

SAG(KR)

व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT (Initial Test)

संख्या / No. : T - 1035/1560/2016
माह / Month : August, 2016



ACE DI 6565 TRACTOR



सत्यमेव जयते

भारत सरकार

GOVERNMENT OF INDIA

कृषि एवं किसान कल्याण मंत्रालय

(कृषि, सहकारिता एवं किसान कल्याण विभाग, मशीनीकरण एवं प्रौद्योगिकी प्रभाग)

MINISTRY OF AGRICULTURE AND FARMERS WELFARE

(Deptt. of Agriculture, Co-operation & Farmers Welfare, Mechanization & Technology Division)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO : 9001 - 2008 Certified Institute)

ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५ TRACTOR NAGAR, BUDNI (M.P.) 466 445

E-mail fmti-mp@nic.in

Website : <http://cfmtti.dacnet.nic.in/>

Telephone : 07564 - 234729

Fax : 07564 - 234743

Page 1 of 49

T-1035/1560/2016	ACE DI 6565 TRACTOR - Commercial (Initial)
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Manufacturer : M/s. Action Construction Equipment Limited,
Dudholla Link Road, Village: Dudholla, Palwal,
Distt. Palwal (Haryana) – 121 102

Test requested by (applicant) : M/s. Action Construction Equipment Limited,
Jajru Road, 25th Mile Stone, Mathura Road,
Ballabgarh, Faridabad (Haryana) – 121 004

Place of running-in : At Applicant's works

Duration of said running-in, (h):

- Engine : 25
- Transmission : 25

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 : ACE
Model : DI 6565
Variants, if any:

S. No.	Variant model Variant models (*)	Variant features
1.	ACE DI 6565 V2 4WD	With 4WD.
2.	ACE DI 6565 V3	With combination of constant mesh & synchromesh gears.
3.	ACE DI 6565 V4 4WD	With combination of constant mesh & synchromesh gears and 4WD.

***The variant models have not been tested at this Institute yet.**

Type : Four wheeled, rear-wheel driven, unit construction, Standard Agricultural Tractor

Year of manufacture : 2014

Chassis number : QAD650018569

Country of origin : India

1.2 Engine:

Make : ACE
Model : A65
Type : Four stroke, water cooled, naturally aspirated, direct injection, diesel engine

Serial number : TQAD0000010

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

- Maximum speed at no load : 2350 to 2450
- Low idle speed : 650 to 750
- Speed at maximum torque : 1100 to 1300

Rated speed, (rpm):

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

T-1035/1560/2016	ACE DI 6565 TRACTOR - Commercial (Initial)
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15. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

SI. No.	Adjustments / Defects / Breakdowns and Repairs	Tractor run hours
1.	During field test with disc Plough, abnormal noise was heard from the differential housing. On inspection one teeth of bull gear of final drive was found broken. So, Bull gear (Part No.461135402600) was replaced with new ones, this breakdown has been categorized as 'Mj-09' as per Annex B of IS: 12207-2014.	50.5
2.	During final component/ assembly inspection it was observed that the friction lining of forth number of LHS brake disc was completely worn out from metallic plate.	85.6

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
16.1.1	PTO Performance :					
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: -5 / +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	40.5 (D)	41.8	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	40.5 (D)	41.8	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	265 (D)	266	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	230 (D)	228	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	25 percent	25.3	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.	135 (D)	104	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.	118 (D)	95	Yes

T-1035/1560/2016	ACE DI 6565 TRACTOR - Commercial (Initial)
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1	2	3	4	5	6	7	
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	Maximum 2.66 (R)	0.52	Yes	
h)	Smoke level	Evaluative	Maximum light absorption coefficient of 3.25 per metre or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	3.25 per meter (R)	0.50	Yes	
16.1.2 Drawbar performance :							
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	21.80 (D)	27.68	Yes	
				21.42 (R) Minimum			
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	14.60 (D)	20.07	Yes	
				15.17 (R) Minimum			
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.	32.6 (D)	34.4	Yes	
				33.4 (R) Minimum			
d)	Max. transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	115 (D)	89	Yes	
16.1.3 Power lift and hydraulic pump performance :							
a)	Maximum lifting capacity throughout the range of lift, (kN):						
	1)	At hitch points	Non Evaluative	[Tolerance of minus 10%]	14.71 (D)	16.89	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	10.78 (D) 9.84 (R) Minimum	11.87	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)	20	Yes	

T-1035/1560/2016	ACE DI 6565 TRACTOR - Commercial (Initial)
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1	2	3	4	5	6	7
16.1.4	Brake performance at 25 kmph:					
a)	Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with Un ballast* (m):					
	1) Cold brake	Evaluative	10	10 (R)	8.72	Yes
	2) Hot brake	Evaluative	10	10 (R)	8.90	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (R)	257 to 324	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
*The manufacturer has not recommended ballasting for road test. Therefore, the brake test was conducted under unballasted condition only.						
16.1.5	Noise measurement :					
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)	92	Yes
16.1.6	Amplitude of mechanical vibrations at :					
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R)	160	No
	2) Right foot rest			100 (R)	230	No
	3) Seat (with driver seated)			100 (R)	70	Yes
	4) Steering wheel			100 (R)	120	No
16.1.7	Air cleaner pull over:	Non Evaluative	0.25% (Max)	Dry type air cleaner is provided	N.A.	N.A.
16.1.8	Haulage requirements :					
a)	Gross mass of the trailers, (tones):					
	1) Two wheel	Non	--	5.0 (D)	5.0	Yes
	2) Four wheel	Evaluative	--	6.0 (D)	6.0	Yes
b)	Distance travelled / liter of fuel consumption, (km/l):					
	1) Two wheel	Non	--	4.0 to 6.0 (D)	4.98 to 5.27	Yes
	2) Four wheel	Evaluative	--	3.5 to 5.5 (D)	4.98 to 5.01	Yes
c)	Fuel consumption (ml/km/tonne):					
	1) Two wheel	Non	--	35 to 55 (D)	37.96 to 40.14	Yes
	2) Four wheel	Evaluative	--	30 to 50 (D)	33.24 to 33.45	Yes

T-1035/1560/2016	ACE DI 6565 TRACTOR - Commercial (Initial)
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1	2	3	4	5	6	7
16.1.9	Wetland cultivation :					
	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	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-				
16.1.10	Safety features :					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes As per IS 12239 (part 2)	Requirements as per clause no.4 of table no. 1	Meets the requirement	Yes
b)	Lighting arrangement	Evaluative	As per CMVR	--do--	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)	--do--	Meets the requirement	Yes
d)	Technical requirements for PTO shaft	Non Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--do--	Meets the requirement	Yes
e)	Dimension of three point linkage	Non Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	Requirements as per clause no.4 of table no. 1	Meets the requirement	Yes
f)	Specification of linkage drawbar	Non Evaluative	Should meet the requirements of IS 12953 and IS 12362 (part 3) (as amended from time to time)	--do--	Meets the requirement	Yes
g)	Specification of swinging drawbar	Non Evaluative		--do--	Not provided	N.A.

1	2	3	4	5	6	7
16.1.11	Labeling of tractors (Provision of labeling plate):					
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	--	ACE	Yes
	2) Model	Evaluative		--	DI 6565	Yes
	3) Year of manufacture	Evaluative		--	2014	Yes
	4) Engine serial number	Evaluative		--	TQAD0000010	Yes
	5) Chassis number	Evaluative		--	QAD650018569	Yes
	6) Declaration of PTO power, (kW)	Evaluative		--	40.5	Yes
16.1.12	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	105.30	105.02 to 105.07	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.45	0.113 to 0.139	Yes
(c)	Ring end gap (mm):					
	- Top comp. ring.	Evaluative	-do-	2.0	0.45 to 0.55	Yes
	- 2 nd comp. ring.		-do-	2.0	0.50 to 0.70	Yes
	- Oil ring.		-do-	2.0	0.50 to 0.70	Yes
(d)	Ring groove clearance (mm):					
	- Top comp. ring.	Evaluative	-do-	0.20	Tapered rings	--
	- 2 nd comp. ring.		-do-	0.20	0.083 to 0.094	Yes
	- Oil ring.		-do-	0.20	0.047 to 0.058	Yes
(e)	Clearance of main bearings (mm):					
	- Diametrical clearance	Evaluative	-do-	0.40	0.072 to 0.133	Yes
	- Crankshaft end float	Evaluative	-do-	0.60	0.16	Yes
(f)	Clearance of big end bearings, (mm):					
	- Diametrical	Evaluative	-do-	0.60	0.069 to 0.120	Yes
	- Axial	Evaluative	-do-	1.00	0.25	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	1.00	0.07 to 0.16	Yes
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.50	0.14 to 0.16	Yes
16.1.13	Literature (Submission to test agency)					
(a)	Operator manual	Evaluative	Provided/ Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
(b)	Parts Catalogue	Evaluative	Provided/ Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
(c)	Workshop/ Service manual	Evaluative	Provided/ Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes

T-1035/1560/2016	ACE DI 6565 TRACTOR - Commercial (Initial)
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16.1.14 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	One (Mj-9)	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-9)	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.	Not provided	No
		If ROPS fitted it should meet the requirement of IS: 11821-1992.	Not provided	Not applicable
2.	Accessories	Trailer hitch, front tow hook may be provided.	Provided	Yes

16.3 Conformity with following IS:

- i) 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 - Types 1, 2 and 3 (third revision) [IS: 4931-1995 (Reaffirmed in March, 2009)] : Conforms
- 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)] : Conforms
- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in February, 2012)] : Conforms
- v) Agricultural tractors - Operator's seat technical requirement [IS 12343 –1998 (First revision) (Reaffirmed in March, 2009)] : Conforms
- 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 – : **Does not conform**
 Technical means for ensuring safety Part 2: Tractors (first revision) IS 12239 (Part-2)-1999 (Reaffirmed in March, 2009)]
- viii) Tractors and machinery for agriculture and forestry, : **Conforms**
 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]]
- ix) Guidelines for location and operation of operator : **Does not conform**
 controls on agricultural tractors and machinery (first revision) (IS: 8133 – 1983) (Reaffirmed in March, 2009) / ISO 3789: 1982]
- x) Agricultural Tractor & Machinery Lighting device for : **Conforms**
 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) The maximum PTO power was recorded as **41.8 kW** against the declaration of **40.5 kW** which meets the requirement of IS: 12207-2014 with regard to tolerance limit.
- ii) The specific fuel consumption corresponding to maximum power was measured as **266 g/kWh** against the declaration of **265 g/kWh**, which meets the requirement of IS:12207-2014 with regard to tolerance.
- iii) The backup torque is **25.3 %**.
- iv) The percentage drop in maximum power during natural ambient and high ambient condition was observed as **5.5 %**, which was considered on higher side. This should be looked into for necessary corrective action.

16.4.1.2 Drawbar performance test:

During 10 hour drawbar test, the creeping of LHS & RHS rear tyre over the rims was observed as 25 mm & 10 mm respectively, which was considered on higher side. This may be looked into for necessary corrective action.

16.4.1.3 Mechanical Vibration:

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

16.4.1.4 Specifications of Power Take-off Shaft:

The dimension “k”, “n” & “p” of [See Fig. 2(b)] of PTO of master shield does not meet the requirement of IS: 4931:1995, this should be looked into for compliance.

16.4.1.5 Linkage drawbar:

Some of the parameters of the drawbar linkage conform to Cat.-I and some of them conform to Cat.-II. Keeping in view of the spirit of standardization, the necessary improvements may be incorporated.

16.4.1.6 Location and movement of various controls:

The stop control lever does not remain in 'Stop' position without application of sustainable manual effort. This is not meeting the requirement of IS: 8133 -1983 (Re-affirmed in March, 2009). This should be looked into necessary corrective action.

16.4.1.7 Constructional requirement with regard to safety:

The working clearance around hydraulic position control and draft control hand lever has not been provided as per IS: 12239 (Part-2) 1999. This should be looked into necessary corrective action.

16.4.2 Field performance test:

During field test with disc Plough, abnormal noise was heard from the differential housing. On inspection one teeth of bull gear of final drive was found broken. So, Bull gear (Part No.461135402600) was replaced with new ones.

This breakdown has been categorized as Mj-09 as per IS: 12207-2014 and calls for stringent quality control measures at production level.

16.4.2.1 Wet land cultivation (Puddling operation):

No ingress of mud/or water was noticed during puddling operation of the tractor. Hence, It meets the requirements of IS: 11082-1984 (Technical requirements of agricultural tractors for wetland operation). The tractor is suitable for wetland operation (Puddling).

16.4.3 Component/ assembly inspection

During final component/ assembly inspection it was observed that the friction lining of 4th number of LHS brake disc was completely worn out from metallic plate. This should be looked into for necessary improvement.

16.5 Maintenance / Service Problems:

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

16.6 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) Provision of safety against accidental start of engine.
- iii) The working clearance around hydraulic position control and draft control hand lever should be provided as per IS: 12239 (Part-2) 1999.
- iv) The fuel shut-off knob for stop does not remain in 'Stop' position without application of sustainable manual effort. So, it should be provided in this way that should be easy handling of tractor for safety purpose.
- v) Provision of differential lock.

T-1035/1560/2016

ACE DI 6565 TRACTOR - Commercial (Initial)

16.7 Adequacy of Literature supplied with machine:**16.7.1** The following literature was supplied with the tractor for reference during the test.

- i) Operator's manual (for DI-305 NG, DI-854NG, DI-350NG, DI-450NG, DI-550NG & DI-6565 tractors models).
- ii) Spare parts catalogue (for DI-305 NG, DI-854NG, DI-350NG, DI-450NG, DI-550NG & DI-6565 tractors models).
- iii) Workshop manual (for DI-305 NG, DI-854NG, DI-350NG, DI-450NG, DI-550NG & DI-6565 tractors models).

16.7.2 The given literature supplied was found adequate. However, the following points needs to be incorporated in owners/operators manual.
Details of all variants along with their features at a glance should be provided in the operator's manual.

16.7.3 The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.


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	10 Months (October, 2015 to August, 2016)	Yes	None

TESTING AUTHORITY:


PRAMOD YADAV
AGRICULTURAL ENGINEER


C. V. CHIMOTE
TEST ENGINEER


R.M. TIWARI
SENIOR AGRICULTURAL
ENGINEER


J. J. R. NARWARE
DIRECTOR

T-1035/1560/2016	ACE DI 6565 TRACTOR - Commercial (Initial)
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18. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
18.1	16.4.1.2, 16.4.1.3, 16.4.1.4 & 16.4.1.5	We will take the necessary action during the production.
18.2	16.4.2	We will take the necessary action during the production.
18.3	16.4.3	We will take care of this in future.

Annexure- I

BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST

S. No	I t e m	Disc Plough	Rotavator	Puddler
1.	Make	Field king	ACE	ACE
2.	Type	Mounted	Mounted	Mounted
3.	No. of Disc/blades	Three	42,in 7 flange	12 (6 in each gang)
4.	Type of Disc/blades	Plane concave	L shape	Notched
5.	Size of bottoms/blades, (mm)	335	250 x 80 x 7	500
6.	Spacing of bottoms/flanges, (mm)	280	250	180
7.	Lower hitch point span, (mm)	785	720	835
8.	Mast height, (mm)	570	530	510
9.	Overall dimensions, (mm):			
	- Length	1920	2040	1020
	- Width	1040	1150	2070
	- Height	1180	1160	1050
10.	Gross mass, (kg)	400	420	305

Annexure- II

BRIEF SPECIFICATION OF CAGE WHEEL

SI No.	Items	Specification
1.	Type	Half cage wheel
2.	Outer dia, (mm)	1200
3.	Width, (mm)	355
4.	No. and types of lugs	14, Straight lugs made of M.S. angle section welded to angle iron frame
5.	Size of angle section, (mm)	50 x 45 x 5
6.	Length of lug, (mm)	350
7.	Spacing of lug, (mm)	205
8.	Weight of each cage wheels, (kg)	100

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE – BUDNI	Page 48 of 49
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Annexure – IIITRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	PTO performance test	13.0
3.	Power lift and hydraulic pump performance test	3.0
4.	Drawbar performance test	16.1
5.	Turning ability	0.2
6.	Location of centre of gravity	0.2
7.	Operator's field of vision	0.2
8.	Brake test	1.0
9.	Noise measurement	1.6
10.	Mechanical vibration test	1.0
11.	Nominal speed test	0.6
B.	FIELD TEST:	
1.	Disc Ploughing	10.5
2.	Rotavation	10.3
3.	Puddling (Including five hours water proof test)	16.2
C.	HAULAGE TEST:	5.9
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	5.8
	TOTAL:	85.6