



ACE DI 550 ★ TRACTOR



भारत सरकार

GOVERNMENT OF INDIA

कृषि मंत्रालय (कृषि एवं सहकारिता विभाग, मशीनीकरण एवं प्रोद्योगिकी प्रभाग)

Ministry Of Agriculture (Deptt. of Agri. & Co-op, 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

Phone: 07564-234729 FAX: 07564-234743 E-mail: fnti-mp@nic.in Website: <http://cfmtti.dacnet.nic.in>



T-942/1460/2014

ACE DI 550 ☆ TRACTOR - Commercial (Initial)

Manufacturer : M/s. Action Construction Equipment Ltd.,
Dudholla Link Road, Plant -II
Dudholla, Distt. Palwal-121102 (HARYANA)

Applicant : M/s. Action Construction Equipment Ltd.,
Jajru Road, 25th Mile Stone Mathura Road,
Ballabgarh, Faridabad, Haryana- 121 004

Test requested by (applicant) : The manufacturer
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 550 ☆
Variants, if any : Not specified
Type : Four wheeled, rear-wheel driven, unit construction, general purpose Agricultural Tractor
Year of manufacture : 2013
Chassis number : SAC 55 0000002
Country of origin : India

1.2 Engine:

Make : Kirloskar oil engines Ltd.
Model : 3R1040
Type : Four stroke, water cooled, naturally aspirated, direct injection, diesel engine
Serial number : 3H.2123/1300001

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

1.3 Cylinder & Cylinder Head:

Number : Three
Disposition : Vertical, Inline
Bore/stroke, (mm) : 105/120 (apa)

T-942/1460/2014	ACE DI 550 ★ TRACTOR - Commercial (Initial)
-----------------	---

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
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	34.0 (D)	33.9	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	34.0 (D)	33.9	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+ 5%	250 (D)	252	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	188 (D)	184.48	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	18.98	25.28	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)	124	Yes
	2) Coolant (water)	Evaluative	The observed value under high ambient condition should not exceed the declaration	110 (D)	87	Yes
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	Not to exceed 2.52 g/kWh	0.47	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 metre (R)	0.18	Yes

T-942/1460/2014	ACE DI 550 ★ TRACTOR - Commercial (Initial)
------------------------	--

16.1.2 Drawbar performance :						
a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	19.90 (D)	24.31	Yes
				19.76 (R)		
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	13.94 (D)	17.12	Yes
				13.39 (R)		
c)	Maximum drawbar power without ballast, (kW).	Evaluative	Min. 80% of PTO power as referred in 16.1.1 (a) of PTO performance	27.2 (D)	29.5	Yes
				27.1 (R)		
d)	Maximum transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	135	77	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)	15.19	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) Minimum, 7.98 (R)	13.22	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	[Tolerance of plus 5 mm]	50 (R)	00	Yes	

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, (as no Road ballast is recommended by the applicant) (m)						
	1)	Cold brake	Evaluative	10	10 (R)	7.16	Yes
	2)	Hot brake	Evaluative	10	10 (R)	7.24	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (R)	325 to 334	Yes	

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

T-942/1460/2014	ACE DI 550 ★ TRACTOR - Commercial (Initial)
------------------------	--

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	98 (R)	95	Yes
16.1.6	Amplitude of mechanical vibrations at :					
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R)	240	No
	2) Right foot rest				290	No
	3) Seat (with driver seated)				90	Yes
	4) Steering Wheel				130	No
16.1.7	Haulage requirements :					
a)	Gross mass of the trailers, (tones):					
	1) Two wheel	Non Evaluative	--	5.0 (D)	5.0	Yes
	2) Four wheel		--	6.0 (D)	6.0	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
	1) Two wheel	Non Evaluative	--	4.0 to 6.0 (D)	5.51 to 5.56	Yes
	2) Four wheel		--	3.5 to 5.50 (D)	5.09 to 5.21	Yes
c)	Fuel consumption (ml/km/tonne):					
	1) Two wheel	Non Evaluative	--	35.0 to 55.0 (D)	35.96 to 36.27	Yes
	2) Four wheel		--	30.0 to 50.0 (D)	31.99 to 32.74	Yes
16.1.8	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 was observed during water proof test	Yes
	1) Clutch assembly	-do-				
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
	4) Engine oil	-do-				
	5) Transmission oil	-do-				

1	2	3	4	5	6	7
16.1.9	Safety features :					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes (As per IS 12239 (part 2)	At present no requirements	Provided	Yes
b)	Lighting	Evaluative	As per CMVR	--	Provided	Yes

T-942/1460/2014	ACE DI 550 ★ TRACTOR - Commercial (Initial)
------------------------	--

	arrangement (Tractor having more than 1150 mm rear track width)					
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)	--	Conforms	Yes
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

16.1.10	Labelling of tractors (Provision of labelling plate):					
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	--	ACE	Yes
	2) Model	Evaluative		--	DI 550 ★	Yes
	3) Year of manufacture	Evaluative		--	2013	Yes
	4) Engine number	Evaluative		--	3H.2123/1300001	Yes
	5) Chassis number	Evaluative		--	SAC 55 0000002	Yes
	6) Declaration of PTO power, (kW)	Evaluative		--	34	Yes
16.1.11	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	105.30	105.00 to 105.01	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.45	0.124 to 0.137	Yes
1	2	3	4	5	6	7
(c)	Ring end gap (mm):					
	- Top comp. ring.	Evaluative	-do-	2.0	0.35 to 0.38	Yes
	- 2 nd comp. ring.		-do-	2.0	0.38 to 0.40	Yes
	- Oil ring.		-do-	2.0	0.38 to 0.43	Yes
(d)	Ring groove clearance (mm):					
	- Top comp. ring.	Evaluative	-do-	0.20	Taper rings	--

T-942/1460/2014	ACE DI 550 ★ TRACTOR - Commercial (Initial)
------------------------	--

	-	2 nd comp. ring.		-do-	0.20	0.051 to 0.052	Yes
	-	Oil ring.		-do-	0.20	0.048 to 0.056	Yes
(e)	Clearance of main bearings (mm):						
	-	Diametrical clearance	Evaluative	To be specified by the manufacturer	0.40	0.062 to 0.090	Yes
	-	Crankshaft end float	Evaluative		0.60	0.20	Yes
(f)	Clearance of big end bearings, (mm):						
	-	Diametrical	Evaluative	-do-	0.60	0.073 to 0.102	Yes
	-	Axial	Evaluative	-do-	1.00	0.40 to 0.50	Yes
(g)	Clearance between king pin and bush, (mm)		Non Evaluative	-do-	1.0	0.77 to 0.92	Yes
(h)	Clearance between centre pin and bush, (mm)		Non Evaluative	-do-	0.50	0.097 to 0.183	Yes

16.1.12	Literature (Submission to test agency)					
(a)	Operator manual	Evaluative	Provided/N ot Provided	As per relevant IS Code (IS 8132)	Provided	Yes
(b)	Parts Catalogue	Evaluative	Provided/N ot Provided	As per relevant IS Code (IS 8132)	Provided	Yes
(c)	Workshop/Service manual	Evaluative	Provided/N ot Provided	As per relevant IS Code (IS 8132)	Provided	Yes

16.1.13	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	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

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	2	3	4	5

T-942/1460/2014	ACE DI 550 ★ TRACTOR - Commercial (Initial)
------------------------	--

1.	Maximum oil pull over, (%)	0.25% (max.)	Not applicable	...
2.	Seating requirements	Should meet the requirements of IS: 12343-1998	Meets the requirements	Yes
3.	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	ROPS not fitted	Not applicable
4.	Technical requirements for PTO shaft	Should meet the requirements of IS: 4931 -1995	Does not meets the requirements	No
5.	Dimensions of three point linkage	Should meet the requirements of IS: 4468 (Part-I)-1997	Does not meets the requirements	No
6.	Specifications of linkage drawbar	Should meet the requirements of IS: 12953-1990.	Does not meets the requirements	No
	Specification of swinging drawbar	Should meet the requirements of IS: 12362 Part 3-1994.	Not provided	--
7.	Accessories	Trailer hitch, front tow hook, linkage drawbar 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)] : **Does not conform**
- 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)] : **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) : [IS 12239 (Part-1)-1996 (Reaffirmed in February, 2012) / ISO 4254-1:1989] : **Does not conform**

- 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] : **Does not conform**
- 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 25.28 %.
- ii) The specific fuel consumption corresponding to maximum power was measured as 252 g/kWh against the declaration of 250 g/kWh, which meets the requirement of IS:12207-2008 with regard to tolerance.

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 55 mm & 150 mm respectively, which was considered on higher side. This may be looked into for necessary corrective action.

16.4.1.3 Hydraulic performance test:

The maximum tilt angle of mast from vertical over the full range of lift was observed as 6.4 degrees against the minimum requirement of 10 degree as per IS: 12224-1987. This should be looked into for necessary corrective action.

16.4.1.4 Mechanical Vibration:

The amplitude of mechanical vibration on various assemblies marked as (*) in Chapter-9 of this test report are on higher side especially at the steering control wheel, left and right foot rest, accelerator lever & brake pedals. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

16.4.1.5 Linkage drawbar:

The dimension "DØ" of the drawbar linkage Doesn't meet the requirement of IS 12953-1995. Keeping in view of the spirit of standardization, the necessary improvements may be incorporated.

16.4.2 Field performance test:

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).

16.5 Component assembly inspection:

During the component assembly inspection the measured depth of oil groove of brake disc was observed as 0.01 to 0.04 mm.

It was found that the brake discs were worn out upto the base metallic part which calls for stringent quality control measures at production level.

The backlash between crown and pinion is not specified, it should be provided.

16.6 Maintenance / Service Problems:

No noticeable maintenance/ service 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) Provision of safety against accidental start of engine.
- iii) The engine STOP knob doesn't remain in stop position.
- iv) Provision of differential lock.
- v) Provision of PTO shaft master shield.
- vi) The minimum cautionary notice as per clause 11.2 of IS: 12239 (Part-2)-1999.
- vii) Color codes for the various gauges should be as per the requirement.

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 ACE DI 550 ★, DI 854 NG, DI 350 NG, DI 450 NG, DI 550 NG, tractors)
- ii) Spare parts catalogue (for ACE DI 550 ★ tractor)
- iii) Workshop manual (for ACE DI 550 ★ & DI 450 ★ tractors)

16.8.2 The revised literature supplied was found adequate however 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

T-942/1460/2014	ACE DI 550 ★ TRACTOR - Commercial (Initial)
------------------------	--

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	9 Months (November, 2013 to July , 2014)	Yes	None

TESTING AUTHORITY:

P.C.MESHRAM
AGRICULTURAL ENGINEER

H.L.YADAV
SENIOR AGRICULTURAL ENGINEER

C. R. LOHI
DIRECTOR

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

18. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
18.1	16.4.1.2, 16.4.1.3 & 16.4.3.4	We will take the necessary action during the production.
18.2	16.5	We will take the necessary action during the production.

Annexure- I

BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST

S. No	Item	Disc Plough	Rotavator	Puddler
1.	Make	Field king	Ace	Not available
2.	Type	Mounted	Mounted	Mounted
3.	No. of Disc/blades	Three	42 in 7 Flanges	12 (6 in each gang)
4.	Type of Disc/blades	Plain concave	L shape	Notched
5.	Size of discs/blades, (mm)	525	250 x 80 x 7	460

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE – BUDNI	Page 12 of 14
---	---------------

T-942/1460/2014	ACE DI 550 ★ TRACTOR - Commercial (Initial)
------------------------	--

6.	Spacing between discs/flanges, (mm)	520	250	164
7.	Lower hitch point span, (mm)	855	720	680
8.	Mast height, (mm)	440	530	680
9.	Overall dimensions, (mm):			
	- Length	2030	2040	1190
	- Width	1750	1150	1810
	- Height	1070	1160	1330
10.	Gross mass, (kg)	365	420	240

Annexure- II

BRIEF SPECIFICATION OF HALF CAGE WHEEL

S. No.	Items	Specification
1	Type	Half cage wheel
2	Outer dia. (mm)	1800
3	Width (mm)	355
4	No. & Type of Lugs	12, straight lugs made of MS angle section welded to angle iron frame
5	Size of angle section, (mm)	50 x 45 x5
6	Length of lug, (mm)	350
7	Spacing of lug, (mm)	205
8	Weight of each cage wheel (kg)	65

Annexure – III

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	PTO performance test	12.6
3.	Power lift and hydraulic pump performance test	4.8
4.	Drawbar performance test	16.7
5.	Turning ability	0.2
6.	Location of centre of gravity	0.2
7.	Operator's field of vision	0.1
8.	Brake test	1.3
9.	Noise measurement	1.4
10.	Mechanical vibration test	1.0
11.	Nominal speed test	0.3
B.	FIELD TEST:	
1.	Disc Ploughing	10.5
2.	Rotavation	10.3
3.	Puddling (Including five hours water proof test)	15.3

T-942/1460/2014	ACE DI 550 ★ TRACTOR - Commercial (Initial)
-----------------	---

C.	HAULAGE TEST:	8.13
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	3.6
TOTAL:		86.4