

(यह परीक्षण रिपोर्ट 31/08/2023 तक वैध है | / THIS TEST REPORT IS VALID UPTO: 31/08/2023)



GROMAX, TRAKSTAR 550 TRACTOR



भारत सरकार

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GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS WELFARE
DEPARTMENT OF AGRICULTURE, COOPERATION & FARMERS WELFARE,
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T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO : 31/08/2023

Manufacturer : M/s. Gromax
Agri Equipment Limited,
Near Vishwamitri Railway Over Bridge,
Vishwamitri, Vadodara – 390011
(Gujarat)

Month: August	Test Report No. T- 1463/1990/2020	Year: 2020
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T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)
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Type of Test : **COMMERCIAL (Variant)**
 Test code/Procedure : IS: 5994:1998 (Reaffirmed in 2014) and IS:12207-2019
 Period of Test : June, 2020 to July,2020
 Test Report No : T-1463/1990/2020
 Month/Year : August, 2020

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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 results presented in this report do not in any way attribute to the durability of the machine.
 - iii) 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.)
 - iv) This is a Variant test report and, should be read in conjunction with the Test report of the base model i.e. **“Gromax, Trakstar 545”** bearing report **No. T-1210/1737/2019** released in **January, 2019** and its administrative extension test report no. **T-1313/1840/2020** released in **March, 2020**.
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Sl. No	Units	Conversion Factor
1.	Force:	
	1 kgf	9.80665 N
		2.20462 lbf
2.	Power:	
	1 Mechanical power	1.01387metric horse power
		745.7 W
	1 Metric horse power	735.5 W
	1 kW	1.35962 Metric horse power
3.	Pressure:	
	1 psi	6.895 kPa
	1 kgf/cm ²	98.067 kPa = 735.56 mm of Hg
	1 bar	100 kPa = 10 N/cm ²
	1 mm of Hg	1.3332 m-bar

A B B R E V I A T I O N S	
Apa	As per applicant
TDC	Top Dead Centre
IS	Indian Standard
LHS/RHS	Left Hand Side/ Right Hand Side
Hg	Mercury
Temp.	Temperature
N.R.	Not recorded
Rpm	Revolutions per minute
O.D/I.D	Outer diameter/ Inner diameter
N.A.	Not available/ Not applicable
PTO	Power take-off
R.H.	Relative Humidity

CONTENTS

		<u>PAGE</u>
1.	Scope of test	05
2.	Fuel & Lubricants	06
3.	Essential Test	07
	3.1 Specifications	07
	3.2 Nominal Speed	19
	3.3 PTO Performance Test	20
4.	Other Applicable Test	24
	4.1 Turning Ability and steering effort	24
	4.2 Location of Centre of Gravity	24
5.	Adjustments, Defects, Breakdowns & Repairs	24
6.	Comparison Between Base Model and Variant Model	24
7.	Summary of observations, comments & recommendations	27
8.	Citizen charter	31
9.	Applicant's comments	31
	Annexure – I	32

T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)
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Manufacturer : M/s. Gromax Agri Equipment Limited,
Near Vishwamitri Railway Over Bridge,
Vishwamitri, Vadodara – 390011 (Gujarat)

Test requested by : The Applicant
Method of Selection : The tractor was submitted directly by the
applicant for test. Hence, method of selection
is not known.

1. SCOPE OF TEST

The “**Gromax Trakstar 545**” tractor had undergone “Initial Commercial Test” at this Institute vide test report No. **T- 1210/1737/2019** released in **January, 2019** and its administrative extension test report bearing report no. **T-1313/1840/2020** was released in **March, 2020**.

Now the applicant has submitted an application for testing of “**Gromax, Trakstar 550**” tractor as a Variant of “**Gromax, Trakstar 545**” tractor.

The applicant having enclosed a list of following differences in the technical specifications between base model “**Gromax, Trakstar 545**” and variant model “**Gromax, Trakstar 550**” tractor and requested to test the “**Gromax, Trakstar 550**” tractor as a variant of “**Gromax, Trakstar 545**” tractor:

The Major features of Base Model and Variant Model are listed below:

S.No.	Parameters	Base Model Test Report no. T- 1210/1737/2019 & T-1313/1840/2020.	Variant Model
1	2	3	4
1.	Tractor:		
	Make	Gromax	Gromax
	Model	Trakstar 545	Trakstar 550
2	Max declared PTO Power (kW):	29.0	32.2
3.	Type of clutch system	Single, Dry friction plate	Dual, friction plates with pads
4.	Range of nominal speed ,(kmph):		
	- Forward	2.92 to 30.93	3.20 to 32.44
	- Reverse	3.89 to 11.82	4.28 to 12.42
5.	Hydraulic system:		
	Make of pump	Rexroth	Dynamics
	Pump delivery rate at minimum pressure and rated engine speed(l/min)	30±2 (D)/30.9(O)	33±2(D)
	Pump speed at rated engine speed, (rpm)	2792	2792
	Maximum hydraulic power (kW)	5.1±0.4(D)	5.6±0.4(D)

1	2	3	4
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T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)
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	Pump delivery rate at maximum hydraulic power, (l/min)	21(D)/25	28±2
	Pressure at maximum hydraulic power, (MPa)	10(D)/13(O)	12.2
	Sustain pressure of the open relief valve(MPa)	15.5 to 19 (D)/17.3(O)	16.5 to 19.9
6.	Type of steering system	Mechanical	Hydrostatic
7.	Differential lock	Not provided	Provided
8.	Make of front wheels	Apollo	MRF
9.	Make of rear wheels	Apollo	MRF
10.	Tyre size & ply rating of rear wheels	13.6 x 28 & 12PR	14.9 x 28 & 12PR
11.	Make & size of rear wheel rims	WILP & W12 x 28	WILP & W13 x 28
12.	Unballast mass of tractor, (kg)	760/1100/1860	820/1200/2020
13.	Overall Dimension (length, width & height), mm	3500/1770/2250	3450/1830/2295

Subsequent to the examination of the case in light of Table-2 & 3 of Indian Standard IS 12207-2019, the following tests were considered to be carried out :

- Specification checking
- Nominal speed test
- PTO Power test under natural ambient condition.
- Turning Ability and steering effort
- Location of Centre of Gravity

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 gm/cc at 15°C was used.

2.2 Lubricants:

S. No.	Particulars	As recommended by the manufacturer	As used during the test
1.	Engine	SAE 15 W 40	SAE 20 W 40
2.	Gearbox, differential, rear axle, final drive, brake, Steering housing & hydraulic system oil	MTAC30	Oil originally filled in the tractor systems was not changed
3.	Grease	Maximile	MP Grease

3. ESSENTIAL TEST

3.1. SPECIFICATIONS

3.1.1 Tractor:		<u>Base Model</u>	<u>Variant Model</u>
Make	:	Gromax	Gromax
Model	:	Trakstar 545	Trakstar 550
Type	:	Four wheeled, rear-wheels driven, standard agricultural tractor.	
Month & Year of manufacture	:	2017	12 / 19
Chassis number	:	M9KATADAAHV000	M9KATAEDBKVJ014
Country of Origin	:	India	
3.1.2 Engine:			
Make	:	Mahindra & Mahindra Ltd.	
Model	:	GTS3045NA3A	GTS3048NA3A
Type	:	Four strokes, liquid cooled, naturally aspirated, direct ignition, diesel engine.	
Serial number	:	NHA6CCE0031	NHA6RAE0030
Engine speed (Manufacturer's recommended production setting), (rpm):			
- Maximum speed at no load	:	2325 to 2525	
- Low idle speed	:	750 to 850	
- Speed at maximum torque	:	1200 to 1500	
Rated speed, (rpm):			
- For PTO use	:	2200	
- For drawbar use	:	2200	
3.1.3 Cylinder & Cylinder Head:			
Number	:	Four	
Disposition	:	Vertical, inline	
Bore/stroke, (mm)	:	88.9 / 120	
Capacity as specified by the applicant, (cc)	:	2979	
Compression ratio	:	21.3 (± 1) : 1 (apa)	
Type of cylinder head	:	Monoblock	
Type of cylinder liners	:	Wet, replaceable	
Type of combustion chamber	:	Re-entrant bowl	
Arrangement of valves	:	Over head, inline	
Valve clearance (cold/hot)			
- Inlet valve, (mm)	:	0.3 to 0.4	
- Exhaust valve, (mm)	:	0.4 to 0.5	
3.1.4 Fuel System:			
Type	:	Gravity and force feed	
3.1.4.1 Fuel tank:			
Capacity, (l)	:	55.0	50.0
3.1.4.2 Water separator	:	Not provided	
3.1.4.3 Fuel feed pump:			
Make	:	Bosch, India	
Type	:	Plunger	
Model/Group combination No.	:	FP/KSG22AD105, F002 A50 040	
Provision of sediment bowl	:	Provided	
Method of drive	:	Through camshaft of fuel injection pump	
3.1.4.4 Fuel filters:		<u>Base Model</u>	<u>Variant Model</u>
Make	:	Bosch, India	
Model/Group combination No	:	F002 H20 117	

Number(s)	:	Two
Types of elements:		
- Primary	:	Cloth Cloth
-Secondary	:	Paper Paper
Capacity of final stage filter,(l)	:	0.44 0.45
3.1.4.5 Fuel Injection pump:		
Make	:	Bosch, India
Model/Group Combination No.	:	F040 333 000 E040 333 100/ Production No.- F002 A2ZA34 (apa)
Type	:	Inline, plungers
Serial number	:	71833535 71845639
Method of drive	:	Through timing gears
3.1.4.6 Fuel injector(s):		
Make	:	Bosch, India
Nozzle holder no.	:	F 002C70007
Nozzle no.	:	DSL A 144P 2141
Type	:	Multi hole (05 holes)
Manufacturer's production pressure setting, (MPa)	:	24.8 – 25.0
Injection timing	:	5° ± 1 before TDC
Firing order	:	1-3-4-2
3.1.4.7 Governor:		
Make	:	Bosch, India
Model/Group combination No.	:	E042 261 200 E042 261 200/ Production No.- RSV400...1100A5C1 887R (apa)
Type	:	Mechanical, centrifugal, variable speed
Rated engine speed, (rpm)	:	2200
Governed range of engine speed, (rpm)	:	750 to 2525
3.1.5 Air Intake System:		
3.1.5.1 Pre-cleaner:		
Make	:	Popular
Type	:	Centrifugal, cyclonic with transparent dust collector.
Location	:	Above the air-cleaner inlet tube, outside the bonnet.
3.1.5.2 Air cleaner:		
Make	:	Donaldson Donaldson
Type	:	Dry type
Location	:	In front of radiator, under the bonnet
Range of suction pressure at maximum power, (kPa)	:	3.5 to 4.4 (apa) 4.3

Details of paper element:

	Base Model		Variant Model	
	Primary	Secondary	Primary	Secondary
- Size (OD/ID), (mm)	126.8/85.8	81.1/64.0	126/86	81 /65
- Length, (mm)	310	305	305	300

- Type	:	Paper	Febric	Paper	Cellulose fiber
- No. of elements	:	One	One	One	One
Air flow restriction indicator	:	Not provided			
Dust unloading valve	:	Provided			
Maintenance schedule	:	Cleaning of primary element at 100 hours of operation/if required in arduous condition then every 400 hours of operation. Replace primary element after every 900 hours of operation or after 3 cleanings of primary filter element replace secondary element after every 2100 hours or after 3 replacement of primary filter element			

3.1.6 Exhaust System:

Type of silencer	:	Updraft	(Cylindrical)		
Position of silencer outlet with respect to SIP, (mm):					
- Upward	:	900		950	
- Longitudinal	:	1620		1580	
- Lateral	:	140 (on RHS)		185 (on RHS)	
Range of exhaust gas pressure at maximum power, (kPa)	:	5.7 to 6.0		11.9 to 12.0	
Provision of spark arresting device	:	None			
Provision against entry of rain water	:	A bend is provided on the outlet of silencer.			

3.1.7 Lubricating system:

Type	:	Force feed cum splash			
Oil sump capacity, (l)	:	6.70			
Total lub oil capacity, (l)	:	7.40			
Oil change period	:	First change after 250 hours and subsequently after every 300 hours of operation.		First change after 250 hours and subsequently after every 350 hours of operation.	

Cooling device, (if any)	:	None			
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3.1.7.1 Filters:

Make	:	Mahindra			
Type	:	Full flow, spin-on, throw away, paper element.			
Number	:	One			

3.1.7.2 Pump:

Type	:	Gear			
Method of drive	:	Through timing gears			
Pressure release setting, (kPa)	:	206.8 to 241.3 (apa)			
Minimum permissible pressure, (kPa)	:	100 (apa)			

3.1.8 Cooling system:

Type	:	Forced circulation of liquid			
Coolant as recommended	:	Lubzs Corporation (apa)			
Coolant and water ratio	:	0.05 : 1 (apa)			

Details of Pump	:	Centrifugal, semi-open impeller of 82.8 mm diameter, having 07 number of vanes and driven through crankshaft pulley by a cogged "V"-belt common to alternator.			
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Details of fan	:	Suction type, 06 plastic blades of 400 mm diameter and mounted on water pump shaft.			
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		<u>Base Model</u>			<u>Variant Model</u>
Means of temperature control	:	Thermostat, Wax type			
Bare radiator capacity, (l)	:	2.60		2.50	
Expansion flask capacity, (l)	:	0.80		0.80	
Total coolant capacity, (l)	:	3.67		6.50	

T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO : 31/08/2023

- Radiator cap pressure, (kPa) : 88 | 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 and model : Exide & 95D31LMF
 Type : Lead acid
 Capacity and rating : 12V, 80 Ah at 20 hours discharge rate
 Location : On RHS of clutch housing inside a separate metallic box
- 3.1.10.2 Starter:**
 : Auto lek
 Make : STM RV-1105
 Model : Pre-engaging, solenoid operated
 Type : 12V & 2.0 kW
 Power rating, (kW) : Not available
- 3.1.10.3 Generator:**
 Make : Auto Lek | Lucas TVS
 Model : Not available | A115
 Type : Alternator
 Output rating : Not available
 Method of drive : 12V, 35 Amp | 12V, 36 Amp
 Driven through crank shaft pulley by a cogged "V" belt, common to water pump pulley
- 3.1.10.4 Voltage regulator** : Inbuilt with alternator

3.1.10.5 Details of lights : (Base and Variant model)

Description	No. & capacity of bulbs	Height of the centre of beam above ground level,(mm)	Size of beam, (mm)	Distance between centre of the beam and outside edge of tractor at standard rear track setting, (mm)
Front Lights:				
- Head lights	2, 12V, 60/55W	1190	160 x 100	770
- Parking lights	2, 12V, 5W	1355	40 x 60	255
- Turn-cum-Hazard Indicators	2, 12V, 21W	1355	75 x 60	200
Rear lights:				
- Stop light	2, 12V, 21 W	1350	40 x 65	260
- Turn-cum-Hazard Indicators	2, 12V, 21W	1350	40 x 65	180
Reflectors (Red)	2	1350	35 x 55	220
Plough light (on RHS mudguard)	1, 12V, 55W	1420	110 Φ	420
Registration plate Light	1, 12V, 5W	1350	40 x 65	220

3.1.11 Instrument panel details:

	<u>Base Model</u>	<u>Variant model</u>
i) Engine rpm meter (0 to 25) x 100 rpm	Provided	(0 to 30) x 100 rpm
ii) Cumulative digital run hour meter		Provided
iii) Water temperature gauge (with coloured zones)		Provided
iv) Lubricating oil pressure gauge (with coloured		Provided

	zones)		
v)	Fuel level gauge (with coloured zones)		Provided
vi)	Turn and hazard light indicator		Provided
vii)	Battery charging warning indicator		Provided
viii)	Starting switch (key-turn-type)		Provided
ix)	Light switch (rotary type)		Provided
x)	Turn indicator light switch		Provided
xi)	Hazard indicator light switch		Provided
xii)	Head light long beam 'ON' indicator		Provided
xiii)	Horn push button		Provided
xiv)	Mobile charging socket	Provided	Not provided
xv)	Steering control wheel		Provided
xvi)	Fuel shut-off knob		Provided
xvii)	Hand accelerator lever		Provided
xviii)	Rear view mirror		Provided
xix)	Parking brake light indicator	Provided	Not provided

3.1.12 Transmission System:

Base Model

Variant Model

3.1.12.1 Clutch:

Make	:	Luke	
Type	:	Single, dry friction plate	Dual dry friction plates with pads
No. of friction plate(s)	:	One	Two
Contact area of each pad, cm ²	:	NA	Transmission PTO
			28.60 28.60
Material	:	Non asbestos (apa)	Asbestos free
Size, OD/ID (mm)	:		
-Transmission	:	279.9 / 166.1 Ø	280 / 168.5 Ø
-PTO	:	N.A	279.9 / 168.0 Ø
Method of operation:	:		
- Transmission	:	By pressing the foot pedal provided on LHS of operator's seat.	By pressing the clutch pedal, halfway on LHS
- PTO	:	N.A	By pressing the clutch pedal, fully on LHS.

3.1.12.2 Gear box:

Make	:	Gromax Agri Equipment Limited (apa)
Type	:	Combination of sliding mesh and constant mesh

No. of speeds:

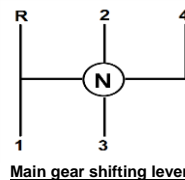
- Forward	:	08
- Reverse	:	02

Location of gear shifting levers

Main gear shifting lever : In front of operator's seat

Range selection lever : In front of operator's seat

Gear shifting pattern in case of base and variant models



Main gear shifting lever

Base Model



Range selection lever

Variant Model

Oil capacity, (l)	:	47.0	43.5
		(Common with differential, rear axle & final drive, hydraulic, and brake system.)	(Common with differential, rear axle & final drive, hydraulic, brake and steering system.)

Oil changing period : Change every 1000 hours of operation

3.1.12.3 Range of nominal Speed, (Kmph) :

- Forward	: 2.92 to 30.93	3.20 to 32.44
- Reverse	: 3.89 to 11.82	4.28 to 12.42

3.1.12.4 Differential:

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

Reduction through crown wheel and pinion : 4.181 : 1 (46/11 T)

Oil capacity, (l)	: 47.0 (Common with gear box, rear axle & final drive, hydraulic, and brake system)	43.5 (Common with gear box, rear axle & final drive, hydraulic, brake and steering system)
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Oil changing period : Change every 1000 hours of operation

Differential lock : **Not provided**

Type	: N.A	Provided
Location	: N.A	Dog clutch
Method of operation	: N.A	On RHS
		By pressing a pedal provided on RHS of operator's seat.

3.1.12.5 Rear axle and final drive :

Type : Bull & pinion type final drive accommodated inside the differential housing

Reduction through final drive : 3.917 : 1 (47/12 T)

Oil capacity of final drive, (l)	: 47.0 (Common with gear box, differential, hydraulic, and brake system)	43.5 (Common with gear box, differential, hydraulic, brake and steering system)
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Oil changing period : Change every 1000 hours of operation

3.1.13 Power lift (Hydraulic System):

Make : Gromax Agri Equipment Ltd. (apa)

Type : Open centre, live & ADDC

No. and type of cylinder : One, single acting

Type of linkage lock for - transport : Hydraulic response control valve in fully closed condition acts as transport lock.

Hydraulic pump:

-Make : Rexroth | Dynamics

-Type : Gear

-Location & drive : On RHS of engine and driven through timing gears.

No. & type of filter(s) : Three

- i) Suction strainer in hydraulic housing,
- ii) Orifice filter in distributor
- iii) Return line filter (full flow, spin on, throw away in return line)

	<u>Base Model</u>	<u>Variant Model</u>
Hydraulic oil capacity, (l)	: 47.0 (Common with gear box, differential, rear axle & final drive, hydraulic, and brake system)	43.5 (Common with gear box, differential, rear axle & final drive, brake and steering system)

Oil changing period : Change every 1000 hours of operation

T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO : 31/08/2023

Provision for external tapping : Not provided

Details of control levers:

- i) Position control lever
- ii) Draft control lever
- iii) Response control knob

Method of draft sensing : Through Top link

3.1.13.1 Three-point linkage:

S. No.	Observations	As per IS: 4468- (Part-1) - 1997(Reaffirmed in Oct., 2017) (Cat.I / Cat.II), (mm)	As measured (mm)		Remarks in case of variant model
			Base model	Variant model	
1	2	3	4 (a)	4 (b)	5
I	Upper hitch points:				
	a) Dia of hitch pin hole	19.30 to 19.50 / 25.70 to 25.90	19.45	19.35/25.63	Conforms to Cat. I & II
	b) Width of ball	44.0 (max.) / 51.0 (max.)	43.95	43.73/51.0	Conforms to Cat. I & II
II	Lower hitch points:				
	a) Dia of hitch pin hole	22.40 to 22.65 / 28.70 to 29.00	28.81	29.0	Conforms to Cat. II
	b) Width of ball	34.8 to 35.0 / 44.8 to 45.0	44.8	44.90	Conforms to Cat. II
III	Lateral distance from lower hitch point to centre line of tractor.	359 / 435	364	364	Does not conform
IV	Lateral movement of lower hitch points	100 (min) / 125 (min)	150	130	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	490	500	Conforms to Cat. I
VI	Transport height	820 (min) / 950 (min)	865	900	Conforms to Cat. I & II
VII	Power range (without force)	560(min) / 650 (min)	640	635	Conforms to Cat. I & II
VIII	Leveling adjustment	100 (min) / 100 (min)	220	290	Conforms to Cat. I & II
IX	Lower hitch point clearance	100 (min) / 100 (min)	125	225	Conforms to Cat. I & II
X	Lower hitch point height	200 (max) / 200 (max)	175	215	Does not conform

3.1.13.2 Drawbar:

3.1.13.2.1 Linkage Drawbar {Refer Fig.1}:

Notation	As per IS: 12953-1990, (Cat.I) / (Cat.II), (mm)	As measured, (mm)		Remarks in case of variant model
		Base Model	Variant Model	

1	2	3	4	5
A	683 ± 1.5 / 825 ± 1.5	683	683	Conforms to Cat. I
B	75 (min) / 75 (min)	74.2	76.2	Conforms to Cat. I & Cat. II
C	30 (min) / 30 (min)	35	35.2	Conforms to Cat. I & Cat. II
DØ	21.79 to 22.0 / 27.79 to 28.00	27.9	28.0	Conforms to Cat. II
E	39.0 (min) / 49.0 (min)	57.2	55.4	Conforms to Cat. I & Cat. II
FØ	12.0 (min) / 12.0 (min)	12.4	12.3	Conforms to Cat. I & Cat. II
G	15.0 (min) / 15.0 (min)	14.1	15.3	Conforms to Cat. I & Cat. II
HØ	25 ± 1 / 25 ± 1	24.3	24.9	Conforms to Cat. I & Cat. II
J	80 ± 1.5 / 80 ± 1.5	80.3	79.8	Conforms to Cat. I & Cat. II
No. of holes	7 / 9	07	07	Conforms to Cat. I

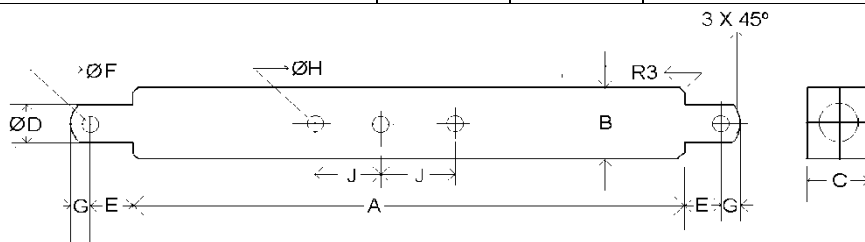


Fig. 1: DIMENSIONAL NOTATIONS FOR LINKAGE TYPE DRAWBAR

	<u>Base Model</u>	<u>Variant Model</u>
3.1.13.2.2 Swinging drawbar		Not provided
3.1.14 Power take-off shaft		
Type	Type-I, independent	Not Type-I, semi 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)	600	640
Distance behind rear axle, (mm)	340	350
Engine to PTO speed ratio	3.67:1	3.44:1
Whether the PTO shaft is capable of transmitting the full power of engine		Yes

3.1.14.1 *Specification of power take-off shaft:

Specification	As per IS:4931-1995 (Type-I) (Reaffirmed in 2014),	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 1858 rpm of engine	Conforms
No. of splines	06	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	In the center line of the tractor		Conforms
Dimensions, (mm) [See Fig. 2]:				
DØ	34.79 ± 0.06	34.81	34.77	Conforms
dØ	28.91± 0.05	28.92	28.92	Conforms
BØ	29.4 ± 0.1	29.41	28.41	Conforms
1	2	3	4	5
AØ (Optional)	8.3± 0.1	8.30	8.33	--
W	8.69 - 0.09 - 0.16	8.61	8.60	Conforms
a	7	7	7	Conforms
b (optional)	25 ± 0.5	25.0	25.40	--
c	38	38.0	38.0	Conforms
X	30°	30°	30°	Conforms
B	76 (min)	82	90.81	Conforms
h	450 to 675	570	625	Conforms

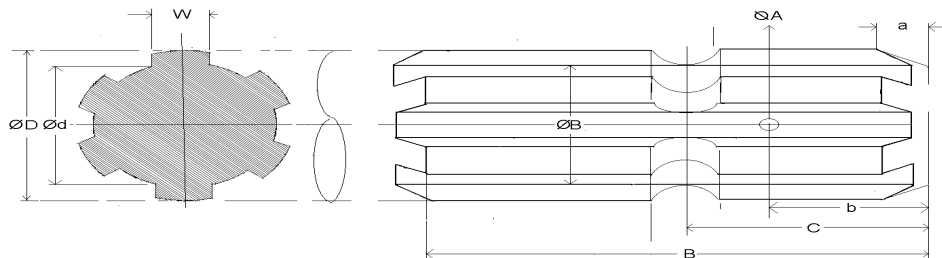


Fig. 2: DIMENSIONAL NOTATIONS FOR TYPE-I POWER TAKE-OFF SHAFT

		<u>Base Model</u>	<u>Variant Model</u>
3.1.14.2 PTO Master Shield	:		Not Provided
3.1.15 Towing hitch:			
3.1.15.1 Front:			
Type	:		Clevis
Location	:		On front axle towards RHS
Height above ground level, (mm)	:	425 (fixed)	420 (fixed)
Dia of pin hole, (mm)	:	31.8	31.78
Width of clevis, (mm)	:	60.0	60.44
3.1.15.2 Rear:		<u>Base Model</u>	<u>Variant Model</u>
Type	:		Clevis
Location	:		At rear of differential housing.
Height above ground level, (mm) :			
-Maximum	:	720	770
-Minimum	:	400	430

	Number of positions	:	12
	Type of adjustment	:	By changing and reversing the position of hitch on its mounting bracket
	Distance of hitch point, (mm) :		
	- From rear axle centre	:	455 465
	- From power take-off shaft end	:	110 115
	Dia of pin hole, (mm)	:	30.2 32.23
	Width of clevis, (mm)	:	75 84.24
3.1.16	Steering:		
	Make	:	Rane Eaton (apa)
	Type	:	Mechanical, worm & screw with single drop arm Hydrostatic, Power steering
	Location of gear box / control valve assembly	:	Above clutch housing
	Method of operation	:	Manually by steering control wheel
	Diameter of steering control wheel, (mm)	:	455
	Make & type of pump	:	NA Dynamics & Tandem Gear
	Location & method of drive	:	NA On RHS of engine & through timing gear
	Make, number, type & location of hydraulic ram cylinder	:	NA Not available, one, double acting & behind the front axle in center
	Capacity, (l)	:	0.27 43.5 (Common with gearbox, differential, rear axle & final drive, brake and hydraulic system).
	Oil change period	:	NA Change after every 1000 hours of operation.
3.1.17	Brakes:		
3.1.17.1	Service Brake:		
	Make	:	JMI
	Type	:	Mechanical, oil immersed discs
	Location	:	On rear half axle shaft before final reduction unit.
	No. of friction disc(s)	:	04 (on each wheel side)
	Area of liners, (cm ²)	:	462.68 (on each wheel side)
	Material of liners	:	Non-asbestos (apa)
	Method of operation	:	Independent or combined pedal operated by right foot.
	Oil capacity, (l)	:	47.0 (Common with gear box, differential, rear axle & final drive, and hydraulic system) 43.5 (Common with gear box, differential, rear axle & final drive, hydraulic and steering system)
	Oil change period	:	Change every 1000 hours of operation
3.1.17.2	Parking Brake:		
	Type	:	Toggle link locking mechanism
	Location & method of operation	:	Service brake act as a parking brake when locked in position by a hand lever provided on RHS of operator's seat.
3.1.18	Wheel Equipment:		
3.1.18.1	Steered Wheel(s):		
	Make	:	Apollo MRF
	Number(s)	:	02
	Type of tyre(s)	:	Pneumatic, ribbed
	Size	:	6.00-16

Ply rating : 8
 Maximum permissible loading : 140 (apa)
 capacity of each tyre at 196
 kPa pressure, (kgf)
Recommended inflation pressure, (kPa):
 - for field work : 167
 - for transport : 196
 Standard track width, (mm) : 1235 (std.) & 1435 | 1270 (std.) & 1450
 Method of changing track width : By reversing the wheel disc
 Make & size of wheel rim : WIL & 4.50E x 16

3.1.18.2 Drive wheel(s):

Make : Apollo | MRF
 Number(s) : 02
 Type of tyre(s) : Pneumatic, Traction
 Size : 13.6 – 28 | 14.9-28
 Ply rating : 12
 Maximum permissible loading : 1160 (apa) | 1600 (As per ITTAC manual).
 capacity of each tyre at 140
 kPa pressure, (kgf)
Recommended inflation pressure, (kPa):
 - For field work : 118
 - For transport : 137
 Track width, (mm) : 1385 (std.), 1495, | 1425 (std.), 1445,
 1555, 1595, 1655, | 1545, 1625, 1705,
 1755 & 1875 | 1725 & 1825.
 Method of changing track width : By reversing & changing the position of wheel disc on off-set rim lugs.
 Make & size of wheel rim : WIL & W12 x 28 | WIL & W13 x 28

3.1.18.3 Wheel base, (mm)

: 1960 | 1940
 Method of changing wheel base, if any, and range. : **None**

3.1.19 Operator's seat:

Make : Harita (apa)
 Type : Cushioned seat with backrest
 Type of suspension : 02, Helical coil spring
 Type of dampening : 01, Hydraulic shock absorber

Range of adjustment, (mm):

- Vertical : Nil
 - Lateral : Nil
 - Longitudinal : ± 55 | ± 11

3.1.20 Provision for safety and comfort of operator:

3.1.20.1 Conformity with IS: 12343-1998 (Reaffirmed in 2014)

All parameters meet with the requirements of IS: 12343-1998: (Re-affirmed in 2014), except the following :

<u>Base Model</u>	<u>Variant Model</u>
i) Vertical distance from seat index point to the centre of clutch pedal.	i) Longitudinal adjustment of operator seat forward and reverse from mid position.
ii) Longitudinal distance from seat index point to the centre of differential lock pedal.	ii) Vertical distance from seat index point to the centre of clutch pedal.
iii) Longitudinal distance from seat index point to the centre of steering control wheel.	iii) Vertical distance from seat index point to the centre of brake pedal.

T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO : 31/08/2023

- iv) Longitudinal distance from seat index point to the centre differential lock pedal.
- v) Longitudinal distance from seat index point to the centre of steering control wheel.

3.1.20.2 Conformity with IS: 6283 (Part-1) – 2006 (Re-affirmed in 2014) & IS: 6283 (Part-2) – 2007 (Re-affirmed in 2014):

All the controls are identifiable with symbols as per IS: 6283 (Part-1) – 2006 (Re-affirmed in 2014) & IS: 6283 (Part-2) – 2007 (Re-affirmed 2014), except the following:

Base model

- i) Color codes for engine revolution gauge

Variant model

- i) Type of Lubrication oil and grease is not mentioned

3.1.20.3 Conformity with IS:8133-1983 (Re-affirmed in 2014), except the following:

Location and movement of various controls meet the requirement of IS: 8133-1983 (Re-affirmed in 2014), **except the following :**

- i) Safety against accidental engine start.
- ii) The fuel shut-off knob does not remain in stop position.

- i) Safety switch against the accidental start is not provided.
- ii) The fuel shut-off knob does not remain in stop position.

3.1.20.4 Conformity with IS: 12239 (Part-1)-1996 (Re-affirmed in October, 2017):

Meets the requirements of IS:12239 (Part-1)-1996 (Re-affirmed in October, 2017), **except the following:**

Base model

- i) Provision of spark arresting device in the exhaust system

Variant model

- i) Vertical retainers are not provided on both side of clutch pedal.
- ii) Spark arresting device in the exhaust system is not provided.

3.1.20.5 Conformity with IS:12239 (Part-2)-1999 (Re-affirmed in 2014):

Meets the requirements of IS:12239 (Part-2)-1999 (Re-affirmed in 2014), **except the following:**

- i) Working clearance around hydraulic control lever and the mudguard is less than the minimum requirement.

- i) PTO shaft master shield is not provided.
- ii) Working clearance between draft control lever and RHS fender is less than the minimum requirement.

3.1.20.6 Conformity with IS: 14683 – 1999 (Re-affirmed in 2014) :

Lighting arrangements meet the requirements of IS:14683-1999 (Re-affirmed in 2014).

3.1.20.7 Rear view mirror:

Rear view mirror has been provided.

3.1.20.8 Slow moving emblem:

Slow moving emblem has been provided.

3.1.21 Labelling of tractor as per IS: 10273-1987 (Reaffirmed in March, 2014):

Locations 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	Trakstar 550
Month and Year of manufacture	12/19

T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO : 31/08/2023

Engine Serial Number	NHA6RAE0030
Chassis Serial Number	M9KATAEDBKVJ01425
Maximum PTO Power, kW	32.2
Specific fuel consumption, g/kWh	258

3.1.22	Mass of un-ballasted tractor, (Kg):	<u>Base model</u>	<u>Variant model</u>
	- Front	: 760	820
	- Rear	: 1100	1200
	- Total	: 1860	2020
3.1.23	Over all dimensions, (mm):		
	- Length	: 3500	3450
	- Width	: 1770	1830
	- Height (with exhaust pipe)	: 2250	2295
	Minimum ground clearance	: 337 (at front axle ballast weight frame)	320 (at front axle ballast weight frame)
3.1.24	Number of external lubricating points:		
	- Oiling	:	Nil
	- Grease cups	:	02
	- Grease nipples	: 17	12
3.1.25	Colour of tractor:		
	Chassis & engine	:	Dark grey
	Bonnet & Mudguards	:	Dark Blue
	Wheel discs & rims	:	Silver

3.2 NOMINAL SPEED TEST

Movement	Gear No.	No of engine revolutions for one revolution of driving wheel		Variation in nominal speed (%)	Nominal speed at rated engine speed when fitted with 13.6-28 size tyres of 610 mm radius index, (kmph)	Nominal speed at rated engine speed when fitted with 14.9-28 size tyres of 640 mm radius index, (kmph)	Variation in nominal speed (%)
		<u>Base model</u>	<u>Variant model</u>				
Forward	L1	173.56	165.31	- 4.75	2.92	3.20	9.58
	L2	117.67	112.15	- 4.69	4.30	4.73	10.00
	L3	70.53	67.28	- 4.61	7.17	7.89	10.04
	L4	49.74	47.43	- 4.64	10.15	11.17	10.05
	H1	57.06	57.12	0.12	8.87	9.30	4.85
	H2	38.70	38.73	0.08	13.06	13.68	4.75
	H3	23.15	23.12	-0.13	21.84	22.99	5.27
	H4	16.37	16.20	1.04	30.93	32.44	4.88
Reverse	LR	130.20	122.43	-5.97	3.89	4.28	10.03
	HR	42.82	42.76	0.14	11.82	12.42	5.08

3.3 PTO PERFORMANCE TEST

S. No.	Particulars	<u>Base Model</u>	<u>Variant Model</u>
1	Date(s) of test	26.04.2018 & 27.04.2018	13.07.2020
2	Tractor run at this Institute prior to start of PTO test, (h)	2.59	1.40
3	Dynamometer test bench used	SAJ AG 250 Eddy Current	Fuchino ESF 1000 S

T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO : 31/08/2023

The results of Power take-off performance test of Previous & Present sample are tabulated in **Table-1** and present sample is graphically represented in **Fig. 3, and 4.**

Table-1

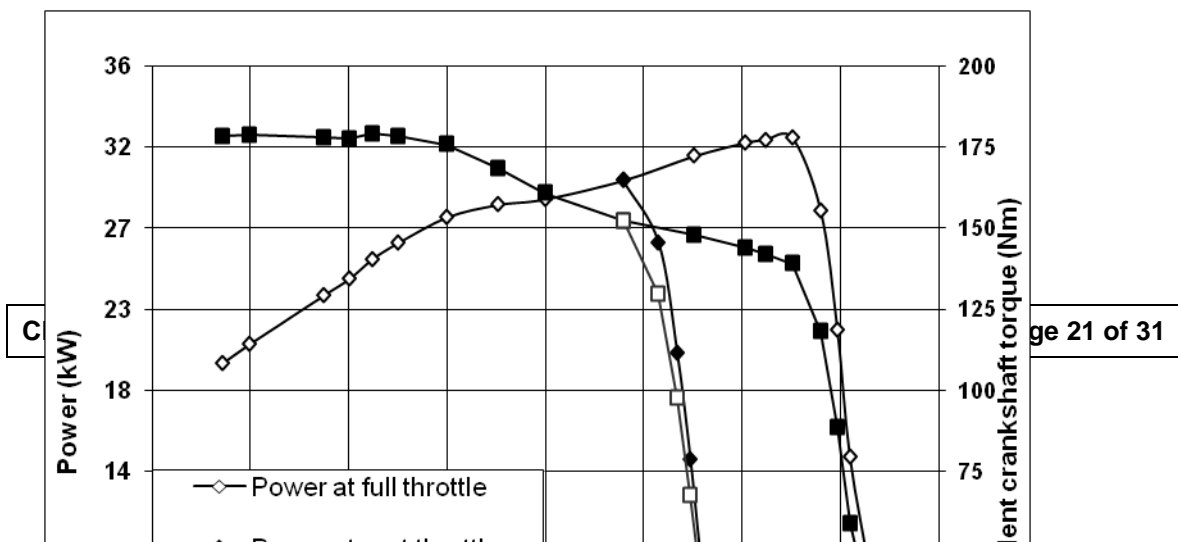
1	Power, (kW)	Speed, (rpm)		Fuel Consumption			Specific energy, (kWh/ l)
		PTO	Engine	(l/h)	(kg/h)	(kg/kWh)	
1	2	3	4	5	6	7	8
a) Maximum power – 2 hours test:							
Base model	27.7	600	2200	8.57	7.16	0.258	3.23
Variant model	32.0	640	2202	10.00	8.36	0.261	3.20
b) Power at rated engine speed (2200 rpm):							
Base model	27.7	600	2200	8.57	7.16	0.258	3.23
Variant model	32.0	640	2202	10.00	8.36	0.261	3.20
c) Power at standard power take-off speed (540 ± 10 rpm):							
Base model	26.4	540	1980	7.65	6.39	0.242	3.45
Variant model	29.7	540	1858	8.34	6.97	0.235	3.56
d) Varying loads at rated engine speed:							
i) Torque corresponding to maximum power available at rated engine speed:							
Base model	27.7	600	2200	8.57	7.16	0.258	3.23
Variant model	32.0	640	2202	10.00	8.36	0.261	3.20
ii) 85% of the torque obtained in (i) :							
Base model	24.2	617	2263	7.77	6.49	0.268	3.11
Variant model	28.0	657	2260	8.89	7.43	0.265	3.15
iii) 75% of the torque obtained in (ii):							
Base model	18.3	623	2285	6.27	5.24	0.286	2.92
Variant model	21.3	667	2294	7.17	5.99	0.281	2.97
iv) 50% of the torque obtained in (ii) :							
Base model	12.5	633	2321	4.91	4.11	0.329	2.54
Variant model	14.3	674	2319	5.49	4.59	0.321	2.60
v) 25% of the torque obtained in (ii):							
Base model	6.3	639	2343	3.69	3.08	0.489	1.71
Variant model	7.4	687	2363	4.07	3.40	0.459	1.82
vi) Unloaded:							
Base model	0.1	649	2380	2.53	2.12	21.200	0.04
Variant model	1.4	697	2398	2.99	2.50	1.786	0.47
e) Varying loads at part throttle:							
i) Torque corresponding to maximum power available at standard PTO speed (540 ± 10 rpm):							
Base model	26.4	540	1980	7.65	6.39	0.242	3.45
Variant model	29.7	540	1858	8.34	6.97	0.235	3.56

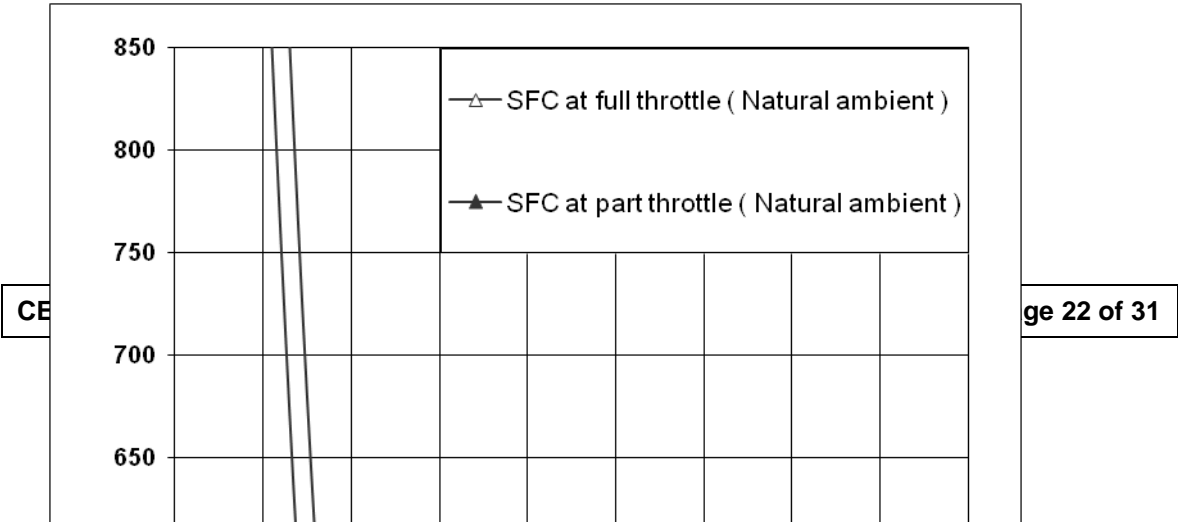
1	2	3	4	5	6	7	8
ii) 85% of the torque obtained in (i) :							
Base model	23.4	563	2065	7.11	5.94	0.254	3.29
Variant model	26.2	561	1930	7.63	6.39	0.244	3.43
iii) 75% of the torque obtained in (ii):							
Base model	17.8	571	2094	5.71	4.78	0.269	3.12
Variant model	20.1	572	1968	6.18	5.17	0.257	3.25
iv) 50% of the torque obtained in (ii) :							

T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)						
	THIS TEST REPORT IS VALID UPTO : 31/08/2023						

Base model	12.0	578	2120	4.45	3.72	0.310	2.70
Variant model	14.2	580	1995	4.82	4.03	0.284	2.95
v) 25% of the torque obtained in (ii):							
Base model	6.1	585	2145	3.24	2.71	0.444	1.88
Variant model	6.9	588	2023	3.31	2.77	0.401	2.08
vi) Unloaded:							
Base model	0.1	591	2167	2.14	1.79	17.9000	0.05
Variant model	1.2	597	2054	2.28	1.91	1.592	0.53

Sl. No.	Parameters	<u>Previous Sample</u>		<u>Present Sample</u>
		Natural ambient	High ambient	Natural ambient
i)	-No load maximum engine speed, (rpm)	: 2380	2358	2398
ii)	-Equivalent crankshaft torque at maximum power, (Nm)	: 120.1	111.3	139
iii)	-Equivalent crankshaft torque at rated power, (Nm)	: --	--	139
iv)	-Maximum equivalent crankshaft torque, (Nm)	: 166.3	154.5	179.1
v)	-Engine speed at maximum equivalent crankshaft torque, (rpm)	: 1001	1001	1348
vi)	-Back up torque, (%)	: 38.5	38.8	28.8
vii)	Smoke level, (m ⁻¹)	: 0.37	--	0.2
viii)	-Range of atmospheric conditions:			
	Temperature, (°C)	: 26 to 28	39 to 44	25 to 28
	Pressure, (kPa)	: 98.1 to 98.5	99.3 to 99.7	97.7 to 98.2
	Relative humidity, (%)	: 56 to 66	18 to 35	42 to 53
ix)	-Maximum temperatures, (°C):			
	Engine oil	: 109	113	104
	Coolant	: 90	95	88
	Fuel	: 46	63	46
	Air intake	: 26	47	30
	Exhaust gas	: 502	506	642
x)	-Pressure at maximum power:			
	Intake air, (kPa)	: 6.6 to 6.7	6.6 to 7.5	4.3
	Exhaust gas, (kPa)	: 7.6 to 8.0	4.9 to 7.6	11.9 to 12.0
xi)	-Consumptions:			
	Lub oil, (g/kWh)	: --	0.171	--
	Coolant (% of total coolant capacity)	: --	1.36	--





T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)	
	THIS TEST REPORT IS VALID UPTO : 31/08/2023	

4. OTHER APPLICABLE TEST

4.1 .1 TURNING ABILITY

Test sample	Characteristics	Minimum turning diameter,(m)		Minimum clearance diameter,(m)	
		LHS	RHS	LHS	RHS
Variant model	Brakes released	6.57	6.62	6.87	6.96
	Brake applied	5.80	5.79	6.12	6.07

T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO : 31/08/2023

4.1.2 STEERING EFFORT TEST

Characteristics	Clockwise	Anti clockwise
Steering effort, (N)	14.8	20.2

4.2 LOCATION OF CENTRE OF GRAVITY

Condition	Particulars	Coordinates
Tractor under un-ballasted condition with all the liquid reservoirs full & the operator replaced by a 75 kg mass on the seat	Height above ground, (mm)	738.4
	Distance forward from the vertical plane containing the axis of rear wheels, (mm)	788.7
	Distance from the median plane parallel to the longitudinal axis of tractor bisecting the track, (mm)	6.7 (towards RHS)

5. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

Sl. No.	Adjustments/Defects/Breakdowns and Repairs	Tractor run hours
--None--		

6. COMPARISON BETWEEN BASE MODEL AND VARIANT MODEL (Based on Table 2 & 3 of Indian Standard 12207: 2019)

Sl. No.	Clause No	Features	Observation as per base model (T-1210/1737/2019) and (T-1313/1840/2020)	Observation on variant model	Remarks
1	2	3	4	5	6
1.	i)	Clutch: Single/dual/dry/wet/ independent clutch/increase in size of clutch	Single, dry friction plate	Dual, dry friction plates with pads	Changed
2.	ii)	Air cleaner:	Dry type	Dry type	No Change
3.	iii)	Exhaust system:	Same configuration in Base & Variant models except (refer para 3.1.6)		No Change
4.	iv)	Gear Box:	Same configuration between Base and Variant model refer para. 3.1.12.2		No Change

1	2	3	4	5	6	
Reduction ratio of transmission:						
	Movement	Gear	Base model	Variant model	Variation (%)	Remark
	Forward	L1	173.56	165.31	- 4.75	Changed
		L2	117.67	112.15	- 4.69	Changed
		L3	70.53	67.28	- 4.61	Changed
		L4	49.74	47.43	- 4.64	Changed

T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO : 31/08/2023

		H1	57.06	57.12	0.12	Changed
		H2	38.70	38.73	0.08	Changed
		H3	23.15	23.12	-0.13	Changed
		H4	16.37	16.20	1.04	Changed
	Reverse	LR	130.20	122.43	-5.97	Changed
		HR	42.82	42.76	0.14	Changed
5.	v)	Range of speeds, (kmph):				
		- Forward	2.92 to 30.93	3.20 to 32.44 (Variation of 4.75 to 10.05 %)	Changed	
		- Reverse	3.89 to 11.82	4.28 to 12.42 (Variation of 5.08 to 10.03 %)	Changed	
		Additional no. of speed	None	None	No Change	
6.	vi)	Fitment/change of engine accessories:				
		- Bare Radiator Capacity, (l)	2.60	2.50	No Change	
		- Total coolant capacity, (l)	3.67	6.50	Changed	
		Air compressors	Not provided	Not provided	No change	
		Oil coolers	Not provided	Not provided	No change	
7.	vii)	Brake system:	Same configuration in Base and Variant model refer para. 3.1.17		No change	
8.	viii)	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	
9.	ix)	PTO shafts:				
		Location	Centrally located	Centrally located	No change	
		Type	Type-I, Not independent	Type-I, semi independent	Changed	
		Engine to PTO speed ratio	3.67 : 1	3.44 : 1	Changed	
10.	x)	Type of drive:				
		2WD or 4WD	2WD	2WD	No change	
11.	xi)	Hydraulic system:				
		Location & type of Hydraulic pump drive	Same configuration in Base & Variant models refer para 3.1.13		No change	

1	2	3	4	5	6	
12	xii)	Positioning of hydraulic sensing mechanism:				
		Lower link, top link, etc.	Through top link	Through top link	No change	
13	xiii)	Rear Final Reduction:	Same configuration in Base & Variant models refer para 3.1.12.5		No change	
14	xiv)	Type of fuel Injection pump:				
		Inline/Rotary/Common rail	Inline	Inline	No change	
15.	Changes related to engine parameters (as per Table-3)					

T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO : 31/08/2023

	a)	Engine operating principle (spark/ compression ignition, two/four stroke)	Compression Ignition, 4 strokes	Compression Ignition, 4 strokes	No change
	b)	Number & arrangement of cylinders	Four, vertical inline	Four, vertical inline	No change
	c)	Maximum declared PTO power, (kW)	29.0 (D)	32.2	Change
	d)	Engine displacement, (cc)	2979	2979	No change
	e)	Rated engine speed, (rpm)	2200	2200	No change
	f)	Naturally aspirated/turbo charged	Naturally aspirated	Naturally aspirated	No change
16.	Change related to ergonomics, safety comfort, statutory / regulatory requirements:				
	a)	IS: 10273	Conformed	Conforms	No change
	b)	IS: 4931	Conformed	Conforms	No change
	c)	IS: 4468	Did not conform	Does not conform	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	Did not conform	Does not conform	No change
	j)	IS:14683	Conformed	Conforms	No change
17.	Other changes:				
	i)	Decals (sticker)	Gromax, Trakstar 545	Gromax, Trakstar 550	Changed
	ii)	Type of steering system	Mechanical, Recirculating ball type	Open centre, Hydrostatic	Changed
	iii)	Make, of front tyres	Apollo	MRF	Changed
	iv)	Make, Size & ply rating of rear tyres	Apollo, 13.6 -28 & 12 PR	MRF, 14.9-28 & 12 PR	Changed
	v)	Overall length, (mm)	3500	3450	Changed
	vi)	Overall width, (mm)	1770	1830	Changed
	vii)	Overall height, (mm)	2250	2295	Changed
	viii)	Wheel base (mm)	1960	1940	
	ix)	Total mass of un- ballasted tractor, (kg)	1825	2020	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 12207:2019** for acceptance of the tractor for the purpose of subsidies/NABARD financing are summarized as under:

T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO : 31/08/2023

Sl. No.	Characteristic	Category (Evaluative / Non-Evaluative)	Requirements as per IS: 12207-2019	Values declared by the applicant/ requirement		As observed		Whether Variant model meets the requirements (Yes/No)
				<u>Base model</u>	<u>Variant Model</u>	<u>Base model</u>	<u>Variant model</u>	
1	2	3	4	5a	5b	6a	6b	7
7.1.1	PTO Performance:							
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: ±5 percent for PTO power and engine power > 26 kW. ±10 percent for PTO power and or engine ≤ 26 kW.	29.0 (D)	32.2 (D)	27.7	32.0	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	29.0 (D)	32.2 (D)	27.7	32.0	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+10 %	190 (D)	258 (D)	258	261	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	173 (D)	180 (D)	166.3	179.1	Yes
e)	Back-up torque, percent	Evaluative	12 % Minimum	12 % (R) Minimum	12 % (R) Minimum	38.5	28.8	Yes
f)	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).	3.25 per meter Maximum (R)	3.25 per meter (R)	0.37	0.32	Yes

1	2	3	4	5a	5b	6a	6b	7
7.1.2	Safety features:							
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulleys, silencer, hydraulic pipes (As per IS 12239 (Part2))	Provided		Meets the requirements		Yes
b)	Lighting arrangement	Evaluative	As per CMVR	Provided		Meets the requirements		Yes

T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO : 31/08/2023

c)	Seating requirements (Tractors having more than 1150 mm rear track width)	Non Evaluative	Should meet the requirements of IS: 12343 (As amended from time to time)	Did not conform	Does not meets the requirements	No
d)	Technical requirements for PTO shaft	Evaluative	Should meet the requirements of IS: 4931 (As amended from time to time)	Conformed	Meets the requirements	Yes
e)	Dimensions of three point linkage	Non Evaluative	Should meet the requirements of IS: 4468 (Part-I) (As amended from time to time)	Did not conform	Does not meets the requirements	No
f)	Specifications of linkage	Evaluative	Should meet the requirements of IS: 12953 (As amended from time to time)	Conformed	Meets the requirements	Yes
g)	Swinging drawbar (wherever fitted)	Evaluative	Should meet the requirement of IS: 12362 (Part 3) (As amended from time to time)	Not Provided	Not Provided	Not applicable
h)	1) Maximum travelling speed at rated engine speed in reverse gear, (kmph)	Evaluative	Should not exceed 20 kmph	Conformed	12.42 kmph (Meets the requirement)	Yes
	2) Audible warning signal on tractor	Evaluative	As soon as the travelling speed in reverse gear reaches to 20 kmph, an audible warning signal on tractor shall be activated. The safety aspects about the operation of shuttle technology shall be brought in operation and manufacturer/dealer shall ensure the training on this aspect to operator before the delivery of tractor.	Not applicable	Not applicable	Not applicable

1	2	3	4	5a	5b	6a	6b	7
7.1.3	Labelling of tractors (Provision of labelling plate):							
	1) Make	Evaluative	Should conform to the requirements of CMVR along with maximum PTO Power in kW and year of manufacture in numerical form.	Gromax Agri Equipment Limited		Yes		
	2) Model	Evaluative		Trakstar 550		Yes		
	3) Month & Year of manufacture	Evaluative		12 / 19		Yes		
	4) Engine number	Evaluative		NHA6RAE0030		Yes		

T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO : 31/08/2023

	5)	Chassis number	Evaluative	MM YY	M9KATAEDBKVJ01425	Yes
	6)	Declaration of PTO power, (kW)	Evaluative	Digit 01 – 12 in box No.1 for MM will represent the months and next two digits in box No.2 for YY will represent the year of manufacturing.	32.2	Yes
7.1.4	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
7.1.5	Fitment of roll Over protective structures (ROPS): for tractor having more than 1150 mm rear track width	Evaluative	ROPS should meet the requirement of IS 11821 or OECD code or equivalent International standard	ROPS not fitted		Not applicable
7.1.6	Standard Accessories	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with the tractor.	Provided		Yes
7.1.7	Accessories (optional)	Non Evaluative	Ballast weights, if fitted, should meet the requirement of CMVR	Provided		Yes

7.2	CATEGORY OF BREAKDOWNS / DEFECTS (as per clause 5.0 of IS:12207-2019) :				
Sl. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	As observed	Whether meets the Requirements (Yes/No.)
1.	Critical breakdown	Evaluative	No critical breakdown	None	Yes
2.	Major breakdowns	Evaluative	Not more than two major breakdowns and neither of them of repetitive nature	None	Yes
3.	Minor breakdowns	Evaluative	Not more than five and frequency of each should not be more than two.	None	Yes
4.	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed five, that is, (2 major + 3 minor) or (1 major + 4 minor) or 5 minor breakdowns.	None	Yes

7.3 Salient Observations:

7.3.1 Laboratory tests:

7.3.1.1 PTO performance test:

- i) The maximum PTO power was recorded as **32.0 kW** against the declaration of **32.2 kW**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
- ii) The specific fuel consumption corresponding to maximum power was recorded

T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO : 31/08/2023

as **261 g/kWh** against the declaration of **258 g/kWh**, which is within the tolerance limit of IS: 12207-2019.

- iii) The maximum equivalent crankshaft torque was recorded as **179.1 N-m** against the declaration of **180 N-m**, which is within the permissible limit as specified in IS: 12207-2019.
- iv) The backup torque is **28.8 %** and meets the evaluative requirement of IS: 12207-2019.

7.3.1.2 Operator's seat:

Longitudinal adjustment of operator seat forward and reverse from mid position. Does not meet the requirement of IS: 12343-1998 (Re-affirmed in 2014). This is recommended to look into for necessary corrective action.

7.3.1.3 Three point linkage:

Lateral distance from lower hitch point to centre line of tractor (lower link in horizontal position) does not meet the requirement of IS: 4468 (part-1):1997 (Reaffirmed in Oct., 2017). This may be looked into for necessary corrective action.

7.4 Maintenance / Service Problems:

No noticeable maintenance or service problem was observed during the test.

7.5 Recommendation with regard to safety on tractor:

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

- i) Vertical retainers on both side of clutch pedal should be provided.
- ii) There should be provision for safety against the accidental start.
- iii) The fuel shut-off knob should remain in stop position.
- iv) PTO shaft master shield should be provided.
- v) Working clearance between draft control lever and RHS fender is less than the minimum requirement.
- vi) Vertical distance from seat index point to the centre of clutch pedal is less than the minimum requirement.
- vii) Vertical distance from seat index point to the centre of brake pedal is less than the minimum requirement.
- viii) Longitudinal distance from seat index point to the centre differential lock pedal is less than the minimum requirement.
- ix) Longitudinal distance from seat index point to the centre of steering control wheel is less than the minimum requirement.

7.6 Adequacy of Literature supplied with machine:

7.6.1 The following literature has been supplied with the tractor

- i) Operator manual of Trakstar 531, Trakstar 536, Trakstar 540, Trakstar 545 & Trakstar 550 tractor models.
- ii) Parts catalogue of Trakstar of Trakstar 531, Trakstar 536, Trakstar 540, Trakstar 545 & Trakstar 550 tractor models.
- iii) Service Manual of of Trakstar 531, Trakstar 536, Trakstar 540, Trakstar 545 & Trakstar 550 tractor models.

7.6.2 The supplied literature was found adequate; except the following

- i) Oil grade recommended in operator's manual for steering system; transmission and hydraulic system do not match with specifications submitted by applicant. This should be looked into. The oil change period for the steering system is not mentioned in the operator's manual.
- ii) Service schedule for engine oil, steering system, transmission and hydraulic system given in operator's manual does not match with specifications submitted by applicant. This calls for necessary corrective action.
- iii) The oil change period for the transmission system in base model is mentioned as 1000 operation hours while the same is mentioned as 1300 operation hours for variant model keeping the same grade of transmission oil in base and variant model. This should be looked into for corrective action.


T- 1463/1990/2020	GROMAX , TRAKSTAR 550 TRACTOR – Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO : 31/08/2023

7.6.3 The literature should be bought out in national as well as other regional languages of India for guidance of users.

8. 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 (June, 2020 to July, 2020)	Yes	--None--

TESTING AUTHORITY:



**NITESH KUMAR VERMA
AGRICULTURAL ENGINEER**



**C.V. CHIMOTE
TEST ENGINEER**



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

The report compiled by: **Shri Pratyush Satya**, Senior Technical Assistant

9. APPLICANTS COMMENTS

Para No.	Our reference	Applicant's comments
9.1	7.3.1.2,7.3.1.3, 7.5,7.6.2 & 7.6.3	Observation will be studied and necessary action will be incorporated.

ANNEXURE- I

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS	HOURS
1.	Nominal speed test	0.75
2.	PTO performance test	6.67
3.	Turning Ability and steering effort	0.35
4.	Location of centre of gravity	0.10
B.	Miscellaneous test and other run hours, including idle run transportation, trial and preparation for test.	0.45
Total		8.32