

(यह परीक्षण रिपोर्ट 31/08/2023 तक वैध है। / THIS TEST REPORT IS VALID UP TO : 31/08/2023)



**GROMAX, TRAKSTAR 531 TRACTOR**



सत्यमेव जयते

भारत सरकार

कृषि एवं किसान कल्याण मंत्रालय  
कृषि, सहकारिता एवं किसान कल्याण विभाग  
मशीनीकरण एवं प्रौद्योगिकी प्रभाग

GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS WELFARE

(Department of Agriculture, Cooperation & Farmers Welfare, Mechanization & Technology Division)

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)

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**GROMAX, TRAKSTAR 531 TRACTOR – Commercial (Initial)****(THIS TEST REPORT IS VALID UPTO 31/08/2023)**

The "GROMAX, TRAKSTAR 531" tractor was submitted for "Initial Commercial Test" at this Institute. Subsequently, the Institute had received an application from the applicant i.e. M/s. Gromax Agri Equipment Limited, vide letter no. nil dated 21.11.2019 for incorporating the following modification on the said tractor model on establishment of the fourth revision of IS: 12207-2019 form 25<sup>th</sup> July, 2019 and requested to evaluate the performance results of the said tractor as per IS: 12207-2019.

S.No.	Parameters /fitments	Re-declared /modified specification
1.	Fitment of front towing hook	Fitted
2.	Modification in Labelling plate	Punching will be done on labelling plate as per IS:12207-2019

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

Test requested by (applicant) : The manufacturer  
Selected for test by : Applicant  
Place of running-in : At manufacturer's works

Duration of said running-in (h):  
- Engine : 15  
- Transmission : 30  
Method of Selection : The tractor was submitted directly by the  
applicant for test. Hence, method of  
selection is not known.

## 1. SPECIFICATIONS

**1.1 Tractor:**  
 Make : Gromax  
 Model : Trakstar 531  
 Brand name : Trakstar  
 Type : Four wheeled, Rear wheel drive, Unit  
 construction, General purpose,  
 Agricultural tractor.  
 Month & Year of manufacture : 05 & 17  
 Chassis number : M9KATAAAHV00005  
 Country of Origin : India

**1.2 Engine:**  
 Make : Mahindra & Mahindra  
 Model : GTS2231NA3A  
 Type : Four stroke, naturally aspirated, liquid  
 cooled, direct injection, diesel engine  
 Serial number : NHM6RBE0008

**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





1	2	3
3.	<p>During the field test with rotavator (Farmking make, 30 blades), the overloading (dropping of engine speed) was observed &amp; engine speed dropped from 2420 rpm to 1400 rpm.</p> <p>Upon the request of applicant, the rotavator (Farmking make, 30 blades) was replaced with rotavator (Tafe make, 30 blades). Again the overloading (dropping of engine speed) was observed &amp; engine speed dropped from 2417 rpm to 900 rpm. The problem of engine stalling was not rectified.</p> <p>Subsequent to this, the firm has again requested for replacement of rotavator (Farmking make, 30 blades) existing gear pair (17/18 teeth) with new gear pair of (16/19 teeth). The gear pair of rotavator was replaced with new gear pair (16/19 teeth). Again the overloading (dropping of engine speed) was observed &amp; engine speed dropped from 2450 rpm to 1400 rpm. The problem of engine stalling was not rectified.</p> <p>Upon this the applicant vide letter dated 18.05.2020 has requested to complete the field test with rotavator with 24 Nos. of blades in place of 30 Nos. blades. Accordingly, the field test with rotavator (Trakmate make, 24 blades) was conducted &amp; test results have been reported in Chapter-13 of this report.</p>	82.65

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

17.1 On the basis of test conducted the performance results have been summarized as evaluative (mandatory) / Non-evaluation (Non-mandatory) parameter 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:

Sl. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	Values declared by the applicant (D)/ Requirement (R)	As observed	Whether meets the requirements (Yes/No)
1	2	3	4	5	6	7
<b>17.1.1 PTO Performance :</b>						
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: $\pm 5\%$ for PTO power and or Engine power $>26$ kW. $\pm 10\%$ for PTO power and or engine $\leq 26$ kW	20.5 (D)	19.6	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	20.5 (D)	19.6	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% maximum	258 (D)	253	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	$\pm 8\%$	115.5 (D)	112.9	Yes
e)	Back-up torque, percent	Evaluative	12 percent, min.	12 (R) percent, min.	32.5	Yes





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1	2	3	4	5	6	7	
f)	Maximum operating temperature, (°C)		Evaluative	The declared value should not exceed the max. value specified by the oil company and the observed value under high ambient condition should not exceed the declaration.	130 (D)	117	Yes
	1)	Engine oil					
	2)	Coolant	Evaluative	The declared value should not exceed the boiling temperature of coolant under the pressurized or otherwise and the observed value under high ambient condition should not exceed the declaration.	119 (D)	94	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.57 (R)	0.77	Yes	
h)	Smoke level, m <sup>-1</sup>	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hatridge value.	3.25 per meter (R)	0.28	Yes	
<b>17.1.2 Drawbar performance :</b>							
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip or 7 percent track slip, (kN)	Non Evaluative	Minimum 70% of static mass with ballast	14.1 (D)	18.18	Yes	
				15.14 (R) Minimum			
b)	Max. drawbar pull without ballast or with standard ballast corresponding to 15 percent wheel slip or 7 percent track slip, (kN)	Evaluative	Minimum 70% of static mass of tractor without ballast or with standard ballast, as the case may be	11.5 (D)	13.95	Yes	
				12.36 (R) Minimum			
c)	Maximum drawbar power without ballast, or with standard ballast as in case may be ,kW	Evaluative	Minimum 80 % of PTO power as referred in Si No. i) a) of PTO performance in case of tractors having total static mass > 1500 kg Minimum 75 % of PTO power as referred in Si No. i) a) of PTO performance in case of light weight tractors having 1500 kg total static mass of tractor Minimum 75 % of the engine power as referred in Si No. i) a) of engine performance in case of tractors which do not have a PTO shaft.	16.4 (D)	17.7	Yes	
				15.7 (R) Minimum			
d)	Maximum transmission oil temperature, (°C)	Evaluative	To be declared by the manufacturer.	110 (D)	75	Yes	





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1	2	3	4	5	6	7
<b>17.1.3</b>	<b>Power lift and hydraulic pump performance :</b>					
<b>a)</b>	<b>Maximum lifting capacity throughout the range of lift, (kN):</b>					
	1) At hitch points	Evaluative	Tolerance of $\pm 10\%$	14.0 (D)	13.0	Yes
	2) With the standard frame	Evaluative	The lift capacity should at least be 24 kg/PTO kW, and it should be 21.5 kg/engine kW where the tractor is not provided with a PTO shaft	4.9 (D) 4.61 (R) (Minimum)	9.18	Yes
<b>b)</b>	Maximum drop in the height of the point of application of the force after each 5 minutes interval for a total duration of 30 Minutes, (mm)	Non Evaluative	The observed value should not exceed 50 mm	50 (D) 50 (R) Maximum	08	Yes
<b>17.1.4</b>	<b>Brake performance at 25 kmph:</b>					
<b>a)</b>	<b>Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with road ballast, (m):</b>					
	1) Cold brake	Evaluative	10 m	10 (R)	7.38	Yes
	2) Hot brake	Evaluative	10 m	10 (R)	7.40	Yes
<b>b)</b>	Maximum force exerted on the brake pedal to achieve a deceleration of $2.5 \text{ m/s}^2$ (N)	Evaluative	600 N	600 (R) Maximum	217 to 224	Yes
<b>c)</b>	Whether parking brake is effective at a force of 600 N at foot pedal (s) or 400 N at hand lever, N	Evaluative	Yes / No	Yes	Yes	Yes
<b>17.1.5</b>	<b>Noise measurement :</b>					
<b>a)</b>	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	88 dB (A) for >1.5 tonne GVW and 85 db (A) for <1.5 tonne GVW (as per CMVR)	81		Yes
<b>b)</b>	Maximum noise at operator's ear level dB(A)	Evaluative	96 (as per CMVR)	92		Yes
<b>17.1.6</b>	<b>Amplitude of mechanical vibrations at:</b>					
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R)	74	Yes
	2) Right foot rest			100 (R)	58	Yes
	3) Seat (with driver seated)			100 (R)	92	Yes
	4) Steering wheel			100 (R)	53	Yes
<b>17.1.7</b>	<b>Air cleaner oil pull over test :</b>					
	Maximum air cleaner pull over, (%)	Evaluative	0.25% (Max)	0.00 to 0.11 %		Yes
<b>17.1.8</b>	<b>Haulage requirements :</b>					
<b>a)</b>	<b>Gross mass of the trailers, (tonne):</b>					
	1) Two wheel	Non Evaluative	As specified by the manufacturer	5.0 (D)	5.0	Yes
	2) Four wheel			5.0 (D)	5.0	Yes





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1	2	3	4	5	6	7
b)	<b>Distance travelled / litre of fuel consumption, (km/l):</b>					
	1) Two wheel	Non	As specified by the manufacturer	6 to 7 (D)	6.08 to 6.22	Yes
	2) Four wheel	Evaluative		6 to 7 (D)	6.89 to 6.81	
c)	<b>Fuel consumption (ml/km/tonne):</b>					
	1) Two wheel	Non	As specified by the manufacturer	35 to 45 (D)	32.16 to 32.88	No
	2) Four wheel	Evaluative		35 to 45 (D)	29.01 to 29.35	
17.1.9	<b>Wetland cultivation (Puddling Operation):</b>					
	Sealing for the following assemblies	Evaluative	The identified assemblies should essentially meet the requirement of IS: 11082. No water ingress in the identified assembly given in column-2.	The manufacturer has recommended that the tractor is suitable for wetland cultivation (puddling operation).	No ingress of water and/or mud was observed	Yes
	1) Clutch assembly	-do-				
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
	4) Engine oil	-do-				
	5) Transmission oil	-do-				
17.1.10	<b>Safety features :</b>					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulleys, silencer, hydraulic pipes (As per IS: 12239 (Part-2))	Meets the requirements		Yes
b)	Lighting arrangement	Evaluative	As per CMVR	Meets the requirements		Yes
c)	Seating requirements (Tractors having more than 1150 mm rear track width)	Non Evaluative	Should meet the requirements of IS: 12343 (As amended from time to time)	Does not meet the requirement		No
d)	Technical requirements for PTO shaft	Evaluative	Should meet the requirements of IS: 4931 (As amended from time to time)	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)	Meets the requirements		Yes
f)	Specifications of linkage drawbar	Evaluative	Should meet the requirements of IS 12953 (As amended from time to time)	Meets the requirements		Yes
g)	Swinging drawbar (wherever fitted)	Evaluative	Should meet the requirements of IS 12362 (Part 3) (As amended from time to time)	Not provided		Not applicable
h)	1) Maximum traveling speed at rated engine speed in reverse gear, kmph	Evaluative	Should not exceed 20.00 kmph	11.44 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 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





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1	2	3	4	5	6	7	
17.1.11	<b>Labelling of tractors (Provision of labelling plate):</b>						
	1)	Make	Evaluative	Should conform to the requirements of CMVR along with maximum PTO power in kW and year of manufacture in numerical form MM YY  Digit 01-12 in box No.1 for MM will represent the months & next two digits in box No.2 for YY will represent the year of manufacturing.	Gromax	Yes	
	2)	Model	Evaluative		Trakstar 531	Yes	
	3)	Month & Year of manufacture	Evaluative		05 & 17	Yes	
	4)	Engine number	Evaluative		NHM6RBE0008	Yes	
	5)	Chassis number	Evaluative		M9KATAAAAHVB00005	Yes	
	6)	Declaration of PTO power, kW	Evaluative		20.5	Yes	
	7)	Specific Fuel Consumption g/kWh	Evaluative		MM	258	Yes
YY							
17.1.12	<b>Discard limit for:</b>						
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by Manufacturer	89.25	88.90 to 88.93	Yes	
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.20	0.097 to 0.104	Yes	
(c)	Piston diameter at skirt, mm	Non Evaluative		88.15	88.820 to 88.824	Yes	
(d)	<b>Ring end gap (mm):</b>						
	-	Top comp. ring.	Evaluative	-do-	2.5	0.35 to 0.40	Yes
	-	2 <sup>nd</sup> comp. ring.		-do-	2.5	0.45 to 0.50	Yes
	-	Oil ring.		-do-	2.0	0.35 to 0.40	Yes
(e)	<b>Ring groove clearance (mm):</b>						
	-	Top comp. ring.	Evaluative	-do-	0.40	Tapered ring	-
	-	2 <sup>nd</sup> comp. ring.	-do-	-do-	0.40	0.064 to 0.066	Yes
	-	Oil ring.	-do-	-do-	0.20	0.046 to 0.048	Yes
(f)	<b>Clearance of main end bearings, (mm):</b>						
	-	Diametrical	Evaluative	-do-	0.25	0.07 to 0.11	Yes
	-	Crank shaft end float	Evaluative	-do-	0.60	0.09	Yes
(g)	<b>Clearance of big end bearings, (mm):</b>						
	-	Diametrical	Evaluative	-do-	0.25	0.05 to 0.09	Yes
	-	Axial	Evaluative	-do-	0.75	0.20 to 0.25	Yes
(h)	Clearance between king pin and bush,(mm)	Non Evaluative	-do-	0.50	0.16 to 0.20	Yes	
(i)	Clearance between center pin and bush,(mm)	Non Evaluative	-do-	0.60	0.14 to 0.18	Yes	



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1	2	3	4	5	6	7
<b>17.1.13 Literature (Submission to test agency):</b>						
(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
17.1.14	Fitment of Roll Over Protective Structure (ROPS): for tractors having more than 1150 mm rear track width	Evaluative	ROPS should meet the requirement of IS:11821 or OECD code or equivalent International Standard	Provided	Not fitted	Not applicable
17.1.15	Standard accessories	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with tractor	Provided	Provided	Yes
17.1.16	Accessories (Optional)	Non Evaluative	Ballast weights if fitted should meet the requirement of CMVR.	Provided	Provided	Yes
<b>17.2 CATEGORY OF BREAKDOWNS / DEFECTS (As per Clause 5.0 of IS:12207-2019):</b>						
S. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	As observed	Whether meets the Requirements (Yes/No.)	
1.	Critical	Evaluative	No critical breakdown	None	Yes	
2.	Major	Evaluative	Not more than two major breakdowns and neither of them of repetitive nature	01(Mj-20)	Yes	
3.	Minor	Evaluative	Not more than five and frequency of each should not be more than two.	None	Yes	
4.	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed five, that is, (2 major + 3 minor) or (1 major + 4 minor) or 5 minor breakdowns.	01(Mj-20)	Yes	





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- 17.4 **Salient Observations:**
- 17.4.1 **Laboratory tests:**
- 17.4.1.1 **PTO Performance:**
- i) The maximum PTO power was observed as **19.6 kW** against the declaration of **20.5 kW**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
  - ii) The drop in maximum PTO power of **5.6 %** was observed during natural to high ambient conditions. This should be looked into for necessary corrective action.
  - iii) The specific fuel consumption corresponding to maximum power was recorded as **253 g/kWh** against the declaration of **258 g/kWh**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
  - iv) The backup torque is **32.5 %**, which meets the evaluative requirement of IS: 12207-2019.
- 17.4.1.2 **Mechanical Vibration:**  
The amplitude of mechanical vibration on various assemblies marked as (\*) in Chapter-9 of this test report is on higher side. This calls for dampening down of vibrations to improve the operational comfort and service life of components.
- 17.4.1.3 **Three point linkage:**  
Some of the parameters conform to Cat. I and some of them conform to Cat. II. Keeping in view the spirit of standardization, necessary improvement may be incorporated.
- 17.4.1.4 **Operator's Seat:**  
The width of seat and longitudinal distance from seat index point to centre of steering control wheel does not meet the requirement of IS: 12343-1998. This should be looked into for necessary corrective action.
- 17.4.1.5 **Operator's work place:**  
Operator's work place meets the requirements of IS: 12239 (Part-I) 1996 (Reaffirmed Oct., 2017), **except the following:**
- i) Provision of spark arresting device in the exhaust system.
  - ii) Provision of vertical retainers at both sides of clutch and brake pedal.
  - iii) Provision of hand holds for easy mounting & dismounting of the operator's.
  - iv) Width of foot steps
- 17.4.1.6 **Constructional requirement with regard to safety:**  
Meets the requirements of IS: 12239 (Part-II)-1996 (Re-affirmed in October, 2017), except the following:
- i) PTO master shield has not been provided.
  - ii) Minimum Cautionary notice as per clause 11.2 of above referred standard has not been provided.
  - iii) Working clearance in between position control and draft control lever is less than the requirement.
- 17.4.1.7 **Location of operator's controls with regard to safety:**  
Location of operator's controls with regard to safety meets the requirements of IS: 8133-1983(Reaffirmed 2014), **except the following:**
- i) Fuel shut-off knob does not remain in stop position.
  - ii) Safety against accidentally start of engine has not been provided.
  - iii) Provision of differential lock in the tractor.





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17.4.1.8 The manufacturer has been specified the make of hydraulic & transmission housing as Gromax Agri. Equipment Ltd. while on physical inspection it was observed Mahindra & Mahindra has been embossed on hydraulic & transmission housing. This should be looked into for necessary corrective action.

17.4.1.9 **Haulage Test:**

i) The specific fuel consumption in two wheels and four wheels trailer was recorded as 32.16 to 32.88 & 29.01 to 29.35 ml/km/ton respectively against the declaration of 35 to 45 ml/km/ton, which does not meet the requirement of IS: 12207-2019 with regard to tolerance. This should be looked into for necessary corrective action.

17.4.2 **Field performance test:**

i) During the field test with disc plough, the draft control lever of hydraulic system was found not working & hydraulic linkage got stucked during raising & lowering of the implement that too only after one hour of working in the field. During the inspection, the control valve assembly with ram cylinder (Part No.007203023C91) was found faulty. Hence, control valve assembly with ram cylinder (Part No.007203023C91) was replaced with new one. This breakdown has been categorized as major breakdown (Mj-20) as per IS: 12207-2019.  
The control valve assembly with ram cylinder (Part No.007203023C91) consists of the following parts.

S. No.	Name of Parts	Parts Number	Quantity
1.	Valve control Assembly(inbuilt with ram cylinder)	007203023C91	01
	Sub Part :		
	(i) Cylinder lift hydraulic	005554399R1	01
	(ii) Piston	73181110 (HSN code)	01
	(iii) Link Roller	00050818D01	01
	(iv) Bolt	000179890	01
	(v) Bolt	000179891	01
	(vi) Washer Spring lock	001082014R2	01
	(vii) Plug BSP Tapping Auxiliary	005558124R1	01
	(viii) Washer sealing	0007043377R1	01
	(ix) Bolt needle valve cover	000751580R3	01
(x) Washer	003045118R1	01	

17.4.2.1 Again during the field test with disc plough, the draft control lever of hydraulic system was found not working & hydraulic linkage got stucked during raising & lowering of the implement that too only after 2.1 hour of working in the field.

- Distributor control valve linkage was checked & found correct.
- Sector of position & draft control lever was removed to check the setting & found correct.
- Transmission oil (common with hydraulic system oil) was checked & refilled. Fresh 10 litres of transmission oil was filled to maintain the level of transmission oil.

Upon this, the hydraulic system was checked and found working satisfactorily.

The above breakdowns occurred only after one hour of working in the field and have been considered as premature and this indicates that, the components used are of very poor quality. It is therefore recommended that, the quality of components should be improved and stringent quality control measures should be introduced at production level.





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**17.4.2.2** During the field test with rotavator (Farmking make, 30 blades), the overloading (dropping of engine speed) was observed & engine speed dropped from 2420 rpm to 1400 rpm. Upon the request of applicant, the rotavator (Farmking make, 30 blades) was replaced with rotavator (Tafe make, 30 blades). Again the overloading (dropping of engine speed) was observed & engine speed dropped from 2417 rpm to 900 rpm. The problem of engine stalling was not rectified. Subsequent to this, the firm has again requested for replacement of rotavator (Farmking make, 30 blades) existing gear pair (17/18 teeth) with new gear pair of (16/19 teeth). The gear pair of rotavator was replaced with new gear pair (16/19 teeth). Again the overloading (dropping of engine speed) was observed & engine speed dropped from 2450 rpm to 1400 rpm. The problem of engine stalling was not rectified. Upon this the applicant vide letter dated 18.05.2020 has requested to complete the field test with rotavator with 24 Nos. of blades in place of 30 Nos. blades. Accordingly, the field test with rotavator (Trakmate make, 24 blades) was conducted & test results have been reported in chapter-13 of this report. To evaluate the field performance of the tractor with rotavator that too only for 10 hours operation considerable time period of 9 months had lost due to incorrect recommendation of matching implement by the applicant. Keeping in view the basic function of the tractor that is to perform different field operations smoothly and the matching implement play a very imperative role in such operations. The overall performance of the tractor directly depends on the matching implements. It is therefore recommended that, before recommendation of matching implement for the tractor an exhaustive internal testing should be conducted at R&D level of the manufacturer so that farmers/user's may not face any complexity in operations of the tractor.

**17.4.2.3 Wet land cultivation (Puddling operation):**  
No ingress of water and or mud in various assemblies/components was noticed during wetland cultivation of tractor. Hence, it meets the requirements of IS: 11082-1984 (Technical Requirements of Agricultural Tractors for Wetland Operation). The tractor is found suitable for wetland operation (Puddling).

**17.4.3 Maintenance / Service Problems:**  
No noticeable maintenance or service problem was observed during the test.

- 17.5 Recommendation with regard to safety on tractor:**  
The following requirements, inter-alia, may be considered for incorporation on the tractor:
- i) Provision for spark arresting device in exhaust system.
  - ii) Width of foot step should be provided as per the requirement of relevant Indian Standard.
  - iii) Longitudinal distance from seat index point to centre of steering control wheel should be provided as per the requirement of relevant Indian Standard.
  - iv) Hand holds for easy mounting and dismounting of operator.
  - v) Vertical retainness at both sides of pedals should be provided as per relevant standard.
  - vi) Fuel shut-off knob should remain in "STOP" position
  - vi) The working clearance between draft control lever and position control lever should be as per the minimum requirements of relevant Indian Standard for easy operating the lever.
  - vii) PTO shaft master shield should be provided to avoid the accident.
  - viii) Safety starting switch should be provided as per the requirement of IS: 8133-1983 (Reaffirmed 2014) to avoid accidental starting of engine.
  - ix) Symbols of starting switch & engine revolution gauge in colour coding may be provided





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- x) Lubricating oil frequency chart should be provided on the tractor  
xi) Provision of differential lock in the tractor.

**17.6 Adequacy of Literature supplied with machine:**

17.6.1 The following literature was supplied with the tractor for reference during the test:

- i) Tractor Operator's Manual of Trakstar 531 tractor.  
ii) Parts Catalogue of Trakstar 531 tractor.  
iii) Service Manual of Trakstar 531 tractor.

17.6.2 The printed literature supplied with the test sample is in English. However, these literatures should be brought out in other vernacular languages of India for guidance of users.

**18. 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	19 Months (January, 2019 to August, 2020)	No	Delay 8.8~09 months due to occurrence of breakdown in hydraulic system of the test sample during field test & non supply of suitable implement by the manufacturer.

**TESTING AUTHORITY:**SHWETABH SINGH  
AGRICULTURAL ENGINEERC. V. CHIMOTE  
TEST ENGINEER  
J.J.R. NARWARE  
DIRECTOR

The report compiled by: Shri Vithato Keyho, Senior Technical Assistant.

**19. APPLICANT'S COMMENTS**

Para No.	Our Reference	Applicant's comments
19.1	17.4.1.2, 17.4.1.3, 17.4.1.4, 17.4.1.5, 17.4.1.6, 17.4.1.7, 17.4.1.8 & 17.4.1.9	Observation will be studied and necessary action will be incorporated.
19.2	17.4.2.1 & 17.4.2.2	
19.3	17.5	
19.4	17.6.2	

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### ANNEXURE- I

#### BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST

S.No	Parameters	Disc Plough	Rotavator initially used for field test	Rotavator used during repeat test	Puddler
1.	Make	Sonalika	Farm king	Trakmate	Not available
2.	Type	Mounted	Mounted	Mounted	Mounted
3.	No. of Disc/blades	Two	30	24	12 6 in each gang
4.	Type of Disc/blades	Plan concave	L-shape	L-shape	Notched concave
5.	Size of bottoms/blades, (mm)	605	270 x 70 x 7	245 x 76 x 6	450
6.	Spacing of bottoms/flanges, (mm)	555	260	230	170
7.	Lower hitch point span, (mm)	760	860	770	800
8.	Mast height, (mm)	600	635	550	500
9.	<b>Overall dimensions, (mm):</b>				
	- Length	1940	1130	750	900
	- Width	1090	1500	1390	2440
	- Height	1220	1125	1040	1050
10.	Gross mass, (kg)	270	410	360	240

### ANNEXURE – II

#### BRIEF SPECIFICATION OF CAGE WHEEL

S. No.	Parameters	Specifications
1.	Type	Half cage wheel
2.	Dia, (mm)	1060
3.	Width, (mm)	310
4.	No. and types of lugs	12, Straight lugs made of M.S. angle section welded to angle iron frame
5.	Size of angle section, (mm)	50 x 50 x 5
6.	Length of lugs, (mm)	310
7.	Spacing of lugs, (mm)	200
8.	Weight of each cage wheels (kg)	45



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ANNEXURE-III

**TRACTOR RUN HOURS DURING TEST**

		HOURS
<b>A.</b>	<b>LABORATORY AND TRACK TESTS:</b>	
1.	Running-in	--
2.	PTO performance test	10.9
3.	Power lift and hydraulic pump performance test	1.0
4.	Drawbar performance test	15.2
5.	Turning ability	0.2
6.	Location of centre of gravity	0.2
7.	Brake test	2.3
8.	Air cleaner oil pull over test	3.2
9.	Noise measurement	1.0
10.	Mechanical vibration test	0.9
11.	Nominal speed test	1.5
<b>B.</b>	<b>FIELD TEST:</b>	
1.	Disc ploughing	10.6
2.	Rotavation	10.9
3.	Puddling (including water proof test)	15.0
<b>C.</b>	<b>Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test.</b>	23.3
	<b>TOTAL:</b>	<b>96.2</b>