



**MAHINDRA, 605 DI PS TRACTOR  
(Brand Name : Arjun Novo)**



**भारत सरकार**

GOVERNMENT OF INDIA

कृषि मंत्रालय (कृषि एवं सहकारिता विभाग, मशीनीकरण एवं प्रोद्योगिकी प्रभाग)

Ministry of Agriculture (Deptt. of Agri. & Co-op, Mechanization & Technology Division)

**केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान**

**CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE**

**(An ISO : 9001-2008 Certified Institute)**

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## 1. SPECIFICATIONS

- 1.1 Tractor:**
- Make : Mahindra  
 Model : 605 DI PS  
 Brand Name : Arjun Novo  
 Variants, if any : **Not announced**  
 Type : Four wheeled, rear-wheel driven, General Purpose Agricultural Tractor.  
 Year of manufacture : 2014  
 Chassis serial number : **N9MB 00002**  
 Country of origin : India
- 1.2 Engine:**
- Make : Mahindra  
 Model : MSI452 3A  
 Type : Four strokes, water cooled, direct injection, natural aspirated, diesel engine.  
 Serial number : **N9MB 00002**
- 1.2.1 Engine speed (Manufacturer's recommended production setting), (rpm):**
- Maximum speed at no load : 2400 to 2500  
 - Low idle speed : 750 to 850  
 - Speed at maximum torque : 1100 to 1300
- Rated speed, (rpm):**
- For PTO use : 2100  
 - For drawbar use : 2100
- 1.3 Cylinder & Cylinder Head:**
- Number : Four  
 Disposition : Vertical, Inline  
 Bore/stroke, (mm) : 96/122  
 Capacity as specified by the applicant, (cc) : 3532  
 Compression ratio : 18.3: 1 (± 0.5)  
 Type of cylinder head : Monoblock  
 Type of cylinder liners : Wet, replaceable  
 Type of combustion chamber : Re-entrant bowl cavity on piston head  
 Arrangement of valves : Overhead, inline
- Valve clearance (cold):**
- |                       | <b>Cold</b> | <b>Hot</b> |
|-----------------------|-------------|------------|
| - Inlet valve, (mm)   | 0.3         | 0.4        |
| - Exhaust valve, (mm) | 0.3         | 0.4        |
- 1.4 Fuel System:**
- Type of fuel feed system : Gravity and force feed
- 1.4.1 Fuel tank:**
- Capacity, (l) : 65.0  
 Location : Above clutch housing  
 Provision for draining of sediments/ water : Provided  
 Material of fuel tank : Metallic

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### 16. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

**16.1** Evaluative (mandatory) / Non-evaluation (Non-mandatory) parameter applicable for qualifying Minimum Performance criteria as per Clause-4 (Table-1) of IS: 12207-2014 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: 12207-2014	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 / +10% for PTO power >26 kW. - 7.5/+10% for PTO power ≤ 26 kW or -5 / +10% for Engine power >26 kW. - 7.5/+10% for Engine power ≤ 26 kW	33.5	33.7	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	33.5	32.5	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	251	246	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	178	176.7	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10% (R) / 15 (D)	18.04	Yes
f)	Maximum operating temperature, (°C)					
	1) Engine oil	Non 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)	114	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.	112 (D)	94	Yes

1	2	3	4	5	6	7
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.52 (R)	0.452	Yes
h)	Smoke level	Evaluative	Maximum light absorption coefficient of 3.25 per metre or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	3.25 per metre (R) / 0.20 (D)	0.23	Yes

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<b>16.1.2 Drawbar performance :</b>						
<b>a)</b>	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	16.19 (R )	27.36	Yes
				22 (D)		
<b>b)</b>	Max. drawbar pull with Unballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	16.25 (R )	19.94	Yes
				16 (D)		
<b>c)</b>	Maximum drawbar power with Unballast, (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.	26.99 (R )	27.7	Yes
				26.8 (D)		
<b>d)</b>	Maximum transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	110 (D)	89	Yes

<b>16.1.3 Power lift and hydraulic pump performance :</b>							
<b>a)</b>	Maximum lifting capacity throughout the range of lift, (kN):						
	1)	At hitch points	Non Evaluative	[Tolerance of minus 10%]	21.5 (D)	22.3	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	7.93 (R) (Minimum) 13.34 (D)	14.16	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	Observed value should not exceed 50 mm.	50 max (R)	00	Yes	
				250 (D)			

1	2	3	4	5	6	7	
<b>16.1.4 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 (R )	9.65	Yes
	2)	Hot brake	Evaluative	10	10 (R )	9.65	Yes
<b>b)</b>	Maximum force				117		

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	exerted on the brake pedal to achieve a deceleration of 2.5 m/s <sup>2</sup> (N)	Evaluative	600	600 (R)	to 130	Yes
<b>16.1.5</b>	<b>Noise measurement :</b>					
<b>a)</b>	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	88 (R)	85	Yes
<b>b)</b>	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	98 (R)	93	Yes
<b>16.1.6</b>	<b>Amplitude of mechanical vibrations at :</b>					
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R)	30	Yes
	2) Right foot rest				40	Yes
	3) Seat (with driver seated)				40	Yes
	4) Steering Wheel				70	Yes
<b>16.1.7</b>	<b>Haulage requirements :</b>					
<b>a)</b>	Gross mass of the trailers, (tones):					
	1) Two wheel	Non Evaluative	--	5.0	5.0	Yes
	2) Four wheel		--	8.0	8.0	Yes
<b>b)</b>	Distance travelled / litre of fuel consumption, (km/l):					
	1) Two wheel	Non Evaluative	--	3 to 6	5.04 to 5.24	Yes
	2) Four wheel		--	3 to 6	4.26 to 4.30	Yes
<b>c)</b>	Fuel consumption (ml/km/tonne):					
	1) Two wheel	Non Evaluative	--	30 to 45	38.20 to 39.65	Yes
	2) Four wheel		--	30 to 45	29.01 to 29.32	Yes
<b>16.1.8</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	No ingress of mud and / or water was observed	Yes
	1) Clutch assembly	-do-				
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				

1	2	3	4	5	6	7
<b>16.1.9</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))	At present no requirements	Provided	--
<b>b)</b>	Lighting	Evaluative	As per CMVR	--	Provided	Yes

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	arrangement (Tractor having more than 1150 mm rear track width)					
<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 meets the requirement</b>	<b>No</b>
<b>d)</b>	Technical requirements for PTO shaft	Non-Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--	Conforms	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)	--	<b>Does not meets the requirement</b>	<b>No</b>
<b>f)</b>	Specification of linkage and swinging drawbars	Non-Evaluative	Should meet the requirements of IS 12953 and IS 12362 (part 3) (as amended from time to time)	--	Conforms	Yes

<b>16.1.100</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 HP	--	Mahindra	Yes
	2)	Model	Evaluative		--	605 DI PS	Yes
	3)	Year of manufacture	Evaluative		--	2014 KE	Yes
	4)	Engine number	Evaluative		--	N9MB 00002	Yes
	5)	Chassis number	Evaluative		--	N9MB 00002	Yes
	6)	Declaration of PTO power, (kW)	Evaluative		--	33.5	Yes

<b>16.1.11</b>	<b>Discard limit for:</b>					
<b>(a)</b>	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	96.522	96.02 to 96.04	Yes
<b>(b)</b>	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.50	0.103 to 0.108	Yes

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>(c)</b>	<b>Ring end gap (mm):</b>					
	- Top comp ring.	Evaluative	-do-	2.5	0.90 to 0.95	Yes
	- 2 <sup>nd</sup> comp. ring.		-do-	2.5	0.35 to 0.40	Yes
	- Oil ring.		-do-	2.0	0.35 to 0.40	Yes
<b>(d)</b>	<b>Ring groove clearance (mm):</b>					

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	- Top comp ring.	Evaluative	-do-	Tapped	NA	...
	- 2 <sup>nd</sup> comp. ring.		-do-	0.30	0.048 to 0.060	Yes
	- Oil ring.		-do-	0.25	0.041 to 0.052	Yes

<b>(e)</b>	<b>Clearance of main bearings (mm):</b>					
	- Diametrical clearance	Evaluative	To be specified by the manufacturer	0.30	0.066 to 0.085	Yes
	- Crankshaft end float	Evaluative		0.90	0.250	Yes

<b>(f)</b>	<b>Clearance of big end bearings, (mm):</b>					
	- Diametrical	Evaluative	-do-	0.20	0.052 to 0.067	Yes
	- Axial	Evaluative	-do-	0.75	0.25	Yes
<b>(g)</b>	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.20	0.074 to 0.154	Yes
<b>(h)</b>	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.20	0.120 to 0.140	Yes

<b>16.1.12</b>	<b>Literature (Submission to test agency)</b>					
<b>(a)</b>	Operator manual	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
<b>(b)</b>	Parts Catalogue	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
<b>(c)</b>	Workshop/Service manual	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes

<b>16.1.13</b>	<b>CATEGORY OF BREAKDOWNS / DEFECTS :</b>				
S. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	As observed	Whether meets the requirements (Yes/No)
1.	Critical	Evaluative	No critical breakdown	<b>None</b>	Yes
2.	Major	Evaluative	Not more than two and neither of them should be repetitive in nature	<b>None</b>	Yes
3.	Minor	Evaluative	Not more than five and frequency of each should not be more than two.	<b>None</b>	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.	<b>None</b>	Yes

<b>16.2</b>	<b>Optional requirements as per Clause-4 (Table-2) of IS:12207-2014:</b>			
S. No.	Characteristic	Requirements as per IS: 12207-2014	AS observed	Whether meets the requirements (Yes/No.)
1	Maximum oil pull over, (%)	0.25% (max.)	Dry type air cleaner provided	Not applicable

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2.	Seating requirements	Should meet the requirements of IS: 12343-1998	<b>Does not meet the requirements</b>	<b>No</b>
3.	Fitment of ROPS	With a provision for fitment of ROPS.	Provided	Yes
		If ROPS fitted it should meet the requirement of IS: 11821-1992	ROPS not fitted	Not applicable
4.	Technical requirements for PTO shaft	Should meet the requirements of IS: 4931 -1995	Meets the requirements	Yes
5.	Dimensions of three point linkage	Should meet the requirements of IS: 4468 (Part-I)-1997	<b>Does not meet the requirements</b>	<b>No</b>
6.	Specifications of linkage drawbar	Should meet the requirements of IS: 12953-1990.	Meets the requirements	Yes
	Specification of swinging drawbar	Should meet the requirements of IS: 12362 Part 3-1994.	Not provided	Not applicable
7.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Front tow hook not provided	<b>No</b>

**16.3 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 in March, 2009)] : Conforms
  - ii) Agricultural tractors – Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS: 4931-1995 (Reaffirmed in March, 2009)] : 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 March, 2007)/ISO 730-1:1994] : **Does not conform**
  - iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in March, 2007)] : Conforms
  - v) Agricultural tractors - Operator's seat technical requirement [IS 12343 –1998 (First revision) (Reaffirmed in March, 2009)] : **Does not conform**
  - vi) Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision) : [IS 12239 (PT-1)-1996 (Reaffirmed in March, 2009)/ISO 4254-1:1989] : **Does not conform**
  - vii) Tractors and machinery for agriculture and forestry – Technical means for ensuring safety Part 2: Tractors (first revision) IS 12239 (PT-2)-1999 (Reaffirmed in March, 2009)] : **Does not conform**
  - viii) Tractors and machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays [IS: 6283 (Part-1 & Part-2) –2006 & 2007(Reaffirmed in March, 2009)/ISO 3767-2:1991]] : Conforms
- |          |          |          |          |
|----------|----------|----------|----------|
| <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> |
|----------|----------|----------|----------|
- ix) Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) (IS: 8133 – 1983) (Reaffirmed in March, 2009)] : **Does not conform**
  - x) Agricultural Tractor & Machinery Lighting device for travel on public roads (IS: 14683-1999) (Reaffirmed in



March, 2009)]

**16.4 Salient Observations:**

**16.4.1 Laboratory tests:**

**16.4.1.1 PTO Performance:**

- i) The maximum backup torque was observed as 18.03 %.
- ii) The maximum power was observed as 33.7 kW against the declaration of 33.7 kW, which meet the requirement of IS: 12207-2014 with regard to tolerance.
- iii) The specific fuel consumption corresponding to maximum power was measured as 0.246 g/kWh against the declaration of 251 g/kWh, which is within the tolerance limit of IS: 12207-2014.
- iv) The power drop of 7.7 % was recorded in high ambient condition as compared to natural ambient condition. It is considered on higher side and calls for necessary corrective action.

**16.4.1.2 Drawbar performance:**

- i) During ten hours drawbar test, creeping of LHS & RHS rear tyre over the rims was observed as 65 mm & 85 mm respectively. This should be looked into for necessary corrective action.

**16.4.1.3 Hydraulic Performance:**

- i) The moment about rear axle with standard frame was calculated as 22.57 kN-m. Whereas, the moment about front axle was calculated as 20.46 & 20.46 kN-m under Unballasted and ballasted condition respectively. The moment about rear axle is on higher side as compared to the moment about front axle even under ballasted condition. It is, therefore, recommended that the lifting capacity of the hydraulic system may be reduced suitably or ballast recommendation may be reviewed to avoid the front lifting of the tractor.
- ii) Maximum lifting capacity throughout the range of lift, at Hitch points was declared as 21.5 kN while it was measured as 22.3 kN which towards higher side and hence meet the requirement.

**16.4.1.4 Mechanical Vibration:**

The amplitude of mechanical vibration on various assemblies marked as (\*) in Chapter-8 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.

**16.4.1.5 Three point linkage:**

Some of the parameters of three point linkage conforms to Cat.I and some of them conforms to Cat.II and also some of not meeting the requirement of both. Keeping in view the spirit of standardization, necessary improvement may be incorporated.

**16.4.1.6 Specifications of Power Take-off Shaft:**

- i) All specifications of PTO shaft meets the requirements however the dimensions of PTO masters shield doesn't meet the requirement so necessary improvement may be incorporated.

**16.4.2 Field Performance:**

**16.4.2.1 Wetland Cultivation (Puddling Operation):**

No ingress of mud/or water was noticed during puddling operation of the tractor. Hence, It meets the requirements of IS: 11082-1984 (Technical requirements of agricultural tractors for wetland operation). The tractor is suitable for wetland operation (Puddling).

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



- 16.4.2 Field Performance:**
- 16.4.2.1 Wetland Cultivation (Puddling Operation):**  
No ingress of mud/or water was noticed during puddling operation of the tractor. Hence, It meets the requirements of IS: 11082-1984 (Technical requirements of agricultural tractors for wetland operation). The tractor is suitable for wetland operation (Puddling).
- 16.5 Recommendation with regard to safety on tractor:**  
The following requirements, inter alia, may be considered for incorporation on the tractor:
- Provision for spark arresting device in exhaust system.
  - The working clearance between the position control lever hence does not meet the requirement of IS: 12239 (Part-2) – 1999.
- 16.6 Adequacy of Literature supplied with machine:**
- 16.6.1** The following literature has been supplied with the tractor
- Service Manual for Mahindra, 605 DI PS (Brand Name: Arjun Novo) tractor
  - Parts Catalogue for Mahindra, 605 DI PS (Brand Name: Arjun Novo) tractor
  - Operator's manual Mahindra, 605 DI PS (Brand Name: Arjun Novo) tractor
- 16.6.2** The literature supplied was found adequate. However, The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.

### 17.0 Citizen charter

Duration of Test	Test duration under citizen charter	Whether the report released within time frame given in the citizen charter	Remark
9 Months (May, 2014 to January, 2015)	10 Months	Yes	--

### TESTING AUTHORITY:

**A. K. SINGH**  
SENIOR AGRICULTURAL ENGINEER

**C. R. LOHI**  
DIRECTOR

Test report compiled by: - Er. Rajneesh Patel Senior Technical Assistant.

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S. No.	Items	Disc Plough	Rotavator
1.	Make	M&M	ACE
2.	Type	Mounted	Mounted
3.	No. of Disc/blades	Three	36, in 7 flanges
4.	Type of Disc/blades	Plain concave	hatchet
5.	Size of bottoms/blades, (mm)	610	245 x 75 x 6
6.	Spacing of bottoms/flanges, (mm)	520	245
7.	Lower hitch point span, (mm)	855	735
8.	Mast height, (mm)	440	470
9.	<b>Overall dimensions, (mm):</b>		
	- Length	1890	1020
	- Width	1080	1985
	- Height	1070	1045
10.	Gross mass, (kg)	365	450

**ANNEXURE – II****BRIEF SPECIFICATION OF FULL CAGE WHEEL**

S. No.	Items	Specification
1.	Type	Full cage wheel
2.	Dia, (mm)	1280
3.	Width, (mm)	850
4.	No. and types of lugs	24, Straight lugs made of M.S. angle section welded to angle iron frame
5.	Size of angle section, (mm)	50 x 50 x 6
6.	Length of lugs, (mm)	425
7.	Spacing of lugs, (mm)	160
8.	Weight of each cage wheels (kg)	145

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

A.	LABORATORY AND TRACK TESTS:	HOURS
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1.	Running-in	--
2.	PTO performance test	15.41
3.	Power lift and hydraulic pump performance test	0.66
4.	Drawbar performance test	18.10
5.	Turning ability	0.50
6.	Location of centre of gravity	0.30
7.	Operator's field of vision	Nil
8.	Brake test	3.17
9.	Noise measurement	2.0
10.	Mechanical vibration test	1.0
11.	Nominal speed test	0.62
<b>B.</b>	<b>FIELD TEST:</b>	
1.	Disc ploughing	10.33
2.	Rotavation	10.30
3.	Puddling (including 5.0 hours water proof test)	15.25
<b>C.</b>	<b>HAULAGE TEST:</b>	5.39
<b>D.</b>	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	9.81
<b>TOTAL:</b>		92.36