



**ACE DI 550 NG TRACTOR**



**भारत सरकार**

**GOVERNMENT OF INDIA**

कृषि मंत्रालय (कृषि एवं सहकारिता विभाग, मशीनीकरण एवं प्रौद्योगिकी 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)**

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T-922/1439/2014

ACE DI 550 NG TRACTOR - Commercial (Initial)

**Manufacturer** : M/s. Action Construction Equipment Limited,  
Dhudholla Link Road,  
Village : Dhudholla, Palwal,  
Distt. Faridabad-121 102 (HARYANA)

**Test requested by (applicant)** : M/s. Action Construction Equipment Limited,  
Jajru Road, 25<sup>th</sup> Miles Stone,  
Mathura Road Ballabgarh,  
District: Faridabad-121 004 (Haryana)

**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 NG  
**Variants, if any** : Not specified

S No.	Variant model	Variant Features
1.	ACE, DI550 NG I	With dry type air cleaner & differential lock.
2.	ACE, DI550 NG II	With dry type air cleaner, power steering & wet brake
3.	ACE, DI550 NG III	With oil bath type air cleaner & reverse PTO.
4.	ACE, DI550 NG IV	With oil bath type air cleaner & high lift capacity.
5.	ACE, DI550 NG V	With oil bath type air cleaner mitta lift & reverse PTO.

**\*The variant models are yet to be tested at this Institute.**

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

**Year of manufacture** : M AC (February, 2013)

**Chassis number** : MAC 550000001

**Country of origin** : India

### 1.2 Engine:

**Make** : ACE  
**Model** : A50  
**Type** : Four stroke, water cooled, naturally aspirated, direct injection, diesel engine

**Serial number** : TMAC0000001

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

- Maximum speed at no load : 2250 to 2350
- Low idle speed : 650 to 750
- Speed at maximum torque : 1100 to 1300

### Rated speed, (rpm):

- For PTO use : 2100
- For drawbar use : 2100



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

Sl. No.	Adjustments / Defects / Breakdowns and Repairs	Tractor run hours
1.	During Hydraulic performance maintenance of lift of load test the weight suddenly drop & touches the ground .after inspected the internal leakage was observed .so the copper washer part no.90168142000 (size 14 x20x15) was found in damaged condition & were replaced with new one.	20.3
2.	During the component assembly inspection presence of oil was observed in clutch housing & clutch plate .180 ml oil collected from clutch housing. This breakdown has been categorized as <b>Mn-06</b> as per IS: 12207-2008 and calls for stringent quality control measures at production level.	87.9

### 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: 12207-2008 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: 12207-2008	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 >35hp. -7.5/+10% for PTO power ≤ 35 hp	34.0 (D)	34.5	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	34.0 (D)	34.2	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	265 (D)	251	<b>No</b>
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	202 (D)	186.6	Yes
e)	Back-up torque, percent	Non Evaluative	7 percent, min.	22.4	23.7	Yes
f)	<b>Maximum operating temperature, (°C)</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.	135 (D)	117	Yes
2)	Coolant (water)	Evaluative	The observed value under high ambient condition should not exceed the declaration	110 (D)	98	Yes



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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	Not exceed to 2.53 g/kWh	0.44	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)	0.11	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	19.0 (D)	25.50	Yes	
				19.0(R)			
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	13.0 (D)	18.61	Yes	
				12.75 (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)	29.4	Yes	
				27.6 (R)			
d)	Maximum transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	135	78	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%]	14.71 (D)	16.84	Yes
	2)	With the standard frame	Evaluative	The lift capacity should at least be 18 kg/PTO hp. and it should be 16 kg/engine hp where the tractor is not provided with a PTO shaft	8.21 Minimum, (R) 8.05 (D)	14.54	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)	26	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)	7.42	Yes
	2)	Hot brake	Evaluative	10	10 (R)	8.69	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)	253 to 269	Yes	

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	c)
	16.1.5
	a)
	b)
	16.1.6
	a)
	16.1.7
	a)
	b)
	b)
	c)
	16.1.8
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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)	83	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	98 (R)	95	Yes
<b>16.1.6 Amplitude of mechanical vibrations at :</b>						
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R)	120	No
	2) Right foot rest				140	No
	3) Seat (with driver seated)				130	No
	4) Steering Wheel				70	Yes
<b>16.1.7 Haulage requirements :</b>						
a)	Gross mass of the trailers, (tones):					
	1) Two wheel	Non Evaluative	--	5.0 (D)	5.0	Yes
	2) Four wheel		--	6.0 (D)	6.0	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
	1) Two wheel	Non Evaluative	--	4.0 to 6.0 (D)	5.91 to 5.96	Yes
	2) Four wheel		--	3.5 to 5.50 (D)	4.94 to 5.09	Yes
c)	Fuel consumption (ml/km/tonne):					
	1) Two wheel	Non Evaluative	--	35.0 to 55.0 (D)	33.5 to 33.9	No
	2) Four wheel		--	30.0 to 50.0 (D)	32.7 to 33.8	Yes
<b>16.1.8 Wetland cultivation :</b>						
	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	--
	1) Clutch assembly	-do-				
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				



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1	2	3	4	5	6	7
<b>16.1.9</b>	<b>Safety features :</b>					
a)	Guards against moving and hot parts	Evaluative	As per CMVR	At present no requirements	Provided	--
b)	Lighting arrangement	Evaluative	As per CMVR	--	Provided	Yes
<b>16.1.10</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	--	ACE	Yes
2)	Model	Evaluative		--	DI 550 NG	Yes
3)	Year of manufacture	Evaluative		--	M AC (February ,2013)	Yes
4)	Engine number	Evaluative		--	MAC 550000001	Yes
5)	Chassis number	Evaluative		--	TMAC 0000001	Yes
6)	Declaration of PTO power, (kW)	Evaluative		--	34	Yes
<b>16.1.11</b>	<b>Discard limit for:</b>					
a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	105.30	105.04 to 105.05	Yes
b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.45	0.112 to 0.117	Yes
<b>c)</b>	<b>Ring end gap (mm):</b>					
-	Top comp. ring.	Evaluative	-do-	2.0	0.45 to 0.50	Yes
-	2 <sup>nd</sup> comp. ring.		-do-	2.0	0.80 to 0.90	Yes
-	Oil ring.		-do-	2.0	0.35 to 0.55	Yes
<b>d)</b>	<b>Ring groove clearance (mm):</b>					
-	Top comp. ring.	Evaluative	-do-	0.25	Taper rings	--
-	2 <sup>nd</sup> comp. ring.		-do-	0.25	0.075 to 0.086	Yes
-	Oil ring.		-do-	0.25	0.041 to 0.045	Yes
<b>e)</b>	<b>Clearance of main bearings (mm):</b>					
-	Diametrical clearance	Evaluative	To be specified by the manufacturer	0.55	0.067 to 0.088	Yes
-	Crankshaft end float	Evaluative		0.60	0.25	Yes
<b>f)</b>	<b>Clearance of big end bearings, (mm):</b>					
-	Diametrical	Evaluative	-do-	0.60	0.072 to 0.109	Yes
-	Axial	Evaluative	-do-	1.00	0.25 to 0.30	Yes
<b>g)</b>	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	1.0	0.77 to 0.92	Yes
<b>h)</b>	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.50	0.092 to 0.125	Yes



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16.1.12 CATEGORY OF BREAKDOWNS / DEFECTS :					
S. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2008	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.	Mn-06	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 minor	Yes

16.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2008:				
S. No.	Characteristic	Requirements as per IS: 12207-2008	As observed	Whether meets the requirements (Yes/No.)
1	2	3	4	5
1.	Maximum oil pull over, (%)	0.25% (max.)	Not applicable	Yes
2.	Seating requirements	Should meet the requirements of IS: 12343-1998	Does not meets the requirements	No
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	Meets the requirements	Yes
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.	Meets the requirements	Yes
	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



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**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)] : **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)] : **Does not conform**
- 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]] : 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 23.7 %.
- ii) The specific fuel consumption corresponding to maximum power was measured as 251g/kWh against the declaration of 265 g/kWh, which does not meet the requirement of IS:12207-2008 with regard to tolerance. This should be looked into.

**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 50mm & 95 mm respectively, which was considered on higher side. This may be looked into for necessary corrective action.





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**16.4.1.3 Hydraulic performance test:**

- i) During Hydraulic performance maintenance of lift of load test the weight suddenly drop & touches the ground .after inspected the internal leakage was observed .so the copper washer part no.90168142000 (size 14 x20x15) was found in damaged condition & were replaced with new one.
- ii) The lifting capacity at standard frame was recorded as 14.54 kN and the moment about rear axle was computed as 21.52 kN-m, which is on higher side in compare to the moment about front axle i.e. 15.57 kN-m. Therefore, it is recommended that the lifting capacity should be reduced suitably or standard mass at front axle may be provided to avoid front lifting of tractor.
- iii) The maximum tilt angle of mast from vertical over the full range of lift was observed as 9.0 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 seat, left and right foot rest. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

**16.4.1.5 Three point linkage:**

The dia.of hitch pin hole of upper hitch point & 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.

**16.4.1.6 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.

**16.4.1.7 Operator's seat:**

Longitudinal distance from seat index point to the centre of steering control wheel does not meet the requirement of IS: 12343-1988. This should be looked into for necessary corrective action.

**16.4.2 Field performance test:**

**16.4.2.1 Haulage performance:**

The fuel consumption (ml/km/tonne) with two wheel was observed as 33.5 to 33.9 ml/km/tonne against the declaration of 35.0 to 55.0 ml/km/tonne for two wheel trailer. This does not meet the requirement of IS: 12207-2008 and therefore, should be looked into for necessary corrective action.

**16.4.2.2 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 presence of oil was observed in clutch housing,180 ml oil collected from clutch housing. This breakdown has been categorized as **Mn-06** as per IS: 12207-2008 and calls for stringent quality control measures at production level.



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- 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) Provision of differential lock.
  - iv) Provision of PTO shaft master shield.
  - v) The minimum cautionary notice as per clause 11.2 of IS: 12239 (Part-2)-1999.
- 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 DI 854 NG ,DI 350 NG, DI 450 NG,DI 550 NG, tractors)
- 16.8.2** The revised literature supplied was found adequate. However, the following points needs to be incorporated in owners/operators manual.
- i) Details of all variants along with their features at a glance should be provided in the operator's manual.
- 16.8.3** 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	8 Months (September, 2013 to March , 2014)	Yes	None

#### TESTING AUTHORITY:

  
**P. K. VERMA**  
SENIOR AGRICULTURAL ENGINEER

  
**C. R. LOHI**  
DIRECTOR

Test Report compiled by: **Chanchlesh Singh Raghuwanshi**, Asst. Agricultural Engineer.