



**MAHINDRA, 255 DI POWER + OIB
(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@gov.in

Website : <http://www.fmttibudni.gov.in>

Telephone : 07564 - 234729

Fax : 07564 - 234743

T- 1107/1633/2017

MAHINDRA , 255 DI POWER + OIB (BRAND NAME:
BHOOMIPUTRA) TRACTOR - Commercial (Variant)



Address of Manufacturer

: Mahindra & Mahindra Ltd.
(Farm Equipment Sector)
Akurli Road, Kandivli (E)
Mumbai – 400 101

Month: September

Test Report No. T- 1107/1633/2017

Year : 2017



GOVERNMENT OF INDIA

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE
TRACTOR NAGAR, BUDNI (MADHYA PRADESH) 466445, INDIA

E-mail: fmti-mp@gov.in

Web site: <http://www.fmttibudni.gov.in>

Telephone : 07564-234729

FAX : 07564-234743



Type of Test : **COMMERCIAL (Variant)**

Test code/Procedure : IS: 5994-1998 (Reaffirmed in March 2009),
IS:9253 (Reaffirmed in September ,2013), and
IS: 12207-2014

Period of Test : July to August, 2017

Test Report No. : T- 1107/1633/2017

Month/Year : **September, 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 Variant test report and, should be read in conjunction with the Test Report of base model i.e. "Mahindra, 255 DI Power + (Brand Name: Bhoomiputra) " Tractor bearing No. T- 946/1464/2014, November, 2014.

SELECTED CONVERSIONS

SELECTED CONVERSIONS		
S. No	Units	Conversion Factor
1	Force:	
	1 kgf	9.80665 N 2.20462 lbf
	Power:	
2	1 hp	1.01387metric hp (Ps) 745.7 W
	1 Ps	735.5 W
	1 kW	1.35962 Ps
	Pressure:	
3	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	
As per applicant	apa
Top Dead Centre	TDC
Indian Standard	IS
Left Hand Side/ Right Hand Side	LHS/RHS
Mercury	Hg.
Temperature	Temp.
Not recorded	N.R.
Revolutions per minute	rpm
Outer diameter/ Inner diameter	O.D/I.D
Not available/ Not applicable	N.A.
Power take-off	PTO
Relative Humidity	R.H.



CONTENTS

	<u>PAGE</u>
1. Scope of test	06
2. Fuel & Lubricants	07
3. Essential Test	07
3.1 Specifications	07
3.2 Nominal speed	20
3.3 PTO Performance Test	21
4. Other applicable test	22
4.1 Brake Test	22
5. Adjustments, Defects, Breakdowns & Repairs	22
6. Comparison Between Base Model and Variant Model	23
7. Summary of Observations, Comments & Recommendations	26
8. Citizen Charter	29
9. Applicant comment's	29
Annexure – I & II	30 & 31

T- 1107/1633/2017

MAHINDRA , 255 DI POWER + OIB (BRAND NAME:
BHOOMIPUTRA) TRACTOR - Commercial (Variant)



- Address of Manufacturer** : Mahindra & Mahindra Ltd.
(Farm Equipment Sector)
Akurli Road, Kandivli (E)
Mumbai – 400 101
- Location of manufacturing plants (apa)** : i) Mahindra & Mahindra Ltd.
(Farm Equipment Sector)
Mahindra Research Valley-AS,
Mahindra World City, Plot No. 41/1, Anjur
P.O.: Chengalpattu- Kanchipuram district –
603004
- ii) Mahindra & Mahindra Ltd.
(Farm Equipment Sector)
Akurli Road, Kandivli (E)
Mumbai – 400 101
- iii) Mahindra & Mahindra Ltd.
(Farm Equipment Sector)
Hingna Road, Hingna MIDC
Nagpur– 440 016.
- iv) Mahindra & Mahindra Ltd.
(Farm Equipment Sector)
Agri Business Development Center,
Khatima Panipat Highway, Udham Singh
Nagar, Vil. Lalpur, Tehsil-Kichha,
Rudrapur – 263 153
- v) Mahindra & Mahindra Ltd.
(Farm Equipment Sector)
Agri Development Center, Vil-Mehla
Tehsil - Dudu Jaipur- Ajmer Road,
Jaipur– 303 007
- vi) Mahindra & Mahindra Ltd.
(Farm Equipment Sector)
Near Bidar "T" Junction , Mahindra Nagar,
Zaheerabad- 502 220
Medak District, Telangana
- Test requested by (applicant)** : The manufacturer
- Place of running-in & test carried out** : At manufacturer work place
- Duration of said running-in (h):**
- Engine : 15
- Transmission : 30
- Method of Selection** : The tractor was directly submitted by the manufacturer for test. Hence method of selection is not known.



1. SCOPE OF TEST

The "Mahindra, 255 DI Power+ (Brand Name- Bhoomiputra)" tractor had undergone "Initial Commercial Test" at this Institute and a test report No. T-946/1464/2014, was released in November, 2014. Now the applicant has submitted an application vide letter No. nil dated 22.02.2017 for testing of "Mahindra , 255 DI Power + OIB (Brand Name: Bhoomiputra)" tractor as a Variant of "Mahindra, 255 DI Power+ (Brand Name- Bhoomiputra)" tractor.

The applicant having enclosed a list of following differences in the technical specifications between "Mahindra, 255 DI Power+ (Brand Name- Bhoomiputra)" and "Mahindra , 255 DI Power + OIB (Brand Name: Bhoomiputra)" and requested to test the "Mahindra , 255 DI Power + OIB (Brand Name: Bhoomiputra)" as a variant of "Mahindra, 255 DI Power+ (Brand Name- Bhoomiputra)" tractor.

The major features of Base model and Variant model are listed below:

S. No.	Parameters	Base Model	Variant Model
1	2	3	4
1.	Make	Mahindra	Mahindra
2.	Model	255 DI Power +	255 DI Power + OIB
3.	Fuel feed pump model / group combination no.	FP/KS G22AD45/2, 9440030030	FP/KS G22AD104, F002A50038
4.	Fuel injector manufacturer's production pressure setting, (MPa)	24.03	25.8
5.	Governor model/group combination no.	RSV400...1050 A5 C1602R	RSV400...1050A5 C1713R
6.	Longitudinal distance of silencer outlet from SIP	1420	1360
7.	Range of speeds (kmph):		
	- Forward	2.80 to 29.75	2.86 to 30.25 (Variation of 1.5 to 2.1 %)
	- Reverse	4.26 to 12.42	4.33 to 12.63 (Variation of 1.6 to 1.7 %)
8.	Brakes system		
	Type	Mechanical, dry disc	Mechanical, oil immersed multi discs
	No. of disc (s)	Two (on each side)	Three (on each wheel side)
	Area of liners (cm ²)	609.27 (on each side)	710.6 (on each wheel side)
9.	Rear differential & Final Reduction unit:		
	Speed reduction through crown wheel & bevel pinion	4.889 : 1 (44T/9T)	4.181 : 1(46T/11T)
	Speed reduction through rear final drive	3.214 : 1 (45T/14T)	3.692 : 1(48T/13T)
10.	Wheel base, mm	1825	1880
11.	Overall length of tractor, mm	3170	3210
12.	Overall width of tractor, mm	1730	1680



1	2	3	4
13.	Rear towing hitch:		
	-Height of hitch above ground level, minimum / maximum, mm	375 / 535	355 / 730
	-No. of positions	04	14
	-Type of adjustment	By changing the position of hitch on its mounting bracket.	By changing the position of hitch & reversing hitch on its mounting bracket.
	-From rear axle centre	430	460
	-From power take-off shaft end	85	100
14.	Transmission system oil capacity, (l)	34.80 (Common with gear box, differential, final drive & hydraulic system).	38.9 (Common with gearbox, differential, final drive, hydraulic and brake system)
15.	Total mass of tractor	1780	1967

Subsequent to the examination of the case in light of Sl. No. v) & vii) of Table-3 of Indian Standard IS 12207-2014, the following tests were considered to be carried out:

- Specification checking
- Nominal speed test
- Maximum power two hour PTO performance test
- Brake test

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 and Air cleaner oil	20W40	Oil originally filled in the engine was not changed
2.	Transmission and hydraulic oil	MTRAC30	Oil originally filled in the tractor system was not changed
3.	Steering housing oil	SAE140	--do--
4.	Grease	MP3 Lithium Base	Servo Grease MP

3. ESSENTIAL TESTS

3.1. SPECIFICATIONS

3.1.1 Tractor:	Base model	Variant model
Make	:	Mahindra
Model	:	255 DI Power + 255 DI Power + OIB
Brand name	:	Bhoomiputra
Type	:	Four wheel, Rear-wheel drive, General Purpose, Agricultural Tractor
Year of manufacture	:	2012 2016
Chassis Serial number	:	BLMC3238 MBNAAABAEGNH00001
Country of Origin	:	India



3.1.2	Engine:	<u>Base model</u>		<u>Variant model</u>
	Make	:		Mahindra
	Model	:		MDI 1500 3A
	Type	:		Four stroke, naturally aspirated, water, cooled, direct injection, diesel engine.
	Serial number	:	BLMC3238	NGG3AAE1030
	Engine speed (Manufacturer's recommended production setting)(rpm) :			
	- Maximum speed at no load	:		2250 to 2350
	- Low idle speed	:		750 to 850
	- Speed at maximum torque	:		1100 to 1300
	Rated speed, (rpm):			
	- For PTO use	:		2100
	- For drawbar use	:		2100
3.1.3	Cylinder & Cylinder Head:			
	Number	:		Two
	Disposition	:		Vertical, Inline
	Bore/stroke, (mm)	:		88.9 / 120
	Capacity as specified by the applicant, (cc)	:		1490
	Compression ratio, (apa)	:		20.4 : 1 +/-1
	Type of cylinder head	:		Monoblock
	Type of cylinder liners	:		Wet, Replaceable
	Type of combustion chamber	:		Re-entrant bowl
	Arrangement of valves	:		Overhead,
	Valve clearance (cold/hot):			
	- Inlet valve, (mm)	:		0.40 / 0.30
	- Exhaust valve, (mm)	:		0.50 / 0.40
3.1.4	Fuel System:			
	Type of fuel feed system	:		Gravity and forced feed
3.1.4.1	Fuel tank:			
	Capacity, (l)	:	49.0	48.0
	Location	:		Above clutch housing
	Provision for draining of sediments/ water	:		Drain plug provided at the bottom of fuel tank on RH side.
	Material of fuel tank	:		Sheet metal
3.1.4.2	Fuel feed pump:			
	Make	:		Bosch, India
	Type	:		Plunger
	Model/Group combination No.	:	FP/KS G22AD45/2, 9440030030	FP/KS G22AD104, F002A50038
	Provision of sediment bowl	:		Provided (metallic)
	Method of drive	:		Through cam shaft of fuel injection pump
3.1.4.4	Fuel filters:			
	Make	:		Bosch, India
	Model/Group combination No.	:	9450030117	F002 H20 117
	Number	:		Two
	Type of elements	:		
	-Primary	:		Cloth
	-Secondary	:		Paper
	Capacity of final stage filter, (l)	:	0.50	0.45



		<u>Base model</u>	<u>Variant model</u>
3.1.4.5	Fuel Injection pump:		
	Make	Bosch, India	
	Model/Group combination No.	E040282100, F002A0Z927	F002A0Z927
	Type	Inline, Plunger	
	Serial number	205003	65306443
	Method of drive	Through timing gears	
3.1.4.6	Fuel injectors:		
	Make	Bosch, India	
	Model/Group combination No.:		
	Holder number	F002 C70 007	
	Nozzle number	DSLA144P2141	
	Type	Multi hole (five holes)	
	Manufacturer's production pressure setting, (MPa)	24.03	25.8
	Injection timing	10 \pm 1 before TDC	
	Firing order	1 - 2	
3.1.4.7	Governor:		
	Make	Bosch, India	
	Model/Group combination No.	RSV400...1050 C1602R.	A5 RSV400...1050A5 C1713R
	Type	Mechanical, centrifugal, variable speed	
	Rated engine speed, (rpm)	2100	
	Governed range of engine speed (rpm)	750 to 2350	
3.1.5	Air Intake system:		
3.1.5.1	Pre-cleaner		
	Make	Popular	
	Type	Centrifugal with transparent dust collector.	
	Location	On top of air cleaner inlet tube, above the bonnet.	
3.1.5.2	Air cleaner:		
	Make	Cromwell/PAI Auto (apa)	Not available
	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)	1.7 to 1.9	2.7 to 2.9
	Oil change period.	After every 50 hours or earlier , if required in arduous condition	
3.1.6	Exhaust System:		
	Type of silencer	Updraft (cylindrical)	
	Position of silencer outlet with respect to SIP, (mm):		
	- Vertical	940	
	- Longitudinal	1420	1360
	- Lateral	130 (on RHS)	
	Range of exhaust gas pressure at maximum power (kPa)	4.0 to 5.7	2.4 to 3.1
	Provision of spark arrestor	None	
	Provision against entry of rain water	A bend is provided at the top of silencer.	



		<u>Base model</u>	<u>Variant model</u>
3.1.7	Lubricating system:		
	Type	Force feed and splash	
	Oil sump capacity, (l)	4.90	4.10
	Total lub oil capacity, (l)	5.20	4.60
	Oil change period	First change after 250 hours, subsequent change after every 300 hours of operation.	
	Cooling device, (if any)	None	
	Filters:		
	Type	Full flow, spin on throw away, paper element.	
	Number	One	
	Pump:		
	Type	Gear	
	Method of drive	Through Camshaft	
	Pressure release setting, (kPa)	206.84 to 241.32	
	Minimum permissible pressure, (kPa)	100	
3.1.8	Cooling system:		
	Type	Forced circulation of coolant	
	Coolant as recommended	Lubzs, having coolant water ratio 0.05:1.	Lubzs, having coolant water ratio 80:20
	Details of pump, mm	82.30 Ø	83.0 Ø
	Details of fan	Centrifugal, semi open impeller of having eight vanes, and driven through crankshaft pulley by a 'V'-belt common to alternator.	
	Details of fan	Suction type having six polypropylene blades of 306.81 mm diameter, and mounted on water pump shaft.	
	Means of temperature control	Thermostat	
	Bare radiator capacity, (l)	1.50	1.8
	Capacity of expansion flask, (l)	0.75	0.7
	Total coolant capacity, (l)	5.50	4.65
	Radiator cap pressure,(kPa)	88	
3.1.9	Starting System:		
	Type	12V, DC, Electrical	
	Aid for cold starting	None	
	Any other device provided for easy starting.	None	
3.1.10	Electrical System:		
3.1.10.1	Battery:		
	Make & Model	Standard furukawa & SFN 88L/TR	Amaron & TR510D31L
	Type	Lead acid	
	Capacity and rating	12V, 88 Ah at 20 hours discharge rate	12V, 80 Ah at 20 hours discharge rate
	Location	On RHS of clutch housing in separate metallic box.	
3.1.10.2	Starter:		
	Make	Autolek	
	Model	STM 1105 V	STM 1105
	Type	Pre-engaging, solenoid operated	
	Capacity and rating	12V, 2.2 kW	
	Serial Number	Not available	



- 3.1.10.3 Generator:**
- | | <u>Base model</u> | <u>Variant model</u> |
|-----------------|-------------------|---|
| Make | : | Lucas-TVS |
| Model | : | A115-36 A115 |
| Type | : | Alternator |
| Serial number | : | 26021490 26021490 |
| Output rating | : | 12V, 36 A |
| Method of drive | : | Through a cogged V-belt common to water pump driven through crank shaft pulley. |
- 3.1.10.4 Voltage regulator** : In built with alternator
- 3.1.10.5 Details of lights:**

Description	No. & capacity of bulb	Height of the centre of beam above ground level, (mm)	Size, (mm)	Distance between centre of the beam and outside edge of tractor at standard rear track setting, (mm)
1	2	3	4	5
Base Model:				
Front Lights:				
- Head lights	2, 12V, 55/60W	990	130 ϕ	500
- Parking lights	2, 12V, 5W	1245	70 x 20	158
- Turn-cum-hazard Indicator light	2, 12V, 21W	1280	75 x 55	158
Rear lights:				
- Parking cum brake light	2, 12V, 5/21W	1240	65 x 55	258
- Turn-cum-Hazard Indicators	2, 12V, 21W	1240	65 x 50	100
Plough light (on RHS mudguard)	1, 12V, 55W	1340	110 ϕ	370
Reflectors (Red)	2, 12V, 5W	1240	65 x 50	168
- Registration plate light (RHS)	Part of rear light assembly			
Variant Model:				
Front Lights:				
- Head lights	2, 12V, 60/55W	990	130 ϕ	500
- Parking lights	2, 12V, 5W	1280	70 x 20	158
- Turn-cum-hazard Indicator light	2, 12V, 21W	1280	75 x 55	100
Rear lights:				
- Tail-cum-brake light	2, 12V, 21W	1240	65 x 55	160
- Turn-cum-hazard Indicator light	2, 12V, 21W	1240	65 x 50	85
- Plough light (on RHS mudguard)	1, 12V, 55 W	1340	110 ϕ	370
- Reflectors (Red)	2, 12V, 5W	1240	65 x 50	125
- Registration plate light (RHS)	Part of rear light assembly			



3.1.11 Instrument panel details:-		<u>Base model</u>	<u>Variant model</u>
i)	Engine speed-cum-cumulative run hour meter (0-25 X 100 RPM)	Provided	Provided
ii)	Coolant temperature gauge (with colour zones)	Provided	Provided
iii)	Fuel level gauge (with colour zones)	Provided	Provided
iv)	Engine oil pressure indicator light	Provided	Provided
v)	Main switch (key-turn type)	Provided	Provided
vi)	Light switch (Rotary type)	Provided	Provided
vii)	Turn-cum-hazard indicator	Provided	Provided
viii)	Turn indicator switch	Not provided	Provided
ix)	Hazard light switch	Provided	Provided
x)	Battery charging warning indicator lamp	Provided	Provided
xi)	Head light long beam ON indicator light	Provided	Provided
xii)	Parking brake indicator light	Provided	Provided
xiii)	Horn push button	Provided	Provided
xiv)	Plough light switch	Provided	Provided
xv)	Hand accelerator lever	Provided	Provided
xvi)	Fuel shut-off control knob	Provided	Provided
xvii)	Rear view mirror	Provided	Provided
xviii)	Steering control wheel.	Provided	Provided

3.1.12 Transmission System

3.1.12.1 Clutch:

	<u>Base model</u>	<u>Variant model</u>
Make		Valeo
Type		Single , dry friction plate type
No. of friction plate, (s)		One
Size, (mm)		279.30 Φ / 170.24 Φ
Method of operation		By pressing the foot pedal provided on LHS of operator's seat

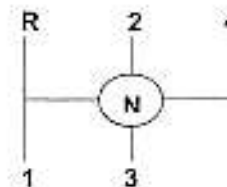
3.1.12.2 Gear box:

Make		Mahindra
Model		Not specified
Type		Mechanical, combination of sliding & constant mesh gears.
Location of gear shifting levers		Main & range selector lever provided in front of operator's seat.

3.1.12.3 No. of speeds:

- Forward		08
- Reverse		02

Gear shifting pattern (In case of Base & Variant model)



Main gear selection lever



Range selection lever

Oil capacity, (l)		34.80 (Common with differential, hydraulic and final drive)	38.9 (Common with differential, final drive, hydraulic and brake system)
Oil changing period		After every 1200 hours of operation	



		<u>Base model</u>	<u>Variant model</u>
3.1.12.4 Differential unit:			
Type	:	Crown wheel & pinion with differential unit accommodated inside the differential housing.	
Reduction through crown wheel and bevel pinion	:	4.889 : 1 (44/9 T)	4.181 : 1 (46/11 T)
Oil capacity, (l)	:	34.80 (Common with differential, hydraulic and final drive)	38.9 (Common with gearbox, final drive, hydraulic and brake system)
Oil changing period	:	After every 1200 hours of operation	
Differential lock:	:	Not Provided	Not Provided
3.1.12.5 Rear axle & final drive:			
Type	:	Bull gear and pinion accommodated inside the differential housing.	
Reduction through final drive	:	3.214 : 1 (45/14 T)	3.692 : 1 (48/13 T)
Oil capacity of final drive, (l)	:	34.80 (Common with gear box, differential, hydraulic systems)	38.9 (Common with gearbox, differential, hydraulic and brake system)
Oil changing period	:	After every 1200 hours of operation	
3.1.13 Power lift:			
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.	
3.1.13.1 Hydraulic pump:			
- Make	:	Dowty	Rexroth
- Type	:	Gear	
- Location & drive	:	On RHS of engine, through timing gears.	
No. & type of filters	:	Three	
		i) Wire mesh strainer at suction	
		ii) Full flow spin-on throw away types at hydraulic top cover LHS of operator's seat.	
		iii) Orifice filter on distributor.	
Hydraulic oil capacity, (l)	:	34.80 (Common with gear box, differential and final drive).	38.9 (Common with gearbox, differential, final drive and brake system)
Oil change period	:	After every 1200 hours of operation	
Provision for external tapping	:	Provided	
Details of control levers	:	i) Position control lever.	
		ii) Draft control lever.	
		iii) Isolating valve knob on distributor	
Method of draft sensing	:	Through top link	



3.1.13.2 Three point linkage:

S. No.	Observations	As per IS: 4468- (Part-1) -1997, (Cat.I / Cat.II), (mm)	As measured (mm)		Remarks in case of <u>Variant model</u>	
			<u>Base model</u>	<u>Variant model</u>		
I.	Upper hitch points:					
	a)	Dia of hitch pin hole	19.30 to 19.50 / 25.70 to 25.90	25.8	25.8	Conforms to Cat.II
	b)	Width of ball	44.0 (max.) / 51.0 (max.)	50.90	50.87	Conforms to Cat.II
II.	Lower hitch points:					
	a)	Dia of hitch pin hole	22.40 to 22.65 / 28.70 to 29.00	28.90	28.74	Conforms to Cat.II
	b)	Width of ball	34.8 to 35.0 / 44.8 to 45.0	45.00	44.92	Conforms to Cat.II
III.	Lateral distance from lower hitch point to centre line of tractor.	359 / 435	435	435	Conforms to Cat.II	
IV.	Lateral movement of lower hitch points	100 (min) / 125 (min)	195	160	Conforms to Cat.I&II	
V.	Distance from end of power take-off to centre of lower hitch point (lower links in horizontal position)	450 to 575 / 550 to 625	555	470	Conforms to Cat.I	
VI.	Transport height	820 (min) / 950 (min)	920	930	Conforms to Cat.I	
VII.	Power range (without force)	560(min) / 650 (min)	590	610	Conforms to Cat.I	
VIII.	Leveling adjustment	100 (min) / 100 (min)	400	265	Conforms to Cat.I&II	
IX.	Lower hitch point clearance	100 (min) / 100 (min)	160	137	Conforms to Cat.I&II	
X.	Lower hitch point height	200 (max) / 200 (max)	200	200	Conforms to Cat.I&II	

3.1.13.3 Drawbar:

3.1.13.3.1 Linkage Drawbar [Refer Fig.1] :

Notation	As per IS: 12953-1990, (Cat.I) / (Cat.II), (mm)	As measured, (mm)		Remarks in case of <u>Variant model</u>
		<u>Base model</u>	<u>Variant model</u>	
A	683 ± 1.5 / 825 ± 1.5	825.0	825.0	Conforms to cat-II
B	75 (min) / 75 (min)	75.0	75.0	Conforms to cat-I & II
C	30 (min) / 30 (min)	32.30	32.12	Conforms to cat-I & II
D \varnothing	21.79 to 22.00 / 27.79 to 28.00	27.80	27.98	Conforms to cat-II
E	39.0 (min) / 49.0 (min)	52.26	53.05	Conforms to cat-I & II
F \varnothing	12.0 (min) / 12.0 (min)	12.0	12.1	Conforms to cat -I & II
G	15.0 (min) / 15.0 (min)	16.78	16.56	Conforms to cat -I & II
H \varnothing	25 ± 1 / 25 ± 1	24.40	24.25	Conforms to cat -I & II
J	80 ± 1.5 / 80 ± 1.5	80.0	81.22	Conforms to cat -I & II
No. of holes	7 / 9	09	09	Conforms to cat - II

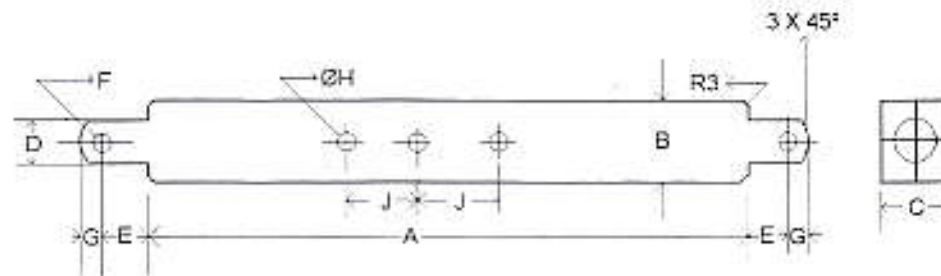


Fig. 1: DIMENSIONAL NOTATIONS FOR LINKAGE TYPE DRAWBAR

		<u>Base model</u>	<u>Variant model</u>
3.1.13.3.2	Swing of rawbar	:	Not provided
3.1.13.3.3	Provision to attach trailer brake valve	:	Not provided
3.1.14	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):	:	Low range: 573, High range: 1669
	Distance behind rear axle, (mm)	:	350
	Engine to PTO speed ratio	:	Low range: 3.667 : 1, High range: 1.258 : 1

3.1.14.1 Specifications of Power Take-Off Shaft:

Specification	As per IS: 4931-1995 (Type-I)	As observed		Remarks in case of variant model
		<u>Base model</u>	<u>Variant model</u>	
1	2	3	4	5
Nominal speed, (rpm)	540 ± 10	540 rpm of PTO shaft corresponds to 1980 rpm of engine.	540 rpm of PTO shaft corresponds to 1980 rpm of engine.	Conforms
No. of splines	6	6	6	Conforms
Direction of rotation	Clockwise	Clockwise	Clockwise	Conforms
Location	The position of the centre of the end of pto shaft shall be within 50mm to right or left of the centre line of the tractor.	In the centre line of the tractor	In the centre line of the tractor	Conforms
Dimensions, (mm) [Refer Fig.2(a)]:				
D \varnothing	34.79 ± 0.06	34.84	34.83	Conforms
d \varnothing	28.91 ± 0.05	28.86	28.87	Conforms
B \varnothing	29.4 ± 0.1	29.5	29.33	Conforms
A \varnothing (optional)	8.3 ± 0.1	8.4	8.31	Conforms
W	8.69 - 0.09/ - 0.16	8.73	8.67	Conforms
a	7	7.0	7	Conforms

1	2	3	4	5
b (optional)	25 ± 0.5	24.80	25.13	Conforms
c	38	38	38	Conforms
X	30°	30°	30°	Conforms
B	76 (min)	87.90	90.42	Conforms
h	450 to 675	560	565	Conforms

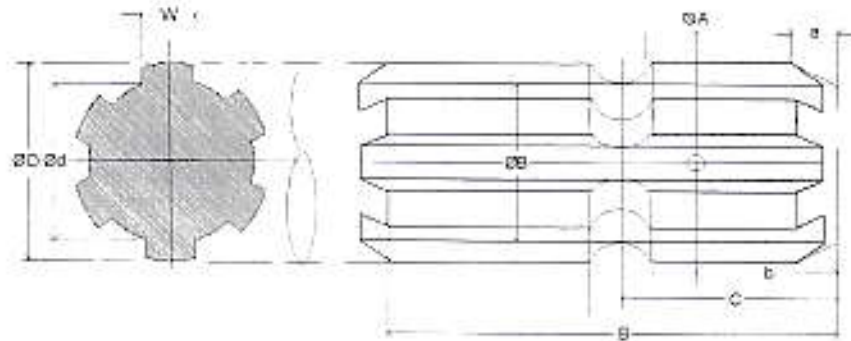


Fig.2 (a): DIMENSIONAL NOTATIONS FOR TYPE-I & II POWER TAKE-OFF SHAFT

1.14.2 Master Shield of Power Take-Off Shaft:

Base model

Variant model

Provided

Dimensions of Power take-Off Shaft Shield, [Refer Fig. 2(b)]:

Specification	As per IS 4931-1995 (mm)	As Observed		Remark in case of Variant model
		Base model	Variant model	
k	70(Min.)	130	70	Conforms
m	125 ± 5	130	120	Conforms
n	85 ± 5	80	65	Does not conform
p	285 ± 5	280	285	Conforms
r	76 (Max.)	Nil	Nil	Conforms

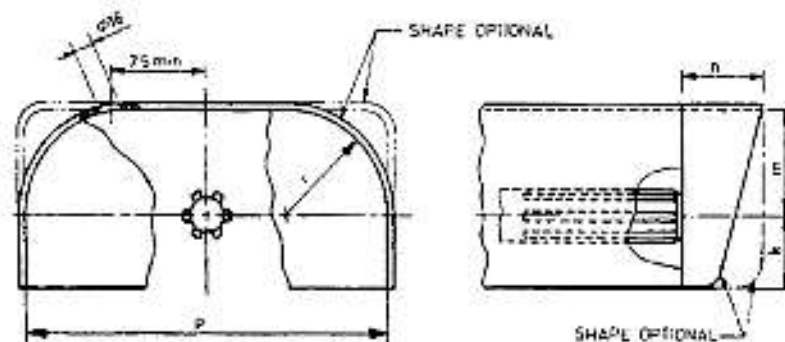


Fig. 2(b): DIMENSIONAL NOTATIONS FOR PTO SHAFT MASTER SHIELD



		<u>Base model</u>	<u>Variant model</u>
3.1.15	Towing hitch:		
3.1.15.1	Front	Not provided	
3.1.15.2	Rear		
	Type	Clevis	
	Location	Behind Differential Housing	
	Height above ground level, (mm):		
	- Maximum	535	730
	- Minimum	375	355
	- No. of positions	04	14
	- Type of adjustment	By changing the position of hitch on its mounting bracket.	By changing the position of hitch & reversing hitch on its mounting bracket.
	Distance of hitch point, (mm):		
	-From rear axle centre	430	460
	-From power take-off shaft end	85	100
	Dia of pin hole, (mm)	28.5	31.97
	Width of clevis, (mm)	75.0	79.95
3.1.16	Steering:		
	Make	RANE	
	Type	Mechanical, re-circulating balls & nut with single drop arm.	
	Location of control wheel	Above clutch housing	
	Method of operation	Manual, by steering control wheel	
	Diameter of steering control wheel, (mm)	420	
	Steering oil capacity, (l)	0.75	0.71
	Lubricant change period	After 600 hours of operation	
3.1.17	Brakes:		
3.1.17.1	Service Brake:		
	Make	TVS-Girling	Not available
	Type	Mechanical, dry disc	Oil immersed multi discs
	Location	On differential half axle shaft, outside of differential housing.	On bull pinion half axle shaft, outside of differential housing.
	No. of disc(s)	Two (on each side)	Three (on each wheel side)
	Area of liners, (cm ²)	609.27 (on each side)	710.6 (on each wheel side)
	Material of liners	Non asbestos (apa)	
	Method of operation	Individual/combined operation by RHS foot pedal.	
	Oil capacity of final drive, (l)	Not applicable	38.9 (Common with gearbox, differential final drive and hydraulic system)
	Oil changing period	Not applicable	After every 1200 hours of operation
3.1.17.2	Parking Brake:		
	Type	Toggle link locking mechanism	
	Location & Method of operation	Service brake acts as parking brake when locked in position by a hand lever provided on RHS of operator seat.	



		<u>Base model</u>	<u>Variant model</u>
3.1.18	Wheel Equipment:-		
3.1.18.1	Steering Wheel(s):		
	Make	: Good year	: JK tyre Sona
	Number(s)	:	: Two
	Type of tyre	:	: Pneumatic, ribbed
	Size	:	: 6.00 – 16
	Ply rating	:	: 8
	Maximum permissible loading capacity of each tyre at 450 kPa pressure, (kgf)	:	: 675
	Recommended inflation pressure, kPa :		
	- for field work	:	: 167
	- for transport	:	: 196
	Track width, (mm)	: 1230 (std) and 1430	: 1240 (std.) & 1440
	Method of changing track width	:	: By reversing the wheel discs,
	Make & size of rims	:	: SSWL 4.5E x 16
3.1.18.2	Drive wheel (s) :		
	Make	: Good year	: Apollo Krishak gold
	Number	:	: Two
	Type of tyre	:	: Pneumatic, traction
	Size	:	: 12.4-28
	Ply rating	:	: 12
	Maximum permissible loading capacity of each tyre at 250 kPa pressure, (kgf)	:	: 1650
	Recommended inflation pressure, (kPa):		
	- For field work	:	: 118
	- For transport	:	: 137
	Track width, (mm)	: 1355 (std), 1475, 1580, 1595, 1700, 1800 and 1915.	: 1355 (std.), 1455, 1565, 1575, 1695, 1805 & 1915
	Make & size of wheel rim	:	: SSWL W 11 x 28
3.1.18.3	Wheel base, (mm)	: 1825	: 1880
	Method of changing wheel base, if any, and range	:	: None
3.1.19	Operator's seat:		
	Make	:	: Harita Grammer.
	Type	:	: Cushioned with back rest
	Type of Suspension	:	: Two helical coil springs
	Type of Damping	:	: Hydraulic shock absorber
	Range of adjustment, (mm):		
	Vertical	:	: Nil
	Lateral	:	: Nil
	Longitudinal	: 132± 5	: ±130
3.1.20	Provision for safety and comfort of operator:		
3.1.20.1	Operator's Seat:		
	Meets the minimum requirements of IS: 12343-1998, (Re-affirmed in March, 2009) except the following:		
	<u>Base model</u>	<u>Variant model</u>	
	i) Length & width of seat does not meet the minimum requirements	i) Width of seat does not meet the minimum requirements	



- 3.1.20.2 **Conformity with IS: 6283 (Part 1 & 2)-1998 (Re-affirmed in March, 2009) :**
Controls and displays are identifiable with symbols meets the requirements as per IS : 6283 (Part 1&2) – 1998, except the following:

Base model

Meets the minimum requirements

Variant model

- i) Grease lubricant frequency chart is not provided
- ii) Oil lubricant, type & frequency chart is not provided.

- 3.1.20.3 **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:

- | | |
|---|--|
| <ul style="list-style-type: none"> i) Safety switch against accidental start of the engine has not been provided. ii) Stopper does not remain in 'Stop' position. | <ul style="list-style-type: none"> i) Provision of safety against accidental start of engine has not been provided. |
|---|--|

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

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

- | | |
|---|--|
| <ul style="list-style-type: none"> i) The spark arrester has not been provided in the exhaust system. ii) Vertical retainers have not been provided on both sides of clutch & brake pedals. iii) Width of foot step. | <ul style="list-style-type: none"> i) The spark arrester has not been provided in the exhaust system. ii) Vertical retainers is not provided on foot step iii) Width of step is less than the minimum requirement of 200 mm |
|---|--|

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

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

- | | |
|---|---|
| <ul style="list-style-type: none"> i) Hydraulic pipelines are not fully insulated. | <ul style="list-style-type: none"> i) Meets the minimum requirements |
|---|---|

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

Lightings provided on the tractor meets the requirements and conform to IS: 14683-1999.

- 3.1.21 **Mass of standard ballast tractor, (kg):**

	<u>Base model</u>	<u>Variant model</u>
- Front	: 655	733
- Rear	: 1125	1234
- Total	: 1780	1967

- 3.1.22 **Over all dimensions:**

- Length	: 3170	3210
- Width	: 1730	1680
- Height (with exhaust pipe)	: 2180	2180
Minimum ground clearance, (mm)	: 305 (below rear towing hitch mounting bracket)	307 (below front axle std. ballast weight)



3.1.23 Labelling of tractor:

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

Name of Manufacturer	:	M/s. Mahindra & Mahindra Limited, Farm Equipment Sector
Make	:	Mahindra
Model	:	255 DI POWER+ OIB
ATIN/Chassis No	:	MBNAAABAEGNH00001
Engine Serial Number	:	NGG3AAE1030
Maximum PTO Power, kW (hp)	:	15.8 (21.2)
Specific fuel consumption, gm/kWh (g/hph)	:	252 (188)
Month & Year of manufacturer	:	HG (i.e. November, 2016)

3.1.24 Number of external lubricating points:

- Oiling	:	Nil
- Grease cups	:	02
- Grease nipples	:	17

3.1.25 Colour of tractor:

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

3.2 NOMINAL SPEED TEST

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 590 mm radius index, (kmph).		Variation in nominal speed (%)
		Base model	Variant model	Base model	Variant model	
Forward	L1	166.54	163.58	2.80	2.86	+2.1
	L2	97.51	95.95	4.79	4.86	+1.5
	L3	68.53	67.23	6.82	6.96	+2.1
	L4	45.82	45.03	10.20	10.38	+1.8
	H1	57.06	56.15	8.19	8.32	+1.6
	H2	33.54	32.88	13.93	14.19	+1.9
	H3	23.48	22.93	19.89	20.26	+1.9
	H4	15.70	15.43	29.75	30.25	+1.7
Reverse	LR	109.62	108.03	4.26	4.33	+1.6
	HR	37.60	37.05	12.42	12.63	+1.7

3.3 PTO PERFORMANCE TEST

S. No.	Particulars	Base Model	Variant Model
1	Date(s) of test	11.04.2014 to 15.04.2014	27.07.2017
2	Tractor run at this Institute prior to start of PTO test, (h)	10.85	2.80
3	Dynamometer test bench used	Eddy Current, Fuchino ESF 1000 S	Eddy Current, SAJ, AG- 250,

Maximum power two hours test under natural ambient condition was conducted. The results of Power take-off performance, maximum power two hours test of base & variant models are tabulated in table-1.

Tractor	Power, (kW)	Speed, (rpm)		Fuel Consumption			Specific energy, (kWh/ l)
		PTO	Engine	(l/h)	(kg/h)	(kg/kWh)	
a) Maximum power – 2 hours test (under natural ambient condition):							
Base model	16.0	573	2101	4.85	4.05	0.253	3.30
Variant model	16.2	573	2101	5.11	4.27	0.264	3.17

S. No.	Parameters	<u>Base Model</u>		<u>Variant Model</u>
		Natural Ambient	High Ambient	Natural Ambient (Max. power Two Hours)
i)	No load maximum speed, (rpm)	2281	2277	2281
ii)	Equivalent crankshaft torque at maximum power, (Nm)	72.9	68.4	73.3
iii)	Maximum equivalent crank shaft torque, (Nm)	93.8	87.6	--
iv)	Engine speed at maximum equivalent crankshaft torque, (rpm)	1199	1151	--
v)	Backup torque, (%)	28.7	28.0	--
vi)	Range of atmospheric condition :			
	- Temperature, (^o C)	27 to 30	42 to 45	25 to 29
	- Pressure, (kPa)	98.3 to 98.7	99.1 to 99.8	98.1 to 98.3
	- Relative humidity, (%)	31.5 to 34.2	18.8 to 26.2	81.2 to 96.2
vii)	Maximum Temperature, (^oC):			
	- Engine oil	105	116	105
	- Coolant	95	110	85
	- Fuel	48	62	44
	- Air intake	51	68	45
	- Exhaust gas	569	583	611
viii)	Pressure at maximum power:			
	- Intake air, (kPa)	-1.9 to -1.7	-2.1 to -1.8	2.7 to 2.9
	- Exhaust gas, (kPa)	4.0 to 5.7	2.5 to 2.8	2.4 to 3.1
ix)	Consumptions:			
	Lub. Oil (g/kWh)	--	0.532	--
	-Coolant (% of total coolant capacity)	--	Nil	--



4. OTHER APPLICABLE TESTS

4.1 BRAKE TEST

4.1.1 Service brake:

4.1.1.1 Cold brake test:

Date of test(s)	: 16.08.2017
Type of Track	: Concrete
Maximum attainable speed (kmph):	
-Without Ballast	: 32.5
-With Road Ballasted	: 32.5

		At maximum attainable speed			
Standard ballasted tractor	Braking device control, force (N)	456	351	246	141
	Mean deceleration, (m/sec ²)	3.96	3.75	3.30	2.50
	Stopping distance, (m)	10.22	10.87	12.33	16.30
Road ballasted tractor	Braking device control force(N)	534	421	307	193
	Mean deceleration, (m/sec ²)	3.73	3.68	3.40	2.50
	Stopping distance, (m)	10.88	11.07	11.99	16.30
		At 25 kmph travel speed			
Standard ballasted tractor	Braking device control, force(N)	480	380	280	179
	Mean deceleration, (m/ sec ²)	3.84	3.42	3.11	2.50
	Stopping distance, (m)	6.36	7.06	7.75	9.65
Road ballasted tractor	Braking device control force,(N)	515	415	315	216
	Mean deceleration, (m/sec ²)	3.64	3.36	3.11	2.50
	Stopping distance, (m)	6.72	7.18	7.75	9.65

4.1.1.2 Brake fade test:

		At maximum attainable speed			
Braking device control force (N)		571	472	373	274
Mean deceleration, (m/ sec ²)		3.73	3.55	3.13	2.50
Stopping distance, (m)		10.85	11.48	13.04	16.30
		At 25 kmph travel speed			
Braking device control force,(N)		556	471	386	301
Mean deceleration, (m/ sec ²)		3.56	3.13	2.71	2.50
Stopping distance, (m)		7.08	7.70	8.89	9.65

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

4.1.2 Parking brake test:

Particulars	18 percent slope		12 percent slope with trailer of 1.78 tonnes.	
	Up	Down	Up	Down
Braking device control force, (N)	287	243	257	210
Efficacy of parking brake	-----Effective-----			

5. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

S. No.	Adjustment/Defect/Breakdown and Repairs	Tractor run hours
	---None---	



**6. COMPARISON BETWEEN BASE MODEL AND VARIANT MODEL
(Based on Table 3 & 4 of Indian Standard 12207: 2014)**

Sl. No.	Clause No	Features	Observation on <u>Base model</u> (T-946/1464/2014 November, 2014)	Observation on <u>Variant model</u>	Remarks		
1	2	3	4	5	6		
1.	i)	Clutch	Single, dry friction plate	Single, dry friction plate	No change		
2.	ii)	Air cleaner	Same configuration in base & variant models (refer para 3.1.5.2), except the following:		No change		
		Range of suction pressure at maximum power, (kPa)	1.7 to 1.9	2.7 to 2.9	Changed		
3.	iii)	Exhaust system	Same configuration in base & variant models (refer para 3.1.6), except the following:		No change		
		Longitudinal distance of silencer outlet from SIP	1420	1360	Changed		
		Range of exhaust gas pressure at maximum power, (kPa)	4.0 to 5.7	2.4 to 3.1	Changed		
4.	iv)	Gear Box:					
		- Type	Mechanical, combination of sliding & constant mesh gears.		No Change		
5.	v)	Reduction ratio of transmission:					
		Movement	Gear	Base model	Variant model	Variation (%)	Remark
		Forward	L1	166.54	163.58	-1.78	Changed
			L2	97.51	95.95	-1.60	-do-
			L3	68.53	67.23	-1.90	-do-
			L4	45.82	45.03	-1.72	-do-
			H1	57.06	56.15	-1.59	-do-
			H2	33.54	32.88	-1.97	-do-
			H3	23.48	22.93	-2.34	-do-
			H4	15.70	15.43	-1.72	-do-
Reverse	LR	109.62	108.03	-1.45	-do-		
	HR	37.60	37.05	-1.46	-do-		
6.	vi)	Range of speeds (kmph):					
		- Forward	2.80 to 29.75	2.86 to 30.25 (Variation of 1.5 to 2.1 %)	Changed		
		- Reverse	4.26 to 12.42	4.33 to 12.63 (Variation of 1.6 to 1.7 %)	Changed		
		Additional no. of speed	None	None	No change		



1	2	3	4	5	6	
7.	vii)	Fitment of accessories:				
		- Expansion tank	Provided	Provided	No change	
		- Additional hydraulic pump	None	None	--do--	
		- Air compressor	None	None	--do--	
		- Radiator	Provided	Provided	--do--	
		- Bare radiator capacity, (l)	1.50	1.8	No Change	
		Total coolant capacity,(l)	5.50	4.65	No Change	
		- Oil cooler	None	None	No Change	
8.	viii)	Brake system:				
		Type	Mechanical, dry disc	Mechanical, oil immersed multi discs	Changed	
		No. of disc (s)	Two (on each side)	Three (on each wheel side)	Changed	
		Area of liners (cm ²)	609.27 (on each side)	710.6 (on each wheel side)	Changed	
9.	ix)	Type of three point linkage:				
		Type	Cat.I/Cat.II	Cat.I/Cat.II	No change	
		Rear/front mounted	Rear mounted	Rear mounted	No change	
10.	x)	PTO shafts:				
		Location	Centrally located	Centrally located	No change	
		Type	Type-I, Not independent	Type-I, Not independent	No change	
		No of splines	6	6	No change	
		Speed corresponding to rated engine speed (rpm)	Low range: 573 & High range:1669	Low range: 573 & High range:1669	No change	
		- Anticlockwise rotation speed (rpm)	Not provided	Not provided	No change	
11.	xi)	Type of drive:				
		2WD or 4WD	2WD	2WD	No change	
12.	xii)	Hydraulic System:				
		Location & type of Hydraulic pump drive	Same configuration in base & variant models (refer para 3.1.13).		No change	
13.	xiii)	Positioning of Hydraulic Sensing Mechanism				
		Lower link, top link, etc.	Through top link	Through top link	No change	
14.	xiv)	Rear differential & Final Reduction unit:				
		Speed reduction through crown wheel & bevel pinion	4.889 : 1 (44T/9T)	4.181 : 1 (44T/11T)	Changed	
		Speed reduction through rear final drive	3.214 : 1 (45T/14T)	3.692 : 1 (48T/13T)	Changed	
15.	xv)	Type of fuel Injection pump:				
		Inline/Rotary/Common rail	Inline plunger	Inline plunger	No change	
16.	Change related to statutory/ regulatory requirements (As per Table 4):					
	a)	Engine operating principle (spark/ compression ignition, two/four stroke)	Compression Ignition, 4 stroke	Compression Ignition, 4 stroke	No change	
	b)	Number & arrangement of cylinders	Two vertical inline	Two vertical inline	No change	
	c)	Maximum declared PTO power, (kW)	15.8	15.8	No change	
	d)	Bore /stroke ,(mm)	88.9/120	88.9/120	No change	
	e)	Engine displacement (cc)	1490	1490	No change	
	f)	Rated engine speed (rpm)	2100	2100	No change	
	g)	Naturally aspirated/turbo charged	Naturally aspirated	Naturally aspirated	No change	



1	2	3	4	5	6
17.	Change related to ergonomics, safety comfort, statutory / regulatory requirements:				
a)	IS: 10273		Conformed	Conforms	No change
b)	IS: 4931		Conformed	Does not conform	Changed
c)	IS: 4468		Conformed	Conforms	No change
d)	IS: 12953		Conformed	Conforms	No change
e)	IS:12343		Did not conform	Does not conform	No change
f)	IS:12239 (Pt-I)		Did not conform	Does not conform	No change
g)	IS:12239 (Pt-II)		Did not conform	Does not conform	No change
h)	IS:8133		Did not conform	Does not conform	No change
i)	IS: 6283		Conformed	Does not conform	Changed
j)	IS:14683		Conformed	Conforms	Not change
18.	Other changes:				
a)	Fuel feed pump model / group combination no.		FP/KS 22AD45/2, 9440030030	FP/KS 22AD104, F002A50038	Changed
b)	Fuel injector manufacturer's production pressure setting, (MPa)		24.03	25.8	Changed
c)	Governor model/group combination no.		RSV400... 1050 A5 C1602R.	RSV400... 1050A 5C1713R	Changed
d)	Wheel base, mm		1825	1880	Changed
e)	Overall length of tractor, mm		3170	3210	Changed
f)	Overall width of tractor, mm		1730	1680	Changed
g)	Rear towing hitch:				
	-Height of hitch above ground level, minimum / maximum, mm		375 / 535	355 / 730	Changed
	-No. of positions		04	14	Changed
	-Type of adjustment		By changing the position of hitch on its mounting bracket.	By changing the position of hitch & reversing hitch on its mounting bracket.	Changed
	-From rear axle centre		430	460	Changed
	-From power take-off shaft end		85	100	Changed
h)	Transmission system oil capacity, (l)		34.80 (Common with gear box, differential, final drive & hydraulic system).	38.9 (Common with gearbox, differential, final drive, hydraulic and brake system)	Changed
i)	Total mass of tractor		1780	1967	Changed
j)	Decals and stickers		Mahindra, 255 DI Power+ Bhoomiputra	Mahindra, 255 DI Power + OIB Bhoomiputra	Changed



7. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

- 7.1 On the basis of test conducted the performance results have been summarized as evaluative (mandatory) and non – evaluative (not mandatory) parameters applicable for qualifying Minimum Performance Criteria as per clause-4 table-1 of Indian Standard 12207: 2014 for acceptance of tractor for the purpose of subsidies/NABARD financing for the applicable features for this tractor model.

Sl. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	Values declared by the applicant/ requirement		As observed		Whether Variant model meets the requirements (Yes/ No.)
				Base model	Variant model	Base model	Variant model	
1	2	3	4	5 a	5 b	6 a	6 b	7
7.1.1	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	15.8 (D)	15.8 (D)	16.04	16.2	Yes
b)	Specific fuel consumption corresponding to aximum power.(g/kWh)	Non Evaluative	± 5%	252	252	253	264	Yes
7.1.2	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)	10 (R)	7.6	6.72	Yes
	2) Hot brake	Evaluative	10	10 (R)	10 (R)	8.1	7.08	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N).	Evaluative	600	600 (R)	600 (R)	433	216 to 301	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	Yes	Yes
7.1.3	Safety features :							
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes (As per IS 12239 (part 2)	Meets the requirement		Meets the requirement		Yes
b)	Lighting arrangement (Tractor having more than 1150 mm rear track width)	Evaluative	As per CMVR	Meets the requirement		Meets the requirement		Yes
c)	Sealing requirement (Tractors having more than 1150 mm rear track width)	Non-Evaluative	Should meet the requirements of IS 12343 (as amended from time to time)	Meets the requirement		Meets the requirement		Yes

T- 1107/1633/2017

**MAHINDRA , 255 DI POWER + OIB (BRAND NAME:
BHOOMIPUTRA) TRACTOR - Commercial (Variant)**


1	2	3	4	5	6	7
d)	Technical requirements for PTO shaft	Non-Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	Did not meet the requirement	Does not meet the requirement	No
e)	Dimension of three point linkage	Non-Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	Meets the requirement	Meets the requirement	Yes
f)	Specification of linkage and swinging drawbars	Non-Evaluative	Should meet the requirements of IS 12953 and IS 12362 (part 3) (as amended from time to time)	Meets the requirement	Meets the requirement	Yes
7.1.4	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		--	255 DI POWER+ OIB	Yes
3)	Year of manufacture	Evaluative		--	HG (i.e. November, 2016)	Yes
4)	Engine number	Evaluative		--	NGG3AAE1030	Yes
5)	Chassis number	Evaluative		--	MBNAAABAEGNH00001	Yes
6)	Declaration of PTO power, kW	Evaluative		--	15.8	Yes

1	2	3	4	5 a	5 b	6 a	6 b	7
7.1.5	Literature (Submission to test agency)							
(a)	Operator manual	Evaluative	Provided/ Not Provided	Provided		Provided		Yes
(b)	Parts Catalogue	Evaluative	Provided/Not Provided	Provided		Provided		Yes
(c)	Workshop/ Service manual	Evaluative	Provided/Not Provided	Provided		Provided		Yes

7.2 Salient Observations:
7.2.1 Laboratory tests:
7.2.1.1 PTO Performance:

- i) The maximum power in variant model was observed as **16.2 kW** respectively against the declaration of **15.8 kW** respectively, which is within the tolerance limit specified in **IS: 12207-2014**.
- ii) The specific fuel consumption in variant model corresponding to maximum power was observed as **264 g/kWh** against the declaration of **253 g/kWh** respectively, which is within the tolerance limit.



- 7.2.1.2 Three point linkage:**
Some of the parameters of three point linkage conform to Cat.I and some of them conform to Cat.II. Keeping in view the spirit of standardization, necessary improvement may be incorporated.
- 7.2.1.3 Operator's Seat:**
Width of Operator's seat does not meet the requirements of IS: 12343:1998 (Re-affirmed in March, 2009) and calls for necessary corrective action.
- 7.3 Maintenance / Service Problems:**
No noticeable maintenance or service problem was observed during the test.
- 7.4 Recommendation with regard to safety on tractor:**
The following requirements, inter alia, may be considered for incorporation on the tractor:
- i) Safety against accidental start of engine should be provided.
 - ii) Spark arresting device in exhaust system should be provided..
 - iii) Differential lock should be provided to work in different terrain condition
 - iv) Vertical retainers should be provided on foot step to prevent the fall of operator.
 - v) There should be provision to attach trailer brake
- 7.5 Applicant submitted the Literature during test with machine:**
- a) Operator's Manual for Mahindra, 255 DI Power + OIB (Brand Name: Bhoomiputra) tractor model.
 - b) Service manual for Mahindra, 255 DI Power + OIB (Brand Name: Bhoomiputra) tractor model.
 - c) Spare Parts Catalogue for Mahindra, 255 DI Power + OIB (Brand Name: Bhoomiputra) tractor model.
- 7.5.1** The supplied literature was found adequate, except the followings:
- a) Grade of oil mentioned in operators' manual for air cleaning system and engine lubricating system does not match with specifications submitted by applicant.
 - b) Coolant recommended in operator's manual for cooling system of tractor does not match with specifications submitted by applicant.
 - c) Servicing and maintenance scheduling chart is not provided in operator's manual.
 - d) Page no. 65-66 of preventive maintenance chart is not provided in operator's manual, whereas it is mentioned on index.
 - e) Specifications of Mahindra, 255 DI Power + OIB tractor with engine model MDI 15003A is not provided in page no. 5 of service manual.
 - f) Specifications of engine model MDI 15003A is not provided in page no. 14 of service manual.
 - g) Mahindra, 255 DI Power + OIB tractor is fitted with 2 cylinder engine, whereas most of information on service manual and parts catalogue is provided of 4 cylinder engine.
- 7.5.2** It is therefore, recommended that above mentioned literature may be brought out as per IS: 8132-1999 (Reaffirmed in March, 2009) for the guidance of users and service personnel in national as well as regional languages for this model of tractor.

The results of the tests carried out on variant model "Mahindra , 255 DI Power + OIB (Brand Name: Bhoomiputra)" Tractor have been compared with those on base model "Mahindra, 255 DI Power+ (Brand Name- Bhoomiputra)" Tractor and found within the limit, as specified in IS: 12207-2014.

T- 1107/1633/2017

MAHINDRA , 255 DI POWER + OIB (BRAND NAME:
BHOOMIPUTRA) TRACTOR - Commercial (Variant)

B. 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	02 Months (July, 2017 to August, 2017)	Yes	None

TESTING AUTHORITY:

RAJNEESH PATEL
AGRICULTURAL ENGINEER

C.V. CHIMOTE
TEST ENGINEER

Y.K. RAO
SENIOR AGRICULTURAL ENGINEER

J.J.R. NARWARE
DIRECTOR

The report compiled by: Shri Rajneesh Patel, Agricultural Engineer.

9. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
9.1	7.2.1.2, 7.2.1.3, 7.4, 7.5.1 & 7.5.2	Observation will be studied and necessary action will be incorporated.

T- 1107/1633/2017

MAHINDRA , 255 DI POWER + OIB (BRAND NAME:
BHOOMIPUTRA) TRACTOR - Commercial (Variant)

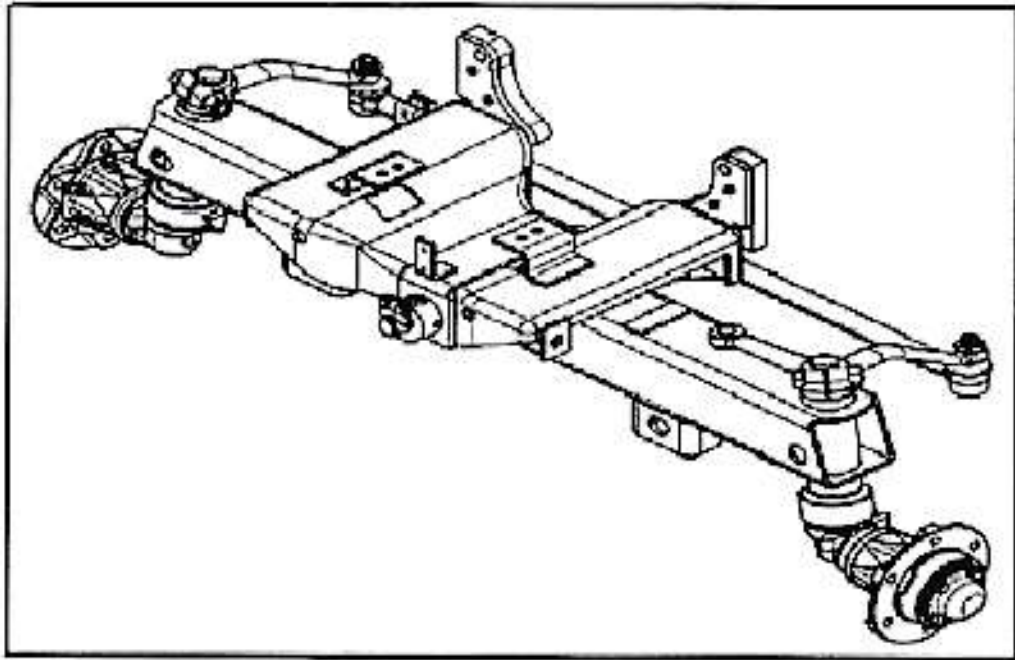


ANNEXURE-I

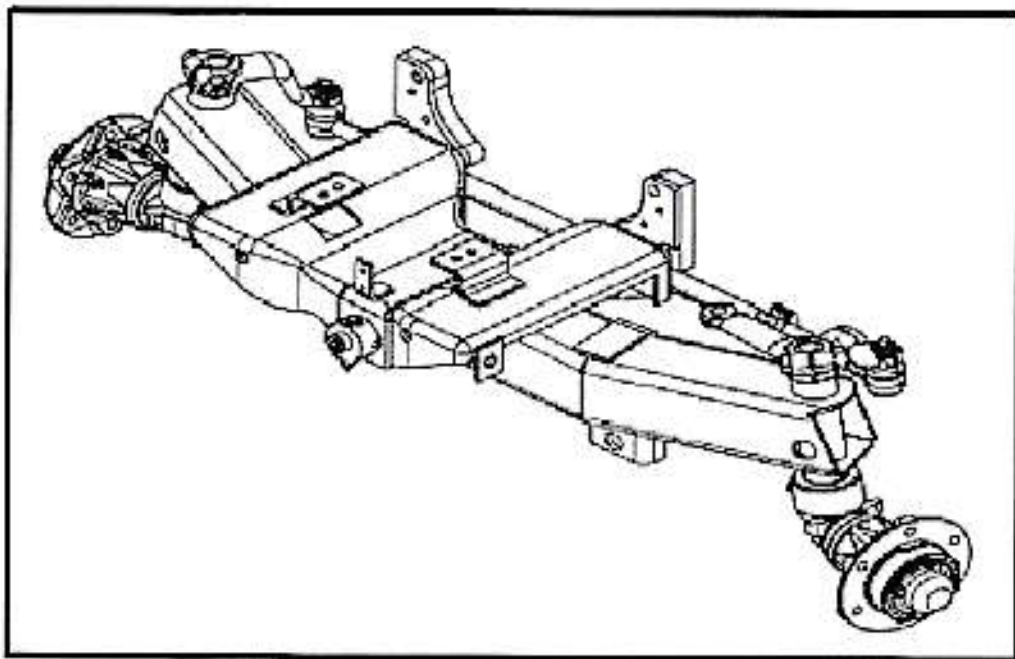
TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS	HOURS
1.	Running -in	--
2.	PTO Performance Test	2.80
3.	Theoretical speed test	0.83
4.	Brake test	2.35
B.	Miscellaneous test and other run hours, including idle run transportation, trial and preparation for test.	0.30
	Total	6.28

ANNEXURE-II



Design of Front Axle on Base Model



Design of Front Axle on Variant Model