

व्यावसायिक परीक्षण रिपोर्ट  
COMMERCIAL TEST REPORT

संख्या/ No.: Power weeder: 145/2838/2022  
माह/Month: April, 2022

**THIS TEST REPORT VALID UP TO : 30<sup>th</sup> April, 2027**



**SPRAYMAN, BSC 840  
POWER WEEDER**



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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## 10.2

**Table 3 : Chemical analysis of rotary blade**

Elements	Requirements as per IS: 6690-1981 (%)	As observed (%)	Remarks
Carbon	0.50 to 0.60	0.53	Conforms
Manganese	0.50 to 1.00	0.66	Conforms
Silicon	1.50 to 2.00	1.01	<b>Does not conform</b>
Phosphorous	0.05 (Max.)	0.01	Conforms
Sulphur	0.05 (Max.)	0.06	<b>Does not conform</b>

## 11. RUN - IN

The power weeder was run-in for 1.33 hour before field performance test. All the fasteners were checked and tightened thereafter.

## 12. FIELD TEST

The field tests under dry land condition were conducted for 27.02 h. The field tests were conducted at the rated 3600 rpm. In all, 5 tests trials were conducted in sandy loam soil at NRFMTTI farm, Hisar. The summary of the field test for dry land operation is given in table-4.

### Crop parameters

- i) Type of weed - Seasonal weeds
- ii) Height of weed, cm - 4.5 to 14.2

**Table 4: SUMMARY OF FIELD PERFORMANCE TEST**

Sl. No.	Parameter		Range
i)	Type of soil	:	Sandy loam
ii)	Soil moisture, %	:	13.6 to 16.5
iii)	Bulk density of soil, g/cc	:	1.70 to 1.89
iv)	Speed of operation, kmph	:	2.11 to 2.38
v)	Depth of cut, cm	:	5.7 to 6.5
vi)	Width of cut, m	:	0.60 to 0.64
vii)	Area covered, ha/h	:	0.089 to 0.119
viii)	Time required for one ha	:	8.40 to 11.24
ix)	Fuel consumption		
		l/h :	1.48 to 1.70
		l/ha :	12.43 to 18.48
x)	Weeding efficiency, %	:	72.1 to 78.8
xi)	Field efficiency, %	:	70.1 to 77.8

## 13. ADJUSTMENT, DEFECTS, BREAKDOWNS & REPAIR

No noticeable defect/breakdown observed during test.

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#### 14. COMPONENTS/ASSEMBLY INSPECTION AND ASSESSMENT OF WEAR

##### 14.1 Engine

The Engine and other assemblies were dismantled after 41.28 hours of engine operation.

##### 14.1.1 Cylinder

Cylinder bore dia. (mm)						
Top Position		Middle position		Bottom Position		Max. permissible wear limit
Thrust	Non-thrust	Thrust	Non-thrust	Thrust	Non-thrust	
77.00	77.00	77.00	77.00	77.01	77.00	77.17

##### 14.1.2 Piston

Piston diameter (mm)						
Top position		At Skirt			Max. permissible wear limit (mm)	
Thrust side	Non-thrust side	Thrust side	Non-thrust side	Piston to cylinder clearance (mm)	Piston dia. At skirt	Piston to cylinder clearance
76.50	76.33	76.96	Not measured due to piston design constraint	0.05	76.85	0.12

##### 14.1.3 Piston Rings end gap:

Ring No.	Ring end gap (mm)			Max. permissible wear limit
	At top	At middle	At bottom	
1 <sup>st</sup> compression ring	0.40	0.45	0.45	1.15
2 <sup>nd</sup> compression ring	0.50	0.50	0.50	1.15
Oil ring	Not measured due to ring design constraint.			

##### 14.1.4 Big end bearing

Dia. of crank pin (mm)	Dia. of bearing (mm)	Clearance (mm)		Max. permissible wear limit (mm)	
		Diametrical	Axial	Diametrical	Axial
33.89	33.96	0.08	0.50	0.12	1.0

##### 14.1.5 Main bearing of crank shaft:

Sr. No.	Dia. of main Journal (mm)	Dia. of main bearing (mm)	Diametrical Clearance of main bearing	End float of crank shaft	Max. permissible wear limit (mm)	
					Diametrical	End float of crank shaft
<b>Ball bearing is provided at both side hence not applicable</b>						

##### 14.1.6 Piston Rings groove clearance:

Ring No.	Ring groove clearance (mm)	Max. permissible wear limit, mm
1 <sup>st</sup> compression ring	0.05	0.15
2 <sup>nd</sup> compression ring	0.02	0.15
Oil ring	Not measured due to ring design constraint	--

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#### 14.1.7 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
6.62	6.61	6.58	6.54	0.04	0.03	0.10	0.12

#### 14.2 Valves, guides and timing gear Observation

Any marked sign of overheating of valves : None

Pitting of seat/faces of valves : None

	Spring stiffness (kgf/mm)	Discard limit (kgf/mm)
Inlet valve spring	1.31	Not specified
Exhaust valve spring	1.32	

14.3 Timing gears : No noticeable defect observed.

14.4 Clutch : No noticeable defect observed.

14.5 Transmission : No noticeable defect observed.

14.6 Rotary drive unit : No noticeable defect observed.

#### 14.7 Wear of blades:

##### 14.7.1 Mass basis:

The wear of the rotary weeder blades was measured after 28.35 hours of field operation and the observations are as under:

Sr. No.	Initial mass (g)	Mass after 28.35 hours (g)	Loss of mass (g)	Percent wear (%)	Percent wear per hour (%)
1	257.0	247.3	9.7	3.78	0.13
2	256.9	249.6	7.3	2.85	0.10
3	251.2	244.6	6.5	2.60	0.09
4	251.0	237.6	13.4	5.33	0.19
5	267.4	258.8	8.6	3.23	0.11
6	252.9	239.7	13.6	5.20	0.18

### 15. CRITICAL TECHNICAL SPECIFICATIONS

Vide Ministry O.M. No. 13-9/2019-M&T (I&P) dated 26.04.2019.

Sr. No.	Parameters	Specifications	Observed	Remarks
1.	Type	Self-propelled, walk behind	Self propelled, walk behind type	Conforms
2.	Working width, mm	300-1500	860	Conforms
3.	Type of engine	Compression/Spark ignition	Spark ignition	Conforms
4.	Starting method	Manual/recoil/self-starting	Recoil	Conforms
5.	Type of clutch	Dry/Wet	Dry	Conforms

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6.	Type of primary gear box	Sliding/constant mesh or combination of both	Combination of both	Conforms
7.	Type of secondary gear box	Gear type, chain & sprocket type	Gear type	Conforms
8.	Material for rotor shaft	SAE 1045 (CRS) / EN8 / EN9	E250	<b>Does not conform</b>
9.	No. of flanges	4 -10	6	Conforms
10.	Types of flanges	Square/circular/rectangular	Square	Conforms
11.	Distance between consecutive flanges, mm	80 to 150	82	Conforms
12.	No. of blades in each flange	3-6	04	Conforms
13.	No. of rotor blade	12 (min.)	20	Conforms
14.	Thickness of rotor blade, mm	5 (min.)	5.7	Conforms
15.	Material of blade	Boron (28MnCrB5) / High carbon steel EN 42j	Mild steel, 65 Mn	<b>Does not conform</b>
16.	Hardness of Blade, HRC	38 (min.)	40 (Average)	Conforms
17.	Shape of rotor blade	C / J shape	J shape	Conforms
18.	Provision for handle height adjustment	Must be provided	Provided	Conforms
19.	Provision for handle rotation	Must be provided	Provided	Conforms
20.	Provision for emergency stop of engine	Must be provided	Provided	Conforms
21.	Provision for easy start of engine	Must be provided	Provided	Conforms
22.	Provision for shield/cover to prevent flying of mud & stone from rotor	Must be provided	Provided	Conforms
23.	Depth control mechanism	Must be provided	Provided	Conforms
24.	Provision for transport wheels	Must be provided	Provided	Conforms
25.	Provision for cover on exhaust	Must be provided	Provided	Conforms
26.	Direction of exhaust emission away from operator	Must be provided	Provided	Conforms
27.	Marking/labeling 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.	Engine number and SFC were not provided	<b>Does not conform</b>
28.	Literature	Operator manual, service manual and Parts catalogue should be provided.	Provided	Conforms

**Note:** The implementation of critical technical specifications has been deferred till 30.09.2022 vide Ministry's O.M No. 13-1/2021- M&T (I&P) dated 03.02.2022.

**16. COMMENTS & RECOMMENDATIONS****16.1 Engine performance**

**16.1.1** The average rated power in rating test of engine was observed as 5.04 kW at 3600 rpm against manufacturer declared power of 6.15 kW at 3600 rpm which is 18.1 % less than the declared power.

**16.1.2** The average torque was observed as 13.33 Nm against the declared value of 19.1 Nm which is 30.2 % less than declared value.

**16.2 Mechanical vibration**

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 affect the useful life of the components. In view of above, this deserve to be given top priority for corrective action.

**16.3** 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.

**16.4** Make & model of governor are not specified. It should be specified.

**16.5** Valve guides and valve spring discard limit is not specified. It should be specified.

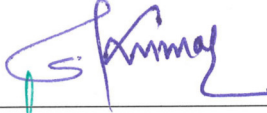

**17. TECHNICAL LITERATURE**

The following literatures are provided by the applicant.

- i) Owner manual
- ii) Spare parts catalogue
- iii) Owner's manual of engine

However, the owner's manual needs to be updated as per IS: 8132-1999.

**TESTING AUTHORITY**

SANJAY KUMAR AGRICULTURAL ENGINEER	
Dr. MUKESH JAIN DIRECTOR	 05-04-2022

Test report compiled by C. Veeranjanyulu, Senior Technician

**18. APPLICANT'S COMMENTS**

No specific comments received from the applicant