

व्यावसायिक परीक्षण रिपोर्ट

COMMERCIAL TEST REPORT (Variant)

संख्या / No. : T-999/1523/2016

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VST SHAKTI MT180/JAI-2W 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

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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.	Air cleaner oil	SAE 20W40	As recommended
2.	Engine oil	SAE 20W40	--do--
3.	Transmission and hydraulic system oil	SAE 90	Oil originally filled in the tractor was not changed
4.	Steering housing oil	Gear HP 140	--do--
	Grease	Multipurpose	Servo Grease MP

3. ESSENTIAL TESTS

3.1 SPECIFICATION

		Base Model	Variant Model
3.1.1 Tractor:	Make	: VST Tillers Tractors Limited	VST Shakti
	Model	: VT 180D HS/JAI-4W	MT 180 / JAI - 2W
	Brand name	: VST Mitsubishi Shakti	NA
	Variants, if any	: NONE	NA
	Type	: Four wheel drive, general Purpose Tractor	Two wheel drive, general Purpose Tractor
	Year of manufacture	: 2013	2014
	Chassis number	: T 13 K 043647	T 14 H 050319
	Country of origin	: India	India
3.1.2 Engine:	Make	: VST Tillers Tractors Limited	VST Tillers Tractors Limited
	Model	: K 3 C	K 3 C
	Type	: Four Stroke, Water cooled, Indirect injection, naturally aspirated ,diesel engine	Four Stroke, Water cooled, Indirect injection, naturally aspirated ,diesel engine
	Serial number	: C 13 K 043244	C 14 G 045676
	Country of origin	: India	India

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

	Base Model	Variant Model
- Maximum speed at no load	: 2875 to 2925	2875 to 2925
- Low idle speed	: 800 to 900	800 to 900
- Speed at maximum torque	: 2000 to 2100	2000 to 2100
Rated speed, (rpm):		
- For PTO use	: 2700	2700
- For drawbar use	: 2700	2700



1	2	3	4	5	6
16.	xvi)	Rear Final Reduction:			
		Reduction through crown wheel and bevel pinion	Same configuration in base & variant models (refer para 3.1.12.4)		No change
		Type of final reduction			
17.	xvii)	Front differential:	Provided	Not Provided	Changed
18.	xviii)	Front Final Reduction:	Provided	Not Provided	Changed
19.	xix)	Type of fuel Injection pump:	Same configuration in base & variant models (refer para 3.1.4)		No change
20.	xx)	Other parameters			
	(a)	Position of silencer with respect to SIP, mm	Various configuration in base & variant models (refer para 3.1.6)		Changed
	(b)	Longitudinal adjustment of operator seat, mm	±30	±43	--do--
	(c)	Mass of tractor, kg	Various configuration in base & variant models (refer para 3.1.21)		--do--
	(d)	Overall dimensions of tractor, mm	Various configuration in base & variant models (refer para 3.1.22)		--do--
	(e)	Number of lubricating points	Various configuration in base & variant models (refer para 3.1.24)		--do--

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: 2014 for acceptance of tractor for the purpose of subsidies/NABARD financing for the applicable features for this tractor model.

S. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	Values declared by the applicant (D)/ Requirement (R)	As observed	Whether Variant model meets the requirements (Yes/ No.)
				Variant	Variant	
1	2	3	4	5	6	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 >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	11.8 (D)	11.5	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	11.8 (D)	11.5	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	360 (D)	389	No



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1	2	3	4	5	6	7
7.1.2 Drawbar performance :						
a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	Ballasting not recommended by the manufacturer	---	---
b)	Max. drawbar pull with standard ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor with standard ballast	6.0 (Minimum) (D) 4.91(R)	6.48	Yes
c)	Maximum drawbar power with standard 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.	8.85 (Minimum) (D) 8.6 (R)	8.8	Yes
7.1.3 Safety features :						
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes (As per IS 12239 (part 2)	---	Meet the requirement	Yes
b)	Lighting arrangement (Tractor having more than 1150 mm rear track width)	Evaluative	As per CMVR	---	Meet the requirement	Yes
c)	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)	---	---	---
d)	Technical requirements for PTO shaft	Non-Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	---	Does not meet the requirement	No
e)	Dimension of three point linkage	Non-Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	---	Does not meet the requirement	No
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)	---	Does not meet the requirement	No
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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	VST Tillers Tractors Ltd.	VST SHAKTI	Yes	
	2) Model	Evaluative		VT 180D HS/JAI-4W	MT 180 / JAI - 2W	Yes	
	3) Year of manufacture	Evaluative		2013	2014	Yes	
	4) Engine serial number	Evaluative		C 13 K 043244	C 14 G045676	Yes	
	5) Chassis serial number	Evaluative		T 13 K 043647	T 14 H 050319	Yes	
	6) Declaration of PTO power, kW	Evaluative		11.8	11.8	Yes	
	7) Specific Fuel Consumption (gm/kWh)	Evaluative		360	360	Yes	
7.1.5 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	
7.1.6	Characteristic	Optional Requirements as per IS: 12207-2014 (table-2)					
(i)	Fitment of ROPS	With a provision for fitment of ROPS. If ROPS fitted it should meet the requirement of IS: 11821-1992		Not provided	Not provided	NA	
(ii)	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.		Front tow hook not provided	Front tow hook not provided	Yes	

7.2 Conformity with following IS:

	Base model	Variant model
i) Guidelines for declaration of power and specific fuel consumption and labeling of agricultural tractors (First revision) [IS 10273:1987 (Reaffirmed in March, 2009)]	Conformed	Conforms
ii) Agricultural tractors – Rear mounted power take-off - Types 1, 2 and 3(third revision)[IS: 4931-1995 (Reaffirmed in March, 2009)]	Did not conform	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 March, 2007)/ISO 730-1:1994]	Did not conform	Does not conform
iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in March, 2007)]	Did not conform	Does not conform
v) Agricultural tractors - Operator's seat technical requirement [IS 12343 -1998 (First revision) (Reaffirmed in March, 2009)]	Did not conform	Does not conform



vi)	Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision) : [IS 12239 (PT-1)-1996 (Reaffirmed in March, 2009)/ISO 4254-1:1989]	Did not conform	Does not conform
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)]	Did not conform	Does not conform
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]]	Did not conform	Does not conform
ix)	Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) (IS: 8133 – 1983) (Reaffirmed in March, 2009)]	Did not conform	Does not conform
x)	Agricultural Tractor & Machinery Lighting device for travel on public roads (IS: 14683-1999) (Reaffirmed in March, 2009)]	Conformed	Conforms

7.3 Salient Observations:

7.3.1 Laboratory tests:

7.3.1 PTO performance

The specific fuel consumption corresponding to maximum power was observed as 389 g/kWh against the declaration of 360 g/kWh which is on higher side of tolerance limit of relevant IS. This should be looked into.

7.3.2 Three point linkage

The parameters as width of ball of upper hitch point hole, width of ball of lower hitch pin hole, diameter of lower hitch pin hole, Lateral distance from lower hitch point to centre line of tractor, distance from end of power take-off to centre of lower hitch point (lower links in horizontal position), Transport height, power /movement range observation of three point linkage does not meets requirement of IS:4931-1995. This should be looked into for necessary corrective action.

7.3.3 Drawbar linkages

Notations of fig. 1 as ' A' 'DØ', FØ, G, HØ of linkage drawbar does not meets the requirement of IS: IS: 12953-1990.This should be looked into for necessary corrective action.

7.3.4 Specifications of Power Take-off Shaft:

The parameters dØ, BØ, AØ, W, b of the dimension of PTO does not conform to IS: 4931-1995.This should be looked into for necessary corrective action.

7.4 Labeling plate:

The PTO power given in labeling plate in kW should also be provided in hp unit as per IS: 10273-1987



- 7.5 Maintenance / Service Problems:**
No noticeable maintenance or service problem was observed during the test. The engine lubricating oil and transmission/hydraulic oil change period is very less. This change period should be examined as the present available lubricants require longer change periods. So it should take some necessary action.
- 7.6 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 master shield on PTO shaft
 - iii) Vertical distance from SIP to centre of steering control should be as per the requirement of IS: 12343 – 1998.
 - iv) The working clearance around range selector and main gear shifting levers may be provided as per IS: 12239 (Part-2) – 1999.
 - v) Engine oil pressure gauge was not found in working condition, it should be in working for safety running of tractor.
 - vi) Draft control lever should be provided to protect the tractor against the overload on field.
- 7.7 Adequacy of Literature supplied with machine:**
The following literature has been supplied with the tractor
- i) Instruction manual in place of Operator's Manual
 - ii) Tractor's part's catalogue
 - iii) Service Manual
- 7.7.1** The technical details of PTO power in kW and hp unit, drawbar power, hydraulic power, haulage recommendation, ballasting details for different operation, tyre size and tyre inflation pressure, weight of tractor etc. should be provided in the operator's manual. The literature should be brought out in national as well as other regional languages of India for guidance of users. The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.

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 (August, 2015 to December, 2015)	Yes	None

TESTING AUTHORITY:


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