

व्यावसायिक परीक्षण रिपोर्ट

COMMERCIAL TEST REPORT (Initial)

(Converted from Confidential to Commercial)

संख्या / No. : T-1000/1524/2016

माह / Month : January, 2016

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**TITAGARH, TITAGARH NGT 50 DI TRACTOR**



सत्यमेव जयते

भारत सरकार

कृषि एवं किसान कल्याण मंत्रालय

(कृषि, सहकारिता एवं किसान कल्याण विभाग)

GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS WELFARE

(DEPARTMENT OF AGRICULTURE, CO-OPERATION AND FARMERS WELFARE)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५

**CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE**

(An ISO : 9001 - 2008 Certified Institute)

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TITAGARH, TITAGARH NGT 50 DI TRACTOR – Commercial

**Manufacturer** : Titagarh Agrico Pvt. Ltd.  
**Factory address**:- Mal godown Road, Bharatpur, Rajasthan - 321001  
**Corporate office**:- Plot No.50, Type A, Harton Complex, Electronic City, Sector - 18, Gurgaon, Haryana - 122015

**Test requested by (applicant)** : Titagarh Agrico Pvt. Ltd.  
**Factory address**:- Mal godown Road, Bharatpur, Rajasthan - 321001  
**Corporate office**:- Plot No.50, Type A, Harton Complex, Electronic City, Sector - 18, Gurgaon, Haryana - 122015

**Place of running-in** : At Applicant's works

**Duration of said running-in, (h):**

- Engine : 24 hrs
- Transmission : 24 hrs

**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 : TITAGARH
  - Model : TITAGARH NGT 50 DI
  - Variants, if any: None
  - Type : 4 Wheeled, Rear two wheel driven, General purpose, Agricultural tractor
  - Year of manufacture : 2014
  - Chassis number : TNKC54000025
  - Country of origin : India
- 1.2 Engine:**
- Make : Kirloskar oil engines Ltd.
  - Model : 3 R 1040
  - Type : 4 Stroke, 3 Cylinder, Inline, Direct Injection, Water Cooled, Diesel Engine
  - Serial number : 3H.2123/1400309
- 1.2.1 Engine speed (Manufacturer's recommended production setting), (rpm):**
- Maximum speed at no load : 2300 to 2400
  - Low idle speed : 650 to 750
  - Speed at maximum torque : 1200 to 1400
- Rated speed, (rpm):**
- For PTO use : 2200
  - For drawbar use : 2200



Commercial



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

16.1 Evaluative (mandatory) / Non-evaluation (Non-mandatory) parameter applicable for qualifying Minimum Performance criteria as per Clause-4 (Table-1) of IS: 12207-2014 for acceptance of the tractor for the purpose of subsidies/NABARD financing are summarized as under:

S. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	Values declared by the applicant (D)/ Requirement (R)	As observed	Whether meets the requirements (Yes/No.)
1	2	3	4	5	6	7
<b>16.1.1 PTO Performance :</b>						
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: -5 / +10% for PTO power >26 kW. -7.5/+10% for PTO power ≤ 26 kW or -5 / +10% for Engine power >26 kW. -7.5/+10% for Engine power ≤ 26 kW	33.50 (D)	32.2	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	33.50 (D)	32.2	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	268 (D)	251	No
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	167.19 (D)	167.58	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	17 (D)	19.91	Yes
f)	Maximum operating temperature, (°C)					
	1) Engine oil	Non Evaluative	The declared value should not exceed the max. value specified by the oil company and the observed value under high ambient condition should not exceed the declaration.	125 (D)	123	Yes
	2) Coolant (water)	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.	110 (D)	99	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.51 (R)	0.45	Yes
h)	Smoke level	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	3.25 per meter (R)	0.22 per meter	Yes

the discard 60 mm.

d limit, (mm)

roove depth

the discard 9 mm

the discard 9 mm

f	Tractor run hours
wn	



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1	2	3	4	5	6	7	
<b>16.1.2 Drawbar performance :</b>							
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	20.50 (D)	23.40	Yes	
				18.23(R)			
b)	Max. drawbar pull with Std. Ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	16.00 (D)	17.08	Yes	
				12.77 (R)			
c)	Maximum drawbar power without ballast, (kW).	Evaluative	Minimum 80 % of PTO power as referred in SI No. i) a) of PTO performance in case of tractors having total static mass > 1500 kg Minimum 75 % of PTO power as referred in SI No. i) a) of PTO performance in case of light weight tractors having 1500 kg total static mass of tractor Minimum 75 % of the engine power as referred in SI No. i) a) of engine performance in case of tractors which do not have a PTO shaft.	26.8 (D)	29.4	Yes	
				25.8 (R)			
d)	Max. transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	105	102	Yes	
<b>16.1.3 Power lift and hydraulic pump performance :</b>							
a)	Maximum lifting capacity throughout the range of lift, (kN):						
	1)	At hitch points	Non Evaluative	[Tolerance of minus 10%]	13.70 (D)	13.39	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	11.2 (D)	11.3	Yes
				7.57 Minimum, (R)			
b)	Maximum drop in the height of the point of application of the force after each 5 minutes interval for a total duration of 30 Minutes, (mm)	Non Evaluative	Observed value should not exceed 50 mm.	50 (D)	05	Yes	
<b>16.1.4 Brake performance at 25 kmph:</b>							
a)	Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with road ballast, (m):						
	1)	Cold brake	Evaluative	10	10 (R)	7.52	Yes
	2)	Hot brake	Evaluative	10	10 (R)	7.61	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s <sup>2</sup> (N)	Evaluative	600	600 (R)	163 to 202	Yes	



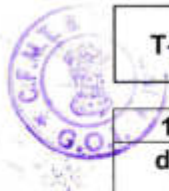
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6	7
3.40	Yes
1.08	Yes
9.4	Yes
02	Yes
3.39	Yes
1.3	Yes
05	Yes
ke pedal with	
52	Yes
61	Yes
63	Yes
02	

1	2	3	4	5	6	7
c)	Whether parking brake is effective at a force of 600 N at foot pedal(s) or 400 N at hand lever	Evaluative	Yes / No	Yes (R)	Yes	Yes
<b>16.1.5 Noise measurement :</b>						
a)	Maximum ambient noise emitted by the tractor, dB(A)	Evaluative	As per CMVR	88 (R)	84	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96 (R)	93	Yes
<b>16.1.6 Amplitude of mechanical vibrations at :</b>						
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R)	280	No
	2) Right foot rest			100 (R)	180	No
	3) Seat (with driver seated)			100 (R)	190	No
	4) Steering wheel			100 (R)	100	Yes
<b>16.1.7 Haulage requirements :</b>						
a) Gross mass of the trailers, (tones):						
	1) Two wheel	Non	--	5.0 (D)	5.0	Yes
	2) Four wheel	Evaluative	--	6.5 (D)	6.5	Yes
b) Distance travelled / litre of fuel consumption, (km/l):						
	1) Two wheel	Non Evaluative	--	5.25 to 5.75 (D)	6.89	Yes
	2) Four wheel		--	5.0 to 5.5 (D)	5.37 to 6.22	Yes
c) Fuel consumption (ml/km/tonne):						
	1) Two wheel	Non Evaluative	--	36.0 to 40.0 (D)	29.01	No
	2) Four wheel		--	40.0 to 44.0 (D)	24.73 to 28.64	No
<b>16.1.8 Safety features :</b>						
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes (As per IS 12239 part 2)	--	Meets the requirement	Yes
b)	Lighting arrangement (Tractor having more than 1150 mm rear track width)	Evaluative	As per CMVR	--	Meets the requirement	Yes
c)	Seating requirement (Tractors having more than 1150 mm rear track width)	Non-Evaluative	Should meet the requirements of IS 12343 (as amended from time to time)	--	Does not meet the requirement	No



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1	2	3	4	5	6	7
d)	Technical requirements for PTO shaft	Non-Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--	Does not meet the requirement	No
e)	Dimension of three point linkage	Non-Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	--	Does not meet the requirement	No
f)	Specification of linkage and swinging drawbars	Non-Evaluative	Should meet the requirements of IS 12953 and IS 12362 (part 3) (as amended from time to time)	--	Does not meet the requirement	No
<b>16.1.9</b>	<b>Labelling of tractors (Provision of labelling plate):</b>					
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	--	TITAGARH	Yes
	2) Model	Evaluative		--	TITAGARH NGT 50 DI	Yes
	3) Year of manufacture	Evaluative		--	2014	Yes
	4) Engine serial number	Evaluative		--	3H.2123/1400309	Yes
	5) Chassis number	Evaluative		--	TNKC54000025	Yes
	6) Declaration of PTO power, (kW)	Evaluative		--	33.5	Yes
<b>16.1.10</b>	<b>Discard limit for:</b>					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	105.185	105.00 to 105.02	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.2	0.129 to 0.147	Yes
(c)	<b>Ring end gap (mm):</b>					
	- 1 <sup>st</sup> comp. ring.	Evaluative	-do-	1.0	0.40	Yes
	- 2 <sup>nd</sup> comp. ring.		-do-	1.0	0.40 to 0.45	Yes
	- Oil ring.		-do-	1.0	0.40 to 0.45	Yes
(d)	<b>Ring groove clearance (mm):</b>					
	- Top comp. ring.	Evaluative	-do-	---	Taper rings	--
	- 2 <sup>nd</sup> comp. ring.		-do-	0.10	0.060 to 0.070	Yes
	- Oil ring.		-do-	0.20	0.050 to 0.059	Yes
(e)	<b>Clearance of main bearings (mm):</b>					
	- Diametrical	Evaluative	To be specified by the manufacturer	0.30	0.052 to 0.082	Yes
	- Crankshaft end float	Evaluative		0.80	0.28	Yes
(f)	<b>Clearance of big end bearings, (mm):</b>					
	- Diametrical	Evaluative	-do-	0.30	0.073 to 0.086	Yes
	- Axial	Evaluative	-do-	0.60	0.20 to 0.25	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.90	0.098 to 0.110	Yes
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.90	0.255 to 0.350	Yes



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16.1.11 Literature (Submission to test agency)							
1	2	3	4	5	6	7	
(a)	Operator manual	Evaluative	Provided/Not Provided	As relevant Code (IS 8132)	per IS (IS 8132)	Provided	Yes
(b)	Parts Catalogue	Evaluative	Provided/Not Provided	As relevant Code (IS 8132)	per IS (IS 8132)	Provided	Yes
(c)	Workshop/Service manual	Evaluative	Provided/Not Provided	As relevant Code (IS 8132)	per IS (IS 8132)	Provided	Yes

Yes  
0 DI  
Yes  
Yes  
309  
Yes  
25  
Yes

16.1.12 CATEGORY OF BREAKDOWNS / DEFECTS :					
S. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	As observed	Whether the requirements (Yes/No.)
1.	Critical	Evaluative	No critical breakdown	None	Yes
2.	Major	Evaluative	Not more than two and neither of them should be repetitive in nature	None	Yes
3.	Minor	Evaluative	Not more than five and frequency of each should not be more than two.	None	Yes
4.	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed five, that is, (2 major + 3 minor) or 5 minor breakdowns.	None	Yes

05.02  
Yes  
147  
Yes

16.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2014:				
S. No.	Characteristic	Requirements as per IS: 12207-2014	As observed	Whether the requirements (Yes/No.)
1.	Air cleaner oil pull over, max. Oil pull over (%)	0.25% (max.)	NA (Dry type)	Not applicable
2.	Fitment of ROPS	With a provision for fitment of ROPS.	Not provided	Not applicable
		If ROPS fitted it should meet the requirement of IS: 11821-1992	Not provided	Not applicable
3.	Specification of swinging drawbar	Should meet the requirements of IS: 12362 Part 3-1994.	Not provided	Not applicable
4.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Provided	Yes

Yes  
45  
Yes  
Yes  
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0.070  
Yes  
0.059  
Yes  
0.082  
Yes  
Yes  
0.086  
Yes  
0.25  
Yes  
0.110  
Yes  
0.350  
Yes

### 16.3 Conformity with following IS:

- Guidelines for declaration of power and specific fuel consumption and labeling of agricultural tractors (First revision) [IS 10273:1987 (Reaffirmed in March, 2009)] : **Conforms**
- Agricultural tractors – Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS: 4931-1995 (Reaffirmed in March, 2009)] : **Does not conform**



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- iii) Agricultural wheeled tractors - Rear mounted three-point linkage: Part 1 Categories 1, 2, 3 & 4 (fourth revision) [IS 4468 (Part-I):1997 (Reaffirmed in February, 2012)] : Does not conform
- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in February, 2012)] : Does not conform
- v) Agricultural tractors - Operator's seat technical requirement [IS 12343 -1998 (First revision) (Reaffirmed in March, 2009)] : Does not conform
- vi) Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision) : Does not conform  
[IS 12239 (Part-1)-1996 (Reaffirmed in February, 2012) / ISO 4254-1:1989]
- vii) Tractors and machinery for agriculture and forestry – Technical means for ensuring safety Part 2: Tractors (first revision) IS 12239 (Part-2)-1999 (Reaffirmed in March, 2009)] : Does not conform
- viii) Tractors and machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays – Symbols for Agricultural Tractors and Machinery [IS: 6283 (Part-2) – 2007(Reaffirmed in March, 2009) / ISO 3767-2:1991]] : Conforms
- ix) Guidelines for location and operation of operator controls on agricultural tractors and machinery (first revision) (IS: 8133 – 1983) (Reaffirmed in March, 2009) / ISO 3789: 1982] : Does not conform
- x) Agricultural Tractor & Machinery Lighting device for travel on public roads [IS: 14683-1999 (Reaffirmed in March, 2009)] : Conforms

**16.4 Salient Observations:****16.4.1 Laboratory tests:****16.4.1.1 PTO Performance:**

- i) The backup torque is 19.91 %.
- ii) The specific fuel consumption corresponding to maximum power, (g/kWh) was observed as 251 against the declared value of 268 g/kWh.

**16.4.1.2 Mechanical Vibration:**

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

**16.4.1.3 Three point linkage & Linkage drawbar :**

Some parameters meet the requirements of Cat I & others meet to Cat II of IS: 4468(Part I)-1997.

The same observed in case of Linkage drawbar IS: 12953:1993. This should be looked into for necessary corrective action.





- 16.5 **Components/Assembly Inspection**  
The spring rate was observed as 15.30 to 15.89 N/mm against the discard value of 18.13 N/mm. This calls for the stringent spares quality during production.
- 16.6 **Maintenance / Service Problems:**  
No noticeable maintenance / service / repair problem was observed during the test.
- 16.7 **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) The fuel shut off Knob should maintain in "STOP" position.
  - iii) The working clearance around control is 40 mm between position and draft control lever.
- 16.8 **Adequacy of Literature supplied with machine:**
- 16.8.1 The following literature was supplied with the tractor for reference during the test.
  - i) Operator's manual for TITAGARH NGT 50 DI, TITAGARH NGT 45 DI, TITAGARH NGT 50 DI (PS), TITAGARH SUPER DI 45 (optional power steering), TITAGARH SUPER DI 39 & TITAGARH NGT 39 DI tractors.
  - ii) Spare parts catalogue for TITAGARH SUPER DI 39, TITAGARH SUPER DI 45, TITAGARH SUPER DI 45 PS, TITAGARH NGT 50 DI, TITAGARH NGT 50 DI PS, TITAGARH NGT 39 DI, TITAGARH NGT 45 DI, TITAGARH NGT 45 DI PS, TITAGARH NGT 50 DI & TITAGARH NGT 50 DI PS tractors.
  - iii) Workshop manual for TITAGARH SUPER DI 39, TITAGARH SUPER DI 45, TITAGARH SUPER DI 45 PS, TITAGARH NGT 50 DI, TITAGARH NGT 50 DI PS, TITAGARH NGT 39 DI, TITAGARH NGT 45 DI, TITAGARH NGT 45 DI PS, TITAGARH NGT 50 DI & TITAGARH NGT 50 DI PS tractors.

It is recommended to provide the separate printed literature for particular model name to better understanding of Indian users.

17. 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	09 Months (April 2015, to December , 2015)	Yes	None

TESTING AUTHORITY:

R.M.TIWARI  
SENIOR AGRICULTURAL ENGINEER

C.R.LOHI  
DIRECTOR

Test Report compiled by: Sh. Nitesh Kumar Verma, Senior Technical Assistant.