

व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT (Batch Test)

संख्या / No. : T-1007/1531/2016
माह / Month : March, 2016



FORCE MOTORS LTD, OX-25 ORCHARD DLX TRACTOR



सत्यमेव जयते

भारत सरकार

कृषि एवं किसान कल्याण मंत्रालय
(कृषि, सहकारिता एवं किसान कल्याण विभाग)

GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS WELFARE

(DEPARTMENT OF AGRICULTURE, CO-OPERATION AND FARMERS WELFARE)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO : 9001 - 2008 Certified Institute)

Tractor Nagar, Budni (M.P.) 466 445

E-mail fmti-mp@nic.in

Website : <http://cfmtti.dacnet.nic.in>

Telephone : 07564 - 234729

Fax : 07564 - 234743



Manufacturer	: M/s. Force Motors Ltd., Mumbai - Pune Road, Akurdi, Pune – 411 035
Test requested by	: The manufacturer
Place of running-in	: At CFMT&TI, Budni
Duration of said running-in, (h):	
- Engine	: 33
- Transmission	: 33
Method of Selection	: The test sample was selected randomly out of seven tractors from the production line by the representative of testing authority.

1. SPECIFICATIONS

1.1 Tractor:	
Make	: Force Motors Ltd.
Model	: OX-25 ORCHARD DLX
Variants if any	: None
Type	: Four wheeled, Rear-wheel driven, Standard Agricultural Tractor.
Year of manufacture	: 2015
Chassis Sr. number	: T08007729A15
Country of origin	: India
1.2 Engine:	
Make	: Force Motors Ltd.
Model	: TD 1950 F(27)
Type	: Four stroke, naturally aspirated, water cooled, direct injection, diesel engine.
Serial number	: D10028696
1.2.1 Engine speed(Manufacturer's recommended production setting), (rpm):	
- Maximum speed at no load	: 2400 to 2500
- Low idle speed	: 700 to 750
- Speed at maximum torque	: 1300 to 1500
Rated speed, (rpm):	
- For PTO use	: 2200
- For drawbar use	: 2200
1.3 Cylinder & Cylinder Head:	
Number	: Three
Disposition	: Vertical, Inline
Bore / stroke, (mm) (apa)	: 90.9 / 100.0
Capacity as specified by the applicant, (cc) (apa)	: 1947
Compression ratio	: 18.3 : 1 to 18.8 :1
Type of cylinder head	: Mono block
Type of cylinder liners	: Dry, replaceable

Previous Sample

- ii) It is, however, recommended that operator's manual be revised/updated as per IS: 8132-1999.

--

Present Sample

The literature supplied was found adequate.

These literatures may also be brought out in National & other regional languages for guidance of user's.

13. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

- 13.1** Evaluative (mandatory) / Non-evaluative (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
13.1.1	PTO Performance :					
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	18.0 (D)	19.1	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	260 (D)	271	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	100 (D)	99.5	Yes
e)	Back-up torque, percent	Non Evaluative	10 %, min.	20 (D) 10%, min (R)	20.3	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.	130 (D)	105	Yes
	2) Coolant	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)	104	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions.	2.50 (D) 2.71(R)	2.51	Yes



T- 1007/1531/2016 **FORCE MOTORS LTD, OX-25 ORCHARD DLX TRACTOR – Commercial (Batch Test)**

1	2	3	4	5	6	7
h)	Smoke level (per meter)	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 (D/R)	1.36	Yes
13.1.2 Drawbar performance :						
a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	14.5 (D) 11.16 (R) Minimum	13.46	Yes
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor with standard ballast	10.8 (D) 9.18 (R) Minimum	12.26	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.	14.5 (D) 15.3 (R) Minimum	15.8	Yes
d)	Maximum transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	130 (D)	81	Yes
13.1.3 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%]	9.80 (D)	9.91	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	7.84 (D) 4.50 (R) Minimum	8.64	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]	Nil	Nil	Yes
13.1.4 Brake performance at 25 kmph:						
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)	6.95	Yes
	2) Hot brake	Evaluative	10	10 (R)	6.50	Yes

T- 1007/1531/2016

**FORCE MOTORS LTD, OX-25 ORCHARD DLX TRACTOR
Commercial (Batch Test)**


1	2	3	4	5	6	7
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (D)	240 to 259	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
13.1.5	Noise measurement :					
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	88 Maximum (R)	85	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	98 Maximum (R)	93	Yes
13.1.6	Amplitude of mechanical vibrations at :					
1)	Left foot rest	Non Evaluative	100 microns (max)	100 Maximum (R)	180	No
2)	Right foot rest				210	No
3)	Seat (with driver seated)				70	Yes
4)	Steering wheel				30	Yes
13.1.7	Haulage requirements :					
a)	Gross mass of the trailers, (tones):					
1)	Two wheel	Non Evaluative	--	2.5 (D)	2.5	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
1)	Two wheel	Non Evaluative	--	7.85 (D)	6.67 to 7.07	No
c)	Fuel consumption (ml/km/tonne):					
1)	Two wheel	Non Evaluative	--	50.9 (D)	56.6 to 60.0	No
13.1.8	Wetland cultivation :					
	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 (R)	As per test report No. T-791/1299/2011 tractor was not recommended for wet land cultivation.	
1)	Clutch assembly	-do-				
2)	Brake housings	-do-				
3)	Front axle hubs	-do-				
4)	Engine oil	-do-				
5)	Transmission oil	-do-				
13.1.9	Safety features :					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes (As per IS 12239 part 2)	--	Provided	Yes
b)	Lighting arrangement	Evaluative	As per CMVR	--	Provided	Yes
c)	Seating requirement	Non-Evaluative	Should meet the requirements of IS 12343 (as amended from time to time)	--	Conforms	Yes



T- 1007/1531/2016	FORCE MOTORS LTD, OX-25 ORCHARD DLX TRACTOR - Commercial (Batch Test)
-------------------	--

1	2	3	4	5	6	7
d)	Technical requirements for PTO shaft	Non-Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--	Conforms	Yes
e)	Dimension of three point linkage	Non-Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	--	Conforms	Yes
f)	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)	--	Conforms	Yes
13.1.10 Labelling of tractors (Provision of labelling plate):						
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	--	Force Motors Ltd.	Yes
	2) Model	Evaluative		--	OX 25 Orchard DLX	Yes
	3) Year of manufacture	Evaluative		--	2015	Yes
	4) Engine serial number	Evaluative		--	D10028696	Yes
	5) Chassis serial number	Evaluative		--	T08007729A15	Yes
	6) Declaration of PTO power, (kW)	Evaluative		--	18.0	Yes
13.1.11 Discard limit for:						
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	91.128	90.93 to 90.95	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.120	0.045 to 0.063	Yes
(c)	Ring end gap (mm):					
	- Top comp. ring.	Evaluative	-do-	1.50	0.30 to 0.45	Yes
	- 2 nd comp. ring.		-do-	1.50	1.00 to 1.10	Yes
	- Oil ring.		-do-	1.50	0.40 to 0.45	Yes
(d)	Ring groove clearance (mm):					
	- Top comp. ring.	Evaluative	-do-	0.20	0.121 to 0.130	Yes
	- 2 nd comp. ring.		-do-	0.15	0.058 to 0.070	Yes
	- Oil ring.		-do-	0.10	0.022 to 0.045	Yes
(e)	Clearance of main bearings (mm):					
	- Diametrical clearance	Evaluative	To be specified by the manufacturer-	0.24	0.050 to 0.102	Yes
	- Crankshaft end float	Evaluative		0.50	0.20	Yes
(f)	Clearance of big end bearings, (mm):					
	- Diametrical	Evaluative	-do-	0.24	0.044 to 0.072	Yes
	- Axial	Evaluative	-do-	0.24	0.20	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.75	0.190 to 0.450	Yes
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.75	0.066 to 0.130	Yes



T- 1007/1531/2016 **FORCE MOTORS LTD, OX-25 ORCHARD DLX TRACTOR Commercial (Batch Test)**

1	2	3	4	5	6	7
13.1.13 Literature (Submission to test agency)						
(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

13.1.14 CATEGORY OF BREAKDOWNS / DEFECTS :					
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.	None	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.	None	Yes

13.2 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

13.3 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 March, 2007)/ISO 730-1:1994] : Conforms
- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in March, 2007)] : Conforms
- v) Agricultural tractors - Operator's seat technical requirement [IS 12343 -1998 (First revision) (Reaffirmed in March, 2009)] : Not Applicable
- vi) Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision) : **Does not conform**
[IS 12239 (PT-1)-1996 (Reaffirmed in March, 2009)/ISO 4254-1:1989]
- vii) Tractors and machinery for agriculture and forestry – Technical means for ensuring safety Part 2: Tractors (first revision) IS 12239 (PT-2)-1999 (Reaffirmed in March, 2009)] : Conforms
- viii) Tractors and machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays [IS: 6283 (Part-1 & Part-2) -2006 & 2007(Reaffirmed in March, 2009)/ISO 3767-2:1991)] : Conforms
- ix) Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) (IS: 8133 – 1983) (Reaffirmed in March, 2009)] : Conforms
- x) Agricultural Tractor & Machinery Lighting device for travel on public roads (IS: 14683-1999) (Reaffirmed in March, 2009)] : Conforms

13.4 Salient Observations:

13.4.1 Laboratory tests:

13.4.1.1 PTO Performance:

- i) The maximum power was recorded as 17.0 & 19.1 kW in case of previous & present sample respectively against the declaration of 18 kW, which meets the requirement of IS: 12207-2014 with regard to tolerance.
- ii) The specific fuel consumption corresponding to maximum power in case of previous and present sample was measured as 266 & 266 g/kWh respectively against the declaration of 260 g/kWh, which Does not meets the requirement of IS: 12207-2014 with regard to tolerance.
- iii) The percentage of backup torque was recorded as 20 & 20.3 % in case of previous & present sample respectively and meets the requirement of IS: 12207-2014 with regard to tolerance.

13.4.1.2 Drawbar Performance:

- i) The maximum drawbar power under unballasted condition was observed as 13.6 kW & 15.8 kW in case of previous & present sample respectively.
- ii) The maximum drawbar pull under unballasted condition was observed as 10.55 kN & 10.36 kN in case of previous & present sample respectively.
- iii) The maximum drawbar pull under ballasted condition was observed as 13.38 kN & 13.46 kN in case of previous & present sample respectively.
- iv) During 10 hour drawbar test, the tyre creeping over rim of 15 mm & 55 mm nil & nil in case of previous & present sample respectively.

**13.4.1.3 Mechanical Vibration:**

The amplitude of mechanical vibration on various assemblies marked as (*) in Chapter-8 of this test report are on higher side specially at steering control wheel, Accelerator lever & brake pedals. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

13.4.1.4 Three point linkage :

Some of the parameters of three point linkage conform to cat-I and some of them conforms to cat-II keeping in view the spirit of standardization, necessary improvements may be incorporated.

13.4.1.5 Symbol for operator's control and other displays :

- i) The fuel level gauge and hand brake are not identified with symbols as per 6283 :(part I & II)-1998.This should be looked into for necessary action.
- ii) The color code for fuel gauge has not been provided as per 6283 :(part I & II)-1998.This should be looked into for necessary corrective action.

13.5 Maintenance / Service Problems:

No noticeable maintenance or service problem was observed during the test.

13.6 Recommendation with regard to safety on tractor:

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

- i) Provision of spark arresting device in the exhaust system.
- ii) Provision of hand holds for easy mounting & dismounting of the operator and width of step of foot pedal may be provided as per IS: 12239 (Part-1) – 1999.
- iii) The working clearance around the hydraulic position control lever and seat may be provided as per IS: 12239 (Part-2) – 1999.

13.7 Adequacy of Literature supplied with machine:

13.7.1 The following literature was supplied with the tractor for reference during the test.

- a) Operator's Manual for OX-25 ORCHARD DLX model of tractor.
- b) Spare Parts Catalogue for OX-25 ORCHARD DLX model of tractor.
- c) Work shop manual OX-25 ORCHARD DLX model of tractor.

13.7.2 The supplied literature was not found adequate as it does not covers the following information. Therefore, it is recommended that relevant literature may be updated by incorporating the following information:

- i) Information related to PTO, Drawbar and hydraulic performance of the tractor such as, rated PTO 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.
- ii) Information on variant models & their feature at a glance shall also be included in the operator's manual.

13.7.3 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



T- 1007/1531/2016

FORCE MOTORS LTD, OX-25 ORCHARD DLX TRACTOR -
Commercial (Batch Test)

14. 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, 2015 to April, 2016)	No	Seasonal delay (rain season during transmission running in)

TESTING AUTHORITY:PRAMOD YADAV
AGRICULTURAL ENGINEERPARDIP KUMAR C. MESHAM
SENIOR AGRICULTURAL ENGINEERC.R.LOHI
DIRECTOR

15. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
15.1	1.20.2 and 12.1.8 ix)	We will ensure conformation in series production
15.2	1.20.4	We have noted the point and care will be taken to establish the compliance.
15.3	1.20.1, 12.1.8 v) and 13.3 v)	We will ensure the dimensional conformation and series production.

**ANNEXURE - I****TRACTOR RUN HOURS DURING TEST**

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	87.9
2.	PTO performance test	10.8
3.	Power lift and hydraulic pump performance test	1.3
4.	Drawbar performance test	16.3
5.	Brake test	3.3
6.	Noise measurement	1.5
7.	Mechanical vibration test	1.0
8.	Air cleaner oil pull over test	--
9.	Theoretical speed test	0.6
	HAULAGE TEST:	5.7
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	6.4
	TOTAL:	134.8