

व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT

संख्या / No. : IMP- 582/1459
माह / Month : December, 2012



**STRAW REAPER COMBINE
“ANAND-761”**



सत्यमेव जयते

भारत सरकार
कृषि मंत्रालय
(कृषि एवं सहकारिता विभाग)

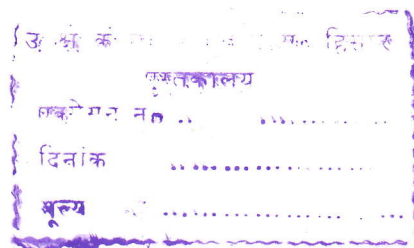
GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE
(DEPARTMENT OF AGRICULTURE & COOPERATION)

उत्तरी क्षेत्र कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान
ट्रैक्टर नगर, सिरसा रोड, हिसार -125001 (हरियाणा)

NORTHERN REGION FARM MACHINERY TRAINING AND TESTING INSTITUTE
TRACTOR NAGAR, SIRSA ROAD, HISAR-125001 (HARYANA)

Telephone : 01662- 276824, 276172
Website : <http://nrfmtti/dacnet.nic.in>

Telefax No. : 01662-276984
E-Mail : fmti-nr@nic.in



IMP- 582/1459	STRAW REAPER-COMBINE "ANAND -761"	COMMERCIAL (ICT)	11
---------------	--------------------------------------	---------------------	----

7. LABOTATORY TESTS :

Material Analysis : The hardness & chemical analysis of critical components of straw reaper are given in table 3 & 4

Table-3 : Hardness of critical components :-

S.No.	Component/Blades	Material	Hardness observed (HRC)	
			Hardened zone	Remainder zone
1	Cutter bar	High carbon steel	53	39
2	Knife guard	High carbon steel	28	28
3	Chaffer cylinder	High carbon steel	49	41
4	Concave	High carbon steel	47	34



Table-4 : Chemical analysis of critical components

S.No	Component/Blades	Primary element (% by weight)				
		Carbon	Manganese	Silicon	Phosphorous	Sulphur
1	Cutter bar	0.71	0.74	0.19	0.011	0.004
2	Knife guard	0.23	0.52	0.15	0.054	0.055
3	Chaffer cylinder	0.71	0.70	0.24	0.011	0.003
4	Concave	0.73	0.73	0.24	0.011	0.003

8. FIELD TEST

The straw reaper fitted with HMT -5911 tractor at engine throttle setting corresponding to 1650 rpm was tested in the field for 37.42 hours for reaping of left over straw & stubbles after harvesting by grain combine harvester. The tractor front was fitted with a wire mesh box type structure to prevent dust deposition on radiator. During tests field performance of straw reaper 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-II & III and summarized in Table-5 & 6. The detail of the tractor used for field operation are given in Annexure-I

Table-5 : Summary of field crop conditions

S.No.	Parameters	Range of parameters
1.	Plant population, No./m ²	289 to 425
2.	Available straw, kg/m ²	0.476 to 0.905
3.	Moisture content of straw, %	7.8 to 8.0
4.	Loose straw per square meter, kg	0.182 to 0.648
5.	Height of stubbles before harvesting, mm	286 to 306
6.	Height of stubbles after harvesting, mm	88 to 104
7.	Straw mass density recovered manually at 8% moisture and at a height of 35 mm, kg/m ²	0.031 to 0.041

NORTHERN REGION FARM MACHINERY TRAINING & TESTING INSTITUTE, HISSAR

IMP- 582/1459	STRAW REAPER-COMBINE “ ANAND -761”	COMMERCIAL (ICT)	12
---------------	---------------------------------------	---------------------	----

Table -6 : Summary of field performance test

S.No.	Observations	Range of observations
1.	Speed of operation, kmph	1.72 to 1.83
2.	Width of cut, m	1.92 to 2.00
3.	Overlap percent	2.44 to 6.34
4.	Rate of work, ha/h	0.30 to 0.35
5.	Fuel consumption	
	l/h	4.28 to 6.67
	l/ha	13.82 to 22.21
	l/tonne	1.80 to 4.76
6.	Power consumption, kW (Ps)*	19.8(26.9) to 27.0(36.7)
7.	Average length of straw, mm	18.6 to 23.9
8.	Straw split percent	95.3 to 98.0
9.	Straw recovery percent	77.3 to 85.9
10.	Grain recovery percent	33.1 to 59.6
11.	Awn recovery, %	N.R.

* Based on fuel consumption of tractor

8.1 Quality of work :

It refers to average length of straw, split straw, straw recovery percentage, dust and awn percentage in wheat straw produced by straw combine. Average length of straw ranged from 18.6 to 23.9 mm. Straw split & straw recovery percentage ranged from 95.3 to 98.0 & 77.3 to 85.9% respectively. Recovery of grain from the left over wheat straw in field by straw reaper combine ranged from 33.1 to 59.6 %.

8.2 Rate of work:

Rate of work of straw reaper combine consists of two main points: (a) Area covered per unit, time and (b) straw recovery. Area covered ranged from 0.30 ha/h to 0.35 ha/h. Overlap percentage ranged from 2.44 to 6.34%. Fuel consumption of tractor to operate the straw reaper combine combination (reaper and tractor trolley) ranged from 4.28 to 6.67 l/h. Power required to operate straw reaper combine is 19.8(26.9) to 27.0(36.7) kW (Ps).

9. EASE OF HANDLING DURING OPERATION.

No specific problem was observed in handling during operation of straw reaper.

10. LABOUR REQUIREMENTS.

Prior to each test, one man hour was required for daily maintenance of tractor and straw reaper for operation, Otherwise one skilled operator is needed to operate tractor with straw reaper. Additional man hours are required for handling and transportation of straw.

IMP- 582/1459	STRAW REAPER-COMBINE “ ANAND -761”	COMMERCIAL (ICT)	14
---------------	---------------------------------------	---------------------	----

Wear of cutter bar, concave & chaffer cylinder blade on mass basis has ranged from 1.52 to 5.95% , 0.15 to 0.29% and Nil to 1.59% respectively whereas the wear on dimensional basis are as follows:-

Blade component	Lengthwise (%)	At tip (%) .	At 50 mm from base (%)
Cutter bar	0.06 to 1.31	7.30 to 9.59	0.42 to 5.33
Concave	0.06 to 0.31	0.53 to 4.19	0.85 to 2.73
Chaffer cylinder	0.06 to 0.68	0.56 to 10.19	1.02 to 3.73

13 SOUNDNESS OF CONSTRUCTION

No breakdown was observed during 37.42 hrs. of field operation under test.

14 SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS:

14.1. Rate of work and fuel consumption:

On the basis of field tests, output of the machine varied from 0.30 to 0.35 ha/h. The forward speed of tractor HMT -5911 varied from 1.72 to 1.83 kmph in L-1 gear. Fuel consumption of tractor varied from 4.28 to 6.67 l/h, 13.82 to 22.21 l/ha & 1.80 to 4.76 l/tonne.

14.1.2 Quality of work:

Quality of straw is expressed in terms of split straw, straw recovery percentage and length of straw. The split straw & straw recovery percentage was observed as 95.3 to 98.0 % & 77.3 to 85.9 % respectively. The average length of straw observed from 18.6 to 23.9 mm. The grain recovery was from 33.1 to 59.6 %.

14.3 COMMENTS AND RECOMMENDATIONS:

1. Quality of wheat straw was observed to be satisfactory and is considered to be satisfactory as animal feed.
2. It is recommended to incorporate the safety device in drive shaft.
3. It is recommended to have safety guards on belt pulley of transmission system
4. The straw split percentage, straw recovery were observed from 95.3 to 98.0% and 77.3 to 85.9 % . which is normal.
5. Hardness of cutter bar, concave and chaffer cylinder blade has observed as 39 to 53, 34 to 47 and 41 to 49 HRC at remainder & hardened zone respectively.
6. Chemical analysis of blades are given in table-4 of the test report.
7. An identification plate should be provided on each unit at regular production level.
8. The safety devices should be provided in power transmitted to propeller shaft, chopping drum, knife blade etc. and V belt and pulley system should be fully covered. This needs to be looked into at regular production level.

IMP- 582/1459	STRAW REAPER-COMBINE " ANAND -761"	COMMERCIAL (ICT)	15
---------------	---------------------------------------	---------------------	----

9. The total pto power consumption has been observed as 55.0 to 75.0 % of the rated pto power of tractor.

15. LITERATURE

A literature in form of booklet was provided with machine. It is recommended to modify it as per IS: 8132-1983 for guidance of users & service personnel.

TESTING AUTHORITY



(R. M. TIWARI) ASSISTANT ENGINEER (W/S)	
(P. K. CHOPRA) SENIOR AGRICULTURAL ENGINEER	
(A. N. MESHARAM) DIRECTOR	

Test report compiled by Sh. B.N. Dixit (S.T.A.)

APPLICANT'S COMMENT

Received and added