

T- 1258/1785/2019	GROMAX, SHAKTIMAAN 45 DLX – COMMERCIAL (FIRST BATCH TEST)- INCOMPLETE
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Manufacturer : M/s. Gromax Agri Equipment Ltd.,
Near Vishwamitri Rly. Over bridge,
Vishwamitri, Vadodara-390011
Gujarat, India

Month: July	Test Report No. T- 1258/1785/2019	Year : 2019
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**GOVERNMENT OF INDIA
CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE
TRACTOR NAGAR, BUDNI (MADHYA PRADESH) 466445, INDIA**

E-mail: fmti-mp@nic.in

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

Telephone: 07564-234729, 234743

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Type of Test : **COMMERCIAL (First Batch Test) - Incomplete**

Test code/Procedure : IS:5994-1998 (Reaffirmed in 2014) and IS: 12207-2014.

Period of Test : February, 2019

Test Report No. : T- 1258/1785/2019

Month/Year : July, 2019

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- 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 randomly selected from the production line by the representative of testing authority 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 an INCOMPLETE (FIRST BATCH TEST) REPORT and should not be used for institutional finance/ subsidy purpose.**
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SELECTED CONVERSIONS

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

C O N T E N T S

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The tractor model “**Shaktimaan- 45 DLX**” had undergone Commercial (Variant) vide test report No. T-929/1447/2014, (August) derived from the base model “**Shaktimaan-45**” bearing test report No. T-659/1165/2009, (March). Now, the applicant has submitted an application vide letter no. Nil., dated 21.05.2018 & 25.05.2018 and informed that the “**Shaktimaan-45**” tractor model is not in production & submitted the last chassis cut off number as S4561703611 & engine no. S4561703611 (July, 2016) and also requested to consider the “**Shaktimaan- 45 DLX**” tractor as a base model for batch testing.

During the initial inspection of tractor, it was observed that the tractor which was selected by the testing authority was not submitted for test by the firm as the governor serial number. **7594469** does not match with the governor serial number. **76006755** of the selected tractor. Upon this, the firm has requested to withdraw the said test sample from the test vide letter no. Nil dated 25.03.2019 & applicant’s request was accepted by the competent authority. Hence, this incomplete report is released as under:-

Manufacturer	: M/s. Gromax Agri Equipment Ltd., Near Vishwamitri Rly. Over bridge, Vishwamitri, Vadodara-390011 Gujarat, India
Test requested by	: The manufacturer
Selected for test by	: The applicant
Place of running-in	: At applicant’s works
Duration of said running-in, (h):	
- Engine	: 50
- Transmission	: 40
Method of Selection	: The test sample was selected randomly out of five tractors from the production line by the representative of testing authority.

1. SPECIFICATIONS [As Specified by the Applicant]

1.1 Tractor:	
Make	: Gromax Agri Equipment Ltd.
Model	: Shaktimaan - 45 DLX
Brand name	: Shaktimaan
Type	: Four wheeled, rear wheel drive, unit construction, general purpose, agricultural tractor.
Year of manufacture	: 2017
Chassis number	: G.J. (i.e., October, 2018)
Country of Origin	: India

- 1.2 Engine:**
- Make : Gromax Agri Equipment Ltd.
 Model : MG-453
 Type : Four stroke, naturally aspirated, water cooled, direct injection, diesel engine
 Serial number : VJG3DS10318
- Engine speed (Manufacturer’s recommended production setting), (rpm) :**
- Maximum speed at no load : 2350 to 2450
 - Low idle speed : 750 to 850
 - Speed at maximum torque : 1200 to 1400
- Rated speed, (rpm):**
- For PTO use : 2200
 - For drawbar use : 2200
- 1.3 Cylinder & Cylinder Head:**
- Number : Three
 Disposition : Vertical, inline
 Bore/stroke, (mm) : 102/110
 Capacity as specified by the applicant, (cc) : 2697
 Compression ratio, (apa) : 18 :1
 Type of cylinder head : Individual
 Type of cylinder liners : Wet, replaceable
 Type of combustion chamber : Direct combustion, re-entrant cavity on piston crown.
 Arrangement of valves : Overhead
- Valve clearance (cold/hot):**
- Inlet valve, (mm) : 0.25±0.05 / 0.25±0.05
 - Exhaust valve, (mm) : 0.25±0.05 / 0.25±0.05
- 1.4 Fuel System:**
- Type of fuel feed system : Gravity and force feed
- 1.4.1 Fuel tank:**
- Capacity, (l) : 36.5
 Location : Above clutch housing
 Provision for draining of sediments/ water : Integrated with fuel filter
 Material of fuel tank : Metallic
- 1.4.2 Water Separator** : Not provided
- 1.4.3 Fuel feed pump:**
- Make : Bosch, India
 Type : Plunger
 Model/Group combination No. : 944030029
 Provision of sediment bowl : Provided
 Method of drive : Through camshaft of fuel injection pump
- 1.4.4 Fuel filters:**
- Make : Bosch, India
 Model/Group combination No. : F002 H20 117
 Number : Two
 Type of elements : Paper
 -Primary : Cloth
 -Secondary : Paper
 Capacity of final stage filter, (l) : 0.49

- 1.4.5 Fuel Injection pump:**
 Make : Bosch, India
 Model/Group combination No. : F002 A0Z809
 Type : Inline, Plunger
 Serial number : 76010113
 Method of drive : Through timing gears
- 1.4.6 Fuel injector:**
 Make : Bosch, India
 Model/Group combination No. : F 002 C70 007
 Type : Multi hole (five hole)
 Manufacturer's production pressure setting, (MPa) : 25.0 to 25.8
 Injection timing : 4 ± 1 degree before TDC
- 1.4.7 Governor:**
 Make : Bosch, India
 Model / Group combination No. : RSV375...1100A5C1472R
 Governor serial number : 7594469
 Type : Mechanical, centrifugal, variable speed
 Rated engine speed, (rpm) : 2200
 Governed range of engine speed (rpm) : 750 to 2450
- 1.5 Air Intake system:**
- 1.5.1 Pre-cleaner:**
 Make : Popular
 Type : Centrifugal with transparent dust collector
 Location : Above main air cleaner inlet tube
- 1.5.2 Air cleaner:**
 Make : Lumax
 Type : Oil bath
 Location : inside the bonnet
 Range of suction pressure at maximum power, (kPa) : 0.8 to 2.8
 Oil capacity, (l) : 0.25
 Oil change period : Change at every 50 hrs or change after 10 hrs in arduous condition
- 1.6 Exhaust system :**
 Type of silencer : Updraft (Cylindrical)
 Position of silencer outlet with respect to SIP, (mm):
 - Vertical : Not Specified
 - Longitudinal : Not Specified
 - Lateral : Not Specified
 Range of exhaust gas pressure at maximum power (kPa) : 7.1 to 7.9
 Provision of spark arresting device : Not provided
 Provision against entry of rain water : A bend is provided at the top of silencer
- 1.7 Lubricating system:**
 Type : Force feed and splash
 Oil sump capacity, (l) : 9.0
 Total lub oil capacity, (l) : 9.5
 Oil change period : Change after every 250 hours of operation.
 Cooling device, (if any) : None
 Minimum permissible lubricating oil : 49

pressure, (kPa)

1.7.1 Filters:

Make : Mahindra
Type : Spin-on paper element
Number : One

1.8 Cooling system:

Type : Forced circulation of water
Coolant recommended : NA
Details of pump : Centrifugal, semi open impeller having twelve vanes of 90 mm diameter and driven by crank shaft pulley through cogged "V" belt common to alternator.

Details of fan : Suction type, having seven polypropylene blades of 390 ± 2 mm diameter and mounted on water pump shaft

Means of temperature control : Thermostat
Bare radiator capacity, (l) : 2.0
Capacity of expansion flask, (l) : 0.85
Total coolant capacity, (l) : 7.0
Radiator cap pressure, (kPa) : 49

1.9 Starting System:

Type : 12V, DC, Electrical
Aid for cold starting : None
Any other device provided for easy starting : None

1.10 Electrical System:**1.10.1 Battery:**

Make & model : Exide & SFN88L/TR
Type : 12V, Lead acid
Capacity and rating : 80 Ah at 20 hours discharge rating.
Location : On RHS of clutch housing, in separate metallic box.
Serial number : A2J8D044012J81

1.10.2 Starter:

Make : Autolek
Model : STM 1121 W
Type : Pre-engaging, solenoid operated
Capacity and rating : 12V, 2.2 kW
Serial number : Not provided

1.10.3 Generator:

Make : Autolek
Model : ALT 4012-A
Type : Alternator
Output rating : 12V, 35 Amp
Method of drive : Through crankshaft 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 bulbs	Height of the centre of beam above ground level,(mm)	Size of beam, (mm)	Distance between centre of the beam and outside edge of tractor at standard rear track setting, (mm)
1	2	3	4	5
Front Lights:				
- Head lights	2, 12V, 60/55W	1230	160 x 100	725
- Parking lights	2, 12V, 5W	1280	75 x 20	115
- Turn indicators - cum- hazard warning lights	2, 12V, 21W	1320	72 x 60	115
Rear lights:				
- Tail-cum-brake light /Parking light	2, 12V, 21/5 W	1290	75 x75	137
- Turn indicators –cum- hazard warning lights	2, 12V, 21W	1290	75 x 55	75
Plough light (on RHS mudguard)	1, 12V, 55W	1385	70 x 55	425
Reflectors (Red)	02	1320	125 Φ	155
Registration plate Light	2, 12V, 5W	1320	Not specified	155

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

1.10.7 Light switch : Rotary type having five positions viz.
i) Off
ii) Dashboard lights-‘ON’
iii) Head lights (short beam) + (ii)
iv) Head lights (long beam) + (ii)
v) Head lights (long beam)

1.10.11 Seven pin trailer socket : Provided

1.11 Instrument panel details:

- i) Engine speed-cum-cumulative run hour meter (0 – 25 x 100 rpm).
- ii) Lubricant oil pressure gauge (with colour zone)
- iii) Coolant temperature gauge (with colour zone)
- iv) Fuel level gauge (with colour zone).
- v) Battery charging indicator light.
- vi) Main switch (key turn type).
- vii) Light switch (rotary type).
- viii) Turn indicator light switch
- ix) Head light long beam indicator light.
- x) Hazard light indicator switch.
- xi) Turn indicator-cum-hazard light tell-tale.
- xii) Steering control wheel.
- xiii) Hand accelerator lever.
- xiv) Horn push button
- xv) Fuel shut-off knob.
- xvi) Rear view mirror.

1.12 Transmission System:**1.12.1 Clutch:**

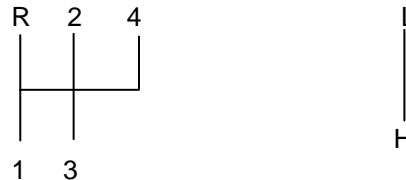
Make	: Valeo
Type	: Single, Dry friction plate
No. of friction plate, (s)	: One
Size OD / ID, (mm)	: 280±2 Φ / 170 Φ
Method of operation	: By pressing the clutch pedal, on LHS.

1.12.2 Gear box:

Make	: Mahindra
Type	: Mechanical, Combination of constant mesh and sliding mesh gears.

Number of speeds:

- Forward	: 8
- Reverse	: 2
Location of main gear shifting lever	: In the centre, in-front of operator's seat
Location of range shifting lever	: On LHS of operator's seat
Gear shifting pattern	:



Oil capacity, (l)	: 37.0	Main Gear shifting lever	Range shifting lever
Oil changing period	: Change between 1000 to 1200 hours of operation		

5.12.3 Nominal Speed:

Movement	Gear No.	No of engine revolutions for one revolution of driving wheel	Nominal speed at rated engine speed when fitted with 13.6-28 size tyres of 610 mm radius index, (kmph)
Forward	L1	191.26	2.64
	L2	112.2	4.51
	L3	78.70	6.42
	L4	52.51	9.64
	H1	65.63	7.71
	H2	38.51	13.15
	H3	26.97	18.75
	H4	18.08	28.04
Reverse	LR	126.07	4.03
	HR	43.28	11.69

1.12.4 Rear Differential Unit:

Type	: Crown wheel and pinion with differential unit, accommodated inside differential housing.
Reduction through crown wheel & pinion	: 4.889:1
Oil capacity of final drive, (l)	: 37.0 (Common with gearbox, rear axle, brake, final drive & hydraulic system)
Oil capacity of final drive, (l)	: Change between 1000 to 1200 hours of

		operation
	Differential lock:	
	Type	: Dog clutch
	Location	: On RHS of differential housing
	Method of operation	: By depressing foot pedal provided on RHS of operator seat
1.12.5	Rear axle and final drive	: (apa)
	Type	: Bull and pinion gear reduction unit, accommodated outside differential housing on both sides.
	Reduction through final drive	: 3.692 : 1
	Oil capacity of final drive, (l)	: 37.0 (Common with gearbox, rear differential, brake & hydraulic system)
	Oil changing period	: Change between 1000 to 1200 hours of operation
1.13	Power lift:	
	Make	: Mahindra & Mahiondra
	Type	: Open centre, Live, ADDC
	No. and type of cylinder	: One, single acting
	Type of linkage lock for transport	: Hydraulic, isolating valve knob in fully closed position act as transport lock.
1.13.1	Hydraulic pump	:
	- Make	: Dowty
	- Type	: Gear
	- Location	: On RHS of engine
	- Method of drive	: Through timing gears.
	No. & type of filters	: Three,
		i) Fine wire mesh strainer at suction pipe line
		ii) Spin-on Paper element on return line on LHS
		iii) Orifice filter
	Hydraulic oil capacity, (l)	: 37.0 (common with gear box, differential, rear axle, final drive & brake system)
	Oil change period	: Change between 1000 to 1200 hours of operation
	Provision for external tapping	: NA
	Details of control levers	: (i) Position control lever. (ii) Draft control lever. (iii) Isolating valve Knob
	Method of draft sensing	: Through top link
1.14.2	Power Take-off Master Shield	: Not Provided
1.15	Towing hitch	:
1.15.1	Front	: Not Provided
1.15.2	Rear	:
	Type	: Clevis
	Location	: At the rear of differential housing.
	Height above ground level, (mm):	
	- Maximum	: 717
	- Minimum	: 467
	- No. of positions	: 04
	- Type of adjustment	: By changing the position of hitch on

		mounting bracket.
	Distance of hitch point, (mm):	
	-From rear axle centre	: 430
	-From power take-off shaft end	: 90.0
	Dia of pin hole, (mm)	: 28.8
	Width of clevis, (mm)	: 75.0
1.16	Steering:	
	Make of distributor	: Rane
	Type	: Mechanical, screw and nut recirculation ball having single drop arm.
	Location	: Above clutch housing
	Method of operation	: Manual, by steering control wheel
	Diameter of steering control wheel, (mm)	: 460
	Steering oil capacity, (l)	: 0.90
	Lubricant change period	: Change between 1000 to 1200 hrs of operation
1.17	Brakes	:
1.17.1	Service Brake	:
	Make	: Brakes India
	Type	: Mechanical, Oil immersed discs
	Location	: On differential half axle shaft, on both sides.
	Area of liners, (cm ²)	: 956.3 (on each wheel side)
	Material of liners	: Non Asbestos
	Method of operation	: Manual, individual/combined operation by RHS foot pedal.
1.17.2	Parking Brake:	
	Type	: Pawl & ratchet mechanism
	Location & Method of operation	: Service brake acts as parking brake when locked in position by a hand lever provided on RHS of the operator's seat.
1.18	Wheel Equipment:	
1.18.1	Steered Wheel(s):	
	Make	: Apollo
	Number	: Two
	Type of tyre	: Pneumatic, ribbed
	Size	: 6.00-16
	Ply rating	: 8
	Maximum permissible loading capacity of each tyre at 196 kPa pressure, (kg)	: 410
	Recommended inflation pressure, (kPa) :	
	- For field work	: 167
	- For transport	: 196
	Track width, (mm)	: 1425 (std.)
	Method of changing track width	: None
	Make & size of wheel rim	: WILP & 4.50E x 16
1.18.2	Drive wheel(s):	
	Make	: CEAT
	Number	: Two
	Type of tyre	: Pneumatic, traction
	Size	: 13.6-28
	Ply rating	: 12
	Maximum permissible loading capacity of each tyre at 120 kPa	: 1050

pressure, (kgf)

Recommended inflation pressure, (kPa):

- For field work : 118

- For transport : 137

Track width, (mm) : 1390 (std.) & 1425

Method of changing track width : By reversing the wheel discs.

Make & size of wheel rim : WILP & W12 x 28

1.18.3 Wheel base, (mm) : 2050

Method of changing wheel base, if any, and range : None

1.19 Seat:

1.19.1 Operator's seat:

Make : Sukata

Type : Cushioned

Type of suspension : Two helical coil springs

Type of Dampening : Hydraulic shock absorber

Range of adjustment, (mm):

Vertical : Nil

Lateral : Nil

Longitudinal : ± 68

1.20 Labelling of tractor as per IS: 10273-1987 (Reaffirmed in 2014):

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

Name of Manufacturer	Gromax Agri Equipment Limited
Make	Gromax
Model	SHAKTIMAAN 45 DLX
Year of manufacturer	GJ (i.e October,2018)
Engine Serial Number	M9KBSBLAEJVG04231
Chassis Serial Number	VJG3DS10318
Maximum P.T.O Power, kW (hp)	29.5 (40.1)
Specific fuel consumption, g/kWh (g/hph)	286 (210)

During the initial inspection of tractor, it was observed that the tractor which was selected by the testing authority was not submitted for test by the firm as the governor serial number 7594469 does not match with the governor serial number 76006755 of the selected tractor. Upon this, the firm has requested to withdraw the said test sample from the test vide letter no. Nil dated 25.03.2019 & applicant's request was accepted by the competent authority. Hence, this incomplete report is released.

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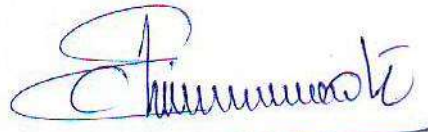
2. CITIZEN CHARTER

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	(01 Months) February, 2019	Yes	None

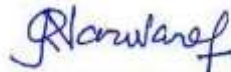
TESTING AUTHORITY:



**C.S. RAGHUWANSHI
AGRICULTURAL ENGINEER**



**C.V. CHIMOTE
TEST ENGINEER**



**J.J.R. NARWARE
DIRECTOR**

This test report is compiled by **Shri Vithato Keyho**, Senior Technical Assistant

3. APPLICANTS COMMENTS

None
