



**CIMMCO LIMITED, TITAGARH SUPER DI - 45 TRACTOR**



सत्यमेव जयते

भारत सरकार

कृषि एवं किसान कल्याण मंत्रालय  
(कृषि, सहकारिता एवं किसान कल्याण विभाग)

**GOVERNMENT OF INDIA**

**MINISTRY OF AGRICULTURE AND FARMERS WELFARE**

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

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५

**CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE**

**(An ISO : 9001 - 2015 Certified Institute)**

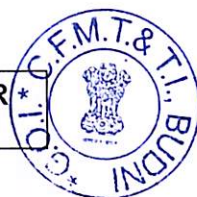
**Tractor Nagar, Budni (M.P.) 466 445**

E-mail [fmti-mp@nic.in](mailto:fmti-mp@nic.in)

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

Telephone : 07564 - 234729

Fax : 07564 - 234743



T-1137/1663/2018

**CIMMCO LIMITED, TITAGARH SUPER DI - 45 TRACTOR  
-Commercial (Initial)**

**Manufacturer** : M/s. Cimmco limited,  
Mal Godown Road,  
Bharatpur – 321 001  
(Rajasthan) India

**Registered Office-**  
M/s. Cimmco limited,756 Anandpur,  
E M Bypass, Kolkata -700107(India)  
CIN: L28910WB1943PLC168801

Test requested by : The manufacturer  
Selected for test by : Applicant  
Place of running-in : At applicant's works  
Duration of said running-in, (h):  
- Engine : 20 (apa)  
- Transmission : 20 (apa)  
**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 : Cimmco limited  
 Model : Titagarh Super DI - 45  
 Brand name : None  
 Variants. If any : None  
 Type : Four wheeled, rear wheel driven, general purpose ,Agricultural tractor  
 Year of manufacture : November, 2016  
 Chassis number : TNKE 45000459  
 Country of origin : India
- 1.2 Engine:**  
 Make : Kirloskar Oil Engines Limited  
 Model : 3R1040 NA1  
 Type : Four Stroke, Water cooled, Direct Injection, Naturally aspirated , Diesel Engine  
 Serial number : 3H.2125/1520558  
 Country of origin : India
- 1.2.1 Engine speed (rpm), (Manufacturer's recommended production setting),:**  
 - Maximum speed at no load : 2100 to 2200  
 - Low idle speed : 650 to 750  
 - Speed at maximum torque : 1200 to 1400  
**Rated speed, (rpm):**  
 - For PTO use : 2000  
 - For drawbar use : 2000
- 1.3 Cylinder & Cylinder Head:**  
 Number : 3  
 Disposition : Vertical, inline  
 Bore/stroke, (mm) : 105/120  
 Capacity as specified by the applicant, (cc) : 3120(apa)  
 Compression ratio : 18±0.5:1  
 Type of cylinder head : Monoblock

T-1137/1663/2018

CIMMCO LIMITED, TITAGARH SUPER DI - 45 TRACTOR  
-Commercial (Initial)

**14.6 Steering system:**

Visual condition of the components of : Normal  
complete steering assembly

**14.7 Starter motor & Alternator:**

Presence of soil/oil in housing : None  
Condition of bearings and other : Normal  
components

**15. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS**

Sl. No.	Adjustments/Defects/Breakdowns and Repairs	Tractor run hours
1.	During maximum power 2 hours test, the power was continuously dropping and temperature of air intake was recorded as 57 °C. To rectify the problem persist in the tractor following checking /adjustment were carried out.	4.5
	i) The Tappet valve clearance was checked & recorded as 0.40 mm & 0.20 mm of intake valve of first & second cylinder of the engine respectively, against the specified limit of 0.25 mm. The valve clearance was adjusted to 0.25 mm.	
	ii) Injector pressure was checked & found correct as 260 kgf/cm <sup>2</sup> .	
	iii) Fuel filter elements were found choked & replace with new ones.	
	iv) Air cleaner filters were also cleaned.	
2.	During PTO test under high ambient conditions, the maximum engine oil temp was measured as 126°C against the declaration of maximum engine oil temp of 125 °C and which does not meet the requirement of IS: 12207-2014 with regard to tolerance.	12.8
3.	During the dry land operation rotavation test, the RHS lower link pivot point (Part no.35303005AA-Plate assembly, lower link) got broken & replace with new ones. This breakdown breakage of three point linkage has been categorized as under <b>Mj-22 (as per IS: 12207-2014)</b> .	74.7

**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:

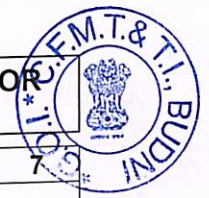
Sl. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	Values declared by the applicant/ (D) Requirement (R)	As observed	Whether meets the requirements (Yes/No)
1	2	3	4	5	6	7
<b>16.1.1</b>	<b>PTO Performance :</b>					
a)	Maximum power under 2 h test, (kW) (Natural 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	31.5 (D)	31.8	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	31.5 (D)	31.8	Yes

T-1137/1663/2018

**CIMMCO LIMITED, TITAGARH SUPER DI - 45 TRACTOR**  
**-Commercial (Initial)**


1	2	3	4	5	6	
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+ 5%	265 (D)	240	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	166 (D)	181.9	No
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	$\frac{18 (D)}{10 (R)}$	19.8	Yes
f)	<b>Maximum operating temperature, (<math>^{\circ}C</math>)</b>					
	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)	126	No
	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)	112	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	$\frac{2.50 (D)}{2.40 (R)}$	0.25	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)	0.10	Yes
<b>16.1.2 Drawbar performance :</b>						
a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	18.8 (D) 17.72 (R)	19.68	Yes
b)	Max. drawbar pull with standard ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor with standard ballast	18.8 (D) 12.88 (R) (Minimum)	15.20	Yes
c)	Maximum drawbar power with standard 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.	25.2 (D) 25.4 (R) (Minimum)	28.6	Yes
d)	Maximum transmission oil temperature ( $^{\circ}C$ )	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	105 (D)	81	Yes

T-1137/1663/2018

**CIMMCO LIMITED, TITAGARH SUPER DI - 45 TRACTOR**  
**-Commercial (Initial)**


1	2	3	4	5	6	7
<b>16.1.3</b>	<b>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%]	Not declared	9.30	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	8.5 (D) 7.48 (R) (Minimum)	8.66	Yes
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)	97	No
<b>16.1.4</b>	<b>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)	7.72	Yes
2)	Hot brake	Evaluative	10	10 (R)	8.66	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)	285 to 312	Yes
c)	Whether parking brake is effective at a force of 600 N at foot pedal(s) or 400 N at hand lever	Evaluative	Yes / No	Yes (R)	Yes	Yes
<b>16.1.5</b>	<b>Noise measurement :</b>					
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	85	82	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96	93	Yes
<b>16.1.6</b>	<b>Amplitude of mechanical vibrations at :</b>					
1)	Left foot rest	Non Evaluative	100 microns (max)	100 (R) (Maximum)	180	No
2)	Right foot rest				180	No
3)	Seat (with driver seated)				100	Yes
4)	Steering Wheel				150	No
<b>16.1.7</b>	<b>Haulage requirements :</b>					
a)	Gross mass of the trailers, (tones):					
1)	Two wheel	Non Evaluative	--	5.0 (D)	5.0	Yes
2)	Four wheel		--	6.5 (D)	6.5	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
1)	Two wheel	Non Evaluative	--	5.7 to 6.7 (D)	5.83 to 5.95	Yes
2)	Four wheel		--	5.3 to 6.5	5.74 to 5.91	Yes

T-1137/1663/2018

**CIMMCO LIMITED, TITAGARH SUPER DI - 45 TRACTOR**  
**-Commercial (Initial)**


1	2	3	4	5	6	7
<b>c) Fuel consumption (ml/km/tonne):</b>						
	1) Two wheel	Non Evaluative	--	32 to 40(D)	33.61 to 34.33	Yes
	2) Four wheel			35 to 42(D)	26.04 to 26.78	No
<b>16.1.8</b>	<b>Wetland cultivation :</b>		The identified assemblies should essentially meet the requirement of IS: 11082. No water ingress in the identified assembly given in column-2. If tractor does not meet the requirements of wetland cultivation, it may be recommended for dry land operation only.	The manufacturer has recommended that the tractor is not suitable for wetland cultivation (puddling operation)	Not recommended	--
	Sealing for the following assemblies:					
	1) Clutch assembly	-do-				
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
<b>16.1.9</b>	<b>Safety features :</b>		Belt drives, pulley, silencer, hydraulic pipes (As per IS 12239 (part 2) As per CMVR Should meet the requirements of IS: 12343 (as amended from time to time) Should meet the requirements of IS 4931 (as amended from time to time) Should meet the requirements of IS 4468 (part 1) (as amended from time to time) Should meet the requirements of IS 12953 and IS 12362 (part 3) (as amended from time to time)	--	Provided	Yes
<b>a)</b>	Guards against moving and hot parts	Evaluative				
<b>b)</b>	Lighting arrangement	Evaluative				
<b>c)</b>	Seating requirement (Tractors having more than 1150 mm rear track width)	Non-Evaluative				
<b>d)</b>	Technical requirements for PTO shaft	Non-Evaluative				
<b>e)</b>	Dimension of three point linkage	Non-Evaluative				
<b>f)</b>	Specification of linkage and swinging drawbars	Non-Evaluative				
<b>16.1.10</b>	<b>Labelling of tractors (Provision of labelling plate):</b>		Should conform to the requirements of CMVR along-with declared value of PTO HP	--	CIMMCO LIMITED	Yes
	1) Make	Evaluative				
	2) Model	Evaluative				
	3) Year of manufacture	Evaluative				
	4) Engine number	Evaluative				
	5) Chassis number	Evaluative				
	6) Declaration of PTO power, kW	Evaluative				
			--	TITAGARH SUPER DI 45	Yes	
			--	2016	Yes	
			--	3H.2125/1520558	Yes	
			--	TNKE 45000459	Yes	
			--	31.5	Yes	
<b>16.1.11</b>	<b>Discard limit for:</b>		To be specified by the manufacturer	105.185 (D)	104.97 to 105.00	Yes
<b>a)</b>	Cylinder bore diameter, (mm)	Evaluative				
<b>b)</b>	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative				
				0.20 (D)	0.130 to 0.144	Yes



1	2	3	4	5	6	
c)	<b>Ring end gap (mm):</b>					
	- Top comp. ring.	Evaluative	-do-	2.0	0.35	Yes
	- 2 <sup>nd</sup> comp. ring.		-do-	2.0	0.40	Yes
	- Oil ring.		-do-	2.0	0.35	Yes
d)	<b>Ring groove clearance (mm):</b>					
				Taper Ring		
	- Top comp. ring.	Evaluative	-do-	0.20	0.058 to 0.072	Yes
	- 2 <sup>nd</sup> comp. ring.		-do-	0.20	0.046 to 0.054	Yes
- Oil ring.						
e)	<b>Clearance of main bearings (mm):</b>					
	- Diametrical clearance	Evaluative	To be specified by the manufacturer	0.30	0.058 to 0.107	Yes
	- Crankshaft end float	Evaluative		0.80	0.20	Yes
f)	<b>Clearance of big end bearings, (mm):</b>					
	- Diametrical	Evaluative	-do-	0.30	0.072 to 0.097	Yes
	- Axial	Evaluative	-do-	0.80	0.55	Yes
g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.90	0.083 to 0.151	Yes
	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.90	0.278 to 0.289	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 meets 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	Mj-22	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.	One (Mj-22)	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 meets the requirements (Yes/No.)
1.	Fitment of ROPS	With a provision for fitment of ROPS. If ROPS fitted it should meet the requirement of IS: 11821-1992	Not provided	-
2.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Not provided	Not Applicable
			Provided	Yes

**16.3**

i)

**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



- ii) Agricultural tractors – Rear mounted power take-off - : Conforms  
Types 1, 2 and 3(third revision)[IS: 4931-1995  
(Reaffirmed in March, 2009)]
- iii) Agricultural wheeled tractors - Rear mounted three- : Does not conform  
point linkage: Part 1 Categories 1, 2, 3 & 4 (fourth  
revision) [IS 4468 (Part-I):1997 (Reaffirmed in March,  
2007)/ISO 730-1:1994]
- iv) Drawbar for agricultural tractors – Link type [IS : Conforms  
12953:1990 (Reaffirmed in March, 2007)]
- v) Agricultural tractors - Operator's seat technical : Conforms  
requirement [IS 12343 -1998 (First revision)  
(Reaffirmed in March, 2009)]
- vi) Guide for safety & comfort of operator of agricultural : Does not conform  
tractors: Part 1 General requirements (first revision) :  
[IS 12239 (PT-1)-1996 (Reaffirmed in March,  
2009)/ISO 4254-1:1989]
- vii) Tractors and machinery for agriculture and forestry – : Does not conform  
Technical means for ensuring safety Part 2: Tractors  
(first revision) IS 12239 (PT-2)-1999 (Reaffirmed in  
March, 2009)]
- viii) Tractors and machinery for agriculture and forestry, : Does not conform  
powered lawn and garden equipment – Symbols for  
operator controls and other displays [IS: 6283 (Part-  
1 & Part-2) –2006 & 2007(Reaffirmed in March, 2009)/  
ISO 3767-2:1991)]
- ix) Guide lines for location and operation of operator : Does not conform  
controls on agricultural tractors and machinery (first  
revision) (IS: 8133 – 1983) (Reaffirmed in March,  
2009)]
- x) Agricultural Tractor & Machinery Lighting device for : Does not conform  
travel on public roads (IS: 14683-1999) (Reaffirmed in  
March, 2009)]

## 16.4

**Salient Observations:**

## 16.4.1

**Laboratory tests:**

## 16.4.1.1

**PTO Performance:**

- i) During maximum power 2 hours test, the power was continuously dropping and temperature of air intake was recorded as 57 °C. To rectify the problem persist in the tractor following checking /adjustment were carried out.
- a) The Tappet valve clearance was checked & recorded as 0.40 mm & 0.20 mm of intake valve of first & second cylinder of the engine respectively, against the specified limit of 0.25 mm. The valve clearance was adjusted to 0.25 mm.
- b) Injector pressure was checked & found correct as 260 kgf/cm<sup>2</sup>.
- c) Fuel filter elements were found choked & replace with new ones.
- d) Air cleaner filters were also cleaned.
- ii) The maximum PTO power was recorded as 31.8 kW against the declaration of 31.5 kW, which meets the requirement of IS: 12207-2014 with regard to tolerance limit.
- iii) The backup torque is 19.8%.
- iv) The maximum equivalent crankshaft torque was observed as 181.9 Nm against the declaration of 166 Nm and which does not meet the requirements of IS: 12207-2014 with regard to tolerance. This should be looked into for necessary corrective action.
- v) The maximum engine oil temperature was recorded as 126°C against the declaration of 125°C. which does not meet the requirement of IS: 12207-2014.





- 16.4.1.2 Hydraulic performance test:**  
Total drop in height of lift during lift load maintenance test was recorded as 97 mm\* against the preferably maximum requirement of 50 mm and calls for necessary corrective action.
- 16.4.1.3 Mechanical Vibration:**  
The amplitude of mechanical vibration on various assemblies marked as (\*) in Chapter-9 of this test report is on higher side, especially at LHS & RHS foot rest & steering control wheel. This calls for dampening down of vibrations to improve the operational comfort and service life of the components.
- 16.4.1.4 Three point linkage:**  
The lateral distance from lower hitch point to center line of tractor does not meet the requirements of IS: 4468(Part I)-1997. This should be looked into for necessary corrective action.
- 16.4.2 Field performance test:**
- 16.4.2.1 Dry land operation:**  
During the rotavation test, the RHS lower link pivot point (Part no.35303005AA - Plate assembly, lower link) got broken & replace with new ones. This breakdown breakage of three point linkage has been categorized as major breakdown (Mj-22) as per IS: 12207-2014 and calls for introduction of stringent quality control measures at production level.
- 16.4.2.2 Wetland Cultivation:**  
The manufacturer has recommended that the tractor is not suitable for wetland cultivation (puddling operation). Hence the, wetland cultivation was not conducted. **Therefore, the declaration of the fact that the tractor is not suitable for wetland cultivation (Puddling operation) should be mentioned clearly and boldly in all the literature relevant to this tractor.**
- 16.5 Maintenance / Service Problems:**  
No noticeable maintenance or service problems was observed the test.
- 16.6 Recommendation with regard to safety on tractor:**  
The following requirements, inter alia, may be considered for incorporation on the tractor:
- Provision for spark arresting device in exhaust system.
  - Provision of safety against accidental start of engine.
  - The working clearance around the position control lever & draft control lever shall be provided as per the requirement of IS: 12239 (part-2)-1999.
  - The fuel shut-off lever does not remain in stop position
  - Provision of differential lock.
  - Width of subsequent step of foot pedal is less than 200 mm..
- 16.7 Adequacy of Literature supplied with machine:**
- Operator's manual for TITAGARH SUPER DI 50, 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.
  - Spare parts catalogue for TITAGARH 45 & 50 HP tractors.
  - Workshop manual for TITAGARH 45 & 50 HP tractors.
- 16.7.1** It is, however, recommended that following literature may be brought out as per IS: 8132-1999 (reaffirmed in March, 2009) for the guidance of users & service personnel in national as well as regional language for this model of tractor.
- 16.7.2** The parts catalogue should be developed mentioning this model name on its cover page.



- 16.7.3 The specification details as maximum power, specific fuel consumption, drawbar pull and power, hydraulic power, haulage requirement and its performance recommendation of ballasting for various operation, preparation and maintenance of tractor for field operation should be update in owner's manual in secured binding form.
- 16.7.4 The declaration of the fact that the tractor is not suitable for wetland cultivation (puddling operation) should be mentioned clearly and boldly in all the literature relevant to this tractor model


## 17.0 Citizen charter

Test duration under citizen charter	Duration of Test	Whether the report released within time frame given in the citizen charter	Remark
10 Months	(09 Months) March, 2017 to December, 2017	No	--

TESTING AUTHORITY:

  
**C.S. RAGHUWANSHI**  
AGRICULTURAL ENGINEER

  
**C. V. CHIMOTE**  
TEST ENGINEER

  
**Y.K. RAO**  
SENIOR AGRICULTURAL  
ENGINEER

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

## 18. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
18.1	16.1.1 (d & f)	Special care will be taken during engine testing
18.2	16.1.3(b)	We will ensure proper sealing in hydraulic system & will ensure during product testing after roll out in regular production.
18.3	16.1.6	We will take necessary action to reduce the vibration level below recommended level during assembly.
18.4	16.1.9 (e)	Adjustment will be made in assembly to meet the longitudinal distance with in required range as per IS:4468(part-1)
18.5	16.1.12(4)	We will take strict quality action in regular production to avoid such premature failures in working service life.