व्यावसायिक परीक्षण रिपोर्ट

COMMERCIAL TEST REPORT

संख्या/ **No.: COMB-223/2641/2021**

माह/**Month: January, 2021**

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

SURINDERA 930 LEOPARD, SELF PROPELLED COMBINE HARVESTER

सत्यमेव जयते

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

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15. FIELD TEST

15.1 Combine harvester was operated in field for 26.78 and 33.06 hours for wheat and paddy harvesting respectively. 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 & IV** respectively.

The crop parameters recorded during the test for all crops are as under:-

Crop Parameters

Sl. No.	Parameters		Observations	
			Wheat	Paddy
1.	Average plant height, cm	:	100 to 106.5	89 to 157
2.	Average number of tillers/m^2	:	401 to 457	196 to 353
3.	Average length of ear head, cm	:	10.9 to 11.6	23 to 32
4.	Average straw/grain ratio	:	1.1 to 1.3	0.6 to 1.4
5.	Average moisture, %			
	- Grain	:	9.5 to 11	16.3 to 17.3
	- Straw	:	8.5 to 9.5	58.3 to 71.1

The results of field performance test of wheat and paddy crops harvesting are summarised in Table – 5 and presented in detail in **Appendix – II to V.**

Table- 5 : SUMMARY OF LOSSES & EFFICIENCIES OBSERVED DURING 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 grain tank (Max.) (%)	Forward speed (kmph)	Area covered (ha/h)	Fuel consumption		Grain out put (kg/h)	Crop through-put (t/h)
									(l/h)	(l/ha)		
1	2	3	4	5	6	7	8	9	10	11	12	13
WHEAT												
HD-3237	1.6	0.9	2.1	99.1	97.6	1.10	1.86 to 1.96	0.608 to 0.629	7.54 to 7.94	12.0 to 13.06	3901.52 to 3986.54	8.24 to 8.97
WH-1105	2.0	0.8	2.4	98.9	97.5	1.06	1.75 to 1.80	0.523 to 0.575	7.95 to 8.26	13.82 to 15.32	3553.27 to 3920.61	8.21 to 8.74
PADDY												
Basmati -1509	2.5	2.1	3.6	98.5	96.0	1.03	1.66 to 1.71	0.403 to 0.470	6.30 to 8.23	15.63 to 17.52	2732.03 to 3382.53	6.50 to 6.91
ND 359	1.9	0.7	2.2	98.8	96.2	0.72	1.70 to 1.74	0.434 to 0.460	8.02 to 8.33	17.39 to 19.19	2566.96 to 4911.33	5.62 to 7.90
Basmati - 17, 18	0.9	0.6	1.4	99.4	96.9	0.33	1.74	0.465	8.40	18.05	3939.70	7.77

b)	Peg teeth of concave		
1	217.2	216.1	0.51
2	213.2	212.2	0.47
3	215.0	214.0	0.46
4	216.1	215.1	0.46
5	215.5	215.2	0.14
6	216.4	215.7	0.32
7	214.9	214.4	0.23
8	217.8	216.9	0.41

18. SUMMARY OF OBSERVATIONS

18.1 ENGINE PERFORMANCE TEST

Table-1 : ENGINE PERFORMANCE TEST (NATURAL 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 – 2 hours test					
73.8	2299	21.87	18.05	0.245	3.37
b) Power at rated engine speed: (2200 rpm)					
73.1	2199	21.87	18.04	0.247	3.34

***High idle at no load was 1650 rpm recommended for field operation.**

Table-2 : 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 -					
71.6	2299	21.92	17.93	0.250	3.27
b) Power at rated engine speed (2200 rpm)					
71.2	2199	21.51	17.62	0.247	3.31

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	
		Wheat harvesting	Paddy harvesting
1.	Range of average speed of operation (kmph)	1.75 to 1.96	1.66 to 1.74
2.	Range of average area covered (ha/h)	0.523 to 0.629	0.403 to 0.470
3.	Maximum average fuel consumption: - (l/h) - (l/ha)	 7.54 to 8.26 12.0 to 15.32	 6.30 to 8.40 15.63 to 19.19
4.	Range of average crop throughput (tonne/h)	8.21 to 8.97	6.50 to 7.90
5.	Average of maximum grain breakage in main grain outlet (%)	1.10	1.03
6.	Average of maximum header losses (%)	0.49	0.95
7.	Average of maximum total non-collectable losses (%)	0.9	2.1
8.	Average of maximum total collectable losses (%) (un threshed + broken from main outlet)	2.0	2.5
9.	Average of maximum total processing losses (%)	2.4	3.6
10.	Average of minimum threshing efficiency (%)	98.9	98.5
11.	Average of minimum cleaning efficiency (%)	97.5	96.0
Performance of straw chopper cum spreader			
12	Uniformity of straw spread, CV	--	19.2
13	Weighted mean size of chopped straw, cm	--	11.1

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 & Part II)-2007(Reaffirmed 2014)-Tractors and machinery for agriculture and forestry-symbol for operator controls and other displays.	:	**Does not conform in toto**
(v)	IS: 8133-1983 (Reaffirmed 2014)-Guidelines for location & operation of operator controls on agricultural tractors and machinery.	:	**Does not conform in toto**
(vi)	IS: 15806-2018 (Combine Harvester recommendation on selected performance and other characteristics)	:	**Does not conform in toto**

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. CRITICAL TECHNICAL SPECIFICATIONS

Deferred till 31.03.2021 vide Ministry O.M. No 13-13/2020 M&T, (I&P) dated 22.12.2020

21. COMMENTS AND RECOMMENDATIONS

21.1 Mechanical vibration

The amplitude of mechanical vibration of components marked as (*) in chapter 13 of this 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.

21.2 Field performance test

No noticeable defect observed during field test.

21.3 Ease of operation and safety provision

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

ii) Slip clutch at grain and tailing elevator drive are not provided. It **MUST** be provided as per the requirement of IS 15806 : 2018

iii) The first aid box is not provided on machine. It **MUST** be provided.

21.4 Discard limit of piston diameter is not specified. It **MUST** be specified.

21.5 Discard limit of thickness of brake lining is not specified. It **MUST** be specified.

21.6 Discard limit of thickness of clutch plate is not specified. It **MUST** be specified.

21.7 Grain tank cover is not provided. It **MUST** be provided as per the requirement of IS: 15806-2018.

21.8 The labelling of controls gauges and all operating controls does not conform, in toto, to the requirement of the IS: 15806-218. It **MUST** be looked into for take corrective action.

21.9 Hardness and chemical composition

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

21.10 Individual brake pedals for LHS & RHS brake is not provided. It may be considered for providing.

21.11 Safety against the accidental start of engine is not provided on combine harvester. It should be provided.

21.12 Material for bushes for flail blade is not specified. It should be specified as per the requirement of IS: 15806-2018.

21.13 There is no drive safety for grain unloading auger. It should be provided.

21.14 The discard limit of clearance between engine Inlet & Exhaust valve and valve guide is not specified. It **MUST** be specified.

21.15 Spring stiffness of inlet and exhaust valve discard limit is not specified. It **MUST** be specified.

21.16 Height of reflector from does not meet the requirement of CMVR. It **MUST** be looked into.

21.17 Height of Slow moving vehicle emblem does not meet the requirement of CMVR. It **MUST** be looked into.

21.18 **Literature supplied with the machine**

The following literature was submitted by applicant during testing.

i) Operator's manual for combine harvester
ii) Operator's manual for engine
iii)Part's catalogue for combine harvester

The following literature should be provided.

i) Operator's manual for SMS
ii) Service manual of SMS
iii) Part's catalogue for SMS

However, the same need to be updated as per IS:-8132-1999

TESTING AUTHORITY

SANJAY KUMAR AGRICULTURAL ENGINEER	
P. K. PANDEY **DIRECTOR**	

Draft test report compiled by: Abhishek Verma, B.Tech. (Ag. Engg.)

22. APPLICANT'S COMMENTS

We will take corrective action in future production