व्यावसायिक परीक्षण रिपोर्ट | संख्या/ **No.: ROTAVATOR-356/2737/2021**

**COMMERCIAL TEST REPORT** | माह/**Month: August, 2021**

**THIS TEST REPORT VALID UP TO : 31st August, 2028**

# SONALIKA, SLCHASSPTR-5.5, ROTARY TILLER, (ROTAVATOR) TRACTOR MOUNTED


भारत सरकार

**Government of India**

कृषि एवं किसान कल्याण मंत्रालय

**Ministry of Agriculture and Farmers Welfare**

कृषि, सहकारिता एवं किसान कल्याण विभाग

**Department of Agriculture, Cooperation and Farmers Welfare**

उत्तरी क्षेत्र कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

**Northern Region Farm Machinery Training and Testing Institute**

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**[ISO 9001:2015 CERTIFIED]**

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### 3.11 Lubricants:

| Sl. No. | Particulars | As recommended by the manufacturer | As used during test |
|---|---|---|---|
| 1 | Primary Gear box | EP-140 | Oil originally filled in the rotavator was not changed |
| 2 | Secondary Gear box | EP-140 | |
| 3 | Rotor Hub | **Not Specified** | EP-140 |
| 4 | Propeller Shaft | **Not Specified** | Lithium base grease |

## 4. RUNNING – IN

Rotavator was run in for 1.15 hour before field performance test.

## 5. LABORATORY TEST

**5.1 Hardness:** - The surface hardness of blade was recorded as under: -

| Description | As per IS: 6690:1981 (HRC) | Hardness as observed (HRC) | Remarks |
|---|---|---|---|
| Edge portion | 53 to 59 | 41.87 (Average) | **Does not conform** |
| On shank portion | 37 to 45 | 40.57 (Average) | Conforms |

### 5.2 Chemical composition

The chemical composition of blades is tabulated as under:-

| Constituents | As per IS: 6690-1981 | | Composition as observed (% of weight) | Remarks |
|---|---|---|---|---|
| | Carbon Steel | Silicon Manganese steel | | |
| Carbon ( C ) | 0.70 -0.85 | 0.50-0.60 | 0.084 | **Does not conform** |
| Silicon (Si) | 0.10 -0.40 | 1.50-2.00 | 0.258 | Conforms to carbon steel |
| Manganese (Mn) | 0.50 -1.0 | 0.50-1.00 | 1.151 | **Does not conform** |
| Sulphur (S) | 0.05(max) | 0.05(max) | 0.079 | **Does not conform** |
| Phosphorous (P) | 0.05(max) | 0.05(max) | 0.039 | Conforms |

## 6. FIELD PERFORMANCE TEST

The field tests of the rotavator comprising of dry land and wet land operation were conducted for 27.35 and 10.53 hours respectively to assess the performance test which is reported in **Annexure-I & II** for dry land and wet land operation respectively.

Observations of field performance test is summarized in the ensuing table:-

**Summary of Field Performance Test**

| Sl. No. | Parameters/operations | Dry land operation | Wet land operation (Puddling) |
|---|---|---|---|
| I | II | III | IV |
| 1. | Tractor used | Farmtrac Champion F2 SM | |
| 2. | Gear used | L-1 | L-1 |
| 3. | Type of soil | Sandy loam | |
| 4. | Average soil moisture (%) | 15.70 to 16.43 | -- |
| 5. | Average depth of standing water (cm) | -- | 5.67 to 6.50 |
| 6. | Bulk density of soil (g/cc) | 1.59 to 1.63 | -- |
| 7. | Average speed of operation (kmph) | 2.13 to 2.16 | 1.97 to 2.01 |
| 8. | Avg. travel reduction (%) | -- | -7.63 to -5.19 |
| 9. | Avg. wheel slip (%) | -2.56 to -0.16 | -- |
| 10. | Average depth of puddle (cm) | -- | 15.43 to 16.00 |
| 11. | Average depth of cut (cm) | 10.30 to 10.70 | -- |
| 12. | Avg. effective width (cm) | 146 to 158 | -- |
| 13. | Area covered (ha/h) | 0.254 to 0.294 | -- |
| 14. | Time required for one ha (h) | 3.40 to 3.94 | -- |
| 15. | Field efficiency (%) | 80.50 to 86.22 | -- |
| 16. | Puddling index (%) | -- | 76.69 to 77.30 |
| 17. | Fuel consumption | | |
| | l/h | 4.30 to 4.67 | 3.28 to 3.56 |
| | l/ha | 15.30 to 17.98 | -- |
| 18. | Avg. PTO power consumption, kW | 19.86 | -- |

**6.1 Dry land operation**

**6.1.1 Rate of work**

i) The rate of work was recorded 0.254 to 0.294 ha/h, and the speed of operation varied from 2.13 to 2.16 kmph.

ii) The time required to cover one hectare was recorded as 3.40 to 3.94 h

**6.1.2 Quality of work**

i) The depth of operation was recorded as 10.30 to 10.70 cm.

ii) Average effective width was observed as 146 to 158 cm.

iii) Field efficiency was observed as 80.50 to 86.22 %.

**6.2 Wet Land operation**

**6.2.1 Quality of work**

i) The depth of puddle was recorded as 15.43 to 16.00 cm.

ii) The puddling index was recorded as 76.69 to 77.30 %.

**6.3 Labour requirement**

In all, two skilled operators are needed to ensure continuous operation of rotavator for day long period.

**6.4 Wear analysis (on mass basis)**

Wear of hatchet blades (on mass basis) was measured and recorded in ensuing table:

**Percentage wear of rotavator blades on mass basis**

| Sl. No. | Initial mass of blade (g) | Mass of blade after 39.03 hr. of operation (g) | Difference of weight (g) | Percentage of wear (%) after 39.03 hr. | Percentage of wear on hour basis (%) |
|---|---|---|---|---|---|
| 1. | 636.8 | 601.2 | 35.6 | 5.60 | 0.14 |
| 2. | 623.9 | 579.4 | 44.5 | 7.13 | 0.18 |
| 3. | 649.1 | 608.1 | 41.0 | 6.31 | 0.16 |
| 4. | 636.5 | 601.0 | 35.5 | 5.58 | 0.14 |
| 5. | 647.1 | 605.1 | 42.0 | 6.49 | 0.17 |
| 6. | 635.5 | 586.8 | 48.7 | 7.66 | 0.20 |
| 7. | 638.5 | 595.0 | 43.5 | 6.81 | 0.17 |
| 8. | 831.3 | 584.6 | 46.7 | 7.39 | 0.19 |
| 9. | 647.6 | 603.2 | 44.4 | 6.86 | 0.18 |
| 10. | 643.6 | 600.1 | 43.5 | 6.76 | 0.17 |
| 11. | 649.4 | 594.5 | 54.9 | 8.45 | 0.22 |
| 12. | 648.6 | 605.6 | 43.0 | 6.63 | 0.17 |

## 7. EFFECTIVENESS OF SEALINGS

After completion of wet land operation for 10.53 hours, the rotavator was dismantled for checking the effectiveness of sealing provided against ingress of dust, and water/mud in various sub-assemblies/components. The observations are given in ensuing table:-

| Sl. No. | Location | Whether ingress of mud and/or water was observed (Yes/No) |
|---|---|---|
| 1. | Primary reduction gear box | No |
| 2. | Secondary reduction gear box | No |
| 3. | Rotor assembly (hub) | No |

## 8. EASE OF OPERATION & ADJUSTMENTS

No noticeable difficulty was observed during the operation and adjustment of rotavator

## 9. DEFECTS, BREAKDOWN AND REPAIRS

No defect observed during the test.

## 11. CRITICAL TECHNICAL SPECIFICATION

(Vide Ministry's communication No 13-9/2019 M &T (I&P) dated 26.04.2019)

| Sr. No | Parameters | Specification | Observed | Remarks |
|---|---|---|---|---|
| 1. | Working width (mm) | 1200 (Min.) | 1620 | Conforms |
| 2. | Type of blade | C/L/J shape as per demand Hatchet blade | J-shape | Conforms |
| 3. | Thickness of blade (mm) | 7-8 (Min.) | 8.0 | Conforms |
| 4. | No. of blades | 30(Min.) | 48 | Conforms |
| 5. | Total Number of flanges | 5 (Min.) | **Not applicable** | -- |
| 6. | Number of blades per flanges | 6 (Max.) | **Not applicable** | -- |
| 7. | Outer diameter of rotor shaft mm | 75-90 | 75 | Conforms |
| 8. | Rotor diameter, including flange and blade mounted on flange, mm | 425 (Min.) | 475 mm rotor diameter including pocket and blade mounted on pocket | Conforms |
| 9. | Side Drive | Gear Drive /Chain Drive (Optional) | Gear drive | Conforms |
| 10. | Depth control mechanism | Arc shaped skid on both side of rotavator | Skid on both Side of rotavator | Conforms |
| 11. | Material of blades | Boron 27/28/30 Mn (28MnCrB5) / High Carbon steel of grade EN42/EN45/EN47 | Boron | Conforms |
| 12. | Hardness of blade Material, HRC | 38 (min) | 41.87 | Conforms |
| 13. | Safety clutch/Device (Shear bolt) in PTO drive shaft | Must be provided | Provided | Conforms |
| 14. | Rotavator stand | Must be provided | Provided | Conforms |
| 15. | Guard over propeller shaft | Must be provided | Provided | Conforms |
| 16. | Sheet metal | AS36 / IS 2062 | IS 2062 | Conforms |

| | | | | |
|---|---|---|---|---|
| 17. | Marking/labeling of machine | The labeling plate should be riveted on the body of machine having Name and address of manufacturer, Country of Origin, Make, Model, Year of manufacturer, Serial Number, Type, size, required of prime mover (kW) | **Partially meet the requirement** | **Partially conform** |
| 18. | Literature | Operator manual, Service manual and Parts catalogue should be provided. | Provided | Conforms |

## 12. COMMENTS AND RECOMMENDATIONS

**12.1** The Dimension of three point linkage of implement does not conform, in toto, to the requirements of IS: 4468(Part-1)-1997 and therefore, it may be looked into for corrective action.

**12.2** The Dimension of PIC of Implement does not conform, in toto, to the requirements of IS: 4931-1995 and therefore, it may be looked into for corrective action.

**12.3** The grade of grease is not specified. It **MUST** be specified.

**12.4** The grade of oil for rotor hub is not specified. It **MUST** be specified.

**12.5** The hardness of blades does not conform, the requirements of IS: 6690-1981. This needs to be looked into for corrective action.

**12.6** The chemical composition of blades does not conform, in toto, to the requirements of IS: 6690-1981. This needs to be looked into for corrective action.

**12.7** The recommended PTO speed of prime mover is not specified on the labeling plate. It **MUST** be looked into.

**12.8** The country of origin is not specified on the labeling plate. It **MUST** be looked into.

**12.9 Technical Literature:**

One booklet entitled "Owner's manual" was provided for reference during test. The same, however, needs to be updated as per IS: 8132-1999.

## TESTING AUTHORITY

| | |
|---|---|
| Er. G.R. AMBALKAR<br>AGRICULTURAL ENGINEER | Ambalkar |
| **Dr. MUKESH JAIN**<br>**DIRECTOR** | 19-08-2024 |

Test report compiled by Dharmendra Kumar, (Technical Assistant)

## 13. APPLICANT'S COMMENTS

| Para No. | Our reference | Applicant Comments |
|---|---|---|
| 13.1 | 12.1 | The dimension of three point linkage will be improve / take care in our regular production as per IS: 4468 (Part-1): 1997, also change the correct dimension in our drawing. |
| 13.2 | 12.2 | The dimension of PIC will be improves in our regular production as per IS: 4931-1995. |
| 13.3 | 12.3 | It is lithium based grease will update the same in our Owner manual. |
| 13.4 | 12.4 | Same EP-140 oil grade use in the rotor hub, will update the same in our Owner manual. |
| 13.5 | 12.5 | The hardness of the blades will be take care in our regular production as per IS: 6690-1981. |
| 13.6 | 12.6 | The chemical composition of blades will be take care in our regular production as per PS: 6690-1981. |
| 13.7 | 12.7 & 12.8 | Will update the labeling plate |
| 13.8 | 12.9 | Will provide the owner manual with our each & every machine. |

N.R.F.M.T.&T.I., HISAR