



**ACE DI 350 + 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)**

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T- 958/1476/2015

ACE DI 350 + TRACTOR - Commercial (Initial)

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

**Applicant** : M/s. Action Construction Equipment  
Limited,  
Jajru Road ,25<sup>th</sup> Mile stone , Mathura Road  
Ballabgarh, Faridabad-121 004 (Haryana)

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 350 +  
Declared Variants :

Sr.No	Variant Name	Variant Features
1.	ACE DI 350 DC+	: With dual clutch, Oil bath air cleaner, Dry disc brakes
2.	ACE DI 350 WB+	: With Single clutch, Dry air cleaner, Oil immersed disc brakes
3.	ACE DI 350 LT+	: With different tyre size, Dry air cleaner, Dry disc brakes
4.	ACE DI 350 RP+	: With Reverse PTO, Dry air cleaner, Dry disc brakes

Type : Four wheeled, rear-wheel driven, unit construction, general purpose Agricultural Tractor  
Year of manufacture : 2013  
Chassis number : 06133515166  
Country of origin : India

**1.2 Engine:**  
Make : Ace (apa)  
Model : AX 35  
Type : Four stroke, water cooled, naturally aspirated, direct injection, diesel engine  
Serial number : 13090994

**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 : 1550 to 1750  
**Rated speed, (rpm):**  
- For PTO use : 2300  
- For drawbar use : 2300

### 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: 12207-2008	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>						
<b>a)</b>	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	23.0 (D)	22.3	Yes
<b>b)</b>	Power at rated engine speed, (kW)	Non Evaluative	-do-	23 (D)	22.3	Yes
<b>c)</b>	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	265 (D)	267	Yes
<b>d)</b>	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	125 (D)	113.6	Yes
<b>e)</b>	Back-up torque, percent	Non Evaluative	10 percent, min. (R)	17 (D)	22.55	Yes
<b>f)</b>	<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)	112	Yes
	2) Coolant (water)	Evaluative	The observed value under high ambient condition should not exceed the declaration	110 (D)	87	Yes
<b>g)</b>	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.67 (R)	0.96	Yes
<b>h)</b>	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)	0.19	Yes

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1	2	3	4	5	6	7	
<b>16.1.2</b>	<b>Drawbar performance :</b>						
<b>a)</b>	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	15.75 (R) 16.0 (D)	18.74	Yes	
<b>b)</b>	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	12.27 (R) 12.5 (D)	14.69	Yes	
<b>c)</b>	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.	17.84 (R) 18.4 (D)	19.0	Yes	
<b>d)</b>	Maximum transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	135 (D)	80	Yes	
<b>16.1.3</b>	<b>Power lift and hydraulic pump performance :</b>						
<b>a)</b>	Maximum lifting capacity throughout the range of lift, (kN):						
	1)	At hitch points	Non Evaluative	[Tolerance of minus 10%]	9.80 (D)	9.96	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	5.35 (R) 7.5 (D)	9.81	Yes
<b>b)</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 (R)	05	Yes	
<b>16.1.4</b>	<b>Brake performance at 25 kmph:</b>						
<b>a)</b>	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)	8.29	Yes
	2)	Hot brake	Evaluative	10	10 (R)	8.39	Yes
<b>b)</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)	404 to 460	Yes	
<b>c)</b>	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	

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1	2	3	4	5	6	7
<b>16.1.5</b>	<b>Noise measurement :</b>					
<b>a)</b>	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	88 (R )	84	Yes
<b>b)</b>	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	98 (R )	93	Yes
<b>16.1.6</b>	<b>Amplitude of mechanical vibrations at :</b>					
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R )	130	<b>No</b>
	2) Right foot rest				260	<b>No</b>
	3) Seat (with driver seated)				100	<b>Yes</b>
	4) Steering Wheel				140	<b>No</b>
<b>16.1.7</b>	<b>Haulage requirements :</b>					
<b>a)</b>	Gross mass of the trailers, (tones):					
	1) Two wheel	Non Evaluative	--	5.0	5.0	Yes
	2) Four wheel		--	6.0	6.0	Yes
<b>b)</b>	Distance travelled / litre of fuel consumption, (km/l):					
	1) Two wheel	Non Evaluative	--	3.5 to 5.5	6.57 to 6.67	Yes
	2) Four wheel		--	4.0 to 6.0	5.50 to 5.99	Yes
<b>c)</b>	Fuel consumption (ml/km/tonne):					
	1) Two wheel	Non Evaluative	--	30.0 to 50.0	29.98 to 30.46	<b>No</b>
	2) Four wheel		--	35.0 to 55.0	27.30 to 30.22	<b>No</b>
<b>16.1.8</b>	<b>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.	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-				
<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) 1999)	---	Meets the requirements	Yes
<b>b)</b>	Lighting arrangement	Evaluative	As per CMVR	--	--do---	Yes
<b>c)</b>	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)	--	--do---	Yes
<b>d)</b>	Technical requirements for PTO shaft	Non Evaluative	Should meet the requirements of IS: 4931 (As amended from time to time)	--	Does not Meet the requirements	<b>No</b>

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1	2	3	4	5	6	7
<b>e)</b>	Dimensions of three point linkage	Non Evaluative	Should meet the requirements of IS: 4468 (Part-I) (As amended from time to time)	--	Meet the requirements	Yes
<b>f)</b>	Specifications of linkage	Non Evaluative	Should meet the requirements of IS 12953 and IS 12362 (Part 3) (As amended from time to time)	--	Meet the requirements	Yes
	Swinging drawbar			---	Not Provided	---
<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 350 +	Yes
	3) Year of manufacture	Evaluative		--	2013	Yes
	4) Engine number	Evaluative		--	13090994	Yes
	5) Chassis number	Evaluative		--	06133515166	Yes
	6) Declaration of PTO power, (kW)	Evaluative		--	23	Yes
<b>16.1.11</b>	<b>Discard limit for:</b>					
<b>(a)</b>	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	91.0	90.00 to 90.03	Yes
<b>(b)</b>	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.55	0.105 to 0.115	Yes
<b>(c)</b>	<b>Ring end gap (mm):</b>					
	- Top comp ring.	Evaluative	-do-	2.0	0.40 to 0.45	Yes
	- 2 <sup>nd</sup> comp. ring.		-do-	2.0	0.45	Yes
	- Oil ring.		-do-	2.0	0.30 to 0.45	Yes
<b>(d)</b>	<b>Ring groove clearance (mm):</b>					
	- Top comp ring.	Evaluative	-do-	0.25	0.087 to 0.097	--
	- 2 <sup>nd</sup> comp. ring.		-do-	0.25	0.065 to 0.069	Yes
	- Oil ring.		-do-	0.25	0.035 to 0.038	Yes
<b>(e)</b>	<b>Clearance of main bearings (mm):</b>					
	- Diametrical clearance	Evaluative	To be specified by the manufacturer	0.90	0.110 to 0.182	Yes
	- Crankshaft end float	Evaluative		0.55	0.25	Yes
<b>(f)</b>	<b>Clearance of big end bearings, (mm):</b>					
	- Diametrical	Evaluative	-do-	0.90	0.055 to 0.082	Yes
	- Axial	Evaluative	-do-	0.55	0.40 to 0.45	Yes
<b>(g)</b>	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	1.0	0.106 to 0.185	Yes
<b>(h)</b>	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	1.0	0.095 to 0.123	Yes

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1	2	3	4	5	6	7
<b>16.1.12 Literature (Submission to test agency)</b>						
<b>(a)</b>	Operator manual	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
<b>(b)</b>	Parts Catalogue	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
<b>(c)</b>	Workshop/ Service manual	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes

<b>16.1.12 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	<b>None</b>	Yes
2.	Major	Evaluative	Not more than two and neither of them should be repetitive in nature	<b>None</b>	Yes
3.	Minor	Evaluative	Not more than five and frequency of each should not be more than two.	<b>None</b>	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.	<b>None</b>	Yes

<b>16.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2008:</b>				
S. No.	Characteristic	Requirements as per IS: 12207-2014	As observed	Whether meets the requirements (Yes/No.)
1	2	3	4	5
1.	Maximum oil pull over, (%)	0.25% (max.)	Not applicable	---
2.	Seating requirements	Should meet the requirements of IS: 12343-1998	Meets the requirements	<b>Yes</b>
3.	Fitment of ROPS	With a provision for fitment of ROPS.	Not provided	<b>No</b>
		If ROPS fitted it should meet the requirement of IS: 11821-1992	ROPS not fitted	---
4.	Technical requirements for PTO shaft	Should meet the requirements of IS: 4931 -1995	Does not meets the requirements	<b>No</b>
5.	Dimensions of three point linkage	Should meet the requirements of IS: 4468 (Part-I)-1997	Does not meets the requirements	<b>No</b>

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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

**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)] : **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**



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**16.4 Salient Observations:**

**16.4.1 Laboratory tests:**

**16.4.1.1 PTO Performance:**

- i) The backup torque is 22.55 %.
- ii) The specific fuel consumption corresponding to maximum power was measured as 267g/kWh against the declaration of 265 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 35 mm & 30 mm respectively, which was considered on higher side. This may be looked into for necessary corrective action.

**16.4.1.3 Hydraulic performance test:**

- i) The maximum tilt angle of mast from vertical over the full range of lift was observed as 5.0 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 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 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.

**16.4.1.6 PTO shaft & its Master shield:**

In PTO shaft parameter B doesn't meets the requirement and PTO master shield should be provided as per IS: 12343-1988.

**16.4.1.7 Operator's seat:**

- i) All parameters meets the requirement of IS: 12343-1988.

**16.4.2 Field performance test:**

**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).

**16.6 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 350 +, DI 450+ & DI 550+tractors)
- ii) Spare parts catalogue (for ACE DI 350 +, DI 450+ & DI 550+tractors)
- iii) Work shop Manual (ACE DI 350+ & DI 450+ 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	12 Months (March , 2014 to February , 2015)	No	Due to non-availability of Field for wet land

**TESTING AUTHORITY:**

**R.M.Tiwari**  
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, 16.4.1.4 and 16.4.1.5	Applicant will take necessary corrective action at his end

**Annexure- I**

**BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST**

S. No	Item	Disc Plough	Rotavator	Puddler
1.	Make	Field king	Same	ACE
2.	Type	Mounted	Mounted	Mounted
3.	No. of Disc/blades	Two	30 in 7 Flanges	12 (6 in each gang)
4.	Type of Disc/blades	Plain concave	L shape	Notched
5.	Size of discs/blades, (mm)	650	160 x 70 x 7	500
6.	Spacing between discs/flanges, (mm)	560	220	180
7.	Lower hitch point span, (mm)	860	720	835
8.	Mast height, (mm)	615	510	510
9.	<b>Overall dimensions, (mm):</b>			
	- Length	1850	1420	1020
	- Width	855	960	2070
	- Height	1200	930	1050
10.	Gross mass, (kg)	295	420	305

**Annexure- II**

**BRIEF SPECIFICATION OF HALF CAGE WHEEL**

Sl No.	Items	Specification
1.	Type	Half cage wheel
2.	Outer dia, (mm)	1800
3.	Width, (mm)	355
4.	No. and types of lugs	12, 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)	65

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**Annexure – III**

**TRACTOR RUN HOURS DURING TEST**

<b>A.</b>	<b>LABORATORY AND TRACK TESTS:</b>	<b>HOURS</b>
1.	Running-in	--
2.	PTO performance test	21.40
3.	Power lift and hydraulic pump performance test	2.25
4.	Drawbar performance test	15.55
5.	Turning ability	0.7
6.	Location of centre of gravity	0.25
7.	Operator's field of vision	nil
8.	Brake test	1.33
9.	Noise measurement	1.25
10.	Mechanical vibration test	1.0
11.	Nominal speed test	1.17
<b>B.</b>	<b>FIELD TEST:</b>	
1.	Disc Ploughing	10.6
2.	Rotavation	10.4
3.	Puddling (Including five hours water proof test)	15.7
<b>C.</b>	<b>HAULAGE TEST:</b>	7.65
<b>D.</b>	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	5.58
	<b>TOTAL:</b>	<b>94.83</b>