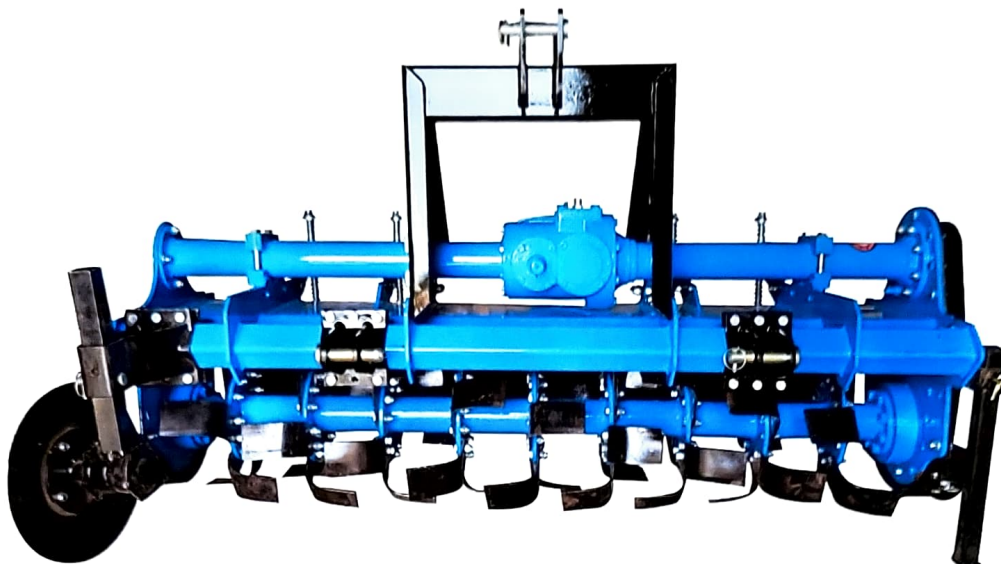


**COMMERCIAL TEST REPORT  
(INITIAL)**

**Test Report No.: IMP-260/285/2024**

**Month: July 2024**

**Validity up to 25<sup>th</sup> July 2031**



**BISKOMAAN 5G+HD ROTARY TILLER (ROTAVATOR)  
(Tractor Mounted, PTO Operated)**



**Farm Machinery Testing And Training Institute,  
Kelappaji College of Agricultural Engineering and Technology  
Kerala Agricultural University,  
Tavanur, 679573 Kerala**

(This institution is an approved testing center by Department of Agriculture & Co-Operation, Ministry of Agriculture, Govt of Kerala vide letter No.8-1/2004- My (I&P) dated September 12, 2010 and Subsequent letters)

Website: <http://fmtc.kau.in>  
E-mail: [fmtctvr@kau.in](mailto:fmtctvr@kau.in)

Telephone No. 0494-2687214

Fax No.0494-2686009

IMP- 260/285/2024	BISKOMAAN 5G+HD ROTARY TILLER (ROTAVATOR) (Tractor Mounted, PTO Operated)	COMMERCIAL ICT
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Manufacturer : M/s Biskomaan Industries Pvt. Ltd  
Vill- Dharour, Sahnewal,  
Ludhiana-141120  
Punjab, India  
Mob:+919835478532  
Email:biskomaan@gmail.com

Applicant : The Manufacturer

BISKOMAAN 5G+HD ROTARY TILLER (ROTAVATOR)  
(Tractor Mounted, PTO Operated)

Report No. : IMP-260/285/2024

Month: July

Year: 2024



**Farm Machinery Testing and Training Institute,  
Kelappaji College of Agricultural Engineering and Technology  
Kerala Agricultural University,  
Tavanur, 679573 Kerala**

Website: <http://fmtc.kau.in>

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Telephone No. 0494-2687214

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<b>IMP- 260/285/2024</b>	<b>BISKOMAAN 5G+HD ROTARY TILLER (ROTAVATOR) (Tractor Mounted, PTO Operated)</b>	<b>COMMERCIAL ICT</b>
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Type of test : INITIAL COMMERCIAL TEST

Period of test : 11.06.2024 to 04.07.2024

Test Report No. : **IMP-260/285/2024**

Month /Year of release : July/2024

- i) The results reported in this report are observed values and no corrections have been applied for atmospheric and site conditions.
- ii) The data given in this report pertain to the particular machine Submitted for Test by the applicant.
- iii) The results presented in this report do not in any way attribute to the durability of the machine.
- iv) This report should not be reproduced in part or full without prior permission of the Testing Authority Farm Machinery, Testing Centre, Kellapaji College of Agricultural Engineering and Technology, Kerala Agricultural University, Tavanur 679573 Kerala.
- V) This is a report on Commercial Test of Rotavator named "BISKOMAAN 5G+HD ROTARY TILLER (ROTAVATOR) (Tractor Mounted, PTO Operated)". **Validity of this test report is upto 25.07.2031.**

### SELECTED CONVERSIONS

S. No	Units	Conversion Factor
<b>1</b>	<b>Force</b>	
	1 kgf	9.80665 N
		2.20462 lbf
<b>2</b>	<b>Power</b>	
	1 hp	1.01387 metric hp (Ps)
		745.7 W
	1 Ps	735.5 W
	1 Kw	1.35962 Ps
<b>3</b>	<b>Pressure</b>	
	1 psi	6.895 kPa
	1 kgf/cm <sup>2</sup>	98.067 kPa = 735.56 mm of Hg
	1 bar	100 kPa = 10 N/cm <sup>2</sup>
	1 mm of Hg	1.3332 m-bar



IMP- 260/285/2024	<b>BISKOMAAN 5G+HD ROTARY TILLER (ROTAVATOR) (Tractor Mounted, PTO Operated)</b>	<b>COMMERCIAL ICT</b>
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Type of test : INITIAL COMMERCIAL TEST

Name of machine : Rotary Tiller (ROTAVATOR)

Make : BISKOMAAN

Model : 5G+HD

Type : Tractor Mounted, PTO Operated, Gear Drive

Manufactured by : M/s Biskomaan Industries Pvt. Ltd  
Vill- Dharour, Sahnewal,  
Ludhiana-141120  
Punjab, India  
Mob:+919835478532  
Email:biskomaan@gmail.com

Applicant



The Manufacturer

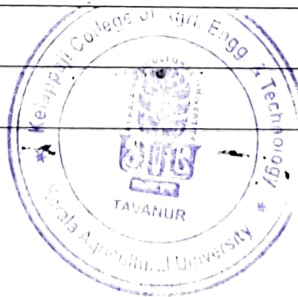
**TESTED BY**

**Farm Machinery Testing Centre,  
Kelappaji College of Agricultural Engineering and Technology  
Kerala Agricultural University,  
Tavanur, 679 573 Kerala**

<b>IMP- 260/285/2024</b>	<b>BISKOMAAN 5G+HD ROTARY TILLER (ROTAVATOR) (Tractor Mounted, PTO Operated)</b>	<b>COMMERCIAL ICT</b>
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3	Method of Selection	6
4	Specifications	7
5	Conformity to Indian Standard	18
6	Running-in	19
7	Laboratory Test	19
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12	Safety requirements	23
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14	Summary of Observation, Comments & Recommendations	28
15	Applicant's comments	29
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<b>IMP- 260/285/2024</b>	<b>BISKOMAAN 5G+HD ROTARY TILLER (ROTAVATOR) (Tractor Mounted, PTO Operated)</b>	<b>COMMERCIAL ICT</b>
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### 1 SCOPE OF TEST

The scope of test was to check and assess the following: -

#### 1.1 Laboratory Test :

- Checking of specifications
- Hardness of soil engaging parts (Rotavator blades)
- Chemical analysis of critical components (Rotavator blades)
- Wear analysis of critical components (Rotavator blades)

#### 1.2 Field Test :

- Rate of work
- Quality of work
- Ease of operation, maintenance and adjustments
- Defects, Breakdowns & repairs

### 2. TEST PROCEDURE / TEST CODES

- |      |   |   |  |
|------|---|---|--|
| i)   | IS 4468(Part-1):1997<br>(Reaffirmed 2012) | : | Agricultural wheeled Tractors-Rear Mounted<br>Three point linkage.   |
| ii)  | IS 4931:1995                              | : | Agricultural tractors-Rear mounted power<br>take off types 1,2 and 3 (Third revision)  |
| iii) | IS 6690:1981<br>(Reaffirmed 2012)         | : | Specification for blades for rotavator for<br>power tillers (First revision)   |
| iv)  | IS 11531:1985<br>(Reaffirmed 2001)        | : | Test code for puddler  |
| v)   | IS 17045:2018*                            | : | Rotary Tiller (Rotavator) - Tractor Driven -<br>Test Procedure, and Recommendations on<br>Selected Performance Characteristics |

\* Not followed in toto, as the test code is under examination by the Ministry as per Ministry's letter No. 13-18/2019-M&T (I&P) dated 22.04.2019

### 3. METHOD OF SELECTION

The test sample was selected by the testing authority through random selection. The following test sample were presented by the applicant during the random selection at applicant's site:

Sl. No	Serial number of test sample	Sl. No	Serial number of test sample
1	7151	2	7152
3	7153	4	7154
5	7155		

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#### 4. SPECIFICATIONS

##### 4.1 General:

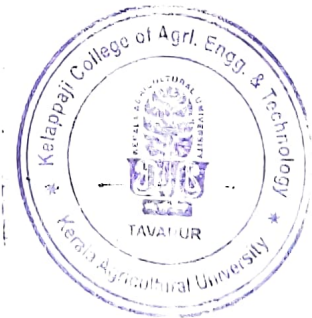
Name of Manufacturer and Address : M/s Biskomaan Industries Pvt. Ltd  
Vill- Dharour, Sahnewal,  
Ludhiana-141120  
Punjab, India  
Mob:+919835478532  
Email:biskomaan@gmail.com

Name of Applicant and Address : The manufacturer

Name of machine : Rotary Tiller (Rotavator)  
Type : Tractor operated, gear drive  
Make : BISKOMAAN  
Model : 5G+HD  
Year of manufacture : 2024-25  
Serial number : 7154  
Recommended Power source, (hp) (apa) : 35 and above  
Type of blade : Hatchet(L-Shape)  
Size (cm) [Rotor Dia. x Working width], (mm), (apa) : Ø 469.61 × 1892  
Country of origin : **India**

##### 4.2 Prime mover used:

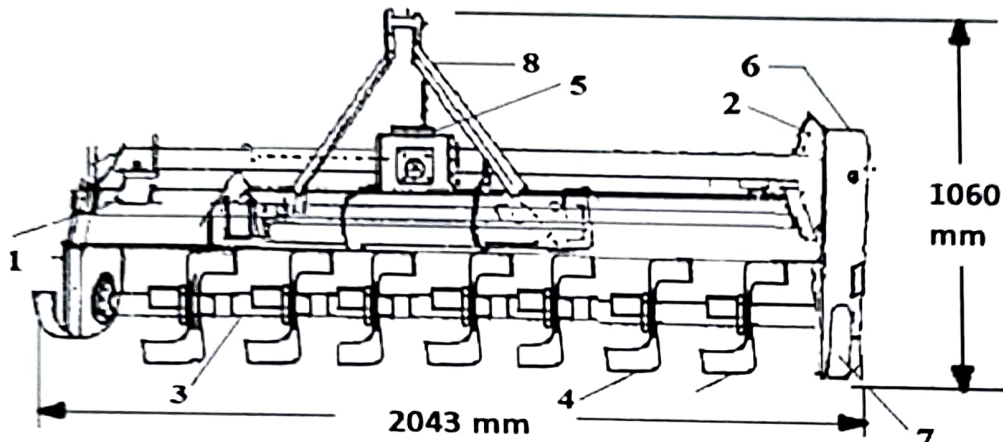
Tractor : New Holland 3630 TX  
Chassis No. : NO20595  
Engine No. : 000186N  
Maximum PTO power kW (hp) : 36.3 (49.4)



IMP- 260/285/2024	<b>BISKOMAAN 5G+HD ROTARY TILLER (ROTAVATOR)</b> (Tractor Mounted, PTO Operated)	COMMERCIAL ICT
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**4.3 Constructional Details (Refer Fig.1) :**

- |                |                                 |
|----------------|---------------------------------|
| 1. Main frame  | 5. Primary reduction gear box   |
| 2. Side plate  | 6. Secondary reduction gear box |
| 3. Rotor shaft | 7. Skid                         |
| 4. Rotor blade | 8. Hitch pyramid                |



**Fig. 1 Rotavator**

**4.3.1 Main Frame :**

- |                                 |  |
|---------------------------------|--|
| Type                            | : Fabricated from MS box and MS plate  |
| Size of box section, (mm)       | : 1824 × 73 × 73   |
| Size of supporting plate, (mm)  | : 640 × 140 × 8 (t)-02Nos.   |
| Type of mounting of box section | : Box section fitted to the side plates with the help of 06 & 06 nos. of bolt & nut at LHS & RHS respectively. |

**4.3.2 Side plates :**

- |                          |                                   |
|--------------------------|-----------------------------------|
| Type                     | : MS plate                        |
| Thickness of plate, (mm) | : LHS Plate:- 10<br>RHS Plate:- 8 |

Size of bolt, (mm)

- |        |           |
|--------|-----------|
| Length | : 40      |
| Dia.   | : Ø 11.69 |

Method of fixing

Fitted with the help of 06 nos & 06 nos. of bolt & nut at LHS & RHS respectively.



<b>IMP- 260/285/2024</b>	<b>BISKOMAAN 5G+HD ROTARY TILLER (ROTAVATOR) (Tractor Mounted, PTO Operated)</b>	<b>COMMERCIAL ICT</b>
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**4.3.3 Shield ( cover ):**

Type : MS sheet  
 Size, (mm) : 1824 × 435 × 4 (t)  
 Method of mounting : Welded to supporting flats of main frame

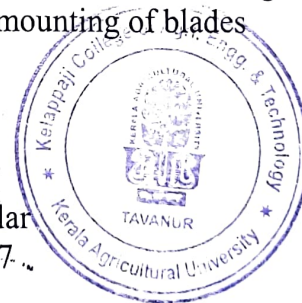
**4.3.4 Trailing board:**

Type : Hinged  
 Material : MS sheet  
 Size of board, (mm) : 1971 × 480 × 3 (t)  
 Locking system : Trailing board is held in position by locking on the fixed bracket with help of four spring loaded rods  
 Method of mounting : Hinged bush with rods  
 Size of rod, (mm) : 2005 × Ø 15.88 – 1 Nos.  
 No. of bush : Three  
 Size of bush, (mm)  
     - Length : 50.65  
     - OD/ID : 33.58/19.21  
 Type of hinge : Forged bush and rod  
 No. of hinges : Three  
 Method of fixing : The trailing board is hinged the rear of main frame with three hinges.

**4.3.5 Rotor :**

**4.3.5.1 Axle :**

Material : MS pipe  
 Type of rotor axle : Tubular section with flanges welded over it for mounting of blades  
 Size of shaft, (mm),  
     - Length : 1730  
     - Diameter : 89.61  
 No. of flanges : 09  
 Type of flanges : Circular  
 Dia. of flange, (mm) : 232.77  
 Thickness of flange, (mm) : 7.5  
 No. of blades on each flange : Each flanges having six blade.  
 Method of mounting blades on flange : Each blade is mounted with the help of two nos. of bolt and nuts of size 35.65 × 13.86 mm  
 Distance between two flanges, (mm) : 190 (central flange), 187 (end flange)  
 Dia. of rotor with blades, (mm) : 469.61



IMP- 260/285/2024	<b>BISKOMAAN 5G+HD ROTARY TILLER (ROTAVATOR)</b> (Tractor Mounted, PTO Operated)	<b>COMMERCIAL ICT</b>
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Method of fixing : Rotor shaft is coupled to another shaft at both ends of side plates. These shafts are fixed in a hub through a ball bearings (6311) & (6309) at LHS & RHS respectively

**4.3.5.2 Rotor blades :**

Number of blades : 54  
 Type of blade : Hatchet (L-shape)  
 Material : Boron steel  
 Overlap, mm : 55  
 Thickness of blade, (mm) : 7.39  
 Thickness at beveled edge, (mm) : 3  
 Length of beveled edge, (mm) : 225  
 Speed of rotor shaft : 182  
 corresponding to 540 rpm of PTO shaft, (rpm)  
 Peripheral speed of rotor blades, (m/min.) : 283

**4.3.6 Depth control mechanism:**

**4.3.6.1 Skid:**

Type & Material : Curved shape, double MS flat  
 Size, (mm):

	Upper	Lower
- Curved length	535	535
- Width	50	50
- Thickness	10	10

No. of skids : Two  
 Method of fixing : Each skid is mounted to side plate with the help of four nut & bolt of size 37.84×Ø 13.76, mm

**4.3.6.2 Adjusting Rack:**

Type : MS slots  
 Size of slots, (mm) : Ø 14.90 – 04 Nos.  
 Range of depth adjustment, (mm) : Up to 125  
 Method of mounting : Adjusting rack is bolted to side plate at one end and other end is welded to upper skid  
 Provision for disc : Provided

IMP- 260/285/2024	<b>BISKOMAAN 5G+HD ROTARY TILLER (ROTAVATOR) (Tractor Mounted, PTO Operated)</b>	<b>COMMERCIAL ICT</b>
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**4.3.7 Hitch pyramid :**

Construction details : Fabricated with MS Sheet & Box

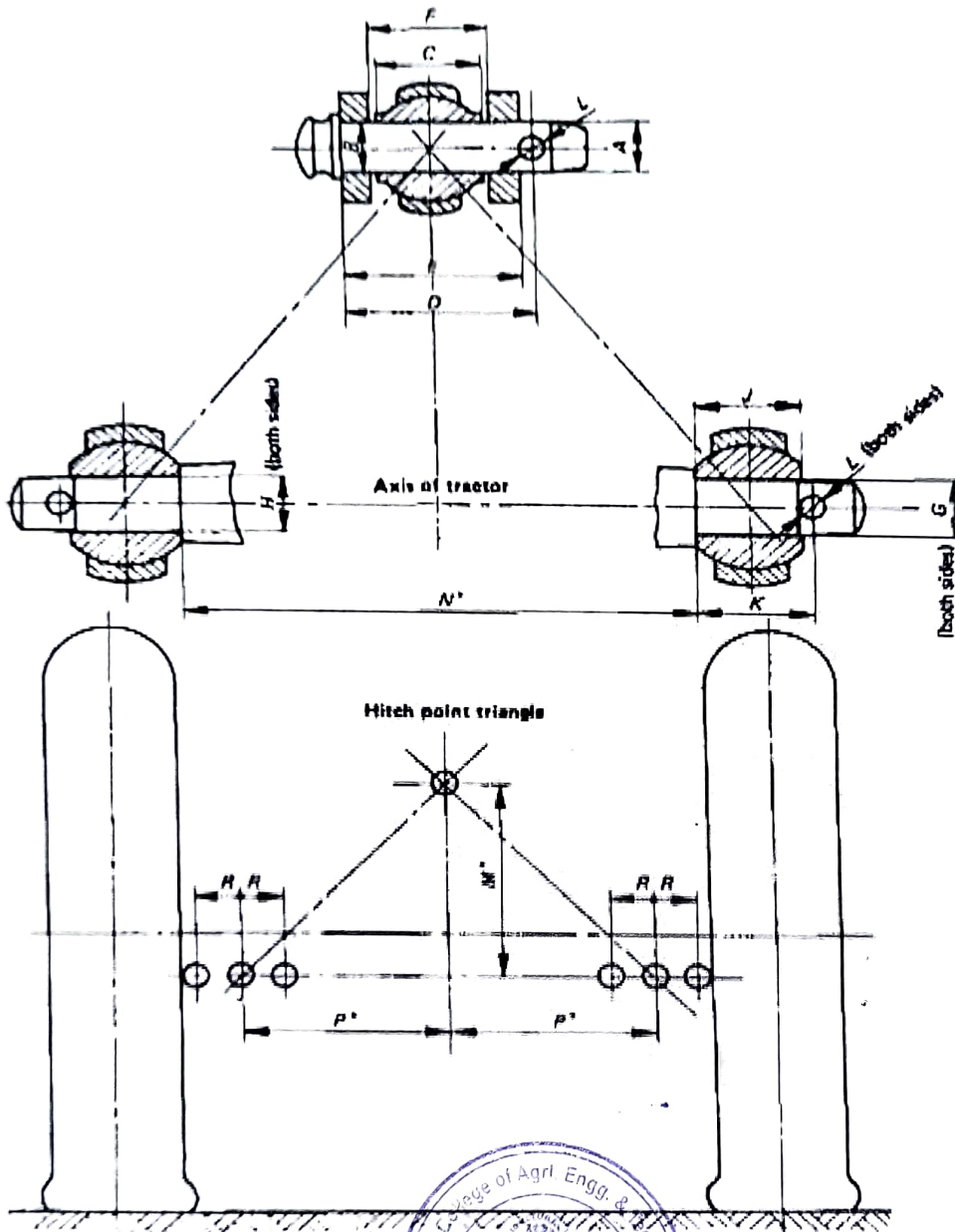
**Dimension of Three point linkage (Refer Fig. 2):-**

Notations	Specifications	Dimensions in mm		Remarks
		As per Is: 4468-1997 (Part-I) (Cat-II) (mm)	As measured (mm)	
<b>Upper Hitch Point</b>				
A	Dia. of hitch pin	25.37 to 25.50	24.92	<b>Does not conform</b>
B	Dia. of hitch pin hole	25.7 + 0.2	25.89	Conforms
F	Width between inner faces of yoke	52 (Min)	60	Conforms
E	Width between outer faces of yoke	86 (Max)	80.89	Conforms
D	Linch pin hole distance	93 (min.)	109	Conforms
L	Dia. of linch pin hole	12	12	Conforms
<b>Lower hitch points</b>				
H	Dia. of hitch pin hole	28.7 to 29.0	28.31	<b>Does not conform</b>
G	Dia. of hitch pin	27.8 to 28.0	27.80	Conforms
K	Linch pin hole distance	49 (Min.)	113	Conforms
L	Dia. of linch pin hole	12	12	Conforms
--	Width between inner faces of yoke		51.93	---
---	Width between outer faces of yoke		78.25	---
M	Mast height	610±1.5 or higher within a range of 810 ± 1.5	610	Conforms
N	Lower hitch point span	825 ± 1.5 or lesser preferably 683 ± 1.5	790 Adjustable	Conforms

IMP-  
260/285/2024

**BISKOMAAN 5G+HD ROTARY TILLER  
(ROTAVATOR)**  
(Tractor Mounted, PTO Operated)

**COMMERCIAL  
ICT**



**Fig. 2 Dimensions of Three Point Linkage**

**4.3.7.1 Mast :**

Type	: Three point linkage
Size of sheet, (mm)	: 555/110 × 500 × 4(t)-02Nos.
Size of box, (mm)	: 542 × 100 × 100 – 1Nos.
Shape	: Box type

<b>IMP- 260/285/2024</b>	<b>BISKOMAAN 5G+HD ROTARY TILLER (ROTAVATOR) (Tractor Mounted, PTO Operated)</b>	<b>COMMERCIAL ICT</b>
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**4.4 Power transmission system:**

Method of operation rotary : Propeller shaft receives drive from tractor PTO and transmits the power to shaft through two gear boxes i.e. primary & secondary respectively

**4.4.1 Primary reduction :**

Type : Spur, Beveled pinion  
 No. of teeth on drive gear : 17  
 No. of teeth on driven gear : 18  
 Reduction ratio at gearbox : 0.94:1  
 No. of teeth on pinion : 11  
 No. of teeth on crown gear : 22  
 Reduction ratio at gearbox : 0.5:1  
 Oil capacity, (l) : 4  
 Grade of oil : SAE 140 Grade  
 Oil change period, (h) : Change the gear box oil Every 200 working hours  
 Length of power transmission shaft, (mm) ( from gear box to secondary reduction unit) : 1772  
 Dia. of shaft, (mm) : Ø 55  
 Provision of breather cap : Provided  
 Provision for checking oil level : Dipstick cum breather provided  
 No. of bearing : 05 Nos. of taper roller bearings (30209-02Nos.,30210-02Nos.,30215-01Nos.)

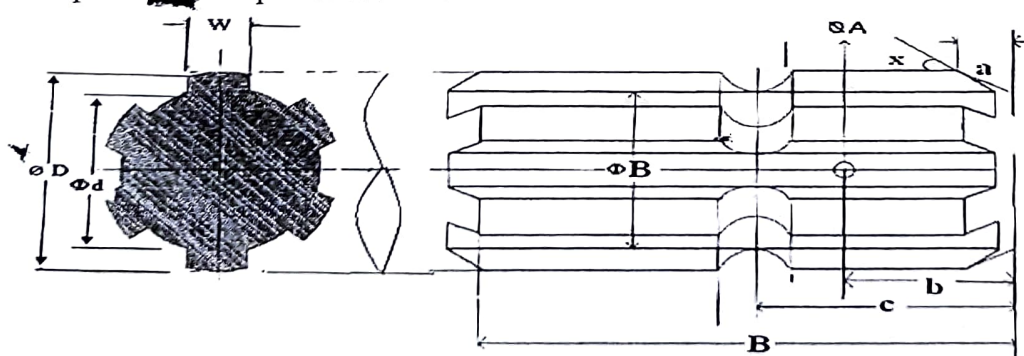


IMP- 260/285/2024	<b>BISKOMAAN 5G+HD ROTARY TILLER (ROTAVATOR)</b> (Tractor Mounted, PTO Operated)	<b>COMMERCIAL ICT</b>
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**4.4.2 Dimensions of Power Input Connection (PIC) of Implement (Refer fig.3):**

Specification	As per IS 4931:1995	As observed	Remarks
Nominal speed (rpm)	540 ± 10 optional 1000 rpm	540	Conforms
No. of splines	6	6	Conforms
Direction of rotation	Clockwise	Clockwise	Conforms
<b>Dimensions (mm)</b>			
DΦ	34.79 ± 0.06	34.84	Conforms
dΦ	28.91 ± 0.05	29.24	<b>Does not conform</b>
BΦ	29.4 ± 0.1	29.40	Conforms
A Φ	8.3 (Optional)	NA	--
W	8.69 – (0.09 to 0.16)	8.69	Conforms
a	7.0	7.0	Conforms
b	25 ± 0.5	NA	--
c	38	38	Conforms
x	30 degree	30	Conforms
B	76 (Min)	84.46	Conforms
Horizontal distance between PIC and Lower Hitch point	150* (IS 10318:2002)	216	Conforms
Vertical distance between PIC and Lower Hitch Point	100 ± 100* (IS 10318:2002)	176	Conforms

\*Recommended dimensions. It may be necessary to vary them in the case of specialized implements.



**Fig.3 Dimensions of Power Input Connection (PIC) of Implement**

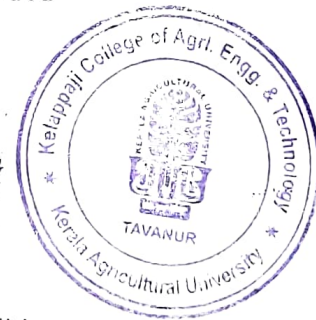
IMP- 260/285/2024	<b>BISKOMAAN 5G+HD ROTARY TILLER (ROTAVATOR)</b> (Tractor Mounted, PTO Operated)	<b>COMMERCIAL ICT</b>
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#### 4.4.3 Secondary reduction :

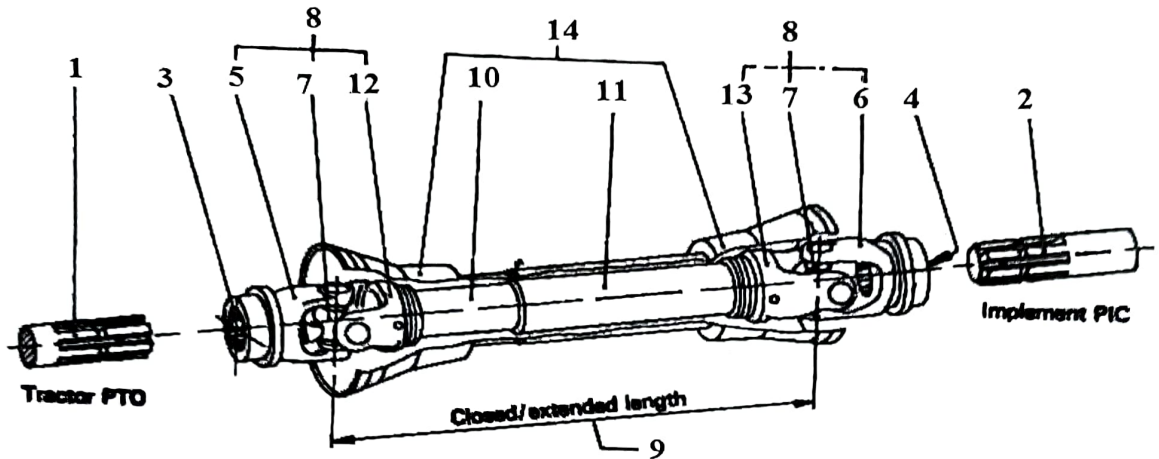
Type	:	Gear type
No. of gears	:	03
Type of gear	:	Spur
No. of teeth on drive gear	:	20
No. of teeth on driven gear	:	28
No. of teeth on idle gear	:	35
Reduction ratio	:	0.71:1
Oil capacity, (l)	:	3
Grade of oil	:	SAE 140
Oil change period, (h)	:	Check gear box oil level-Every 50 working hours & change gear box oil every 200 working hours.
Provision of breather cap	:	Provided
Oil level checking bolt	:	Provided
No. of bearing	:	04; taper roller bearings (32210-01No., 30209-02Nos.,) Ball bearing (6311-01No.)
Oil drain plug	:	Provided

#### 4.4.4 Power Take Off Drive Shaft (Refer fig. 4):

Type	:	Telescopic with universal joint
Length of the shaft, (mm):		
-Closed	:	545
-Extended	:	825
Mass of shaft, (kg)	:	16.8
Guard over propeller shaft	:	Provided



IMP- 260/285/2024	<b>BISKOMAAN 5G+HD ROTARY TILLER (ROTAVATOR)</b> (Tractor Mounted, PTO Operated)	COMMERCIAL ICT
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**Fig. 4: PTO Drive Shaft**

**KEY**

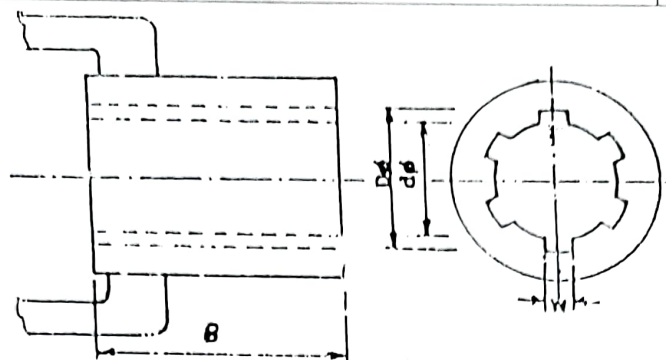
- |                           |   |
|---------------------------|---|
| 1 PTO                     | 8 Universal Joint                             |
| 2 PIC                     | 9 PTO Drive Shaft, Closed and Extended Length |
| 3 PTO Yoke Bore           | 10 Inner Shaft                                |
| 4 PIC Yoke Bore           | 11 Outer Shaft                                |
| 5 PTO Yoke                | 12 Inner Shaft Yoke                           |
| 6 PIC Yoke                | 13 Outer Shaft Yoke                           |
| 7 Journal Cross- Assembly | 14 PTO Drive Shaft Guard                      |

**Dimensions of PIC yoke bore (Ref. Fig 5) :**

S. No.	Notations	Dimensions (mm)		Conformity to IS
		As per IS: 4931-1995	As observed	
1	D $\phi$	34.93 $\pm$ 0.03	34.95	Conforms
2	d $\phi$	29.7 $\pm$ 0.1	30	<b>Does not conform</b>
3	W	8.69 + (0.02 to 0.05)	8.71	Conforms
4	B	54 (min)	62.33	Conforms



IMP- 260/285/2024	<b>BISKOMAAN 5G+HD ROTARY TILLER (ROTAVATOR) (Tractor Mounted, PTO Operated)</b>	<b>COMMERCIAL ICT</b>
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**Fig. 5: Propeller Shaft Insert Dimensions, (mm)**

- 4.5 Safety clutch/device (shear bolt in PTO drive shaft) : Provided
- 4.6 Rotavator stand : Provided
- 4.7 Overall dimensions (Refer fig.1)
  - Length,(mm) : 2043
  - Width,(mm) : 1200
  - Height,(mm) : 1060
- 4.8 Operational mass, (kg) : 446
- 4.9 Colour : Sky Blue & Black
- 4.10 Marking/Labeling of implement :

A metallic labeling plate is rivetted on RHS cover with the following details

<b>BISKOMAAN INDUSTRIES</b>			
<b>GANPATI ESTSTE SAHNEWAL CHOWK LUDHIANA (PB)</b>			
Make	BISKOMAAN 5G+HD	Power req.	35 Hp
Serial No.	7154	Size	6 Feet
Country of origin	INDIA	Weight	446 kg
Website: <a href="http://www.biskomaan.com">www.biskomaan.com</a>			



<b>IMP- 260/285/2024</b>	<b>BISKOMAAN 5G+HD ROTARY TILLER (ROTAVATOR) (Tractor Mounted, PTO Operated)</b>	<b>COMMERCIAL ICT</b>
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### 5. CONFORMITY TO INDIAN STANDARD

Specification for Rotavator (Tractor operated) to be considered under subsidy scheme of DAC & FW, Ministry of Agriculture and Farmer Welfare, vide ministry's order no. 13-9/2019-M&T (I&P)-Part. Dated 26<sup>th</sup> April, 2019.

Sl. No.	Parameters	Specifications	As observed	Remarks
1	Working width, (mm)	1200 (min.)	1892	Conforms
2	Type of blades	Hatchet/ Straight/Curved/L type	L type (Hatchet)	Conforms
3	Overlap, (mm)	15 (min)	55	Conforms
4	Thickness of blade, (mm)	7-8 (min)	7.39	Conforms
5	No. of blades	30 (min)	54	Conforms
6	Total no. of flanges	5 (min)	9	Conforms
7	Number of blades per flanges	6 (max)	Provided	Conforms
8	Outer diameter of rotor shaft with blade, (mm)	75-90	89.61	Conforms
9	Rotor diameter, including flange and blade mounted on flange, (mm)	425 (min)	469.61	Conforms
10	Side drive	Gear drive	Gear	Conforms
11	Depth control mechanism	Arc shaped skid on both side of rotavator)	Provided	Conforms
12	Material of Blade	Boron steel 28 MnCrB5/High carbon steel En 42j	Boron steel	Conforms
13	Hardness of blade, HRC	38 (min)	37-56	Conforms
14	Safety clutch / device (shear bolt in PTO drive shaft)	Must be provided	Provided	Conforms
15	Rotavator stand	Must be provided	Provided	Conforms
16	Guard over propeller shaft	Must be provided	Provided	Conforms
17	Sheet metal	AS36 /IS 2062	AS 36	Conforms
18	Marking/labeling of machine	The labeling plate should be riveted on the body of machine having Name & Address of manufacturer, country of origin, Make, Model, Year of Manufacturer, Serial Number, Type, Size, required size of prime mover (kw)	Partially Provided	Partially conforms
19	Literature	Operator manual, service manual & parts catalogue should be provided	Provided	Conforms

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## 6. RUNNING-IN

The rotavator was run-in for 1.0 hour before conducting the actual test. All the fasteners were checked and tightened thereafter.

## 7. LABORATORY TEST

### 7.1 Hardness of blades

The hardness of blades was determined at edge and shank portion. The results of hardness test are tabulated in **Table-I**.

**Table-1**

S. No	Hardness (HRC)				Remarks	
	As per IS 6690:1981 (Reaffirmed 2012)		As observed		Shank portion	Edge portion
	Shank portion	Edge portion	Shank Portion	Edge portion		
1	37 to 45	56 ± 3	37.0 to 42.0	54.0 to 56.0	Conforms	Conforms

### 7.2 Chemical composition

The results of chemical composition test are tabulated in **Table-2**

**Table-2**

Constituents	As per IS 6690:1981 (reaffirmed 2012)		Composition as observed (% of weight)	Remarks
	Carbon Steel	Silicon Manganese Steel		
Carbon ( C )	0.70 -0.85	0.50-0.60	0.620	<b>Does not conform</b>
Silicon (Si)	0.10 -0.40	1.50-2.00	0.486	<b>Does not conform</b>
Manganese (Mn)	0.50 -1.00	0.50-1.00	0.622	Conforms
Sulphur (S)	0.05(max)	0.05(max)	0.028	Conforms
Phosphorous (P)	0.05(max)	0.05(max)	0.020	Conforms
Boron (B)	---	---	<0.001	---
Chromium	---	---	0.140	---
Nickel	---	---	<0.005	---
Copper	---	---	<0.001	---

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### 8. FIELD PERFORMANCE TEST

The field tests of the implement comprising of dry and wet land operation were conducted for 24.0 and 11.0 hours respectively in different soil moisture conditions to assess the performance of the implement.

The no load Engine speed of tractor was set corresponding to 1600 rpm. The observations are summarized in Annexure-I & II.

### SUMMARY OF FIELD PERFORMANCE TEST

Table-3

S. No.	Parameters	Dry land operation	Wet land operation (puddling)
i)	Tractor used	New Holland 3630 TX	
ii)	Gear used	L-II	
iii)	Type of soil	Medium	
iv)	Av. soil moisture (%) / Av. depth of standing water (cm)	6.7 to 10.6	5.3 to 7.1
v)	Bulk density of soil (g/cc)	1.64 to 1.77	---
vi)	Field efficiency / Puddling Index (%)	79.33 to 82.72	78 to 81
vii)	Av. speed of operation (kmph)	3.15 to 3.19	2.88 to 2.93
viii)	Av. depth of cut/depth of puddle (cm)	12.8 to 13.3	15.4 to 16.8
ix)	Av. width of operation (cm)	187.9 to 189.2	---
x)	Area covered (ha/h)	0.472 to 0.493	---
xi)	Time required for one hectare (h)	2.03 to 2.12	---
xii)	Av. wheel slippage (%)	-2.18 to -1.68	---
xii)	Fuel consumption		
	-l/h	4.46 to 4.77	4.89 to 5.03
	-l/ha	9.46 to 9.68	---

#### 8.1 Rate of work

##### 8.1.1 Dry land operation

-The rate of work in medium soil was recorded 0.472 to 0.493 ha/h and the corresponding forward speed as 3.15 to 3.19 kmph.

-The time required to cover one-hectare area was recorded as 2.03 to 2.12 h.

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### 8.1.2 Wet land operation

-Speed of operation was recorded as 2.88 to 2.93 kmph.

### 8.2 Quality of work

#### 8.2.1 Dry land operation

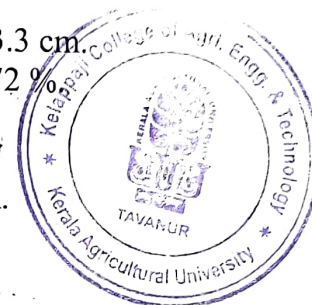
-The depth of operation was recorded as 12.8 to 13.3 cm.

-The field efficiency was recorded to 79.33 to 82.72 %

#### 8.2.2 Wet land operation

- Depth of puddle was recorded as 15.4 to 16.8 cm.

- Puddling index was recorded as 78 to 81 %.



### 8.3 Wear of blades (on mass basis):

S. No.	Initial Mass (g)	Final Mass (g)	Loss of mass (g)	Percentage of Wear	
				After 35.0 h	Per hour
1	1046	983.87	62.13	5.94	0.170
2	1068	1009.8	58.19	5.45	0.156
3	1078	1017.7	60.26	5.59	0.160
4	1050	990.12	59.88	5.70	0.163
5	1056	995.46	60.54	5.73	0.164
6	1002	940.48	61.52	6.14	0.175
7	1011	947.41	63.59	6.29	0.180
8	1084	1021.8	62.18	5.74	0.164
9	1006	944.6	61.4	6.10	0.174

**Remark:** - The hourly percentage wear of blades on mass basis was recorded as 0.156 to 0.180 %.

### 8.4 Wear of blades (on dimensional basis):

Initial width (mm)	Final width (mm)	Percentage of wear	
		After 35.0 h	Per hour
A (at tip)			
80.84	74.71	7.58	0.22
81.74	75	8.25	0.24
82.64	76.75	7.13	0.20
81.02	75.4	6.94	0.20

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84.3	78.24	7.19	0.21
81.96	76.15	7.09	0.20
82.16	76.82	6.50	0.19
82.05	76.09	7.26	0.21
84.4	77.76	7.87	0.22
B (65 mm from edge)			
81.54	74.76	8.31	0.24
84.13	78.01	7.27	0.21
83.62	76.68	8.30	0.24
82.31	76.43	7.14	0.20
85	78.79	7.31	0.21
84.79	78.84	7.02	0.20
84.17	78.14	7.16	0.20
83.8	77.68	7.30	0.21
83.93	77.59	7.55	0.22

### 9. EFFECTIVENESS OF SEALINGS

After completion of field test in wet land operation for 11.0 h, the implement was dismantled for checking effectiveness of sealing's provided against ingress of dust and water/mud in various sub-assemblies and also to check the condition of components of the rotavator.

Sl. No.	Location	Whether ingress of mud and/or water was observed
1.	Primary reduction gear box	No
2.	Secondary reduction gear box	No
3.	Rotary axle bearing cap	No

### 10. EASE OF OPERATION & ADJUSTMENTS

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

### 11. DEFECTS, BREAKDOWNS AND REPAIRS

No defect/breakdown and repair was occurred during entire period of field & lab tests.

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### 12. SAFETY REQUIREMENTS

Clause	Specified in IS	Conformity
<b>Clause 8.4</b> IS 10740:1983 (Reaffirmed 2004)	PTO driven implements shall be equipped with shielding for the implement drive line	Conforms
<b>Clause 8.5</b> IS 10740:1983 (Reaffirmed 2004)	PTO driven implements that require removal of the tractor master guard shall include comparable shielding	Conforms
<b>Clause 8.5</b> IS 10740:1983 (Reaffirmed 2004)	A safety (S) shall be provided at a prominent location on the implement and tractor specifying the normal PTO operating speed and that implement drive line shield and PTO shield are to be kept in place	Conforms
<b>Clause 5.2</b> IS 10318:2002 Locking device	The PTO and PIC yokes shall be fitted with locking devices to prevent axial displacement	Conforms

### 13. PARAMETERS APPLICABLE FOR QUALIFYING MINIMUM PERFORMANCE CRITERIA

Evaluative / Non-evaluative parameters applicable for Qualifying Minimum Performance Criteria of rotavator as per **Clause -14 (Table-2) of IS 17045: 2018**

Sl. No.	Characteristics	Category (Evaluative/Non-Evaluative)	Requirements as per IS 13539: 2018 (Second revision)	Values declared by the applicant/requirement	As observed	Whether meets the requirements (Yes/No)
1	2	3	4	5	6	7
<b>13.1</b>	<b>Field Performance</b>					

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i)	Suitability for Wet land Operation	Evaluative	Should be suitable for Wet Land operation	Yes	Suitable	Yes
ii)	Depth of cut in dry land operation, (cm)	Evaluative	Minimum 10 cm.	---	12.8 to 13.3	Yes
iii)	Depth of puddle in wet land operation, (cm)	Evaluative	Minimum 12 cm.	---	15.4 to 16.8	Yes
iv)	Field efficiency, (percent)	Evaluative	Minimum 75 percent	---	79.33 to 82.72	Yes
v)	Puddling index, (percent)	Evaluative	Minimum 65 percent	---	78 to 81	Yes

**13.2 Safety requirement :**

i)	Safety considerations	Evaluative	Should meet the requirement of IS 10740 and IS 10318	---	Refer para 11.0	Yes
ii)	Safety clutch/ device (Shear bolt) in PTO drive shaft	Evaluative	Should be provided	---	Provided	Yes
iii)	Rotavator stand	Evaluative	Should be provided	---	Provided	Yes
iv)	Rotavator shield to prevent flying of mud & stone	Evaluative	Should be provided	---	Provided	Yes
v)	Guard over propeller shaft	Evaluative	Should be provided	---	Provided	Yes

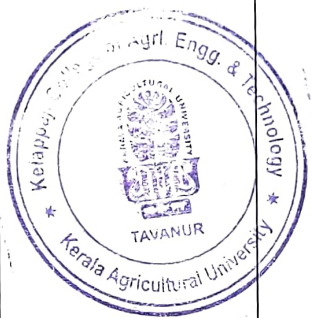


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<b>13.3 Effectiveness of Sealings</b> (presence of ingress of dust and water/mud in various sub assemblies)						
i)	Primary reduction gear/box	Evaluative	No ingress of mud and water	---	None	Yes
ii)	Secondary reduction gear/box	Evaluative	No ingress of mud and water	---	None	Yes
iii)	Rotary axle bearing cap	Evaluative	No ingress of mud and water	---	None	Yes
<b>13.4 Material of Construction</b>						
i)	Hardness of blade	Evaluative	High carbon steel, boron steel	---	Boron steel	Yes
ii)	Chemical composition of rotor blade	Evaluative	As per IS 6690	---	Used boron steel	---
<b>13.5 Dimensional Requirements</b>						
i)	Dimensions of three point linkage	Non-Evaluative	Should meet IS 4468 (Part 1)	---	Conforms	No
ii)	Dimensions of power input connection (PIC) of Implement	Non-Evaluative	Should meet IS 4931	---	Conforms	No
iii)	Dimensions of power input connection (PIC) Yoke bore	Non-Evaluative	Should meet IS 4931	---	Conforms	No
<b>13.6 Literature (Submission to Test Agency)</b>						

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i)	Operator cum service manual and parts catalogue	Evaluative	Should be provided as per IS 8132	---	Provided	Yes
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<b>13.7</b>	<b>Labeling of Rotavator</b> (Provision of Labeling Plate) Should be Welded on Rotary Tiller (Rotavator)					
	Parameters	Evaluative	Should be provided on rotary tiller (rotavator)	---	Provided	No
	Name and address of manufacturer					
	Make					
	Model					
	Size (m) [Dia. of rotor × width of cut]					
	Country of origin					
	Year of manufacturer [DD/MM/YY YY]					
	Chassis Serial Number					
	Recommended PTO speed of prime-mover, (rpm)					
	Maximum PTO Power required, kW					



<b>13.8</b>	<b>CATEGORY OF BREAKDOWNS/DEFECTS</b>				
	Category of breakdown	Category (Evaluative /non-evaluative)	Requirements	As observed	Whether meets the requirement (Yes/No)

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i)	Critical breakdown	Evaluative	No critical breakdown	None	Yes
ii)	Major breakdowns	Evaluative	Not more than one and neither of them should be repetitive in nature	None	Yes
iii)	Minor breakdowns	Evaluative	Not more than three and frequency of each should not be more than two	None	Yes
iv)	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed four, that is (1 major+3 minor) or 4 minor breakdowns	Nil	Yes



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

- 14.1 No ingress of dust and water/mud in primary reduction gear box, secondary reduction gear box, and rotary axle bearing cap was observed.
- 14.2 Provisions for breather cap, oil level dipstick in primary and secondary gearbox are provided.
- 14.3 The specification of implement hitch does not conforming in full to the IS 4468 (Pt-I):1997.
- 14.4 Dimensions of PIC does not conforming in full to IS 4931:1995.
- 14.5 Chemical composition of rotavator blade does not conform fully to IS 6690:1981
- 14.6 Dimensions of PIC yoke bore does not conforming in full to IS 4931:1995.
- 14.7 Safety device is provided in rotavator propeller shaft.
- 14.8 Provision for parking stand is provided in rotavator.
- 14.9 The provided labeling plate should be as per the requirement of IS.




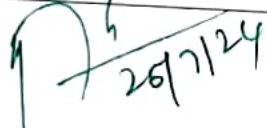
#### 14.10 Adequacy of literature:

Operator's manual, service manual and parts catalogue of the Rotavator in English & Hindi were provided in single booklet form for reference during the test. However, this should be brought out in other regional languages as per IS 8132:1999 (Reaffirmed 2004) for the sake of user & technical personnel.



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**TESTING AUTHORITY:**

Er. Vishnu Prasad S R Test Engineer- FMTTI KCAE&FT, KAU, Tavanur	
Dr. Dhalin D Professor - Dept of FMPE KCAE&FT, KAU, Tavanur	
Er. Sindhu Bhaskar Head- FMTTI KCAE&FT, KAU, Tavanur	
Dr. Jayan PR Professor & Head - Dept of FMPE KCAE&FT, KAU, Tavanur	 26/7/24

The test report is compiled by Er. Vishnu Prasad S R, Test Engineer and Er. Sreejith Warriar J S, Assistant Engineer, FMTTI, KAU, KCAE&FT, Tavanur.

**15. APPLICANT'S COMMENTS**

Sl. No.	Our reference	Applicant's comments
1	14.3	The specification of implement hitch will be conforming in full to the IS 4468 (Pt-I):1997 in our regular production.
2	14.4	Dimensions of PIC will be conforming in full to IS 4931:1995 in our regular production.
3	14.5	Chemical composition of rotavator blade will be conform fully to IS 6690:1981 in our regular production.
4	14.6	Dimensions of PIC yoke bore will be conforming in full to IS 4931:1995 in our regular production.
5	14.9	The labeling plate will be provided as per the requirement of IS in our regular production.
6	14.10	Adequacy of literature: Operator's manual, service manual and parts catalogue of the Rotavator in English & Hindi were provided in single booklet form for reference during the test. However, this will be brought out in other regional languages as per IS 8132:1999 (Reaffirmed 2004) for the sake of user & technical personnel in our regular production.

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ANNEXURE- I

**FIELD PERFORMANCE RESULTS (DRY LAND)**

Place of test : Dhanusa, Ludhiana, Punjab

Tractor used: New Holland 3630 TX

Sl. No	Parameters	No. of tests		
		I	II	III
1	Date of test	12.06.2024	13.06.2024	14.06.2024
2	Duration of test (h)	8.00	8.00	8.00
3	Gear Used	L-II		
4	Furrow length (m)	74	65.60	65
5	Type of soil	Medium		
6	Bulk density (g/cc)	1.68	1.64	1.72
7	Soil moisture (%)	9.12	6.7	10.6
8	Previous treatment	Nil		
9	Tractor Engine Speed (rpm):			
	- No load	1600	1600	1600
	- On load	1540	1520	1530
10	Forward speed (kmph)	3.16	3.15	3.19
11	Wheel slip (%)	-2.18	-1.85	-1.68
12	Av. depth of cut (cm)	12.9	12.8	13.3
13	Av. width of cut (cm)	188.7	189.2	187.9
14	Area covered (ha/h)	0.493	0.472	0.482
15	Time required for one ha (h)	2.03	2.12	2.07
16	Field efficiency (%)	82.72	79.33	80.47
17	Fuel Consumption			
	-(l/h)	4.77	4.46	4.60
	-(l/ha)	9.68	9.46	9.52

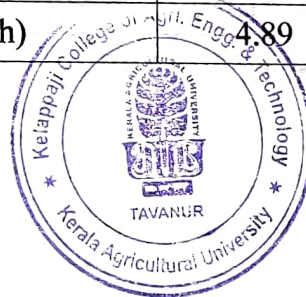
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**ANNEXURE - II**

**FIELD PERFORMANCE RESULTS (WET LAND)**

Place of test : Dhanusa, Ludhiana, Punjab  
Tractor used: New Holland 3630 TX

Sl. No.	Parameters	No. of tests	
		I	II
1	Date of test	15.06.2024	16.06.2024
2	Duration of test (h)	5.30	5.30
3	Gear used	L-II	
4	Type of soil	Medium	
5	Previous treatment	Nil	
6	Tractor Engine speed (rpm):		
	- No load	1600	1600
	- On load	1520	1510
7	Av. forward speed (kmph)	2.88	2.93
8	Av. travel reduction (%)	-0.16	-0.23
9	Av. depth of standing water (cm)	7.1	5.3
10	Water over puddle (cm)	2.9	2.2
11	Av. depth of puddle (cm)	15.4	16.8
12	Av. wheel sinkage (cm)	18.7	18.9
13	Puddling index (%)	81	78
14	Fuel consumption (l/h)	4.89	5.03



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ANNEXURE- III

### SYMBOLS & ABBREVIATIONS

#### I. Symbols assigned to basic SI units

Sl. No	Physical quantity	Name of SI Unit	Symbol
1.	Length	Meter	m
		Millimeter	mm
2.	Mass	Kilogram	kg
		Gram	g
		Tonne	t
3.	Time	Second	s

#### II. Symbols assigned to some derived units

Sl. No	Physical quantity	Name of SI Unit	Symbol	
1.	Area	Square centimeter	cm <sup>2</sup>	
		Square meter	m <sup>2</sup>	
		Hectare	ha	
2.	Speed/Velocity	Meter per second	m/s	
		Kilometer per hour	kmph	
3.	Pressure	Newton per square millimeter	N/mm <sup>2</sup>	
		Time	Minute	min
			Hour	H
5.	Volume	Cubic centimeter	cm <sup>3</sup>	
		Milliliter	ml	
		Liter	l	

#### ABBREVIATIONS

As per applicant	: apa	Clause	: Cl
Degree	: deg	Figure	: Fig
Indian Standard	: IS	Kilowatt	: KW
Number	: No.	Not available	: N.A.
Not Recorded	: N.R.	Percent	: %
Reference	: Ref.	Revolution per minute	: rpm
Low two	: L-2	Ply rating	: PR
Ampere hour	: Ah	Centimeter	: cm
Horsepower	: HP	Ampere	: Amp
Mild steel	: MS	Liters per hour	: lph