



VST SHAKTI, MT 224 - 1D / AJAI - 4W TRACTOR



सत्यमेव जयते

भारत सरकार

कृषि एवं किसान कल्याण मंत्रालय
कृषि, सहकारिता एवं किसान कल्याण विभाग
मशीनीकरण एवं प्रौद्योगिकी प्रभाग

GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS WELFARE

(Department of Agriculture, Cooperation & Farmers Welfare, Mechanization & Technology Division)

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

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO : 9001 - 2015 Certified Institute)

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Manufacturer : M/s. VST Tillers Tractors Limited
 Plot No.39, Phase-1, Sipcot Industrial Complex, Mookandapalli, Hosur-635 126.
 Head Office-
 Post Box No.4801, Mahadevapura post, Whitefield Road, Bangalore-560 048

Test requested by (Applicant) : The Manufacturer

2. ESSENTIAL TESTS

2.1. SPECIFICATIONS OF “VST SHAKTI, MT 224 – 1D / AJAI - 4W” tractor

The following are the brief specifications of the tractor. However, for detail specifications, the test report No. **T- 1076/1601/2017** released in February, 2017 should be referred.

2.1.1 Tractor:

Make : VST SHAKTI
 Model : MT 224 – 1D/AJAI – 4W
 Brand name : None
 Type : Four wheeled, 4WD, Unit construction, General purpose, Agricultural Tractor

Month & Year of manufacture : 09 | 19
 Chassis Serial number : BCDTJB079499
 Country of Origin : India

2.1.2 Engine:		<u>Previous sample</u> <u>Present sample</u>	
Make	:	VST Tillers Tractors Limited	
Model	:	V3D V3D	
Type	:	Four stroke, liquid cooled, naturally aspirated, Indirect injection, diesel engine	
Serial number	:	D16E014015 BEAEJB025439	
Engine speed (Manufacturer’s recommended production setting)(rpm) :			
- Maximum speed at no load	:	3125 to 3175	
- Low idle speed	:	850 to 950	
- Speed at maximum torque	:	2150 to 2250	
Rated speed, (rpm):			
- For PTO use	:	3000	
- For drawbar use	:	3000	

2.1.3 Cylinder & Cylinder Head:

Number : 3
 Disposition : Vertical inline
 Bore/stroke, (mm) : 73/78
 Capacity as specified by the applicant, (cc) : 979.35

2.1.4 Fuel System:
 Type of fuel feed system : Gravity and forced feed

2.1.4.1 Fuel feed pump: : Not provided

2.1.4.2 Fuel Injection pump:

Make : Bosch
 Model/Group combination No. : 9410 030 523
 Type : Inline Plunger
 Serial number : Not available

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4. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

4.1 The performance results have been reproduced from commercial (Variant) test report no. T-1076/1601/2017 (February, 2017) / 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: 2019 for acceptance of tractor for the purpose of subsidies / NABARD financing are summarized as under.

S. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	Values declared by the applicant (D)/ Requirement (R)	As observed	Whether meets the require- ments (Yes/No)
1	2	3	4	5	6	7
4.1.1 PTO Performance :						
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: $\pm 5\%$ for PTO power and or Engine power >26 kW. $\pm 10\%$ for PTO power and or engine ≤ 26 kW	13.4 (D)	12.8	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	13.4 (D)	12.8	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10%	370 (D)	358	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	$\pm 8\%$	50 (D)	49.5	Yes
e)	Back-up torque, percent	Evaluative	12 percent, min.	12 % (D) 12 % (R) Minimum	21.6	Yes
f)	Maximum operating temperature, ($^{\circ}$ C)					
	1) Engine oil	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)	124	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.	120 (D)	113	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	3.72 (R) Maximum	1.65	Yes
h)	Smoke level, m^{-1}	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hatridge value.	3.25 per meter (R)	0.70 per meter	Yes



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1	2	3	4	5	6	7
4.1.2 Power lift and hydraulic pump performance :						
a) Maximum lifting capacity throughout the range of lift, (kN):						
	1) At hitch points	Evaluative	Tolerance of $\pm 10\%$	6.50 (D)	6.23	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	3.43 (D) 3.01(R) Minimum	3.62	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	The observed value should not exceed 50 mm	50 (D) Maximum	00	Yes
4.1.3 Safety features :						
	a) Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes (As per IS: 12239 (Part-2))	Meets the requirements		Yes
	b) Lighting arrangement	Evaluative	As per CMVR	Meets the requirements		Yes
	c) 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)	Not applicable as the rear track width of tractor is less than 1150 mm.		Not applicable
	d) Technical requirements for PTO shaft	Evaluative	Should meet the requirements of IS: 4931 (As amended from time to time)	Meets the requirements		Yes
	e) Dimensions of three point linkage	Non Evaluative	Should meet the requirements of IS: 4468 (Part-2) Category 1N (As amended from time to time)	Meets the requirements		Yes
	f) Specifications of linkage drawbar	Evaluative	Should meet the requirements of IS 12953 Category 1N (As amended from time to time)	Meets the requirements		Yes
	g) Swinging drawbar (wherever fitted)	Evaluative	Should meet the requirements of IS 12362 (Part 3) (As amended from time to time)	Not fitted		Not applicable
	h) 1) Maximum traveling speed at rated engine speed in reverse gear, kmph	Evaluative	Should not exceed 20 kmph	7.36 kmph (Meets the requirement)		Yes
	2) Audible warning signal on tractor	Evaluative	As soon as the travelling speed in reverse gear reaches to 20 kmph, an audible warning signal on tractor be activated. The safety aspects about the operation of shuttle technology shall be brought in operation and manufacturer /dealer shall ensure the training on this aspect to operator before the delivery of tractor.	Not Applicable		Not Applicable

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1	2	3	4	5	6	7
4.1.4	Labelling of tractors (Provision of labelling plate):					
1)	Make	Evaluative	Evaluative	Should conform to the requirements of CMVR along-with maximum PTO power in kW and year of manufacture in numerical form MM YY Digit 01-12 in box No.1 for MM will represent the months & next two digits in box No.2 for YY will represent the year of manufacturing.	VST SHAKTI	Yes
2)	Model	Evaluative	Evaluative		MT 224-1D/AJAI-4W	Yes
3)	Month & Year of manufacture	Evaluative	Evaluative		09 19	Yes
4)	Engine number	Evaluative	Evaluative		BEAEJB025439	Yes
5)	Chassis number	Evaluative	Evaluative		BCDTJB079499	Yes
6)	Declaration of PTO power, (kW)	Evaluative	Evaluative		13.4	Yes
7)	Specific fuel consumption (gm/kWh)	Evaluative	Evaluative		370	Yes

Remark: For other Parameters test report no. T-1430/1957/2020 (March, 2020 & T-1432/1959/2020 (March, 2020) should be referred.

4.2 CATEGORY OF BREAKDOWNS / DEFECTS (As per Clause 5.0 of IS:12207-2019) :					
S. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	As observed	Whether meets the Requirements (Yes/No.)
1.	Critical	Evaluative	There is no 'critical breakdown' during the course of testing	None	Yes
2.	Major	Evaluative	There are not more than 1 major breakdowns and neither of them is of repetitive nature	None	Yes
3.	Minor	Evaluative	There are not more than 3 minor defects during the test and the frequency of each is not be more than two	None	Yes
4.	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed four that is, (1 major + 3 minor) or 4 minor breakdowns	None	Yes

4.3 Salient Observations:

4.3.1 Laboratory tests:

4.3.1.1 PTO Performance:

- The maximum power was observed as **12.8 kW** against the declaration of **13.4 kW**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
- The specific fuel consumption corresponding to maximum power was measured as **358 g/kWh** against the declaration of **370 g/kWh**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit
- The maximum equivalent crankshaft torque was recorded as **49.5 Nm** against the declaration of **50.0Nm**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit
- The backup torque was observed as **21.6 %**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit

4.3.1.2 Hydraulic performance test:

- Maximum lifting capacity throughout the range of lift at hitch point and standard frame was recorded as **6.23 kN & 3.62 kN** respectively against the declaration of **6.50 kN & 3.43 kN** respectively. Which meet the minimum requirement of IS: 12207-2019.

4.4 This tractor model meets the evaluative requirements of IS: 12207-2019.



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5. 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	03 Month (March, 2020 to May, 2020)	Yes	--None--

TESTING AUTHORITY:

C.S RAGHUWANSHI
AGRICULTURAL ENGINEER

C.V. CHIMOTE
TEST ENGINEER

J.J.R. NARWARE
DIRECTOR

6. APPLICANT'S COMMENTS

--None--

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

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	Nominal speed Test	2.9
3.	PTO performance test	10.1
4.	Power Lift and hydraulic pump performance test	1.3
B.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	6.1
	TOTAL:	20.4