



MAHINDRA, 575 DI POWER + TRACTOR
(Brand Name : Bhoomiputra)



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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| T-943/1461/2014 | MAHINDRA, 575 DI POWER + (BRAND NAME: BHOOMIPUTRA) TRACTOR – COMMERCIAL (Initial) |
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1. SPECIFICATIONS

1.1 Tractor:

Make : Mahindra
 Model : 575 DI POWER +
 Brand Name : Bhoomiputra

Variants, if any (As per applicant's declaration)

| *S. No. | Variant models* | Brand name , If any | Variant features |
|---------|--------------------|---------------------|---|
| 1. | 575 DI Power + | Bhoomiputra | Sliding gear Box, Non-CRPTO, Single clutch, Dry brake, Manual Steering |
| 2 | 575 DI DLX Power + | Bhoomiputra | PCM gear box, Non-CRPTO, Single Clutch, OIB Brake, Hydrostatic steering |
| 3 | 575 DI Power + | Sarpanch | PCM gear box, Non-CRPTO, Single Clutch, Dry Brake, Manual steering |

* Yet not tested at this Institute.

Type : Four wheeled rear wheel drive general purpose Agricultural Tractor.
 Year of manufacture : 2012 FC (i.e. it means September, 2012, 2012)
 Chassis serial number : NKEC 00001
 Country of origin : India

1.2 Engine:

Make : Mahindra
 Model : MDI 2500 3AS
 Type : Four strokes, water cooled, direct injection, naturally aspirated, diesel engine.
 Serial number : NKEC 00001

1.2.1 Engine speed (Manufacturer's recommended production setting), (rpm):

- Maximum speed at no load : 2250 to 2350
 - Low idle speed : 750 to 850
 - Speed at maximum torque : 1200 to 1400

Rated speed, (rpm):

- For PTO use : 2100
 - For drawbar use : 2100

1.3 Cylinder & Cylinder Head:

Number : Four
 Disposition : Vertical, Inline
 Bore/stroke, (mm) : 88.9/110 (apa)
 Capacity as specified by the applicant, (cc) : 2730
 Compression ratio : 20.2 : 1
 Type of cylinder head : Monoblock
 Type of cylinder liners : Wet, replaceable
 Type of combustion chamber : Re-entrant bowl cavity on piston top

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17. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

17.1 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 I | As observed | Whether meets the requirements (Yes/No) |
|---------------|---|--|---|--|-------------|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 17.1.1 | PTO Performance : | | | | | |
| 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 >35hp. -7.5/+10% for PTO power ≤ 35 hp | 29.83 (D) | 30.5 | Yes |
| b) | Power at rated engine speed, (kW) | Non Evaluative | -do- | 29.83 (D) | 30.5 | Yes |
| c) | Specific fuel consumption corresponding to maximum power, (g/kWh) | Non Evaluative | + 5% | 254.69 (D) | 0.243 | Yes |
| d) | Maximum equivalent crankshaft torque, (Nm) | Non Evaluative | ± 8% | 177.6 (D) | 162.04 | No |
| e) | Back-up torque, percent | Non Evaluative | 10 percent, min. | 18 (D) 10% | 16.79 | 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) | 124 | 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) | 90 | Yes |
| g) | Engine oil consumption, (g/kWh) | Evaluative | Not exceeding 1% of SFC at max. power under High ambient conditions | 1% of SFC (D) 2.45 (R) | 1.229 | 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 meter (D) | 0.27 | Yes |

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| 17.1.2 Drawbar performance : | | | | | | | |
| a) | Maximum drawbar pull with ballast corresponding to 15 percent wheel slip or 7% track slip (kN) | Non Evaluative | Minimum 65% of static mass with ballast | 18.65 (D) | 22.55 | Yes | |
| | | | | 18.23 (R) | | | |
| b) | Max. drawbar pull without ballast or with standard ballast, as the case may be corresponding to 15 percent wheel slip or 7% track slip (kN) | Evaluative | Minimum 65% of static mass of tractor without ballast or with standard ballast, as the case may be | 12.25 (D) | 15.82 | Yes | |
| | | | | 12.11 (R) | | | |
| c) | Maximum drawbar power without ballast or with standard ballast, as the case may be (kW). | Evaluative | Min. 80% of PTO power as referred in SL No. i) a) of PTO performance in case of tractors having total static mass > 1500 kg Minimum 75% of PTO power as referred in SL No. i) a) of PTO performance in case of light weight tractors having 1500 kg total static mass of tractor. Minimum 75% of engine power as referred in SL No. i) a) of engine performance in case of tractors which do not have a PTO shaft. | 25.7 (D) | 26.2 | Yes | |
| | | | | 24.4 (R) | | | |
| d) | Maximum transmission oil temperature (°C) | Non Evaluative | The declared value should not exceed the maximum value specified by oil company | 110 (D) | 81 | Yes | |
| 17.1.3 Power lift and hydraulic pump performance : | | | | | | | |
| a) | Maximum lifting capacity throughout the range of lift, (kN): | | | | | | |
| | 1) | At hitch points | Non Evaluative | [Tolerance of minus 10%] | 14.6 (D) | 19.34 | 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 | 10.2 (D) | 14.40 | Yes |
| | | | | | 7.18 (R) (Minimum) | | |
| 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) | 80 | No | |
| | | | | 50 (R) | | | |

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| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
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| 17.1.4 | Brake performance at 25 kmph: | | | | | |
| 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) | 6.67 | Yes |
| | 2) Hot brake | Evaluative | 10 | 10 (R) | 6.99 | Yes |
| b) | Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N) | Evaluative | 600 | 600 (R) | 167 to 197 | Yes |
| 17.1.5 | Noise measurement : | | | | | |
| a) | Maximum ambient noise emitted by the tractor dB(A) | Evaluative | As per CMVR | 88 (R) | 81 | Yes |
| b) | Maximum noise at operator's ear level dB(A) | Evaluative | As per CMVR | 98 (R) | 93 | Yes |
| 16.1.6 | Amplitude of mechanical vibrations at : | | | | | |
| | 1) Left foot rest | Non Evaluative | 100 microns (max) | 100 (R) | 80 | Yes |
| | 2) Right foot rest | | | | 60 | Yes |
| | 3) Seat (with driver seated) | | | | 60 | Yes |
| | 4) Steering Wheel | | | | 100 | Yes |
| 17.1.7 | Haulage requirements : | | | | | |
| a) | Gross mass of the trailers, (tones): | | | | | |
| | 1) Two wheel | Non Evaluative | -- | 5.0 (D) | 5.0 | Yes |
| | 2) Four wheel | Evaluative | -- | 7.0 (D) | 7.0 | Yes |
| b) | Distance travelled / litre of fuel consumption, (km/l): | | | | | |
| | 1) Two wheel | Non Evaluative | -- | 5.0 to 6.0 (D) | 5.99 to 6.08 | No |
| | 2) Four wheel | Evaluative | -- | 5.0 to 6.0 (D) | 5.17 to 5.37 | Yes |
| c) | Fuel consumption (ml/km/tonne): | | | | | |
| | 1) Two wheel | Non Evaluative | -- | 30.00 to 35.00 (D) | 32.88 to 33.36 | Yes |
| | 2) Four wheel | | -- | 25.00 to 30.00 (D) | 26.59 to 27.63 | Yes |
| 17.1.8 | Wetland cultivation : | | | | | |
| | 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- | | | | |
| | 4) Engine oil | | | | | |
| | 5) Transmission oil | | | | | |

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| 17.1.9 | Safety features : | | | | | |
| a) | Guards against moving and hot parts | Evaluative | Belt drives, pulley, silencer, hydraulic pipes (As per IS 12239 (part 2)) | At present no requirements | Provided | Yes |
| b) | Lighting arrangement (Tractor having more than 1150 mm rear track width) | Evaluative | As per CMVR | -- | Provided | Yes |
| c) | 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) | -- | Does not meets the requirement | No |
| d) | Technical requirements for PTO shaft | Non-Evaluative | Should meet the requirements of IS 4931 (as amended from time to time) | -- | Does not meets the requirement | No |
| e) | Dimension of three point linkage | Non-Evaluative | Should meet the requirements of IS 4468 (part 1) (as amended from time to time) | -- | Does not meets the requirement | No |
| f) | 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 |
| 17.1.10 | Labelling of tractors (Provision of labelling plate): | | | | | |
| | 1) Make | Evaluative | Should conform to the requirements of CMVR along-with declared value of PTO HP | -- | Mahindra | Yes |
| | 2) Model | Evaluative | | -- | 575 DI POWER + | Yes |
| | 3) Year of manufacture | Evaluative | | -- | 2012 F C | Yes |
| | 4) Engine number | Evaluative | | -- | NKEC 00001 | Yes |
| | 5) Chassis number | Evaluative | | -- | NKEC 00001 | Yes |
| | 6) Declaration of PTO power, kW (hp) | Evaluative | | -- | 29.83 (40) | Yes |
| 17.1.11 | Discard limit for (mm) | | | | | |
| (a) | Cylinder bore diameter, (mm) | Evaluative | To be specified by the manufacturer | 89.13 (D) | 88.92 to 88.95 | Yes |
| (b) | Clearance between piston & cylinder liner at skirt, (mm) | Non Evaluative | | 0.20 (D) | 0.148 to 0.160 | Yes |

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| (C) | Ring end gap (mm): | | | | | |
| | - Top comp ring. | Evaluative | -do- | 2.50 | 0.35 to 0.40 | Yes |
| | - 2 nd comp ring. | | -do- | 2.50 | 0.50 to 0.60 | Yes |
| - Oil ring. | -do- | | 2.00 | 0.50 to 0.60 | Yes | |
| (d) | Ring groove clearance (mm): | | | | | |
| | - Top comp ring. | Evaluative | -do- | Taper Ring | -- | Yes |
| | - 2 nd comp ring. | | -do- | 0.30 | 0.082 to 0.086 | Yes |
| - Oil ring. | -do- | | 0.20 | 0.052 to 0.061 | Yes | |
| (e) | Clearance of main bearings (mm): | | | | | |
| | - Diametrical clearance | Evaluative | To be specified by the manufacturer | 0.20 | 0.068 to 0.109 | Yes |
| | - Crankshaft end float | Evaluative | | 0.60 | 0.14 | Yes |
| (f) | Clearance of big end bearings, (mm): | | | | | |
| | - Diametrical | Evaluative | -do- | 0.20 | 0.076 to 0.097 | Yes |
| | - Axial | Evaluative | -do- | 0.75 | 0.25 | Yes |
| (g) | Clearance between king pin and bush, (mm) | Non Evaluative | -do- | 0.30 | 0.157 to 0.265 | Yes |
| (h) | Clearance between centre pin and bush, (mm) | Non Evaluative | -do- | 0.30 | 0.099 to 0.112 | Yes |
| 17.1.11 | Literature (Submission to test agency) | | | | | |
| (a) | Operator manual | Evaluative | Provided/Not Provided | As per relevant IS Code (IS 8132) | Provided | Yes |
| (b) | Parts Catalogue | Evaluative | Provided/Not Provided | As per relevant IS Code (IS 8132) | Provided | Yes |
| (c) | Workshop/Service manual | Evaluative | Provided/Not Provided | As per relevant IS Code (IS 8132) | Provided | Yes |
| 17.1.12 | CATEGORY OF BREAKDOWNS / DEFECTS | | | | | |
| S. No. | Category of breakdowns | Category (Evaluative / Non Evaluative) | Requirements as per IS: 12207-2014 | | As observed | Whether meets the requirements (Yes/No) |

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|----|------------------|------------|--|-------------|-----|
| 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 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 |

| 17.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2014: | | | | |
|---|-----------------|---|-----------------------------|--|
| S. No. | Characteristic | Requirements as per IS: 12207-2014 | AS observed | Whether meets the requirements (Yes/No.) |
| 1. | Fitment of ROPS | With a provision for fitment of ROPS. | Not provided | Not applicable |
| | | If ROPS fitted it should meet the requirement of IS: 11821-1992 | Not provided | Not applicable |
| 2. | Accessories | Trailer hitch, front tow hook, linkage drawbar may be provided. | Front tow hook not provided | No |

17.3 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)] : **Does not 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] : **Conforms**
- 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 Conforms**
- 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)] : **Conforms**
- 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]] : **Does not conform**
- 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)] : **Conforms**

17.4 Salient Observations:

17.4.1 Laboratory tests:

17.4.1.1 PTO Performance:

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- i) The backup torque was observed as **16.79%**, which does not meet the requirement of declared value of manufacturer. This should be looked into.
- ii) The maximum equivalent crankshaft torque was measured as **162.04** Nm against the declaration of **177.6** Nm, which does not meets the tolerance limit of IS: 12207-2008.

17.4.1.2 Drawbar performance:

During ten hours drawbar test, creeping of LHS & RHS rear tyre over the rims was observed as 45 mm & 80 mm respectively. This should be looked into for necessary corrective action.

17.4.1.3 Hydraulic performance:

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 during load maintenance hydraulic test was observed as 80 mm against the declaration of 50 mm, which does not meets the requirement of relevant IS.

17.4.1.4 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.

17.4.1.5 Labelling Plate:

The engine and chassis serial number of the tractor were embossed/ punched same at engine housing & labelling plate respectively.

The engine and chassis serial number of the tractor should be given separately for its noteworthy identification.

17.5 Component and assembly inspection

The backlash between crown wheel and pinion was observed 0.30 mm against the discard limit of 0.30 mm. This approaches the discard limit, which should be looked into.

17.6 Variant model:

The variant model listed in the specification sheet in para 2.5 are not identified with different name for different features. Therefore, furnished and served such information of variant with different features as variant same model name of base model is so confusing and deceive to users.

17.7 Maintenance / Service Problems:

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

17.8 Recommendation with regard to safety on tractor:

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

- i) Provision for spark arresting device in exhaust system.
- ii) Colour codes with amber zones on all gauges (engine oil pressure gauges, engine revolution gauges, fuel level gauge, water temperature gauge) as per relevant IS.

17.9 Adequacy of Literature supplied with machine:

17.9.1 The following literature has been supplied with the tractor

- i) Operator's Manual for Mahindra 575 DI Power + tractor
- ii) Part's catalogue for Mahindra 575 DI Power + tractor – Engine, Chassis and Seat metal, transmission and hydraulic.
- iii) Service Manual Mahindra 575 DI Power + tractor

17.9.2 The revised operator's manual provided against the comment of draft test report found adequate.

18.0 Citizen charter

| Duration of Test | Test duration under citizen charter | Whether the report released within time frame given citizen charter | Remark, if any |
|--|-------------------------------------|---|----------------|
| 08 Months (January, 2014 to August, 2014) | 10 Months | Yes | None |

TESTING AUTHORITY:

PRADIPKUMAR C. MESHAM
SENIOR AGRICULTURAL ENGINEER

H.L.YADAV
SENIOR AGRICULTURAL ENGINEER

C.R. LOHI
DIRECTOR

19. Applicant's Comments

| Para No. | Our Reference | Applicant's comments |
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| 19.1 | 17.4.1.1 (iii), 17.4.1.2, 17.4.1.3, 17.4.1.4, 17.5 & 17.8 | Observations will be studied and necessary action will be incorporated. |
| 19.2 | 17.6 | The variant models listed in the specification sheet on page no. 6 are differentiated with their distinguishing features and brand name. |

ANNEXURE - I

BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST

| S. No. | Items | Disc Plough | Rotavator | Puddler |
|--------|----------------------------------|---------------|--------------|---------------------|
| 1. | Make | M&M | Shaktiman | Not available |
| 2. | Type | Mounted | Mounted | Mounted |
| 3. | No. of Disc/blades | Three | 30 | 12 (6 in each gang) |
| 4. | Type of Disc/blades | Plain concave | Hatchet | Notched |
| 5. | Size of bottoms/blades, (mm) | 610 | 110 x 50 x 5 | 460 |
| 6. | Spacing of bottoms/flanges, (mm) | 520 | 235 | 164 |
| 7. | Lower hitch point span, (mm) | 855 | 770 | 680 |
| 8. | Mast height, (mm) | 440 | 545 | 450 |
| 9. | Overall dimensions, (mm): | | | |
| | - Length | 1890 | 1040 | 1190 |
| | - Width | 1080 | 1130 | 1810 |
| | - Height | 1070 | 1000 | 1330 |
| 10. | Gross mass, (kg) | 365 | 320 | 210 |

ANNEXURE – II

BRIEF SPECIFICATION OF HALF CAGE WHEEL

| S. No. | Items | Specification |
|--------|---------------------------------|---|
| 1. | Type | Half cage wheel |
| 2. | Dia. (mm) | 1085 |
| 3. | Width (mm) | 355 |
| 4. | No. and type of lugs | 12, straight lugs made up of MS angle section welded to angle iron frame. |
| 5. | Size of angle section, (mm) | 50 x 50 x 5 |
| 6. | Length of lugs, (mm) | 350 |
| 7. | Spacing lugs, (mm) | 285 |
| 8. | Weight of each cage wheels (kg) | 60 |

ANNEXURE – III

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TRACTOR RUN HOURS DURING TEST

| A. | LABORATORY AND TRACK TESTS: | HOURS |
|---------------|--|--------------|
| 1. | Running-in | -- |
| 2. | PTO performance test | 14.57 |
| 3. | Power lift and hydraulic pump performance test | 0.25 |
| 4. | Drawbar performance test | 15.09 |
| 5. | Turning ability | 0.20 |
| 6. | Location of centre of gravity | 0.20 |
| 7. | Operator's field of vision | 0.10 |
| 8. | Air Cleaner oil pull over tes | 2.50 |
| 9. | Brake test | 1.91 |
| 10. | Noise measurement | 0.83 |
| 11. | Mechanical vibration test | 1.00 |
| 12. | Theoretical speed test | 1.45 |
| B. | FIELD TEST: | |
| 1. | Disc ploughing | 11.16 |
| 2. | Rotavation | 10.59 |
| 3. | Puddling (including 5.0 hours water proof test) | 15.0 |
| C. | HAULAGE TEST: | 5.70 |
| D. | Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test | 11.12 |
| TOTAL: | | 91.67 |