

(यह परीक्षण रिपोर्ट 30/06/2023 तक वैध है। / THIS TEST REPORT IS VALID UP TO : 30/06/2023)



## MAHINDRA, JIVO 225 DI 4WD 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

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T- 1448/1975/2020	<b>MAHINDRA, JIVO 225 DI 4WD TRACTOR- Commercial (Variant)</b>
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### 3. ESSENTIAL TEST

#### 3.1. SPECIFICATIONS

3.1.1	<b>Tractor:</b>	<u>Base Model</u>		<u>Variant Model</u>
	Make	:		Mahindra
	Model	:		JIVO 225 DI
	Type	:		Four wheeled, rear-wheel driven, unit constriction, agricultural tractor
	Month & Year of manufacture	:		EH (August, 2017)
	Chassis number	:		MBNAKGAABHGE00002
	Country of Origin	:		India
				MBNZKGALFKGF00060
3.1.2	<b>Engine:</b>			
	Make	:		Mahindra
	Model	:		MDI1365 NX20
	Type	:		Four stroke, naturally aspirated, liquid cooled, direct injection, diesel engine
	Serial number	:		GHE6GAA0002   GKF6GAA5087
	<b>Engine speed (Manufacturer's recommended production setting), (rpm):</b>			
	- Maximum speed at no load	:		2500 to 2600
	- Low idle speed	:		950 to 1150
	- Speed at maximum torque	:		1300 to 1500
	<b>Rated speed, (rpm):</b>			
	- For PTO use	:		2300
	- For drawbar use	:		2300
3.1.3	<b>Cylinder &amp; Cylinder Head:</b>			
	Number	:		Two
	Disposition	:		Vertical, inline
	Bore/stroke, (mm)	:		88.9/110
	Capacity as specified by the applicant, (cc)	:		1365
	Compression ratio	:		19.8 : 1
	Type of cylinder head	:		Monoblock
	Type of cylinder liners	:		Wet, replaceable
	Type of combustion chamber	:		Re-entrant bowl open cavity on piston top
	Arrangement of valves	:		Overhead, inline
	<b>Valve clearance (cold):</b>			
	- Inlet valve, (mm)	:		0.40/0.30
	- Exhaust valve, (mm)	:		0.50/0.40
3.1.4	<b>Fuel System:</b>			
	Type	:		Gravity and force feed
3.1.4.1	<b>Fuel tank:</b>			
	Capacity, (l)	:		22.0
	Location	:		Above clutch housing
	Provision for draining of sediments/ water	:		Provided
	Material of fuel tank	:		Metallic
3.1.4.2	<b>Water separator</b>	:		<b>Not Provided</b>

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## 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: 2019** for acceptance of the tractor for the purpose of subsidies/NABARD financing are summarized as under:

Sl. No.	Characteristic	Category (Evaluative / Non-Evaluative)	Requirements as per IS: 12207-2019	Values declared by the applicant (D)/Requirement (R)		As observed		Whether Variant model meets the requirements (Yes/No)
				Base model	Variant Model	Base model	Variant model	
1	2	3	4	5a	5b	6a	6b	7
<b>7.1.1</b>	<b>PTO Performance:</b>							
<b>a)</b>	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: ±5 percent for PTO power and engine power >26kW. ±10 percent for PTO power and or engine ≤ 26 kW.	13.7 (D)	13.7 (D)	13.5	12.8	Yes
<b>b)</b>	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+10 %	275 (D)	275 (D)	264	267	Yes
<b>7.1.2</b>	<b>Drawbar performance :</b>							
<b>a)</b>	Max. drawbar pull with ballast corresponding to 15 percent wheel slip or 7 percent slip, kN	Non Evaluative	Minimum 70 percent of static mass with ballast	7.40 (D) 8.41 (R)	Not applicable	9.26	Not applicable	Not applicable
<b>b)</b>	Max. drawbar pull without ballast, as the case may be corresponding to 15 percent wheel slip or 7 percent track slip, kN	Evaluative	Minimum 70 percent of static mass of tractor without ballast or with standard ballast, as the case may be	6.00 (D) 6.83 (R)	7.40 (D) 7.62 (R)	7.37	9.02	Yes
<b>c)</b>	Maximum drawbar power without ballast as the case may be, 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.	11.0 (D) 10.1 (R)	10.3 (D) 9.6 (R)	11.1	10.7	Yes

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1	2	3	4	5a	5b	6a	6b	7
d)	Max. transmission oil temperature (°C)	Evaluative	The declared value should not exceed the maximum value specified by oil company	120 (D)	120 (D)	75	64	Yes
<b>7.1.3</b>	<b>Power lift and hydraulic pump performance:</b>							
<b>a)</b>	Maximum lifting capacity throughout the range of lift, (kN):							
1)	At hitch points	Evaluative	Tolerance of $\pm 10\%$	7.35(D)	8.82(D)	10.35	8.59	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	4.41(D) 3.22(R)	4.41(D) 3.01(R)	7.24	5.30	Yes
<b>b)</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) 50 (R) Maximum		30	05	Yes
<b>7.1.4</b>	<b>Noise measurement:</b>							
<b>a)</b>	Maximum ambient noise emitted by the tractor at bystanders position, dB(A)	Evaluative	88 dB (A) for > 1.5 tonne GVW & 85 dB (A) for < 1.5 tonne GVW (as per CMVR)	85 (R)	80	79	77	Yes
<b>b)</b>	Maximum noise at operator's ear level dB(A)	Evaluative	96 (as per CMVR)	96 (R)	93	94	92	Yes
<b>7.1.5</b>	<b>Safety features:</b>							
<b>a)</b>	Guards against moving and hot parts	Evaluative	Belt drives, pullies, silencer, hydraulic pipes (As per IS 12239 (Part2))	Provided		Meets the requirements		Yes
<b>b)</b>	Lighting arrangement	Evaluative	As per CMVR	Provided		Meets the requirements		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 as the rear track width of tractor is less than 1150 mm.		Not applicable		Not applicable

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1	2	3	4	5a	5b	6a	6b	7
d)	Technical requirements for PTO shaft	Evaluative	Should meet the requirements of IS: 4931 (As amended from time to time)	Conforms		Meets the requirements		Yes
e)	Dimensions of three point linkage	Non Evaluative	Should meet the requirements of IS: 4468 (Part-I) (As amended from time to time)	Conforms		Meets the requirements		Yes
f)	Specifications of linkage	Evaluative	Should meet the requirements of IS: 12953 (As amended from time to time)	Conforms		Meets the requirements		Yes
g)	Swinging drawbar (wherever fitted)	Evaluative	Should meet the requirement of IS: 12362 (Part 3) (As amended from time to time)	--		Not Provided		Not applicable
h)	1) Maximum travelling speed at rated engine speed in reverse gear, (kmph)	Evaluative	Should not exceed 20 kmph	Conforms		6.41 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 shall 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		Not applicable

<b>7.1.6 Labelling of tractors (Provision of labelling plate):</b>								
1)	Make	Evaluative	Should conform to the requirements of CMVR along with maximum PTO Power in kW and year of manufacture in numerical form.  <b>MM YY</b> Digit 01 – 12 in box No.1 for MM will represent the months and next two digits in box No.2 for YY will represent the year of manufacturing.	Mahindra				Yes
2)	Model	Evaluative		JIVO 225 DI 4WD				Yes
3)	Month & Year of manufacture	Evaluative		FK				<b>No</b>
4)	Engine number	Evaluative		GKF6GAA5087				Yes
5)	Chassis number	Evaluative		MBNZKGALFKGF00060				
6)	Declaration of PTO power, kW	Evaluative		13.7				

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1	2	3	4	5a	5b	6a	6b	7
<b>7.1.7</b>	<b>Literature (Submission to test agency):</b>							
<b>(a)</b>	Operator manual	Evaluative	Provided / Not Provided	Provided	Provided	Provided	Provided	Yes
<b>(b)</b>	Parts Catalogue	Evaluative	Provided / Not Provided	Provided	Provided	Provided	Provided	Yes
<b>I</b>	Workshop/ Service manual	Evaluative	Provided / Not Provided	Provided	Provided	Provided	Provided	Yes
<b>7.1.8</b>	Fitment of roll Over protective structures (ROPS): for tractor having more than 1150 mm rear track width		ROPS should meet the requirement of IS 11821 or OECD code or equivalent International standard	ROPS not fitted			Not applicable	
<b>7.1.9</b>	Standard Accessories	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with the tractor.	Provided			Yes	
<b>7.1.10</b>	Accessories (optional)	Non Evaluative	Ballast weights, if fitted, should meet the requirement of CMVR	Not applicable			Not applicable	

7.2	<b>CATEGORY OF BREAKDOWNS / DEFECTS (as per clause 5.0 of IS:12207-2019)</b>				
Sl. 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	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 three 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

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**7.3 Salient Observations:**

**7.3.1 Laboratory tests:**

**7.3.1.1 PTO Performance:**

- i) The maximum PTO power was recorded as **12.8 kW** against the declaration of **13.7 kW**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
- ii) The specific fuel consumption corresponding to maximum power was recorded as **267 g/kWh** against the declaration of **275 g/kWh**, which is within the tolerance limit of IS: 12207-2019.

**7.3.1.2 Drawbar Performance:**

- i) Maximum drawbar pull in base model (under ballasted condition) and variant model (under un- ballasted condition) has been recorded as **9.26 kN & 9.02 kN** respectively. The drawbar pull in base model (2WD) is higher compare to variant model (4WD).
- ii) The hourly fuel consumption (l/h) corresponding to maximum drawbar pull in case of base model (2WD) and variant model (4WD) has been recorded as **2.39 l/h & 3.33 l/h** respectively. The hourly fuel consumption of variant model is very high in compare to base model.

**From the above point (i) & (ii),**

- a) It indicates that the maximum drawbar pull of four wheel drive tractor (variant model) is lower compare to two wheel drive tractor (base model) and which is not inline with the basic design criteria of four wheel drive tractor. Beside this, the two wheel drive tractor (base model) is consuming **39.3 % less** fuel and generating higher drawbar pull in compare to the four wheel drive tractor (variant model). Thus, the drawbar performance of four wheel drive tractor (variant model) is deteriorated in compare to the two wheel drive tractor (base model).
- b) By considering the performance of this tractor as above, there is no benefit to farmers by purchasing four wheel drive (variant model) tractor even after paying the more money/capital. The farmers shall not get any additional benefit to purchase **Mahindra JIVO 225 DI 4WD** tractor compare to **Mahindra JIVO 225 DI** tractor.

**Keeping in view the above, it is recommended that the design of “Mahindra JIVO 225 DI 4WD” tractor model should be reviewed before commercial production and marketing.**

**7.3.1.3 Hydraulic performance test:**

Maximum lifting capacity throughout the range of lift at hitch point and standard frame was recorded as **8.59 kN & 5.30 kN** respectively against the declaration of **8.82 kN & 4.41 kN** respectively & which meet the evaluative requirement of IS: 12207-2019.

**7.3.1.4 Dimension of Power Take-Off Master Shield:**

The dimensions “m” & “p” of the power take off shaft master shield does not meet the requirements of IS: 4931-1995 (Reaffirmed in 2014) and calls for necessary corrective action.

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**7.3.1.5 Labelling of tractor:**

The month & year of manufacture of tractor were embossed/ punched on labelling plate is “FK” in coded form against the requirement of numerical form and hence does not meet the evaluative requirement of IS: 12207-2019. This should be looked into for necessary action.

**7.4 Maintenance / Service problems:**

No noticeable maintenance and service problems was observed during the test.

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

The following requirements, inter alia, may be considered for incorporation on the tractor as per relevant Indian Standards:

- i) There is Provision for spark arresting device in exhaust system.
- ii) Fuel shut-off knob does not remain in “STOP” position.
- iii) The working clearance between position control lever & draft control lever should be provided as per relevant standard.
- vi) Vertical retainness is not provided on both sides of pedals

**7.6 Adequacy of Literature:**

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

- i) Operator’s Manual for Mahindra, JIVO 4WD Tractor
- ii) Part’s catalogue Mahindra, JIVO 225 DI 4WD Tractor
- iii) Service Manual Mahindra, JIVO 225 DI 4WD Tractor

**7.6.2** The supplied literature was found adequate, **except the following**:-

- i) Oil change period of front axle & front final drive given in the schedule & maintenance chart of Operator’s manual and Service manual does not match with specifications submitted by applicant.
- ii) Brand of coolant given in the Operator’s manual and Service manual does not match with specifications submitted by applicant.
- iii) First oil change period of engine lubrication system is only 100 hour but now high quality grades of lubricants are available, which had higher oil change period. This should be looked into.

**7.6.3** These literatures may also be brought out in national & other regional languages for the guidance of user’s and service personnel.

The results of the test carried out on the variant model “**Mahindra JIVO 225 DI 4WD**” tractor has been compared with those on base model “**Mahindra JIVO 225 DI**” and found that, the overall performance of four wheel drive (variant model) tractor is deteriorated in compare to the two wheel drive (base model) tractor and there is no benefit to farmers by purchasing “**Mahindra JIVO 225 DI 4WD**” tractor even after paying the more money/capital. Therefore, It is recommended that the design of “**Mahindra JIVO 225 DI 4WD**” tractor model should be reviewed before commercial production and marketing.





### 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	6 Months (November, 2019 to April, 2020)	Yes	None

#### TESTING AUTHORITY:

**RAJNEESH PATEL**  
AGRICULTURAL ENGINEER

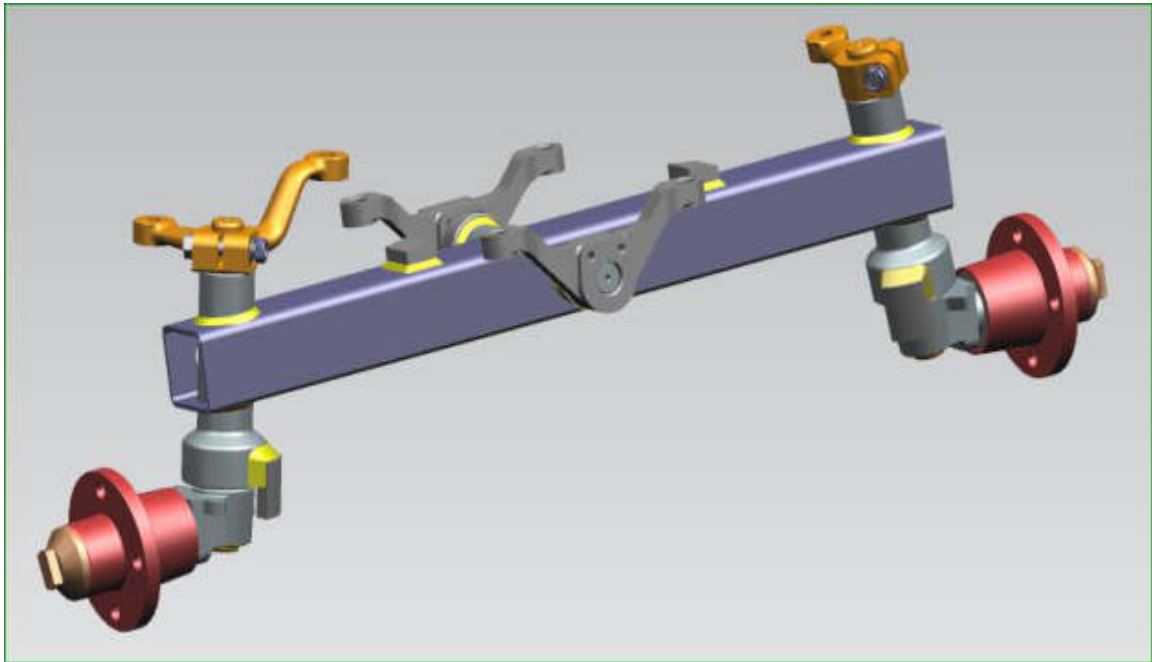
**C.V. CHIMOTE**  
TEST ENGINEER

**J.J.R. NARWARE**  
DIRECTOR

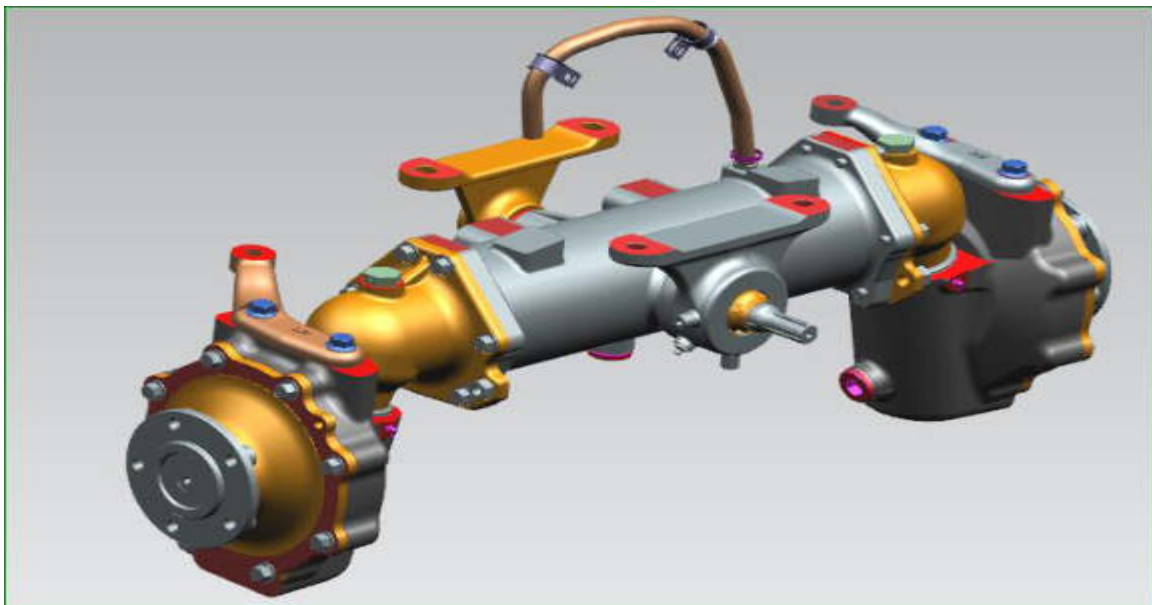
This test report is compiled by **Smt. Poonam Khurasia**, Senior Technical Assistant

### 9. APPLICANT COMMENT'S

Para No.	Our Reference	Applicant's comments
9.1	7.5 (i), (ii), (iii) & (vii) 7.6.2 (I, ii & iii)	Observations will be studied, and necessary action will be incorporated.
9.2	7.6.3	Literatures are available in various languages of India.



Design of Front Axle on Base Model



Design of Front Axle on Variant Model

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**ANNEXURE- II**

**TRACTOR RUN HOURS DURING TEST**

<b>A.</b>	<b>LABORATORY AND TRACK TESTS:</b>	<b><u>HOURS</u></b>
1.	Running-in	60.00
2.	PTO performance test under natural ambient condition	3.08
3.	Drawbar performance test	12.00
4.	Noise measurement	1.00
5.	Turning ability test	0.25
6.	Location of centre of gravity	0.25
7.	Nominal speed test	0.95
<b>C.</b>	Miscellaneous test and other run hours including idle run, transportation, preparation for test and trial runs.	1.42
<b>TOTAL</b>		<b>78.95</b>