

व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT

संख्या/ No.: MACHINE-54/3093/2023
माह/Month: October, 2023

THIS TEST REPORT VALID UP TO : 31st October, 2028



**ROVER, RS933
SIDE PACK 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
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Sr. No.	Location		HD (μ)	VD (μ)
1.	Handle	Left	100	120*
		Right	120*	80
2.	Engine cover		330*	200*
3.	Frame pipe		210*	340*
4.	Grass deflector		300*	240*
5.	Starter		330*	410*
6.	Fuel tank		380*	210*
7.	On/off switch		100	80

* The amplitude of mechanical vibration is on higher side.

12. NOISE MEASUREMENT

Noise at operator's ear level

Date of test	: 14.06.2023
Type of sound level meter	: Casella CEL-63X
Temperature, °C	: 33.6
Pressure, kPa	: 738.9
Relative humidity, %	: 300.6
Background noise level, dB(A)	: 52.6
Observed noise level, dB(A)	: 92.4

Noise at By-stander's ear level

Observed noise level, dB(A)	: 76.8
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13. HARDNESS AND CHEMICAL COMPOSITION OF ROTOR BLADES

11.1 Hardness:

11.1.1 Hardness of straight blade:

Sr. No.	As per IS: 6025:1982 HRC	As observed (HRC)	Remarks
	48 to 58	55.57	Conforms

11.2 Chemical composition analysis:

11.2.1 Straight blade:

Constituents	As per IS: 6025-1982	Composition as observed (% of weight)	Remarks
Carbon I	0.70-0.95	0.5101	Does not conform
Manganese (Mn)	0.30 to 0.50	1.5371	Does not conform
Silicon (Si)	--	0.4761	--
Sulphur (S)	--	0.0338	--
Phosphorous (P)	--	0.0284	--

12. FIELD TEST

Field tests were conducted for 10.20 hours with straight blade attachment and 15.97 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 shown in Annexure-III.

Machine- 54/3093/2023	ROVER, RS933 SIDE PACK BRUSH CUTTER (COMMERCIAL)
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Sr. No.	Parameters	Seasonal Grass cutting	
		For Triangular blade	For nylon rope
1.	Field condition	Leveled	Leveled
2.	Intensity of grass	High	High
3.	Number of grass/weed in 1 sq. m	178 to 235	197 to 262
4.	Height of grass/weed, cm	19.0 to 27.0	19.0 to 27.5
5.	Diameter of grass/weed, mm	0.9 to 2.0	0.8 to 2.35
6.	Mass of grass cut (kg/h)	38.57 to 54.28	50.0 to 57.41
7.	Area covered (Rate of work), ha/h	0.015 to 0.017	0.018 to 0.021
8.	Time required for one hectare, h	58.82 to 66.67	47.62 to 55.56
9.	Fuel consumption		
	-l/h	0.71 to 0.81	0.60 to 0.75
	-l/ha	41.76 to 54.00	28.57 to 41.67

12.1 Cutting using Triangular blade

12.1.1 Rate of work

- i) Area covered (rate of work) was observed as 0.015 to 0.017 ha/h.
- ii) Time required for one hectare was observed as 58.82 to 66.67 hours.
- iii) Numbers of perennial weed in one square meter was 178 to 235.
- iv) Mass of perennial weed cut was 38.57 to 54.28 kg/h.

12.1.2 Fuel consumption

Fuel consumption was observed as 0.710 to 0.810 l/h and 41.76 to 54.00 l/ha.

12.2 Cutting using nylon rope assembly

12.2.1 Rate of work

- i) Area covered (rate of work) was observed as 0.018 to 0.021 ha/h.
- ii) Time required for one hectare was observed as 50.0 to 57.41 h.
- iii) Mass of grass cut was observed as 50.0 to 57.41 kg/h.
- iv) Numbers of grass stem in one m² area was 197 to 262.

12.2.2 Fuel consumption

Fuel consumption was observed as 0.60 to 0.75 l/h and 28.57 to 41.67 l/ha.

12.3 Labor requirement

To ensure the cutting work without interruption, two operators are required to work alternatively. Additionally, one more labor is needed to 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

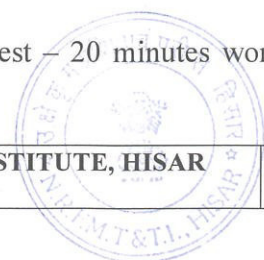
Component	Duration of operation (h)	Initial mass/Length(g/m)	Mass / Length after operation (g/mm)	Loss of mass / length(g/m)	Percentage wear	Percentage wear on hour basis
Triangular blade	10.20	310	300	10.0	3.23	0.32
Nylon rope	16.89	2.80	1.0	1.80	64.29	3.81

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.



15.1.6 Piston Rings groove clearance:

Ring no.	Ring groove clearance, mm	Max. permissible wear limit, mm
1 st compression ring	0.07	0.15
2 nd compression ring	0.07	0.15
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
Circular blade				
3.	Material of Circular/straight blade	Alloy Steel	Alloy 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		
Straight blade				
10.	Diameter of straight blade, mm	250-350	Straight blade is not recommended by applicant	-
11.	Width of ends/at center, mm	50/70 (Min.)		
12.	Thickness of straight blade, mm	1.5 (Min.)		
Nylon rope				
13.	Length of nylon rope, mm	2000-4000	2800	Conforms
14.	Diameter of nylon rope, mm	2.5 to 4.0	3.0 Ø	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.)	0.60	Does not conform
20.	On off provision in fuel supply system	Must be provided	Provided	Conforms
21.	Provision for easy start of engine	Must be provided	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	Must be provided	Provided	Conforms
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.	Machine Make, Country of Origin and SFC is not specified on the sticker provided on engine.	Partially conform
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 The hardness of blades does not conform, to the requirements of IS: 6025-1982. This needs to be looked into for corrective action.
- 17.4 No noticeable defect was observed during the field test. The performance of brush cutter was found to be satisfactory.
- 17.5 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 manufacture
 7. Serial number
 8. Engine number
 9. Engine hp
 10. Rated rpm
 11. SFC
- 17.6 Observed engine power is 0.43 kW against declaration of 0.75 kW.



18. TECHNICAL LITERATURE

The following literatures are provided with brush cutter by the applicant during the test.

- a) Operator manual
- b) Parts catalogue
- c) Service manual

However, the manuals need to be updated as per IS: 8132-1999.

TESTING AUTHORITY

Er. SANJAY KUMAR AGRICULTURAL ENGINEER	
Dr. MUKESH JAIN DIRECTOR	 06.10.2023

19. APPLICANT'S COMMENTS

We will improve in mass production.

