व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT (Variant)

संख्या / No. : T-837/1346/2012
माह / Month : July, 2012

ACE DI 550 DC TRACTOR

सत्यमेव जयते

भारत सरकार
कृषि मंत्रालय
(कृषि एवं सहकारिता विभाग)

GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE
(DEPARTMENT OF AGRICULTURE & CO-OPERATION)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान
ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५

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3. ESSENTIAL TEST

3.1 SPECIFICATIONS

			Base Model	Variant Model
3.1.1	**Tractor:**			
	Make	:	ACE (apa)	ACE
	Model	:	DI - 450	DI 550 DC
	Type	:	Four wheeled, rear wheel driven, standard Agricultural Tractor	
	Year of manufacture	:	2008	**2011**
	Chassis number	:	01084500015	**11115505921**
	Country of Origin	:	India	**India**
3.1.2	**Engine:**			
	Make	:	ACE (apa)	**ACE**
	Model	:	A 498 BT	**AA 498 BT**
	Type	:	Four stroke, Water cooled, direct injection, diesel engine.	
	Serial number	:	0715047	11123521
	Engine speed (Manufacturer's recommended production setting), (rpm):			
	- Maximum speed at no load,	:	2400 to 2500	2400 to 2500
	- Low idle speed	:	700 to 800	700 to 800
	- Speed at maximum torque	:	1600 to 1700	1600 to 1700
	Rated speed, (rpm):			
	- For PTO use	:	2300	2300
	- For drawbar use	:	2300	2300
3. 1.3	**Cylinder & Cylinder Head:**			
	Number	:	Four	**Four**
	Disposition	:	Vertical, inline	**Vertical, inline**
	Bore/stroke, (mm)	:	98 / 105	98 / 105
	Capacity as specified by the applicant, (cc)	:	3168	3168
	Compression ratio	:	18.5:1	18.5:1
	Type of cylinder head	:	Monoblock	Monoblock
	Type of cylinder liners	:	Wet, replaceable	Wet, replaceable
	Type of combustion chamber	:	Direct injection,Torroidal cavity on piston crown	Direct injection,Torroidal cavity on piston crown
	Arrangement of valves	:	Overhead, inline	**Overhead, inline**
	Valve clearance (cold):			
	- Inlet valve, (mm)	:	**0.35**	0.35
	- Exhaust valve, (mm)	:	**0.45**	0.45
3. 1.4	**Fuel System:**			
	Type of fuel feed system	:	**Gravity and Force feed**	Gravity and Force feed

1	2	3	4	5	6
24.	Other changes				
	a)	Governor			
		Make & Model group combination number of governor	Shandong Xinya Industrial Co. Ltd, China & T-375-1200	Wuxi Weifu High-Tech Co. Ltd. & BHF4PL085223	Changed
	b)	Fuel injector			
		Make & Model group combination number of fuel injector	Shandong Xinya Industrial Co. Ltd, China & P136B	Wuxi Weifu High-Tech Co. Ltd. & KBALP001F	Changed
	c)	POWER LIFT (HYDRAULIC SYSTEM)			
		Make	ACE (apa)	Mitta (apa)	Changed
		Pump delivery rate at min. pressure and rated engine speed (l/min)	23.39	22.02	Changed
		Max. hydraulic power, (kW)	5.1	5.4	Changed
		Pump delivery rate at max. hydraulic power, (l/min)	22.07	20.73	Changed
		Pressure at maximum hydraulic power, (MPa)	14.0	15.5	Changed
		Sustained pressure of the open relief valve, (Mpa)	17.0	18.0	Changed

7. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

7.1 On the basis of test conducted the performance results have been summarized as evaluative (mandatory) and non – evaluative (not mandatory) parameters applicable for qualifying Minimum Performance Criteria as per clause-4 table-1 of Indian Standard 12207: 2008 for acceptance of tractor for the purpose of subsidies/NABARD financing for the applicable features for this tractor model.

Sl. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2008	Values declared by the applicant/ requirement		As observed		Whether Variant model meets the require-ments (Yes/No.)
				Base model	Variant Model	Base model	Variant model	
1	2	3	4	5 a	5 b	6 a	6 b	7
7.1.1	PTO Performance :							
a)	- Max. 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	32.2 (D)	34.0 (D)	31.3	33.8	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	32.2 (D)	34.0 (D)	31.3	33.8	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	252 (D)	265 (D)	262	254	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	165 (D)	178 (D)	156.2	160.3	No

1	2	3	4	5 a	5 b	6 a	6 b	7
e)	Back-up torque, percent	Non Evaluative	7 percent, min.	7	25.1	20.1	14.2	Yes
f)	Maximum operating temperature (^{o}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	135	116	108	Yes
	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.	115	115	92	75	Yes
7.1.2	Power lift performance:							
	Max. Lift capacity, (kN):							
a)	i) - At the hitch points	Non Evaluative	**[Tolerance of minus 10%]**	12.00 (D)	12.00 (D)	9.73	17.94	**No**
	ii) - At 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	9.17 (D) 7.41 (R)	9.17 (D) 8.00 (R)	7.80	14.59	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]	25	50	25	03	Yes
7.1.2	Labelling of tractors (Provision of labelling plate):							
	1) Make	Evaluative	Should conform to the require-ments of CMVR along-with declared value of PTO HP	--	ACE			Yes
	2) Model	Evaluative		--	DI 550 DC			Yes
	3) Year of manufacture	Evaluative		--	2011			Yes
	4) Engine serial number	Evaluative		--	11123521			Yes
	5) Chassis number	Evaluative		--	11115505921			Yes
	6) Declaration of PTO power, kW	Evaluative		--	34.0			Yes

7.2 Salient Observations:

7.2.1 Laboratory tests:

7.2.1.1 PTO Performance:

i) The backup torque is 13.8 %.

ii) The maximum power was observed as **33.8 kW** against the declaration of **34.0 kW,** which meet the requirement of IS: 12207-2008 with regard to tolerance.

iii) The specific fuel consumption corresponding to maximum power was measured as **254 g/kWh** against the declaration of **265 g/kWh**, which meets the requirement of IS:12207-2008 with regard to tolerance.

iv) The maximum equivalent crankshaft torque was measured as **160.3 Nm** against the declaration of **178.0 Nm,** which does not meets the requirement of IS: 12207-2008 with regard to tolerance. This should be looked into for necessary corrective action.

7.2.1.2 Hydraulic Performance:

i) The lifting capacity at hitch points was observed as **17.90 kN** against the specified value of **12.00 kN**, which is 33.0% on higher side and does not meet the requirement of IS: 12207-1999 with regard to tolerance. This should be looked into for necessary corrective action.

ii) The lifting capacity at standard frame was observed as **14.59 kN** against the specified value of 9.17 kN, which is 37.1% on higher side with reference to declaration. This should be looked into for necessary corrective action.

iii) The moment about rear axle was computed as **15.75 kN-m** and **21.74 kN-m**, at hitch point and standard frame respectively which is on higher side when compared to the moment of tractor about front axle i.e. **15.29 kN-m**. Therefore, it is recommended that the lifting capacity may be reduced suitably or ballast recommendation for front axle may be reviewed to avoid front lifting of tractor

7.2.1.3 Three Point Linkage:

i) The Lateral distance from lower hitch point to centre line of tractor and power range (without force) does not meet the requirement of IS: 4468 (Part-1)-1997. This may be looked into for necessary corrective action.

ii) Some of the parameters of three point linkage conform to Cat. I and some of them conform to Cat. II. In view of the spirit of standardization, necessary improvements may be incorporated.

7.2.1.4 Specifications of Power Take Off Shaft:

The dimensions 'a' of the Power take-off shaft does not meet the requirement of IS: 4931-1995. This should be looked into for necessary corrective action.

7.3 Maintenance / Service problems:

No noticeable maintenance and service problems was observed during the test.

7.4 Recommendation with regard to safety on tractor:

The following requirements, inter alia, may be considered for incorporation on the tractor as per relevant Indian Standards:

i) Provision for spark arresting device in exhaust system.

ii) Provision of PTO shaft master shield.

iii) Provision of differential lock.

7.5 Adequacy of Literature:

7.5.1 The following literatures were supplied with the test tractor for reference during the test.

a) Operator's manual (ACE DI -550 DC & ACE DI -450 tractor models).

b) Parts Catalogue (ACE DI -550 DC & ACE DI -450 tractor models).

7.5.2 The supplied literature was found adequate. However, these literatures should be brought out in national as well as other regional languages of India for guidance of users.

The results of the tests carried out on variant model **"ACE 550 DC"** have been compared with those on base model **"ACE DI 450"** and found within the limit, as specified in Indian Standard:12207-2008.

TESTING AUTHORITY:

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8. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
1.	7.2.1.1.iv, 7.2.1.2.i, 7.2.1.2.ii, 7.2.1.2.iii, 7.2.1.3.i, 7.2.1.4 & 7.4	We are looking into these for improvement

ANNEXURE -I

TRACTOR RUN HOURS DURING TEST

A.	**LABORATORY AND TRACK TESTS:**	**HOURS**
1.	Running-in	--
2.	PTO performance test	11.0
3.	Power lift and hydraulic pump performance test	1.2
4.	Nominal speed test	0.7
5.	Turning ability	0.2
6.	Operator's field of vision	0.2
B.	Miscellaneous test and other run hours including idle run, transportation, preparation for test and trial runs.	1.27
	TOTAL:	**14.6**