.8	-3.36 to -1.80	16.8 to 18.2
viii)	Av. depth of cut, (cm) / Av. Depth of puddles, (cm)	26 to 27	6.0	15.9 to 17.8
ix)	Av. working width, (cm)	61 to 63	110 to 120	--
x)	Area covered, (ha/h)	0.122 to 0.124	0.293 to 0.294	--
xi)	**Fuel consumption:**			
	- (l/h)	2.04 to 2.06	2.18 to 2.38	2.50 to 2.67
	- (l/ha)	16.61 to 16.72	7.44 to 8.09	--
xii)	Av. draft of implement, (kN)	395 to 420	--	--

Remarks:-The average lub oil and coolant consumptions during the entire field tests were observed to be **1.55** and **3.12** ml/h respectively.

13.4 Wet land cultivation (Puddling):

13.4.1 The tractor was fitted with half cage wheel and paddy harrow (Puddler) for conducting the puddling operation. The brief specification of half cage wheel used is given in **Annexure – II.**

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

S. No.	Location	Whether ingress of mud and/or water	Remarks
1.	King pin assemblies	No	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	

14. HAULAGE TEST

		Two wheel (Single axle)	Four wheel (Double axle)
Type of trailer:			
Gross mass of trailer, (tonnes)	:	5.0	6.0
Height of trailer hitch above ground level, (mm)	:	495	505
Gear used during the test for negotiating slopes up to 8%	:	H-4	H-4
Average travel speed, (kmph)	:	29.97 to 31.10	30.64
Average fuel consumption:			
- (l/h)	:	4.04 to 4.30	4.15 to 4.44
- (ml/km/ one)	:	26.93 to 27.66	22.56 to 24.18
Average distance traveled per litre of fuel consumption, (km)	:	7.23 to 7.43	6.90 to 7.38
General observations:			
Effectiveness of brakes	:	Effective	Effective
Maneuverability of tractor-trailer Combination	:	Satisfactory	Satisfactory

15. COMPONENTS / ASSEMBLY INSPECTION

The engine and other assemblies were dismantled after **90.2** hours of tractor operation at this Institute.

15.1 Engine:

15.1.1 Cylinder bore:

Cylinder No.	Cylinder bore dia, (mm)						Maximum 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.	88.950	88.956	88.956	88.957	88.956	88.950	89.13
2.	88.957	88.958	88.958	88.956	88.957	88.955	
3.	88.953	88.955	88.951	88.953	88.956	88.951	

15.1.2 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.	88.351	88.259	88.816	**	88.13	0.144	0.20
2.	88.348	88.251	88.813	**		0.145	
3.	88.346	88.255	88.816	**		0.140	

** **Not measured due to piston design features.**

15.1.3 Ring end gap:

Rings	Ring end gap, (mm)									Max. Per-missible end gap limit,(mm)
	Top	Middle	Bot-tom	Top	Middle	Bottom	Top	Middle	Bottom	
1st comp. ring	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	2.5
2nd comp. ring	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	2.5
Oil ring	0.35	0.35	0.35	0.30	0.35	0.35	0.35	0.35	0.35	2.0

15.1.4 Ring side clearance:

Rings	Ring side clearance, (mm)			Max. Permissible clearance Limit, (mm)
	Piston-I	Piston-II	Piston-III	
1st Compression ring	- TAPERED-			
2nd Compression ring	0.072	0.071	0.070	0.30
Oil ring	0.038	0.044	0.043	0.20

15.1.5 Main bearings:

Bearing No.	Diametrical Clearance, (mm)	Crankshaft end Float, (mm)	Max. permissible clearance limit, (mm)	
			Diametrical clearance	Crankshaft end float
1.	0.113 to 0.115	0.18	0.20	0.60
2.	0.117 to 0.118			
3.	0.116 to 0.117			
4.	0.112 to 0.114			

15.1.6 Big end bearings:

Bearing No.	Clearance, (mm)		Max. permissible clearance limit, (mm)	
	Diametrical	Axial	Diametrical	Axial
1.	0.112 to 0.113	0.25	0.20	0.75
2.	0.113 to 0.114	0.25		
3.	0.109 to 0.109	0.25		

15.1.7 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	:	20.15 to 20.59	Against the discard limit of 14.0 N/mm.
Exhaust	:	20.05 to 20.69	
Clearance between valve guide and valve stem, (mm):			
Intake valve	:	0.054 to 0.060	discard limit of 0.200 mm.
Exhaust valve	:	0.073 to 0.077	

15.2 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)	:	8.379 to 8.436	Against discard limit of 5.30 mm
Height of lining over rivet head, (mm)	:	1.30 to 1.78	Against discard limit of 0.20 mm

15.3 Transmission gears:

Any visual damage, pitting & chipping of any transmission gear teeth	:	None	
Backlash between crown wheel and pinion, (mm)	:	0.261	Against discard limit of 0.300 mm

15.4 Brakes:

Description	Initial specified thickness of brake disc, (mm)	Measured thickness of brake disc after test, (mm)	Measured height of lining over rivet head, (mm)	Minimum permissible thickness of brake disc, (mm)
Left	12.58 to 12.68	12.57 to 12.61	1.39 to 1.74	1.8
Right	12.58 to 12.68	12.52 to 12.63	1.50 to 1.83	1.8

15.5 Front axle:

Any marked wear of king pins	:	None	
Any marked wear of king pin bushes	:	None	
Clearance between king pins and bushes, (mm)	:	0.11 to 0.12	Against discard limit of 0.30 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)	:	0.15 to 0.16	Against discard limit of 0.30 mm

15.6 Steering system:

Visual condition of the components of complete steering assembly : Normal

15.7 Starter motor & Alternator:

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

16. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

S. No.	Adjustment/ Defects/ breakdowns and Repairs	Tractor run hours
	-None-	-

17. COMPARISON OF SPECIFICATION AND PERFORMANCE CHARACTERISTICS OF PREVIOUS SAMPLE [TEST REPORT No. T-764/ 1272/ 2011, (April) AND PRESENT SAMPLE]

			Previous sample	Present sample
17.1	**Specification:**			
17.1.1	**Tractor:**			
	Make	:	Mahindra	Mahindra
	Model	:	265 DI MKM	265 DI MKM
	Brand name	:	Bhoomiputra	Bhoomiputra
17.1.2	**Engine:**			
	Make	:	Mahindra	Mahindra
	Model	:	MDI 17853A	MDI 17853A
	Bore/Stroke, (mm)	:	88.9/110	88.9/110
	Specified cubic capacity, (cc)	:	2048	2048
	Rated engine speed (rpm)	:	1900	1900
17.1.2.1	**Fuel system:**			
	Make & model of fuel feed pump	:	FP/KS 22AD 62,9 440 030 029(apa)	FP/KS 22AD 62,9 440 030 029(apa)
	Make & model of fuel filters	:	Bosch, India & F 002 H20 117	Bosch, India & F 002 H20 117
	Make and model of fuel injection pump	:	Bosch, India & F002 AOZ 736,PES 3A 85D 320 RS 2000	Bosch, India & F002 AOZ 736,PES 3A 85D 320 RS 2000
	Make & model of fuel injectors	:	Bosch, India & F002 C70 007 653 310 342, DSLA 144P 1754	Bosch, India & F002 C70 007 653 310 342, DSLA 144P 1754
	Type of injector	:	Multi hole (Five holes)	Multi hole (Five holes)
	Manufacturer's production pressure setting, (MPa)	:	25.0+0.8	25.0+0.8
	Injection timing	:	6 ± 1 degree BTDC	6 ±1 degree BTDC
	Make & model of governor	:	Bosch, India & RSV400...950A5C1592R.	Bosch, India & RSV400...950A5C1592R.

			Previous sample	Present sample
17.1.2.2	**Lubricating system:**			
	Total lubricating oil capacity,(l)	:	5.83	5.65
17.1.3	**Transmission:**			
17.1.3.1	**Clutch:**			
	Type of clutch plate	:	Single , dry friction plates	
	Size, (mm),(OD/ID)		280/170	280/170
17.1.3.2	**Gear Box:**			
	No. of speeds:			
	- Forward	:	8	8
	- Reverse	:	2	2
	Range of speed, (kmph) :			
	- Forward	:	2.79 to 28.20	2.66 to 27.28
	- Reverse	:	4.23 to 12.27	4.02 to 11.88
17.1.4	**Service Brake:**			
	Type	:	Mechanical, dry disc brakes	
	No. of friction disc	:	Two on each wheel side	
	Area of liners, (cm^2)	:	605 (on each wheel side)	607.7 (on each wheel side)
17.1.5	**Wheel equipment:**			
	Make & Size of tyres	:		
	- Front	:	6.00-16, 8 PR	6.00-16, 8 PR
	- Rear	:	12.4-28, 12 PR	12.4-28, 12 PR
	Standard Track width, (mm):			
	- Front	:	1222	1240
	- Rear	:	1360	1360
17.1.5.1	**Wheel base, (mm)**	:	1830	1880
17.1.6	**Overall dimensions, (mm):**			
	- Length	:	3295	3255
	- Width	:	1705	1670
	- Height	:	2175 (at silencer)	2195 at steering wheel)
	- Ground clearance, (mm) (below trailer hitch mounting bracket)	:	400 (below transmission housing drain plug)	335 (below front axle ballast weight)
17.1.7	**Operational mass (kg),(unballasted):**			
	- Front	:	720	680
	- Rear	:	1060	1060
	- Total	:	1780	1740

			Previous sample	Present sample
17.1.8	**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 March, 2009)]	:	Conformed	Conforms
ii)	Agricultural tractors – Rear mounted power take-off - Types 1, 2 and 3 (third revision)[IS: 4931-1995 (Reaffirmed in March, 2009)]	:	**Did not Conform**	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 March, 2007)	:	Conformed	Conforms

iv)	Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in March, 2007)]	:	Conformed	Conforms
v)	Agricultural tractors - Operator's seat technical requirement [IS 12343 –1998 (First revision) (Reaffirmed in March, 2009)]	:	**Did not Conform**	**Does not conform**
vi)	Guide for safety & comfort of operator of agricultural tractor Part 1 general requirement (first revision) [IS: 12239 (Part-1) 1996/ISO 4254-I: 1989. (Re-affirmed in March, 2007)]	:	**Did not conform**	**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) (Re-affirmed in March, 2009.)	:	**Did not conform**	**Does not conform**
viii)	Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) (IS: 8133-1983) (Re-affirmed in March, 2009)	:	**Did not conform**	**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 agriculture tractors and machinery [IS :6283 (Part-I&II)-1998 (Reaffirmed in March, 2009) /ISO3767-2: 1991]	:	**Did not conform**	**Does not conform**
x)	Agricultural tractor and machinery lighting device for travel on public roads (IS: 14683-1999) (Reaffirmed in March, 2009)	:	Conformed	Conforms
17.2	**Performance Characteristics:**		**Previous sample**	**Present sample**
17.2.1	**PTO Performance:**			
	(Vide report no.T-737/1244,August,2010)			
	Maximum Power, (kW)	:	22.7/22.2*	22.8
	Power at Rated engine speed,(kW)	:	22.7/22.2*	22.8
	Specific fuel consumption corresponding to maximum power, (g/kWh)	:	233/236*	239
	Maximum equivalent crankshaft torque,(Nm)	:	127.3	126.1
	Back up torque, (%)	:	11.7	9.9
	Maximum temperatures (degree):			
	Engine oil	:	88	126
	Coolant	:	100	103
	Fuel	:	58	64
	Air intake	:	49	72
	Exhaust gas	:	535	587
	Lub oil consumption, (g/kWh)	:	1.61	1.22

(* denotes the values taken from the test report number T-764/1272/2011, April, of declared base model)

17.2.2 **Drawbar performance :**

	Previous sample	Present sample
(Vide report no.T-737/1244,August,2010)		
Maximum power with unballasted tractor, (kW) :	19.3	21.4
Maximum pull with std. / unballasted Tractor, (kN) :	12.3	14.46
Maximum transmission oil temperature (deg. C) :	77	77

17.2.3 **Hydraulic performance:**

(Vide report no.T-737/1244,August,2010)		
Hydraulic pump discharge at minimum pressure and rated engine speed (l/min.) :	28.0	29.88
Maximum hydraulic power, (kW) :	5.5	6.87
Sustained pressure of the open relief valve, (MPa) :	17.5	19.5
Maximum lifting capacity, (kN):		
- At the hitch point :	11.58	13.28
- At the standard frame :	9.55	8.37
Total drop in height of lift during load maintenance test, (mm) :	44	25

17.2.4 **Brake performance test at 25 kmph speed (max).**

Parameter	Previous Sample		Present Sample	
(Vide report no.T-737/1244,August,2010)	Cold	Hot	Cold	Hot
Maximum Stopping distance, (m)	6.60	7.20	7.25	7.75
Maximum force exerted on the brake Pedal effort required to achieve deceleration of 2.5 m/sq sec, (N) :	403 to 420		417 to 435	
Weather parking brake is effective at a force of 600N at foot pedal (s) or 400 N at hand lever :	Effective		Effective	

17.2.5 **Noise measurement:**

- Maximum noise at bystanders position, dB(A) :	83	81
- Maximum noise at operator's ear level dB(A) :	93	93

17.2.6 **Mechanical vibration:**

Maximum amplitude of vibration at (microns):		
- Foot rest – LHS & RHS :	90 & 480	240
- Steering wheel :	350	130
-Driver's seat, (driver in seat): :	100	30

17.2.7 **Haulage Test:**

	Two wheel trailer	Four wheel trailer	Two wheel trailer	Four wheel trailer
-Gross mass of trailer, (tonnes) :	5.0	6.0	5.0	6.0
- Average speed, (kmph) :	28.65 to 28.77	28.65 to 30.07	29.97 to 31.10	30.64
-Distance traveled per litre of fuel consumed, (km) :	7.79 to 7.88	7.42 to 7.67	7.23 to 7.43	6.90 to 7.38
- Average fuel consumption (cc/km/tonne) :	25.4 to 25.7	21.7 to 22.5	26.9 to 27.7	22.6 to 24.2

17.2.8 **Wetland cultivation (Puddling Operation)**

Whether requirement of IS : 11082-1984 are meet in full : Meets the requirement

17.3 **Salient Observations:**

17.3.1 **Laboratory test:**

Previous Sample (Vide report no.T-737/1244,August,2010)	Present Sample
i) The backup torque is **11.7%.**	i) The backup torque is **9.9%.**
ii) The specific fuel consumption corresponding to maximum power was measured as **233/236*** g/kWh against the declaration of 245 g/kWh, which is within the tolerance limit of IS: 12207-2014.	ii) The specific fuel consumption corresponding to maximum power was measured as **239** g/kWh against the declaration of 252 g/kWh, which is within the tolerance limit of IS: 12207-2014.
17.3.1.2 Drawbar Performance:	
i) During drawbar performance tyre creeping was observed LHS and RHS 05 mm and 45 mm respectively which is on higher side and calls for necessary corrective action.	i) During drawbar performance tyre creeping was observed LHS and RHS 15 mm and 27 mm respectively.
17.3.1.3 Hydraulic Performance:	
i) The lifting capacity at standard frame was recorded as 9.55 kN and the moment about the rear axle was computed as14.52 kN-m. the moment about rear axle is on higher side as compared to the moment about front axle i.e 11.49 kN-m.. It is therefore, recommended that the lifting capacity of the hydraulic system may be reduced suitably or standard ballast mass at front axle may be provided to avoid front lifting of the tractor.	i) The lifting capacity at standard frame was recorded as 8.37 kN and the moment about the rear axle was computed as 12.54 kN-m. 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 mass at front axle may be provided to avoid front lifting of the tractor.
17.3.1.4 Air cleaner oil pull over test:	
i) The maximum oil pull over was recorded as 0.59%, against the maximum limit of 0.25 % ,which is very high and calls for necessary improvement in the air intake system of the tractor to enhance the service life of the engine.	i) The maximum oil pull over was recorded as 0.06%, against the maximum limit of 0.25 %.
ii) The average area covered in M .B. ploughing operation with recommended size of plough was recorded in the range of 0.112 ha/h. Keeping in view the PTO power of the tractor, the area coverage is considered to be less, hence the recommended size of the plough may be reviewed.	ii) The average area covered in M .B. ploughing operation with recommended size of plough was recorded in the range of 0.122 to 0.124 ha/h. Keeping in view the PTO power of the tractor, the area coverage is considered to be less, hence the recommended size of the plough may be reviewed.

(* denotes the values taken from the test report number T-764/1272/2011, April, of declared base model)

17.4 **Adequacy of literature:**

i) The following literature was supplied with the tractor for reference during the test.	The following literature was supplied with the tractor for reference during the test.
a) Operator's manual	a) Operator's manual
b) Workshop manual	b) Workshop manual
c) Parts catalogue	c) Parts catalogue

17.5 **Qualifying performance (comparable limit) for batch model in comparison to ICT model (vide test report no.T-737/1244,2010,August) (please refer clause 7.6 of IS:12207-2014):**

1	2	3	4	5		6
S. No.	Characteristic	Requirements as per IS: 12207-2014		As observed		Whether meets the require-ments (Yes/No)
		Column – 4 of Table-1	Clause 7.6			
17.5.1	**Drawbar performance:**					
a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Minimum 65% of static mass with ballast	The performance shall be within 7.5 of ICT or limit specified under column 3 whichever is higher	19.27	16.89	No
b)	Maximum drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Minimum 65% of static mass of tractor without/ standard ballast		12.30 (with standard ballast)	14.46	No
c)	Maximum drawbar power without 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.		19.3	21.4	No
d)	Maximum transmission oil temperature (°C)	The declared value should not exceed the maximum value specified by oil company.		77	77	Yes
17.5.2	**Power lift and hydraulic pump performance :**					
	(Vide report no.T-737/1244,2010,August)					
a)	Maximum lifting capacity throughout the range of lift, (kN):					
	1) At hitch points	[Tolerance of minus 10%]	The performance shall be within 7.5 of ICT or limit specified under column 3 which ever is higher	11.58	13.28	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		9.55	8.37	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		44	25	Yes

18. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

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

S. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	Values declared by the applicant (D)/ Requirement (R)	As observed	Whether meets the requirements (Yes/No)
1	2	3	4	5	6	7
18.1.1	**PTO Performance :**					
a)	- Max. power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: -5 / +10% for PTO power >26 kW. – 7.5/+10% for PTO power ≤ 26 kW or-5 / +10% for Engine power >26 kW. – 7.5/+10% for Engine power ≤ 26 kW.	22.8 (D)	22.8	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	22.8 (D)	22.8	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+ 5%	252 (D)	239	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	132 (D)	126.1	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	11.0 (D)	9.9	**No**
f)	**Maximum operating temperature (^{0}C):**					
	1) Engine oil	Non Evaluative	The declared value should not exceed the max. value specified by the oil company and the observed value under high ambient condition should not exceed the declaration.	130 (D)	126	Yes
	2) Coolant	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.	112 (D)	103	Yes

1	2	3	4	5	6	7
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions.	1% of SFC	1.22	Yes
h)	Smoke level	Evaluative	Maximum light absorption coefficient of 3.25 per metre or equivalent BOSCH No. 5.2 or 75 Hatridge value (**As per CMVR**)	60 Hartridge	0.19	Yes
18.1.2	**Drawbar performance :**					
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	17.68 (D) 13.70 (R)	16.89	Yes
b)	Max. drawbar pull with standard ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor with standard ballast	11.99 (D) 11.09 (R) Minimum	14.46	Yes
c)	Maximum drawbar power without ballast/ with standard ballast, (kW).	Evaluative	Minimum 80 % of PTO power as referred in Sl No. i) a) of PTO performance in case of tractors having total static mass > 1500 kg Minimum 75 % of PTO power as referred in Sl No. i) a) of PTO performance in case of light weight tractors having 1500 kg total static mass of tractor Minimum 75 % of the engine power as referred in Sl No. i) a) of engine performance in case of tractors which do not have a PTO shaft.	18.2 (D) 18.3 (R) Minimum	21.4	Yes
d)	Max. transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	110 (D)	77	Yes
18.1.3	**Power lift and hydraulic pump performance :**					
a)	Maximum lifting capacity throughout the range of lift, (kN):					
	1) At hitch points	Non Evaluative	[Tolerance of minus 10%]	11.7 (D)	13.28	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	7.8 (D) 5.47(R)	8.37	Yes
b)	Maximum drop in the height of the point of application of the force after each 5 minutes interval for a total duration of 30 minute, (mm)	Non Evaluative	[Tolerance of plus 5 mm]	120	25	Yes

1	2		3	4	5	6	7
18.1.4	**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)	7.25	Yes
	2)	Hot brake	Evaluative	10	10 (R)	7.75	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s^2 (N)		Evaluative	600	600 (R)	417 to 435	Yes
c)	Whether parking brake is effective at a force of 600 N at foot pedal(s) or 400 N at hand lever		Evaluative	Yes / No	Yes	Yes	Yes
18.1.5	**Noise measurement :**						
a)	Maximum ambient noise emitted by the tractor dB(A)		Evaluative	As per CMVR	86 (R)	81	Yes
b)	Maximum noise at operator's ear level dB(A)		Evaluative	As per CMVR	96 (R)	93	Yes
18.1.6	**Amplitude of mechanical vibrations at :**						
	1)	Left foot rest	Non Evaluative	100 microns (max)	100 (R)	240	**No**
		Right food rest			100 (R)	180	**No**
	2)	Seat (with driver seated)		-do-	100 (R)	30	Yes
	3)	Steering wheel		-do-	100 (R)	130	**No**
18.1.7	**Haulage requirements :**						
a)	Gross mass of the trailers, (tones):						
	1)	Two wheel	Non Evaluative	--	5.0 (D)	5.0	Yes
	2)	Four wheel		--	6.0 (D)	6.0	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):						
	1)	Two wheel	Non Evaluative	--	6 to 7 (D)	7.23 to 7.43	Yes
	2)	Four wheel		--	6 to 7 (D)	6.90 to 7.38	Yes
c)	Fuel consumption (ml/km/tonne):						
	1)	Two wheel	Non Evaluative	--	35 to 45 (D)	26.93 to 27.66	**No**
	2)	Four wheel		--	35 to 45 (D)	22.56 to 24.18	**No**
18.1.8	**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 welland 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 test.	Yes
	1)	Clutch assembly	-do-				
	2)	Brake housings	-do-				
	3)	Front axle hubs	-do-				
	4)	Engine Oil	-do-				
	5)	Transmission Oil	-do-				

1	2	3	4	5	6	7
18.1.9	**Safety features :**					
a)	Guards against moving and hot parts	Evaluative	As per CMVR	--	Meet the requirements	--
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)	-	**Does not meet the requirements**	**No**
d)	Technical requirements for PTO shaft	Non 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)	-	Meet the requirements	Yes
f)	Specifications of linkage	Non Evaluative	Should meet the requirements of IS 12953 and IS 12362 (Part 3) (As amended from time to time)	-	Meet the requirements	Yes
	Swinging drawbar			-	Not Provided	Yes
18.1.10	**Labelling of tractors (Provision of labelling plate):**					
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	--	Mahindra	Yes
	2) Model	Evaluative		--	265 DI MKM	Yes
	3) Year of manufacture	Evaluative		--	GG (i.e.October,2016)	Yes
	4) Engine number	Evaluative		--	NEBT00078	Yes
	5) Chassis number	Evaluative		--	NEBT00078	Yes
	6) Declaration of PTO power, (kW)	Evaluative		--	22.8 (30.6)	Yes
18.1.11	**Discard limit for:**					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer-	89.13	88.953 to 88.960	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.20	0.140 to 0.145	Yes
(c)	**Ring end gap (mm):**					
	- Top comp. ring.	Evaluative	-do-	2.5	0.25	Yes
	- 2nd comp. ring.		-do-	2.5	0.55	Yes
	- Oil ring.		-do-	2.0	0.35	Yes
(d)	**Ring groove clearance (mm):**					
	- Top comp. ring.	Evaluative	-do-		-TAPERED-	Yes
	- 2nd comp. ring.		-do-	0.30	0.070 to 0.072	Yes
	- Oil ring.		-do-	0.20	0.038 to 0.044	Yes
(e)	**Clearance of main bearings (mm):**					
	- Diametrical clearance	Evaluative	-do-	0.20	0.112 to 0.118	Yes
	- Crankshaft end float	Evaluative		0.60	0.18	Yes

1	2	3	4	5	6	7
(f)	**Clearance of big end bearings, (mm):**					
	- Diametrical	Evaluative	-do-	0.20	0.109 to 0.114	Yes
	- Axial	Evaluative	-do-	0.75	0.25	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.30	0.112 to 0.124	Yes
(h)	Clearance between center pin and bush, (mm)	Non Evaluative	-do-	0.30	0.147 to 0.155	Yes

18.1.12 CATEGORY OF BREAKDOWNS / DEFECTS :

S. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	As observed	Whether meets the require-ments (Yes/No.)
1.	Critical	Evaluative	No critical breakdown	None	Yes
2.	Major	Evaluative	Not more than two and neither of them should be repetitive in nature	None	Yes
3.	Minor	Evaluative	Not more than five and frequency of each should not be more than two.	None	Yes
4.	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed five, that is, (2 major + 3 minor) or 5 minor breakdowns.	None	Yes

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

	Characteristic	Requirements as per IS: 12207-2014	As observed	Whether meets the requirements (Yes/No.)
1.	Fitment of ROPS	With a provision for fitment of ROPS.	Not provided	Not applicable
		If ROPS fitted it should meet the requirement of IS: 11821-1992	ROPS not fitted	Not applicable
2.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Front two hook are not provided	No

18.3 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 March, 2009)] : Conforms

ii) Agricultural tractors – Rear mounted power take-off - Types 1, 2 and 3(third revision)[IS: 4931-1995 (Reaffirmed in March, 2009)] : Conforms

iii) Agricultural wheeled tractors - Rear mounted three-point linkage: Part 1 Categories 1, 2, 3 & 4 (fourth revision) [IS 4468(Part-I):1997/ISO 730-1:1994 (Reaffirmed in March, 2009)] : Conforms

iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in March, 2007)] : Conforms

v)	Agricultural tractors - Operator's seat technical requirement [IS 12343 –1998 (First revision) (Reaffirmed in March, 2009)]	:	**Does not conform**
vi)	Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision) : [IS 12239 (PT-1) 1996/ISO 4254-1:1989 (Reaffirmed in (Reaffirmed in March, 2007)]	:	**Conforms**
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 March, 2009)]/ ISO 3767-2:1991)]	:	Conforms
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 March, 2009)]		**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 March, 2009)]	:	**Does not conform**
x)	Agricultural Tractor & Machinery Lighting device for travel on public roads (IS: 14683-1999) (Reaffirmed in March, 2009)]	:	Conforms

18.4 Salient Observations:

18.4.1 Laboratory tests:

18.4.1.1 PTO Performance:

i) The backup torque is **9.9%** only & does not meet the requirement of IS: 12207-2014.

ii) The maximum power was recorded as **22.2 & 22.8 kW** in case of previous & present sample respectively against the declaration of **22.8 kW**, which meets the requirement of IS: 12207-2014 with regard to tolerance.

iii) The specific fuel consumption corresponding to maximum power was measured as **236 & 239** g/kWh in case of previous & present sample respectively against the declaration of 252 g/kWh, which is within the tolerance limit of IS: 12207-2014.

18.4.1.2 Hydraulic Performance: -

i) The lifting capacity at standard frame was recorded as 8.37 kN and the moment about the rear axle was computed as 12.54 kN-m. 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 mass at front axle may be provided to avoid front lifting of the tractor.

18.4.1.3 Mechanical Vibration:

The amplitude of mechanical vibration on various assemblies marked as (*) in Chapter-9 of this test report is on higher side, especially at the steering control wheel, foot rest and operator seat. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

18.4.1.4 Three point linkage:

Some of the parameters of three point linkage conforms to Cat.I and some of them conforms to Cat.II. Keeping in view the sprit of standardization, necessary improvement may be incorporated.

18.4.1.5 Operator's Seat:

Longitudinal distance from SIP to centre of steering control wheel does not meet the requirements of IS: 12343:1998 (Re-affirmed in March, 2009) and calls for necessary corrective action.

18.4.1.6 **Location and operation of operator's control:**
Safety against start of engine doesnot meets the requirements of IS: 8133-1983. This may be looked into.

18.4.2 **Field performance test:**
Dry land operation:
The average area covered in M .B. ploughing operation with recommended size of plough was recorded in the range of 0.122 to 0.124 ha/h. Keeping in view the PTO power of the tractor, the area coverage is considered to be less, hence the recommended size of the plough may be reviewed.

18.4.2.1 **Wet land cultivation (Puddling operation):**
No ingress of mud and / or water was observed during the test

18.4.2.2 **Labeling of tractor: -**
The engine and chassis serial number of the tractor were embossed/ punched same **NEBT00078** at engine housing & labeling plate. For noteworthy identification of engine and chassis (Transmission) the serial number of these assemblies should be different. The brand name of the tractor must also be mentioned on the labeling plate.

18.5 **Maintenance / Service Problems:**

No noticeable maintenance or service problem was observed during the test. However, servicing schedule for dry filter element has not been specified.

18.6 **Recommendation with regard to safety on tractor:**
The following requirements, inter alia, may be considered for incorporation on the tractor:

i) Provision of safety against accidental start of engine.
ii) Provision for spark arresting device in exhaust system.
iii) The working clearance around the draft control lever may be provided as per IS: 12239 (Part-2) – 1999.
iv) Provision of Front tow hook.

18.7 **Adequacy of Literature supplied with machine:**
Literature has been supplied by the firm for this model of tractor. It is therefore, recommended that, the Operator's manual, workshop manual & parts catalogue for this model of tractor may be brought out as per IS: 8132-1999 (Reaffirmed in 2004) for the guidance of users and service personnel in national as well as other regional languages.

19. CITIZEN CHARTER

Time frame for Testing & Evaluation as per Citizen Charter	Duration of Test	Whether the Test Report is released within the time frame given in Citizen Charter	Remarks
10 Months	10 Months (December,2016 to October ,2017)	No	None

TESTING AUTHORITY:

C.S RAGHUWANSHI
AGRICULTURAL ENGINEER

C. V. CHIMOTE
TEST ENGINEER

Y.K.RAO
SENIOR AGRICULTURAL ENGINEER

J.J.R.NARWARE
DIRECTOR

20. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
20.1	18.4.1.1(i),18.4.1.2,18.4.1.3,18.4.1.4,18.4.1.5,18.4.1.6,18.4.2, & 18.6 & 18.7	Observations will be studied and necessary action will be incorporated
20.2	18.4.2.2	The 17 digits chassis & 11 digits engine serial numbering identification for subject tractor already implemented on production from November 2016 across all plants. The subject tractor model was produced in year of October, 2016.

ANNEXURE-I

BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST

S.No.	Item	Disc Plough	Rotavator	Puddler
1.	Make	Anil industries, Bina	Shaktimaan	Not available
2.	Type	Mounted	Mounted	Mounted
3.	No. of bottoms/blades	Two	30	12 (6 in each gang)
4.	Type of bottoms/blades	General purpose	Hatchet	Notched
5.	Size of bottoms/blades, (mm)	340	170 x 140 x 5	460
6.	Spacing of bottoms/flanges, (mm)	300	230	164
7.	Lower hitch point span, (mm)	785	870	680
8.	Mast height, (mm)	580	560	680
9.	**Overall dimensions, (mm):**			
	- Length	1535	1000	1190
	- Width	1220	1420	1810
	- Height	1150	1070	1330
10.	Gross mass, (kg)	230	420	240

ANNEXURE-II

BRIEF SPECIFICATION OF HALF CAGE WHEEL

S. No.	Items	Specification
1.	Type	Half cage wheel
2.	Dia, (mm)	1085
3.	Width, (mm)	355
4.	No. and types of lugs	12, straight lugs mode of M.S. angle section welded to angle iron frame
5.	Size of angle section, (mm)	50 x 50 x 5
6.	Length of lugs, (mm)	350
7.	Spacing of lugs, (mm)	285
8.	Weight of each cage wheels (kg)	60

ANNEXURE-III

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	PTO performance test	17.1
3.	Power lift and hydraulic pump performance test	1.3
4.	Drawbar performance test	16.9
5.	Turning ability	0.2
6.	Location of centre of gravity	0.2
7.	Operator's field of vision	0.1
8.	Brake test	1.6
9.	Noise measurement	0.8
10.	Air cleaner oil pull over test	3.5
11.	Mechanical vibration test	0.6
12.	Theoretical speed test	1.4
B.	**FIELD TEST:**	
1.	MB ploughing	10.9
2.	Rotavation	10.7
3.	Puddling (including 5.0 hours water proof test)	15.7
C.	**HAULAGE TEST:**	5.4
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	3.8
	TOTAL:	90.2