



CAPTAIN, 120 DI 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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2. FUEL AND LUBRICANTS

2.1 Fuel : The High-speed diesel oil supplied by M/s Indian Oil Corporation Limited having density of 0.836 g/cc at 15°C was used.

2.2 Lubricants:

S. No.	Particulars	As recommended by the manufacturer	As used during the test
1.	Engine & air cleaner oil	SAE 20W40	SAE 20W40
2.	Main gear box and high-low gear box assembly, Rear differential unit, rear axle, rear final drive & hydraulic system	SAE 90	Oil originally filled in the tractor was not changed
3.	Front Differential unit, Front axle and front final drive	SAE 90	Not applicable
4.	Steering gear box	SAE 90	-do-
5.	Grease	Servo JML MP-3	Servo Grease MP

3. ESSENTIAL TESTS

3.1 SPECIFICATIONS

3.1.1 Tractor:

	Base model	Variant model
Make	M/s. Captain Tractors Pvt. Ltd. (apa)	Captain
Model	DI 2600 4WD	CAPTAIN 120 DI
Type	Four wheel driven, Agricultural Tractor	Four wheeled, rear wheel drive, agricultural tractor.
Year of manufacture	2010	2013
Chassis serial number	10042600	B13040002
Tractor number	K 0314	Not specified
Country of origin	India	India

3.1.2 Engine:

	Base model	Variant model
Make	Field Marshal	Field Marshal
Model	FH-785	FH-785
Type	Four stroke, naturally aspirated, Air cooled, direct injection, diesel engine.	Four stroke, naturally aspirated, Air cooled, direct injection, diesel engine.
Serial number	DB 5155	FE 08415
Country of origin	India	India
Engine speed (rpm), (Manufacturer's recommended production setting):		
- Maximum speed at no load	2650 to 2850	2650 to 2850
- Low idle speed	900 to 1100	900 to 1100
- Speed at maximum torque	1330 to 1530	1330 to 1530
Rated speed, (rpm):		
- For PTO use	2600	2600
- For drawbar use	2600	2600

3.1.3 Cylinder & Cylinder Head:

	Base model	Variant model
Number	One	One
Disposition	Vertical	Vertical
Bore/stroke, (mm)	85/110	85/110



	Base model	Variant model
Capacity as specified by the applicant, (cc)	: 624	624
Compression ratio	: 17 :1	17 :1
Type of cylinder head	: Monoblock, Cast aluminum alloy with fins	Monoblock, Cast aluminum alloy with fins
Type of cylinder liners	: Dry, Integral with cylinder block with cast iron fins.	Dry, Integral with cylinder block with cast iron fins.
Type of combustion chamber	: Direct combustion, cavity on piston crown.	Direct combustion, cavity on piston crown.
Arrangement of valves	: Overhead	Overhead
Valve clearance (cold/hot):		
- Inlet valve, (mm)	: 0.10	0.10
- Exhaust valve, (mm)	: 0.10	0.10
3.1.4 Fuel System:		
Type of fuel feed system	: Gravity	Gravity
3.1.4.1 Fuel tank:		
Capacity, (l)	: 14.9	14.1
Location	: Above clutch housing	Not provided
Provision for draining of sediments/ water	: Not provided	Not provided
Material of fuel tank	: Metallic	Metallic
3.1.4.2 Water Separator:		
Make	: Hilux	Not provided
Type	: Inverted funnel gravity separation	--
Location	: On LHS of the engine	--
Capacity (l)	: 0.50	--
3.1.4.3 Fuel feed pump:	: Not Provided	
3.1.4.4 Fuel filters:		
Make	: Bosch, India	Bosch, India
Model/Group combination No.	: 9 450 030 120	F 002 H20 108
Number	: Two	One
Type of elements:		
-Primary	: Cloth	Paper
-Secondary	: Paper	-
Capacity of final stage filter, (l)	: 0.55	0.40
3.1.4.5 Fuel Injection pump:		
Make	: Bosch, India	Bosch, India
Model/Group combination No.	: F002 F20 033	F002 F20 033
Type	: Plunger	Plunger
Serial number	: Not available	Not available
Method of drive	: Through engine camshaft.	



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 requirements (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	5.8	5.8	6.1	5.6	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	5.8	5.8	5.8	5.3	No
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	332	332	323	335	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	33.0 (D)	33.0 (D)	29.0	26.0	Yes
e)	Back-up torque, percent	Non Evaluative	7 percent, min.	7 perc ent, min (R)	7 perc ent, min (R)	27.2	20.9	Yes
f) Maximum operating temperature (°C)								
	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.	130 (D)	130 (D)	131	122	Yes



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1	2	3	4	5 a	5 b	6 a	6 b	7
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under ambient conditions	3.32 (R)	NA	1.64	NA	Yes
h)	Smoke level	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	3.25 per meter (R)	3.25 per meter (R)	1.14 per meter	1.09 per meter	Yes
17.1.2 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%]	5.2 (D)	5.2 (D)	3.41	3.96	No
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	1.44 Minimum, (R)	1.44 Minimum, (R)	3.36	1.58	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 minute, (mm)	Non Evaluative	[Tolerance of plus 5 mm]	10 (D)	10 (D)	10	Nil	Yes
17.1.3 Brake performance at maximum attainable speed of 18.74 kmph:								
a) Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with ballast* (m):								
1)	Cold brake	Evaluative		10	10 (R)	10 (R)	4.40	4.62
2)	Hot brake	Evaluative		10	10 (R)	10 (R)	4.90	4.25
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative		600	600 (R)	600 (R)	480 to 500	360 to 480
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 (R)	Yes	Yes
*The manufacturer has not recommended ballasting for road test. Therefore, the brake test was conducted under standard ballast condition only.								



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1	2	3	4	5	6	7
7.1.4 Labelling of tractors (Provision of labelling plate):						
1)	Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	CAPTAIN	CAPTAIN	Yes
2)	Model	Evaluative		DI 2600 4WD	CAPTAIN 120 DI	Yes
3)	Year of manufacture	Evaluative		2010	2013	Yes
4)	Engine serial number	Evaluative		DB 5155	FE08415	Yes
5)	Chassis number	Evaluative		10042600	B13040002	Yes
6)	Declaration of PTO power, kW	Evaluative		5.8	5.8	Yes

7.2 Salient Observations:

7.2.1 Laboratory tests:

7.2.1.1 PTO Performance:

- i) The maximum power was observed as 5.6 kW against the declaration of 5.8 kW, which meet the requirement of IS: 12207-2008 with regard to tolerance.
- ii) The specific fuel consumption corresponding to maximum power was measured as 335 g/kWh against the declaration of 332 g/kWh, which meets the requirement of IS:12207-2008 with regard to tolerance.
- iii) The maximum equivalent crankshaft torque was observed as 26.0 Nm against the declaration of 33.0 Nm and which does not meet 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) During the hydraulic performance test, the hydraulic pressure pipe to distributor (at junction position with distributor) was leaked .so hydraulic pressure pipe (Part no. 011430.00) replace with new one.
- ii) The maximum lifting capacity throughout the range of lift was observed as 3.96 kN against the declaration of 5.20 kN and which does not meet the requirement of IS: 12207-2008 with regard to tolerance. This should be looked into for necessary corrective action.

7.2.1.3 Three point linkage:

- i) The diameter of hitch pin hole of upper hitch point, transport height & power/movement range of tractor does not meets the requirement of IS: 4468 (Part-1)-1997. This should be looked into for necessary corrective action.
- ii) Some of the parameters of the three point 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.

7.2.1.4 Linkage drawbar:

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

7.2.1.5 Location and operation of operator's control:

The working clearance around the high - low selection lever and the hydraulic pressure pipe was observed as 07 mm against the minimum requirement of 70 mm as per per IS: 12239 (Part 2)-1996 This should be looked into for necessary corrective action.

7.3

Maintenance / Service Problems:

During the PTO performance test maximum power was observed as 5.27 kW against the declaration of 5.8 kW .The observed power is 9.14% less than the declaration.

So the tractor was removed from the PTO test lab & as per applicant request, as per service manual of tractor 50 hours of engine, servicing has been done.

- (i) Engine oil filter replaced with new one
- (ii) Engine oil change
- (iii) Gear box oil filter was cleaned.
- (iv) The engine valve clearance was recorded as 0.40 mm & 0.40 mm against the declaration of 0.10 & 0.10 mm for inlet and exhaust valves respectively. The valve clearance was adjusted and set to declared value.

7.4

Recommendation with regard to safety on tractor:

The following requirements, inter alia, may be considered for incorporation on the tractor:

- i) Provision of safety against accidental start of the engine.
- ii) Provision for spark arresting device in exhaust system.
- iii) Provision of PTO shaft master shield.
- vi) Vertical retainness both side has not been provided, only on inner sides of clutch & brake pedals.

7.5

Adequacy of Literature supplied with machine:

7.5.1

Literature was supplied with the tractor for reference during the test.

- i) Operator's manual (for Captain 120 DI and Captain 120 DI 4WD Tractor)
- ii) Spare parts catalogue (for Captain 120 DI and Captain 120 DI 4WD Tractor)
- iii) Service catalogue (for Captain 120 DI and Captain 120 DI 4WD Tractor)

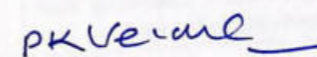
7.5.2

Information related to PTO , Drawbar and hydraulic performance of the tractor such as, maximum engine power, rated engine power, maximum torque, backup torque, specific fuel consumption, maximum drawbar power & pull, hydraulic pump discharge rate, hydraulic power & lifting capacities etc should be included in the technical specification of the tractor for the guidance of the user's.

The results of the tests carried out on variant model "CAPTAIN, 120 DI" have been compared with those on base model "CAPTAIN, DI 2600 4WD "and found within the limit, as specified in Indian Standard: 12207-2008.

8. 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	5 Months (May 2013 to September, 2013)	Yes	None

TESTING AUTHORITY:


P. K. VERMA
SENIOR AGRICULTURAL ENGINEER



C.R LOHI
DIRECTOR

Test Report compiled by: **Shri.Chanchlesh Singh Raghuwanshi**, Senior Technical Assistant.

9. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
9.1	7.2	Suggestion and recommendation will be incorporated for the quality of product.