

Application Reference No. 28/2022-23/75

(यह परीक्षण रिपोर्ट 30/06/2028 तक वैध है / THIS TEST REPORT IS VALID UPTO 30/06/2028)



**Make of Agricultural Tractor : MAHINDRA**  
**Model : YUVO TECH+ 405 DI 4WD**  
**Manufactured by : Mahindra & Mahindra Limited**  
**(Farm Equipment Sector)**  
**Mahindra Research Valley, Mahindra**  
**World City, Plot no. 41/1, Anjur P.O.,**  
**District Chengalpattu - 603004.**



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-1744/2275/2023	MAHINDRA, YUVO TECH+ 405 DI 4WD TRACTOR - 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: June	Test Report No.: T-1744/2275/2023	Year: 2023
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GOVERNMENT OF INDIA  
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[C]	Tractor manufacturer's name and address	:	<b>Mahindra &amp; Mahindra Limited (Farm Equipment Sector) Mahindra Research Valley, Mahindra World City, Plot no. 41/1, Anjur P.O., District Chengalpattu - 603004.</b>
	Location of other manufacturing plants (apa)	:	<b>Mahindra &amp; Mahindra Limited (Farm Equipment Sector)</b>
		:	(i) Akurli Road, Kandivli (E), MUMBAI - 400 101.
		:	(ii) MIDC, Hingna Road, Nagpur - 440 028
		:	(iii) Khatima Panipat Highway, Rudrapur, Udham Singh Nagar - 263 153
		:	(iv) Jaipur Ajmer Road, Jaipur - 303 007
		:	(v) Near Bidar "T" Junction , Mahindra Nagar, Zaheerabad- 502 220
		:	(vi) Mahindra Research Valley Mahindra World City, Plot no. 41/1, Anjur P.O., District Chengalpattu - 603004.
[C]	Submitted for test by (Applicant)	:	The Manufacturer
[C]	Selected for test by	:	The Ministry vide OM No. 13-17/2021 - M&T (I&P) dated 28.07.2022, has allowed the applicant to submit the test sample directly to the Institute without requiring any random selection for Initial Commercial Testing. Thus, the applicant directly submitted the test sample to the Institute for test.
[D]	Place of running-in	:	At manufacturer's works
[D]	Duration of running-in:	:	
	-Engine	:	30
	-Transmission	:	36
[C]	Location of test	:	Government of India, Central Farm Machinery Training and Testing Institute, P.O. - Tractor Nagar, BUDNI – 466445 (M.P.), INDIA

## 1. SPECIFICATIONS OF TRACTOR

<b>1.1</b>	<b>Identification:</b>		
<b>1.1.1</b>	<b>Denomination</b>		
[C]	Make of tractor	:	Mahindra
[C]	Model	:	YUVO TECH+ 405 DI 4WD
[C]	Type	:	Four Wheel Drive, Standard Agricultural Tractor.
[C]	Month & year of manufacture	:	09/22
[D]	Country of origin	:	India
<b>1.1.2</b>	<b>Numbers:</b>		
[D]	1 <sup>st</sup> Serial No. or prototype	:	MBNPFAFVFMNJ00001
[C]	Serial No.	:	MBNPFAFVFNNF00010

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## 1.2 Engine:

[D] Manufacturer's address : Mahindra & Mahindra Limited  
(Farm Equipment Sector)

i) Akurli Road, Kandivli (E), MUMBAI - 400 101

ii) MIDC, Hingna Road, Nagpur - 440 028

iii) Khatima Panipat Highway, Udham Singh Nagar, Rudrapur - 263 153

iv) Jaipur Ajmer Road, Jaipur - 303 007

v) Near Bidar "T" Junction , Mahindra Nagar, Zaheerabad- 502 220

vi) Mahindra Research Valley, Mahindra World City, Plot no. 41/1, Anjur P.O., District Chengalpattu - 603004.

[C] Make : Mahindra

[C] Model : MTHCI27NA039B3A

[C] Type : Four stroke, naturally aspirated, liquid cooled, direct injection, diesel engine.

[C] Serial No. : NNF7KBE0013

### 1.2.1 Cylinders:

[C] Number/disposition : Three, vertical, in-line

[D] Bore / Stroke, (mm) : 98/122

[D] Capacity, cm<sup>3</sup> : 2760

[D] Compression ratio : 19.7 (±1): 1

[D] Arrangement of valves : Overhead, inline

[D] Cylinder liners : Wet, replaceable

[D] Type of combustion chamber : Re-entrant bowl

1.2.2 Supercharging : **Not Available**

### 1.2.3 Fuel system:

[C] Fuel feed system : Gravity and force feed

#### Filter(s):

[C] Make : Bosch

[C] Model : F002 H25 037

[C] Type : Spin-on paper element

[C] Number(s) : One

[D] Capacity of fuel tank, (l) : 53.4

#### Injection pump:

[C] Make : Bosch

[C] Model : F 002 A2Z A83, PES3A85D320RS2000

[C] Type : Inline, plunger

[C] Serial Number : 27460994

#### Manufacturer's production setting of injection pump:

[C] Flow rate (rated engine speed & full load), (kg/h) : 6.68

[D] Timing : 4.5 ± 1 degree before TDC

#### Injectors:

[D] Make : Bosch, India

[D] Model/Group combination No. : :

[D] Holder no. : F002C70552

[D] Nozzle no. : DSLA 147P 1379

[D] Type : Multi hole (six)

[D] Manufacturer's production pressure setting : 25.0 + 0.8 MPa

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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:

Sl. 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</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: $\pm 5\%$ for PTO power and or engine power $> 26$ kW. $\pm 10\%$ for PTO power and or engine $\leq 26$ kW.	26.5 (D)	26.6	Yes
<b>b)</b>	Power at rated engine speed, (kW)	Non Evaluative	-do-	26.5 (D)	26.6	Yes
<b>c)</b>	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% max.	242 (D)	251	Yes
<b>d)</b>	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	$\pm 8\%$	170 (D)	165.2	Yes
<b>e)</b>	Back-up torque, percent	Evaluative	12 percent	25 (D) 12 (R)	30.0	Yes
<b>f)</b>	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.	130 (D)	101	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.	119 (D)	93	Yes
<b>g)</b>	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under natural ambient conditions.	2.51 Maximum (R)	0.30	Yes
<b>h)</b>	Smoke level, $m^{-1}$	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 Maximum (R)	0.32	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.	18.0 (D)	*	*
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 70% of static mass of tractor without ballast or with standard ballast, as the case may be.	14.30 (D) 14.42 (R) Minimum	19.16	Yes
c)	Maximum drawbar power without ballast/ 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.	21.2 (D) 21.3 (R) Minimum	21.9	Yes
d)	Maximum transmission oil temperature, (°C)	Evaluative	The declared value should not exceed the maximum value specified by oil company	120 (D)	83	Yes
* Applicant vide letter no. FD/BVH/ICT/YUVOTECH+4054wd/23-24/07 dated 22.05.2023 has requested not to conduct the ballasted drawbar performance & ten-hour drawbar test which was allowed as per the additional guidelines for testing of tractors as per new regime of testing of tractors vide a OM No. 13-32/2023-M&T(I&P) (FTS-125476) dated 16.05.2023. Accordingly, only unballasted drawbar performance test was conducted.						
<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.	16.67 (D)	16.69	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.	13.24 (D) 6.26 (R) Minimum	13.35	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
<b>6.1.4</b>	<b>Brake performance at 25 kmph:</b>					
a)	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 (R)	6.85	Yes
2)	Hot brake	Evaluative	10	10 (R)	7.16	Yes
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

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1	2	3	4	5	6	7		
6.1.5	<b>OPTIONAL TESTS:</b> As the applicant has not applied for any optional tests, therefore no optional tests was conducted.							
6.1.6	<b>Safety features :</b>							
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulleys, silencer, hydraulic pipes [As per IS 12239 (Part2)]	Meets the requirement	Yes			
b)	Lighting arrangement	Evaluative	As per CMVR	Meets the requirement	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)	<b>Does not meet the requirement</b>	<b>No</b>			
d)	Technical requirements for PTO shaft	Non Evaluative	Should meet the requirements of IS: 4931 (As amended from time to time)	Meets the requirement	Yes			
e)	Dimensions of three point linkage	Non Evaluative	Should meet the requirements of IS: 4468 (Part-I) (As amended from time to time)	<b>Does not meet the requirement</b>	<b>No</b>			
f)	Specifications of linkage drawbar	Non Evaluative	Should meet the requirements of IS: 12953 (As amended from time to time)	Meets the requirement	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)	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 fitted	Not applicable			
6.1.7	<b>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, specific fuel consumption (SFC) corresponding to maximum power in g/kWh and year of manufacture in numerical form. <table border="1" style="margin: 5px auto;"><tr><td>MM</td><td>YY</td></tr></table> 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.	MM	YY	Mahindra	Yes	
MM	YY							
	2) Model	Evaluative		YUVO TECH+ 405 DI 4WD	Yes			
	3) Month & Year of manufacture	Evaluative		09/22	Yes			
	4) Engine number	Evaluative		NNF7KBE0013	Yes			
	5) Chassis number	Evaluative		MBNPF AFVFNN F00010	Yes			
	6) Maximum PTO power, (kW)	Evaluative		26.5	Yes			
	7) Specific fuel consumption, (g/kWh)	Evaluative	242	Yes				

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1	2	3	4	5	6	7
<b>6.1.8</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>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: 12207-2019	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 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

**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 1 Categories 1, 2, 3 & 4 (fourth revision) [IS:4468(Part-I) – 1997 (Reaffirmed in 2022)] : **Does not conform**
- iv)** Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed Year 2022)] : **Conforms**
- v)** Agricultural tractors- Operator's seat technical requirement [IS12343 - 2021] : **Does not conform**
- vi)** Guide for safety & comfort of operator of agricultural tractors:Part 1 General requirements (first revision):[IS 12239 (Part 1) - 2018] : **Does not conform**
- 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)] : **Does not conform**



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- viii) Guide lines for location and operation of operator controls on agricultural tractors and machinery [IS: 8133 - 2021] : **Does not conform**
- ix) Tractors and machinery for agriculture and forestry, powered lawn and garden equipment - Symbols for operator controls and other displays Part-2 Symbols for agricultural tractors and machinery [IS: 6283(Part-1) - 2006 (Reaffirmed Year 2019) and IS: 6283 (Part-2) – 2007 (Reaffirmed Year 2019)] : **Conforms**
- 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:

**Applicant vide letter no. FD/BVH/ICT/YUVOTECH+4054wd/23-24/06 dated 01.05.2023 has recommended that tractor operating range is from 1000 rpm to rated engine rpm under full load condition. Hence during PTO performance test, varying speed test was conducted upto 1000 rpm of engine only under natural and high ambient condition.**

##### 6.4.2 Drawbar performance test:

**Applicant vide letter no. FD/BVH/ICT/YUVOTECH+4054wd/23-24/07 dated 23.05.2023 has recommended that tractor operating range is from 1000 rpm to rated engine rpm under full load condition. Hence Drawbar performance test was conducted upto 1000 rpm of engine only.**

##### 6.4.3 Operator's seat:

The following parameters does not meet the requirement of IS: 12343-2021.

- i) Provision for adjustment of driver's mass has been specified as 50 to 120 kg against the requirement of 40 to 100 kg.
- ii) Vertical distance from SIP to centre of steering control wheel has been measured as 190 mm against the requirement of 265 to 385 mm.
- iii) Longitudinal distance from SIP to centre of steering control wheel has been measured as 540 mm against the requirement of 425 to 525 mm.
- iv) Vertical distance from SIP to foot rest has been measured as 560 mm against the requirement of 450 to 520 mm.

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

##### 6.4.4 Operator's work place:

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

- i) Vertical retainers on inner side of clutch pedal is 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.

##### 6.4.5 Three point linkage:

The dimensions viz. diameter of hitch pin hole & width of ball of upper hitch points, diameter of hitch pin hole & width of ball of lower hitch points, lateral distance from lower hitch point to centre line of tractor and distance from end of power take-off to centre of lower hitch point (lower link in horizontal position) does not meet the requirements of IS:4468 (Part-I) – 1997. This should be looked into for corrective action.

##### 6.4.6 PTO master shield:

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

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### 6.5 Specification of Tractor:

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)	Transmission oil	TRACT ELF MM/IOCL	Servo M-TRAC 30/M-Star genuine OIB oil (P. No. 17-1)
b)	Transmission oil change period	First change after 1200 hours of operation and subsequently after every 1200 hours of operation.	First change after 1300 hours of operation and subsequently after every 1200 hours of operation. (P. No. 18-2)

### 6.6 Maintenance / Service Problems:

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

### 6.7 Recommendation with regard to safety on tractor:

- i) Fuel shutoff knob does not remain in stop position as per the requirement of IS: 8133-2021.
- ii) Identification of engine stop control, engine speed control, transmission control, parking brake & PTO engaging lever by colour has not been provided as per the requirement as laid down in Table - 5 of IS: 8133-2021.
- iii) Colour code for engine revolution gauge should be provided as per IS: 6283 Part - 2 2017
- iv) The hand accelerator lever, when moved away from the operator (i.e. forward) decreases the engine speed, which does not meet the requirement as laid down in Table - 1 of IS: 8133-2021.
- v) Differential lock has not been provided.
- vi) The working clearance between draft control lever and position control lever has been measured as 40 mm against the minimum requirement of 70 mm.

Above parameters should be looked into for necessary corrective action.

### 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: -

- a) Operator Manual for "Mahindra Yuvo Tech+" tractor model.
- b) Parts catalogue for "Mahindra Yuvo Tech+ 405 DI 4WD" tractor model.
- c) Service manual for "Mahindra Yuvo Tech+ 405 DI 4WD" 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:

- i) Recommended ballast masses for different operations.
- ii) Engine to PTO speed ratio.

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

TESTING AUTHORITY

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

Draft Test Report compiled by Vithato Keyho, Senior Technical Assistant.

7. APPLICANT'S COMMENTS

Para No.	Our reference	Applicant's comments
7.1	6.5 & 6.8.2	Parameters in product literature will be studied & necessary action will be initiated

ANNEXURE-I

TRACTOR RUN HOURS DURING TEST

A. LABORATORY AND TRACK TESTS:		HOURS
1	Running-in	Applicant has declared it to be conducted on their work place
2	PTO performance test	10.3
3	Power lift and hydraulic pump performance test	1.3
4	Drawbar performance test	3.5
5	Brake performance test	1.5
6	Nominal speed test	1.5
B.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	6.9
TOTAL:		25.0