

व्यावसायिक परीक्षण रिपोर्ट (प्रथम बैच)  
COMMERCIAL TEST REPORT (1<sup>st</sup> Batch)

संख्या/No. : T- 1664/2195/2022  
माह/Month : July, 2022

[ONLINE TESTING]

(यह परीक्षण रिपोर्ट 31.07.2027 तक वैध है/THIS TEST REPORT IS VALID UPTO 31.07.2027)



**MAHINDRA, YUVO 475 DI TRACTOR**



सत्यमेव जयते

भारत सरकार

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

**GOVERNMENT OF INDIA**

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

E-mail: [fmti-mp@nic.in](mailto:fmti-mp@nic.in), Web site: [fmttibudni.gov.in](http://fmttibudni.gov.in), Telephone: 07564-299003

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## 1. BACKGROUND

1. Base model "Mahindra YUVO 475 DI" tractor was tested under Initial Commercial Test vide Test Report No. T-1068/1593/2017 (February, 2017).
2. The "Mahindra YUVO 475 DI" tractor was submitted for 1<sup>st</sup> batch testing at this institute. The applicant had withdrawn tractor before completion of all applicable test, as maximum PTO power was recorded as **30.6 kW** against the declaration of **28.3 kW** and which does not meets the evaluative requirement of IS:12207-2019. Hence incomplete test report released vide test report no. T-1573/2101/2021 released in August, 2021.
3. Now, the applicant had submitted an application No. 28/2021-22/80 dated: 30.11.2021 for 1<sup>st</sup> Batch Testing of tractor model "Mahindra YUVO 475 DI". The relevant tests on the tractor model were conducted under Batch Test and accordingly the test report is released as under.

## 2. FUEL AND LUBRICANTS

- 2.1 Fuel** : The High-speed diesel oil supplied by M/s Indian Oil Corporation Limited having density of 0.828 g/cc at 15°C was used.

S. No.	Particulars	As recommended by the manufacturer	As used during the test
1.	Engine	15W40	Oil originally filled in the tractor was not changed
2.	Gearbox, Differential, Rear axle & Rear Final drive, Brakes and Hydraulic system.	TRACT ELF MM / IOCL	Oil originally filled in the tractor was not changed -do-
3.	Steering	TRACT ELF MM / IOCL	
4.	Grease	MP3 Lithium base	MP3 Lithium base

## 3. SPECIFICATIONS

- 3.1 Tractor:**
- Make : Mahindra  
Model : YUVO 475 DI  
Type : Four Wheel Drive, Standard Agricultural Tractor.  
Month & Year of manufacture : 11/21  
Chassis number : MBNSFAJBBMZ00007  
Country of Origin : India
- 3.2 Engine:**
- Manufacturer's address : **M/s. Mahindra & Mahindra Limited**  
(Farm Equipment Sector)  
Near Bidar "T" Junction , Mahindra Nagar, Zaheerabad- 502 220
- Make : Mahindra  
Model : MDI 2385 3AD  
Type : Four stroke, naturally aspirated, liquid cooled, indirect injection, diesel engine.  
Serial number : ZMG5FCF8277
- Engine speed (Manufacturer's recommended production setting, (rpm) :**
- Maximum speed at no load,(rpm) : 2150 to 2350  
- Low idle speed, (rpm) : 750 to 850  
- Speed at maximum torque, (rpm) : 1300 to 1500
- Rated speed, (rpm):**
- For PTO use : 2000  
- For drawbar use : 2000

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1	2	3	4	5	6	7
d)	Maximum transmission oil temperature, (°C)	The declared value should not exceed the maximum value specified by oil company.		81	100	No
<b>15.3.2 Power lift and hydraulic pump performance:</b>						
a)	Maximum lifting capacity throughout the range of lift, (kN):					
	1) At hitch points	±10 percent	The performance shall be within 7.5% of ICT or limit specified under column 3 whichever is higher	16.69	14.89	No
	2) With the standard frame	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		9.84	10.14	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 minute, (mm)	The observed value should not exceed 50 mm		07	05	Yes

## 16. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

**16.1** On the basis of tests conducted the performance results have been summarized as evaluative (mandatory) and non-evaluative (not-mandatory) parameter applicable for qualifying Minimum Performance Criteria as per Clause-4 (Table-1) of IS: 12207-2019 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: 12207-2019	Values declared by the applicant (D) / Requirement(R)	As observed	Whether meets the requirements (Yes/No.)
1	2	3	4	5	6	7
<b>16.1.1</b>	<b>PTO Performance:</b>					
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: ± 5% for PTO power or engine power >26 kW, ± 10% for PTO power or Engine power ≤ 26 kW.	28.3 (D)	29.3	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	28.3 (D)	29.0	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% max.	234 (D)	247	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	168 (D)	166.4	Yes

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1	2	3	4	5	6	7
e)	Back-up torque, percent	Evaluative	12 %, min.	12 %, (R) minimum	20.2	Yes
f)	<b>Maximum operating temperature, (°C)</b>					
	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.	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)	98	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	3.25 (D) 2.44 (R) maximum	0.37	Yes
h)	Smoke level, (m <sup>-1</sup> )	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hatridge value ( <b>As per CMVR</b> )	3.25 per meter max.	0.18	Yes
<b>16.1.2</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 with ballast	18.35 (D) 19.39 (R) minimum	22.47	Yes
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 70% of static mass of tractor without ballast	13.04 (D) 13.59 (R) minimum	15.43	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.	22.6 (D) 23.4 (R) minimum	25.6	Yes
d)	Max. transmission oil temperature, (°C)	Evaluative	The declared value should not exceed the maximum value specified by oil company	120 (D)	100	Yes

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1	2	3	4	5	6	7
<b>16.1.3</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	±10%	14.7 (D)	14.89	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	11.77 (D) 6.90 (R) minimum	10.14	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 minute, (mm)	Non Evaluative	Observed value should not exceed 50 mm.	50 (D) 50 (R) maximum	05	Yes
<b>16.1.4</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 road ballast, (m):					
1)	Cold brake	Evaluative	10	10	6.87	Yes
2)	Hot brake	Evaluative	10	10	7.11	Yes
<b>b)</b>	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s <sup>2</sup> (N)	Evaluative	600	600 maximum	235 to 289	Yes
<b>c)</b>	Whether parking brake is effective at a force of 600 N at foot pedal(s) or 400 N at hand lever, N	Evaluative	Yes / No	Yes (R)	Yes	Yes
<b>16.1.5</b>	<b>Noise measurement:</b>					
<b>a)</b>	Maximum ambient noise emitted by the tractor, dB(A)	Evaluative	88 dB (A) for >1.5 tonne GVW and 85 db (A) for <1.5 tonne GVW (as per CMVR)	85 maximum	82	Yes
<b>b)</b>	Maximum noise at operator's ear level, dB(A)	Evaluative	96 (as per CMVR)	96 maximum	92	Yes
<b>16.1.6</b>	<b>Amplitude of mechanical vibrations at:</b>					
1)	Left foot rest	Non Evaluative	100 microns (max.)	100 (max.)	78	Yes
2)	Right foot rest				68	Yes
3)	Seat (with driver seated)				95	Yes
4)	Steering Wheel				61	Yes
<b>16.1.7</b>	<b>Air Cleaner:</b>					
	Max. oil pull over, (%)	Evaluative	0.25% (max.)	Dry type air cleaner is fitted	Not applicable	--

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1	2	3	4	5	6	7
<b>16.1.8</b>	<b>Haulage requirements:</b>					
<b>a)</b>	Gross mass of the trailers, (tones):					
	Two wheel	Non Evaluative	As specified by the manufacturer	5.0 (D)	5.0	Yes
Four wheel	Non Evaluative	6.0 (D)		6.0	Yes	
<b>b)</b>	<b>Distance travelled / litre of fuel consumption, (km/l):</b>					
	Two wheel	Non Evaluative	As specified by the manufacturer	5.5 to 5.7(D)	5.59 to 5.70	Yes
Four wheel	Non Evaluative	5.0 to 5.1(D)		5.74	<b>No</b>	
<b>c)</b>	Fuel consumption (cc/km/tonne):					
	Two wheel	Non Evaluative	As specified by the manufacturer	35.1 to 36.3 (D)	35.06 to 35.78	Yes
Four wheel	Non Evaluative	32.4 to 33.2 (D)		29.01	<b>No</b>	
<b>16.1.9</b>	<b>Wetland cultivation:</b>					
	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	The major breakdowns were not observed in the field test during initial commercial testing of this tractor model having test report No. T-1068/1593/2017 released in February 2017. So, as per the provision as laid down in clause 7.2 of IS: 12207-2019, the field test during the batch testing of this tractor model was not conducted.	--
1)	Clutch assembly	-do-				
2)	Brake housings	-do-				
3)	Front axle hubs	-do-				
4)	Engine oil	-do-				
5)	Transmission oil	-do-				
<b>16.1.10</b>	<b>Safety features:</b>					
<b>a)</b>	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes (As per IS 12239 part 2)	Meets the requirement	Yes	
<b>b)</b>	Lighting arrangement	Evaluative	As per CMVR	Meets the requirement	Yes	
<b>c)</b>	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)	<b>Does not meet the requirement</b>	<b>No</b>	
<b>d)</b>	Technical requirements for PTO shaft	Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	Meets the requirement	Yes	
<b>e)</b>	Dimension of three point linkage	Non Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	Meets the requirement	Yes	

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1	2	3	4	5	6	7
f)	Specification of linkage drawbar	Evaluative	Should meet the requirements of IS 12953 and IS 12362 (part 3) (as amended from time to time)		Meets the requirement	Yes
g)	Specifications of Swinging drawbar (wherever fitted)	Evaluative	Should meet the requirements of IS 12362 (Part 3) (As amended from time to time)		Not fitted	--
	1) Maximum travelling speed at rated engine speed in reverse gears, (kmph)	Evaluative	Should not exceed 20 Kmph		11.20 (Meets the requirement)	Yes
h)	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. Not applicable		Not applicable	--

16.1.11 Labelling of tractors (Provision of labelling plate):						
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO in kW and year of manufacture in numerical MM YY Digit 01-12 in box No.1 for MM will represent the month and next two digit in the box No.2 for YY will represent the year of manufacturing		<b>M/s. Mahindra &amp; Mahindra Limited, Farm Equipment Sector, India</b>	
	2) Model	Evaluative			YUVO 475 DI	Yes
	3) Month & Year of manufacture	Evaluative			11/21	Yes
	4) Engine number	Evaluative			ZMG5FCF8277	Yes
	5) Chassis number	Evaluative			MBNSFAJBBMZH 0007	Yes
	6) Declaration of maximum PTO power, (kW)	Evaluative			28.3	Yes
	7) Specific fuel consumption (g/kWh)	Evaluative			234	Yes

16.1.12 Discard limit for:						
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	89.13	88.904 to 88.928	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.20	0.103 to 0.115	Yes
(c)	Piston diameter at skirt, (mm)	Non Evaluative		88.15	88.804 to 88.813	Yes
(d)	<b>Ring end gap (mm):</b>					
	- Top comp. ring	Evaluative	-do-	2.50	0.30 to 0.35	Yes
	- 2 <sup>nd</sup> comp. ring		-do-	2.50	0.40 to 0.55	Yes
	- Oil ring		-do-	2.00	0.25 to 0.55	Yes
(e)	<b>Ring groove clearance (mm):</b>					
	- Top comp. ring	Evaluative	-do-	0.30	Tapered ring	--
	- 2 <sup>nd</sup> comp. ring		-do-	0.30	0.065 to 0.073	Yes
	- Oil ring		-do-	0.20	0.036 to 0.048	Yes
(f)	<b>Clearance of main bearings (mm):</b>					
	- Diametrical clearance	Evaluative	-do-	0.20	0.081 to 0.109	Yes
	- Crankshaft end float	Evaluative	-do-	0.60	0.13	Yes

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1	2	3	4	5	6	7
<b>g)</b>	<b>Clearance of big end bearings, (mm):</b>					
	- Diametrical	Evaluative	-do-	0.20	0.031 to 0.076	Yes
	- Axial	Evaluative	-do-	0.75	0.15	Yes
<b>(h)</b>	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.30	0.08 to 0.11	Yes
<b>(i)</b>	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.30	0.08 to 0.11	Yes
<b>16.1.13</b>	<b>Literature (Submission to test agency)</b>					
<b>(a)</b>	Operator manual	Evaluative	Provided / Not Provided	Provided	Provided	Yes
<b>(b)</b>	Parts Catalogue	Evaluative	Provided / Not Provided	Provided	Provided	Yes
<b>(c)</b>	Workshop/ Service manual	Evaluative	Provided / Not Provided	Provided	Provided	Yes
<b>16.1.14</b>	<b>Fitment of Roll Over Protective Structure (ROPS):</b> for tractors having more than 1150 mm rear track width	Evaluative	ROPS should meet the requirement of IS:11821 or OECD code or equivalent International Standard	Not Provided	Not fitted	---
<b>16.1.15</b>	<b>Standard accessories</b>	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with tractor	Provided	Provided	Yes
<b>16.1.16</b>	<b>Accessories (Optional)</b>	Non Evaluative	Ballast weights if fitted should meet the requirement of CMVR.	Provided	Provided	Yes

<b>16.2 CATEGORY OF BREAKDOWNS / DEFECTS:</b>					
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



**16.3 Salient Observations:**

**16.3.1 Laboratory tests:**

**16.3.1.1 Mechanical Vibration:**

The amplitude of mechanical vibration on various assemblies marked as (\*) in Chapter-10 of this test report is on higher side. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

**16.3.1.2 Operator's Seat:**

- i) Longitudinal distance from seat index point to the centre of differential lock pedal has been measured as 260 mm which is not within the range of 410 to 720 mm.
- ii) Vertical distance from seat index point to centre of steering control wheel has been measured as 175 mm which is not within the range of 265 to 385 mm.
- iii) Vertical distance from seat index point from foot rest has been measured as 545 mm which is not within the range of 450 to 520mm.
- iv) Position of silencer outlet with respect to seat index point has been measured as 775 mm the minimum requirement of 800 mm.

Above parameters does not meet the requirement of IS: 12343-1998, (Re-affirmed in January, 2021). This should be looked into for necessary corrective action at production level.

**16.3.1.3 Operator's work place:**

- i) Vertical retainer has not been provided on inner side of clutch pedal.
- ii) Spark arresting device has not been provided in the exhaust system.

**The above observations were also made in the previous test report No. T-1068/1593/2017 (February, 2017) and no improvement have been made as regards to its conformity so far.**

**16.3.1.4 PTO master shield:**

PTO master shield has not been provided on tractor. This should be looked into for necessary corrective action.

**16.3.1.5 Haulage test:**

- i) Distance travelled per litre fuel consumption with four wheel wheel trailers was observed as 5.74 km/l against the declaration of 5.0 to 5.1 km. This should be looked into for necessary corrective action.
- ii) Specific fuel consumption with four wheel trailer was observed as 29.01 cc/km/ton against the declaration of 32.4 to 33.2 cc/km/ton. This should be looked into for necessary corrective action.

**The above observations were also made in the previous test report No. T-1068/1593/2017 (February, 2017) and no improvement have been made as regards to its conformity so far.**

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

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

- i) Fuel shut off knob should remains in stop position as per requirement of IS: 8133-1983.
- ii) Working clearance between draft control lever & RHS mudguard has been measured as 60 mm against the minimum requirement of 70 mm. This should be provided as per IS: 12239 (Part-2) – 1999 (Reaffirmed in January, 2019).

**The above observations were also made in the previous test report No. T-1068/1593/2017 (February, 2017) and no improvement have been made as regards to its conformity so far.**

**16.5 Specification of tractor:**

- i) The oil change period for transmission, hydraulic & brake system on specifications submitted by applicant does not match with operator manual (Refer P. No. 18-2). This should be looked into for corrective action.
- ii) The type of clutch plate & clutch assembly found on tractor engine does not match with sketch diagram of service & parts catalogue manual (Refer P. No. 118). This should be looked into for corrective action.

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**16.6 Maintenance / Service Problems:**

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

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


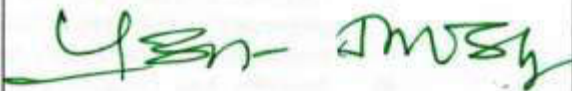
**16.7.1** The following literature was supplied with test sample for reference during the test.

- a) Operator's manual for Mahindra YUVO 475 DI tractor model.
- b) Service manual for Mahindra YUVO 475 DI tractor model.
- c) Parts catalogue for Mahindra YUVO 475 DI tractor model.

**16.7.2** 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:

- i) Inflation pressure and load carrying capacity of steered wheels & drive wheels tyre.
- ii) Coolant and water ratio.
- iii) Specification of recommended matching trailer for haulage operation.

**TESTING AUTHORITY:**

<p><b>C.V. CHIMOTE</b> TEST ENGINEER</p>	
<p><b>P.K. PANDEY</b> DIRECTOR</p>	

Draft Test Report is compiled by: **Pratyush Satya**, Senior Technical Assistant

**17. Applicant's comments**

Para no.	Our reference	Applicant's comments
17.1	16.5 (i), (ii) & 16.7.2 (i), (ii), (iii)	Observation will be studied and necessary corrective actions for improvement in the manual will be ensured.