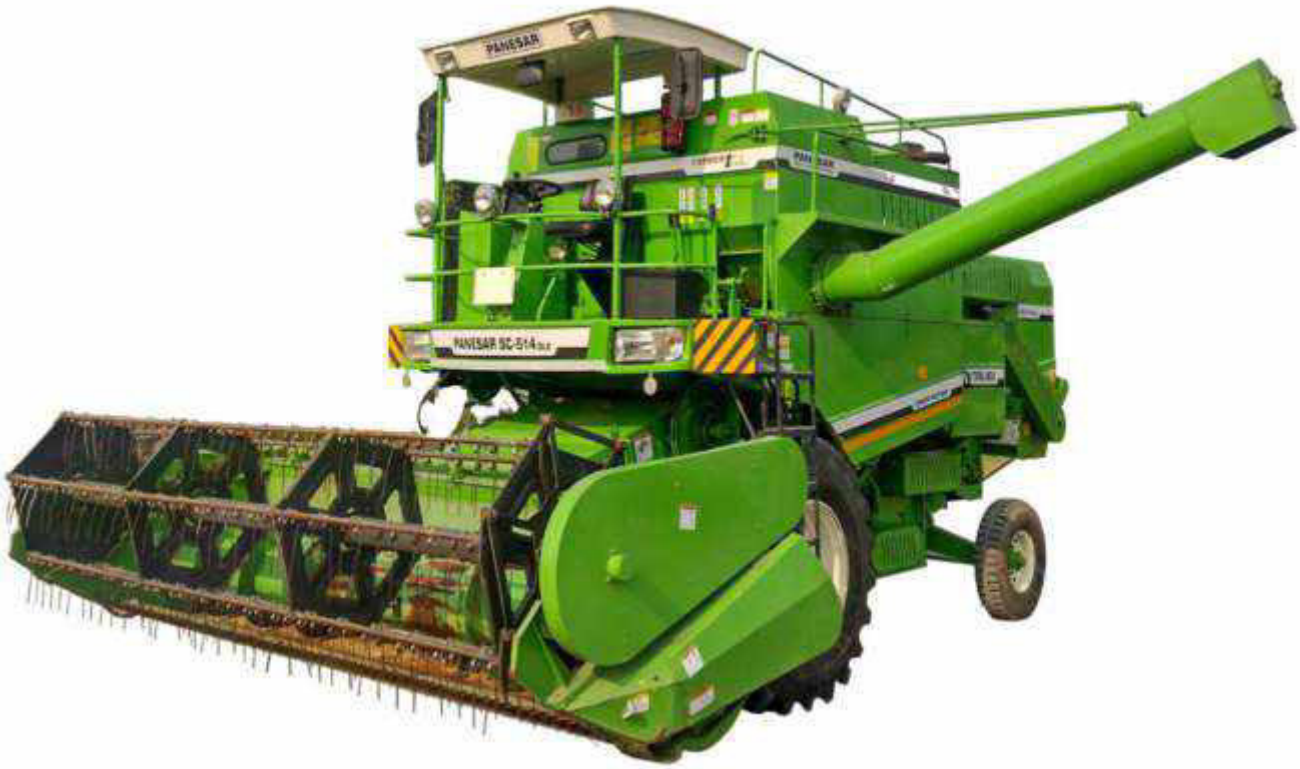
व्यावसायिक परीक्षण रिपोर्ट | संख्या/ No.: COMB- 250/2778/2022

COMMERCIAL TEST REPORT | माह/Month : January, 2022

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



PANESAR, SC 514 DLX, SELF PROPELLED COMBINE HARVESTER

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 32.89 and 28.55 (Excluding run-in) 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 given below:-

Crop Parameters

Sl. No.	Parameters		Observations	
			Wheat	Paddy
1.	Plant height, cm	:	88 to 104	114 to 126
2.	Number of tillers/m^2	:	256 to 340	214 to 272
3.	Length of ear head, cm	:	8 to 11	20 to 25
4.	Straw/grain ratio	:	1.0 to 1.4	1.4 to 1.6
5.	Moisture, %			
	- Grain	:	10.0 to 11.5	14.33 to 14.83
	- Straw	:	10.5 to 13.2	65.2 to 69.2

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-3226	2.5	0.8	2.6	99.2 *	97.1	1.90	2.04 to 2.16	0.535 to 0.669	6.90 to 8.46	10.49 to 12.91	2613 to 3048	5.40 to 7.14
PADDY												
Pioneer-28P67	1.9	0.4	2.1	99.2	96.5	1.13	2.02 to 2.18	0.517 to 0.060	10.09 to 12.14	17.52 to 23.47	4174 to 5776	10.76 to 15.00

16. DEFECTS, ADJUSTMENTS, BREAKDOWNS AND REPAIRS

Sl. No	Defects/ adjustments/ Breakdown/ Repair	Category of breakdown/ Defects As per IS:15806-2018	Progressive hours
1	Leakage of oil from steering cylinder oil gear was observed, due to bending of O ring, it was rectified by dismantling and refitting.	Min-18	36.78

18. SUMMARY OF OBSERVATIONS

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)	2.04 to 2.16	2.02 to 2.18
2.	Range of average area covered (ha/h)	0.504 to 0.669	0.517 to 0.600
3.	Average fuel consumption: (l/h) (l/ha)	 6.90 to 8.46 10.49 to 12.91	 10.09 to 12.14 17.52 to 23.47
4.	Range of average crop throughput (tonne/h)	5.40 to 7.14	10.76 to 15.00
5.	Grain breakage in main grain outlet (%)	1.07 to 1.90	0.47 to 1.13
6.	Header losses (%)	0.43 to 0.70	0.21 to 0.35
7.	Total non-collectable losses (%)	0.5 to 0.8	0.3 to 0.4
8.	Total collectable losses (%) (un threshed + broken from main outlet)	1.6 to 2.5	0.9 to 1.9
9.	Total processing losses (%)	1.6 to 2.6	1.0 to 2.1
10.	Threshing efficiency (%)	99.2 to 99.7	99.2 to 99.6
11.	Cleaning efficiency (%)	97.1 to 98.2	96.5 to 98.0
	Performance of straw chopper cum spreader		
12.	Uniformity of straw spread, CV (Percent)	--	15.27
13.	Weighted mean size of chopped straw, cm	--	12.52

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.	:	Conforms
(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**

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 hrs. Max. Power test in natural ambient condition, kW	Evaluative	71.7 **(D)**	±5% of declared value	73.8	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	69 **(D)**	±5% of declared value	70.3	Conforms
	c) Power at rated engine speed, kW (under natural ambient condition)	Non-evaluative	72 **(D)**	±5% of declared value	73.1	Conforms
	d) Specific fuel consumption corresponding to average maximum power under 2 h maximum power test, g/kWh.	Evaluative	240 **(D)**	+5% of declared value	245	Conforms

1		2	3	4	5	6	7
	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 CMV rules, Light absorption coefficient 3.25 m^{-1}/ Hartridge units 75 **(D)**	Nil	2.18 m^{-1}	Conforms
	f)	Max. Crank shaft torque, (Nm) observed during the test after no load engine speed is adjusted as per manufacturer's recommendation for field work	Evaluative	419 **(D)**	±8% of declared value	430.1	Conforms
	g)	Back up torque, %	Evaluative	7 % min. **(R)**	Nil	42.27	Conforms
	h)	Max. Operating temperature, °C i) Engine oil ii) Coolant	Evaluative	i) 120 **(D)** ii) 105 **(D)**	Should not exceed the declared value	i) 115 ii) 98	Conforms
	i)	Lubrication oil consumption, g/kWh	Evaluative	Not exceeding 1 % of SFC at maximum power (high ambient) **(R)** (Max. 2.45 g)	Nil	0.387	Conforms
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) **CMVR does not prescribe hot brake test.**	Evaluative	As per requirement of CMVR, Max. 10 m **(R)**	--	Cold 6.17 m	Conforms
	b)	Max. Force exerted on brake pedal to achieve declaration of 2.5 m/sec^2 (N)	Evaluative	≤ 600 N **(R)**	--	Cold 400 N	Conforms

1		2	3	4	5	6	7
	c)	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, Should be effective **(R)**	--	Effective	Conforms
III. Mechanical vibration							
	a)	Operator's platform	Non evaluative	120 µm max. **(R)**	Nil	290	**Does not conform**
	b)	Steering control wheel	Non evaluative	150 µm max. **(R)**	Nil	290	**Does not conform**
	c)	Seat with driver seated	Non evaluative	120 µm max. (R)	Nil	284	**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 is cleaner provided and 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 88 dB (A) Maximum **(R)**	Nil	86	Conforms
	b)	Max. Noise at operator's ear level dB (A)	Evaluative	As per CMV rules 98 dB (A) Maximum **(R)**	Nil	95	Conforms
VI. Header lifting Test							
	a)	Satisfactory completion of header lifting test	Evaluative	-	Nil	Satisfactorily completed	Conforms
VII. Discard limit							
	a)	Cylinder bore diameter, mm	Evaluative	104.15 **(D)**	Should not exceed the values declared by the manufacturer	104.03	Conforms
	b)	Piston diameter, mm	Evaluative	103.826 **(D)**	-do-	103.95	Conforms
	c)	Piston to cylinder liner clearance at skirt	Evaluative	0.17 **(D)**	-do-	0.08	Conforms

1		2	3	4	5	6	7
	d)	Ring end gap, mm i) Top compression ring ii) 2nd compression ring iii) Oil ring	Evaluative	i) 1.2 **(D)** ii) 1.2 **(D)** iii) 1.2 **(D)**	-do-	i) 0.40 ii) 0.40 iii) 0.40	Conforms
	e)	Ring groove clearance, mm 1. Top compression ring 2. 2nd compression ring 3. Oil ring	Evaluative	i) Tapered ii) 0.20 **(D)** ii) 0.10 **(D)**	-do-	i) Tapered ii) 0.08 ii) 0.03	Conforms
	f)	Diametrical and axial clearance of big end bearing, mm Diametrical Axial	Evaluative	0.12 **(D)** 0.60 **(D)**	-do-	0.13 0.38	Conforms
	g)	Diametrical and axial clearance of main bearings, mm Diametrical Crank shaft end float	Evaluative	0.13 **(D)** 0.40 **(D)**	-do-	0.11 0.23	Conforms
	h)	Thickness of brake lining, mm	Evaluative	Up to rivet **(D)**	-do-	8.09	Conforms
	i)	Thickness of clutch plate, mm	Evaluative	Up to rivet head **(D)**	-do-	2.30 to 2.42 mm above the rivet head	Conforms
VIII. Field performance							
	a)	Suitability for crops	Evaluative	Wheat and paddy (Wheel type) Paddy (Track type)	Nil	Wheat and paddy	Conforms
	b)	Average processing losses (%)	Evaluative Wheat Rice	Max (of Average 3% Average 4% **(R)**	Nil	Wheat (max) 2.6 % Paddy (max) 2.1 %	Conforms Conforms
	c)	Threshing efficiency	Evaluative	≥98 percent for wheat & Paddy **(R)**	Nil	99.7 % for Wheat 99.6 % for Paddy	Conforms

1		2	3	4	5	6	7
	d)	Cleaning efficiency	Evaluative	≥96 percent for wheat & Paddy **(R)**	Nil	98.2% for Wheat 98 % for Paddy	Conforms
	e)	Grain breakage in main grain tank	Evaluative	≤ 2.5 percent **(R)**	Nil	1.9 % for Wheat 1.13 % for Paddy	Conforms
	f)	Non collectable losses	Evaluative	*i)* ≤ 2.5 percent for wheat & Paddy & grain **(R)**	Nil	0.8 % For Wheat 0.4 % For Paddy	Conforms
IX. Field Performance for straw Management System (if fitted)							
	a)	Uniformity of straw spread	Evaluative	20% Max. **(R)**	--	15.27	Conforms
	b)	Weighted mean size of chopped straw, cm	Evaluative	20% Max. **(R)**	--	12.52	Conforms
X. 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 **(R)**	-	Provided	Conforms
	d)	Spark arrester in engine's exhaust in case naturally aspirated engine	Evaluative	Essential **(R)**	-	Provided	Conforms
	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

1		2	3	4	5	6	7
	h)	Slip clutch at following drives –					
		i) Cutting platform auger	Evaluative	Essential **(R)**		Provided	Conforms
		ii) Undershot conveyor drive	Non evaluative	Optional	-	Provided	Conforms
		iii) Grain & tailing elevator	Non evaluative	Optional		**Not provided**	**Does not conform**
	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 **(R)**	-	Provided	Conforms
X	**Material of construction** :						
	i)	Knife guard should conforms to IS: 6024 - 1983	Non evaluative	Should have maximum hardness 163 HB **(R)**	-	203 (Average)	Conforms
	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% **(R)**	-	C=0.6972 Mn= 0.5545	**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 % **(R)**	--	C=0.0842	**Does not conform**

19.2 Acceptance Criteria in case of Breakdown/Defects as per clause 4.2 of IS:15806-2018

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	1 (Min-18)	Yes
4.	Total breakdown	Evaluative	In no case total no of (major + minor) breakdowns exceed five	None	Yes

20. CRITICAL TECHNICAL SPECIFICATIONS
(Vide Ministry's communication F. No 9-1/2019 M&T (I&P) dated 20.08.2019)

Sl No.	Parameters	Specification	Observation	Remarks
Rotor				
1.	Rotor diameter, mm	165-170	170	Conforms
2.	No. of lugs on rotor in row	6	6	Conforms
3.	No. of rows in periphery	4	4	Conforms
4.	Length of pivotal flail, mm	170-180	177	Conforms
5.	Width of flail, mm	50 ± 1	50	Conforms
6.	Thickness of flail, mm	5.0 (Min.)	6.0	Conforms
7.	No of flails in one set	2	2	Conforms
8.	Spacing between flails of one set, mm	35 (Max)	38.4	Conforms
9.	Distance between adjacent flails units, mm	200±10	203	Conforms
10.	No of rows/bars of serrated blades	1	1	Conforms
11.	No of serrated blades in row	20 (Min.)	24	Conforms
12.	Spacing between serrated blades, mm	50 (Max.)	50	Conforms
13.	Overlapping of pivotal blade on serrated blade, mm	60 (Min.)	106 (Adjustable)	Conforms
Spreader				
14.	Total no of flaps	6 + 2 (side)	6+2	Conforms
15.	Length of flaps, cm	38 (Min.)	41	Conforms
16.	Distance between flaps (left to right)	Adjustable	Adjustable	Conforms
17.	Spreader angle with horizontal, degree	Adjustable preferably downwards	Adjustable	Conforms

18.	Spreader angle with line of travel, degree	15 (Min.) (adjustable)	22° (Max.) (Adjustable)	Conforms
19.	Spreader sheet thickness, mm	2.5-3.0	3.0	Conforms
20.	SMS sheet thickness, mm	5.0 (Min.) for outer	6.0	Conforms
21.	Rotor balancing	Should be dynamically balanced	Balanced	Conforms
22.	Rotor rpm	Min. 1600	2100	Conforms
23.	Fitting of SMS on combine harvester	Rigidly fixed to the combine chassis	Rigidly fixed	Conforms
24.	Fitting of power transmission system on combine harvester	Rigidly fixed to the combine chassis	Rigidly fixed	Conforms
25.	Marking/labelling of machine	Labelling plate should be riveted on the body of machine having Name and address of manufacturer, Country of origin Make Model Year of manufacturer, Serial number, Type Size required size of prime mover (kW), Weight of the machine (Kgs)	Year of Manufacturer, Type, Size, Required size of prime mover (kW), weights of the machine (kgs) are not provided.	Conforms
26.	Literature	Operator manual, Service manual and Parts catalogue should be provided	Provided	Conforms

21. COMMENTS AND RECOMMENDATIONS

21.1 Mechanical vibration

The amplitude of mechanical vibration of components marked as (*) in chapter 12 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

Leakage of oil from steering cylinder oil seal due to bending of O ring was observed during field test. It should be looked into for suitable quality improvement.

21.3 Ease of operation and safety provision

i) Safety against the accidental start of engine is not provided on combine harvester. It **MUST** be provided.

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

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

21.4 **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.

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

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

21.7 There are discrepancies in the maintenance schedule chart provided in operator's manual. It should be checked and corrected.

21.8 The height of first step of ladder is observed as 590 mm against the requirement of 550 mm. It should be locked into for corrective action for operator's comfort.

21.9 **Literature supplied with the machine**

The following literature was submitted by applicant during testing.

i) Operator's and manual for combine harvester
ii) Parts catalogue for combine harvester
iii) HAEETI, Service manual, Ashok leyland
vi) Operator's and manual for SMS
v) Parts catalogue for SMS

However, the same needs to be updated as per IS:-8132-1999 by including the information related to SMS

TESTING AUTHORITY

Er. G.R. AMBALKAR AGRICULTURAL ENGINEER	Ambalkar
Dr. MUKESH JAIN **DIRECTOR**	21.01.2022

22. APPLICANT'S COMMENTS

	Our Reference	Applicant's Comments
22.1	21.1	We will take necessary action to reduce the vibration.
22.2	21.2	We will improve the quality.
22.3	21.4	We will take up the matter for our vender for further improvement.
22.4	21.7	The operator manual will be revised
22.5	21.8	Height of first step of ladder will be reduced in regular production.