

व्यावसायिक परीक्षण रिपोर्ट (प्रारंभिक)  
COMMERCIAL TEST REPORT (Initial)

संख्या / No. : T-1112/1638/2017  
माह / Month : October, 2017



**MAHINDRA, JIVO 245 DI 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

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Manufacturer

: M/s. Mahindra & Mahindra Limited  
(Farm Equipment Sector)  
Akurli Road, Kandivli (E)  
Mumbai - 400 101

Month: October

Test Report No.- 1112/1638/2017

Year: 2017



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Type of Test : **COMMERCIAL (Initial)**  
 Test code/Procedure : **IS: 5994-1998 (Reaffirmed in 2009)**  
**IS: 9253-2001 (Reaffirmed in 2012)**  
**and IS: 12207-2014.**  
 Period of Test : **May, 2017 to October, 2017**  
 Test Report No. : **T- 1112/1638 /2017**  
 Month/Year : **October, 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 selected by the representative of testing authority, for tests.
- iii) The results presented in this report do not in any way attribute to the durability of the machine.
- iv) This report should not be reproduced in part or full without prior permission of the Director, Central Farm Machinery Training and Testing Institute, Budni (M.P.)

#### SELECTED CONVERSIONS

SELECTED CONVERSIONS			ABBREVIATIONS	
Sl. No	Units	Conversion Factor		
1	<b>Force:</b>		apa	As per applicant
	1 kgf	9.80665 N	TDC	Top Dead Centre
		2.20462 lbf	IS	Indian Standard
2	<b>Power:</b>		LHS/RHS	Left Hand Side/ Right Hand Side
	1 hp	1.01387metric hp (Ps)	Hg.	Mercury
		745.7 W	Temp.	Temperature
	1 Ps	735.5 W	N.R.	Not recorded
	1 kW	1.35962 Ps	rpm	Revolutions per minute
3	<b>Pressure:</b>		O.D/I.D	Outer diameter/ Inner diameter
	1 psi	6.895 kPa	N.A.	Not available/ Not applicable
	1 kgf/cm <sup>2</sup>	98.067 kPa = 735.56 mm of Hg	PTO	Power take-off
	1 bar	100 kPa = 10 N/cm <sup>2</sup>	R.H.	Relative Humidity
	1 mm of Hg	1.3332 m-bar		





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T-1112/1638/2017

MAHINDRA, JIVO 245 DI TRACTOR - Commercial (Initial)

Manufacturer	:	M/s. Mahindra & Mahindra Limited (Farm Equipment Sector) Akurli Road, Kandivli (E) MUMBAI - 400 101
Location of manufacturing plant	:	M/s. Deepak Diesel Pvt. Ltd. Survey no. 287/1, Shapur Village Main Road & Shapur (Veraval), Dist. Rajkot-360024 (Gujrat) (M/s. DDP Ltd. is contract manufacturer of M&M Ltd.)
Test requested by (applicant)	:	The manufacturer
Selected for test by	:	The manufacturer
Place of running-in	:	At applicant's works
<b>Duration of said running-in (h):</b>		
- Engine	:	30 hours,
- Transmission	:	30 hours
<b>Method of Selection</b>	:	The tractor was submitted directly by the applicant for test. Hence method of selection is not known.

## 1. SPECIFICATIONS

<b>1.1 Tractor:</b>		
Make	:	Mahindra
Model	:	JIVO 245 DI
Brand Name	:	None
Type	:	Four wheeled, four wheel drive, general purpose, Agricultural Tractor.
Year of manufacture	:	2016
Chassis serial number	:	MBNZKGBBFGCF00001
Country of origin	:	India
<b>1.2 Engine:</b>		
Make	:	Mahindra
Model	:	MDI1365 NX24
Type	:	Four stroke, naturally aspirated, liquid cooled, direct injection, diesel engine.
Serial number	:	CGF4WKA0001
<b>1.2.1 Engine speed (Manufacturer's recommended production setting), (rpm):</b>		
- Maximum speed at no load	:	2500 to 2600
- Low idle speed	:	950 to 1150
- Speed at maximum torque	:	1300 to 1500
<b>Rated speed, (rpm):</b>		
- For PTO use	:	2300
- For drawbar use	:	2300
<b>1.3 Cylinder &amp; Cylinder Head:</b>		
Number	:	Two
Disposition	:	Vertical, Inline
Bore/stroke, (mm)	:	88.9/110
Capacity as specified by the applicant, (cc)	:	1365.5
Compression ratio	:	19.8±1 : 1
Type of cylinder head	:	Monoblock
Type of cylinder liners	:	Wet, replaceable
Type of combustion chamber	:	Re-entrant bowl cavity on piston top
Arrangement of valves	:	Overhead, inline



	<b>Valve clearance (Cold/Hot):</b>		
	- Inlet valve, (mm)	: 0.40	0.30
	- Exhaust valve, (mm)	: 0.50	0.40
<b>1.4</b>	<b>Fuel System:</b>		
	Type of fuel feed system	: Gravity & forced feed	
<b>1.4.1</b>	<b>Fuel tank:</b>		
	Capacity, (l)	: 21.8	
	Location	: Above clutch housing	
	Provision for draining of sediments/ water	: Yes provided	
	Material of fuel tank	: Metallic	
<b>1.4.2</b>	<b>Water Separator:</b>		Not Provided
<b>1.4.3</b>	<b>Fuel feed pump:</b>		
	Make	: Sundaram Fasterns ltd, (Autolec division) (apa)	
	Type	: Mechanical, diaphragm type	
	Model/Group combination No.	: Not available	
	Location	: On RHS of timing cover	
	Method of drive	: Through camshaft	
<b>1.4.4</b>	<b>Fuel filters:</b>		
	Make	: Bosch, India	
	Model/Group combination No.	: F 002 H20 130	
	Number	: One	
	Type of element	: Spin on ,paper element	
	Capacity (l)	: 0.5	
<b>1.4.5</b>	<b>Fuel Injection pump:</b>		
	Make	: Bosch, India	
	Model/Group combination No.	: E E41269 200	
	Type	: Inline, Plunger	
	Serial number	: Not provided	
	Method of drive	: Through camshaft lobe	
<b>1.4.6</b>	<b>Fuel injectors:</b>		
	Make	: Bosch, India	
	Model/Group combination No./Holder Number	: F 002 C70 552	
	Nozzle Number	: DSLA 144P 5522 ,417 110 834	
	Type	: Multihole (Five holes)	
	Manufacturer's production pressure setting, (Mpa)	: 25+0.8	
	Injection timing	: 10.5° ± 1.5° BTDC	
	Firing order	: 1 - 2	
<b>1.4.7</b>	<b>Governor:</b>		
	Make	: Mahindra & Mahindra	
	Model/Group combination No.	: Not available	
	Type	: Mechanical, centrifugal (fly weight)	
	Governed range of engine speed, (rpm)	: 950 to 2600	
	Rated engine speed, (rpm)	: 2300	
<b>1.5</b>	<b>Air intake system:</b>		
<b>1.5.1</b>	<b>Pre-cleaner:</b>		Not Provided





- 1.5.2 Air cleaner:**
- Make : Donaldson  
 Type : Dry type  
 Location : Behind radiator under the bonnet  
 Range of suction pressure at maximum power, (kPa) : 2.0 to 2.1
- | Details of elements: | Primary element | Secondary element |
|----------------------|-----------------|-------------------|
| - Size (OD/ID), (mm) | 105.4/63.7      | 59.3/44.7         |
| - Length, (mm)       | 269.6           | 260.3             |
| - Type               | Polyester felt  | Cellulose fiber   |
| - No. of elements    | Two             |                   |
- Air flow restriction indicator : Mechanical type dust clog indicator provided on air cleaner assembly.
- Dust unloading valve : Provided
- Maintenance schedule : Primary- For every 800 hrs of operation.  
 Secondary- First replacement after 2500 hrs, subsequent every 2400 hrs.
- 1.6 Exhaust System:**
- Type of silencer : Horizontal, (Cylindrical)
- Position of silencer outlet with respect to SIP, (mm):-
- Downward : 215
  - Longitudinal : 1695
  - Lateral : 345 (on RHS)
- Range of exhaust gas pressure at maximum power, (kPa) : 4.4 to 4.8
- Provision of spark arresting device : None
- Provision against entry of rain water : A bend is provided at downward of silencer.
- 1.7 Lubricating system:**
- Type : Forced feed-cum-splash
- Oil sump capacity, (l) : 4.0
- Total lub oil capacity, (l) : 4.45
- Oil change period : First change after 100 hours and subsequently after every 250 hours of operation.
- 1.7.1 Filters:**
- Make : Naveen Oil Filter Pvt.Ltd.(apa)
- Serial no./Part. no : 006025734Y91
- Type : Full flow, spin-on paper element.
- Number : One
- Capacity, (l) : 0.35
- 1.7.2 Pump:**
- Make : Precision Autowares Pvt. Ltd. (apa)
- Type : Rotary Lobe
- Method of drive : Driven Through camshaft
- Pressure release setting, ( kPa) : 400 to 500
- 1.8 Cooling system:**
- Type : Forced circulation of coolant
- Coolant as recommended : Radiator Additive Zero-R Anti Rust
- 1.8.1 Details of Pump** : Centrifugal, semi open impeller having six vanes of 80 mm diameter and driven through crankshaft pulley by a cogged "V" belt.



- 1.8.2 Details of fan** : Suction type, having six plastic blades of 310 mm diameter and mounted on water pump.
- Means of temperature control : Thermostat
- Bare radiator capacity, ( l ) : 2.20
- Capacity of expansion flask, (l) : 1.0
- Total coolant capacity, ( l ) : 5.50
- Radiator cap pressure, (kPa) : 88
- 1.9 Starting System:**
- Type : 12V, DC, Electrical
- Aid for cold starting : None
- Any other device provided for easy starting : None
- 1.10 Electrical System:**
- 1.10.1 Battery:**
- Make and model : Exide & MFS 70R
- Number : One
- Type : Lead Acid
- Capacity and rating : 12V, 65 Ah at 20 hour discharge rating
- Location : Infront of radiator under the bonnet.
- Ground polarity : Negative
- 1.10.2 Starter:**
- Make : Lucas-TVS (apa)
- Model : Not available
- Type : Pre-engaging solenoid operated
- Power rating : 12V, 2.0 kW
- Serial number : 26261050 D
- 1.10.3 Generator:**
- Make : Autolek
- Model : AL-18820
- Type : Alternator
- Serial number : Not available
- Output rating : 12V, 45 Amp (apa)
- Method of drive : Through water pump pulley by a cogged "V" belt.
- 1.10.4 Voltage regulator** : In-built in alternator
- 1.10.5 Details of lights:**

Description	No. & capacity of bulb	Height of the centre of beam above ground level, (mm)	Size, (mm)	Distance between centre of the beam and outside edge of tractor at standard rear track setting, (mm)
<b>Front Lights:</b>				
- Head lights	2, 12V, 35/35W	1010	120 x 180	425
- Parking lights	2, 12V, 5W	1010	40 x 65	215
- Turn-cum-hazard Indicator light	2, 12V, 21W	1010	65 x 75	160
<b>Rear lights:</b>				
- Stop light/ Parking light	2, 12V, 21W	975	40 x 65	230
- Turn-cum-hazard Indicator light	2, 12V, 21W	975	40 x 65	150
- Plough light (on RHS mudguard)	1, 12V, 55 W	1080	110 $\Phi$	360
- Reflectors (Red)	2	975	40 x 65	190
- Registration plate light	Part of the rear combination lamp assembly			

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





**1.10.7 Light switch** : Combination switch with rotary type light switch having following positions.  
 i) Off  
 ii) Parking lights +Dashboard light  
 iii) Head lights (short beam) + (ii)  
 iv) Head lights (long beam) + (ii)  
 v) Turn indicator switch  
 vi) Horn push button

**1.10.8 Horn:**  
**Make** : Minda  
**Type** : 12V, 2B, Electromagnetically vibrated diaphragm  
**Location** : In front of radiator, under the bonnet

**1.10.9 Fuse box:**

Capacity	5A	10A	15A
Number	2	3	4

**1.10.10.1 Details of other electrical accessories:**

**1.10.10.2 Flasher Unit:**

**Make** : Interface  
**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 Slow moving triangle** : Provided

**1.10.10.4 Safety device** : **Not provided**

**1.10.10.5 Seven pin trailer socket** : Provided

**1.11 Instrument panel details:**

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

**1.12 Transmission System:**

**1.12.1 Clutch:**

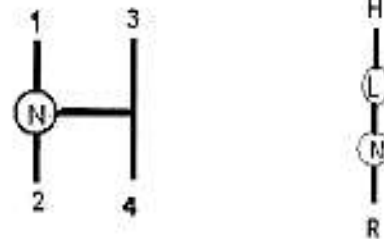
**Make** : Valeo  
**Type** : Single, Dry friction plate, diaphragm type.  
**No. of friction plate(s)** : One  
**Size, OD/ID, (mm)** : 200/135  $\phi$   
**Method of operation** : By pressing clutch pedal fully provided on LHS of operator's seat.



## 1.12.2

**Gear box:**

Make : Mahindra  
 Model/Identification mark : 006613104Y1  
 Type : Mechanical, sliding mesh gears  
 Gear shifting pattern :



Location of gear shifting levers

**Gear shift lever  
(on LHS)**

**Range shift lever  
(on RHS)**

: Gear shift lever provided on LHS & Range shift (High-Low-Reverse) lever are in RHS operator's seat

**No. of speeds:**

- Forward : 08  
 - Reverse : 04

Oil capacity (l)

: 22.8 (Common with differential, rear axle, final drive, hydraulic, steering & brake system)

Oil changing period

: First change in 850 hrs then after every 1050 hours of operation.

## 1.12.3

**Nominal Speed:**

Movement	Gear No.	No. of engine revolutions for one revolution of driving wheel	Nominal speed at rated engine speed when fitted with 8.3-24 size tyres of 470 mm radius index, (kmph)
Forward	L1	195.49	2.08
	L2	133.76	3.04
	L3	96.69	4.22
	L4	63.59	6.39
	H1	55.46	7.34
	H2	37.90	10.80
	H3	27.42	14.89
	H4	18.03	22.61
Reverse	R1	195.85	2.08
	R2	133.47	3.06
	R3	96.89	4.19
	R4	63.64	6.40
Number of revolutions of front wheels for one revolution of driving wheel (for 4WD):			1.59

1.12.4 **Differential:**

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

Reduction through crown wheel & bevel pinion : 4.1:1 (41/10 T)

**Differential lock :**

Type : Pin type

Location : On RHS of operator's seat

Method of operation : By pressing a pedal provided at RHS of operator's seat



<b>1.12.5 Rear axle &amp; final drive:</b>	
Make	: Mahindra (apa)
Type	: Bull & pinion type reduction unit accommodated inside the differential housing.
Reduction through final drive	: 4.75 :1 (57/12T)
Oil capacity of final drive, (l)	: 22.8 (Common with gear box & differential hydraulic, brake & steering system).
Oil changing period	: First change in 850 hrs subsequently after every 1050 hours of operation.
<b>1.12.6 Front Differential Unit:</b>	
Make	: Mahindra (apa)
Type	: Crown wheel and pinion with differential assembly accommodated inside the front axle housing.
Location	: At Center
Reduction through crown wheel & pinion	: 2.308 : 1 (30/13T)
Oil capacity (l)	: 5.0 (common with front axle & final axle)
Oil change period	: First change in 100 hrs subsequently after every 850 hours of operation.
Differential lock	: Not provided
<b>1.12.7 Front axle &amp; final drive:</b>	
Make	: Not available
Type	: Bevel-pinion at the end of front axle & another pair of bevel-pinion at front wheel hub.
Reduction through bevel & pinion	: 1.417: 1 (17/12T)
Reduction ratio at wheel hub	: 3.545 : 1 (39/11T)
Oil capacity (l)	: 5.0 (common with front differential unit)
Oil change period	: First change in 100 hrs subsequently after every 850 hours of operation.
<b>1.13 Power lift (Hydraulic System):</b>	
- Make	: Mahindra
- Type	: Open centre, live & ADDC
- No. and type of cylinder	: One, single acting
- Type of linkage lock for transport	: Hydraulic, isolating valve in fully closed position act as transport lock.
<b>1.13.1 Hydraulic pump:</b>	
- Make	: Rexroth
-Serial no.	: R002 GW 181
- Type	: Tandem Gear type
- Location	: In front of engine crankcase
- Drive	: Through crankshaft pulley.
No. & Type of Hydraulic filter(s)	: Three i) Wire mesh strainer at suction ii) Full flow spin on paper element type at pump suction line iii) Orifice filter on distributor
Hydraulic oil capacity, ( l )	: 22.8 (common to transmission ,brake & steering system)
Oil change period	: First change in 850 hrs subsequently after every 1050 hours of operation.
Provision for external tapping	: Provided
Details of control levers	: i) Position control lever (Black) ii) Draft control lever (yellow) iii) Isolating valve knob on distributor (Grey)
Method of draft sensing	: Through top link





## 1.13.2 Three point linkage:

S.No.	Observations	As per IS:4468(Part-2) -1993, Cat.1N (Narrow Hitch), (mm)	As measured (mm)	Remarks
I.	<b>Upper hitch points:</b>			
a)	Dia of hitch pin hole	19.30 to 19.51	19.37	Conforms to Cat. 1 N
b)	Width of ball	44.0 (max.)	43.72	-do-
II.	<b>Lower hitch points:</b>			
a)	Dia of hitch pin hole	22.40 to 22.73	22.7	-do-
b)	Width of ball	34.8 to 35.0	34.85	-do-
III.	Lateral distance from lower hitch point to centre line of tractor	218	218	-do-
IV.	Lateral movement of lower hitch points	50 (min)	85	-do-
V.	Distance from end of power take-off to centre of lower hitch point (lower links in horizontal position)	300 to 375	310	-do-
VI.	Transport height	600 (min)	660	-do-
VII.	Power range (Without force)	420 (min)	440	-do-
VIII.	Leveling adjustment	75(min)	200	-do-
IX.	Lower hitch point tyre clearance	100 (min)	145	-do-
X.	Lower hitch point height	200 (max)	200	-do-

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

The following are dimensions observed, corresponding to 470 mm as tyre dynamic radius index:

S.No.	Parameter	Notation	Dimension or range, (mm)	Setting used during test, (mm)
(1)	(2)	(3)	(4)	(5)
1.	Length of lower link	A	515	515
2.	Length of lift arm	B	200	200
3.	Length of lift rods	C	410 to 500	425
4.	Length of top link	D	360 to 440	435
5.	Distance of lift rod connection point from pivot point of lower link.	E	300	300
6.	Distance of lower link pivot point from rear wheel axis:			
	-Horizontally	F	140, behind	140, behind
	-Vertically	G	120, below	120, below
7.	Distance of upper link pivot point from rear wheel axis:			
	-Horizontally	H	245,220 behind	245, behind
	-Vertically	J	230,250, above	230, above
8.	Distance of lift arm pivot point from rear wheel axis:			
	-Horizontally	K	65, behind	65, behind
	-Vertically	L	260, above	260, above
9.	Height of lower hitch points relative to the rear wheel axis:			
	- In high position	M	55 to 190 above	170 above
	- In low position	N	-435 to -245 below	270 below
10.	Height of lower link hitch points when locked in transport position		170	

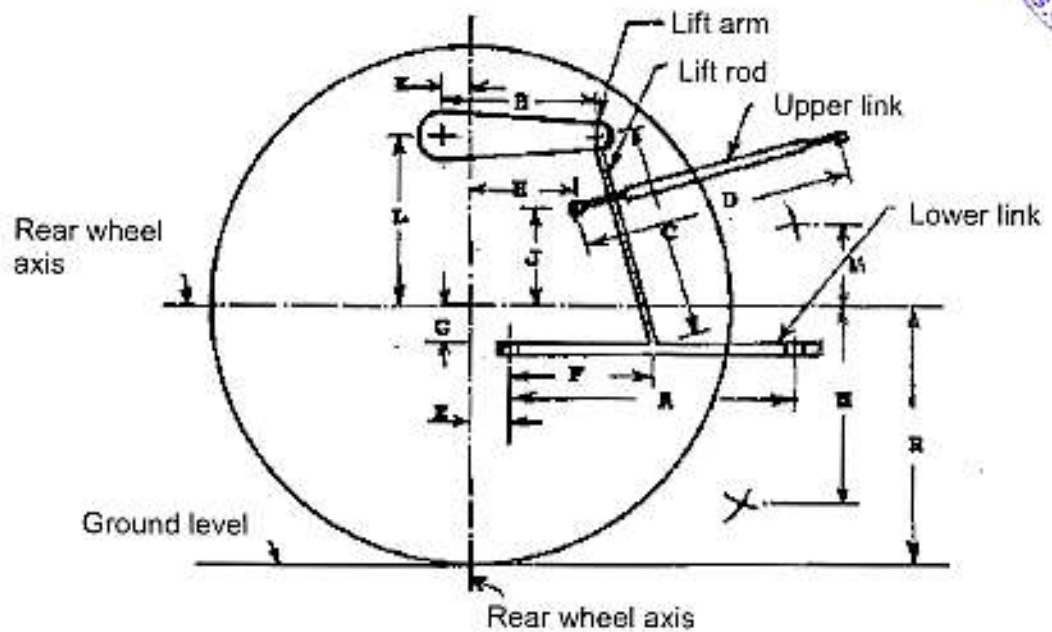


Fig. 1(A): DIMENSIONAL NOTATIONS FOR TABLE OF LINKAGE GEOMETRY

1.13.4 Drawbar:

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

Notation	As per IS: 12953-1995 (Cat. I N) (mm)	As measured, (mm)	Remarks
A	$400 \pm 1.5$	400	Conforms to Cat-I N
B	75 (min)	76	-do-
C	30 (min)	31.25	-do-
D $\varnothing$	21.79 to 22.0	22.0	-do-
E	39.0 (min)	42.8	-do-
F $\varnothing$	12.0 (min)	12.0	-do-
G	15.0 (min)	15.0	-do-
H $\varnothing$	$25 \pm 1$	24.6	-do-
J	$80 \pm 1.5$	80	-do-
No. of holes	05	05	-do-

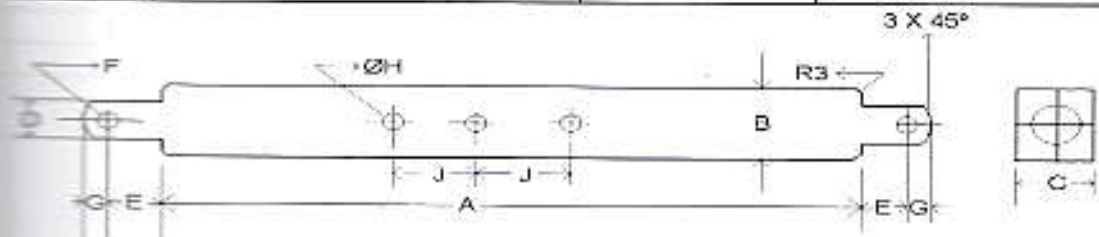


Fig. 1(B): DIMENSIONAL NOTATIONS FOR LINKAGE DRAWBAR

1.13.4.2 Swinging drawbar

: Not provided





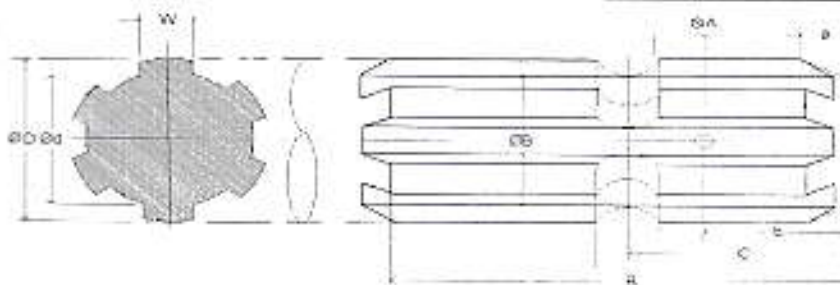
1.14

**Power take-off shaft:**

Type	: Type-I, Not independent
Method of engaging	: By a hand lever provided on LHS of operator's seat
No. of shaft(s)	: One
PTO speed corresponding to rated engine speed (rpm)	: 608 & 751
Other speed corresponding to rated engine speed (rpm)	: None
Distance behind rear axle, (mm)	: 345
Engine to PTO speed ratio	: 3.786 : 1 & 3.06:1
Whether the PTO shaft is capable of transmitting the full power of engine	: Yes

**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 corresponds to 2044 rpm of engine.	Conforms
No. of splines	6	6	Conforms
Direction of rotation	Clockwise	Clockwise	Conforms
Location	The position of the centre of the end of PTO shaft shall be within 50 mm to right or left of the centre line of the tractor	Centrally located	Conforms
<b>Dimensions (mm) [See Fig. 2(A)]:</b>			
D $\emptyset$	34.79 ± 0.06	34.79	Conforms
d $\emptyset$	28.91 ± 0.05	28.92	Conforms
B $\emptyset$	29.4 ± 0.1	29.5	Conforms
A $\emptyset$ (Optional)	8.3 ± 0.1	8.3	Conforms
W	8.69 - 0.09 - 0.16	8.60	Conforms
A	7	7	Conforms
b (Optional)	25 ± 0.5	25	Conforms
C	38	38	Conforms
X	30°	30°	Conforms
B	76 (min)	83	Conforms
H	450 to 675	445	Conforms

**Fig. 2(A): DIMENSIONAL NOTATIONS FOR TYPE-I POWER TAKE-OFF SHAFT****1.14.2 Power Take-off Master Shield (Type I&II): Not provided**





1.15	<b>Towing hitch:</b>	
1.15.1	Front	: Not Provided
1.15.2	Rear:	
	Type	: Clevis
	Location	: At rear of transmission housing
	<b>Height above ground level, (mm):</b>	
	- Maximum	: 290
	- Minimum	: 255
	No. of position	: 2 positions
	- Type of adjustment	: By reversing the position of hitch on its mounting bracket.
	<b>Distance of hitch point,(mm):</b>	
	- From rear axle centre	: 455 & 505
	- From power take-off shaft end	: 110,160 & 210
	Dia of pin hole, (mm)	: 26
	Width of clevis, (mm)	: 61.3
1.16	<b>Steering system:</b>	
	Make	: Danfoss
	Type	: Hydrostatic
	Method of operation	: Manual, by steering control wheel
	Diameter of steering control wheel, (mm)	: 360
	<b>Make &amp; type of pump</b>	: Rexroth & Tandem gear
	Location	: In front of engine crankcase
	Method of drive	: Through crankshaft pulley
	Make, no. & type of hydraulic ram cylinder	: Ognibini, one & double acting cylinder (apa)
	Location of ram cylinder	: In front of front axle ,In center
	Lubricant capacity (l)	: 21.8 (common with transmission, hydraulic & brake system.)
	Oil change period,	: First change in 850 hrs subsequently after every 1050 hours of operation.
1.17	<b>Brakes:</b>	
1.17.1	<b>Service Brake:</b>	
	Make	: JMFT. (apa)
	Type	: Mechanical, oil immersed disc brakes
	Location	: On rear axle shaft, outside of differential housing.
	No. of disc (s)	: Three (on each wheel side)
	Area of liners. (cm <sup>2</sup> )	: 442.1 (on each wheel side)
	Material of liners	: Organic paper based (apa)
	Method of operation	: Individual or combined pedal operation by right foot of operator
1.17.2	<b>Parking Brake:</b>	
	Type	: Ratchet locking mechanism
	Method of operation	: Service brake act as parking brake when locked in position by a hand lever provided on below steering of the operator's seat.



<b>1.18</b>	<b>Wheel Equipment:</b>	
<b>1.18.1</b>	<b>Steered Wheel(s):</b>	
	Make	: Apollo
	Number	: Two
	Type of tyre	: Pneumatic, traction
	Size	: 6.00 -14
	Ply rating	: 6
	Maximum permissible loading capacity of each tyre at 248 kPa pressure, (kgf)	: 450 (apa)
	<b>Recommended inflation pressure, (kPa) :</b>	
	- for field work	: 167
	- for transport	: 248
	Track width, (mm)	: 880(Std.) & 950
	Method of changing track width	: None
	Make & size of rim	: Wheels India ltd, A5J x 14
<b>1.18.2</b>	<b>Driving wheel</b>	
	Make	: Apollo
	Number	: Two
	Type of tyre	: Pneumatic, traction
	Size	: 8.3-24
	Ply rating	: 6
	Maximum permissible loading capacity of each tyre at 241 kPa pressure, (kgf)	: 825
	<b>Recommended inflation pressure, (kPa) :</b>	
	- for field work	: 118
	- for transport	: 172
	Track width, (mm)	: 770 ,810,870 & 910(Std.)
	Method of changing track width	: By reversing the wheel disc & changing the position of wheel disc on off-set rim lugs.
	Make & size of rim	: Wheels India ltd., W7 x 24
<b>1.18.3</b>	<b>Wheel base (mm)</b>	: 1570
	Method of changing wheel base, if any	: None
<b>1.19</b>	<b>Operator's seat:</b>	
	Make	: Mahindra-Swaraj Automotive-Nabha(apa)
	Type	: Cushioned
	Type of suspension	: Helical coil springs
	Type of dampening	: Hydraulic shock absorber
	<b>Range of adjustment,(mm):</b>	
	- Vertical	: Nil
	- Lateral	: Nil
	- Longitudinal	: Nil
<b>1.20</b>	<b>Provision for safety and comfort of operator:</b>	
<b>1.20.1</b>	<b>Conformity with IS:12343-1998:</b>	
	Not applicable as the rear track width of tractor is less than 1150 mm.	
<b>1.20.2</b>	<b>Conformity with IS: 6283 (Part-1 &amp; 2)-2006 &amp; 2007(Re-affirmed in March, 2009):</b>	
	Symbols for operator controls and displays specific to agricultural tractor are provided as per IS: 6283 (Part - 2) – 2007, <b>except the following</b>	
	i) Colour codes for engine revolution gauge.	



- 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(Re-affirmed in March, 2009), **except the following:**
- i) Provision of safety against accidental start of engine has not been provided.
- 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) Provision of spark arresting device in the exhaust system.
  - ii) Hand holds for easy mounting & dismounting of the operator has not been provided.
- 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) The working clearance around PTO engage hand lever is less than 70 mm
  - ii) Provision for PTO master shield
- 1.20.6 Conformity with IS: 14683 – 1999 (Re-affirmed in March, 2009) :**  
Lighting requirements conform to 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 (Reaffirmed in March, 2009):**

The Labelling plate riveted on LHS of mudguard, provides the following information:

Name of Manufacturer	M/s. Mahindra & Mahindra Ltd. Farm Equipment Sector, India
Make	Mahindra
Model	JIVO 245 DI
Year of manufacture	FG (i.e September,2016)
Engine serial number	CGF4WKA0001
Chassis serial number/ATIN	MBNZKGBBFGCF00001
Maximum P.T.O Power. (kW)	16.5
Specific fuel consumption, g/kWh(g/hph)	274.9 (205)

**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	Nil	Nil	Nil	Nil
	Water	Nil	Nil	Nil	Nil
Rear	C.I. weight	Nil	Nil	Half cage wheels fitted	Nil
	Water	Nil	Nil	Half cage wheels fitted	Nil
	Additional weight, if any	Nil	Nil	30 (In front of tractor)	Nil





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MAHINDRA, JIVO 245 DI TRACTOR - Commercial (Initial)

1.23	Masses:			
	Particulars	Mass of the tractor with standard ballast and with all the liquid reservoirs full but without operator, (kg)		
		Front	Rear	Total
	With Un ballast as used during drawbar performance test, dry land operation	470	610	1080
	With Un ballast as used during field test:			
	-Dry land operation	470	610	1080
	-Wet land operation	530	670	1200
	With Un ballast as used during haulage test with trailer hitch, canopy and drawbar	475	585	1060

1.24 Overall dimensions:

Condition	Length, (mm)	Width, (mm)	Height, (mm)		Ground Clearance, (mm)
			With exhaust Pipe	Without exhaust pipe	
With un ballast	2725	1120	825	1360	260 (Below trailer hitch bracket)

1.25 Number of external lubricating points:

- Oiling : Nil
- Grease nipples : 17
- Grease cups : Nil

1.26 Colour of tractor:

- Chassis & engine : Smoke grey
- Bonnet : Red
- Mudguard : Red
- Wheel discs & rims : Red

1.27 Optional features ,if any : None

2. FUEL AND LUBRICANTS

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

2.2 Lubricants:

S.No.	Particulars	As recommended by the manufacturer	As used during the test
1.	Engine oil	API CH4 / SAE 15W40 / Mahindra M star Genuine Oil	SAE 15W40
2.	Transmission, differential, final drive , hydraulic, brake & Steering system	Mahindra M star Transmission Oil	Oil originally filled in the tractor was not changed
3.	Front axle	SAE 80W 90	Oil replaced during wet land cultivation repeat test
4.	Grease	Cluber grease	MP3 lithium base



### 3. PTO PERFORMANCE TEST

Date(s) of test : 27.06.2017 & 28.06.2017  
 Tractor run at the Institute prior to start of : 3.0  
 PTO test, (h)  
 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)	
1	2	3	4	5	6	7
<b>a) Maximum power – 2 hours test:</b>						
15.7	608	2302	4.93	4.12	0.262	3.19
14.4	608	2302	4.63	3.87	0.269	3.11*
<b>b) Power at rated engine speed (2300 rpm):</b>						
15.7	608	2302	4.93	4.12	0.262	3.19
14.4	608	2302	4.63	3.87	0.269	3.11*
<b>c) Power at standard power take-off speed (540 ± 10 rpm):</b>						
14.9	540	2044	4.34	3.63	0.244	3.43
14.0	540	2044	4.23	3.54	0.253	3.31*
<b>d) Varying loads at rated engine speed:</b>						
<b>i) Torque corresponding to maximum power available at rated engine speed:</b>						
15.7	608	2302	4.93	4.12	0.262	3.19
<b>ii) 85% of the torque obtained in (i):</b>						
14.1	643	2434	4.59	3.84	0.272	3.07
<b>iii) 75% of the torque obtained in (ii) :</b>						
10.8	657	2487	3.78	3.16	0.293	2.86
<b>iv) 50% of the torque obtained in (ii) :</b>						
7.3	662	2506	3.07	2.57	0.352	2.37
<b>v) 25% of the torque obtained in (ii) :</b>						
3.6	669	2533	2.48	2.08	0.569	1.47
<b>vi) Unloaded:</b>						
0.1	676	2559	2.19	1.83	1.300	0.06
<b>e) Varying loads at Standard PTO speed (540 ± 10 rpm):</b>						
<b>i) Torque corresponding to maximum power available at standard PTO speed (540 ± 10 rpm):</b>						
14.9	540	2044	4.34	3.63	0.244	3.43
<b>ii) 85% of the torque obtained in (i) :</b>						
13.2	559	2116	3.96	3.31	0.251	3.33
<b>iii) 75% of the torque defined in (ii):</b>						
10.1	571	2162	3.23	2.70	0.270	3.13
<b>i) 50% of the torque defined in (ii):</b>						
6.8	580	2196	2.54	2.13	0.313	2.67
<b>ii) 25% of the torque defined in (ii):</b>						
3.5	591	2238	1.91	1.59	0.454	1.82
<b>vi) Unloaded:</b>						
0.1	606	2294	1.39	1.16	8.923	0.09

\* Under high ambient conditions

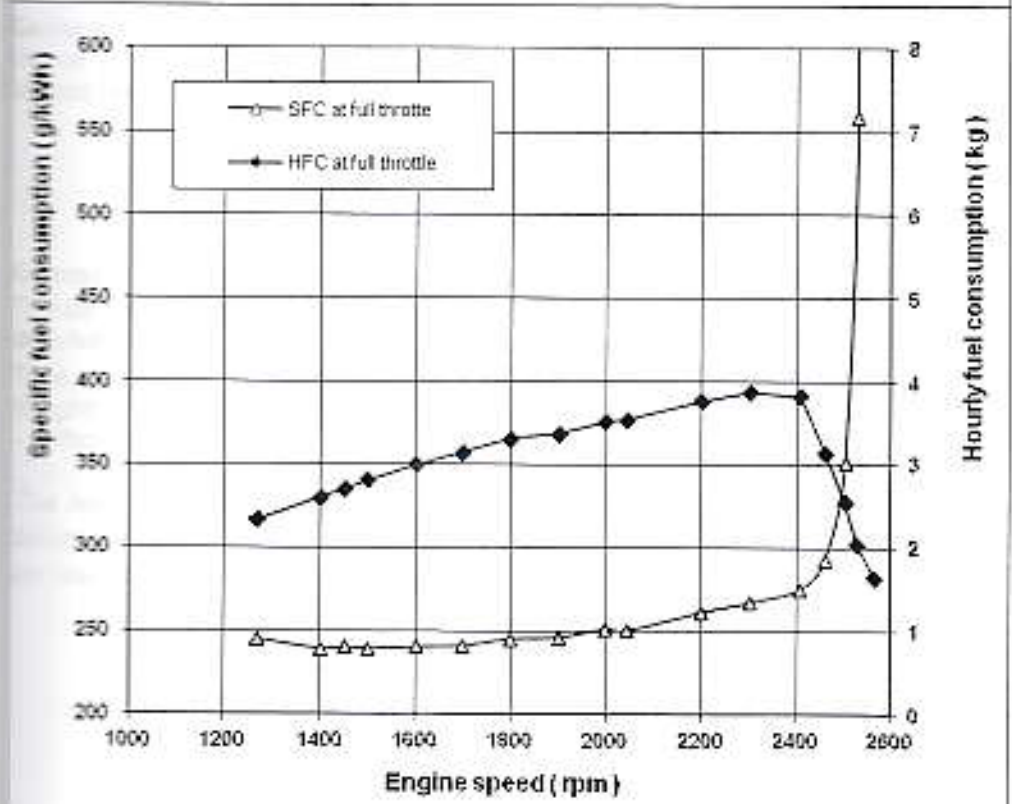
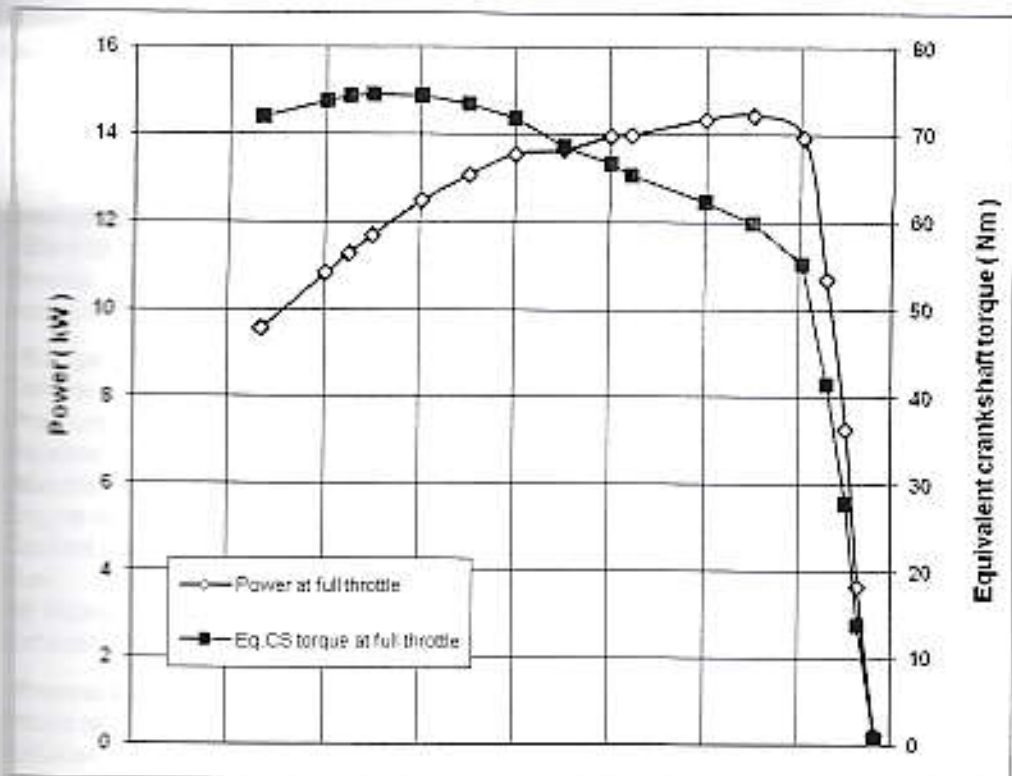


Fig. 4 : PTO PERFORMANCE CHARACTERISTICS ( High ambient )





	<u>Natural ambient</u>	<u>High ambient</u>
-No load maximum engine speed (rpm)	2559	2567
-Equivalent crankshaft torque at maximum power, (Nm)	65.0	59.9
-Maximum equivalent crankshaft torque (Nm)	79.4	74.5
-Engine speed at maximum equivalent crankshaft torque (rpm)	1450	1499
- Backup torque, (%)	22.2	24.4
<b>Smoke level</b> , maximum light absorption coefficient, (per meter)	0.16	--
<b>- Range of atmospheric conditions:</b>		
Temperature (°C)	26 to 27	42 to 45
Pressure, (kPa)	97.4 to 98.1	98.8 to 99.3
Relative humidity (%)	79 to 85	38 to 55
<b>-Maximum temperatures, (°C):</b>		
Engine oil	98	113
Coolant (water)	85	100
Fuel	47	64
Air intake	25	43
Exhaust gas	609	622
<b>-Pressure at maximum power:</b>		
Intake air, (kPa)	2.0 to 2.1	2.0 to 2.2
Exhaust gas, (kPa)	4.4 to 4.8	5.2 to 5.7
<b>-Consumptions :</b>		
Lub oil, (g/kWh)	--	0.66
Coolant (water) (% of total coolant capacity)	--	Nil

#### 4. DRAWBAR PERFORMANCE TEST

Date(s) of test	: 28.07.2017, 29.07.2017 & 31.07.17
Tractor run at the Institute prior to start of drawbar test, (h)	: 17.7
Type of track	: Concrete
<b>Height of drawbar, (mm):</b>	
- Without ballast	: 465

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



**Table - 2**

**DRAWBAR PERFORMANCE TEST**

G a a r	Travel Speed, (km/h)	Draw- bar power, (kW)	Draw- bar pull, (kN)	Engine Speed, (rpm)	Wheel Slip, (%)	Fuel consumption		Specific Energy, (kW/h)	Atmospheric conditions				Temperature (°C)			Max. sust- ained pull, (kN)
						(kg/ kW/h)	(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
<b>i) Maximum power test (Tractor Unballasted with 4 WD in engaged condition):</b>																
L1	1.96	4.91	9.02	2501	15.2	0.500	2.93	1.67	24	97.8	91	29	56	84	93	10.80
L2	2.84	7.52	9.52	2479	15.2	0.382	3.43	2.19	34	97.8	92	29	55	84	91	10.62
L3	3.87	9.41	8.76	2437	15.3	0.366	4.12	2.28	24	97.9	91	30	61	84	99	10.43
L4	5.68	13.0	8.25	2302	13.1	0.314	4.88	2.66	24	97.9	91	30	61	87	100	10.07
H1	6.79	13.3	7.06	2309	9.9	0.311	4.95	2.69	24	97.9	96	30	56	87	93	8.68
H2	10.35	14.9	5.16	2306	6.5	0.280	4.99	2.99	23	98.0	97	29	53	86	91	6.50



Contd.. Table-2

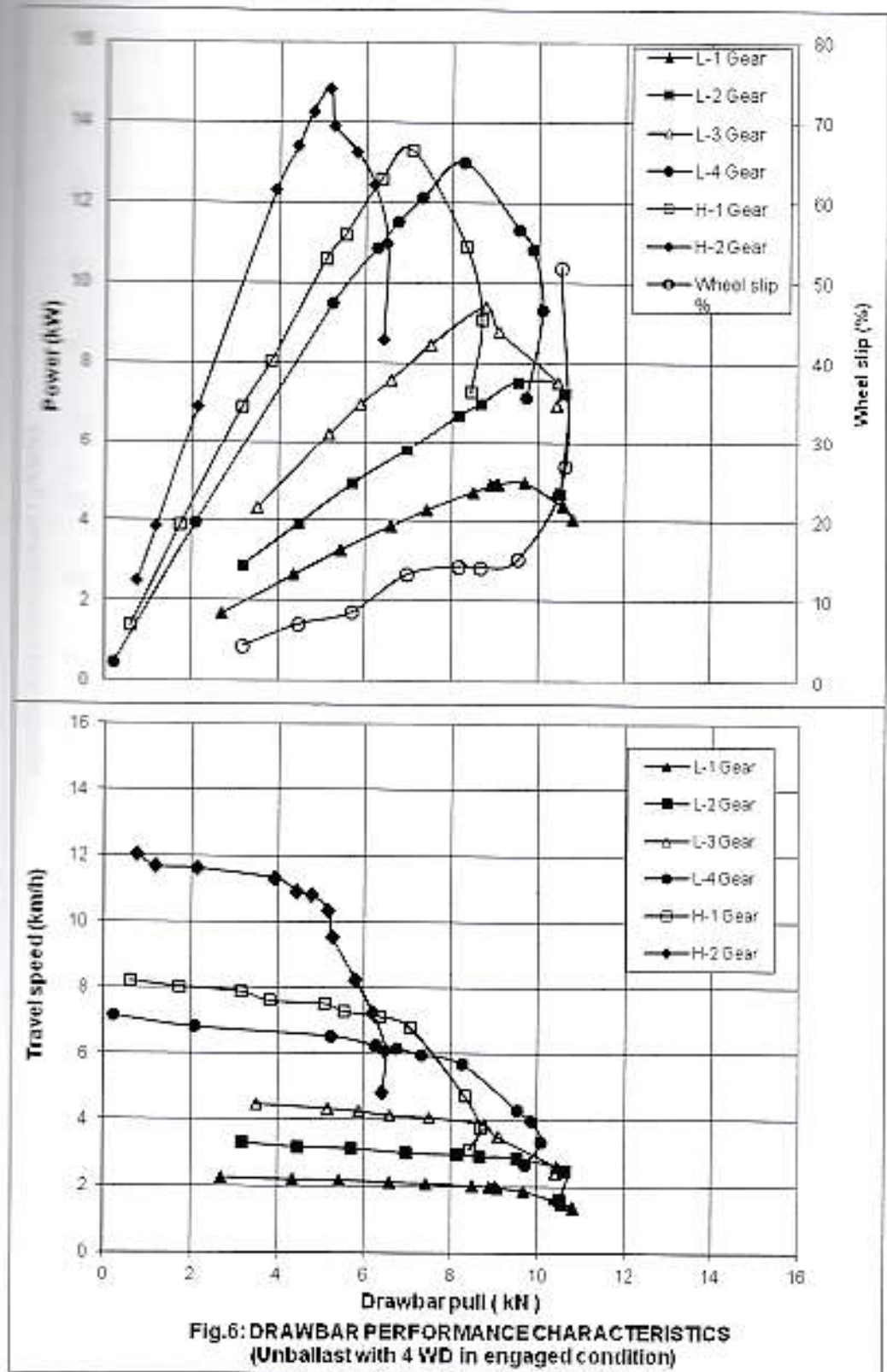
G. o. a. r	Travel Speed, (km/h)	Draw-bar power, (kW)	Draw-bar pull, (kN)	Engine Speed (rpm)	Wheel Slip, (%)	Fuel consumption		Specific Energy, (kWh/h)	Atmospheric conditions			Temperature, [°C]			Max. sustained fuel, (kg)	
						(kg/kWh)	(l/h)		Temp (°C)	Pressure (kPa)	R.H. (%)	Fuel	Trans. oil	Coolant (water)		Eng. oil
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<b>iii) Five hours test at 75 percent of pull obtained at max. Power (Tractor Unballasted with 4 WD in engaged condition):</b>																
L4	6.31	10.86	6.20	2428	8.5	0.321	4.19	2.60	25	98.1	79	31	52	85	90	--
<b>iv) Five hours test at pull corresponding to 15 percent wheel slip (Tractor Unballasted with 4 WD in engaged condition):</b>																
L3	3.96	9.70	8.81	2439	--	0.341	3.96	2.45	24	98.3	76	29	50	84	85	--

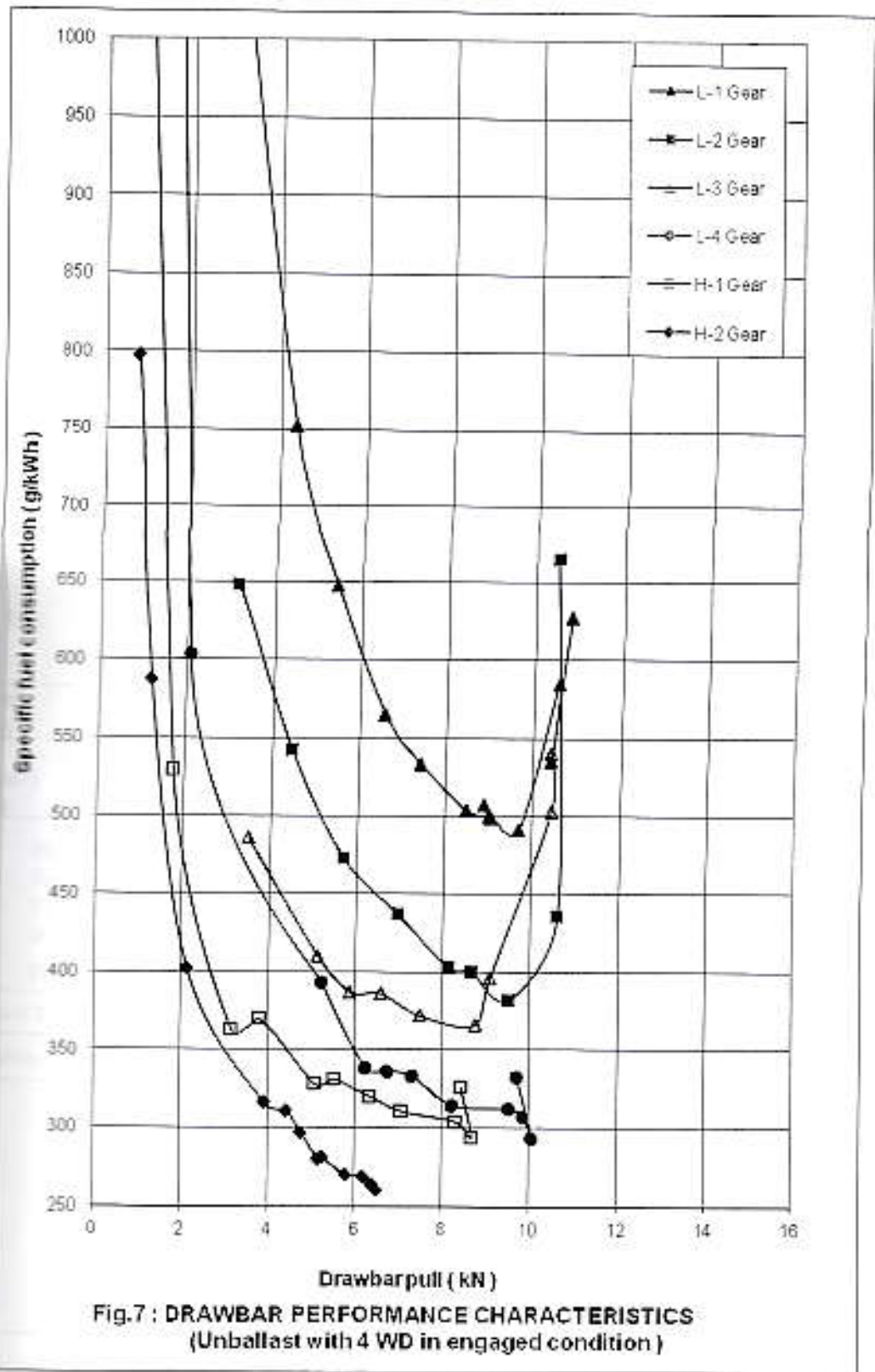
i) The coolant (water) and lub oil consumption during 10 hours test were observed as nil and 4.48 ml/hr respectively

ii) Tyre Creeping, (mm):  
 LHS : NIL Front  
 RHS : NIL Rear

iii) Maximum temperatures during entire drawbar test, (°C):  
 Engine oil : 101  
 Coolant (water) : 90  
 Transmission oil : 77  
 Fuel : 34









### 5. POWER LIFT AND HYDRAULIC PUMP PERFORMANCE TEST

Date(s) of test : 11.07.2017 & 12.07.2017

Tractor run at the Institute prior to start of hydraulic test, (h) : 15.0

Pump speed at rated engine speed (rpm) : 2300

#### 5.1 Hydraulic power test:

Pump delivery rate at minimum pressure and rated engine speed, (l/min) : 18.16

Maximum hydraulic power, (kW) : 2.93

Pump delivery rate at maximum hydraulic power, (l/min) : 16.69

Pressure at maximum hydraulic power, (Mpa) : 10.5

Sustained pressure of the open relief valve, (Mpa) : 12.9

#### Tapping point:

a) Relief valve test : At external circuit

b) Pump performance test : At pump outlet

Temperature of hydraulic fluid, (°C) : 61 to 62

#### 5.2 Lifting capacity test :

Test	Height of lower hitch point above ground in down position, (mm)	Vertical movement with lifting forces, (mm)	Maximum force exerted through full range, (kN)	Corresponding pressure, (Mpa)	Moment about rear axle, (kN-m)	Max. tilt angle of mast from vertical (degrees)
At hitch points	200	415	7.81	11.61	5.12	--
On the standard frame	200	410	4.54	11.61	5.74	23.0

#### 5.3 Maintenance of lift load:

Force applied at the frame, (kN) : 4.09

Temperature of hydraulic fluid at the start of test, (°C) : 61

#### Test data:

Elapsed time (minute)	5	10	15	20	25	30
Cumulative drop in height of lift, (mm)	01	01	06	07	08	09

### 6. BRAKE TEST

#### 6.1 Service brake:

##### 6.1.1 Cold brake test:

Date of test(s) : 22.05.2017

Type of Track : Concrete

Maximum attainable speed (kmph):

- Un ballasted : 24.5

Unballasted Track		At maximum attainable speed				
		Braking device control, force (N)	591	551	520	489
		Mean deceleration, (m/sec <sup>2</sup> )	2.81	2.74	2.68	2.50
	Stopping distance, (m)	8.28	8.45	8.63	9.26	



**6.1.2 Brake fade test:**

Un ballasted tractor	Braking device control force(N)	At maximum attainable speed			
		579	552	526	500
		Mean deceleration, (m/sec <sup>2</sup> )	2.88	2.69	2.62
	Stopping distance, (m)	8.38	8.60	8.82	9.26

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	18 percent slope		12 percent slope with trailer of 1.06 tonnes.	
	Facing up	Facing down	Facing up	Facing down
Braking device control force, (N)	471	451	393	394
Efficacy of parking brake	-----Effective-----			

**7. NOISE MEASUREMENT****7.1 Noise at bystander's position:**

Date of test : 18.05.2017

Type of track : Concrete

Background noise level, dB (A) : 56

**Atmospheric conditions:**

Temperature, (°C) : 40

Pressure, (kPa) : 96.6

Relative humidity, (%) : 21

Wind velocity, (m/s) : 1.5

**TEST DATA:**

S. No.	G e a r	Travelling speed before acceleration, (kmph)	Noise level, dB (A)
1.	L1	1.71	77
2.	L2	2.52	77
3.	L3	3.45	77
4.	L4	5.25	78
5.	H1	6.04	76
6.	H2	8.81	78
7.	H3	12.18	77
8.	H4	18.32	79

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

Date of test : 31.08.2017

Type of track : Concrete

Background noise level, dB(A) : 57.0

**Atmospheric conditions:**

Temperature, (°C) : 27

Pressure, (kPa) : 98.1

Relative humidity, (%) : 80

Wind velocity, (m/s) : 1.1

**TEST DATA:**

Gear	Drawbar pull at which the tractor develops the max. noise level, (kN)	Corresponding travelling speed, (kmph)	Noise level dB (A)
L1	8.48 to 8.99	2.01 to 1.96	92
L2	9.27 to 9.52	2.87 to 2.84	91
L3	3.50 to 8.76	4.46 to 3.87	92
L4	7.79 to 8.25	5.76 to 5.68	94
H1*	5.08 to 7.06	7.51 to 6.79	94
H2	4.42 to 4.76	10.92 to 10.80	92

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

**8. MECHANICAL VIBRATION MEASUREMENT**

Date of test : 01.08.2017

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	100	60	160*	120*
		Right	90	140*	90	160*
ii)	Steering control wheel		80	90	160*	80
iii)	Seat	Bottom	30	30	60	60
		Back	30	30	90	20
iv)	Mudguard	Left	80	100	140*	150*
		Right	60	90	70	160*
v)	Head light	Left	50	40	50	100
		Right	30	30	60	160*
vi)	Battery base, centre		50	70	120*	120*
vii)	Tail light	Left	60	60	160*	150*
		Right	60	40	150*	120*
viii)	Plough light		60	170*	220*	170*
ix)	Gear shifting lever		80	80	70	110*
x)	Accelerator lever	Hand	100	30	170*	90
		Foot	100	90	190*	120*
xi)	Brake pedal	Left	60	70	90	120*
		Right	100	90	180*	140*
xii)	Clutch pedal		60	40	100	60
xiii)	Main hydraulic control lever		30	30	100	150*
xiv)	PTO engaging lever		70	90	130*	110*
xv)	Differential lock pedal		40	20	60	30

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

**9. LOCATION OF CENTRE OF GRAVITY**

Condition	Particulars	Coordinates
Tractor under standard ballasted condition but with all the liquid reservoirs full & the operator replaced by a 75 kg mass on the seat	Height above ground, (mm)	607
	Distance forward from the vertical plane containing the axis of rear wheels, (mm)	684
	Distance from the median plane parallel to the longitudinal axis of tractor bisecting the track, (mm)	3.9 (RHS)



### 10. TURNING ABILITY

Characteristics	Minimum turning diameter, (m)		Minimum clearance diameter, (m)	
	LHS	RHS	LHS	RHS
Brake applied	4.75	4.69	4.99	4.93
Brakes released	5.41	5.38	5.65	5.62

### 11. OPERATOR'S FIELD OF VISION

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

1. The non-visible space in front is 5420 mm which is 3.45 times of its wheel base (i.e. 1570 mm)
2. The non-visible space in LHS & RHS is 1200 mm which is 1.32 times of its rear standard track width (i.e. 910 mm)
3. No masking effect observed

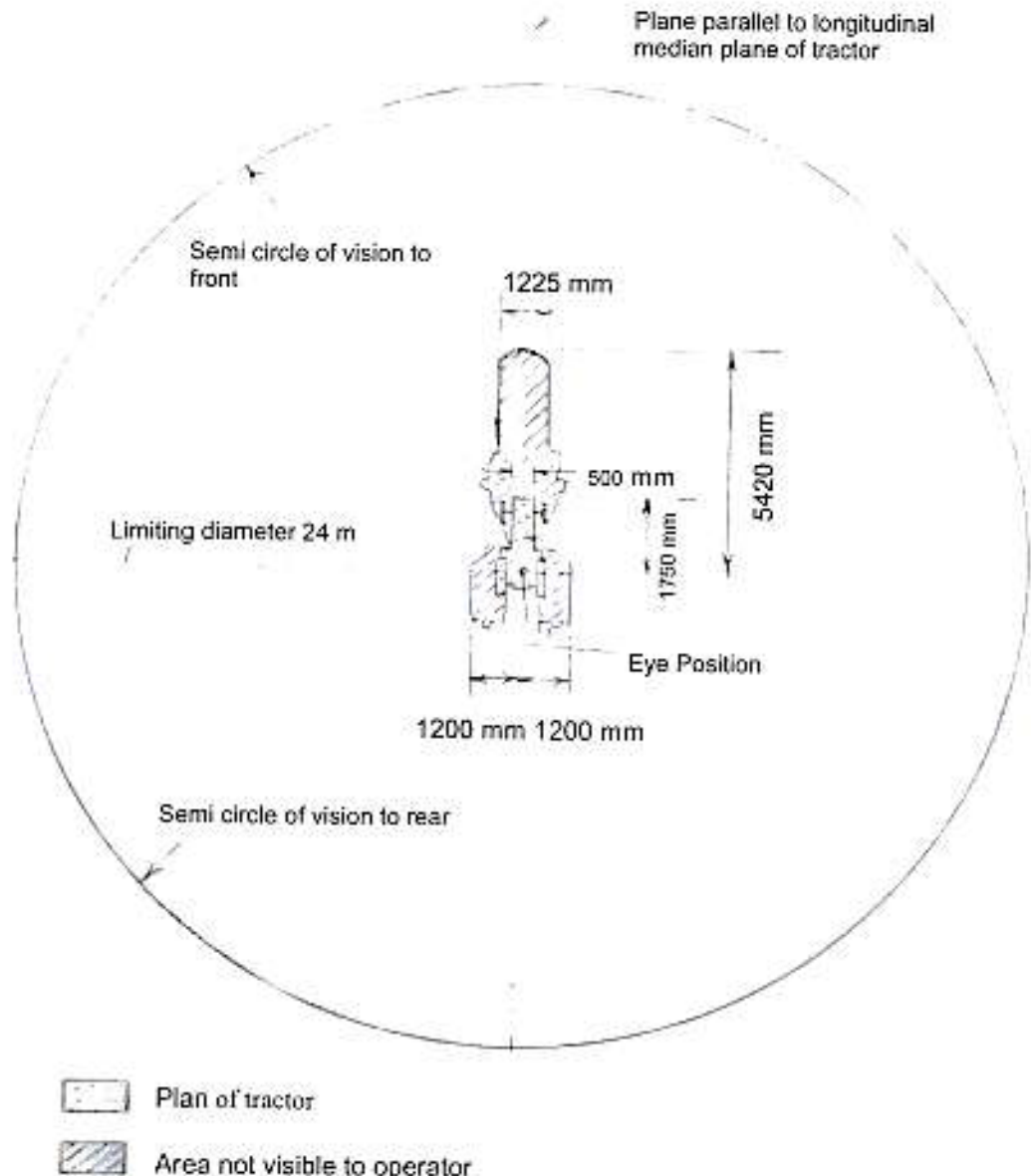


Fig. 8: OPERATOR'S FIELD OF VISION





## 12. FIELD TEST

- 12.1 The field tests comprising of mould board ploughing, rotavation and puddling (including water proof test of 5.0 hours) were conducted for 13.7, 13.9 and 10.4 hours respectively. All the field tests were conducted at the full accelerator settings, when the no load speed of the engine varied from 2529 to 2571 rpm.
- 12.2 The brief specifications of the implements used during field tests are given in Annexure -I.
- 12.3 The summary of field test observation with two bottom Mould board plough, 16 blade rotavator and half cage wheel with 16-blade rotavator is given in Table – 3.

Table – 3

## SUMMARY OF FIELD PERFORMANCE TEST

S.No.	Parameter/operation	MB Ploughing	Rotavation	Puddling
i)	Type of soil	Light & Heavy	Light & Heavy	Heavy
ii)	Av. Soil moisture, (%) / Av. Depth of standing water, (cm)	7 to 15	11 to 13	13 to 19
iii)	Bulk density of soil, (g/cc)	1.6 to 1.7	1.8 to 2	--
iv)	Cone index, (kgf/sq.cm) / Puddling index, (%)	5.9 to 8.5	6.3 to 8.2	80 to 81
v)	Gear used	L-2	L-2	L-2
vi)	Av. Speed of operation, (kmph)	2.64 to 2.96	3.18 to 3.27	2.43 to 2.57
vii)	Av. Wheel slip, (%) / Av. Travel reduction, (%)	9 to 19	-2.9 to -1.2	3.5 to 4.5
viii)	Av. Depth of cut, (cm) / Av. Depth of puddle, (cm)	16 to 20	5 to 7	27 to 28
ix)	Av. Working width, (cm)	17.2 to 24.1	76 to 88	--
x)	Area covered, (ha/h)	0.049 to 0.064	0.178 to 0.261	--
xi)	<b>Fuel consumption:</b>			
	- (l/h)	2.15 to 2.31	2.93 to 3.29	3.14 to 3.21
	- (l/ha)	33.59 to 47.14	11.23 to 18.48	--
xii)	Av. Draft of implement, (kN)	4.02 to 5.0	---	---

**Remarks:-**The average coolant & lub oil consumption during the entire field tests was observed as 3.50 ml/h & 2.33 ml/h.

## 12.4 Wet land cultivation (Puddling):

12.4.1 The tractor was fitted with half cage wheel with 16 –blades rotavator (0.8 meter) for conducting the puddling operation. The brief specification of half cage wheel used is given in Annexure – II.

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

S. No.	Location	Whether ingress of mud and/or water	Remarks
1.	King pin assemblies	No	Ingress of mud /or water in the RHS swivel housing (stub axle assembly) was observed.
2.	Stub axles	Yes	
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	



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**12.5 Repeat Test :**

**12.5.1 Wet land cultivation (Puddling) test on same model:**

During the initial test on wet land cultivation (Puddling operation) ingress of water and mud in RHS swivel housing (stub axle assembly) was observed and the tractor does not meeting the evaluative requirement of **IS: 12207-2014** in respect to wet land cultivation (Puddling operation). Consequent upon the request received from the applicant vide letter No. Nil dated 21.08.2017 for changing the RHS swivel housing (stub axle assembly) parts of front axle & replacement of the following parts having the same specification under 'Repeat test' as per the provision of **clause 3.2.3 of IS 12207-2014**.

S. No.	Part Name	Existing parts	Quantity	Replaced Parts	Quantity
i)	'O' ring swivel housing	006513336Y1	02	006513336Y1	02
ii)	'O' ring beam to side housing	006513337Y1	02	006513337Y1	02
iii)	Swivel housing seal	007609741C1	02	007609741C1	02
iv)	Hub seal	008003896B1	02	008003896B1	02
v)	Shim end reduction	006513355Y1	04	006513355Y1	04
vi)	Shim end reduction	006513357Y1	04	006513357Y1	04
vii)	Front axle oil	25.143	5 litre	25.143	5 litre
viii)	Sealant 515	For sealing used			

**12.5.2** The request of applicant was accepted by the competent authority & wetland cultivation test (puddling operation) was conducted.

**12.5.3** The summary of repeat wet land cultivation (Puddling operation) test observation with puddling is given in Table-4.

**SUMMARY OF REPEAT WET LAND CULTIVATION  
(Puddling Operation) TEST**

**Table - 4**

S. No.	Parameter/ Operation	Puddling
1	Type of soil (refer IS: 7926-1975)	Heavy
2	Av. Depth of standing water (cm)	16 to 19
3	Puddling index. (%)	82
4	Gear Used	L-2
5	Av. Speed of operation, (kmph)	2.81 to 2.80
6	Av. Travel reduction (%)	-0.9 to -0.3
7	Av. Depth of Puddles, (cm)	26 to 27
8	Fuel consumption, (lh)	3.15 to 3.21

**12.5.4** After completion of **repeat wet land cultivation** (Puddling operation 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	





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### 13. HAULAGE TEST

Type of trailer	:	<b>Two wheel (Single axle)</b>
Gross mass of trailer, (tonne)	:	2.5
Height of trailer hitch above ground level, (mm)	:	265
Gear used during the test for negotiating slopes up to 8%	:	H-4
Average travel speed,(kmph)	:	23.23 to 23.63
<b>Average fuel consumption:</b>		
- (l/h)	:	4.9 to 5.15
- (ml/km/tonne)	:	47.4 to 49.8
Average distance traveled per litre of fuel consumption, (km)	:	8.03 to 8.44
<b>General observations:</b>		
Effectiveness of brakes	:	Effective
Maneuverability of tractor-trailer combination	:	Satisfactory

### 14. COMPONENTS/ASSEMBLY INSPECTION

The engine and other assemblies were dismantled after 108.0 hours of tractor operation at this Institute.

#### 14.1 Engine:

##### 14.1.1 Cylinder bore:

Cylinder No.	Cylinder bore dia. (mm)						Maximum permissible wear limit, (mm)
	Top position		Middle position		Bottom position		
	Thrust side	Non-thrust side	Thrust side	Non-thrust side	Thrust side	Non-thrust Side	
1.	88.954	88.954	88.953	88.957	88.951	88.957	89.13
2.	88.955	88.956	88.951	88.950	88.953	88.952	

##### 14.1.2 Piston:

Piston No.	Piston dia. (mm)					Clearance between piston and cylinder liner at the skirt of the piston, (mm)	
	Top(above top compression ring)		At skirt			As observed	Maximum permissible limit
	Thrust side	Non-thrust side	Thrust side	Non-thrust side	Max. permissible wear limit		
1.	88.069	87.991	88.821	*	88.15	0.136	0.200
2.	88.089	88.023	88.818	*		0.138	

\* Not measured due to piston design feature

##### 14.1.3

Rings	Cylinder No.1			Cylinder No.2			Max. Permissible end gap limit,(mm)
	Top	Middle	Bottom	Top	Middle	Bottom	
1 <sup>st</sup> comp. ring	0.20	0.20	0.20	0.20	0.20	0.20	2.5
2 <sup>nd</sup> comp.ring	0.55	0.55	0.55	0.55	0.55	0.55	2.5
Oil Ring	0.35	0.35	0.35	0.35	0.35	0.35	2.0

##### 14.1.4 Ring side clearance:

Rings	Ring side clearance, (mm)		Max. Permissible clearance Limit, (mm)
	Piston-I	Piston-II	
1 <sup>st</sup> Compression ring	Taper Ring		--
2 <sup>nd</sup> Compression ring	0.058	0.065	0.30
Oil ring	0.031	0.030	0.20





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**14.1.5 Main bearings:**

Bearing No.	Diametrical Clearance, (mm)	Crankshaft end float, (mm)	Max. permissible clearance limit, (mm)	
			Diametrical clearance	Crankshaft end float
1.	0.111	0.13	0.200	0.60
2.	0.112			
3.	0.108 to 0.112			

**14.1.6 Big end bearings:**

Bearing No.	Clearance, (mm)		Max. permissible clearance limit, (mm)	
	Diametrical	Axial	Diametrical	Axial
1.	0.068 to 0.073	0.20	0.200	0.750
2.	0.064 to 0.066	0.20		

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

Observation

Any marked sign of overheating of valves : None  
 Pitting of seat/faces of valves : None  
 Any visual damage to the teeth of timing gears : None

**Spring Rate, (N/mm):**

-Intake valve : 19.52 to 19.90 | Against the discard limit 14 of N/mm  
 -Exhaust valve : 19.42 to 19.61

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

Intake valve : 0.037 | Against the discard limit of 0.30 mm  
 Exhaust valve : 0.059 to 0.061

**14.2 Clutch:**

Any marked wear on clutch friction plates : None  
 Condition of clutch release bearing : Normal  
 Condition of diaphragm & springs : Normal  
 Condition of pilot bearing : Normal  
 Presence of oil in clutch housing : None  
 Any marks on fly wheel/ pressure plate : None  
 Overall thickness of clutch plate, (mm) : 8.20 to 8.21 | Against discard limit of 5.1 mm (1.3 mm per side)  
 Height of lining over rivet head, (mm) : 1.54 to 1.76 | Not specified

**14.3 Transmission gears:**

Any visual damage, pitting & chipping of any transmission gear teeth. : None  
 Backlash between crown wheel and pinion, (mm) : 0.23 | Against discard limit of 0.5 mm

**14.4 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 depth of oil groove (mm)
Left	4.7/4.9	4.76 to 4.83	0.40 to 0.59	3.1 ( 0.8 mm for disc face)
Right	4.7/4.9	4.81 to 4.84	0.38 to 0.60	

**14.5 Front axle:**

: The front axle final reduction unit case is directly connected with tie rod of steering system. Taper roller bearings are provided at bevel gear case & front axle case.

Condition of front axle seals and bearings : Normal



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- Any visual damage, pitting & chipping of front axle transmission gear teeth : None
- Clearance between king pin and bushes, (mm) : Not measured due to 4WD design.
- Clearance between centre pin and bushes, (mm) : 0.064 to 0.090 Against the discard limit of 0.30 mm
- 14.6 Steering system:**  
Visual condition of the components of complete steering assembly : Normal
- 14.7 Starter motor & Alternator:**  
Presence of soil/oil in housing : None  
Condition of bearings and other components : Normal

### 15. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

Sl. No.	Adjustments/Defects/Breakdowns and Repairs					Tractor run hours
1.	During the initial test on wet land cultivation (Puddling operation) ingress of water and mud in RHS stub axle assembly (swivel housing) was observed and the tractor does not meeting the evaluative requirement of IS: 12207-2014 in respect to wet land cultivation (Puddling operation). Consequent upon the request received from the applicant vide letter No. Nil dated 21.08.2017 for changing the RHS stub axle assembly (swivel housing) parts of front axle & replacement of the following parts having the same specification under "Repeat test" as per the provision of clause 3.2.3 of IS 12207-2014.					35.1
S. No.	Part Name	Existing parts	Quantity	Replaced Parts	Quantity	
i)	'O' ring swivel housing	006513336Y1	02	006513336Y1	02	
ii)	'O' ring beam to side housing	006513337Y1	02	006513337Y1	02	
iii)	Swivel housing seal	007609741C1	02	007609741C1	02	
iv)	Hub seal	008003896B1	02	008003896B1	02	
v)	Shim end reduction	006513355Y1	04	006513355Y1	04	
vi)	Shim end reduction	006513357Y1	04	006513357Y1	04	
vii)	Front axle oil	25.143	5 litre	25.143	5 litre	
viii)	Sealant 515	For sealing used				
2.	During wet land cultivation (puddling test) seepage of oil was observed from rear PTO shaft. On close inspection cassette seal PTO (Part no. 006511674V1) were found in damaged condition. The cassette seal PTO (Part no. 006511674V1) were replaced with new ones This breakdown has been categorized as Mn-13 as per IS: 12207-2014.					51.7





### 16. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

16.1 Evaluative (mandatory) / Non-evaluation (Non-mandatory) parameter 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:

Sl. 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
<b>16.1.1</b>	<b>PTO Performance :</b>					
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: -5 / +10% for PTO power >26 kW. -7.5/+10% for PTO power ≤ 26 kW or -5 / +10% for Engine power >26 kW. -7.5/+10% for Engine power ≤ 26 kW	16.5 (D)	15.7	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-dc-	16.5 (D)	15.7	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+ 5%	275 (D)	262	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	81(D)	79.4	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	18 (D)	22.2	Yes
f)	Maximum operating temperature, (°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)	113	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)	100	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	1% (D) 2.69 (R)	0.66	Yes
h)	Smoke level	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	5.2 FSN meter (D) 3.25 per meter (R)	0.16	Yes



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1	2	3	4	5	6	7
<b>16.1.2 Drawbar performance :</b>						
a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	Not applicable		
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	6.70 (D) 6.88 (R)	9.52	Yes
c)	Maximum drawbar power without ballast (kW).	Evaluative	Minimum 80 % of PTO power as referred in SI No. i) a) of PTO performance in case of tractors having total static mass > 1500 kg Minimum 75 % of PTO power as referred in SI No. i) a) of PTO performance in case of light weight tractors having 1500 kg total static mass of tractor Minimum 75 % of the engine power as referred in SI No. i) a) of engine performance in case of tractors which do not have a PTO shaft.	13.2 (D) 11.8 (R)	14.9	Yes
d)	Maximum transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	120 (D)	77	Yes
<b>16.1.3 Power lift and hydraulic pump performance :</b>						
a)	Maximum lifting capacity throughout the range of lift, (kN):					
1)	At hitch points	Non Evaluative	[Tolerance of minus 10%]	7.35 (D)	7.81	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	4.41 (D) 3.70 (R)	4.54	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 Minutes.(mm)	Non Evaluative	Observed value should not exceed 50 mm.	50 (D)	09	Yes
<b>16.1.4 Brake performance at 25 kmph:</b>						
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)	8.28	Yes
2)	Hot brake	Evaluative	10	10 (R)	8.38	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s <sup>2</sup> (N)	Evaluative	600	600 (R)	489 to 500	Yes
<b>16.1.5 Noise measurement :</b>						
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	85 (R)	79	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96 (R)	94	Yes
<b>16.1.6 Amplitude of mechanical vibrations at :</b>						
1)	Left foot rest	Non Evaluative	100 microns (max)	100 (R)	160	No
2)	Right foot rest				160	No
3)	Seat (with driver seated)				90	Yes
4)	Steering Wheel				160	No

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1	2	3	4	5	6	7
16.1.7	<b>Haulage requirements :</b>					
a)	Gross mass of the trailers, (tones):					
	1) Two wheel	Non Evaluative	--	2.5	2.5	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
	1) Two wheel	Non Evaluative	--	7.79	8.03 to 8.44	Yes
c)	Fuel consumption (ml/km/tonne):					
	1) Two wheel	Non Evaluative	--	42.8	47.4 to 49.8	Yes
16.1.8	<b>Wetland cultivation :</b>					
	Sealing for the following assemblies:		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 ingresses of water and/or mud	No ingress of mud and / or water was observed after repeat test	Yes
	1) Clutch assembly	Evaluative				
	2) Brake housings	Evaluative				
	3) Front axle hubs	Evaluative				
	4) Engine oil	Evaluative				
	5) Transmission oil	Evaluative				
16.1.9	<b>Safety features :</b>					
a)	Guards against moving and hot parts	Evaluative	As per CMVR	---	Meet the requirements	Yes
b)	Lighting arrangement	Evaluative	----do---	---	-do-	Yes
c)	Sealing 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)	----	Not applicable as the rear track width of tractor is less than 1150 mm.	Not applicable
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-2) 1993 (Cat.1N Narrow Hitch)	----	-do-	Yes
f)	Specifications of linkage drawbar	Non Evaluative	Should meet the requirements of IS 12953-1990 & IS:4468 (Part-2)-1993	----	Meet the requirements	Yes
	Swinging drawbar		Should meet the requirements of IS 12362-(Part 3)-1994.	----	Not Provided	Not applicable
16.1.10	<b>Labelling of tractors (Provision of labelling plate):</b>					
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	--	Mahindra	Yes
	2) Model	Evaluative		--	JIVO 245 DI	Yes
	3) Year of manufacture	Evaluative		--	FG (i.e September,2016)	Yes
	4) Engine number	Evaluative		--	CGF4WKA0001	Yes
	5) Chassis number	Evaluative		--	MBNZKGBBFGC F00001	Yes
	6) Declaration of PTO power, kW (hp)	Evaluative		--	16.5	Yes





1	2	3	4	5	6	7
<b>16.1.1</b>	<b>Discard limit for:</b>					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	89.1(D)	88.951 to 88.957	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.20 (D)	0.136 to 0.138	Yes
(c)	<b>Ring end gap (mm):</b>					
	- Top comp. ring.	Evaluative	-do-	2.5	0.20	Yes
	- 2 <sup>nd</sup> comp. ring.		-do-	2.5	0.55	Yes
	- Oil ring.		-do-	2.0	0.35	Yes
(d)	<b>Ring groove clearance (mm):</b>					
	- Top comp. ring.	Evaluative	-do-	Taper Rings		--
	- 2 <sup>nd</sup> comp. ring.		-do-	0.30	0.058 to 0.065	Yes
	- Oil ring.		-do-	0.20	0.030 to 0.031	Yes
(e)	<b>Clearance of main bearings (mm):</b>					
	- Diametrical clearance	Evaluative	To be specified by the manufacturer	0.20	0.108 to 0.112	Yes
	- Crankshaft end float	Evaluative		0.60	0.13	Yes
(f)	<b>Clearance of big end bearings, (mm):</b>					
	- Diametrical	Evaluative	-do-	0.20	0.064 to 0.073	Yes
	- Axial	Evaluative	-do-	0.75	0.20	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	Not applicable		
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.30	0.064 to 0.090	Yes
<b>16.1.13</b>	<b>Literature (Submission to test agency)</b>					
(a)	Operator manual	Evaluative	Provided/ Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
(b)	Parts Catalogue	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
(c)	Workshop/ Service manual	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
<b>16.1.14</b>	<b>CATEGORY OF BREAKDOWNS / DEFECTS :</b>					
S. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	As observed	Whether meets the requirements (Yes/No.)	
1.	Critical	Evaluative	No critical breakdown	None	Yes	
2.	Major	Evaluative	Not more than two and neither of them should be repetitive in nature	None	Yes	
3.	Minor	Evaluative	Not more than five and frequency of each should not be more than two.	One (Mn-13)	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.	One	Yes	





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1	2	3	4	5	6	7
<b>16.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2014:</b>						
	<b>Characteristic</b>	<b>Requirements as per IS: 12207-2014</b>	<b>As observed</b>	<b>Whether meets the requirements (Yes/No.)</b>		
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 tow hook not provided	No		

**16.3 Conformity with following IS:**

- i) Guidelines for declaration of power and specific fuel consumption and labeling of agricultural tractors (First revision) [IS 10273:1987 (Reaffirmed in March, 2009)] : Conforms
- ii) Agricultural tractors – Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS: 4931-1995 (Reaffirmed in March, 2009)] : Conforms
- iii) Agricultural wheeled tractors - Rear mounted three-point linkage: Part 1 Categories 1, 2, 3 & 4 (fourth revision) [IS 4468 (Part-2):1993 (Reaffirmed in March, 2007)/ISO 730-1:1994] : 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)] Tractors having more than 1150 mm rear track width. : Not applicable as the rear track width of tractor is less than 1150 mm.
- vi) Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision) : [IS 12239 (PT-1)-1996 (Reaffirmed in March, 2009)/ISO 4254-1:1989] : **Does not conform**
- vii) Tractors and machinery for agriculture and forestry – Technical means for ensuring safety Part 2: Tractors (first revision) IS 12239 (PT-2)-1999 (Reaffirmed in March, 2009)] : **Does not conform**
- viii) Tractors and machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays [IS: 6283 (Part-1 & Part-2) –2006 & 2007(Reaffirmed in March, 2009)/ ISO 3767-2:1991)] : Conforms
- 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

**16.4 Salient Observations:**

**16.4.1 Laboratory tests:**

**16.4.1.1 PTO Performance:**

- i) The maximum PTO power was recorded as 15.7 kW against the declaration of 16.5 kW, which meets the requirement of **IS: 12207-2014** with regard to tolerance limit.
- ii) The backup torque was observed as 22.2 %.



- iii) The specific fuel consumption corresponding to maximum power was measured as 262 g/kWh against the declaration of 275 g/kWh, which is within the tolerance limit of IS: 12207-2014.

**16.4.1.2 Mechanical Vibration:**

The amplitude of mechanical vibration on various assemblies marked as (\*) in Chapter-8 of this test report is on higher side. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

**16.4.1.3 Location and operation of operator's control:**

Working clearance PTO engaged hand lever is 25 mm clearance, which does not meet the requirement of the IS: 12239 (Part-2)-1999. This should be looked into for necessary corrective action.

**16.4.1.4 Symbols for operator controls and displays:**

Colour codes for engine revolution gauge are not identifiable with the symbols as per IS: 6283 (Part-1 & 2) -1998. This should be pay attention for improvement as per IS.

**16.4.2.1 Wetland Cultivation (Puddling Operation):**

- i) During the initial test on wet land cultivation (Puddling operation) ingress of water and mud in RHS swivel housing (stub axle assembly) was observed and the tractor does not meeting the evaluative requirement of IS: 12207-2014 in respect to wet land cultivation (Puddling operation). Consequent upon the request received from the applicant vide letter No. Nil dated 21.08.2017 for changing the RHS stub axle assembly (swivel housing) parts of front axle & replacement of the following parts having the same specification under "Repeat test" as per the provision of clause 3.2.3 of IS 12207-2014.

S. No.	Part Name	Existing parts	Quantity	Replaced Parts	Quantity
i)	'O' ring swivel housing	006513336Y1	02	006513336Y1	02
ii)	'O' ring beam to side housing	006513337Y1	02	006513337Y1	02
iii)	Swivel housing seal	007609741C1	02	007609741C1	02
iv)	Hub seal	008003896B1	02	008003896B1	02
v)	Shim end reduction	006513355Y1	04	006513355Y1	04
vi)	Shim end reduction	006513357Y1	04	006513357Y1	04
vii)	Front axle oil	25.143	5 litre	25.143	5 litre
viii)	Sealant 515	For sealing used			

The repeat wetland cultivation (Puddling operation) test was conducted and no ingress of water and/or mud was observed in various assemblies / components. The tractor was found suitable for wetland cultivation (Puddling operation) and meets the requirements of IS: 11082-1984.(Technical requirements of agricultural tractors for wetland operations).

- ii) During wet land cultivation (puddling test) seepage of oil was observed from rear PTO shaft. On close inspection cassette seal PTO (Part no. 006511674V1) were found in damaged condition. The damaged cassette seal PTO (Part no. 006511674V1) were replaced with new ones This breakdown has been categorized as Mn-13 as per IS: 12207-2014 and calls for stringent quality control measures at production level.

**16.5 Maintenance / Service Problems:**

No noticeable maintenance or service problem was observed during the test. However, suitable provision for draining the sediments/water may be provided at the fuel tank.

**16.6 Recommendation with regard to safety on tractor:**

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

- Provision for spark arresting device in exhaust system.
- Provision of master shield for PTO shaft.
- Front tow hook should be provided.





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MAHINDRA, JIVO 245 DI TRACTOR - Commercial (Initial)

- 16.7 **Adequacy of Literature supplied with machine:**
- 16.7.1 The following literature has been supplied with the tractor
- i) Operator's Manual for Mahindra, JIVO 245 DI Tractor.
  - ii) Part's catalogue Mahindra, JIVO 245 DI Tractor.
  - iii) Service Manual Mahindra, JIVO 245 DI Tractor.
- 16.7.2 The literature supplied was found adequate. However, The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.

## 17.0 Citizen charter

Duration of Test (Including Repeat Test)	Time frame for Testing evaluation as per citizen charter	Whether the report released within time frame given citizen charter	Remark, if any
06 Months (May, 2017 to October, 2017)	10 Months	Yes	----

TESTING AUTHORITY:C.S. RAGHUWANSHI  
AGRICULTURAL ENGINEERC.V. CHIMOTE  
TEST ENGINEERY.K. RAO  
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DIRECTOR

## 18. Applicant's Comment

Para No.	Our Reference	Applicant's Comment
18.1	16.4.1,2,16.1.4.3,16.1.4.4,16.1.2.1(i & ii) & 16.6 (i, ii & iii)	Observation will be studied & necessary action will be incorporated.





## BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST

S. No.	Items	Mould board Plough	Rotavator
1.	Make	Mahindra	Mahindra
2.	Type	Mounted	Mounted
3.	No. of Disc/blades	Two	16 in 4 flange
4.	Type of Disc/blades	Plain concave	Hatched
5.	Size of bottoms/blades, (mm)	255	220 x 68 x 7.7
6.	Spacing of bottoms/flanges, (mm)	170	190
7.	Lower hitch point span, (mm)	480	515
8.	Mast height, (mm)	371	365
9.	<b>Overall dimensions, (mm):</b>		
	- Length	1035	745
	- Width	760	1010
	- Height	840	790
10.	Gross mass, (kg)	95	100

## ANNEXURE - II

## BRIEF SPECIFICATION OF HALF CAGE WHEEL

S. No.	Items	Specification
1.	Type	Half cage wheel
2.	Dia. (mm)	885
3.	Width (mm)	315
4.	No. and type of lugs	9 & angular type
5.	Size of angle section, (mm)	40 x 40 x 5
6.	Length of lugs, (mm)	300
7.	Spacing lugs, (mm)	245
8.	Weight of cage wheels (kg)	45

## ANNEXURE - III

## TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	PTO performance test	11.7
3.	Power lift and hydraulic pump performance test	2.4
4.	Drawbar performance test	14.7
5.	Turning ability	0.2
6.	Location of centre of gravity	0.2
7.	Operator's field of vision	0.2
8.	Brake test	0.8
9.	Noise measurement	0.8
10.	Mechanical vibration test	0.8
11.	Theoretical speed test	0.9
B.	<b>FIELD TEST:</b>	
1.	Disc ploughing	13.7
2.	Rotavation	13.8
3.	Puddling (including 5.0 hours water proof test) (Repeat test)	31.4
C.	<b>HAULAGE TEST:</b>	7.1
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	9.3
<b>TOTAL:</b>		108.0