

व्यावसायिक परीक्षण रिपोर्ट  
COMMERCIAL TEST REPORT

संख्या/ No.: Machine- 41/2925/2022  
माह/Month: October, 2022

**THIS TEST REPORT VALID UP TO : 31<sup>st</sup> October, 2027**



**SHAKTI, SBC-900  
BRUSH CUTTER**



भारत सरकार

**Government of India**

कृषि एवं किसान कल्याण मंत्रालय

**Ministry of Agriculture and Farmers Welfare**

कृषि एवं किसान कल्याण विभाग

**Department of Agriculture and Farmers Welfare**

उत्तरी क्षेत्र कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

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

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Sr. No.	Location		HD ( $\mu$ )	VD ( $\mu$ )
1	Handle	Left	258*	221*
		Right	224*	203*
2	Engine cover		176*	256*
3	Frame pipe		210*	242*
4.	Grass deflector		196*	231*

\* The amplitude of mechanical vibration is on higher side.

## 10. NOISE MEASUREMENT

### Noise at operator's ear level

Date of test	:	04.10.2022
Type of sound level meter	:	Casella CEL-63X
Temperature, $^{\circ}$ C	:	13.8
Pressure, kPa	:	98.83
Relative humidity, %	:	84.8
Background noise level, dB(A)	:	52.6
Observed noise level, dB(A)	:	86.6

## 11. HARDNESS AND CHEMICAL COMPOSITION OF ROTOR BLADES

### 11.1 Hardness:

#### 11.1.1 Hardness of triangular blade:

Sr. No.	As per IS: 6025:1982 HRC	As observed (HRC)	Remarks
	48 to 58	49.0	Conforms

### 11.2 Chemical composition analysis:

#### 11.2.1 Triangular blade:

Constituents	As per IS: 6025-1982	Composition as observed (% of weight)	Remarks
Carbon (C)	0.70-0.95	0.3259	<b>Does not conform</b>
Manganese (Mn)	0.30 to 0.50	0.7894	<b>Does not conform</b>
Silicon (Si)	--	0.3752	--
Sulphur (S)	--	0.0303	--
Phosphorous (P)	--	0.0071	--

## 12. FIELD TEST

Field tests were conducted for 13.25 hours with triangular blade attachment and 13.01 hours with Nylon rope attachment. Detailed results of field tests are shown in Annexure-I & II and summarized in the ensuing table. Details about the operator are show in Annexure-III.

Sr. No.	Parameters	Seasonal Grass cutting	
		For triangular blade	For nylon rope
1	Field condition	Leveled	Leveled
2	Intensity of grass	High	High
3	Average number of grass/weed in 1 sq. m	105 to 196	150 to 227

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4	Avg. height of grass/weed, cm	25 to 90	20 to 45
5	Avg. Diameter of grass/weed, mm	2.0 to 4.5	1.2 to 2.0
6	Avg. Mass of grass cut (kg/h)	39 to 70	13.4 to 17.8
7	Avg. area covered (Rate of work), ha/h	0.042 to 0.046	0.043 to 0.046
8	Avg. Time required for one hectare, h	21.74 to 23.81	21.74 to 23.26
9	Avg. Fuel consumption		
		l/h	1.00 to 1.04
		l/ha	21.74 to 24.76
			1.00 to 1.08
			22.73 to 24.66

## 12.1 Cutting using triangular blade

### 12.1.1 Rate of work

- The average area covered (rate of work) was observed as 0.042 to 0.046 ha/h.
- Average time required for one hectare was observed as 21.74 to 23.81 hours.
- Average numbers of perennial weed in one square meter are was 105 to 196
- Average mass of perennial weed cut was 39 to 70 kg/h.

### 12.1.2 Fuel consumption

Fuel consumption was observed as 1.0 to 1.04 l/h and 21.74 to 24.76 l/ha.

## 12.2 Cutting using nylon rope assembly

### 12.2.1 Rate of work

- Average area covered (rate of work) was observed as 0.043 to 0.046 ha/h.
- Average time required for one hectare was observed as 21.74 to 23.26 h.
- Average mass of grass cut was observed as 13.4 to 17.8 kg/h.
- Average No. of grass stem in one m<sup>2</sup> area was 150 to 227

### 12.2.2 Fuel consumption

Average fuel consumption was observed as 1.00 to 1.08 l/h. and 22.73 to 24.66 l/ha.

## 12.3 Labor requirement

To ensure the cutting work without interruption, two operators are required to work alternates. Additionally, one more labour is needed gather the collected bush/weeds.

## 12.4 Adequacy of power of prime mover

The power of prime mover was found adequate.

## 12.5 Wear analysis of critical components

Component	Duration of operation (h)	Initial length/ mass (mm/g)	Length/ Mass after operation (mm/g)	Loss of length/ mass (mm/g)	Percentage wear	Percentage wear on hour basis
Triangular blade	13.25	237.9	233.0	4.9	2.06	0.16
Nylon rope	13.01	22.40	750	1490	66.52	5.11

## 13. EASE OF OPERATION & ADJUSTMENTS

Fatigue was observed just after half an hour of operation of the brush cutter, mainly, due to excessive mechanical vibration and noise. The operator complained about pain in different parts of his body like wrist & shoulder etc during operation.

Work-Rest cycle for this brush cutter is observed on follows

30 minutes work – 10 minutes rest – 20 minutes work – 10 minutes rest – 20 minutes work -15 minutes rest & so on.

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### 15.1.6 Piston Rings groove clearance:

Ring no.	Ring groove clearance, mm	Max. permissible wear limit, mm
1 <sup>st</sup> compression ring	0.07	0.45
2 <sup>nd</sup> compression ring	0.06	0.45
Oil ring	Not measured due to ring design constraint	

### 15.1.7 Valve guide clearance:

Valve guide diameter (mm)		Valve stem diameter (mm)		Valve guide clearance (mm)		Max. permissible wear limit (mm)	
Inlet	Exhaust	Inlet	Exhaust	Inlet	Exhaust	Inlet	Exhaust
Not applicable							

### 15.2 Valve guides and valve springs

Valve spring stiffness, kgf/mm : **Not applicable**

## 16. 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.	Type	Self propelled, portable	Self propelled	Conforms
2.	Type of cutting attachment	Circular disc/Straight blade/nylon rope	Straight blade & nylon rope used	Conforms
<b>Circular blade</b>				
3.	Material of Circular/straight blade	Alloy Steel	Steel	Conforms
4.	No. of teeth on circular disc blade	50-100	Circular blade is not recommended by applicant	--
5.	Root diameter/Overall diameter (mm)	200-270		
6.	Thickness of disc (mm)	1.5 Min		
7.	Teeth thickness (mm)	2.0 Min		
8.	Material of Blade	M42		
9.	Hardness of Blade, HRC	68-70		
<b>Straight blade</b>				
10.	Diameter of straight blade (mm)	250-350	255	Conforms
11.	Width of ends/at center (mm)	50/70, Min.	51/68	Conforms
12.	Thickness of straight blade (mm)	1.5 Min	1.5	Conforms
<b>Nylon rope</b>				
13.	Length of nylon rope (mm)	2000-4000	Length 2240 mm	Conforms
14.	Diameter of nylon rope (mm)	2.5 to 4.0	Diameter- 2.5 mm	Conforms
15.	Type of engine	Compression ignition/Spark ignition	Spark Ignition	Conforms
16.	Starting method	Manual/recoil/self-starting	Manual/Recoil Start	Conforms
17.	Type of clutch	Cone/centrifugal	Centrifugal	Conforms

18.	Type of gear drive	Bevel pinion	Bevel pinion	Conforms
19.	Capacity of fuel tank (l)	1.0 (min)	1.0 lit.	Conforms
20.	On off provision in fuel supply system	Must be provided	Provided	Conforms
21.	Provision for easy start of engine	Must be provided	Choke is provided	Conforms
22.	Provision for emergency stop of engine	Must be provided	Provided	Conforms
23.	Provision for shield/cover to prevent flying of mud and stone from rotor	Must be provided	Provided	Conforms
24.	Provision for Grass deflector at the rear of the cutting mechanism			
25.	Provision for Pad with shoulder bet to dampen the vibration	Must be provided	Provided	Conforms
26.	Provision for cover on exhaust.	Must be provided	Provided	Conforms
27.	Direction of exhaust emission away from operator	Must be provided	Provided	Conforms
28.	Provision for safety kit (helmet, ear plug, mask, hand gloves, safety glass, Protective cloth, safety shoes)	Must be provided	Provided	Conforms
29.	Marking/labeling of machine	The labeling plate should be riveted on the body of machine having Name and address of manufacturer & Applicant, country of origin Make, Model, year of manufacturer, Serial Number, Engine number, Engine HP, rated rpm & SFC.	Just a sticker and not proper labeling plate is provided on the machine with following information. Make-Shakti Model-SBC-900 Serial no. – BC-10/20 Mfg- January, 2020 Shakti Agro Industries 2153/1, St. No-6, Arjun Nagar, Gill Road, Ludhiana-141003 (Punjab)	<b>Partially conform</b>
30.	Literature	Operator manual, Service manual and Parts catalogue should be provided.	Provided	Conforms

**17. COMMENTS AND RECOMMENDATIONS**

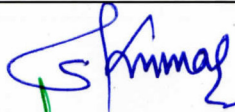

- 17.1** The amplitude of mechanical vibration marked as (\*) on the relevant chapter, are on drastically higher side. It is not just directly concerned with operator's health, safety and comfort, but also adversely affects the useful life of the components. In view of above, this deserved to be given top priority for corrective action.
- 17.2** The chemical composition of blades does not conform, to the requirements of IS: 6025-1982. This needs to be looked into for corrective action.
- 17.3** A suitable labeling plate (not sticker) needs to be provided with "Interlia" following information.
1. Name and address of manufacturer
  2. Name and address of applicant
  3. Country of origin
  4. Make
  5. Model
  6. Year of manufacturer
  7. Serial number
  8. Engine number
  9. Engine hp
  10. Rated rpm
  11. SFC

**18. TECHNICAL LITERATURE**

The User's Manual was provided by the applicant during the test. The following literature, therefore, **MUST** be provided as per IS: 8132-1999 for guidance.

- i) Operator's manual
- ii) Service manual
- iii) Parts catalogue

**TESTING AUTHORITY**

Er. SANJAY KUMAR AGRICULTURAL ENGINEER	
Dr. MUKESH JAIN DIRECTOR	 13.10.2022

**19. APPLICANT'S COMMENTS**

We will follow comments and recommendatinos mention in the draft test report.