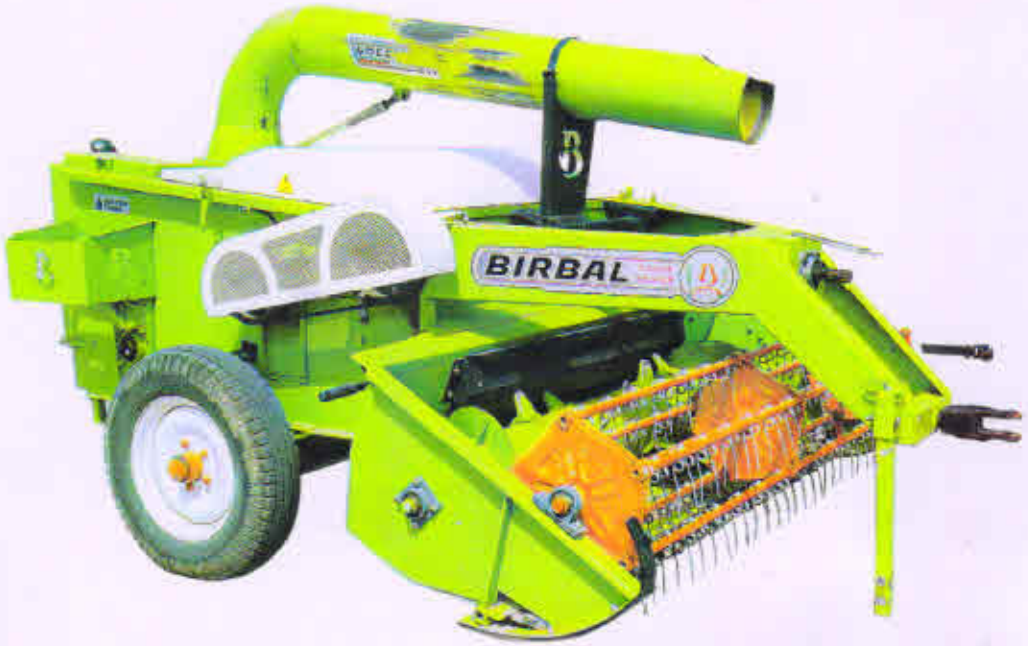
व्यावसायिक परीक्षण रिपोर्ट

COMMERCIAL TEST REPORT

संख्या/ **No.: SR.Comb- 150/2708/2021**

माह/**Month: July, 2021**

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



BIRBAL, BSR
STRAW REAPER COMBINE

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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6. LABOTATORY TESTS

Material analysis: The hardness and chemical analysis with respect to critical components are given in Table-3 & 4 respectively.

Table-3 : Hardness of critical parts :-

S. No.	Component	Material	Average Hardness observed (HRC)	
			Hardened zone	Remainder zone
1	Cutter bar blade	High carbon steel	55.9	32.6
2	Knife guard	High carbon steel	194.7 (HB)	
3	Knife back	Mild carbon steel	206.7 (HB)	
4	Chopping cylinder blade	High carbon steel	58.5	32.6
5	Concave blade	High carbon steel	60.3	27.4

Table-4 : Chemical analysis of critical components

S. No.	Component	Primary element(%) by weight				
		Carbon	Manganese	Silicon	Phosphorous	Sulphur
1	Knife blade	0.528	0.604	0.293	0.011	0.050
2	Knife guard	0.313	0.710	0.386	0.018	0.053
3	Knife back	0.184	0.532	0.196	0.033	0.062
4	Chopping cylinder blade	0.398	0.541	0.575	0.000	0.051
5	Concave blade	0.534	0.563	0.328	0.010	0.048

7. FIELD TEST

The straw reaper combine was operated with Swaraj 963 tractor at engine throttle setting corresponding to 540 rpm tractor PTO and was tested in the field for 38.45 (including running-in 1.64) hours for reaping of left over straw & stubbles after wheat harvesting by grain combine harvester. During tests field performance of straw reaper combine was assessed with regard to quality of work, rate of work, fuel consumption, safety and soundness of construction etc. The crop parameters, atmospheric conditions and performance parameters as observed during field tests are also given in **Annexure-I & II** and summarized in Table-5 & 6.

Table-5 : Summary of field crop conditions

S. No.	Parameters	Range of parameters
1.	No. of tillers, per m^2	215 to 390
2.	Manually recovered straw, before straw reaping (loose + stubbles) g/m^2	409.12 to 561.05
3.	Moisture content of straw, %	9.0 to 16.0
4.	Manually recovered straw after straw reaping, g/m^2	75.00 to 113.33
5.	Height of stubbles before harvesting, mm	250 to 370
6.	Height of stubbles after harvesting, mm	50 to 100
7	Straw recovery t/ha t/h	 3.17 to 4.86 0.82 to 1.20

Table -6 : Summary of field performance test

S. No.	Observations	Range of observations
1.	Speed of operation, kmph	1.45 to 1.52
2.	Width of cut, m	1.97 to 2.00
3.	Overlap, %	1.96 to 3.43
4.	Rate of work, ha/h	0.248 to 0.260
5.	Fuel consumption l/h l/ha	 5.10 to 6.20 20.55 to 23.99
6.	Average length of straw, mm	16.24 to 19.88
7.	Straw split, %	89.70 to 92.40
8.	Straw recovery, %	77.43 to 86.63
9.	Grain recovery, %	56.19 to 69.97

7.1 Ease of operation

No noticeable problem was observed during operation of straw reaper.

7.2 Quality of wheat straw: Satisfactory for animal feed.

7.3 Labour requirements

One man hour was required for daily maintenance of tractor and straw reaper. One skilled operator is needed to operate tractor with straw reaper. Extra labourers are required for transportation & handling of bhusa collected.

8. WEAR OF CRITICAL COMPONENTS

The wear of serrated blades of cutter bar, chopping cylinder and concave was measured after completion of 38.45 hours of wheat straw harvesting.

Percentage wear on mass basis were computed and the results are given below in Table - 7

Table-7: Wear assessment of blades on mass basis

7.1 Concave blade

Sr. No.	Concave		
	Mass before test (g)	Mass after test (g)	Wear (%)
1	91.40	91.18	0.24
2	92.30	92.25	0.05
3	92.10	92.00	0.11
4	90.20	90.10	0.11

7.2 Chopping cylinder

Sr. No.	Chopping cylinder		
	Mass before test (g)	Mass after test (g)	Wear (%)
1	69.70	69.68	0.03
2	69.00	68.82	0.26
3	68.30	68.02	0.37
4	69.67	69.64	0.04
5	69.50	69.49	0.01
6	69.48	69.46	0.03

7	69.00	68.85	0.22
8	68.80	68.78	0.03
9	69.90	69.79	0.16
10	70.50	70.40	0.14
11	69.30	69.20	0.14
12	70.10	70.00	0.14
13	69.50	69.43	0.10
14	69.90	69.60	0.43
15	74.40	74.30	0.13
16	68.50	68.45	0.07

Wear of concave & chopping cylinder blade on mass basis has ranged from 0.05 to 0.24 % and 0.03 to 0.43 % respectively.

9. SOUNDNESS OF CONSTRUCTION

No noticeable breakdown was observed during 38.45 hours of field operation.

10. CRITICAL TECHNICAL SPECIFICATION

(Vide Ministry's communication No 13-9/2019 M &T (I & P) dated 26.04.2019)

Sl. No.	Parameters	Specifications	Observation	Remarks
1.	Towing hook type	Clevis/Circular	Clevis	Conforms
2.	Power input shaft connection to tractor PTO	Propeller shaft with universal joint	Provided	Conforms
3.	Cutting Width, mm	1500 to 2500	2330	Conforms
4.	Speed of chopping cylinder, rpm	800 to 1000	860	Conforms
5.	Chopping cylinder dia. mm	700 to 900	787	Conforms
6.	PTO drive shaft	Compliant with BIS code		
	- Safety against overload	Must be provided	**Not provided**	**Does not conform**
	- Guard in shaft	Must be provided	**Not provided**	**Does not conform**
7.	Safety cover in all drive	Must be provided	Provided	Conforms
8.	Chopping cylinder blade	Serrated	Provided	Conforms
9.	Material of blade and ledger plate	High carbon steel EN 42 J& EN 44	**Not specified**	**Does not conform**
10.	Hardness if blade and ledger plate, HRC	36 and 45 (Min.)	55.87	Conforms
11.	Provision for concave clearance adjustment	Must be provided	Provided	Conforms
12.	Provision of grain recovery	Must be provided	Provided	Conforms

13.	Reel type	Pick up tine	Pick up tine	Conforms
14.	Diameter of tine bar, mm	20 (Min.)	27	Conforms
15.	Arrangement for forward & backward movement of reel	Must be provided	Provided	Conforms
16.	Labelling of lubricating points	Must be provided	Provided	Conforms
17.	Marking/labelling of machine	The labelling plate should be riveted on the body of machine having name & address of manufacturer, serial number, size, required size of prime mover (kW/HP)	Provided	Conforms
18.	Literature	Operator manual, service manual & parts catalogue should be provided	Provided	Conforms

11. COMMENTS & RECOMMENDATIONS

10.1 Safety device in feeding platform auger drive is not provided. It **MUST** be provided.

10.2 **Visual observations and provision for adjustments**

i) The provision for following adjustment on straw reaper is not provided. It should be provided.
   a) Adjustment of air displacement.

ii) PTO drive shaft safety against overload and guard in shaft is not provided. It **MUST** be provided.

iii) Material of blade and ledger plate is not specified. It **MUST** be specified.

12. TECHNICAL LITERATURE

The following manuals are provided during the test:

i) Operator cum service manual.
ii) Parts catalogue

The operator cum service manual of machine should be updated as per IS: 8132-1999.

TESTING AUTHORITY

Er. G.R. AMBALKAR AGRICULTURAL ENGINEER	Ambalkar
Dr. MUKESH JAIN **DIRECTOR**	09.07.2021

Draft test report compiled by: Er. Dharmendra Kumar, Technical Assistant

13. APPLICANT'S COMMENTS

We will take corrective action in our future production.