

**THIS TEST REPORT VALID UP TO : 28<sup>th</sup> February, 2025**



**CENTURY, XL-5 P  
POWER WEEDER**



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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10.2 Table 4 : Chemical analysis of rotary blade

Elements	Requirements as per IS: 6690-1996 (%)	As observed (%)	Remarks
1.	2.	3.	4.
Carbon	0.50 to 0.60	0.3085	Does not conform
Manganese	0.50 to 1.00	0.6014	Conforms
Silicon	1.50 to 2.00	0.8296	Does not conform
Phosphorous	0.05 (Max.)	0.0163	Conforms
Sulphur	0.05 (Max.)	0.0354	Conforms
Boron	--	0.0026	--

## 11. FIELD TEST

The field tests under dry land condition were conducted for 27.28 h. The field tests were conducted at the 3250 rpm of engine. In all, 7 tests trials were conducted in sandy loam soil at the NRFMTTI farm, Hisar. The summary of the field test for dry land operation is represented in table-5.

## Weed parameters

- i) Type of weed - Seasonal weeds  
ii) Height of weed, cm - 4.5 to 12.6

Table 5: SUMMARY OF FIELD PERFORMANCE TEST

Sl. No.	Parameter		Range
i)	Type of soil	:	Sandy
ii)	Average Soil moisture, %	:	7.1 to 18.4
iii)	Average Bulk density of soil, g/cc	:	1.39 to 1.71
iv)	Average Speed of operation, kmph	:	0.74 to 1.03
v)	Average depth of cut (cm)	:	5.90 to 7.13
vi)	Average Width of cut, m	:	0.77 to 0.90
vii)	Average Area covered, ha/h	:	0.046 to 0.077
viii)	Average Time required for one ha	:	14.92 to 21.74
ix)	Average Fuel consumption		
	l/h	:	0.86 to 1.20
	l/ha	:	14.63 to 24.0
x)	Average Weeding efficiency (%)	:	66.67 to 90.93
xi)	Average Field efficiency (%)	:	62.65 to 89.33

## 12. ADJUSTMENT, DEFECTS, BREAKDOWNS &amp; REPAIR

No noticeable breakdown occurred during test.

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

## 13.1 Engine :

The Engine and other assemblies were dismantled after 40.96 h of engine operation.

## 13.1.1 Cylinder :

Cylinder bore dia. (mm)						
Top Position		Middle position		Bottom Position		Max. permissible wear limit
Thrust	Non-thrust	Thrust	Non-thrust	Thrust	Non-thrust	
70.03	70.02	70.03	70.02	70.03	70.01	70.25



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13.1.2	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
69.55	69.58	69.97	Not measured due to piston design feature	0.06	--	0.35

### 13.1.3 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	0.34	0.34	0.34	1.0
2 <sup>nd</sup> compression ring	0.48	0.48	0.48	1.0
Oil ring	0.40	0.40	0.40	1.0

### 13.1.4 Big end bearing

Dia. of crank pin(mm)	Dia. of bearing (mm)	Clearance (mm)		Max. permissible wear limit (mm)	
		Diametrical	Axial	Diametrical	Axial
29.98	30.10	0.12	0.80	0.175	0.80

### 13.1.5 Main bearing of crank shaft:

Ball bearing is provided at both ends
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### 13.1.6 Piston Rings side clearance:

Ring No.	Ring side clearance (mm)	Max. permissible wear limit, mm
1 <sup>st</sup> compression ring	0.04	0.40
2 <sup>nd</sup> compression ring	0.03	0.40
Oil ring	0.09	0.40

### 3.1.7 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
5.48	5.48	5.47	5.46	0.01	0.02	0.20	

### 13.2 Valve guides and valve springs

Valve spring stiffness, N/mm :

Inlet valve : 5.25

Exhaust valve : 5.14

Discard limit not specified.

### 13.3 Timing gears

No noticeable defect observed.

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**13.4 Clutch**

No noticeable defect observed.

**13.5 Transmission**

No noticeable defect observed.

**13.6 Rotary drive unit**

No noticeable defect observed.

**13.7 Wear of blades:****13.7.1 Mass basis:**

The wear of the rotary weeder blades was measured after 27.28 hrs. of field operation and the observations are as under:

Sl. No.	Initial mass (g)	mass after 27.28 hrs.(g)	Loss of mass (g)	Percent wear (%)	Percent wear per hour
1	396.4	382.3	14.1	3.56	0.13
2	405.2	389.4	15.8	3.90	0.14
3	396.2	382.1	14.1	3.56	0.13
4	384.9	368.6	16.3	4.23	0.16
5	387.4	375.3	12.1	3.12	0.11
6	353.1	340.8	12.3	3.48	0.13

**14. SUMMARY OF OBSERVATIONS**

S. No.	Characteristics	Declaration	Tolerance (as per IS :13539-2008)	As observed	Whether within the tolerance limit (Yes/No)
1	2	3	4	5	6
<b>14.1</b>	<b>Engine performance test</b>				
i)	Average rated power in rating test, kW	4.0	± 5%	3.17	No
ii)	Specific fuel consumption at average rated power in rating test, g/kwh	310	± 5%	464	No
iii)	Governing test		Tolerance (as per IS :7347-1974)		
	Momentary speed change in percentage of rated speed.	-	For class-1 Governing- 12% (Max) and class-2 governing- 15% (Max)	5.69	Yes
	Permanent change in speed in percentage of rated speed	-	For class-1 Governing- 6% (Max) and class-2 Governing- 10% (Max)	5.13	Yes



<b>14.3</b>	<b>Wear assessment</b>				
i)	Cylinder bore diameter	70.25	---	70.03	Yes
ii)	Clearance between piston & cylinder liner	0.35	---	0.06	Yes
iii)	Ring end gap		---		
	-Top ring	1.0	---	0.34	Yes
	-2 <sup>nd</sup> ring	1.0	---	0.48	Yes
	-oil ring	1.0	---	0.40	Yes
iv)	Ring groove clearance:		---		
	-Top ring	0.40	---	0.04	Yes
	-2 <sup>nd</sup> ring	0.40	---	0.03	Yes
	-Oil ring	0.40	---	0.09	Yes
v)	Clearance of big end bearing :		---		
	-Diametrical	0.175	---	0.12	Yes
	-Axial	0.80	---	0.80	Yes
vi)	Clearance of main bearing		---		
	-Diametrical	--	---	Ball bearing provided	--
	-Crankshaft end float	--			--

<b>14.2</b>	<b>Amplitude of mechanical vibration (microns) at :</b>				
i)	Steering handle grips				
	Left	100 max.	--	2900	No
	Right	100 max.	--	2900	No
ii)	Clutch/brake lever	100 max.	--	1500	No
iii)	Accelerator lever	100 max.	--	2000	No

<b>14.4</b>	<b>Safety requirements</b>	<b>Requirement</b>	<b>Observation</b>	<b>Remark</b>
i)	Provision of guards on moving parts other than rotary	--	Provided	Yes
ii)	Provision of guard for tilling component as per clause 5.2 of IS 15925-2012	--	Provided	Yes
iii)	Location and direction of exhaust emission to be away from the operator	--	Provided	Yes
iv)	Covers on hot parts	--	Provided	Yes
v)	Provision of parking stand with locking	--	Provided	Yes
vi)	Identification of controls	Shall have the direction and/or method of operation clearly identified by durable label or mark	Provided	Yes





vii)	Marking/labels with Advice to read operator's manual Advice Wear eye and ear protection Cautionary information Safety signs near tines Distance warning for bystanders	--	Provided	Yes
viii)	Pertinent instructions	Shall be provided as presented in Annex A of IS:15925-2012	Not provided	No

**14.5 Field test**

No noticeable breakdown occurred during field testing of rotary tiller.

**14.6 Ease of operation and handling**

No noticeable difficulty was faced during the test.

**14.7 Maintenance/service problems**

No noticeable maintenance/service problem observed during the test.

**15. CRITICAL TECHNICAL SPECIFICATION**

(Vide ministry's communication F. No. 9-1/2019-M&T (I&P) Dated 20.08.2019)

Sr. No.	Parameters	Specification	Observation	Remarks
1	Type	Self-propelled, walk behind	Self-propelled, walk behind	Conforms
2	Working width (mm)	300-1500	912 mm	Conforms
3	Type engine	Compression ignition/spark ignition	Spark ignition engine	Conforms
4	Starting method	Manual/recoil/self-starting	Manual/recoil	Conforms
5	Type of clutch	Dry/wet	Wet type	Conforms
6	Type of drive	Belt/ Chain / Gear/ Shaft	Gear type	Conforms
7	Material for rotor shaft	SAE1045 (CRS)/ EN8/ EN9	Not specified	--
8	No. of flanges	2-10	6	Conforms
9	Type of flanges	Square/circular/rectangular	Square	Conforms
10	Distance between consecutive flanges (mm)	24 to 150	120 mm	Conforms
11	No. of blades in each flange	1-6	4	Conforms
12	No. of rotor blade	8 (Min.)	24	Conforms
13	Thickness of rotor blade (mm)	5 (Min.)	5.6 mm	Conforms



14	Material of blade	Boron (28MnCrB5)/ High Carbon Steel of grade EN42j	65Mn (As per applicant)	Conforms
15	Hardness of blade, HRC	38(Min.)	Average- 41.6	Conforms
16	Shape of rotor blade	C/J/L Shape	J shape	Conforms
17	Provision for handle height adjustment	Must be provided	Provided	Conforms
18	Provision for handle rotation	Optional	<b>Not provided</b>	--
19	Provision for emergency stop of engine	Must be provided	<b>Not provided</b>	<b>Does not conform</b>
20	Provision for easy start engine	Must be provided	Provided	Conforms
21	Provision for shield/cover to prevent flying of mud & stone from rotor	Must be provided	Provided	Conforms
22	Depth control mechanism	Must be provided	Provided	Conforms
23	Provision for transport wheels	Optional	Provided	Conforms
24	Provision for cover on exhaust	Must be provided	Provided	Conforms
25	Direction exhaust emission away from operator	Must be provided	Provided	Conforms
26	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	Name and address of manufacturer & applicant and country of origin are not specified	<b>Does not conform in toto</b>
27	Literature	Operator manual, service manual and parts catalogue be provided	Parts catalogue is not provided	<b>Does not conform in toto</b>

## 16. COMMENTS & RECOMMENDATIONS

### 16.1 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 deserved to be given top priority for corrective action.

16.2 Oil filter is not provided in lubrication system. It **MUST** be provided.

16.3 Material of rotor cover and rotor shaft is not specified. **This is critical parameter and therefore, It MUST be specified.**



- 16.4 Provision for emergency stop of engine is not provided. **This is critical parameter and therefore, It MUST be provided.**
- 16.5 Marking/labeling of machine **does not meet the requirement of critical technical specification. It must be looked in toto.**
- 16.6 Specific fuel consumption at average rated power observed is higher than the value of declared by the applicant. It **MUST** be looked into.
- 16.7 The power observed during engine performance test is less than the value declared by the applicant. It **MUST** be looked into.
- 16.8 The capacity of the cylinder is not specified. It **MUST** be specified.
- 16.9 Pertinent instruction is not mentioned. It **MUST** be mentioned.
- 16.10 Hardness of the blade does not conform to IS: 6690-1981. This needs to be looked into for corrective action.
- 16.11 The chemical composition of blades does not conform to as per IS: 6690-1981. This needs to be looked into for corrective action.
- 16.12 The rotor blade is not marked. It **MUST** be marked.

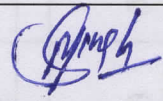
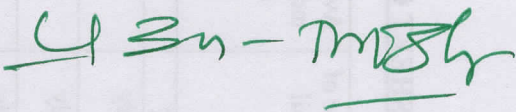
### 17. TECHNICAL LITERATURE

Operator's manual was provided for reference during the testing,

Parts catalogue must be provided.

Operator's manual should be updated as per IS:8132-1999.

### TESTING AUTHORITY

MAAN SINGH SENIOR TECHNICAL ASSISTANT	
P. K. PANDEY DIRECTOR	

### 18. APPLICANT'S COMMENTS

Para No	Our reference	Applicants comment's
18.1	16.1	We will do the corrective actions to decrease the amplitude of mechanical vibration by discussion with manufacturer
18.2	16.2	We will add the oil filter in future machines
18.3	16.3	We will mention it on labeling plate in future machines
18.4	16.4	We will add the emergency stop of engine in future machines
18.5	16.5	We will use the labeling as per requirement in future machines
18.6	16.6	We will take corrective action
18.7	16.7	We will use to mention tested power on labeling plate
18.8	16.8 to 16.9	We will mention it on labeling plate in future machines
18.9	16.10 to 16.12	We will take corrective action.