

व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT

संख्या/ No.: Comb- 249/2777/2022
माह/Month: January, 2022

THIS TEST REPORT VALID UP TO : 31st January, 2029



**SHANDONG WECHAI LOVOL INTERNATIONAL
TRADING CO., LTD, LOVOL RG-108 PLUS,
SELF PROPELLED COMBINE HARVESTER (TRACK
TYPE)**



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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15. FIELD TEST

15.1 The combine harvester was operated in field for 51.02 hours (excluding run in 1.67 h) for paddy harvesting. During the test, available varieties of crop were harvested to assess the field performance of combine with regard to quality of work, rate of work, fuel consumption, safety and soundness of construction etc. The crop and atmospheric conditions during field test are given in **Appendix - II**. The crop parameters recorded during the test for paddy crops is as under:-

Crop Parameters

Sl. No.	Parameters		Observations
			Paddy
1.	Average plant height, cm	:	92 to 135
2.	Average number of tillers/m ²	:	154 to 375
3.	Average length of ear head, cm	:	19 to 29
4.	Average straw/grain ratio	:	1.6 to 4.1
5.	Average moisture, %:		
	- Grain	:	14.5 to 15.5
	- Straw	:	53 to 64

The summary of losses and efficiencies observed during field performance test with paddy crop is summarised in Table 4 and presented in detail in **Appendix - III**

TABLE-4: SUMMARY OF LOSSES & EFFICIENCIES OBSERVED IN FIELD PERFORMANCE TEST

Crop variety	Collectable losses (%) (Max.)	Non-collectable losses (%) (Max.)	Total processing losses (%) (Max.)	Threshing efficiency (%) (Min.)	Cleaning efficiency (%) (Min.)	Grain breakage in main tank (%) (Max)	Forward speed (kmp/h)	Area covered (ha/h)	Fuel consumption		Grain output (kg/h)	Crop through-put (t/h)
									(l/h)	(l/ha)		
1	2	3	4	5	6	7	8	9	10	11	12	13
IR-64 DRT	1.7	1.8	2.2	98.5	98.0	0.43	1.57 to 2.36	0.230 to 0.324	7.26 to 7.51	22.43 to 32.74	1200 to 2530	6.10 to 11.12
MTU-1010	1.4	1.1	2.3	98.7	97.4	0.30	1.83 to 2.74	0.262 to 0.426	7.43 to 8.41	19.20 to 32.07	1737 to 2470	5.03 to 8.09

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15.2 Unloading of grains

The time to unload the grain tank ranged from 79 to 105 seconds in paddy operation.

15.3 Time required for daily maintenance

The average labour required for daily maintenance was approximately two man hours.

15.4 Harvesting of any other crop

Not done, as not recommended.

16. DEFECTS, ADJUSTMENTS, BREAKDOWNS AND REPAIRS

No noticeable defect or breakdown was observed during the test.

17. INSPECTION AND ASSESSMENT OF WEAR

	The engine and other assemblies were dismantled after 71.84 hours of engine operation.						
17.1	Engine						
17.1.1	Cylinder bore						
Cylinder No.	Cylinder bore dia. (mm)						Max. permissible wear limit (mm)
	Top position		Middle position		Bottom position		
	Thrust side	Non-thrust side	Thrust side	Non-thrust side	Thrust side	Non-thrust side	
1.	98.03	98.01	98.02	98.02	98.02	98.02	98.15
2.	98.05	98.02	98.05	98.01	98.04	98.01	
3.	98.04	98.00	98.04	98.01	98.03	98.01	
4.	98.03	98.00	98.03	98.00	98.02	98.00	

17.1.2 Piston

Piston No.	Piston dia. (mm)				Clearance between cylinder liner and piston (mm)	
	Top position		At skirt		Observed	Discard limit
	Thrust side	Non-thrust side	Thrust side	Non-thrust side		
1.	96.840	96.805	97.885	Not measured due to piston design constraint	0.165	0.25
2.	96.919	96.790	97.885		0.165	
3.	96.815	96.855	97.899		0.141	
4.	96.815	96.819	97.902		0.128	

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18. SUMMARY OF OBSERVATIONS

18.1 Engine Performance Test:

Brake Power KW	Engine speed (rpm)	Fuel consumption			Specific energy, kWh/l
		l/h	kg/h	Specific, kg/ kWh	
(1)	(2)	(3)	(4)	(5)	(6)
i) Maximum power – Two hour test:					
70.60	2350	19.03	15.72	0.222	3.71
ii) Power at rated engine speed: (2400 rpm)					
70.45	2400	19.30	15.94	0.226	3.65

Table2- : ENGINE TEST (HIGH AMBIENT)

Brake Power (kW)	Engine speed (rpm)	Fuel consumption			Specific energy, kWh/l
		l/h	kg/h	Specific, kg/ kWh	
(1)	(2)	(3)	(4)	(5)	(6)
a) Maximum power-					
69.4	2350	19.22	15.73	0.226	3.61
b) Power at rated engine speed: (2400 rpm)					
68.6	2400	19.37	15.85	0.237	3.54

18.2 Field Test:

18.2.1 Summary of field tests:

The results of the field test are summarized below:

S. No.	Parameters	Observed Range Paddy harvesting
1.	Average speed of operation (kmph)	1.57 to 2.74
2.	Average area covered (ha/h)	0.230 to 0.426
3.	Average fuel consumption:	
	- (l/h)	7.26 to 8.41
	- (l/ha)	19.20 to 32.74
4.	Average of maximum crop throughput (t/h)	5.03 to 11.12
5.	Average of maximum grain breakage in main grain outlet (%)	0.15 to 0.43
6.	Average of maximum header losses (%)	0.19 to 0.71
7.	Average of maximum total non-collectable losses (%)	0.4 to 1.8
8.	Average of maximum total collectable losses (%) (unthreshed + broken from main outlet)	0.8 to 1.7
9.	Average of maximum total processing losses (%)	1.1 to 2.3
10.	Average of minimum threshing efficiency (%)	98.5 to 99.5
11.	Average of minimum cleaning efficiency (%)	97.4 to 98.0

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18.3 Conformity to Indian Standard

- | | | |
|-------|--|---------------------------------|
| (i) | IS: 6025-1982 (Reaffirmed 2014)-Specification for knife section for harvesting machine. | Does not conform in toto |
| (ii) | IS: 6024-1983 (Reaffirmed 2014)-Specification for guards for harvesting machines. | Does not conform in toto |
| (iii) | IS: 10378-1982 (Reaffirmed 2016)-Specification of knife back for harvesting machine. | Does not conform in toto |
| (iv) | IS: 6283 (Part-I)-2006 & IS: 6283 (Part-II) (Reaffirmed 2014)-Tractor and machinery for agriculture and forestry, powered lawn and garden equipment-symbol for operator controls and other displays. | Conforms |
| (v) | IS: 8133-1983 (Reaffirmed 2014)-Guidelines for location & operation of operator controls on agricultural tractors and machinery. | Conforms |
| (vi) | IS:15806-2018-Combine Harvester- Recommendations on Selected Performance and Other Characteristics. | Conforms |

19. SELECTED PERFORMANCE AND OTHER CHARACTERISTICS

19.1 Acceptance criteria for performance characteristics as per clause 4.1 of IS 15806:2018						
S. No	Characteristics	Category (Evaluative/Non evaluative)	Requirement (R) Declaration (D)	Tolerance	Observed	Remarks
1	2	3	4	5	6	7
I. Prime mover performance						
a)	Max. power (absolute) average max. power observed during 2 h. Max. power test in natural ambient condition, kW	Evaluative	73.6 (D)	±5% of declared value	70.6	Conforms
b)	Max. power observed during test after adjusting the no load engine speed as per recommendation of the manufacturer for field work, kW	Evaluative	73.6 (D)	±5% of declared value	70.6	Conforms



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1	2	3	4	5	6	7
c)	Power at rated engine speed, kW (under natural ambient condition)	Non-evaluative	73.8 (D)	±5% of declared value	70.4	Conforms
d)	Specific fuel consumption corresponding to average maximum power under 2 h maximum power test, g/kWh.	Evaluative	253 (D)	+5% of declared value	222.7	Conforms
e)	Max. Smoke density (Bosch no.) at 80% load between the speed at max. Power & 55% of speed at max. Or 1000 rpm whichever is higher	Evaluative	As per central motor vehicles rules (CMV) rules (R)	Nil	1.732 m ⁻¹	Conforms
f)	Max. Crank shaft torque, (Nm) observed during the test after no load engine speed is adjusted as per manufacture's recommendation for field work	Evaluative	307.2 (D)	±8% of declared value	315.9	Conforms
g)	Back up torque, %	Evaluative	7 % min.(R)	Nil	9.1	Conforms
h)	Max. Operating temperature, 0C i) Engine oil ii) Coolant	Evaluative	i) 125 (D) ii) 115 (D)	Should not exceed the declared value	i) 102.3 ii) 88.8	Conforms
i)	Lubrication oil consumption, g/kWh	Evaluative	1 % of SFC at maximum power (high ambient) (R) (Max.2.26)	Nil	0.272	Conforms

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1	2	3	4	5	6	7
II. Brake performance at 24 km/h or maximum speed whichever is less						
a)	Max. Stopping distance at a force equal to or less than 600 N on brake pedal (m)- (cold brake and hot brake)	Evaluative	As per requirement of CMVR (R)	--	Not applicable as hydrostatic transmission does not require any separate/ regular conventional brake system.	--
b)	Effectiveness of parking brake at a force of 600 N at foot pedal or 400 N at hand lever	Evaluative	As per requirement of CMVR (R)	--	Effective	Conforms
III. Mechanical vibration						
a)	Operator's platform	Non evaluative	120 µm max. (R)	Nil	832	Does not conform
b)	Steering control wheel	Non evaluative	150 µm max (R).	Nil	711	Does not conform
c)	Seat with driver seated	Non evaluative	120 µm max. (R)	Nil	623	Does not conform
IV. Air cleaner oil pull over						
a)	Air cleaner oil pull over in % when tested in accordance with IS 8122 part (II) 2000	Evaluative	0.20 max. (R)	Nil	Dry type air cleaner provided hence test is not applicable	Not applicable
V. Noise measurement						
a)	Max. ambient noise emitted by combine at by standers position dB (A)	Evaluative	As per CMV rules (R)	Nil	86.9	Conforms
b)	Max. noise at operator's ear level dB (A)	Evaluative	As per CMV rules (R)	Nil	97.7	Conforms



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1	2	3	4	5	6	7
VI. Header lifting Test						
a)	Satisfactory completion of header lifting test	Evaluative	-	Nil	Satisfactory completed	Conforms
VII. Discard limit						
a)	Cylinder bore diameter, mm	Evaluative	98.15 (D)	Should not exceed the values declared by the manufacture	98.05	Conforms
b)	Piston diameter, mm	Evaluative	97.7 (D)	-do-	97.9	Conforms
c)	Piston to cylinder liner clearance at skirt, mm	Evaluative	0.25 (D)	-do-	0.165	Conforms
d)	Ring end gap, mm i) Top compression ring ii) 2 nd compression ring iii) Oil ring	Evaluative	i) 1.20 (D) ii) 1.20 (D) ii) 1.20 (D)	-do-	i) 0.50 ii) 0.60 ii) 0.45	Conforms
e)	Ring groove clearance, mm 1. Top compression ring 2. 2 nd compression ring 3. Oil ring	Evaluative	i) 0.30 (D) ii) 0.30(D) ii) 0.30(D)	-do-	i) Tapered ii) 0.075 ii) 0.049	Conforms
f)	Diametrical and axial clearance of big end bearing, mm Diametrical Axial	Evaluative	0.40(D) 0.80(D)	-do-	0.07 0.30	Conforms
g)	Diametrical and axial clearance of main bearings, mm Diametrical Crank shaft end float	Evaluative	0.40(D) 0.80(D)	-do-	0.08 0.25	Conforms
h)	Thickness of brake lining, mm	Evaluative	--	-do-	Not applicable	--

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1	2	3	4	5	6	7
i)	Thickness of clutch plate, mm	Evaluative	--	-do-	Not applicable	--
VIII. Field performance						
a)	Suitability for crops	Evaluative	Wheat & paddy (Wheel type) Paddy (Track type)	Nil	Applicant recommended to test in paddy crop only	Conforms
b)	Average processing losses (%)	Evaluative Rice	Average 4% (R)	Nil	2.3 % (Max. average)	Conforms
c)	Threshing efficiency	Evaluative	≥98 percent (R)	Nil	98.5 % (Min. average)	Conforms
d)	Cleaning efficiency	Evaluative	≥96 percent (R)	Nil	97.4 % (Min. average)	Conforms
e)	Grain breakage in main grain tank	Evaluative	≤ 2.5 percent (R)	Nil	0.43 % (Max. average)	Conforms
f)	Non collectable losses	Evaluative	l) ≤ 2.5 percent (R)	Nil	1.8 % (Max. average)	Conforms
IX. Safety requirement						
a)	Guards against all moving parts/ drives and hot parts	Evaluative	Belt and chain drives, pulleys hydraulic pipes (Around operators work place) (R)	--	Provided	Conforms
b)	Lighting arrangement	Evaluative	As per CMVR (R)	-	Provided	Conforms
c)	Grain tank cover	Evaluative	Essential	-	Provided	Conforms
d)	Spark arrester in engine's exhaust in case naturally aspirated engine	Evaluative	Essential (R)	-	Turbo charger provided in exhaust system	Not applicable

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1	2	3	4	5	6	7
e)	Stone trap before concave bars	Evaluative	Essential (R)	-	Provided	Conforms
f)	Rear view mirror	Evaluative	Essential (R)	-	Provided	Conforms
g)	Fire extinguisher	Evaluative	Essential (R)	-	Provided	Conforms
h)	Slip clutch at following drives –					
	i) Cutting platform	Evaluative	Essential (R)		Provided	Conforms
	ii) Undershot conveyor drive	Non evaluative	Optional		Provided	Conforms
	iii) Grain & tailing elevator	Non evaluative	Optional		Sensor provided	Conforms
i)	Anti slip surfaces at operator platform & ladder & proper gripping for the control levers.	Evaluative	Essential(R)	-	Provided	Conforms
j)	Working clearance around the controls	Non evaluative	Essential 70 mm, min (R)	-	Provided	Conforms
k)	Labelling of control and gauges	Evaluative	Essential	-	Provided	Conforms
XI	Material of construction :					
i)	Knife guard should conform to IS: 6024 -1983	Non evaluative	Should have maximum hardness 163 HB	-	226 (Average)	Does not conform

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1	2	3	4	5	6	7
ii)	Knife blade As per IS :6025 - 1982	Non evaluative	It must have Chemical composition as C=0.70-0.95 % Mn= 0.30-0.50%	-	C0.54 Mn= 0.8584	Does not conform Does not conform
iii)	Knife back should meet the requirement of IS:10378-1982	Non evaluative	The knife back shall be manufactured from Carbon Steel having minimum carbon content of 0.35 %	--	C=0.20	Does not conform

18.2 Acceptance criteria in case of Breakdowns/Defects as per clause 4.2 of IS:15806-2018

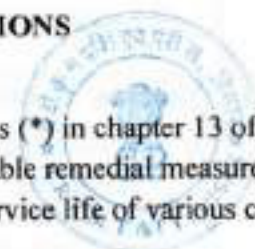
XVII. Break down (critical, major & minor)

Sr. No.	Category of breakdowns	Category (Evaluative/ Non evaluative)	Requirements as per OM	As observed	Whether meets the requirements (Yes/No)
1.	Critical	Evaluative	No critical breakdown	None	Yes
2.	Major	Evaluative	Not more than two and neither of them should be repetitive in nature	None	Yes
3.	Minor	Evaluative	Not more than five and frequency of each should not be more than two	None	Yes
4.	Total breakdown	Evaluative	In no case total no of (major + minor) breakdowns exceed five	None	Yes

20. COMMENTS AND RECOMMENDATIONS

20.1 Mechanical vibration

The amplitude of mechanical vibration of components marked as (*) in chapter 13 of this test report are observed on higher side. This calls for providing suitable remedial measures to dampen the vibration in order to improve the operational comfort and service life of various components & sub-assemblies.



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20.2 Field performance test

No noticeable defect and breakdown observed during operation of combine harvester.

20.3 Ease of operation and safety provisions

i) No noticeable difficulties observed during operation of combine harvester.

20.4 Hardness and chemical composition

Hardness & chemical composition of knife blade and knife guard are not within the limit specified in relevant standards. It should be looked into for corrective action at regular production level.

20.5 The discard limit for spring stiffness is not provided by the applicant it should be provided.

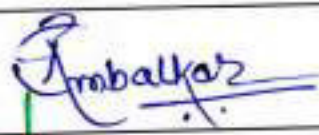

20.6 Literature supplied with the machine.

The following literatures are provided by the applicant during the test.

- i) Service manual cum operator's manual
- ii) Spare part catalogue
- iii) Engine spare parts catalogue

20.7 The service manual & operator manual provided in single manual named as service manual. Separate service manual and operator manual should prepared with model name RG-108 PLUS on front page and literature needs to be updated as per 8132-1999

TESTING AUTHORITY

G.R AMBALKAR AGRICULTURAL ENGINEER	
Dr. MUKESH JAIN DIRECTOR	 19.01.2022

Draft test report compiled by: V.S. Shinde, Sr. Technical Assistant

21. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant comments
21.1	20.1	We will take corrective action in our further production
21.2	20.4	We will provide knife blade and guard with prescribed chemical composition and hardness
21.3	20.7	We will provide operator's manual and service manual separately and update it as per IS code