

गोपनीय परीक्षण रिपोर्ट
CONFIDENTIAL TEST REPORT

संख्या /No. : T-1596/2127/2021

माह / Month : October, 2021

व्यावसायिक परीक्षण रिपोर्ट में परिवर्तित
CONVERTED TO COMMERCIAL
TEST REPORT

(यह परीक्षण रिपोर्ट 31/10/2024 तक वैध है / THIS TEST REPORT IS VALID UPTO 31/10/2024)
[ONLINE TESTING]



KUBOTA, MU5502 TRACTOR



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.)-466 445

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO 9001: 2015 Certified Institute)

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Initially the applicant had submitted the application of “KUBOTA, MU5502” tractor for confidential test vide application no. 28/2020-21/32 dated 23.12.2020. After releasing the draft test report, applicant had submitted a letter vide no. KAI/BUD/MU5502-confi/07 dated 27.10.2021 for conversion of nature of test from confidential test to commercial test. The request of the applicant has been examined and accepted for conversion of nature of test as per relevant commercial test procedures. Hence, this confidential test report is released under commercial test.

Manufacturer : M/s. KUBOTA Corporation,
Escorts Kubota India Private Limited 18/4,
Mathura Road, Faridabad 121007,
Haryana, India.

Test requested by (applicant) : M/s. Kubota Agricultural Machinery India
Pvt. Ltd.,,Block No.94,Tower-1,8th
Floor,TVH Belicia Towers,MRC Nagar,
Chennai-600 028 , Tamil Nadu , INDIA.

Method of Selection : The test sample was directly submitted by
applicant for test.

1. SPECIFICATIONS

1.1 Tractor:

Make : Kubota
Model : MU5502
Variants, if any : None
Brand name : None
Type : Four wheeled, rear wheel driven, Unit
construction, Agricultural Tractor

Year of manufacture : 03 | 20
Chassis number : KBTM60SFKLEPC006
Country of Origin : India

1.2 Engine:

Make : Kubota Engine (Thailand) Co., Ltd.
Model : V2403-M-DI-TE3
Type : Four strokes, liquid cooled, turbo charged,
Indirect injection, diesel engine.

Serial number : BLA3556

Engine speed (Manufacturer’s recommended production setting), rpm :

- Maximum speed at no load : 2400 to 2500
- Low idle speed : 1000 to 1050
- Speed at maximum torque : 1100 to 1500

Rated speed, (rpm):

- For PTO use : 2200
- For drawbar use : 2200

1.3 Cylinder & Cylinder Head:

Number : Four
Disposition : Vertical, Inline
Bore/stroke, (mm) : 87 / 102.4
Capacity as specified by the applicant, (cc) : 2434
Compression ratio, (apa) : 19.5: 1
Type of cylinder head : Monoblock
Type of cylinder liners : Wet, non replaceable
Type of combustion chamber : Direct Injection, Re-entrant type
Arrangement of valves : Overhead, Inline
No. of valves on each cylinder : Two inlet & two exhaust valve on each
cylinder of engine

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17. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

17.1 On the basis of test conducted the performance results have been summarized as evaluative (mandatory) / non-evaluative (non-mandatory) parameters applicable for qualifying Minimum Performance criteria as per Clause-4 (Table-1) of **IS: 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 require- ments (Yes/No)
1	2	3	4	5	6	7
17.1.1	PTO Performance:					
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: $\pm 5\%$ for PTO power and or engine power > 26 kW. $\pm 10\%$ for PTO power and or engine ≤ 26 kW.	31.7 (D)	31.3	Yes
b)	Power at rated engine speed, (kW)	Non-Evaluative	-do-	31.7 (D)	31.3	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% max.	235 (D)	243	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non-Evaluative	$\pm 8\%$	181.4(D)	183.3	Yes
e)	Back-up torque, percent	Evaluative	12 percent	35% (D) 12% (R) Minimum	34.8	Yes
f)	Maximum operating temperature, ($^{\circ}\text{C}$)					
	1) Engine oil	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)	111	Yes
	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.	127 (D)	108	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions.	1% of SFC Should not exceed 2.43 (R)	0.51	Yes
h)	Smoke level, m^{-1}	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)	0.10 per meter	Yes

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1	2	3	4	5	6	7	
17.1.2	Drawbar performance:						
a)	Max. drawbar pull with ballasted corresponding to 15 percent wheel slip, (kN)	Non-Evaluative	Minimum 70% of static mass of tractor with ballast.	25.5 (D) 21.97 (R) Minimum	25.58	Yes	
b)	Max. drawbar pull with unballasted as the case may be corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 70% of static mass of tractor without ballast or with standard ballast, as the case may be.	20.8 (D) 18.21(R) Minimum	22.29	Yes	
c)	Maximum drawbar power with unballast, (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.	27.6 (D) 20.2 (R) Minimum	29.5	Yes	
d)	For tractors fitted with air conditioned /heated cabin: Maximum drawbar power without ballast, or with standard ballast as the case may be, kW	Evaluative	Minimum 70 % of PTO power as referred in SI No. i) a) of PTO performance in case of tractors having total static mass > 1500 kg	Not fitted	Not applicable	Not applicable	
e)	Maximum transmission oil temperature (°C)	Evaluative	The declared value should not exceed the maximum value specified by oil company	120 (D)	86	Yes	
17.1.3	Power lift and hydraulic pump performance:						
a)	Maximum lifting capacity throughout the range of lift, (kN):						
	1)	At hitch points	Evaluative	Tolerance of ± 10%	16.6 (D)	16.68	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.	14.0 (D) 7.67 I Minimum	14.83	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	The observed value should not exceed 50 mm	50 (D) Maximum	25	Yes	

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1	2	3	4	5	6	7
17.1.4	Brake performance at 25 kmph:					
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)	7.64	Yes
2)	Hot brake	Evaluative	10	10 (R)	7.84	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (R) Maximum	138 to 158	Yes
c)	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
17.1.5	Noise measurement:					
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	88 (R)	79	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96 (R)	93	Yes
17.1.6	Amplitude of mechanical vibrations at:					
1)	Left foot rest	Non Evaluative	100 microns (max)	100 (R)	98	Yes
2)	Right foot rest				56	Yes
3)	Seat (with driver seated)				80	Yes
4)	Steering wheel				159	No
17.1.7	Air cleaner Oil Pull-Over:					
	Maximum air cleaner oil pull over, (%)	Evaluative	0.25% (Maximum)	Dry type air cleaner fitted		Not applicable
17.1.8	Haulage requirements:					
a)	Gross mass of the trailers, (40abel):					
	Two wheel	Non-	--	5.0 (D)	5.0	Yes
	Four wheel	Evaluative	--	8.0 (D)	8.0	Yes
b)	Distance travelled / liter of fuel consumption, (km/l):					
	Two wheel	Non-	--	4 to 6 (D)	5.04 to 5.04	Yes
	Four wheel	Evaluative	--	2.9 to 4.9 (D)	4.55 to 4.60	Yes
c)	Fuel consumption (ml/km/tonne) :					
	Two wheel	Non-	--	35 to 45 (D)	39.4 to 39.65	Yes
	Four wheel	Evaluative	--	27 to 37 (D)	27.2 to 27.5	Yes
17.1.9	Wetland cultivation (Puddling Operation):					
	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. If tractor does not meet the requirements of wetland cultivation, it may be recommended for dry land operation only.	There should be no ingress of water and/or mud (R)	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-				

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1	2	3	4	5	6	7
17.1.10	Safety features:					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulleys, silencer, hydraulic pipes (As per IS 12239 (Part-2))		Meets the requirement	Yes
b)	Lighting arrangement	Evaluative	As per CMVR		Meets the requirement	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 Meets 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 requirement	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 requirement	Yes
f)	Specifications of linkage drawbar	Evaluative	Should meet the requirements of IS: 12953 (As amended from time to time)		Meets the requirement	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 applicable
h)	1) Maximum travelling speed at rated engine speed in reverse gears, Kmph	Evaluative	Should not exceed 20 Kmph		13.85 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 provided	Not applicable
17.1.11	Labelling of tractors (Provision of Labeling 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. MM YY 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.		KUBOTA	Yes
	2) Model	Evaluative			MU5502	Yes
	3) Month & Year of manufacture	Evaluative			03 & 20	Yes
	4) Engine number	Evaluative			BLA3556	Yes
	5) Chassis number	Evaluative			KBTM60SFKLECPC006	Yes
	6) Maximum PTO power, (kW)	Evaluative			31.7 @ 2200 RPM	Yes
	7) Specific fuel consumption, (g/kwh)	Evaluative			235	Yes
17.1.12	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer and supported by the printed literature	87.17	87.008 to 87.018	Yes
(b)	Piston & cylinder liner clearance at skirt, (mm)	Non-Evaluative		0.30	0.075 to 0.078	Yes
(c)	Piston diameter at skirt, mm	Non-Evaluative		86.85	86.940 to 86.943	Yes

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1	2	3	4	5	6	7	
(d)	Ring end gap (mm):						
	-	Top comp. ring.	Evaluative	-do-	1.25	0.30	Yes
	-	2 nd comp. ring.		-do-	1.25	0.55	Yes
	-	Oil ring.		-do-	1.25	0.35	Yes
(e)	Ring groove clearance (mm):						
	-	Top comp. ring.	Evaluative	-do-	0.20	0.071 to 0.075	Yes
	-	2 nd comp. ring.		-do-	0.20	0.068 to 0.070	Yes
	-	Oil ring.		-do-	0.15	0.037 to 0.040	Yes
(f)	Clearance of main bearings (mm):						
	-	Diametrical clearance	Evaluative	-do-	0.40 (D)	0.062 to 0.066	Yes
	-	Crankshaft end float	Evaluative		0.50 (D)	0.24	Yes
(g)	Clearance of big end bearings, (mm):						
	-	Diametrical	Evaluative	-do-	0.20 (D)	0.061 to 0.064	Yes
	-	Axial	Evaluative	-do-	0.75 (D)	0.40	Yes
(h)	Clearance between king pin and bush, (mm)		Non-Evaluative	-do-	0.35(D)	0.058 to 0.060	--
(i)	Clearance between centre pin and bush, (mm)		Non-Evaluative	-do-	0.35 (D)	0.116 to 0.123	Yes
17.1.13	Literature (Submission to test agency)						
(a)	Operator manual	Evaluative	Provided / Not Provided	Provided	Provided	Yes	
(b)	Parts Catalogue	Evaluative		Provided	Provided	Yes	
I	Workshop/ Service manual	Evaluative		Provided	Provided	Yes	
17.1.14	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	Not fitted	Not applicable		
17.1.15	Standard Accessories	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with tractor	Provided	Yes		
17.1.16	Accessories (optional)	Non Evaluative	Ballast weight, if fitted, should meet the requirement of CMVR	Provided	Yes		

17.2 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	Evaluative	No critical breakdown	None	Yes
2.	Major	Evaluative	Not more than one and neither of them should be repetitive in nature	None	Yes
3.	Minor	Evaluative	Not more than three 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 four, that is, (1 major + 3 minor) or 4 minor breakdowns.	None	Yes

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17.3 Salient Observations:

17.3.1 Laboratory tests:

17.3.1.1 PTO Performance:

- i) The maximum PTO power was recorded as **31.3 kW** against the declaration of **31.7 kW**, which meets the requirement of IS: 12207-2019 as regard to tolerance limit.
- ii) The specific fuel consumption corresponding to maximum power was recorded as **243 g/kWh** against the declaration of **235 g/kWh** which meets the requirement of IS:12207-2019 as regard to tolerance limit..
- iii) The maximum equivalent crankshaft torque was recorded as **183.3 N-m** against the declaration of **181.4 N-m**, which meets the requirement of IS: 12207-2019 as regard to tolerance limit.
- iv) The backup torque is **34.8 %** which meets the evaluative requirement of IS: 12207-2019.

17.3.1.2 Drawbar performance test :

- i) During ten hours drawbar test creeping of LHS and RHS of rear tyre over the rims was recorded as 85 and 50 mm respectively. This should be looked into for necessary corrective action.
- ii) Due to excessive creeping of RHS rear tyre tube got damaged and replaced with new one. This may be looked into for necessary corrective action.

17.3.1.3 Hydraulic performance test:

Coupled frame mast angle over the full range of lift has been recorded as **8.7 degree** against the minimum requirement of **10 degree**. This should be looked into for necessary corrective action.

17.3.1.4 Mechanical Vibration:

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

17.4 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) Longitudinal distance of SIP from differential lock and steering control wheel should be provided as IS: 12343-1998 (Reaffirmed in:2019).
- ii) Vertical retainness at inner side of clutch pedal & provision for spark arresting device should be provided as IS :12239 (Part-I)-2018.
- iii) Provision of master shield has should be provided as IS: 12239 (Part-II) (Reaffirmed in 2019).
- iv) Spark arrester should be provided in the exhaust system as per the requirement of IS:12239 (Part-2)-1999 (Re-affirmed in January, 2019).
- v) Colour codes for engine revolution gauge, fuel level gauge & water temperature should be provided as per IS: 6283 (Part-1 & 2)-2006 & 2007 (Reaffirmed in 2019).
- vi) Working clearance in between position control and draft control lever is should be provided as per IS: 12239 (Part-II) (Reaffirmed in 2019).

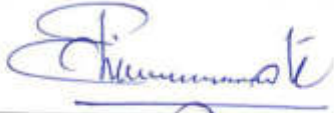
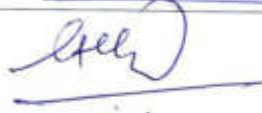
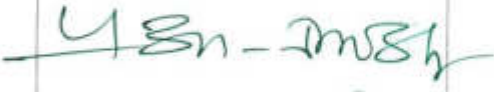
17.6 Adequacy of Literature supplied with machine:

17.6.1 The following literature has been supplied with the tractor for reference during the testing.

- i) Operator's manual of KUBOTA MU5502, MU5502-4WD & MU5502-T tractors.
- ii) Illustrated part's catalogue of KUBOTA MU5502, MU5502-4WD & MU5502-T

- tractors.
- iii) Workshop manual of KUBOTA MU5502, MU5502-4WD & MU5502-T tractors.
- 17.8.2 The supplied literature was found adequate
- 17.8.3 These literatures may also be brought out in national & other regional languages for the guidance of user's and service personnel.

TESTING AUTHORITY:

C.V. CHIMOTE TEST ENGINEER	
Y. K. RAO SENIOR AGRICULTURAL ENGINEER	
P. K. PANDEY DIRECTOR	

Draft test report compiled by **Pratyush Satya**, Senior Technical Assistant.

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18. APPLICANT'S COMMENTS

--NIL--

ANNEXURE-I

BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST

S. No.	Parameters	Disc Plough	Rotavator
1	Make	Vasundhara krishi yantra	Kubota
2	Type	Mounted	Mounted
3	No. of Discs / Blades	Three	42 in 8 flanges
4	Type of Discs / Blades	Concave	L shape
5	Size of Discs / Blades (mm)	660	230 x 75 x 7
6	Spacing of Discs /Flanges, (mm)	510	255
7	Lower hitch point span, (mm)	850	825
8	Mast height, (mm)	390	525
9	Overall Dimensions (mm):		
	Length	1900	1050
	Width	1090	2065
	Height	1150	1070
10	Gross Mass, (Kg)	280	510

ANNEXURE-II

BRIEF SPECIFICATION OF FULL CAGE WHEEL

S. No.	Parameters	Specification
1	Type	Full cage wheel
2	Outer dia. (mm)	1330
3	Width (mm)	1000
4	No. & Type of Lugs	28, straight lugs made of MS angle section welded to angle iron frame
5	Size of angle section, (mm)	49 x 49 x 5
6	Length of lug, (mm)	490
7	Spacing of lug, (mm)	290
8	Weight of each cage wheel (kg)	160

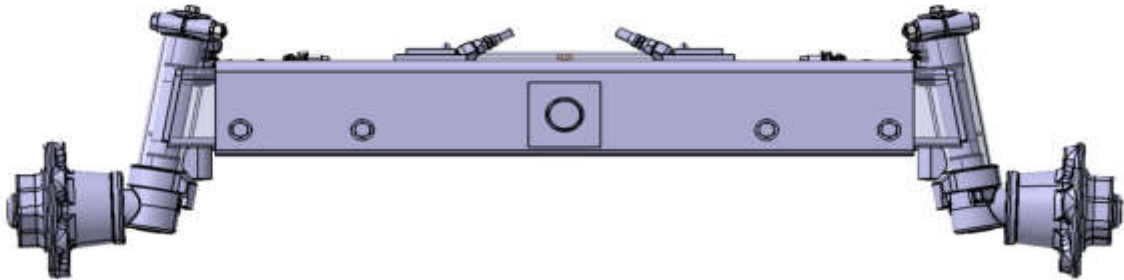
ANNEXURE-III

TRACTOR RUN HOURS DURING TEST

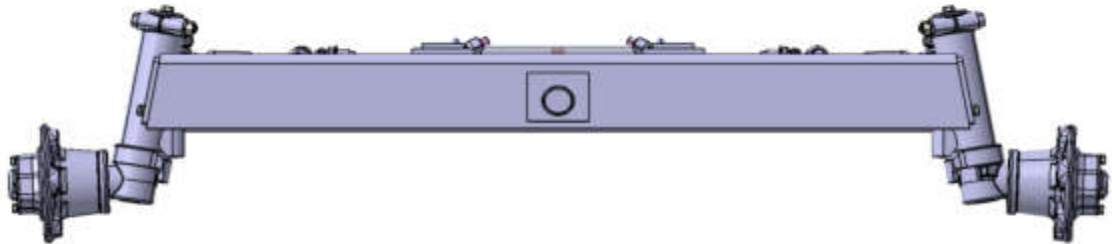
A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	PTO performance test	17.2
3.	Power lift and hydraulic pump performance test	3.5
4.	Drawbar performance test	28.6
5.	Turning ability	0.5
6.	Location of centre of gravity	0.3
7.	Operator's field of vision	0.0
8.	Brake test	1.9
9.	Noise measurement	1.0
10.	Mechanical vibration test	0.8
11.	Theoretical speed test	1.5
B.	FIELD TEST:	
1.	Disc ploughing	11.2
2.	Rotavation	10.3
3.	Wetland cultivation (including water proof)	15.5
C.	HAULAGE TEST:	5.1
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	7.8
	TOTAL:	105.3

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ANNEXURE-IV



Standard fitment front axle design



Optional fitment front axle design