

Application Reference No. 28/2022-23/92

(यह परीक्षण रिपोर्ट 31/08/2028 तक वैध है / THIS TEST REPORT IS VALID UPTO 31/08/2028)



**Make of Agricultural Tractor : VST**  
**Model : VST 929 DI EGT**  
**Manufactured by : M/s. VST Tillers Tractors Limited**  
Plot No.39, Phase-1, Sipcot Industrial Complex,  
Mookandapalli, Krishnagiri, Hosur  
[Tamil Nadu]-635 126.



भारत सरकार

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

GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS WELFARE  
(DEPARTMENT OF AGRICULTURE & FARMERS WELFARE)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

ट्रैक्टर नगर, बुदनी (म.प्र.) 466 445

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

TRACTOR NAGAR, BUDNI (M.P.) 466 445

(An ISO 9001:2015 Certified Institute)

T-1761/2292/2023	VST, VST 929 DI EGT - INITIAL COMMERCIAL TEST
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## IMPORTANT INFORMATION

The Government of India, Ministry of Agriculture and Farmers' Welfare has directed, vide a OM No. 13-17/2021-M&T (I&P) dated 28.07.2022, that since 15<sup>th</sup> August, 2022, only mandatory tests will be carried out on a tractor unless applicant has expressly requested for optional tests as well, mentioned in the above captioned OM.

In the instant case, there is no request from the applicant to carry out the optional tests hence only Mandatory Tests, as given below, have been conducted and reported in this report: -

1. PTO performance
2. Hydraulic performance
3. Drawbar performance
4. Brake performance

Month: August	Test Report No.: T-1761/2292/2023	Year: 2023
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## 1. SPECIFICATIONS OF TRACTOR

### 1.1 Identification:

#### 1.1.1 Denomination

[C]	Make of tractor	:	VST
[C]	Model (trade name)	:	VST 929 DI EGT
[C]	Type	:	Four wheel driven, Standard Agricultural Tractor.
[C]	Month & year of manufacture	:	01/23
[D]	Country of origin	:	India

#### 1.1.2 Numbers:

[D]	1 <sup>st</sup> Serial No. or prototype	:	MZCV2JEV2JE000003
[C]	Serial No.	:	MZCV2JEV2AF000038

#### 1.2 Engine:

[D]	Manufacturer's address	:	M/s. Yanmar Power Technology Co. Ltd. (Plant-1) 1009-2, Kawamichicho, Nagahma, Shiga, 526-0111 Japan (Plant-2) Plot No. 1-5, 2 <sup>nd</sup> Avenue road, ORIGNS by Mahindra World City, North Chennai, Village-Eliambedu, Taluk-Ponneri District-Tiruvallur, 601206 Tamil Nadu India
[C]	Make	:	M/s. Yanmar Power Technology Co. Ltd.
[C]	Model	:	3TN82S-BKVST
[C]	Type	:	Four stroke, naturally aspirated, liquid cooled, direct injection, diesel engine.
[C]	Serial No.	:	00185M

#### 1.2.1 Cylinders:

[C]	Number/disposition	:	Three, vertical, in-line
[D]	Bore / Stroke, (mm)	:	82 / 84
[D]	Capacity, cm <sup>3</sup>	:	1331
[D]	Compression ratio	:	20.5±0.5
[D]	Arrangement of valves	:	Overhead, inline
[D]	Cylinder liners	:	Wet, non-replaceable
[D]	Type of combustion chamber	:	Direct Injection

1.2.2 Supercharging : **Not Available**

#### 1.2.3 Fuel system:

[C]	Fuel feed system	:	Gravity and force feed
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#### Filter(s):

[C]	Make	:	M/s. Yanmar Power Technology Co. Ltd.
[C]	Model	:	Not Available
[C]	Type	:	Spin on paper element, throw away
[C]	Number(s)	:	One
[D]	Capacity of fuel tank, (l)	:	25.0

#### Injection pump:

[C]	Make	:	M/s. Yanmar Power Technology Co. Ltd.
[C]	Model	:	729J30-51300 G001
[C]	Type	:	Inline
[C]	Serial Number	:	20220824

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## 6. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

6.1 On the basis of test conducted the performance results have been summarized as evaluative (mandatory) / Non-evaluative (Non-mandatory) parameters applicable for Qualifying Minimum Performance criteria as per Clause-4 (Table-1) of IS: 12207-2022 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: 12207-2022	Values declared by the applicant/ (D) Requirement (R)	As observed	Whether meets the requirements (Yes/No)
1	2	3	4	5	6	7
<b>MANDATORY TESTS: (As per Ministry's Office Memorandum No. 13-17/2021-M&amp;T (I&amp;P) dated 28<sup>th</sup> of July, 2022).</b>						
<b>6.1.1 PTO Performance:</b>						
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 $\leq 26$ kW.	18.65 (D)	17.8	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	18.65 (D)	17.8	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	Should not be more than 10% of declared value	300 (D)	287	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non-Evaluative	$\pm 8\%$	73 (D)	78.5	Yes
e)	Back-up torque, percent	Evaluative	Should be minimum 12 percent	12 (D) 12 (R)	29.1	Yes
f)	Maximum operating temperature, ( $^{\circ}$ C):					
	1) Engine oil	Evaluative	The declared value should not exceed the <i>Max</i> value specified by the oil company and the observed value under natural ambient/high ambient condition should not exceed the declaration	135 (D)	117	Yes
	2) Coolant	Evaluative	Observed value should not exceed the declared value or boiling point of coolant at radiator cap pressure whichever is lower. The boiling point of the coolant at radiator pressure shall be provided by the applicant.	120 (D)	95	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at <i>Max</i> power under natural ambient conditions.	2.87 Maximum (R)	0.05	Yes
h)	Smoke level, $m^{-1}$	Evaluative	Max Smoke level shall be reported out of 6 readings tested as per IS 12062 and observed value should be well within the required limits.	3.25 per meter Maximum (R)	0.43	Yes

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1	2	3	4	5	6	7	
<b>6.1.2</b>	<b>Drawbar performance:</b>						
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non-Evaluative	Minimum 70% of static mass of tractor with ballast.	Ballasting not recommended by the manufacturer	Not applicable	Not applicable	
b)	Max. drawbar pull with standard ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	In case of tractors having total static mass $\geq$ 1500 kg, <i>Min</i> 70% of static mass of tractor without ballast or with standard ballast, as the case may be. In case of light weight tractors having $\leq$ 1500 kg total static mass of tractor, <i>Min.</i> 65% of static mass of tractor without ballast or with standard ballast, as the case may be.	6.51 (D) 6.47 (R)	9.45	Yes	
c)	Maximum drawbar power <del>without ballast</del> 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 $\leq$ 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.	14.0 (D) 13.4 (R)	14.1	Yes	
d)	For tractors fitted with air conditioned /heated cabin: Maximum drawbar power without ballast, or with standard ballast as the case may be, kW	Evaluative	Min 70%of PTO power as referred in SI No. i) a) of PTO performance in case of tractors having total static mass > 1 500 Kg.	Not fitted	Not fitted	Not applicable	
e)	Maximum transmission oil temperature, ( $^{\circ}$ C)	Evaluative	The declared value should not exceed the maximum value specified by oil company	120 (D)	105	Yes	
<b>6.1.3</b>	<b>Power lift and hydraulic pump performance:</b>						
a)	Maximum lifting capacity throughout the range of lift, (kN):						
	1)	At hitch points	Evaluative	Should not be less than 90% of declared value.	6.5 (D)	6.07	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.	4.5 (D) 4.19(R) Minimum	4.84	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) Max	05	Yes	

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1	2	3	4	5	6	7	
<b>6.1.4</b>	<b>Brake performance at 25 kmph:</b>						
<b>a)</b>	Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with standard ballast, (m):						
	1)	Cold brake	Evaluative	10	10 (R)	4.13	Yes
	2)	Hot brake	Evaluative	10	10 (R)	4.82	Yes
<b>b)</b>	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	Yes	Yes	
<b>6.1.5</b>	<b>OPTIONAL TESTS: As the applicant has not applied for any optional tests, therefore no optional tests was conducted.</b>						
<b>6.1.6</b>	<b>Safety features:</b>						
<b>a)</b>	Guards against moving and hot parts	Evaluative	Belt drives, pulleys, silencer, hydraulic pipes [As per IS 12239 (Part2)]	Meets the requirement	Yes		
<b>b)</b>	Lighting arrangement	Evaluative	As per CMVR	Meets the requirement	Yes		
<b>c)</b>	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 (Max. track width 1010 mm at front & 990 mm at rear)	<b>Not applicable</b>		
<b>d)</b>	Technical requirements for PTO shaft	Non Evaluative	Should meet the requirements of IS: 4931 (As amended from time to time)	Meets the requirement	Yes		
<b>e)</b>	Dimensions of three-point linkage	Non Evaluative	Should meet the requirements of IS: 4468 (Part-1N) (As amended from time to time)	<b>Does not meet the requirement</b>	<b>No</b>		
<b>f)</b>	Specifications of linkage drawbar	Non Evaluative	Should meet the requirements of IS: 12953 (As amended from time to time)	Meets the requirement	Yes		
<b>g)</b>	Specifications of Swinging drawbar (wherever fitted)	Non Evaluative	Should meet the requirement of IS: 12362 (Part-3) (As amended from time to time)	Not provided	Not applicable		
<b>h)</b>	Audible warning signal on tractor	Evaluative	If tractor travel speed in reverse gear exceeds 20 kmph, an audible warning signal on tractor shall get activated.  A sticker to the effect that "operating the tractor beyond 20 kmph speed in reverse gear is not safe" should be prominently displayed.	Not provided	Not applicable		

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1	2	3	4	5	6	7
<b>6.1.7</b>	<b>Labelling of tractors (Provision of labelling plate):</b>					
1)	Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO in kW, Specific fuel consumption (SFC) corresponding to maximum power in g/kWh and year of manufacture in numerical form MM    YY	VST	Yes	
2)	Model	Evaluative		VST 929 DI EGT	Yes	
3)	Month & Year of manufacture	Evaluative		01 & 23	Yes	
4)	Engine number	Evaluative		00185M	Yes	
5)	Chassis number	Evaluative		MZCV2JEV2AF 000038	Yes	
6)	Maximum PTO power, (kW)	Evaluative		18.65	Yes	
7)	Specific fuel consumption, g/kWh	Evaluative		300	Yes	
<b>6.1.8</b>	<b>Literature (Submission to test agency):</b>					
<b>(a)</b>	Operator manual	Evaluative	The printed literature in booklet form should be provided as per IS 8132 and should submit along with the test sample.	Provided	Yes	
<b>(b)</b>	Parts Catalogue	Evaluative		Provided	Yes	
<b>(c)</b>	Workshop/ Service manual	Evaluative		Provided	Yes	
<b>6.1.9</b>	<b>Fitment of Roll Over Protective Structures (ROPS):</b>					
	For tractor having more than 1150 mm rear track width	Evaluative	ROPS should meet the requirement of IS:1182 or OECD code or equivalent International Standard	Not fitted	Not applicable	
<b>6.1.10</b>	Standard Accessories	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with tractor	Provided	Yes	
<b>6.1.11</b>	Accessories (optional)	Non Evaluative	Ballast weight, if fitted, should meet the requirement of CMVR	Not fitted	Not applicable	

<b>6.2 CATEGORY OF BREAKDOWNS / DEFECTS (As per clause 5.0 of IS:12207-2022):</b>					
S. No.	Category of break-downs	Category (Evaluative / Non-Evaluative)	Requirements as per IS: 12207-2022	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 neither of them should be repetitive in nature	None	Yes
4.	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed five, that is, (2 major + 3 minor) or (1 major + 4 minor) or 5 minor breakdowns.	None	Yes

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### 6.3 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 Year 2019)]   | : | Conforms  |
| ii)   | Agricultural tractors - Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS:4931-1995 (Reaffirmed Year 2019)]  | : | Conforms  |
| iii)  | Agricultural wheeled tractors – Rear mounted three-point linkage: Part 2 Categories 1N (Narrow Hitch) [IS:4468(Part-II) – 1993 (Reaffirmed in 2019)]   | : | <b>Does not conform</b>   |
| iv)   | Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed Year 2022)]   | : | Conforms  |
| v)    | Agricultural tractors- Operator's seat technical requirement [IS12343 - 2021]  | : | Not applicable as the rear track width of tractor is less than 1150 mm. |
| vi)   | Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision):[IS 12239 (Part 1) - 2018]   | : | <b>Does not conform</b>   |
| vii)  | Tractors and machinery for agriculture and forestry – Technical means for ensuring safety Part 2: Tractors (first revision) (IS 12239 (Part 2) 1999) (Reaffirmed Year 2019)]   | : | <b>Does not conform</b>   |
| viii) | Guide lines for location and operation of operator controls on agricultural tractors and machinery [IS: 8133 - 2021]   | : | <b>Does not conform</b>   |
| ix)   | Tractors and machinery for agriculture and forestry, powered lawn and garden equipment - Symbols for operator controls and other displays Part2 Symbols for agricultural tractors and machinery [IS: 6283(Part-1) - 2006 (Reaffirmed Year 2019) and IS: 6283 (Part-2) – 2007 (Reaffirmed Year 2019)] | : | <b>Does not conform</b>   |
| x)    | Agricultural Tractors and Machinery-Lighting device for travel on public roads [(IS:14683-1999) (Reaffirmed Year 2019)]  | : | Conforms  |

### 6.4 Salient Observations:

#### 6.4.1 PTO performance test:

During PTO performance test, the minimum lubricating oil pressure was recorded as 3.1 kg/cm<sup>2</sup> at rated engine speed against the minimum permissible pressure of “3.67 kg/cm<sup>2</sup> at rated output” declared by the manufacturer. This should be looked into for necessary corrective action.

Upon this, the applicant has submitted letter no. Nil dated 18.07.2023 and requested to continue further testing, which was allowed.

#### 6.4.2 Three-point linkage:

The dimensions viz. distance from end of power take -off shaft to centre of lower hitch point (lower links in horizontal position) , power movement & transport height does not meet the requirements of IS: 4468 (Part-2) Category 1N -Narrow Hitch: 1993 (Re-affirmed in 2019). This should be looked into for necessary corrective action.

#### 6.4.3 Operator's work place:

The following parameters does not meet the requirement of IS: 12239 (Part-I) -2018.

- i) Vertical retainers on both sides of clutch pedal are not provided.
- ii) Spark arresting device has not been provided in the exhaust system.

Therefore, all of the above should be looked into for necessary corrective action.



**6.4.4 PTO master shield:**

PTO master shield has not been provided on tractor as per IS: 12239 (Part-II)-1999 (Reaffirmed 2019). This should be looked into for necessary corrective action.

**6.4.5 Specification of Tractor:**

i) Discrepancies in the specification between the Specification sheet and Operator's manual are as under:

S. No.	Description	As per Specification Sheet	As per Operator's manual
a	Oil change period of gear box, differential, final drive, hydraulic, steering brakes & front axle	First 50 hrs. & subsequently after every 200 hrs of operation.	First change after 100 hours of operation and subsequently after every 1000 hours of operation (P. No. 57)
b	Hydraulic filter change	First clean 50 hrs. & if require change it subsequently after every 200 hrs.	Every 250 hrs the filter should be replaced. (P. No. 55)

ii) Content related to rotavator is given in Chapter 9 of lubrication system of engine in service manual. This should be looked into for necessary corrective action.

**6.5 Maintenance / Service Problems:**

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

**6.6 Recommendation with regard to safety on tractor:**

- i) Identification of hand controls (Differential locks & parking brake controls) by colour has not been provided as per the requirement as laid down in Table – 5 of IS: 8133-2021.
- ii) The working clearance between parking brake hand accelerator lever has been measured as 20 mm against the minimum requirement of 70 mm.
- iii) Identification symbol of start switch & parking brake lever has not been provided as per the requirement of IS: 6283 (Part-1) 2006 and IS: 6283 (Part-2) – 2007 (Reaffirmed in 2019).
- iv) Colour codes for engine revolution gauge, fuel level & water temperature gauge has not been provided as per the requirement of IS: 6283 (Part-2) – 2007 (Reaffirmed in 2019).
- v) The hand accelerator lever, when moved away from the operator (i.e. forward) decrease the engine speed, which does not meet the requirement as laid down in Table -1 of IS 8133-2021.

Above parameters should be looked into for necessary corrective action.

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**6.8 Adequacy of Literature supplied with machine:**

**6.8.1** The following literatures were supplied with the test tractor for reference during the test: -

- Operator Manual for "VST 929 DI EGT" tractor model.
- Parts catalogue for "VST 929 DI EGT" tractor model.
- Service manual for "VST, VST 929 DI EGT" tractor model.

**6.8.2** The operator manual may be brought out for the guidance of users and service personnel as per IS: 8132-1999 incorporating, inter alia, the following:

- Safe hitch height while using trailer.

**TEST CARRIED OUT AT C.F.M.T. & T.I., BUDNI (M.P.), INDIA**

**TESTING AUTHORITY**

<b>C. V. CHIMOTE</b> TEST ENGINEER	
<b>A.K. UPADHYAY</b> DIRECTOR(I/C)	

Draft test report compiled by Poonam Khurasia, Senior Technical Assistant

**7. APPLICANT'S COMMENTS**

Para No.	Our reference	Applicant's comments
7.1	1.2.7	Please add thermostat as a type of temperature control because the thermostat is given in our tractor engine. By mistake, details are not given in the application.
7.2	1.4.1.1	Please correct engine to PTO ratio of 2 <sup>nd</sup> PTO speed as 3.221:1 as per calculation of transmission line diagram.
7.3	1.12	Please correct the track width adjustment method and value as per given below value, some typographical error in our declaration. Rear track width adjustment method –By reversing the position of disc on off-set wheel rim. Rear track width (mm)-860 (Std.) & 750
7.4	6.4.1, 6.4.2, 6.4.3 (i), (ii), 6.4.4, 6.4.5 (i), (ii), 6.6 (i), (ii), (iii), (iv) & (v)	Observation will be studied and necessary action will be taken for quality improvement in products.

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**ANNEXURE-I**

**TRACTOR RUN HOURS DURING TEST**

<b>A.</b>	<b>LABORATORY AND TRACK TESTS</b>	<b>HOURS</b>
1.	Running-in	Applicant has declared it to be conducted on their work place.
2.	PTO performance test	9.8
3.	Power lift and hydraulic pump performance test	3.4
4.	Drawbar performance test	5.5
5.	Brake performance test	1.0
6.	Nominal speed test	1.8
<b>B.</b>	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	4.1
	<b>TOTAL:</b>	<b>25.6</b>