



**ACE DI 450 + TRACTOR**



सत्यमेव जयते

**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)**

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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, 25<sup>th</sup> 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 450 +

Variants, if any:

S. No.	Variant model	Variant features
1.	ACE DI 450 +	With dry air cleaner, dry disc brake, manual steering
2.	ACE DI 450 DC+	With dual clutch, oil bath air cleaner, manual steering.
3.	ACE DI 450 LT+	With large tyre, dry air cleaner & dry disc brake.
4.	ACE DI 450 PS+	With power steering, dry type air cleaner, oil immersed brake
5.	ACE DI 450 RP+	With Reverse PTO, oil bath type air cleaner, dry disc brake

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

Year of manufacture : 2013

Chassis number : 06134515160

Country of origin : India

### 1.2 Engine:

Make : ACE

Model : AX 45

Type : Four stroke, water cooled, naturally aspirated,  
direct injection, diesel engine

Serial number : 13058243

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

- Maximum speed at no load : 2400 to 2500

- Low idle speed : 700 to 800

- Speed at maximum torque : 1600

#### Rated speed, (rpm):

- For PTO use : 2300

- For drawbar use : 2300



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

Sl. No.	Adjustments / Defects / Breakdowns and Repairs	Tractor run hours
1.	During Drawbar performance leakage of Transmission oil was observed from transmission to clutch housing. After dismantling from the clutch housing it is found that the oil seal (part no. 934035025070) was misaligned and damaged. This was replaced with new one. (Mn-5)	22.2

### 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
<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	31.0 (D)	31.8	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	31.0 (D)	31.1	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+ 5%	262 (D)	251	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	165 (D)	157.2	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	18	16.4	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)	115	Yes



1	2	3	4	5	6	7
	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)	92	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.51 (max.) (R)	0.73	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)	0.34 per metre	Yes
<b>16.1.2 Drawbar performance :</b>						
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	16.50 (D) 16.57 (R)	21.36	Yes
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) 12.56 (R)	17.12	Yes
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.	24.8 (D) 25.44 (R)	27.3	Yes
d)	Max. transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	135	84	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%]	9.80 (D)	10.44	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	7.50 (D) 7.48 Minimum, (R)	8.77	Yes



1	2	3	4	5	6	7
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)	70	No
<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 unballasted* tractor, (m):					
	1) Cold brake	Evaluative	10	10 (R)	9.65	Yes
	2) Hot brake	Evaluative	10	10 (R)	9.65	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)	531	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
*Road Ballast not recommended by the manufacturer.						
<b>16.1.5 Noise measurement :</b>						
a)	Maximum ambient noise emitted by the tractor, dB(A)	Evaluative	As per CMVR	88 (R)	85	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)	190	No
	2) Right foot rest			100 (R)	190	No
	3) Seat (with driver seated)			100 (R)	80	Yes
	4) Steering wheel			100 (R)	100	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	--	4.00 to 6.00 (D)	5.7 to 6.2	No
	2) Four wheel		--	3.50 to 5.50 (D)	5.5 to 5.8	No
c)	Fuel consumption (ml/km/tonne):					



1	2	3	4	5	6	7
	1) Two wheel	Non Evaluative	--	35.0 to 55.0 (D)	32.4 to 34.8	No
	2) Four wheel		--	30.0 to 50.0 (D)	28.6 to 30.2	No
<b>16.1.8</b>	<b>Wetland cultivation :</b>					
	Sealing for the following assemblies:	Evaluative	<b>The identified assemblies should essentially meet the requirement of IS: 11082. No water ingress in the identified assembly given in column-2.</b> 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 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-				
<b>16.1.9</b>	<b>Safety features :</b>					
<b>a)</b>	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes (As per IS 12239 (part 2))	Requirements as per table no. 4	Provided	Yes
<b>b)</b>	Lighting arrangement (Tractor having more than 1150 mm rear track width)	Evaluative	As per CMVR	--do--	Provided	Yes
<b>c)</b>	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--	Conforms	Yes
<b>d)</b>	Technical requirements for PTO shaft	Non-Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--do--	Conforms	Yes
<b>e)</b>	Dimension of three point linkage	Non-Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	--do--	Does not meet the requirement	No
<b>f)</b>	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)	--do--	Conforms	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 450 +	Yes
	3) Year of manufacture	Evaluative		--	2013	Yes
	4) Engine serial number	Evaluative		--	1305 8243	Yes
	5) Chassis number	Evaluative		--	06134515160	Yes
	6) Declaration of PTO power, (kW)	Evaluative		--	31	Yes



16.1.11 Discard limit for:						
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	98.55	98.00 to 98.06	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.55	0.163 to 0.203	Yes
<b>(c) Ring end gap (mm):</b>						
	- Top comp. ring.	Evaluative	-do-	2.0	0.55	Yes
	- 2 <sup>nd</sup> comp. ring.		-do-	2.0	0.65 to 0.70	Yes
	- Oil ring.		-do-	2.0	0.50 to 0.60	Yes
<b>(d) Ring groove clearance (mm):</b>						
	- Top comp. ring.	Evaluative	-do-	0.25	Taper rings	--
	- 2 <sup>nd</sup> comp. ring.		-do-	0.25	0.063 to 0.071	Yes
	- Oil ring.		-do-	0.25	0.017 to 0.020	Yes
<b>(e) Clearance of main bearings (mm):</b>						
	- Diametrical clearance	Evaluative	To be specified by the manufacturer	0.40	0.073 to 0.12	Yes
	- Crankshaft end float	Evaluative		0.60	0.18	Yes
<b>(f) Clearance of big end bearings, (mm):</b>						
	- Diametrical	Evaluative	-do-	0.60	0.073 to 0.193	Yes
	- Axial	Evaluative	-do-	1.00	0.30 to 0.38	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	1.00	0.083 to 0.139	Yes
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	1.00	0.209 to 0.225	Yes
<b>16.1.12 Literature (Submission to test agency)</b>						
(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
<b>16.1.13 CATEGORY OF BREAKDOWNS / DEFECTS :</b>						
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.	Mn- 5 (onetime)	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	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	Not applicable
		If ROPS fitted it should meet the requirement of IS: 11821-1992	Not provided	Not applicable
2.	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)] : 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 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) : [IS 12239 (Part-1)-1996 (Reaffirmed in February, 2012) / ISO 4254-1:1989] : Does not conforms
- 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)] : 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 conforms
- 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 16.4 %.
- ii) The specific fuel consumption corresponding to maximum power was measured as 251 g/kWh against the declaration of 262 g/kWh, which meets the requirement of IS:12207-2014 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 65 mm & 70 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 especially at the seat. This calls for dampening down of vibrations to improve the operational comfort and service life of 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.

**16.4.1.5 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.

**16.4.2 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).

**16.4.3 Component/ assembly inspection**

After completion of puddling test and water proof test, the tractor was partially dismantled it was observed that gearbox oil was presence in clutch housing. It 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) Provision of differential lock.
- iv) Provision of PTO shaft master shield.



- 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 ACE DI 350+, DI 450+ & DI 550+ tractors)
  - ii) Spare parts catalogue (for ACE DI 350+, DI 450+ & DI 550+ tractors)
  - iii) Workshop manual (for ACE DI-350+ & DI-450+ tractors)
- 16.7.2** The given literature supplied was found adequate. However, the following points need 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.
- 16.7.3** The workshop manual has been supplied by the manufacturer before the release of this report.  
Therefore, it is recommended that operator's manual and workshop manual may be brought out as per IS: 8132-1999 (Reaffirmed in 2009) for the guidance of users and service personnel in national as well as regional languages by inclusion of the above information among the others.

### 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	12 Months (March, 2014 to February, 2015)	No	The tractor was under waiting for wetland field performance test.

#### TESTING AUTHORITY:

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